amateur radio

JANUARY, 1973

Registered at G.P.O. Melbourne for transmission by post as a periodical — Category "B"

Price 40 Cents

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

Latest on Oscar 6

L.P. Filter

G5RV

Modern Filters

amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA. FOUNDED 1910

JANUARY, 1973
Vol. 41, No. 1

Published monthly, as the official journal, by the Wireless Institute of Australia. Reg. Office: Above 474 Toorak Rd., Toorak, Vic., 3142.

Enquiries and material to:
The Editor, Phone (03) 24-8652.
P.O. Box 150, Toorak, Vic., 3142.

Copy is required by the third of each month. Acknowledgment may not be made unless specially requested. All important items should be sent by certified mail.

The Editor reserves the right to edit all material, including Letters to the Editor and Hamads, and reserves the right to refuse acceptance of any material, without specifying any reason.

Advertising:
Advertisement material should be sent direct to the Editor by the 25th of the month preceding the month prior to publication.

Hamads should be addressed to the Editor by the third of each month.

Printers:
"RICHMOND CHRONICLE"
Shakespeare Street, Richmond, Vic., 3121
Phone 42-2419.

CONTENTS

COVER

A dramatic photograph of the blast-off of the THOR-DELTA rocket which put Oscar 6 into orbit. Up-to-date information on Oscar 6 is included elsewhere in this issue.

QSP

RTTY, QRM AND YOU

Felt like QRMing one of those obnoxious r.t.t.y. signals lately? You haven't? Perhaps you don't go on the h.f. bands much these days. From Alf Chandler's Intruder Watch Report ("A.R.") it's obvious that r.t.t.y. constitutes the major part of the intruder QRM on the 14 MHz. band, and is far from negligible on the other h.f. bands. Some of these signals are particularly offensive as they occupy more bandwidth in the c.w. section of 20 metres than does the occasional s.s.b. non-gentlemen. Genuine amateur r.t.t.y. operators are pained but not too surprised when, in the middle of a choice DX contact an amateur c.w. operator opens up calling CQ on their space frequency.

Amateur r.t.t.y'ers are used to being blamed for QRM. Indeed, in the early days it was the Amateurs themselves and not the Australian Post Office who were instrumental in restricting amateur r.t.t.y. operation.

Fortunately as the true facts have become known, the official attitude and that of many Amateurs has undergone a radical change. R.t.t.y. has now become almost a respectable mode of operation and there are good reasons for this.

Firstly, amateur r.t.t.y. is extremely economical in its use of bandwidth. On the h.f. bands, the maximum permissable shift is 850 Hz., but nobody uses anything but narrow shift (170 Hz.) on the h.f. bands these days.

Secondly, on the basis of speed and accuracy, r.t.t.y. is probably the most efficient form of communication available and this is amply borne out by the ever increasing use of r.t.t.y. by commercial stations.

Thirdly, r.t.t.y. is one amateur field still dominated by the home-brewer. Sophisticated solid-state designs appear at frequent intervals in amateur journals and very few r.t.t.y. types have descended to using commercial demodulating equipment.

Fourthly, contrary to what might be expected, it isn't necessary to embezzle the firm's funds to get going in r.t.t.y. Some enthusiasts have paid up to $1,200 for a machine, but most amateurs use a Creed Model 7 or a Teletype Corp. Model 15 for which they pay around $50. And these will even double as electric typewriters around the home. The vast majority of r.t.t.y. circuitry uses conventional components, and my junk box supplies most of my needs.

Finally, amateur r.t.t.y. is progressive. Amateurs like Vic Poor, K6NO, and Iw Hoff, W6FFC, and, nearer home, Eric Ferguson, VK3KF, as well as many others, have continued to make contributions to the state of the art which are of commercial as well as amateur interest. Unattended operation is possible. Faster speeds (100 w.p.m.) are around the corner. Oscar 6 uses r.t.t.y. telemetry. Very slow speeds (down to 1 w.p.m or less) can, by data averaging, be used to achieve fantastic performances in the retrieval of signal from noise.

So, when you next feel the urge to QRM that r.t.t.y. signal, listen first and make sure it isn't one with the 170 Hz. warble which is a characteristic of amateur r.t.t.y. This one isn't doing you any harm. But get aboard and clobber the r.t.t.y. intruders in the amateur bands as much as you like. C.w. is okay for this but only if everybody lumbers the chap simultaneously. The catch is that r.t.t.y. electronics have been devised to defeat c.w. QRM. So why not join us and do a proper job on them by fighting r.t.t.y. with r.t.t.y.? It is very noticeable that during world-wide contests, intruders disappear from the r.t.t.y. section of our bands. There must be some sort of a moral to this, if I could only think what it was . . .

JIM GODING, VK3DM,
Member of W.I.A. Executive.

U.S.A. TELEPHONY EXTENSIONS

F.C.C. Docket 19162 squashed any fears that U.S.A. telephony stations could operate from 14150 kHz. instead of the present 14200 kHz. In the F.C.C. Report and Order on this, it was stated "certainly we would be short-sighted if we totally disregarded opinions such as that of the I.A.R.U., Region 1 Division, which pointed out (inter alia) 'The downward shift to 14150 kHz. will cause severe interference to operation in Region 1'. U.S. high power and large number of stations would render it impossible for foreign stations to operate above 14150 kHz. when U.S.A. stations are heard; would also upset I.A.R.U. Region 1 long established band plans."

R.T.T.Y.

"Considerable investment is being made in a Teleprinter Handbook as it is thought that there is a good market for a publication on this subject." R.S.G.B. Report of Council to members for 1972.

O.I.C's

"Anyone for a sked on 500 Terahertz?" asks Jim Fisk, the Editor of "Ham Radio" (Sept.) in connection with the development of optical integrated circuits which are closely related to laser communications.

OVERSEAS SURFACE MAILS

Mails from overseas by surface mail take some time to reach destination. Parcels posted from A.R.R.L. on 31st August reached the W.I.A. office on 17th November. Parcels from West Germany postmarked 21st September arrived on 16th November. A similar situation affects magazines sent by sea mail.

U.S.A.—AMATEUR STATIONS USED FOR NON-AMATEURS

Another interesting F.C.C. Report and Order (19245) quotes "The Commission believes that the best solution lies between the extremes of prohibiting entirely third party communication and permitting unlimited third party operations. To prohibit entirely third party traffic would tend to stifle one of the basic purposes of the Amateur Radio Service which is to provide a voluntary non-commercial radio service. But to allow all third party communications would tend to cause increased congestion in the Amateur bands . . . We are adding a new section, 97.114, which will both prohibit commercial third party traffic . . . it will not prohibit the use of the Amateur Radio Service on behalf of organisations such as the Eye Bank and the American Red Cross" (except for traffic on regular business affairs).

COSTS OF NATIONAL AMATEUR JOURNALS

The R.S.G.B. Accounts (Nov. "Radio Comm.") for the year ending 30/6/72 show the cost, including staff remuneration **and after deducting advertising revenue** of their journal "Radio Communication" as £33,245 (this is equivalent to about $69,000). Like "Amateur Radio", their journal is distributed free to members each month. The U.K. membership figures quoted by the I.A.R.U. for 1972 show 17,800 members (9,200 licensed) paying $US10.00 membership fee. On the same basis, "Amateur Radio" for the year 1972 was budgetted as costing the W.I.A. $13,225 (1972 Fed. Convention Minutes).

PHILATELY

CW enthusiasts will be pleased to note the design of the new 60c Pioneer Communications stamp.

U.S.A. REPEATERS

Yet another F.C.C. Docket 18803 (on v.h.f. repeaters) revised the definitions applicable to the Amateur Radio Service. "**Terrestrial location**" was defined as "Any point within the major portion of the Earth's atmosphere, including aeronautical, land and maritime locations." "**Fixed operation**" states "Radio communication conducted from the specific geographical land location shown on the station licence". "**Effective radiated power**"—"The product of the radio frequency power, expressed in watts, delivered to an antenna, and the relative gain of the antenna over that of a half-wave dipole antenna."

TX ON A CHIP

Announced in the U.S.A. through "CQ" (Sept.) and other mags. is the LP2000 IC which is capable of producing 100 mW. of r.f. power to an antenna and is less than 4/10ths inch diameter by 2/10ths inch high. Add a crystal, microphone and power supplies and you are in business.

OPTO - ELECTRONICS

Is the title of a short article in "S.W. Mag." for Sept. 1972. This covers Nixie tubes but goes on to describe LEDS of three varieties of gallium salts and liquid crystals, both of which operate from low voltages.

WEAK VOICES ON TAPE

Weak voices of unknown origin appearing as recordings on magnetic tape is now the subject of a book by G6RS, 32 Badminton Rd., Maidenhead, Berks, SL64QT, U.K. Anyone interested? ("Short Wave Mag.," Sept. 1972)

BUILDING MODERN FILTERS

PART THREE

By "CABBAGE-TREE NED"*

● The ripple filters exemplify the practical rewards of "modern" filter design.

A flat-filter (Butterworth) to give 30 dB. attenuation at 15 kHz. from a cut-off frequency of 10 kHz. would require nine elements. An equal-ripple (Chebyshef) low-pass would require only six elements—that means two less coils to wind. Moreover, the usable bandwidth is wider.

The complete-ripple (elliptic) filter can display the same virtues as to attenuation, **and**, by means of the in-built "rejection notch" just outside the pass-band, enables suppression of a necessary command signal from the wanted intelligence. The Zone envisages trying such a filter in a modification of its f.m. facilities.

USE OF THE TABLES

Certain quantities appear which need some comment, granted that our main concern is with **amount** of attenuation in the stop-band and sharpness beyond the chosen cut-off frequency.

Using standard symbols, the diagrams will explain the meaning of A_P, A_S, f_{co}, f_S, f_1 and f_2. Nevertheless, in words, the symbols mean:

A_P = Maximum attenuation in pass-band = ripple magnitude.

A_S = Minimum (required) attenuation in stop-band.

f_S = Frequency where minimum stop-band attenuation is first reached.

f_1 = First attenuation peak.

f_2 = Second attenuation peak with five-section filter.

The diagrams, note, have mostly been drawn with attenuation dB. up the axis, and the pass-band therefore is represented with a low value of attenuation. Hence the diagrams may appear upside down compared with the other (possibly more familiar) representation.

Reflection co-efficient (r%) and v.s.w.r. are shown because of their well known importance in r.f. circuits. It can be shown that r is related to ripple magnitude, increasing therewith, but at the same time allows greater choice of skirt-steepness.

Further, if we accept that at audio frequencies we can often tolerate reflection losses more easily, we have some flexibility in locating the peaks of attenuation in the stop-band.

The practical need is to place "rejection notches" where we want them. Since the basic design process is beyond our present scope, the Tables are compiled so that we can, as hinted in the last paragraph, sacrifice a desired value of pass-band ripple (hence of v.s.w.r.) in order to gain a degree of choice for the notch frequency. Thus, if we must place the notch on a given frequency, we can search the Tables for a notch frequency to suit and accept the then-available skirt-steepness or v.s.w.r.

GENERAL COMMENTS

A later article deals with the winding of inductances for these filters using pie-gapped Philips P-Cores of one (the most useful) size. The cores are self-shielding and hence ease one part of the constructor's problem.

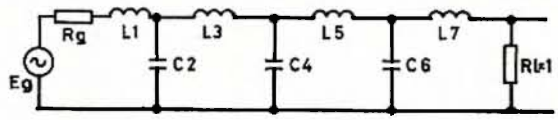
The Tables given can be used for either of the two ladder structures, T or Pi. However, some care is needed then in reading the column headings, and it is suggested that the data given be used only as indicated in connection with each Table.

Further, it is true that a given filter-prototype can be turned end-for-end if for instance it is needed that the source end be of high impedance and the output end be of low impedance. Again some care is needed.

It was felt that a useful, if slightly limited, tabulation would be more to the point than the complex of information which would have resulted with the more comprehensive possibilities suggested in the last two paragraphs.

Nevertheless, for the power-matched Tables 2 and 3, it is valid to use the pi-type schematic if desired, since for a 5th order elliptic filter (say) there would be only two coils to wind instead of five. Further, some workers have remarked that power-matched filters are easier to align, although they do involve some loss which is not present in voltage-source filters.

The figures in column 3 of the Tables may be deceptive because cut-off frequency is taken as that where the skirt falls past the ripple-dB. level, not the more familiar 3 dB. level. Thus for 0.1 dB. ripple and 70 dB. attenuation (Table 3), it apparently takes 1½ octaves beyond cut-off to reach —70 dB. In fact, a flat filter of the same (5th) order would have reached only about —30 dB. at the same frequency.



Rip. Depth A_P Reflect. r% v.s.w.r.	Order N	Ratio f_S/f_R	L1	C2	L3	C4	L5	C6	L7	Requir. dB. Atten. A_S
A_P = 0.01 dB.	3	3.3	0.239	0.228	0.094					18
r = 5%	5	2.2	0.246	0.286	0.261	0.197	0.078			30
v.s.w.r. = 1.1	7	1.9	0.248	0.297	0.297	0.281	0.249	0.256	0.456	45
A_P = 0.1 dB.	3	2.3	0.241	0.239	0.114					18
r = 15%	5	1.8	0.248	0.287	0.281	0.225	0.103			30
v.s.w.r. = 1.35	7	1.7	0.250	0.295	0.306	0.290	0.276	0.219	0.101	45
A_P = 0.5 dB.	3	1.8	0.250	0.242	0.148					18
r = 33%	5	1.6	0.259	0.277	0.306	0.241	0.144			30
v.s.w.r. = 2.0	7	1.5	0.262	0.283	0.324	0.284	0.306	0.240	0.142	45

EQUAL-RIPPLE LOW-PASS FILTERS
TABLE 1.—VOLTAGE SOURCE
(Units: L Henrys, C Farads)

Acknowledgment must be made to the publishers, John Wiley & Sons, for their ready permission to use small portions of Zverev's Handbook of Filter Synthesis in deriving the values of Tables 3 and 4 particularly. Much of the information as to flat (Butterworth) and equal-ripple filters is fairly easily obtained with quite ordinary use of Kirchhoff's Laws and standard mathematical equations. The process basically is to equate the L and C co-efficients in a Kirchhoff equation to corresponding numerical co-efficients in what are called Standard Butterworth and Chebyshef Polynomials.

The polynomial (flat Butterworth, or Chebyshef equal-ripple) filters are in general physically simpler since they consist only of inductors in the series arm and capacitors only in the shunt arm. The elliptic filters do provide steeper skirt-slopes, and useful rejection notches in the stop-band, at the price of slightly more complexity.

For the curious, useful added information can be found in any of the references in the short bibliography.

SAMPLE DESIGN No. 1

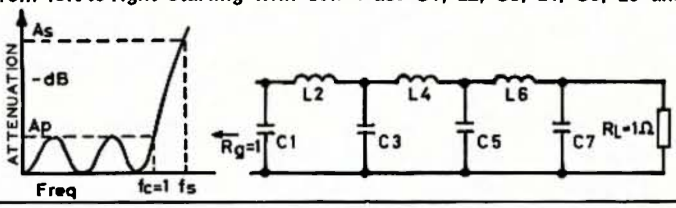
An equal-ripple low-pass audio filter is needed to have cut-off at 3.5 kHz. as a "steeper-skirt" replacement for the flat filter of the last paper. It is required to produce at least 30 dB. of

* VK3ZRQ, A. G. Birch, 5 Harrison Street, Bendigo, Vic., 3550.

Rip. Depth A_P Reflect. r% v.s.w.r.	Order N	Ratio f_s/f_x	L1	C2	L3	C4	L5	C6	L7	Requir. dB. Atten. A_s
A_P = 0.01 dB.	3	3.3	0.238	0.240	0.238					18
r = 5%	5	2.2	0.156	0.268	0.346	0.268	0.156			30
v.s.w.r. = 1.1	7	1.9	0.145	0.254	0.320	0.298	0.320	0.254	0.145	45
A_P = 0.1 dB.	3	2.3	0.228	0.254	0.228					18
r = 15%	5	1.8	0.207	0.247	0.357	0.247	0.207			30
v.s.w.r. = 1.35	7	1.7	0.201	0.242	0.356	0.267	0.356	0.242	0.201	45
A_P = 0.5 dB.	3	1.8	0.297	0.204	0.297					18
r = 33%	5	1.6	0.287	0.208	0.429	0.208	0.287			30
v.s.w.r. = 2.0	7	1.5	0.284	0.206	0.432	0.220	0.432	0.206	0.284	45

Alternative Ladders for Table 2 only

1. The T-input scheme above Table 1, with column headings as given.
2. The Pi-type scheme here given, but now read the column headings from left-to-right starting with col. 4 as: C1, L2, C3, L4, C5, L6 and C7.



EQUAL-RIPPLE LOW-PASS FILTERS
TABLE 2.—POWER-MATCHED
(Units: L Henrys, C Farads)

attenuation at the frequency 5.5 kHz. The filter is to be driven from a voltage-source and work into a 600 ohm load.

Solution: Choose the filter with normalised values given in line 8 of Table 1, since with an f_s/f_{co} ratio of 1.6, the required 30 dB. will be achieved by the frequency 3,500 × 1.6 = 5.6 kHz., which would still be acceptable.

The element values are calculated as shown:

$$L1 = \frac{0.259 \times 600}{3500} = 0.0443 \text{ Henry} = 44.3 \text{ mH.}$$

$$L3 = \frac{0.306 \times 600}{3500} = 52.4 \text{ mH.}$$

$$L5 = \frac{0.144 \times 600}{3500} = 24.7 \text{ mH.}$$

$$C2 = \frac{0.277}{3500 \times 600} = \frac{0.277}{2.1 \times 10^6} = 0.132\ \mu\text{F.}$$

$$C4 = \frac{0.241}{2.1 \times 10^6} = 0.151\ \mu\text{F.}$$

SAMPLE DESIGN No. 2

To improve the tonal quality of the audio passed by the flat filter of the 2nd Paper or the equal-ripple equivalent just presented, we want a filter to cut-off at 6 kHz. and produce at least 40 dB. of attenuation before the frequency rises above 10 kHz. The filter is to work between 600-ohm terminations. It is also needed that the filter should reject two command-signals on frequencies which can be set within fairly flexible limits somewhere beyond cut-off in the stop-band.

Solution: The requirements suggest we choose the 5th order elliptic filter which will have the required two infinite-rejection notches built-in to the stop-band, and provide power matching.

For the relatively small value of A_s = 40 dB., we can choose normalised element values in Table 3 from any one of lines 4, 8, 12 or 15.

Line 4 would almost satisfy both frequency and attenuation requirements with only A_P = 0.01 dB. ripple. However, we choose to have a margin, and settle for A_P = 0.1 dB. and find the frequency need easily satisfied, while still having v.s.w.r. = 1.35 only.

The element values thus become:

$$L1 = \frac{0.16 \times 600}{6000} = 0.016 \text{ Henry} = 16 \text{ mH.}$$

$$L2 = \frac{0.0275}{10} = 0.00275 \text{ Henry} = 2.75 \text{ mH.}$$

$$L3 = \frac{0.252}{10} = 25.2 \text{ mH.}$$

$$L4 = \frac{0.085}{10} = 8.5 \text{ mH.}$$

$$L5 = \frac{0.121}{10} = 12.1 \text{ mH.}$$

$$C2 = \frac{0.189}{6000 \times 600} = \frac{0.189}{3.6 \times 10^6} = 0.0525\ \mu\text{F.}$$

(0.047 in parallel with 0.0047 μF.)

$$C4 = \frac{0.138}{3.6 \times 10^6} = 0.0384\ \mu\text{F.}$$

(say 0.039 μF.)

(This could have been a voltage-source design in fact, but our Tables are necessarily of limited scope, and power matched filters do have their virtues.)

SAMPLE DESIGN No. 3

An r.f. filter is required for harmonic suppression at the output of a typical h.f. s.s.b. transmitter operating below 30 MHz., and into a 50-ohm impedance. The filter must produce between 40 and 50 dB. of attenuation before the frequency 50 MHz. is reached.

Solution: Since there is no requirement for rejection notches, we could use an equal-ripple filter from Table 2. However, Table 3 gives more flexibility, and choosing to tolerate 15% reflection (a v.s.w.r. of 1.35), we could obtain our 50 dB. from line 7 of the Table and find the element values as listed below:

$$L1 = \frac{0.168 \times 50}{30 \times 10^6} = \frac{0.168}{0.6 \times 10^6} = 0.28\ \mu\text{H.}$$

(9 turns, 1½" long, ½" diam.)

$$L2 = \frac{0.0172}{0.6 \times 10^6} = 0.0287\ \mu\text{H.}$$

(2 turns, ½" long, ½" diam.)

$$L3 = \frac{0.273}{0.6 \times 10^6} = 0.455\ \mu\text{H.}$$

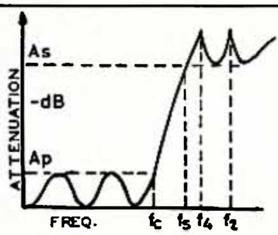
(12 turns, 1¼" long, ½" diam.)

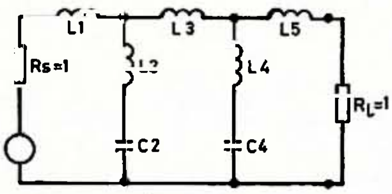
$$L4 = \frac{0.049}{0.6 \times 10^6} = 0.082\ \mu\text{H.}$$

(4 turns, 1" long, ½" diam.)

$$L5 = \frac{0.143}{0.6 \times 10^6} = 0.24\ \mu\text{H.}$$

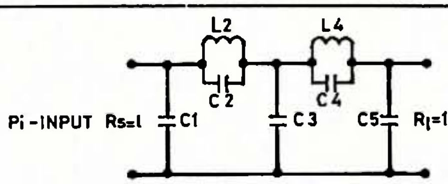
(8 turns, 1¼" long, ½" diam.)





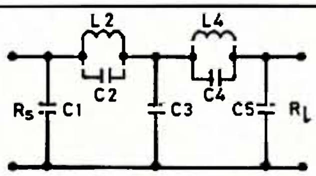
T-INPUT

Rip. Depth A_P Reflect. r% v.s.w.r.	A_S Desired Min., Atten. Required at f_S	L1	L2	C2	L3	L4	C4	L5	$\frac{f_S}{f_0}$	Notches $\frac{f_4}{f_c}$	$\frac{f_2}{f_c}$
$A_P = 0.01$ dB.	70	0.118	0.005	0.203	0.242	0.013	0.191	0.111	3.07	3.22	5.13
r = 5%	60	0.117	0.008	0.200	0.236	0.021	0.181	0.104	2.56	2.68	4.24
v.s.w.r. = 1.1	50	0.113	0.011	0.196	0.230	0.032	0.168	0.096	2.06	2.16	3.36
	40	0.108	0.018	0.189	0.219	0.055	0.147	0.081	1.70	1.77	2.71
$A_P = 0.1$ dB.	70	0.176	0.007	0.212	0.297	0.018	0.197	0.166	2.56	2.68	4.24
r = 15%	60	0.173	0.011	0.206	0.287	0.030	0.184	0.157	2.06	2.16	3.36
v.s.w.r. = 1.35	50	0.168	0.017	0.200	0.273	0.049	0.166	0.143	1.70	1.77	2.71
	40	0.160	0.028	0.189	0.252	0.085	0.138	0.121	1.41	1.46	2.17
$A_P = 0.18$ dB.	70	0.201	0.008	0.205	0.318	0.022	0.191	0.188	2.37	2.48	3.90
r = 20%	60	0.197	0.013	0.202	0.306	0.035	0.178	0.178	1.94	2.02	3.14
v.s.w.r. = 1.5	50	0.192	0.020	0.195	0.290	0.055	0.160	0.163	1.62	1.69	2.57
	40	0.182	0.032	0.184	0.266	0.095	0.133	0.139	1.37	1.41	2.07
$A_P = 0.28$ dB.	60	0.220	0.014	0.195	0.326	0.038	0.172	0.200	1.89	1.97	3.04
r = 25%	50	0.213	0.023	0.187	0.303	0.065	0.152	0.181	1.56	1.62	2.43
v.s.w.r. = 1.67	40	0.203	0.036	0.176	0.278	0.108	0.123	0.156	1.32	1.37	1.99
	30	0.187	0.059	0.159	0.244	0.196	0.091	0.121	1.17	1.20	1.65
For Pi-Input, read →		C1	C2	L2	C3	C4	L4	C5			



ELLIPTIC FILTERS
(Chebyshef-Cauer Filters)
TABLE 3.—POWER-MATCHED
5th Order (N = 5)
(Normalised to 1 Hz. at frequency where the skirt has dropped to the A_P value)
(Units: L Henrys, C Farads)

PI-INPUT
Valid for voltage source if ratio R_{load} to R_{source} is high, say 20 to 1.



Rip. Depth A_P Reflect. r% v.s.w.r.	Desired dB. Atten. at f_S	$\frac{f_S}{f_c}$	$\frac{f_4}{f_c}$	$\frac{f_2}{f_c}$	C1	C2	L2	C3	C4	L4	C5
$A_P = 0.1$ dB.	60	2.06	2.16	3.36	0.080	0.012	0.182	0.222	0.025	0.216	0.201
r = 15%	50	1.70	1.77	2.71	0.074	0.020	0.172	0.210	0.046	0.196	0.192
v.s.w.r. = 1.35	40	1.41	1.46	2.17	0.062	0.034	0.158	0.190	0.072	0.165	0.176
	30	1.22	1.25	1.77	0.046	0.059	0.136	0.163	0.130	0.124	0.157

ELLIPTIC FILTERS
TABLE 4.—VOLTAGE SOURCE
5th Order (N = 5)
(Normalised to 1 Hz. and 1 ohm load at frequency where the skirt has reached the A_P value of attenuation = 0.33 dB.)
(Units: L Henrys, C Farads)

$$C2 = \frac{0.200}{50 \times 30 \times 10^6}$$
$$= \frac{0.2}{15 \times 10^2}$$
$$= 0.000133\ \mu F.$$
$$= 133\ pF.$$

$$C4 = \frac{0.166}{15 \times 10^2}\ \mu F.$$
$$= 117\ pF.$$

$$\text{Frequency } f_S = 30 \times 1.7$$
$$= 51\ MHz.$$
is acceptable.

This filter could be wound as air-cored coils of a few turns, but would need careful shielding. ●

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FOOTNOTE

The writer would be interested to hear from any reader who makes use of the material in this series of articles.

TECHNICAL REVIEW

By "A.R." Technical Assistants

"LEARNING THE MORSE CODE"

"During the past decade increasing difficulty has been experienced in obtaining adequate Morse training practice by those who, for reasons of their employment, or hobby, are obliged to hold Morse code qualifications. This situation has arisen largely because, in the general communication field, telegraphy gradually has been phased out in favour of telephony, since the latter is a faster and more convenient means of communication. As a direct result, those organisations which have been providing Morse training facilities found it unprofitable to continue because of the increasingly reduced demand for their services. Today, such services virtually have ceased to exist.

"However, a widespread requirement for Morse training facilities still exists —if not in the commercial communication field—then in other areas where the need for a code system still applies. In the aviation and marine fields, certain catagories of pilots and ship's officers, because of their navigation responsibilities, are required to hold Morse qualifications in order to recognise the code symbols transmitted by ground-installed navigation aids. Again, in the hobby field, Amateur Radio operators must pass a Morse test and even Boy Scouts and Girl Guides have Morse included in their training schedules."

The above two paragraphs are the introductory notes on the folder of "Learning The Morse Code" produced by Flight Training Centre (Aust.) Pty. Ltd. This course consists of one 7" LP and two 12" LP records which are played on a normal record player at a speed of 33 r.p.m. to start with and later, as copying speed is increased, at 45 r.p.m. As would be expected, the tone is different on the two playing speeds, but is equally pleasant on both.

Mr. Ivan R. Hodder introduces the course on the records and uses the voice method of learning the code symbols. For instance, the letter "P" is sung (virtually) as "D'DAH DAH DIT". He does not use the audio oscillator until the symbols are known fairly well, and some practice has been obtained at putting these sung symbols down on paper. Once this has been achieved, he then changes over to the audio oscillator and this is used for the rest of the course. The two reviewers are equally divided on their opinion regarding the use of the voice method as the starting method of learning. It may help or hinder the ultimate speed of learning. The quality of the audio is quite good with little if any background noise to distract the student. Mr. Hodder speaks clearly and precisely so no misunderstanding of his meanings should occur. It would be desirable to have a record player with little wow or flutter and the use of headphones with the player will materially reduce the distracting effect of any room echoes.

The general packaging and write up on the back of the folder are good and help to make this course complete. It is a pity that the printed symbols miss out the more commonly used punctuation marks—even to the extent of the start and finish symbols. The last two are, however, used in the texts to indicate start and finish. Numerals receive scant use in this course and it is felt this is an unfortunate decision by Mr. Hodder, particularly if this course is to be used by aspiring Amateurs. As with any recorded method of code whereby the recording is played back a number of times to the student, familiarity with the text becomes a problem. To overcome this, it is suggested that the pickup head of the record player be placed at random on the record, so reducing temporarily the possibility of anticipating successive letters or numerals.

SUMMARY

This course is considered to be a good starting course for those people who have no access to skilled training. The instructions are clear, concise and adequate for the newcomer who wants to learn Morse code. The lack of adequate practice with numerals and the lack of punctuation signs are the only criticisms, and the worth of the course in other regards far outweighs these. This course, like any of this type, cannot in itself be consideraed a complete course. Once a person has become familiar with the contents of this course, he should then get practice on the air from one or more of the stations that send slow Morse for beginners. One such station is VK2BWI.

The course used in this evaluation was supplied through the kind courtesy of William Willis and Co., 77 Canterbury Road, Canterbury, Vic., 3126, from whence further details should be obtained. ●

USING "STANDARD ORBITS" FOR OSCAR 6

*BY RICHARD TONKIN**

● The standard Orbit-satellite tracing system has been successfully used by many amateurs to track OSCAR 6. Sets of Standard Orbits for the Australian State capitals were included as an insert in the October, 1972, issue of "A.R." The orbit achieved by Oscar 6 is extremely close to that used to produce Standard Orbits and no changes to the data published in last October's "A.R." are required.

At this stage, with the satellite operational and with many amateurs having either worked through the 2-10 metre repeater, or planning to do so, it is considered desirable again to run through the proper use of the Standard Orbit system.

The Standard Orbits system relies on the fact that the satellite is in an orbit very close to circular, at a height of approximately 1460 kilometres above the earth. Oscar 6 has, in fact, achieved just such an orbit. Each orbit around the earth is completed in 114.99 minutes which, for simplicity, we can round off to 115 minutes, or 1 hour, 55 minutes. The Equator is taken as a reference point on the orbit. Each orbit begins when the satellite crosses, travelling north, and ends 1 hour, 55 minutes later when the Equator is next crossed, again travelling north. This 1 hour, 55 minutes is the PERIOD of the orbit. From the time one orbit begins at the Equator, to the end of that orbit, 1 hour, 55 minutes (that is, one PERIOD) later, the Earth rotates westward, below the satellite by (in the case of OSCAR 6) 28.7 degrees, so that if, say, orbit number 547 begins on the Equator (travelling north) at 181.0 degrees west longitude at 0852 GMT, the next orbit (number 548) will begin on the Equator 1 hour, 55 minutes later and, during that time, the Earth will have rotated westward, beneath the satellite, by 28.7 degrees. Therefore, orbit 548 will begin at 10.47 GMT (08.52 plus 01.55), at 209.7 degrees west longitude (181.0 plus 28.7) —or 210 degrees west, to round off the figures. These figures of 10.47 GMT at 210 degrees west longitude are referred to as the ascending (i.e. travelling into the Northern Hemisphere) NODE (i.e., Equator crossing), for orbit 548

ASCENDING NODES are the key factors in the Standard Orbits system. The sets of Standard Orbits for the state capitals published as an insert in October, 1972, "A.R." are simply the azimuth and elevation bearings at two minute time intervals for typical orbits of the OSCAR 6 satellite which come into range of the state capitals and the districts around them. It will be seen that orbits are printed out with reference to ASCENDING NODES and are spaced at 5 degree intervals. Ideally of course it would be desirable to have the Standard Orbits at 1 degree intervals, but the marginally increased tracking accuracy that would be achieved would be far-outweighed by the fact that 5 times as many Standard Orbits would have to be printed. Hence a compromise of 5 degrees intervals was reached - this has been found to be quite satisfactory, even for use with directional antennas on 2 metres and 70 centimetres.

Returning now to the "ASCENDING NODES." If you are, for example, in or near Sydney and you want to track OSCAR 6 on a hypothetical orbit 548, what do you do? By looking at the Standard Orbit tables for Sydney, you will see that the ASCENDING NODE for orbit 548 (210 degrees west longitude) appears on the tables. If it had been 211 or 212 degrees the Standard Orbit for 210 degrees should still have been used, as it is the closest to 211 or 212. Having selected the Standard Orbit marked "ASCN NODE 210 W," what next? Simply add the number of minutes at the beginning of the "ADD MINS" column on the Standard Orbit table (92 minutes) to the ASCENDING NODE time (10.47 GMT) for orbit 548 —so, 10.47 GMT plus 92 minutes equals 12.19 GMT. That means, then, that the satellite will come into range of Sydney at 12.19 GMT at an azimuth bearing of 175 degrees (the azimuth reading corresponding to the 92 minutes at the start of the 210 degrees west Standard Orbit). By looking at the 210 degrees Standard Orbit, it can be seen that OSCAR 6 will reach maximum elevation above the horizon of 32 degrees at the 102 MINUTE mark (12.29 GMT), and that the satellite will go out of range on an azimuth bearing of 308 degrees at the 112 minute mark (12.39 GMT). Therefore the orbit will be within range of Sydney for a total of about 20 minutes.

It can be seen that the "ADD MINS" column in the Standard Orbit sets refers to the time that it takes the satellite to travel from the ASCENDING NODE to the point where it comes over the horizon at the appropriate city. So that in the example above, it takes OSCAR 6 92 minutes to travel from the Equator to a point where it comes into range of Sydney, on orbit 548, which is a night time orbit. On daytime orbits, it takes the satellite about one hour to come into range of Sydney, after crossing the Equator, travelling north. The half-hour difference between daytime and night-time orbits is caused by the fact that the satellite has to travel a shorter distance from the Equator to reach Sydney on the south-bound (daytime) orbits. Orbit 548, like all night-time orbits over Australia, travels from south-east to north-west, while the daytime orbit travels from north-east to south-east.

The morning (southbound) orbits of OSCAR 6 over Australia have ASCENDING NODES between 290 and 80 degrees west, while the evening (north-

(continued on Page 11)

* 13 Nestan Drive, Ringwood, Vic., 3134.

THE G5RV* By the Man Himself

● The G5RV aerial is a multi-band dipole specifically designed with dimensions which allow it to be installed in most normal-sized back gardens, permitting effective operation from 1.8 to 30 MHz.

As the G5RV aerial does not make use of traps or ferrite beads, the "dipole" portion becomes progressively longer in electrical length with increasing frequency. This effect confers certain advantages over a normal or trap dipole because, with increasing electrical length, the major lobes of the vertical radiation patterns tend to be lowered as the frequency is increased.

Thus, from 7 MHz. up, most of the energy radiated in the vertical plane is at an angle suitable for DX working. Furthermore, the horizontal polar diagram changes with increase of frequency from a more or less typical two horizontal dipole diagram to that of a typical "long wire" aerial at 14.21 and 23 MHz.

Although the impedance matching of a suitable (non-critical) length of 75 ohm twin feeder (preferred) or 75 to 80 ohm co-axial feeder from the base of the matching stub to the transmitter or preferably, to a suitable aerial tuning unit, is approximate only for most bands, a very good match indeed is obtained on 14 MHz. It so happens also that the polar diagram on this band is that of a three-half-wavelength long-wire which is particularly suitable for all-round DX working and gives an estimated gain of about 3 dB. over a simple dipole in the directions of the four major lobes.

The above reasoning does not apply to its use on 1.8 MHz. where it functions as a Marconi or T aerial with most of the effective radiation taking place from the vertical or near-vertical portions of the system, the "flat top" acting as a top-capacity loading element. However, with the transmitter end of the feeder strapped and with the system tuned to resonance with a suitable series inductance and capacitor circuit connected to a good earth, or a counterpoise, very effective radiation on this band is obtainable even when the flat top is as low as 25 feet above ground.

CONSTRUCTION

The dimensions of the aerial and matching stub are as shown in Fig. 1. It should be noted that it is quite in order to "bend" the lower half of the matching stub if desired owing to relatively low height above ground of the flat top. The writer has used this aerial for many years at a height of only 25 feet with excellent results on all bands from 1.8 to 28 MHz.

A word about the matching stub is in order. If this is of open wire feeder construction (preferred because of lower losses, especially at 21 and 28 MHz.) its length should be 34 feet (17 feet for the half-size version), but if 300 ohm ribbon is used allowance must be made for the velocity factor of this type of twin-lead. Since this is approximately 0.88, the actual physical length of the 300 ohm ribbon stub should be 29 feet 6 inches. It should be borne in mind that this matching stub is intended to resonate as a half-wave impedance transformer at 14 MHz., which was chosen as the design centre frequency for the G5RV aerial, thus giving a very good impedance match for a 75 to 100 ohm twin-lead or co-axial cable connected to the base of the stub.

If desired, due to lack of sufficient space to accommodate the 102 feet long flat top, the ends of the aerial may be dropped vertically (or semi-vertically) for up to 10 feet at each end, thus reducing the overall length to 82 feet.

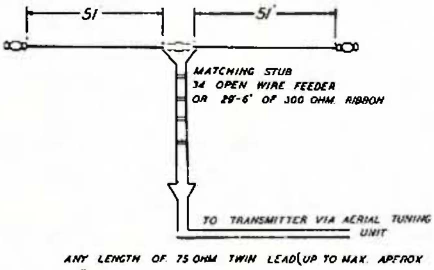


Fig. 1.—Dimensions of the full-size G5RV Aerial. For the half-size version, the dimensions of the flat-top and matching stub are scaled proportionately.

An alternative arrangement to that of the matching stub and twin-lead or co-axial cable feeder is to use an 83 feet length of open-wire feeder measured from the centre of the flat top to the terminals of the a.t.u. This arrangement permits parallel tuning of the a.t.u. on all bands from 3.5 to 28 MHz. with very low feeder losses.

The spacing of either the open-wire stub or the 83 ft. long open-wire feeder is not critical and may conveniently be anything from 2 to 6 inches, using either 14 or 16 s.w.g. copper wire. Although the use of 14 s.w.g. is recommended for the flat top, 16 s.w.g. is adequate for the matching stub or tuned feeder and is easier to "hang" neatly.

It is recommended that attention be paid to making a sound mechanical job of the construction of the aerial. In particular, if 300 ohm ribbon is used for the matching stub, the ribbon should be looped over the centre insulator of the flat top and secured with nylon thread or plastic tape, leaving "flying" ends about 9 inches long forming two loops for connection to each half of the aerial. This type of construction avoids breaking of the ribbon due to swinging and vibration in high winds. Alternatively, a suitable triangular shaped ceramic or plastic dipole centre insulator which is designed to secure the 300 ohm ribbon may be used.

Although it may be very convenient to use a length of, say, up to 100 ft. of co-ax. direct from the transmitter to the base of the matching stub, it must be remembered that such an arrangement will tend to produce currents which will flow in the outer conductor of the co-ax., causing unwanted radiation from the co-axial feeder. This may be avoided by the use of either 75 ohm twin-lead and a suitable a.t.u. or the open-wire feeder and a.t.u. as already mentioned. However, the use of a suitable wide-band balun as suggested in the article by G3HZP in July 1966 R.S.G.B. Bulletin would be preferable if co-axial cable is to be used.

Nevertheless, in practice very satisfactory operation can be achieved by the simple use of co-ax. direct from the transmitter to the base of the matching stub even though the v.s.w.r. may reach 10 to 1 or more on 3.5 MHz. This figure may be reduced to about 5 to 1 on 3.5 MHz. by "pruning" the co-ax. On the higher frequency bands the v.s.w.r. on the co-ax. lies between 5 to 1 and 1.5 to 1, the latter figure applying to 14 MHz. where, as explained above, the matching is very good.

Contrary to general belief, a v.s.w.r. of up to 5 to 1 on a length of co-ax. up to about 100 feet, at the frequencies considered here, results in negligible loss of power. However, this is not to say that it is not better to keep the v.s.w.r. figure as low as possible, especially where a low-pass t.v.i. filter is to be used. It is mainly for this reason that the writer prefers to use a convenient length of 80 ohm co-ax. from the transmitter to an a.t.u. and then 75 ohm twin-lead to the base of the stub. In this way, using a low-pass filter and a v.s.w.r. meter in the length of co-ax., a perfect, or near perfect, match can be obtained for the transmitter and filter on all bands.

THE AERIAL TUNING UNIT

As stated above, the writer prefers to use an a.t.u. for the reasons given. There are various satisfactory forms of a.t.u. but one which the writer has used for many years and which is extremely flexible electrically and yet does not require the coils to be tapped for optimum feeder loading, is shown in Fig. 2.

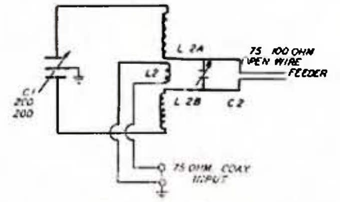


Fig. 2.—A suggested aerial tuning unit for use with the G5RV aerial. C1 is a 200/200 pF. split-stator transmitter capacitor, the plate spacing being determined by the power it will have to handle. The coupling capacitor C2 consists of three 500 pF. broadcast receiver variable capacitors connected in parallel. If necessary, this combination may be supplemented by a bank of switched high-voltage mica capacitors.

* Reprinted from "Ohm" Magazine.

In any case, whatever form of a.t.u. is used a suitable v.s.w.r. meter should be inserted in the co-ax. feeder from the transmitter output to the a.t.u. Optimum loading and maximum harmonic suppression will be achieved by watching the reverse current in the v.s.w.r. meter and adjusting both a.t.u. tuning and loading capacitors for minimum reverse current.

If the link-coupling coil is common for all bands (using plug-in a.t.u. coils) it is preferable that it be of the "swinging" type, i.e. adjustable coupling. It will be found that, starting with the link coil fully coupled, normally, after the a.t.u. tuning and loading capacitors have been adjusted to give the lowest possible reverse current, adjustment of the link-coil coupling will, in nearly all cases, permit a v.s.w.r. of virtually 1:1 to be obtained on the co-ax. cable to the transmitter.

However, if a.t.u. coils having individual link-coils are used, the number of turns on each link should be adjusted to suit the actual conditions applying to a particular installation for each of the bands.

For a common, swinging, link-coil three turns is about as good a compromise as may easily be obtained.

Table 1 gives coil winding details for each band.

7 MHz.—A similar arrangement exists at this frequency except that the flat top plus 16 ft. of the matching stub now functions as a partially folded-up "two half waves in phase" aerial, giving a polar diagram somewhat sharper than a conventional 1/2λ dipole and low angle vertical plane radiation. Again, the matching at the base of the stub is degraded somewhat by the unwanted reactance of the stub, but despite this the system loads well. See Fig. 4.

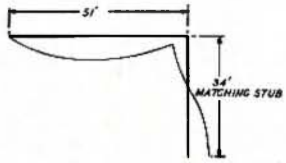


Fig. 4.—Current distribution at 7 MHz. The aerial now functions as two half-waves in phase (partially folded at centre). Some reactive mismatch still occurs at the base of the stub, but operation is very effective.

14 MHz.—At this frequency the conditions are ideal. The flat-top forms a three halfwave long-wire centre-fed aerial having six lobes of radiation, four major and two minor. As the centre impedance of a wire of this length at about 30 to 35 ft. above ground is approximately 90 to 100 ohms and the 34 ft. stub acts as a 1:1 impedance

Band (MHz.)	Turns	Turn Spacing (in.)	S.W.G.	Coil I.D. (in.)	Fixed Link Coil* (turns)
3.5	17 + 17	close wound	14	2.5 (former)	4 or 5
7	9 + 9	close wound	14	2.5 (former)	3
14	5 + 5	1/10	10	2.25 (self support.)	2
21, 28	4 + 4	1/2	10	1.75 (self support.)	1

TABLE 1.

* Alternatively, a common three-turn swinging link coil 1⅞ inch i.d., 14 s.w.g. close wound; centre portion of coil formers cut away suitably to permit entry of swinging link coil.

THEORY OF OPERATION

The general theory of operation has been explained in the introduction. The theory of operation on each band from 3.5 to 28 MHz. will now be given in turn.

3.5 MHz.—On this band, each half of the flat-top plus about 16 ft. of each leg of the stub forms a fore-shortened or slightly folded-up dipole. The remainder of the stub acts as an unwanted but unavoidable reactance between the centre of the dipole and the feeder to the transmitter or a.t.u. The polar diagram, is similar to that of a horizontal dipole. See Fig. 3.

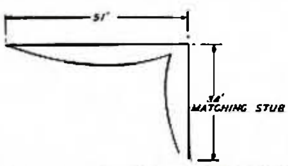


Fig. 3.—The current distribution of the G5RV aerial at 3.5 MHz. Only one half is shown. The aerial functions as a half-wave dipole partially folded up at the centre. Some reactive mismatch occurs at the base of the matching stub, but performance is very good despite a rather high v.s.w.r. on 75 ohm co-ax. or 75 ohm twin feeder to the transmitter or a.t.u.

transformer, the match to an 80 or even 75 ohm feeder is quite acceptable. Most of the radiation in the vertical plane is at an angle of about 14 which is very effective for DX working. See Fig. 5.

21 MHz.—Here the aerial works as a five halfwave long-wire giving a very effective polar diagram and good low-angle radiation. Although a bad mismatch occurs at the base of the stub, the aerial loads well and performs very satisfactorily. See Fig. 6.

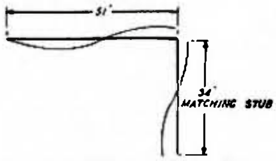


Fig. 5.—Current distribution at 14 MHz. In this case, the aerial functions as a 3/2 wavelength long wire. A centre impedance of about 90 ohms is transferred to the base of the matching stub (this acts as a 1:1 impedance transformer) and results in a good match to either 75 ohm co-ax. or 75 ohm twin feeder.

FEDERAL W.I.A. NEW ADDRESS:
P.O. BOX 150,
TOORAK, VIC., 3142
Victorian Division address is unchanged as P.O. Box 36, East Melbourne, Vic., 3002.

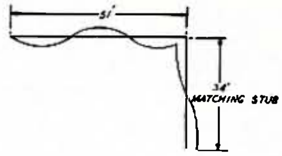


Fig. 6.—Current distribution at 21 MHz. The aerial functions as a 5/2 wavelength long wire. Mismatch at the base of the stub when coupled to 75 ohm co-ax. or 75 ohm twin feeder results in a high v.s.w.r., but operation remains effective.

28 MHz.—On this band the aerial functions as two 3/2λ long wires fed in phase. The polar diagram is similar to that of a typical 3/2λ long wire with slightly sharpened lobes and the radiation is at a low angle, good for DX working. Again, the mismatch at the base of the stub is considerable but, in practice, the aerial loads well and works very effectively. See Fig. 7.

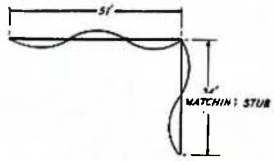


Fig. 7.—Current distribution at 28 MHz. The aerial is effectively two 3/2 wavelength long wires fed in phase. Mismatch to 75 ohm co-ax. or 75 ohm twin feeder at the base of the stub causes a high v.s.w.r., but operation is effective especially if an a.t.u. is used.

In connection with the above descriptions, reference should be made to the Amateur Radio Handbook or the A.R.R.L. or "CQ" Amateur Handbooks where the polar diagrams of typical long-wire aerials may be found.

THE HALF-SIZE VERSION

Many requests have been received for information on the half-size version of the G5RV aerial for use in very restricted space. It is quite possible to scale all wire length dimensions (including that of the stub) down to exactly half-size and the resulting aerial will work from 7 to 28 MHz. Optimum performance and impedance matching will occur on 28 MHz., where the operating conditions will be as for the full size version at 14 MHz. ●

THE HISTORICAL DEVELOPMENT OF U.H.F. CIRCUIT TECHNIQUES

PART ONE

ROGER LENNED HARRISON, VK9RI and VK2ZTB (ex VK3ZRY)*

• In these articles the author records, in chronological order, the efforts of the people and research organisations who made contributions to the development and use of the radio frequency spectrum between 30 MHz. and 60 GHz.

SUMMARY

I think it is significant that Hertz performed his now famous experiments in this region, but the region above 30 MHz. was mostly neglected until about 1920. In the following decade American Radio Amateurs began exploring the region just above 30 MHz. The techniques employed were crude and consisted of modulated oscillators and regenerative detectors. Results, however, were encouraging and frequency limits were gradually pushed back over the years up to W.W. II.

Also during those two decades preceding W.W. II. the idea of guided waves was stumbled upon by Otto Schriever and George Southworth. George Southworth first explored guided waves and later, with assistants, he developed many waveguide components.

The war years gave much impetus to u.h.f. techniques development and many devices such as reflex klystrons, improved magnetrons (first appeared 1936), travelling wave tubes and waveguide circuit elements appeared. During the decade immediately following the war, masers and more exotic travelling waves devices appeared.

In 1948 the transistor appeared as well as several other semiconductor devices.

The two decades following war saw many devices developed—both vacuum electronic and solid state devices. These devices provided an improvement in techniques for all regions throughout the spectrum between 30 MHz. and 60 GHz. Such devices as the carcinotron and the planitron, the travelling wave maser, the Alder tube, tunnel diodes and varactors caused small revolutions in u.h.f. circuit techniques in their particular fields of application.

Very recently **mesa construction** and **planar-epitaxial** transistors have been developed and are suitable for use in the u.h.f. bands up to the Giga Hertz region. These devices promise much for the future.

Overall, it appears that prior to the war basic circuit elements and fundamental ideas were developed. The war seemed to change this and active circuit devices were devised to overcome problems of generating power, low noise amplification, etc. The years following the war seemed to have carried on this developmental trend.

* P.O. Box 702, Darlinghurst, N.S.W., 2010.

INTRODUCTION

I will broadly classify the frequencies extending from 30 MHz. to 60 GHz. as u.h.f.

The lower limit I have set at 30 MHz. as this was considered the start of the u.h.f. region in the early part of this century. All frequencies above 30 MHz. were then regarded as in "the ultra-highs".

The upper limit I have placed at 60 GHz. as this appears to be the limit of modern practice. Experimental generation of frequencies has occurred beyond this, but exceedingly little information can be obtained—and then only as vague references to developmental experiments.

Throughout this article I will make use of the term Hertz to denote cycles per second as this is a concise and accurate way of expressing the fundamental unit of frequency. It is interesting to quote here from the introduction to "Ultra-High Frequency Techniques".[1]

". . . One is the use of Kc. and Mc. where kilocycles per second and megacycles per second are meant. Until some simpler name than cycles per second is adopted in the English-speaking countries, it is inevitable that kilocycles or Kc. and megacycles or Mc. will be used in oral transmission."

The concluding chapter ends at 1965 as this was written in 1967 and 1965 was the most convenient, if not the obvious, year to end the post-war development decades. I hope that the ensuing decade proves as fruitful as the previous one. Indeed, so far (1970) it appears to be more so!

1850-1900: MAXWELL'S THEORY AND HERTZ'S PROOF

Prior to 1859 a mathematician, James Clerk Maxwell, had made a study of the work done by Ohm, Kirchoff, Henry, Lenz, Coulomb and, particularly, Faraday. From the study of these, and several other people's works, he formulated his electromagnetic theory and published in 1859 the argument and the mathematics of his idea.

In this publication he made predictions as to the properties of electromagnetic waves. He predicted that electromagnetic waves had very similar properties to those possessed by light which had already been investigated. He also postulated that light was an electromagnetic wave.

This rather revolutionary idea caught the attention of several people, mainly physicists, who were investigating electrical phenomenon at the time. Among them were Lord Kelvin (Britain), Popoff (Russia) and the now famous Henriech Hertz from Germany.

During the years 1886 to 1888 Hertz conducted a series of experiments to investigate the main portions of Maxwell's theory. The results of these experiments indicated that Hertz had achieved an amazing degree of success in what he had set out to investigate.

The point that is of interest is that these experiments were conducted using equipment which generated frequencies in the region between 30 MHz. and 600 MHz.[2,3] The equipment was simple but very effective; using lenses constructed of cast paraffin and reflectors made of copper, and a spark gap discharge (an oscillatory discharge), Hertz very ably demonstrated that electromagnetic waves had similar properties to light. These experiments were conducted near 500 MHz.[3] He measured the velocity as being 280 km./sec., which is very close to that of light. The velocity of propagation experiments were carried out at several frequencies from 30 MHz. to 150 MHz.[3]

These experiments were published in a number of papers in 1888 and 1889 and were followed by the book "Electric Waves" in 1894.[3]

These publications aroused the interest of two people who greatly advanced the knowledge and use of the idea postulated by Maxwell. One was a British scientist, Sir Oliver Lodge, and the other was an Italian engineer, Guglielmo Marconi.

1900-1920: THE ADVANCEMENT OF A NEW SCIENCE

Around 1890 Sir Oliver Lodge experimented with resonant circuits and aerial structures. But this work was done around frequencies of 100 kHz. to 500 kHz.

In 1894 Marconi began experimenting in his father's estate with "wireless" communications. The apparatus was crude and similar to that used by Hertz. It consisted of an induction coil and a Morse key with a sheet of metal for an antenna. The receiver had a similar antenna and he used a coherer for a detector, later improving this device.

Marconi filed his first patent in June 1896 in London. During the ensuing years he developed his equipment, establishing communications over both land and water using a combination of land stations and naval ships. In 1900 Marconi had developed his equipment into a practical form and patented his apparatus. This was the now famous patent No. 7777.[4]

Marconi drew heavily from the work and apparatus of Sir Oliver Lodge and the apparatus that Marconi developed and originally patented used similar frequencies, viz., in the range 100 to 500 kHz.

In America, Flemming recognised the possibility that the thermionic diode (invented by Edison) could be utilised for the detection of Radio signals, and in 1905 he patented a device for this purpose. This thermionic device was essentially that produced and investigated by Edison.[4]

This device provided a leap forward in the then primitive art of "wireless" communications, then mainly being investigated by Amateurs with home made equipment.

In 1907 an even larger step forward was taken by Lee de Forest when he patented the "triode" valve. This device provided amplification and paved the way for future development of circuit techniques.[4]

The first World War speeded the development of techniques somewhat, but still the frequencies involved were below 30 MHz. Much use of the spectrum below 1.5 MHz. was made by military and government authorities and Radio Amateurs were relegated to "below 200 metres" (above 1.5 MHz. at the cessation of hostilities).

This gave rise to an unexpected source of technical development and much private research and widespread application by Amateurs pushed high frequency circuit techniques toward 30 MHz.

Towards the end of this period two German physicists investigating the fundamental operation of thermionic vacuum tubes and various circuit techniques observed that certain tubes gave rise to oscillations independent of the external circuit and at an extremely high frequency.

The two men involved, Barkhausen and Kurz, were, at the time, investigating very high frequency oscillator circuits.

In 1920, they published a paper entitled "The Shortest Waves Producible by Means of Vacuum Tubes".[4,5]

Also in 1920, George Southworth, then a lecturer and student at Yale University in America, conducted a series of experiments aimed at accurately measuring the dielectric constant of water. His apparatus is shown in Fig. 1.

He set up Lecher lines that extended externally from a water trough and which were coupled to a u.h.f. oscillator. Here I quote his own words[6]:

> "Upon conducting the experiment, I did not find in water the nice orderly standing-wave pattern found in air but instead there was evidence of other wavelength components superimposed on those to be expected."

He first thought that these resonances were peculiar to water, but soon found that these waves were functions of the dimensions of the trough. He also found that when the Lecher wires were removed entirely that the extraneous resonances were supported by the trough alone, whether it had metal sides or not.

These extraneous resonance patterns have since been recognised as TE_{10} waves in a rectangular guide.

At the same time a lecturer at the University of Kiel in Germany, one Otto Schriever, published a paper in which he described a series of waves that could be supported on dielectric wires of circular cross-section. These waves were identified later as transverse magnetic waves in a circular guide.

During his years at Yale University, George Southworth, lecturing and doing graduate studies, performed quite a number of experiments with u.h.f. oscillators and circuit techniques. These techniques subsequently came into common use by Radio Amateurs in the period 1920-1930. Some of this early equipment is illustrated in Fig. 2.

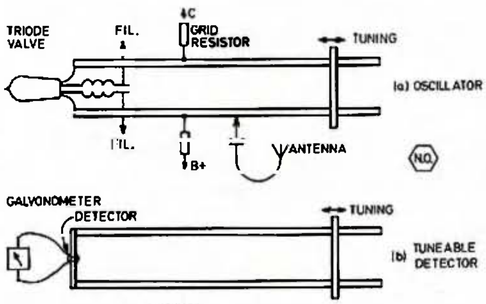


FIG. 2

In 1916 Marconi developed and tested some equipment which would enable the use of beams to be used to obtain greater privacy in communications. This had direct military applications which Marconi was desirous of demonstrating. The equipment operated on a wavelength of 3 metres (100 MHz.) and used cylindrical paraboloidal reflectors. With this equipment, good communications for ranges up to six miles was obtained. Further investigations were carried out by one of Marconi's employees, one C. S. Franklin, and in 1917 a range of 20 miles was obtained from Carnarvon in England. The wavelength used was again 3 metres and another improved, paraboloidal reflector was used.[7]

In 1919, Franklin successfully constructed oscillators using thermionic valves. His investigations, although done independently and without correspondence with Southworth in America, were very similar and used almost identical circuit techniques to those employed by G. C. Southworth.[17]

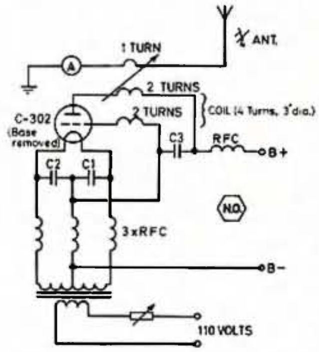
It appears that the period between 1900 and 1920 was a period of intensive investigation into a new science. The investigators proceeded, somewhat randomly, in many directions, several lines of which laid the foundations and fundamentals of u.h.f. circuit properties and techniques.

1920 TO 1930:
EXTENDING THE SPECTRUM

This was a decade during which Radio Amateurs played an important part. This was the period during which long distance propagation of short waves was studied.

The years between 1920 and 1925 produced a confusion of investigators and results into shortwave transmitters and propagation (below 30 MHz.). The circuit techniques used and spectacular results achieved by Amateurs during this period, sparked off a move towards ever decreasing wavelengths and the practical uses that might be obtained. It appears that Radio Amateurs were the first people to use frequencies above 30 MHz. for practical communications. The circuit techniques were refinements of those used at lower frequencies and subsequent developments employed circuit techniques similar to that used by Southworth earlier (see previous section).

In 1924 S. Kruse published an article in a magazine put out by the American Radio Relay League. The article was called "Working at 5 Metres". The article described a rather crude adaption of a Hartley oscillator, the circuit of which is shown in Fig. 3. The tube used was a baseless C-302 (a triode), then in fairly common use at lower frequencies. The frequency was changed by altering the spacing of the turns on the coil. A receiver used the same circuit except that two parallel metal discs were used as a variable capacitor connected between grid and plate.

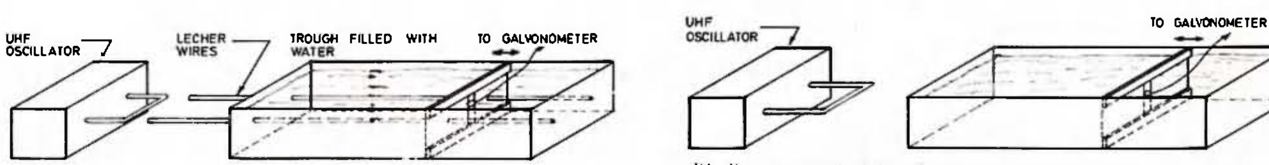


5 METRE OSCILLATOR FIG. 3

It appears that a number of people were using these techniques at about this time but the range of such apparatus was exceedingly limited and showed little hope of bettering the performance of equipment then being used below 30 MHz.

Frequency measuring equipment made use of Lecher wires which were later used as the frequency determining elements in oscillators. A rather

(Continued on Page 17)



(a) The standing wave pattern in the trough was not orderly and contained extraneous resonances

(b) Upon removing the lecher wires it was found that the trough supported a resonant pattern itself. This later sparked of the development of the waveguide.

SOUTHWORTH'S APPARATUS FIG. 1

CONSTRUCTING AN L.P. FILTER

A. G. EARWICKER,* VK3AOD

● Many of us have found rather irksome the "metal-bashing" aspects of housing a piece of home-brew equipment. The author has a simple solution, at least for low-pass filters.

No doubt many Amateurs like myself get satisfaction from building pieces of equipment, but feel disappointed somewhat in their final appearance because of our lack of skill or equipment to produce a suitable box or chassis worthy of our efforts. No matter what effort I put into the making of a box or chassis, it always falls short of that professional look.

Because of slight t.v.i. it was necessary for me to fit a low pass filter to my transmitter, but whatever book or magazine I read on the subject all their details of construction called for a three-division box, which to me and possibly many others meant constructional troubles.

* 67 Latrobe Street, Warragul, Vic., 3820.

Then I hit on an idea which proved to be very successful, not only to house a low pass filter, but over the years I could have saved myself a lot of constructional headaches had I thought of it before.

Briefly the idea is, why use a rectangular box anyway? Why not house the unit in a tube? All sizes are obtainable anywhere. If you are desperate and can't find the size you want, try the pantry or food cupboard, an empty food can might do the trick!

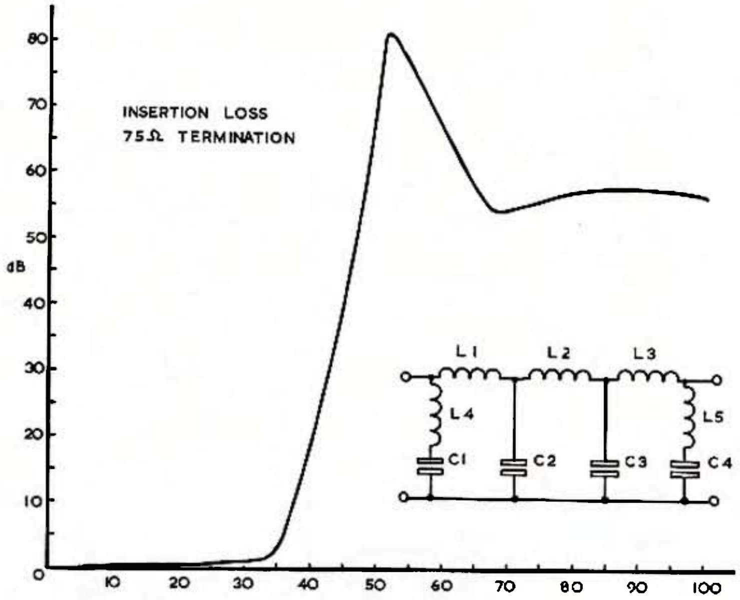
I can imagine all sorts of questions being asked. How are you going to fit and wire components in a can or tube? Much easier than on a chassis, is my reply.

This is the method. First of all arrange all the parts you wish to house as neatly as possible, then measure the overall length and diameter of the parts as arranged and from this calculate the length and size of the tube required. Now cut circular pieces of sheet metal (I used empty condensed milk cans because they are nicely tinned) that will snugly fit **into** the ends of the tube. You will require one for each end and one for each division.

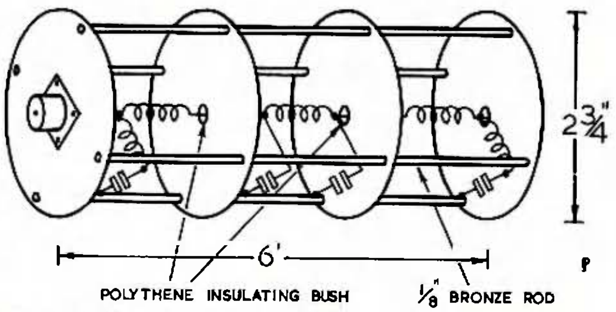
Now temporarily clamp or bolt these together and drill four ⅛" holes evenly spaced right on the edges. Cut four pieces of 8 or 10 gauge tinned copper wire or ⅛" brazing rod to the same length as the tube and thread the four pieces of sheet metal over the four pieces of wire. Now solder the two end pieces right on the ends of the wire and space and solder the divisions as required.

This is a surprisingly easy process if you used tinned copper wire. You will now find that you have a very sturdy little unit which is very easy to wire up and assemble. When this is complete, simply slip into the tube. It should not require any other fixing if a snug fit, and it can be easily slipped out again for service if required.

[Editor's Note.—To illustrate the technique the author supplied us with his actual filter unit. Dimensions and component values are shown in the accompanying drawings and table. Some doubts were felt about the effectiveness of the relatively loose discs inside the tube in preventing r.f. leakage from end to end, so attenuation measurements were made, yielding the results shown in the graph. The filter is obviously quite successful, particularly for t.v.i. on Channels 0 or 1. However, it might be improved still more at higher frequencies by the use of springy "fingers" around the disc edges to provide more positive contact to the inside surface of the tube.] ●



C1, C4—33 pF. 1200 v.w.
C2, C3—120 pF. 1200 v.w.
L1, L3—10 turns.
L2—11 turns.
L4, L5—7 turns.
Coils are ½ inch i.d., 8 t.p.i. 18 s.w.g. wire.



DIAMETER OF DISCS = INTERNAL DIAMETER OF COPPER TUBE CASING

USING "STANDARD ORBITS" FOR OSCAR 6

(continued from Page 6)

bound) orbits have ASCENDING NODES between 150 and 275 degrees west. As a guide, the morning orbits have similar numbers at the start of the "ADD MINS" column (between 56 and 82 minutes) than the evening orbits (between 86 and 104 minutes).

The orbit track of OSCAR 6 over Australia is approximately every two days so that, if the ASCENDING NODE for orbit 523 on 26th November were to be 211 degrees at 10.52 GMT, the ASCENDING NODE for orbit 548 will be 210 degrees at 10.45 GMT, on 28th November.

ASCENDING NODES data is available from the OSCAR State Co-ordinators, whose names and addresses appear below:—

Alan Hennessy, VK2RX, 23A New Illawarra Road, Bexley North, N.S.W., 2207.

John Nott, VK3ZQN, 28 Harley St., Dingley, Vic., 3172.

Lawrie Blagborough, VK4ZGL, 54 Bishop Street, ST. LUCIA, Qld., 4067.

Gary Herden, VK5ZK, 52 Arthur Street, Plympton Park. S.A. 5038.

Don Graham, VK6HK, 42 Purdom Street, Wembley Downs, W.A. 6019.

Peter Frith, VK7PF, 181 Punchbowl Road, Launceston, Tasmania, 7250. ●

NEWCOMER'S NOTEBOOK

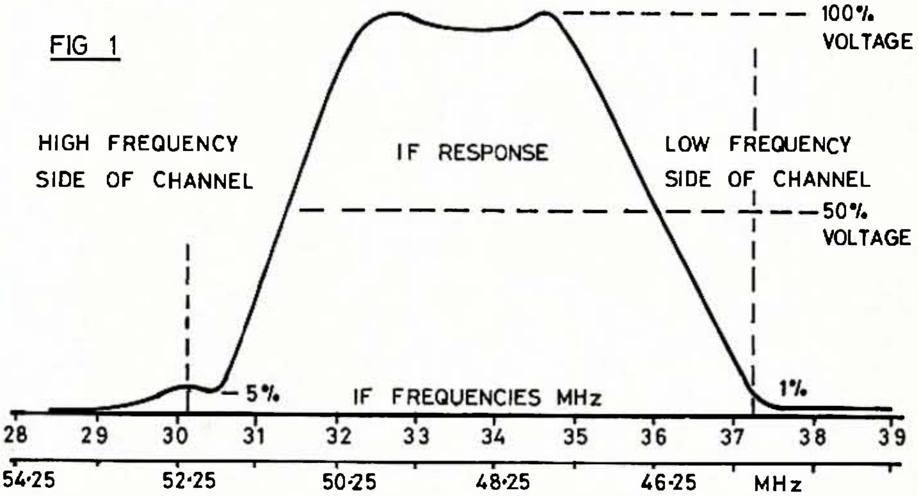
With Rodney Champness,* VK3UG

TVI ON 6 METRES

Have you ever wondered why your 6 metre transmission gets into your neighbor's television set when it is tuned to Channel 0? Overload, crossmodulation, grid rectification, &c., &c. Have you ever looked at the alignment curve of a typical TV set? Well, if you haven't, have a look at Figure 1.

The older TV sets will likely have a better IF selectivity curve. The reason for this being that up to four video IF stages were used, with their attendant coils, and adjacent channel sound and picture traps. The newer sets have as few as two video IF stages and usually no adjacent channel sound or picture traps — although for some these are available at a price. It can be seen by comparing the IF selectivity curves of a two-stage IF Figure 2, with no adjacent channel traps and a four-stage IF, Figure 3, with adjacent channel traps that you will more easily interfere with the former. It is a pity that the IF selectivity of many TV sets has been so degraded in recent years. This appears to be in an effort to cut costs, and as a result it leaves the sets wide open to interference from a variety of sources. You will find sets of different manufacture and/or different models are susceptible to interference to varying degrees.

FIG 1



OVERALL T.V. SET RESPONSE WHEN TUNED TO CHANNEL "O"

30.5 MHz is the sound IF frequency of 50 per cent. of TV sets as is 36 MHz the video IF frequency, exactly 5.5 MHz apart. By looking at Figure 1 you can see that the TV set has little if any response outside the TV channel. Hang on—wait a minute, if this is so how do I cause the interference? Look again at Figure 1, it will become obvious that this is a voltage versus frequency graph. If 100 per cent. response is shown as 0db and if the plotting of response is done in a decibels versus frequency graph the response pattern shown is vastly different as shown in Figure 2.

It can be seen that the TV set IF has considerable response outside the 7 MHz channel width, particularly on the Video side of the IF strip. The penny may be starting to drop as to what I am getting at. I've been quoting that the sound IF is on the low side of the IF strip when it is common knowledge that the sound carrier is on the high side of the channel. Now take Channel 0 and I'll show how the inversion occurs.

Channel 0
Local Oscillator
82.25 MHz 82.25 MHz
Carrier Picture
46.25 MHz Carrier Sound 51.75 MHz
Difference (IF)
36.00 MHz 30.50 MHz

It can be seen that sideband inversion occurs, just as it does in all superhet receivers if the local oscillator is higher in frequency than the received signal. If you require no inversion of sidebands, &c., the local oscillator should be on the low side of the signal.

Turning once again to Figure 2, it can be seen that the TV's response to your signal at 52.001 MHz is only perhaps 20dB down on the response at mid-channel. The skirt selectivity of a good SSB receiver filter should be at least 100db down for a minimum of interference from adjacent stations.

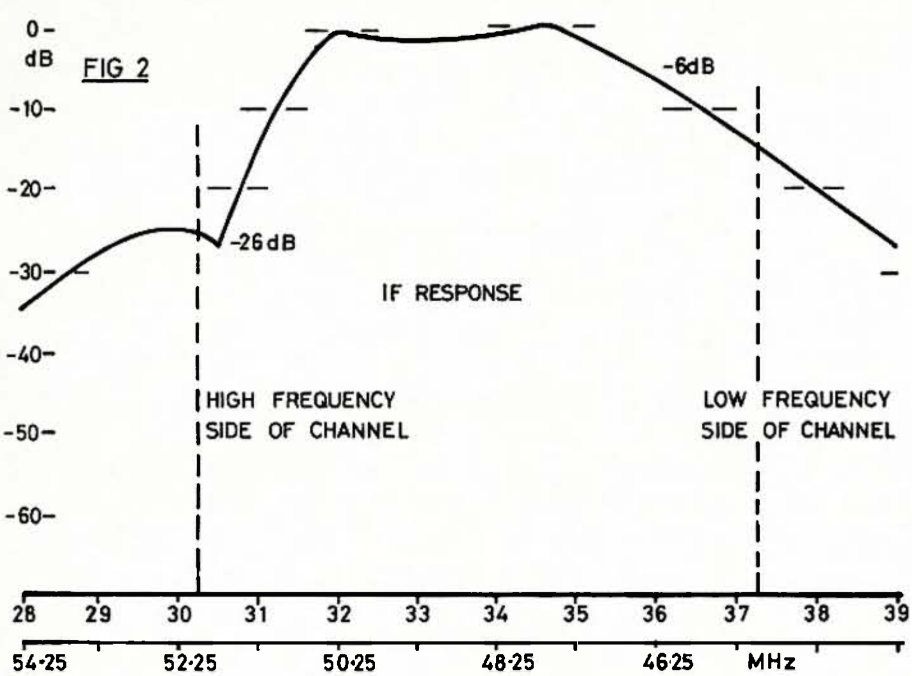
You will not need to think very long to realise your signal will easily exceed the input level of the television station even to the extent of being 20 dB stronger if you're close. There is certainly a lot of difference between a recommended rejection out of pass band of 100dB and the TV set's 20dB. This means that your signal at the video detector is as strong if not stronger than the desired TV programme, therefore, exit TV picture and sound.

Servicemen in general will not touch the IF alignment of a TV set even when it is obvious this should be attended to. Spot alignment techniques are usually quite satisfactory on the majority of sets. It is simple, quick and doesn't require elaborate equipment. Sets with their alignment out are also more susceptible to interference, as well as giving the owner a poorer grade of picture. Another common problem is encountered when the TV fine tuner is maladjusted — which is most of the time. This maladjustment can swing a fair proportion of the IF response into the amateur band, or in other cases into the two-way radio bands, or paging systems. This depends on which channel is being viewed. The performance on the TV channel is inferior and the interfering signal can be dominant.

To overcome the problem of maladjustment of the fine tuner is it not easily possible to arrange an Automatic Frequency Control circuit to control the tuner local oscillator? Varicap diodes suitable for the job are available. A discriminator tuned to the video or audio signal carriers in the IF strip could supply the control signal for the varicap diode on the local oscillator in the tuner. With such a circuit, it would be possible to do away with one more control—the fine tuning control. A control that is misused by the average viewer. This would eliminate one more cause of extreme TVI and give the viewer a better picture.

Now consider moving your transmission to 53.25 MHz. If you and your neighbours have accurately tuned sets with adjacent channel traps you may not cause TVI, as you should be spot on the adjacent channel picture trap, which should attenuate the TV set response by 60dB, as indicated by Figure 3. If the TV signal is, say, 1 mv into the set, the amateur signal would need to be of the order of 1 volt to be equal in strength at the video detector. Some sources indicate that for zero effect on the video the interfering signal should not exceed a hundredth of the wanted signal. This would mean that in the case just quoted the set would show absolutely no interference if the amateur signal were 10 mV into the set (provided no crossmodulation can occur in stages preceding the adjacent picture trap. —Tech. Ed.).

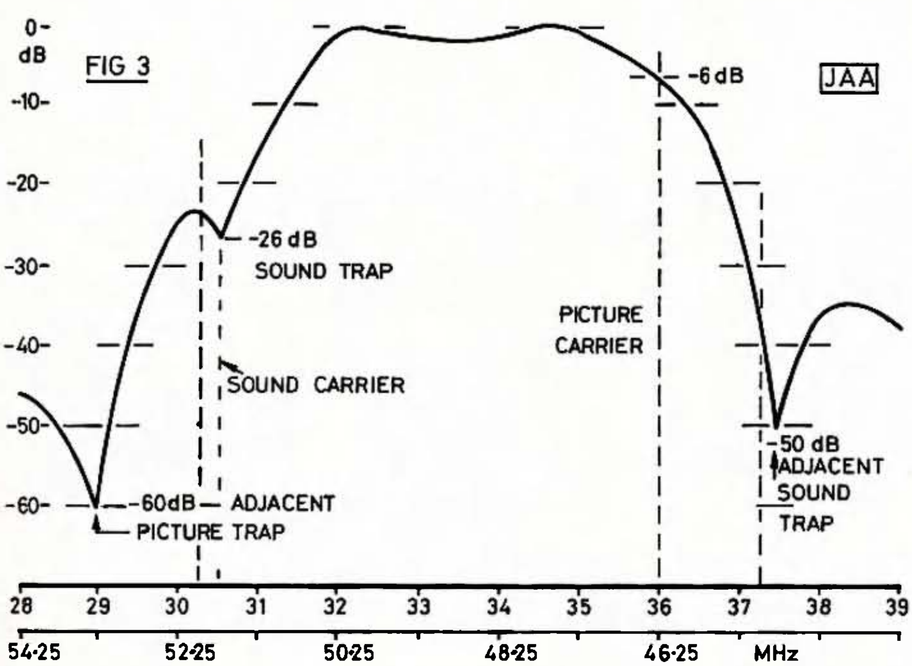
*44 Rathmullen Rd., Boronia, 3155, Vic.



OVERALL T.V. SET RESPONSE WHEN TUNED TO CHANNEL "O"

Perhaps I can now give some rough approximations on how little or how much effect your transmissions would have on this rather ideal set of Figure 3. Assume that the TV Channel 0 is putting out 100,000 watts effective radiated power. Assume that you are putting out 100 watts into a 10 dB gain aerial; in other words 1000 watts effective radiated power in the favoured direction. At the TV set your 1000 watts ERP can appear as a signal of 100 times (20dB) the signal of the TV signal and cause no trouble. Let's calculate very approximately how far away your neighbour would need to be and still not receive any interference.

The relative power of the TV transmitter is 50dB (100,000) above 1 watt. The amateur transmitter is 30dB (7000) above 1 watt . The previous statements indicating the trap attenuation 60dB and the relative level of the interfering signal permissible of 40 dB gives us a figure of 20 dB. This 20 dB is the amount the amateur signal can be stronger than the TV signal and cause no visible interference. This 20dB must be subtracted from the 30dB to give the effectivenes of each transmitter. The effectiveness of the amateur transmitter is therefore 10dB above 1 watt. 50dB minus 10dB gives a figure of 40dB in favor of the television station signal. The difference in the effectiveness of the two signals from the same site is 10,000 times or 40dB. This reduces when the amateur station is closer to the TV set than the TV station. Using the assumption that the signal power falls as the square of the distance it can be seen that the distance for a given signal strength varies with the square root of the power ratio. The square root of 10,000 is 100. This should mean that at say 50 miles from the TV station, no neighbour further than half a mile away should notice any TVI, with your aerial beaming directly into the front of his. Consider if you are using 1 watt into a 10dB gain aerial, this distance reduces to 88 yards. Now, if you use the opposite polarisation you should gain up to another 20dB of attenuation. This could mean that you might work as close as 26½ feet, and no TVI. If you were to beam into the side of his aerial where he should have a null, the theoretical attenuation figures will indicate that you could work as close as two and a half feet and still cause no TVI. This is now assuming that there are no reflections off any other metal work nearby.



OVERALL T.V. SET RESPONSE WHEN TUNED TO CHANNEL "O"

I have obviously talked you into the fact that TVI doesn't exist, or more truly that it shouldn't occur, if everything is okay. I was talking of a good quality set, in good condition, correctly set up in all regards (no wound down Channel 1 tuner biscuits, please), with a good aerial designed for Channel 0 and a properly balanced feeder. The average cut-price TV set has no adjacent channel traps, is roughly aligned, the viewer mistunes the fine tuner, the aerial has seen better days (rusty and with semi-conductor joints), and the feeder cable is open on one side. No wonder you cause TVI. See Figure 2 and compare it with Figure 3. It would make you weep.

As amateurs, I believe we must assume that the average TV set is far from perfect in its ability to reject out-of-channel signals. From observation of Figure 2 it can be seen that the further you take your transmission away from Channel 0 the less the TV set will respond to your signals. I believe this points very forcibly to one slavish habit that has become ingrown amongst many VHF operators. This habit is operating from the bottom end of the band upwards. In this case 52 megs upwards. For local work, where dependence on frequency selective propagation phenomena is not necessary, working from 54 MHz downwards would be sensible. Use your head and use the band for minimum interference. This could mean that you can operate 6 metres and your neighbour watch his TV with no trouble or strained relationships. It might be a wise thought in VK3 and VK4 to adopt one or other of the VK2 AM net frequencies, as I believe these are quite close to 54 megs. Shifting of FM nets would be desirable, too.

These same thoughts expressed above also apply equally well to those amateurs in Channel 5A area who work 2 metres, and to those who live in Channel 1 areas. Those who live in Channel 1 areas should work the low end of 0 metres.

Tests I have conducted indicate that (1) bandedge (52meg) operation causes considerable interference; (2) AM causes more trouble than SSB; (3) needless high power causes more trouble. A point of interest — I have run 10 watts output on 53.032 MHz and not caused TVI in my own set 50 feet away. The signal strength at the location tested was in the vicinity of 300uv. To overcome the interference I fitted an elementary trap on the receiver aerial terminals.

Having considered all the points I have brought up, other points should become obvious. How about traps fitted to the aerial terminals of the TV set, &c. This can be the subject of a future article. I would most definitely appreciate the thoughts of those who have tackled this problem with traps and other suppression devices. I would like to know how effective various ones are and any other data, constructional and otherwise, you can help with. Amateur radio has been accused of becoming an unproductive hobby, we are followers and imitators mostly, and not innovators. The suppression of interference to electronic equipment caused by transmitting equipment is one of the real challenges left to amateur radio in this day and age. Are you willing to take up this challenge, and help? If so, write to me with your information, or submit it independently.

This has probably been pretty heavy going under the title of "Newcomer's Notebook". If you have a bit of trouble getting the gist of it all the first time through I'll not be surprised.

Has your SW set got a BFO ? If it hasn't the BFO kit advertised in "Amateur Radio" by the YRCS is apparently very good. More about BFOs, &c., in a future article. ●

AMATEUR FREQUENCIES:

ONLY THE STRONG GO ON — SO SHOULD A LOT MORE AMATEURS!

Commercial Kinks

With Ron Fisher,* VK3OM

This month I have compiled an interesting assortment of ideas for owners of the Trio TS510 transceiver, the Trio 9R 59DE/s receivers, and a few more hints for the FT200.

Firstly, my thanks to Bernard Taylor VK2AZY for his notes on the inclusion of a Yaesu noise blanker into his Trio TS510 transceiver. These units are available from Bail Electronic Services at a cost of 25 dollars each. Now for the step-by-step details on their installation.

A NOISE BLANKER FOR THE TRIO TS510.

Remove R316 10K ohms and take out the link between "P" and "TP 1" on the printed circuit board UC 1204J. Mount the noise blanker on top of the chassis over the edge of the same board and directly behind the VFO. Connect the 150 volt terminal of the blanker to "TP 2", the L308 side of R319 1K ohms, and the supplied dropping resistor to the 150 volt terminal on the board. These can be soldered to the terminal above the board.

If no CW filter is fitted the input and output leads can be run through the holes provided in the printed circuit board. The input lead connects to "TP 1" directly and the output lead connects to "P" via the 2pf. condenser mounted on a tag strip near L308.

The switch can be conveniently mounted in the blank "ext" switch position or alternately a pull-on switch could be provided for the RIT control, giving front-panel control.

The Yaesu noise blanker comes prealigned for the IF frequency of 3280 khz. as used in the FT 570/401 series transceivers, so slight retuning is needed. The crystal calibrator and the S-meter proved ideal for this. However, tuning the noise amplifier was more difficult (T354). A noise source is needed to peak this, and Bernard finished up running his antenna lead to the ignition system of his car, then aligning with a digital VTVM reading millivolts AC.

With the Blanker in circuit (switch closed) blanking is adjusted to about 3db loss on the S-meter or as necessary. Bernard also notes that when he first installed the noise blanker, he placed it under the chassis but had problems with cross modulation and excessive band width on strong signals. Mounting the unit on top of the chassis as described overcomes the trouble. Mr. Fred Bail, of Bail Electronic Services, tells me that Yaesu are producing a new type blanker which overcomes all problems with cross modulation, but which does not have such effective blanking action. Apparently cross modulation is a much greater problem in Japan than it is here, as no trouble has been noted locally in this connection. Consequently, Bail's are still importing the older, more effective units.

In conclusion, Bernard states that it is not necessary to retune L308 as the 2pf. condenser has little effect. To take the blanker out of circuit just lift the input and output leads and replace the jumper wire between TP 1 and P.

After noting the excellent results that Bernard Taylor has achieved in this modification, it seems likely that similar results could be obtained by installing one of the Yaesu blankers in the Heath transceivers. The Heathkit models SB100, SB101, SB102, HW100 and HW101 transceivers as well as th SB300 and SB301 receivers all use the same IF frequencies as the Trio TS510. One day when time permits I might give this a try in my SB101, but in the meantime if anyone tries it I would like to hear about it.

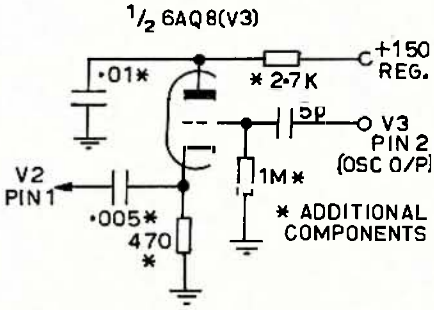
While on the subject of noise blankers, I hope to have details on a simple blanker for the FT200 in the next few months and I know quite a few people are waiting for this.

TRIO 9R 59DE/S. The Trio instruction book states that a cathode follower after the front end (HF) oscillator might be worth while. A letter from Alex Graham VK6ZCR contains details of the cathode follower he built. The circuit is reproduced here.

Alex reports a considerable improvement in overall stability. I have also had a chance to try this out on my own receiver. The frequency pulling I reported some months ago, after I had increased the AGC action is practically eliminated by the inclusion of the follower and even shorting the output of the follower to earth has very little effect on the oscillator frequency.

If after completing all the previous modifications to the oscillator section you are still not happy with stability, there is one final modification that might be worth trying. This is to build a complete external oscillator section. There are quite a few benefits from this. Firstly, it might only be necessary to build a single band oscillator to cover the twenty-metre band for instance. Note that I have not actually tried this, but if you are keen enough, you might like to. Even a stable signal generator might be worth using. Don't forget to disable the normal oscillator.

With that I bring to a conclusion this series on the 9R 59DE receivers. If and when more modifications or data become available the subject could, of course, be reopened. In the meantime I think we have covered the subject rather well.



THE FT200 PART FIVE.—From John VK3AUJ comes the following hint. If you are inclined to use VOX and find that you run your anti-trip level full on, the distortion in the receiver will probably be of the order of 20 per cent. This is caused by the anti-trip rectifier being connected directly across the primary of the audio output transformer. To adjust the anti-trip tune the receiver for about a one KHz beat against the calibrator. If the anti-trip is set too high you will be able to hear the second harmonic audio beat quite clearly. Set the anti-trip just below the point where the second harmonic disappears.

Another VOX problem that came to my notice recently is where the VOX relay will pull in but will not release. Firstly check the diodes as mentioned in the FT200 Part Two (September), and also check resistor R11, 22K ohms 2 watt. In my case the resistor had gone completely open. The PTT mode was still OK but VOX was quite impossible. You will find that it is necessary to lift one end of this resistor from the circuit to test it.

Next month I will have information on changing Heathkit single-band transceivers to other bands, plus more of general interest. ●

* 3 Fairview Ave., Glen Waverley, Vic., 3150.

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PROJECT AUSTRALIS

With George Long,* VK3YDB

Oscar 6 has now been in orbit round the earth for three months and it is believed that a report on the activities should now be published. It should be noted at this stage that because of the early closing date for the January copy of "A.R." this article was written in the middle of November. Some of the comments in this article may therefore be out of date by the time of publication.

Oscar 6 is the first Amateur Radio Satellite designed for a long life. If all goes well, Oscar 6 may still be operational by January of 1974. This would indeed be a fine achievement for all Radio Amateurs round the world. It could also be worth while to remember that if all goes according to plan Oscar 7 might also be in orbit by that time.

Let us return in time and think about Oscar 6, which is presently with us. Firstly, let me go over some of the technical background. Oscar 6 has the following characteristics:

Input frequency: 145.900 to 146.000 MHz.
Output frequency: 29.450 to 29.550 MHz.
U.h.f. beacon output frequency: 435.100 MHz.
H.f. beacon output frequency: 29.450 MHz.

These are the essential specifications. The other thing to bear in mind is that Oscar 6 has an in-built a.g.c. system and that it will tend to attenuate any excessively strong input signals. Because the a.g.c. is not selective, the attenuation will apply to all signals regardless of their strengths into the satellite. Be warned therefore, the strong may spoil it for the weaker stations. The maximum power required for Oscar for successful communication is not in excess of 150 watts e.r.p. Note that this e.r.p. is not transmitter output. Hence fifteen watts into a 10 dB. aerial pointed at the satellite is all that is required.

The following problems have been noted with Oscar 6:

(a) The h.f. beacon on 29.450 MHz. is very weak and is rarely readable without a really good receiver and, at least, a beam. This is very unfortunate as it makes the telemetry difficult to obtain on this frequency and does not allow for ready acquisition of the satellite. The cause of the weak signals has not been ascertained with certainty, but is believed to be caused by incorrect adjustments prior to launch.

(b) The satellite tends to switch off during, before or after passes, but again the cause of this has not been firmly established, but may be due to pulses appearing on the h.t. bus as the solar cell currents change.

This fault may also cause the satellite to switch on without any ground command but this has not as yet occurred. Unfortunately, this has left the Australis Group with a problem because it requires that persons be available for all orbits. This is not always possible and leads to the satellite being off on some passes. So please bear with us, if the satellite is off when you expect it to be on, then please don't growl; we are doing our best but we have our daily bread to earn.

(c) Possibly a more serious problem is that the satellite is not, perhaps, receiving full charge from the solar cells, caused by an intermittent failure of the Z face solar panel. This is a small panel but the problem could become more serious as the cells deteriorate. This might mean that the time required for re-charging will be longer. The Australis Oscar Group will make every attempt to see that the Oscar 6 satellite is on every week-end when it is possible to have safe operation of the satellite and every effort will be made to keep all interested people informed about what is going on.

It is now possible to give more precise details of the equipment being used to get into Oscar 6. Firstly, on the transmitting side, it has been found that the two best modes are s.s.b. and c.w. S.s.b. seems to be marginally better than c.w. because more can be communicated in a shorter time than is possible with 10 w.p.m. Morse code. As stated previously, it seems that the low-powered s.s.b. stations have as much chance of operating via the "bird" as any high-powered station. One of the best signals into Oscar 6 at the beginning was using 50 watts into a dipole (VK1ZT). This will give you an idea how little power is required.

As for aerials, it seems that two varieties are preferred. Firstly, the old standby—the turnstile performs an excellent job when the satellite is about 10 degrees above the horizon. Below this the ten element (or less, depending on transmitter output power) is found to work very well. We have received reports that at low angles a vertical aerial is better, but this is unconfirmed. Have you any comments?

Bob VK3AOT has done very well using a.m. He is the only one I know who has done well using this mode and the Group would like to hear from anybody else who has used a.m., either with or without success.

On the receiving side, a good receiver is essential. It has been found that a barefoot commercial transceiver does leave something to be desired, but an appropriate 10 metre pre-amplifier (using an MPF121 or similar) will make all the difference.

Many types of aerials have been used with various results, but two easily constructed ones prove to be very successful. A groundplane is quite good when the satellite is not more than 30 degrees above the horizon. The other very useful aerial is the crossed dipole (a scaled-up 2 metre turnstile) but this is not the most effective if the satellite is on a low elevation pass.

The most successful system seems to be a combination of a crossed dipole and a groundplane with the ability to switch between the two. This is very important so that the best one may be selected quickly.

EXTRACTS FROM AMSAT 1972 ANNUAL REPORT

Amsat, the Radio Amateur Satellite Corporation, is a non-profit organisation founded in 1969 to develop amateur satellites and satellite experiments for the Amateur Service. Amsat's activities are conducted primarily through its members, under the guidance and co-ordination of an elected seven-member Board of Directors, and officers elected by the Board. Membership is international, and there are currently over 640 members and 52 member societies in 36 countries, representing a growth in membership of 50 per cent. in the last year.

Accomplishments for the Year 1972.—In January, the Amsat Board of Directors approved the construction of a new amateur communications satellite on a "crash" basis, to be ready in time for a launch with the ITOS-D meteorological satellite in the latter part of 1972. This satellite, Amsat-Oscar-C (A-O-C) was to be based on the use of the W5CAY Morse code telemetry and Codestore message storage systems, the W.I.A.-Project Australis command system, and the Amsat two-to-ten metre linear repeater, all of which had been constructed for the more complex Amsat-Oscar-B (A-O-B) multiple repeater satellite. The decision to develop A-O-C provided more time to complete and test the additional systems planned for A-O-B.

Amsat-Oscar-C is now familiar to all of us as Oscar 6—the first of a series of long life-time amateur satellites designed for a period of operation of a year or more in space. Its 910-mile altitude sun-synchronous orbit makes tracking fairly simple, since the satellite passes repeat at similar times on a two-day cycle.

Oscar 6 represents several innovations in space. This is the first time that satellite telemetry has been transmitted to the ground directly as Morse code. It is the first time a digital memory system, Codestore, has been used for the store-and-forward of Morse code and teletype communications/operations messages. A two-to-ten metre linear repeater designed for multi-channel communications is in operation from space for the first time, and also for the first time a beacon is operating in the new 435-438 MHz. portion of the 70-centimetre band allocated to the Amateur Satellite Service at the 1971 I.T.U. Space Conference. Oscar 6 also contains a 21-function command system capable of changing the operating conditions of the spacecraft by ground control.

In June, an Amateur Satellite Service Committee was established comprised of representatives of A.R.R.L., Project Oscar and Amsat. Chaired by W. W. Eitel, WA7LRU/W6UF, Chairman of the Board of Project Oscar, the committee will develop plans for funding and staffing satellite projects, advise on regulatory matters affecting the Amateur Satellite Service, and organise programmes for the public service use of amateur satellites.

In 1971, Amsat submitted a proposal to provide a ten-metre amateur station to fly aboard Skylab-A. N.A.S.A.'s manned orbiting laboratory scheduled for launch in 1973. The project, named Skylarc (for Skylab Amateur Radio Communications) was designed to encourage the use of space techniques by amateurs throughout the world, while providing the opportunity to communicate directly with astronauts during their leisure time. On January 7, 1972, N.A.S.A. sent Amsat a letter rejecting the proposal. The letter, in part, said: "It is with real regret that I must inform you that, in spite of the broad appeal of your concept and a generally favourable disposition to encourage Amsat activities, N.A.S.A. has concluded that we cannot add it to Skylab at this stage of the programme, and therefore, we must reject your proposal."

Amsat has also proposed to N.A.S.A. an amateur repeater experiment for launch as part of the ATS-G Applications Technology Satellite now planned for launch around 1976. This experiment, Syncart (Synchronous Amateur Radio Transponder) was proposed as a 146-to-435 MHz. 20-watt linear translator to be integrated into the ATS-G spacecraft for flight into synchronous orbit at a stationary position over the equator. While no final action has been received with regard to this proposal, present indications are that difficulties in implementing a suitable antenna feed system on ATS-G may cause N.A.S.A. to turn down the Syncart proposal.

Current Activity.—With the successful launch of A-O-C/Oscar 6 on October 15, Amsat activities are currently concentrated on assuring the most effective and efficient use of the satellite. Control stations have been established on the East and West Coasts of the United States, Eastern and Western Australia, and New Zealand, with an additional station planned in Europe. Codestore loading stations are also being set up in various parts of the world.

In conjunction with Oscar's operation in space, a contract has been awarded to the Talcott Mountain Science Centre to prepare a workbook containing curricula based on the use of amateur satellites as tools in the classroom. This workbook is expected to be completed shortly for distribution to schools throughout the world. In addition, several fellowships are being offered to educators outside the United States to spend a school term at the Talcott Mountain Science Centre to learn how amateur satellites can be used in classroom instruction. Upon their return home, these persons will use this experience to teach students in their own countries the various aspects of space science using Oscar 6 and future amateur satellites.

Also in the planning stages are experiments to use amateur terminals aboard small airplanes and boats for communications through Oscar 6. The successful two-way transmission of slow-scan television pictures has already been documented, and medical data exchange is also planned via Oscar 6.

Concurrently with the operation of Oscar 6, construction of Amsat-Oscar-B is continuing. During the past year Amsat has employed two aerospace technicians who were instrumental in completing Oscar 6 in time for its October launch. These technicians are now working on the A-O-B project constructing additional Morse code telemetry encoders, Codestore units, two-to-ten metre repeaters, and other systems needed for A-O-B. Amsat is expecting the delivery of the DJ4ZC/DJ5KQ Euro-Oscar repeater flight unit, which is now completed. This linear repeater has an uplink from 432.125 to 432.175 MHz., a downlink from 145.975 to 145.925 MHz. (inverted passband), and an output of 10 to 14 watts p.e.p.

Future Activity.—Looking ahead to this next year, Amsat will be most heavily involved in maintaining operation of Oscar 6 in efforts to maximise its usefulness and its operating lifetime. Concurrently, construction of Amsat-Oscar-B will continue at a rapid pace, with the hope of its launch soon after the end of life of Oscar 6. Because of this high level of activity, Amsat is in urgent need of volunteers to assist in the development of satellite hardware, and administrative and financial help is also needed if these projects are to be successful.

AMSAT COMMENT

"Amateurs 5000 miles apart should be able to communicate through Oscar 6 . . . K2RTH of New York was able to hear his own signals through the satellite when it was over Dakar in West Africa, over 3,000 miles away."

AMENDMENTS TO A-O-C TELEMETRY DATA

See Table on Page 11 of "A.R.," November, 1972.

(a) Channel 1A—
Parameter Range: 80.
Channel 6B—
Parameter Calibration: not meaningful.

(b) Amendments to final column (Final Calibration Data/Comments)—
1B: 1 plus x equals minus 1.078 N plus 105.8 (mA.).
1C: 1 minus x equals minus 1.102 N plus 107.2 (mA.).
1D: 1 plus y equals minus 2.240 N plus 219.0 (mA.).
2A: 1 minus y equals minus 2.105 N plus 205.5 (mA.).
2B: 1 plus z equals minus 4.300 N plus 417.0 (mA.).
2C: 1 minus z equals minus 4.100 N plus 402.5 (mA.).

(c) No other amendments are required.

CONTESTS

With Peter Brown,* VK4PJ

VK-ZL CONTEST, 1972

This contest seemed to go along okay although here I hardly made a contact with Ws and Ks when I was on the phone section of 20 metres. South America was open on Sunday afternoon, but not enough there. Japanese stations swamped 15 metres as far as I was concerned and as usual at times could be contacted several a minute.

I looked for Gs on 10 and 15 metres without much success, but George VK4XY told me that there was quite some 10 metre activity with G land after the VK-ZL finished.

When I listened the c.w. section was too much for me, but I don't know how long that activity continued.

I was very disappointed with 80 metres—only making one ZL contact. Where were they?

YJ8BL and VR1AA were in terrific demand and must have amassed a terrific score. It is very good to have high scorers to set a standard or goal if you wish and I hope that they can be with us next year.

CONTEST DATES

Ross Hull: On now, 1401 GMT, 4th December, 1972, to 1400 hrs. GMT, 21st January, 1973.

John Moyle National Field Day, 0600 GMT, 10th February, 1973, to 0800 GMT, 11 the February, 1973. The second week-end in February.

Remembrance Day 1973: August, get that c.w. operational, not much time. ●

* Federal Control Manager, Box 638, G.P.O., Brisbane, Queensland, 4001.

1973 CQ WW 160 METRE CONTEST

Mr. P. Nesbit, VK3APN, writes:—

STARTS: 0000 GMT, Saturday, January 27.

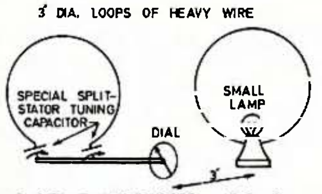
ENDS: 1500 GMT, Sunday, January 28.

1. This is a CW contest. No CW to phone or cross band contacts allowed.
2. Exchanges will consist or RST plus serial number starting from 001. W/VE/VO stations.
3. Claim 2 points per contact with stations in the same country, 5 points per contact with stations in other countries except W/VE/VO, 10 points per contact with W/VE/VO stations.
4. A multiplier of one (1) is allowed for each State, Canadian province, or country worked.
5. Final score equals total QSO points multiplied by total multiplier.
6. Awards will be made to the top-scoring station in each country. Second and third place awards will also be made if the score participation warrants.
7. Send logs to: Contest Chairman, Charles M. O'Brien W2EQS, 190 Knickerbocker Road, Apt. 9, Englewood, NJ, 07631, USA. The mailing dead-line is February 28 ●

THE HISTORICAL DEVELOPMENT OF U.H.F. CIRCUIT TECHNIQUES

(continued from Page 10)

crude wavemeter, using conventional circuit elements, was devised from a low capacitance, split-stator, tuning gang and a single loop of heavy wire. The indicator was a small lamp in series with another loop coupled to the first. An illustration is given in Fig. 4.[8]



5 METRE WAVEMETER FIG. 4

Again, in January 1926, in "QST" an article was published by Harry Lyman. In the article, the author described circuits capable of working at 200 MHz. These circuits extended and refined the principles used earlier by Kruse.[9]

These crude early techniques paved the way for later developments, experiments and use by both Amateurs and research organisations. The techniques developed during this period though, enabled an extension of the usable frequency spectrum to take place up to a frequency approaching 600 MHz. This was achieved mainly through the use of Barkausen type oscillators mentioned previously. ●

(to be continued)

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VHF UHF

an expanding world

With Eric Jamieson,* VK5LP

Closing date for copy: 30th of month.
Times: E.A.S.T.

VK0	53.100	VK0MA, Mawson.
	53.200	VKOGR Casey.
VK2	52.450	VK2WI, Dural.
VK3	144.700	VK3WI/R6, Vermont.
	144.925	VK3QZ, Traralgon.
VK4	52.400	VK4WI/2, Townsville.
	144.390	VK4WI/R1, Toowoomba.
VK5	53.000	VK5VF, Mt. Lofty.
	144.800	VK5VF, Mt. Lofty.
VK6	52.006	VK6VF, Bickley.
	52.900	VK6TS, Carnarvon.
	52.950	VK6VE, Mt. Barker.
	144.500	VK6VE, Albany.
	145.000	VK6VF, Bickley.
VK7	144.900	VK7VF, Devonport.
VK8	52.200	VK8VF, Darwin.
ZL1	145.100	ZL1VHF, Auckland.
ZL2	145.200	ZL2VHF, Wellington.
	145.250	ZL2VHP, Palmerston North.
ZL3	145.300	ZL3VHF, Christchurch.
ZL4	145.400	ZL4VHF, Dunedin.
JA	52.500	JA1IGY, Japan.
HL	50.100) 52.010)	HL9WI, South Korea.

*Forreston, S.A., 5233.

Refer to December, 1972, issue of "Amateur Radio" for listing of additional beacons which may be heard should conditions be suitable, and for television stations sound carrier frequencies.

The current listings of beacons in the New Zealand Call Book show the following as additional operating in that country:— 145.150 ZL1VHW; 431.800 ZL2UHF; the correct call sign for the Palmerston North Beacon on 431.850 is corrected to ZL2UHP.

It would appear the Australian beacon listings will be thrown into some confusion in the future with the proposed changes to call signs as indicated by the P.M.G. Department, so it will be up to the various groups operating the beacons to keep me informed of changes so the beacon listings may be as accurate as possible. It would have been nice to see single letter call signs for the beacons but, as these are not available, the the suggested three letter suffixes will be quite an improvement on the present call signs which include oblique strokes, and listeners now will mainly need to concentrate on getting the call area figure and the last letter to readily identify a particular beacon.

144 MHZ MOONBOUNCE IN VK5.

Congratulations to Chris VK5MC at Hatherleigh, near Millicent, in the south-east of S.A., who has been rewarded for his great efforts by hearing his own 144 MHz CW signals reflected from the lunar surface. Chris first heard his signals on the evening of 24th October, 1972, but was unable to tape the signals due to severe interference from his tape recorder. On 28th October Chris was again successful in hearing his own echoes, and with a different recorder secured 11 minutes of his E.M.E. experiment. Times were 00.24 to 00.35, peaking at 00.32 S.A.S.T. Those hearing the tape have found it very fascinating, with some very clear echoes evident.

Chris is running 100 watts of CW from a 4X150A into four stacked rhombics of 50 wavelengths per leg. Converter has a TIS88 front-end into an early model FR100 receiver, with an active audio filter using IC's, following it — bandpass probably being less than 200 hertz. The first echoes were heard using an MPF121 in the front end, this having to be pressed into service in a hurry as the original TIS88 had been destroyed by an electrostatic charge from the large rhombic array. Adjustments will be needed to the rhombic as it has now been found to be nearly one degree out of the intended position.

This effort is probably the first successful attempt in S.A. and by one of the few actively engaged in E.M.E. experiments. The project was started just after Christmas, 1971, and in less than nine months echoes were heard. Chris would like to thank the Mt. Gambier amateurs, in particular, Trevor VK5TN, for their assistance with the project.

REMEMBRANCE DAY CONTEST

Suppose I will be accused of being smug, but congratulations to VK5 for their effort in winning the contest, looks like a bit of arm-twisting pays off sometimes! Pleased to note also that in at least three States some increased interest was shown by VHF operators. VK2 submitted 7 VHF logs; VK3-6; VK4-15; VK5-18; VK6-1; VK7-24. Perhaps the contest this year was only a trial run for some of the VHF participants, and next year we can hope to see a greater number of submitted logs from all States. In this way we can be assured of keeping some place in the contest in the future.

ROSS HULL CONTEST

By the time you read this most of the Ross Hull Contest will be over, but don't forget to send in your logs to reach the Contest Manager not later than 23rd February, this gives you five weeks. Will be interesting to see what effect the two contacts per day with the same station has on the overall interest.

NATIONAL FIELD DAY CONTEST

The John Moyle National Field Day Contest on 10th and 11th February has been amended sufficiently from previous years to warrant an increase in interest if only to try out some of the alterations. At the moment the idea of separating the true field day stations from mobile stations or stations more or less permanently mounted in vehicles is a good one, and it will be interesting to see what happens.

The Federal Contest Manager, Peter VK4PJ, is certainly putting some effort and interest into the various contests to try and make them more interesitng for us all, perhaps we can do a little in return by joining in the contests and ensuring a log is sent in. Anyway, there is still time to get organised for the Field Day.

NOTES FROM HERE AND THERE

A short letter with QSL card from Ron VK4ZLC indicates he is now living in Townsville (probably having moved there for the JA signals!) and reports he is operational on 6 metres AM, 52.525 FM and Channel B, and is building 2 metre gear for the car. 146 MHz activity is not great in Townsville, "but they are working on it."

Also from Townsville comes a letter from Ron VK4ZTK, who reports reception of 6 metre beacons from VK5 and VK8 on the same evening, 13th November. No answers to his calls. Hopes to be quite active on 6 metres this year. Thanks for writing, Ron, perhaps some more general news from the North would help to put you on the map.

Oscar 6 has certainly created quite a lot of interest, and some interesting contacts have been made. Strongest consistent station at this QTH appears to be VK6HK.

REPEATER FREQUENCIES

Appears at present that three States will be making the change in repeater frequencies on 1st February, VK3, 5 and 7, thus confirming the series of motions recently circulated by Federal Executive. New frequences will be:—

Ch. 1 — 146.1 in; 146.7 out.
Ch. 2 — 146.2 in; 146.8 out.
Ch. 3 — 146.3 in; 146.9 out.
Ch. 4 — 146.4 in; 147.0 out.
Ch. 5 — 146.15 in; 146.75 out.
Ch. 6 — 146.25 in; 146.85 out.
Ch. 7 — 146.35 in; 146.95 out.
Simplex Channels: 146.0; 146.45; 146.5; 146.55; 146.65.
National Teleprinter Channel: 146.6.

That's all for this time. Not as much as usual, one reason being I have been completely off the air during the month whilst changing 6 and 2 metre equipment over to SSB operation. Probably the other best reason is that with the earlier time of closing for the copy not so many people have written in time for these notes.

The scope of these notes can be widened if you want it, if anyone cares to write with interesting information on other aspects of amateur radio, such as amateur TV, especially if the information is likely to be of interest to other areas of Australia.

A New Year has dawned, may it be a successful and prosperous one for you all, with plenty of DX, and trouble-free running of your gear. Closing with the thought for the month:— "You could get rich manufacturing crutches for lame excuses."

—The Voice in the Hills.

HOW TO PREDICT OSCAR DX

Is the heading of an article in October QST by the managing editor of QST. This features a chart showing the use of low power between 145.90 MHz and 146.00 MHz, and high power outside these limits. He states: "In the low power area signals in excess of 100 W erp will distrupt the normal functioning of the repeater"—"Adjust your frequency, power and antenna so that at no time your repeated signal exceeds the strength of Oscar's 29.45 MHz beacon."

INTRUDER WATCH

With Alf Chandler, VK3LC

I have been alerted to a new kind of Intruder in our bands — Commercials using Amateur Call-signs; 9K2BG, MP4AB and others. With the easy access to Amateur equipment between 0800 and 1300 GMT stations in Kuwait, Saudi Arabia and Dubai (in the Trucial States) are using 14280 to 14350 Khz to pass their commercial, political and part-military traffic using the Arabic language.

Anybody in our fraternity speak Arabic?

The general indifference shown by the majority of Amateurs in a large measure eases the path for these usurpers.

I often wonder what those Spanish speaking stations below 14200 Khz are talking about.

Can anybody give me a translation?

*Federal I.W. Co-ordinator, 1536 High St., Glen Iris, Vic., 3146.

"20 YEARS AGO"

With Ron Fisher, VK3OM

TWENTY YEARS AGO, JANUARY, 1953.

Reading through old copies of Amateur Radio, every once in a while, I find an item of unusual interest. Contained in the Federal Notes of the January, 1953, issue, is one such item worth quoting.

"Recording and playback of other amateurs' transmissions". In the past permission had been granted upon application to the Superintendent, Wireless Branch in the State concerned, for 10 amateurs in VK2 and VK3, and five amateurs in VK4, VK5, VK6 and VK7. Under those conditions half of the number in each State was to be composed of Institute members and half non members except that should insufficient applications be received from non members the vacancies could be filled by Institute members.

Rather a quaint ruling. However, from that date, it became possible for any amateur to apply for a permit to record and replay amateur transmissions. The permit was granted provided that the applicant could satisfy the Wireless Branch that the recording equipment was capable of producing recordings of good quality.

The Editorial page extolled the value of the National Field Day contest in its connection with the Civil Defence Scheme and expressed the hope of greater participation. The rules for 1953 had undergone quite a few changes from previous years. Most important was the reluction in duration of the contest to a twelve hour period on the Sunday only. Transmitter power was limited to a maximum of twenty-five watts input. I have often felt that perhaps our present Field Day rules could be improved with the inclusion of a section for low power, home built equipment. These were also the days before the multi operator set-ups moved in.

Technical articles for January included part two of N. Southwell's Phasing Type Single Sideband and Suppressed Carrier Exciter. By the same author, an article on Quarter Wave Matching Stubs Impedance Calculations. D. W. Tacey, VK3DW described his Foolproof Antenna Tuning-Final Loading System. He used a normal parallel tuned set up, but fed the antenna either from one side of the coil, or from the centre point of the split-stator tuning condenser. Results claimed a 200-mile contact on 80 metres with an S8 report using an indoor 30-foot antenna.

Chris Cullinan was at it again, this time with his "Superb 30 watt Modulator". A pair of 807's with inverse feedback provided the power which could be used to modulate the transmitter or act as a Hi-Fi record playing amplifier. Dr. A. F. Taylor, VK3AT, described his approach to FM using a diode modulator. This system was claimed to have several advantages over the reactance tube modulator.

Looking down the list of new call signs, P. J. Healy, VK2APQ, and K. E. Pincott, VK3AFJ. Both names and call signs seem to ring a bell somewhere. ●

Magazine Index

With Syd Clark, VK3ASC

"73 MAGAZINE"

August (one of Wayne's more interesting issues): Navassa; Slow Scan Television; Premodulation Speech Processor; Two Buck Signal Generator; Transmitters, Then and Now; Practical Amateur FM Repeaters; El Cheape Test Probes; Prog. Line Power Supply; Random Access Switching; Diode Receiver for 432 MHz.; The Taming of the HHRW; $5 Pre-Amp. Compressor; Push-to-Talk for the Sixer; Audio Distribution Panel; Voltage Multiplier Supply for Scopes; VFO Operation for the Twoer; /MM Manoeuvres; The Sun and Radio; Poor Man's Transcanner; SCR Regulator for KW Power Supplies; The Ideal Crystal Oscillator; The HW-16 on Phone; FM Adaptor.

"QST"

September: A Simple Function Generator; Some Plain Facts About Multi-Band Vertical Antennas; A 4000-Channel Two Metre Synthesizer; Four Bands on a Pole; Fundamentals of Solid State Power Amplifier Design, Part 1; The Pip-Squeak gets Smaller; Universal Power Supply for the Amateur Station; Synthesis of a Varicap; A "State of the Art" Approach to Multi-Band FM; Amateur Activity in South Dakota Flood Disaster. ●

Ionospheric Predictions

With Bruce Bathols,* VK3ASE — JAN. 73

Here are the Predictions for January 1973 from Charts supplied by the Ionospheric Prediction Service Division.

As from this month, the "Series P" charts have been drastically reduced and have been replaced by "Grafex" charts which are supplied by a computer. These new charts have been specially designed for Amateur frequencies and show predictions for the Bands 7 and 28 MHz.

Predictions from all Australian capital cities to the following areas are available:

Auckland, Cairo, Honolulu, Johannesburg, London (short and long paths), Macquarie Island, Montreal (short and long paths), Moscow, New York, Port Moresby, Rio-de-Janiero, San Francisco, Tokyo and West Africa (short and long paths).

For the purpose of the publication of this information in "Amateur Radio", it must be appreciated that space limitations will curtail the printing of the entire list. However, in the initial stages, I will endeavour to publish all of the countries I have predictions for, and concentrate on the Eastern States where the Amateur population is the heaviest.

Predictions for the 7 MHz. band will be reduced in favour of the higher frequencies, to show their openings as they occur periodically.

Comments from readers on the above remarks would be most appreciated and correspondence should be sent to me at the address shown at the foot of the column.

Use of the F1 mode is shown only, although other modes may extend the openings. All times are GMT.

28 MHz.—

VK5	to	JA		0100-0800
VK7	,,	VK9		0200-0700

21 MHz.—

VK1/2	to	SU		0500-1200
,,	,,	G	S.P.	0800-1500
,,	,,	G	L.P.	0900-1100
,,	,,	VE	S.P.	1500, 2000-2400
VK3	,,	UA		0500-1300
,,	,,	W6		2000-0300
,,	,,	PY		0900
,,	,,	ZS		0700-1100
,,	,,	KH6		2000-1000
VK4	,,	W1		1500, 2000-2400
,,	,,	G	S.P.	0800-1500
,,	,,	G	L.P.	0900-1300
VK5	,,	W6		2000-0300
,,	,,	JA		2400-1500
,,	,,	5Z	S.P.	0600-1100
,,	,,	5Z	L.P.	0800-1500, 2000-0300
VK6	,,	W6		2300-0300
,,	,,	PY		1000-1100
VK7	,,	G	S.P.	0700-1200
,,	,,	G	L.P.	1000
,,	,,	VK9		2100-1600

14 MHz.—

VK1/2	to	ZL		1900-1500
,,	,,	SU		0900-2400
,,	,,	G	S.P.	0700-1500
,,	,,	G	L.P.	0900-1300
,,	,,	VK0		1900-1500
,,	,,	VE3	S.P.	1400-2100
,,	,,	VE3	L.P.	1400-1800, 2000-2400
VK3	to	UA		0700-1500
,,	,,	W6		0400-0600, 1600-2100
,,	,,	PY		0400-1200, 1800-2400
,,	,,	ZS		1200-1700, 2000-2100
,,	,,	KH6		0400-1400, 1800-2100
VK4	,,	W1		1400-2100
,,	,,	G	S.P.	0700-1700
,,	,,	G	L.P.	0800-1200, 2000-2200
VK5	,,	W6		0500-0600, 1600-2100
,,	,,	JA		0600-1600, 2100-2400
,,	,,	5Z		1400-1800, 2100-0100
,,	,,	5Z	L.P.	0500, 0700-2100
VK6	,,	W6		0600, 1600-2200
,,	,,	PY		1700, 2200-0200, 0800-1200
VK7	,,	G	S.P.	0800-1800
,,	,,	G	L.P.	0900-1500
,,	,,	VK9		0500-2300

7 MHz.—

VK1/2	to	UA		1200-2000
,,	,,	W6		0800-1600
,,	,,	PY		0400-1200, 1800-2300
VK3	,,	G	S.P.	1400-2000
,,	,,	G	L.P.	0900
,,	,,	VK0		0900-1900
VK4	,,	KH6		0800-1700
VK5	,,	ZS		1600-2100
VK6	,,	W1		1000-1400
VK7	,,	SU		1500-2000

* 3 Connewarra Avenue, Aspendale, Vic., 3195.

AWARDS COLUMN

With Geoff Wilson,* VKAMK

Two new awards are now available to Australian Amateurs. The first, to be known as the "Australian V.H.F./U.H.F. Century Club Award", is an extension of the former V.H.F.C.C. Award to cater for the increasing interest in the bands 420MHz. to 2450MHz. It will now be possible under the new rules for an operator to obtain a separate award for each authorized band between 52 and 2450 MHz.

The second award, to be known as the "Worked All VK Call Areas (V.H.F.) Award", is similar in character to the WAVKCA award currently offered to overseas HF operators. VHF operators will be required to contact all call areas of Australia from VKI—O on 52 MHz. or above, the number of stations to be worked from each call area being given in the appendix to the rules. This award is considerably more difficult than the present W.I.A. 52 MHz. W.A.S. Award, of which in excess of 100 have now been issued. It is hoped that the new award will stimulate activity especially from VK9 and VKO, and currently a number of stations are active in these areas.

It is noted that the full rules for both these new awards will appear in the new Call Book. Both were set out in full in the 1972 Federal Convention minutes.

CHANGE OF ADDRESS FOR ALL W.I.A. FEDERAL AWARDS

All applications for awards, inquiries, &c., for W.I.A. Federal Awards are to be addressed to the following: "The Federal Awards Manager, W.I.A.", P.O. Box 150, Toorak, Victoria, 3142, AUSTRALIA.

Please do NOT send correspondence to Box 2611W, Melb., Box 67, East Melb., or direct to the home or QTH of the Fed. Awards Mgr.

* 7 Norman Ave., Frankston, Vic., 3199.

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VHF Transmitters, two only, 522 VHF Transmitters, 832A. What offers? VK4QS, 6 Robinson St., Belgian Gdns, 4810, Queensland.

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Heathkit, SB301E, RX with 400Hz CW filter, SB401E TX SB610 monitor scope, coupled to RX and TX SB600 speaker. Some spare valves; S650. Matching units, A1 condition. VK2ZH, ph. (02) 428-2253.

Y.R.C.S.

With Bob Guthberlet*

Greetings to all Supervisors, Club Leaders, Instructors and members. Yes, it's that time of the year. Many clubs will go into recess for the Christmas and New Year period. May all of you have a happy period of rest and relaxation, returning in 1973 to greater success with Y.R.C.S.

Here is something for you to think about. It has been suggested to me that we should eliminate the words "Youth Radio Club Scheme" overprinting from our proficiency certificates and substitute "Amateur Radio Training Scheme". The reason given for the suggestion is that senior members of some clubs might think it beneath their dignity to receive a "youth" award. What is dignity? Some years ago a public speaker said, "Dignity is the starch of the shroud — the more dignity yau have the nearer you are to the grave." Apart from this interpretation there is the question of our new Constitution, in which Clause 3 under objectives states: "To develop in young persons an interest in radio and electronics, etc., etc." My concern is that to substitute the word "Amateur" could be interpreted as an aim to make club members amateurs in the popular usage of the word.

* Federal Co-ordinator, W.I.A.-Y.R.C.S., Methodist Manse, Kadina, S.A., 5554.

BOOK REVIEW

With Syd. Clark, VKASC.

"FREQUENCY MODULATION BROADCASTING" Report of the Australian Broadcasting Control Board, June, 1972.

The recommendations are that a Frequency Modulation Broadcasting Service should be set up and that the system consist of National, Commercial and Public Broadasting Stations operating in a band 40 MHz wide between 470 and 540 MHz.

Since the Australian Service will be unique, no recommendations have yet been made as to the technical standards to be used and we may use methods of broadcasting mono, stereo or quad services which differ greatly from those adopted overseas. Whether or not our great-grandchildren will decide we should have put colour TV on UHF and FM on the VHF (88-108 MHz.) band used in the U.S.A. only they will know. By 1977 it should be practical to produce receivers which use a synthesizer technique to lock the local oscillator to a crystal; or a reference frequency transmitted by the FM station. Furthermore, FM broadcasting stations can be employed on a number of services simultaneously without interaction between them.

Now that the ABC has made its recommendations and the Federal Government has indicated that services will commence about 1977 it is up to industry to ensure that the Australian Service is superior to similar services which already exist.

WIRELESS INSTITUTE OF AUSTRALIA—VICTORIAN DIVISION

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A.O.C.P.: **12-Month Course** commences **February 1973** and is conducted each **Friday night**. Cost: $25 members, $38 non-members; includes lecture notes. Other 12-month A.O.C.P. Courses commence August 1973.

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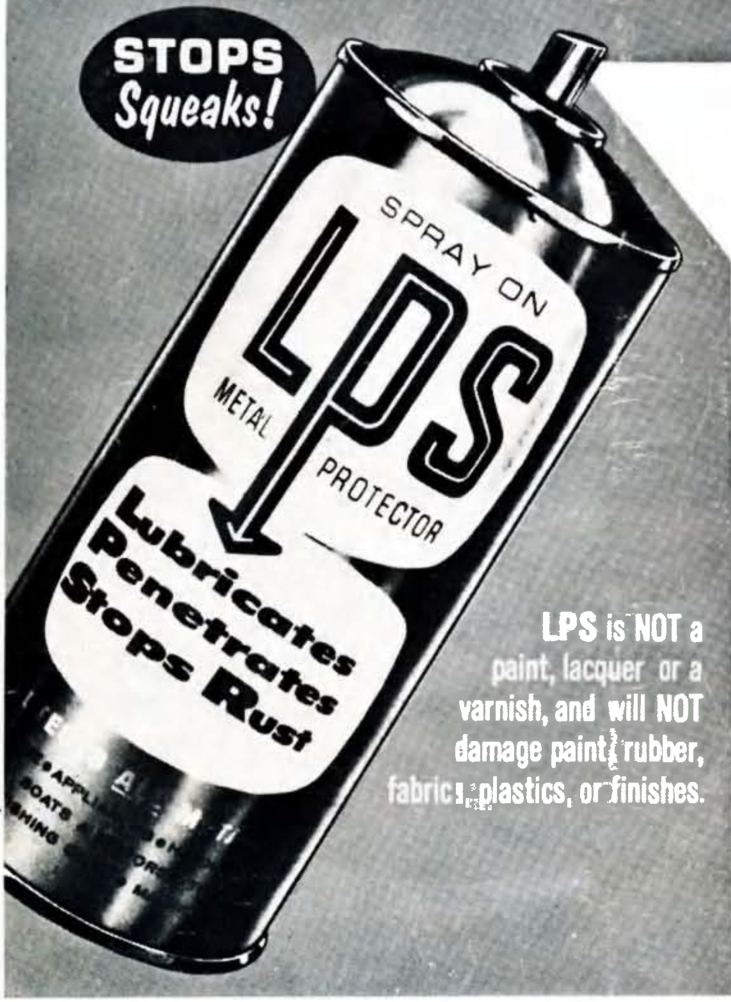

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MODEL AS-100D/P — Price $34.50

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MODEL OL-64D — Price $19.75

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MODEL A-10/P — Price $55.00

Giant 6½ inch meter. In-built signal injector, overload protected.
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amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA. FOUNDED 1910

FEBRUARY, 1973
Vol. 41, No. 2

Published monthly, as the official journal, by the Wireless Institute of Australia. Reg. Office: Above 474 Toorak Rd., Toorak, Vic., 3142.

Enquiries and material to:
The Editor, Phone (03) 24-8652.
P.O. Box 150, Toorak, Vic., 3142.

Copy is required by the third of each month. Acknowledgment may not be made unless specially requested. All important items should be sent by certified mail.

The Editor reserves the right to edit all material, including Letters to the Editor and Hamads, and reserves the right to refuse acceptance of any material, without specifying any reason.

Advertising:
Advertisement material should be sent direct to the Editor by the 25th of the month preceding the month prior to publication.

Hamads should be addressed to the Editor by the third of each month.

Printers:
"RICHMOND CHRONICLE"
Shakespeare Street, Richmond, Vic., 3121
Phone 42-2419.

CONTENTS

COVER

The presentation in November of a beautiful certificate by Mr. I. W. N. Clarke as Branch Organiser of J.O.T.A. to Mr. Paul Hayden, President of the VK4 Division, marks the esteem in which the Scouts hold Amateur Radio.

QSP

SCHIZOPHRENIC

Lovely word, isn't it? According to one of my dictionaries it means "a person of split personality". Where could such a person fit into amateur radio?

We all agree that amateur radio is the greatest hobby in the world. It supplies a training ground for the future electronic wizards, it encourages peace and understanding between the peoples of the world, it can be enjoyed by young and old. BUT, let's face it, it also breeds some mighty peculiar types in its ranks. There is the HF man who thinks the spectrum stops at 30 megs., the VHF man who thinks CW is a barbaric form of communication, the AM man who can't bear duck talk, the list is endless.

One of the most peculiar is the man who does some job for the Institute. It may be relaying the Sunday broadcast every week for years on end, or organising a programme of lectures, or working on the Divisional Council, or one of the jobs, large or small, which must be done to keep the Institute a viable, active body.

Of this most peculiar group the one to whom the title "schizophrenic" can readly be applied is the Divisional Councillor. Within his home division he is regarded as representing that ferocious body, the Federal Executive. At Federal Conventions he is regarded as being the private devil sent to raise Hell by a Diabolic Division. If he didn't have a split personality when he started, it's London to a brick that he will have one after a couple of years.

With the formation of the Federal company the Federal Councillor's job became somewhat more exacting than before. Previously he could cast his vote with the knowledge that there was always the chance to retract on his return to his Division if he found that his vote did not reflect the Divisional attitude. Now that loophole has been closed, and his vote at the Convention is binding on the Division. In this day of rapid progress no one can afford to wait two or three months to make up their minds, and for this reason the Constitution of the Company made the requirement that the voting at a Convention be binding.

Where does this leave the Federal Councillor? Now, more than ever, he must be a man whom the Divisional members feel they can trust, and he must know the feeling within his Division on a number of widely different matters. The first qualification is one which is not easy to express. It is not necessarily being a "good egg" who will bend over backwards to carry out every whim of the members, for, by his position, the Federal Councillor often has access to classified information which has a direct bearing on the topic, and which he must apply without revealing. I think that to earn the member's trust, the Councillor must at all times give a straight answer, be it yes or no, and stick to it. This may not always win a popularity poll, but at least the members will know where they stand.

The second qualification is easy meat. All the Councillor has to do is monitor every contact on every band every day, and listen to every member all day every day. Obviously impossible, so what can he do? Not as much as YOU, the average member, can do. Your Federal Councillor will welcome your thoughts on Institute matters. Don't wait until the next General Meeting to pass them on. The P.M.G. has a wonderful system called the telephone, and it also runs a mail delivery service. Of course, if you hear the Councillor on the air, you can contact him there and pass on your thoughts, but please remember that he too would like to be a radio amateur sometimes, so let him enjoy the hobby once in a while. Most Federal Councillors are available at work by phone, but not all bosses are radio amateurs, so use some discretion during working hours. Judging by Federal Conventions, most Federal Councillors are night owls so there should be ample time after tea to ring him and let him know how you or a group of members feel on a particular topic. If you are so inclined, scribble your comments or thoughts on a sheet of paper and post or give them to your Councillor.

After 10 Federal Conventions I feel that one of the loneliest places in the world is sitting at the Convention table facing the rest of the delegates. It can be and is made less lonely by the knowledge that your Division has faith in your ability to protect their interests and that the members have given you the ammunition to fight on their behalf.

So far we have looked at the Federal Councillor from the Divisional side. From the Executive side the Councillor is the Division. All requests and directives are passed through the Councillor, and in exactly the same fashion the Executive must trust the Councillor to represent them fairly to the members. To this end, the Executive must accept the responsibility of passing on information to the Councillor so that he can assess the matter and discuss it with his Divisional Council and the members. As with the members, Executive sometimes leaves the Councillor in the dark as to feelings and thoughts on topics. The result is the same — the Councillor is left holding the baby.

Of all Institute jobs that of Federal Councillor is probably the most rewarding and most depressing. From one side or the other the Federal Councillor is bound to be wrong sooner or later, but if he is wrong for one, he is right for the other. Schizophrenic, yes; happy, YES.

GEOFF TAYLOR,
VK5, Federal Councillor.

COST OF "AMATEUR RADIO"

How much of your subscription is swallowed up by the cost of A.R.? 40 cents per copy? No. This is the cover price for direct subscriptions and "one off" sales. Your subscription in 1973 contributes $2.64 towards A.R. Can you think of any other periodical of comparable standard being as cheap as this? Out of this yearly amount the costs of postages, wrappers and addressing absorb about 90 cents, leaving only a little over 14 cents per copy for printing and other costs. Is this a bargain?

OSCAR 6 VHF BEACON

Late news prior to going to press is that the 435.1 MHz beacon is inoperative after nearly three months of excellent performance.

J.O.T.A.

The World Co-ordinator in Geneva writes that the 15th Jamboree-on-the-air, as heard via HB9S, was better than ever before. The station HB9S, located 1600 metres a.s.l., closed early because of a first-of-the-season blizzard—they said the temperature was —10 deg. C. and when they took the dipole down (the storm had attended to the quad) it was 5 in. thick with ice! The 16th J.O.T.A. is 20th and 21st October, 1973, so get your new diary entered up for this event.

JUNE, 1972, A.R.

Can anybody donate an unwanted copy of June, 1972, A.R. to the Executive office? This request derives from the fact that this issue is out of print.

CANBERRA EASTER CONVENTION, 1973

The dates are April 20th to 23rd in Canberra and a capital programme has been planned by the Canberra Radio Society, P.O. Box 1173, Canberra, A.C.T., 2601. The only problem may be accommodation. Early reservations are essential.

QUEENSLAND STATE CONVENTION, 1973

The date of the VK4 State Convention is 6th/7th October, 1973, instead of the Queen's Birthday weekend in June. The venue — Ipswich Amateur Wrestling Club Hall — tights optional.

(Continued on Page 5.)

TUNING THE QUAD— THE EASY WAY

*BY S. E. MOLEN, VK2SG**

● Following on from his earlier article on the practical construction of quad arrays, VK2SG gives detailed instructions on the tuning procedure necessary to achieve their high performance capabilities.

Having built quads and tuned them and been on the bands for numerous years using them, I am surprised when I hear people say that quads are hard to tune or that three bands cannot be fed with one co-ax. Both these statements are incorrect when the correct procedure of tuning is used. Of course, if one's approach is haphazard then anything is hard to do! Another idea that seems to have taken root is that the quad has a large vertical component. This statement has as much truth as the above about hard tuning, etc. But I will admit that if the quad is tuned incorrectly then all the previous statements are true.

What I am trying to say is that only if the quad is tuned correctly is it easy to tune, capable of one-line multi-band feed, practically free of vertical component, and free of reaction between the elements on different bands.

So what we need to know to get a quad working is how to tune it correctly. That, basically, is the purpose of this article.

To tune the quad we must firstly understand its operation. There are several good books available on quads and these are recommended for reading and study. After reading these books you should have some idea of what they are all about. It is not my intention to go into great detail on the operation of a quad but rather to concentrate more on their tuning. I will, though, make some broad comments on various aspects of the quad, and with your reading you will, I hope, be able to understand.

To understand the operation of a Quad or, for that matter, any aerial, we must understand the operation of a dipole for the dipole is the basis of all aerials. Here again I am not going to go to great detail on dipoles, but let us look at the current and voltage distribution. From Fig. 1 we can see that the centre of the dipole is at zero voltage, also the ends are at zero current, assuming, of course, that the aerial is resonant.

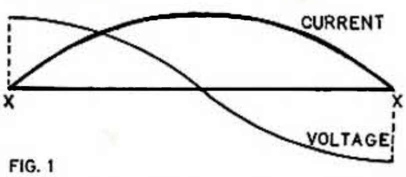
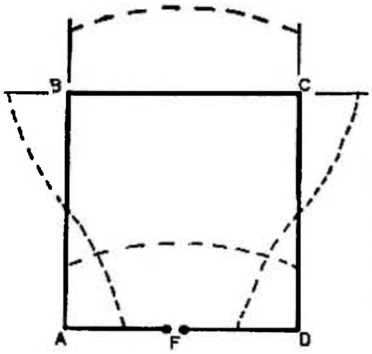


FIG. 1

Now this voltage and current distribution will remain constant whether we have the dipole horizontal, vertical or anywhere in between, provided that there is no outside influence in the field; also the distribution will remain relatively constant (with some slight distortion) even though the elements may be bent somewhere along their length. Again, if we place another resonant dipole in the field of the original dipole with quarter wave separation we will find a mirror image of the original voltage/current distribution appearing in this dipole. The closer it is placed to the original dipole the more current will be induced, and the phase angle will change. If we bend the ends of the elements towards each other we can arrive at a point where the ends of the elements are in phase with each other and there is no voltage or current difference. At this point the ends of the elements will be touching and distribution of current and voltage will be equal around the loop formed. What we now have is an extended folded dipole in the form of a square. This forms the driven element of a quad.

So we now have an active quad element which on its own will exhibit an impedance of approximately 72 ohms and will give a gain slightly less than stacked dipoles, due to the slight distortion of the current and voltage at the corners of the loop (Fig. 2). The gain of the loop will be about 0.9 dB. as against 1 dB. with stacked dipoles, but of course we would have to feed the two dipoles in the correct phase and correctly tuned; whereas with the loop we feed it at one point only and the rest takes care of itself.



With feedpoint F at bottom, the vertical conductor currents (in AB and CD) oppose, — while the horizontal currents (in AD and CD) are in phase and radiate at right angles to element plane.

FIG. 2—CURRENT DISTRIBUTION ON QUAD LOOP

We now have a loop and we can turn this into a cubical quad by adding a reflector and/or director/s. By doing this, we can increase the gain of the aerial. For the first parasitic element it is better to add a reflector than a director. By adding a reflector we can get 5.8 dB. gain, whereas by adding a director we can only get 3.4 dB. Also the back-to-front ratio with the reflector is 25 dB., whereas with the director it is only about 10 dB. But the elements must be tuned, which is, of course, why this has been written. How does one tune a quad to get the best results?

I am assuming here that you have used a standard set of measurements, that you have followed all the constructional methods of the previous article, and that you have the quad ready to tune. So we won't worry about the construction, only the tuning.

The first element to tune is the reflector. The reason for this is that if we tune the driven element first, any changes we make to the reflector and directors will be reflected in changes in tuning of the driven element. Therefore, we would have to re-tune the driven element again, the original tuning being a waste of time. There is a school of thought that says if you make the reflector 5% longer than the driven element it is correctly tuned. This is roughly true, but in practice it may be necessary to make the reflector 4½% longer or even 5½% longer, and we cannot say exactly how long the reflector need be until we start tuning. As you can see it will be hard to change the size of the reflector after we have it in the air, so while it is possible to use a full loop, there is no guarantee that it will be accurately tuned when you get it in the air. Therefore, I use stubs in the reflector and directors, permitting them to be accurately tuned.

LOW SIGNAL SOURCE

So we set about tuning the reflector with a few very simple tools. If you take a lead from the S meter of your receiver so that you can take the meter to the quad, you can tune the reflector on your own. The tools needed will be the extended S meter, a long shank screwdriver and a soldering iron, and

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that is all. Of course you also need an external signal, which must not be too strong as this could be misleading, and it should be stable. It was found that a 12AT7 crystal oscillator with the second half as a doubler, tripler or quadrupler, 120 volts on the plate, and situated about 300 feet away from the reflector provided adequate signal for the job. Too much signal may give a false indication, for example two dips with a rise above normal between them. Thus keep the signal as low as possible, detuning the oscillator if necessary, remembering to keep it at least 30 dB. above the residual noise of the receiver. A signal of S7 would be adequate for the purpose.

TUNING THE REFLECTOR

Now to tune the reflector. Turn the back of the quad (reflector) on to the incoming signal, grasp the bottom of the stub in your hand and with the long shank screwdriver short out the stub at the top (away from your other hand). Now, watching your S meter, slide the screwdriver down the stub maintaining the short until the S meter dips (Fig. 3). Carefully checking this point for minimum signal, put a wire short across this point, check it again to make sure you have the exact point, and solder it.

Do the same for the other bands. It does not matter in which order you approach this tuning, whether you start at 28 MHz. or 14 MHz., the results will be the same. So that is the reflector tuned; it's as easy as that.

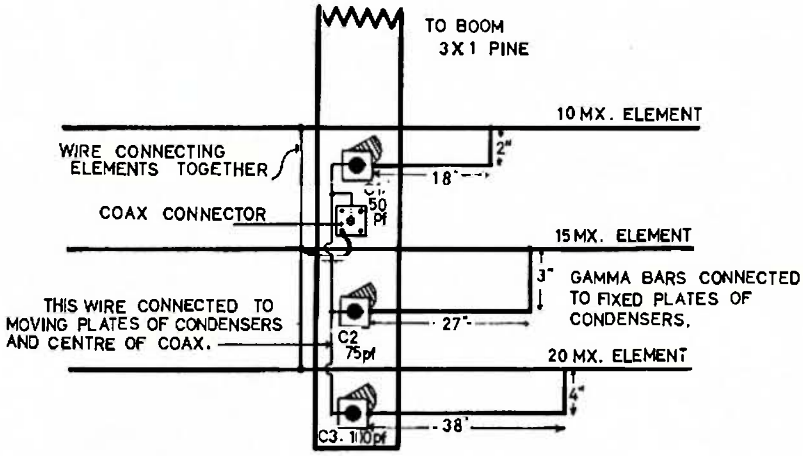


FIG. 4 3 BAND TRIGAMMA MATCH

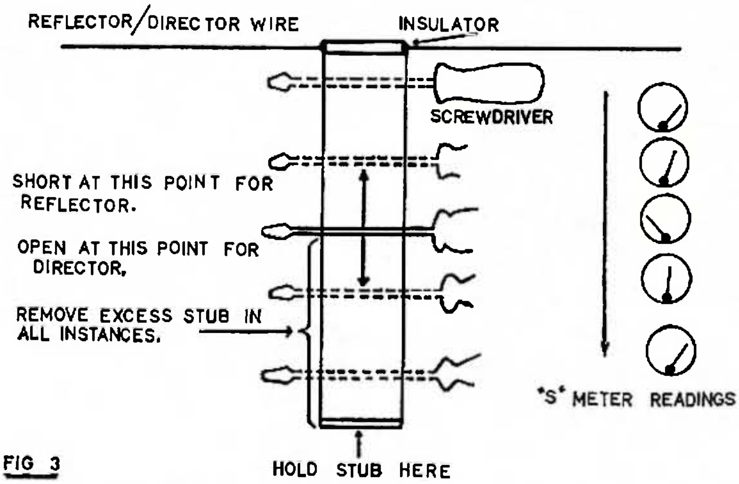


FIG 3

NOW THE DIRECTOR

If you are thinking of putting a director or directors on your quad, making it a 3, 4 or 5 element quad, it is no more difficult to tune the directors than it was to tune the reflector. Starting with the director nearest the driven element and turning the quad towards the incoming signal, we treat it in exactly the same way as we did the reflector, in other words we short out the stub for minimum signal, add on an inch away from the element and cut off the rest of the stub.

Now, with the stub open-circuited you will find a dramatic change in your S meter reading! If you have removed your screwdriver you will find the signal has increased. If you clip little bits at a time, about ⅛", you will find the signal gently increasing. When you clip the bits off keep them level and move away from the stubs and director to confirm your measurement. If you keep snipping untill the last snip causes the signal to fall slightly, you have gone too far; to correct this, take your soldering iron and put a blob of solder on the end of the stub. This not only holds the strands together but will bring the director back on tune.

Repeat this for each band and for each director, working out from the driven element. You will, of course, have to reduce the incoming signal from time to time as it is best to keep it at about S7 while tuning so that the a.v.c. in your receiver does not tend to flatten out and give you incorrect readings.

FEEDING THE QUAD

Now to tune the driven element; you thought I had forgotten it, didn't you? But before we get around to tuning the driven element let us consider the various methods of feeding. As you know, the simplest method is to feed it with co-ax. of the right impedance. This is effective for a single band quad with spacing such as to present the correct impedance, but if we intend to have more than one band, or if we change the spacing, we will find that the impedance has changed and therefore our co-ax. is mismatched. We could use a separate co-ax. for each band, but really don't you think this is a waste of good co-ax.?

A quad with a certain spacing exhibits a certain impedance. Adding further elements, changing spacing, c adding more wire (for other bands) changes the impedance, and so we have to change the co-ax. accordingly. Furthermore, if we use a quad of flat instead of spider configuration, we will have a different impedance on each band and therefore need a different type of co-ax. for each band. Whilst the spider configuration offers constant impedance on all bands, I am not too happy about the two top canes carrying all the weight! One could tie them back to each other, but this stiffens the whole structure and removes one of the best features of the quad—flexibility.

But to return to the feeding and tuning. With the flat configuration, we will have different impedances on each band. To overcome this, we can use one of the simplest and most effective methods of feeding, and that is the tri-gamma match. It has been said that this method of feed is hard to tune. This is not strictly true, for if the tuning is approached correctly it is fairly simple.

If we look at Fig. 4 we see the normal method of feeding the tri-gamma match, also the measurements of the gamma bars and the size of the condensers.

There are several ways of tuning the gamma match. One is to use a noise bridge, but you need a general coverage receiver at the start, to find out where you really are! I will admit that when one understands the operation of the noise bridge it is possible to get the quad on frequency and also read off the impedance. This does have some advantages and if you know anyone who has a noise bridge, see if you can get a loan of it; even ask him along to assist you with the tuning! Another method is to apply power to the aerial through an s.w.r. bridge. Incidentally, it is advisable to keep the power as low as possible, firstly to protect your final tubes, and secondly to reduce the QRM on the bands.

The use of the noise bridge does not require an s.w.r. bridge, whereas the use of power does require one. It will be up to you as to which method you use, but in both instances the tuning method is the same.

TUNING THE DRIVEN ELEMENT

Firstly, we check that all condensers are fully in mesh before we start our tuning; if they are not we could be led astray. The gamma bars should be slightly longer than necessary. Starting with 28 MHz. we tune the condenser for a dip in the s.w.r., which may not be great at this point. Do not take the condenser more than half out of mesh; if indications are that it needs to go further, adjust the gamma bar for a lower s.w.r. Do not, at this time, try for a very low s.w.r. on 28 MHz., but tune to 21 MHz. and repeat the process, and then tune to 14 MHz. Now, if you tune back to 28 MHz. you will find that the s.w.r. has changed. Tune the condenser and gamma bar for the lowest s.w.r., re-tune to 21 MHz. and do the same thing, and so to 14 MHz. And do it all again! Once more returning to 28 MHz., we are ready to tune for absolute s.w.r., and so to 21 MHz. and 14 MHz. As a final check on each band, you may need just a touch on the condenser to bring the beam "spot-on"; and that is the tuning finished.

One point to realise is that the gamma bars should be almost the same length as the stub in the reflector, providing the sides of the element are the same size, and the condensers should be about half in mesh. If the condensers are right out of mesh it indicates that the whole thing is tuned to a lower frequency, and one will need to re-tune, so that the condensers do finish in the half mesh condition. This can be done by adjusting the condensers on the three bands. It should not be necessary to touch the gamma bars, but if it is, they should need only very slight adjustment. While the s.w.r. will indicate low at all times, the quad will operate just that little bit better if this final check is carried out.

I realise that all this tuning is a little hard to do at the top of the tower, but it can be done at a lower level, say with the quad tied to the mast at a point where you can work on it from the ground. The tuning at this height will be slightly inaccurate, but it will not be far out, and when you get the beam to the top of the tower you will only have to make small adjustments to tune it "spot-on".

There is one other point to remember; when we tune the quad near the ground and then shift it up the tower the point of minimum s.w.r. will shift in frequency. If we want to have our quad tuned to say 14.2 MHz. when it is on top of the tower, we will have to tune it to 14.1 MHz. approximately when it is near the ground. A good rule of thumb for this is to allow 75 kHz. for the first 30 feet rise and 25 kHz. for every 20 feet above this. This is a useful basis to work to and makes the final tuning at the top so much simpler.

Finally, have you ever stopped to think what the quad looks like electrically? Actually, if we carefully look at the quad we will find that in reality we have stacked dipoles. In the case of the two element quad, electrically it looks like two stacked two element Yagis. The gain of the quad will be slightly less (owing to the corner distortion) than the stacked Yagis. Accordingly, a three element quad looks like stacked three element Yagis, and so on. So if you have ever wondered why a two element quad works so much better than the two element Yagi this is the reason. I think you will agree that quads are easy to tune; just think how long it has taken you to read this, allow for time to set up things and move around the aerial and that is how long it should take you to tune your own quad! ●

OSP (Continued from Page 2.)

RTS AND MISSING A.R's.

Means "returned to sender". Another reminder about A.R's returned to sender. As soon as an A.R. wrapper "returned to sender" is received through the post that mailing plate is removed from the plate file. If your A.R. does not reach you within two or three weeks of the time when everybody else receives theirs something has gone wrong. Write in to the Executive Office there and then so that something can be done about it; please do not leave it for months and months.

VK8 AMATEUR ADVISORY COMMITTEE

The Victorian Division nominations to the Advisory Committee for 1973 are VK's 3NT, 3ANG, 3ES, 3ZO and 3JS.

TWO-METRE BAND—9M2

The MARTS Newsletter of November gleefully reports that Malaysia (West) amateurs have had the 2-metre band restored to them. 144-146 MHz for amateur service and amateur Satellite service. 146-148 MHz for amateur service only, but this band has many frequencies occupied by other services. The newsletter suggests the use of 144.48 or 144.60 MHz for local use and goes on to report many FM stations operative in the K.L. area.

INTER-STATE TRANSFERS

If you move from one State to another (except for very short period visits) the Divisional Office of the State from which you depart should be advised so that your transfer can be processed through the central membership EDP records. If you were financial you will remain financial to the end of the calendar year so long as you would have continued being financial in the State from which you departed. If you were not financial at the time of your move you will be required to re-join the W.I.A. in your new State if you wish to continue membership. Because of inter-State advices when you notify your transfer and Divisional access to membership EDP records if required, you are not likely to be considered unfinancial in your new State if you were indeed financial in the State you left.

IMMIGRATION SPONSORSHIP

The Institute has been asked, nay been begged, to sponsor the immigration of a Chilean amateur with his wife and family. Sponsorship requires that accommodation be guaranteed for one year. We would like to help. Is there anybody able to assist ? If so, please write to the Executive office for further details.

BERU, 1972

In the first 100 listed were VK2BPN, VK3MR, VK2GW, VK3ZC, VK3KS, VK6WO, VK2NS, VK3RJ and VK20W. All VK call areas were represented.

Contest Calender

February. John Moyle Memorial National Field Day. 2nd weekend. World SSTV Contest.
ARRL DX Contest—'phone, 1st weekend, CW 2nd weekend.

March. ARRL DX Contest—'phone 1st weekend
B A R T G. R T T Y Contest.
C Q WW PX SSB Contest.

Keep practising with the key . . . the "RD" is not far away.

SSTV AND OSCAR 6

WA9UHV, writing to Amsat about s.s.t.v. through the satellite, considers the best pictures are received when overhead passes are used. However, acceptable pictures are obtained when maximum elevation is 40 deg. This seems to be the minimum orbit required for full 8 second frames. ●

THE HISTORICAL DEVELOPMENT OF U.H.F. CIRCUIT TECHNIQUES

PART TWO

ROGER LENNED HARRISON, VK2ZTB (ex VK3ZRY)*

1930-1940: MAGNETRONS, KLYSTRONS AND WAVEGUIDES

In 1920, George Southworth, then at Yale University, stumbled on the effects of guided waves (see early part of Ref. 5). Soon after leaving Yale, he joined the Bell Telephone Company Research Department. During the ensuing eight years he worked at various projects mainly concerned with trans-oceanic telephony. Towards the end of this time he re-kindled his interest in the very new idea of guided waves.

Wave Guides. Late in the summer of 1931 he started a series of clandestine experiments with which he explored the basic principles of guided waves. He used both metal and dielectric circular columns in his experiments and explored the fields inside them at various frequencies. To reduce their physical size he filled them with a dielectric—water. Fig. 5 illustrates the apparatus he used. The actual experiments were not performed until March 1932.

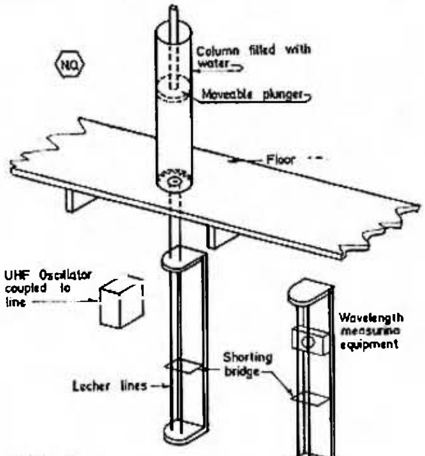


FIG. 5

Late in the 1920s several European research organisations attached to electrical engineering firms had been doing research into tube manufacturing with a view to producing tubes which would oscillate at extremely high frequencies. Several experimental types were produced which were capable of producing Barkhausen oscillations up to 2000 MHz.

Southworth obtained and put to use several of these tubes for his waveguide experiments. By the end of 1932, Southworth had identified and thoroughly explored the dominant transverse electric (TE_{11}) and circular magnetic (TM°_{01}) waves. With continuing experiments, this time with the knowledge and admission of the Bell Telephone Company, he developed the electromagnetic horn (a waveguide antenna) and later the waveguide transmission line in 1933.[5]

In developing the first waveguide transmission lines, George Southworth, plus assistants, developed a waveguide oscillator and waveguide receiver shown in Figs. 6 and 7. The detector in the receiver was a silicon crystal mounted in a polystyrene rod, very similar in construction to the "catswhisker" detectors used 20 years previously.

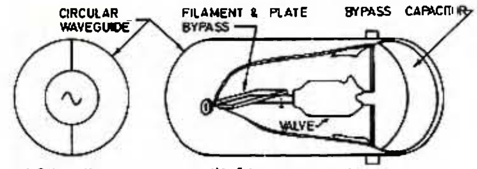
Southworth also investigated the characteristics of specific discontinuities introduced into waveguides and developed the waveguide filter. Assistance in developing these devices came from Mr. H. E. Curtis and Mr. N. C. Olmstead from Bell Telephone laboratories.

Measuring techniques had also to be developed along with the various circuit elements and the travelling standing-wave detector was developed as well as cavity wavemeters[9] (see Figs. 8, 9, 10, 11).

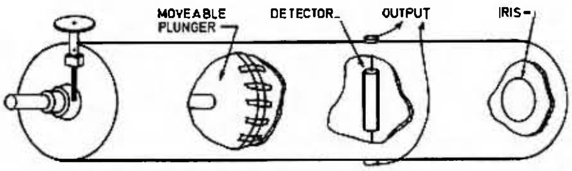
The Silicon Crystal. In 1936 Mr. R. S. Ohl, of the Bell Telephone laboratories, was given the task of improving silicon rectifiers as detectors. By introducing specific impurities into very pure silicon he produced both NP and PN junctions; and when investigating their characteristics discovered that the devices he developed had thermal and light-sensitive properties as well as improved electrical characteristics. These devices were subsequently developed into microwave detectors and ultimately into many things known as solid state devices.

The Magnetron. Sometime after Barkhausen type oscillators were being used and the effects of electron transit time and electronic oscillation were becoming understood and accepted, several people embarked on projects aimed at developing high power at extremely high frequencies.

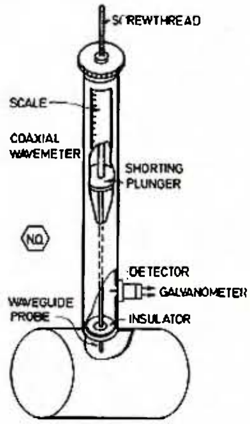
Notables in these first attempts were C. W. Rice (Britain) who produced a magnetron (Fig. 12) in 1936 capable of producing 3 watts at 5000 MHz.[10]



BARKHAUSEN OSCILLATOR IN WAVEGUIDE FIG. 6



EARLY WAVEGUIDE RECEIVER FIG. 7



WAVEGUIDE WAVEMETER BY BOWEN (1934) FIG. 9

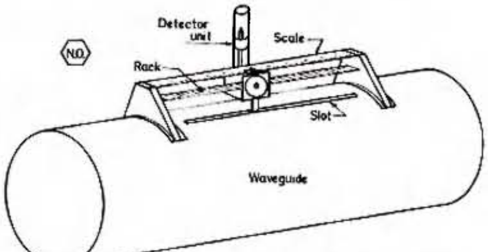
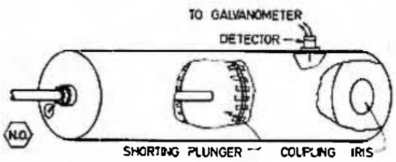
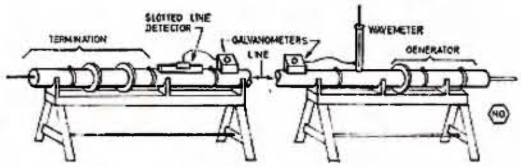


FIG. 8 – STANDING WAVE DETECTOR

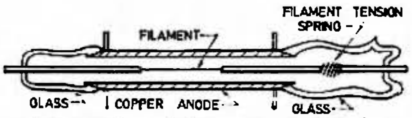


EARLY HIGH-Q CHAMBER (SOUTHWORTH) FIG. 10



TYPICAL SETUP OF 1934 INVESTIGATIONS FIG. 11

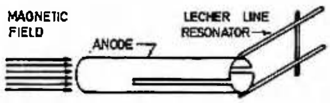
* P.O. Box 702, Darlinghurst, N.S.W., 2010.



SINGLE ANODE MAGNETRON (C.W. RICE 1936) FIG. 12

The filament and the anode formed part of a co-axial line resonator.

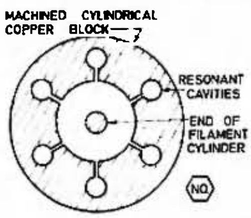
E. G. Linder (Britain) constructed an anode which formed part of a two-wire (Fig. 13) transmission line resonator. The concept of transmission lines as resonators, having come originally from Hertz and Lecher[5] was now well established and in fairly widespread use by Radio Amtaeurs.



MAGNETRON ANODE EMPLOYED BY LINDER FIG. 13

The techniques used in these early devices were copied and further developed in America.

On 21st February, 1940, the Physics Department of the University of Birmingham tested a magnetron in their laboratories which produced approximately half a kilowatt of power at 3000 MHz. The power input was kilowatts. This device was a tremendous advance over all the previous efforts and subsequent devices have only been refinements on this device. A diagram of the anode is shown in Fig. 14.[10]



ANODE USED IN FIRST BIRMINGHAM MAGNETRON FIG. 14

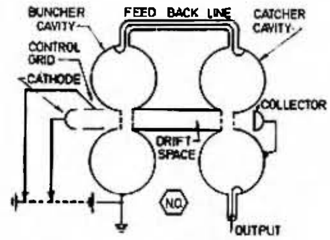
This, and subsequent devices, were developed with the aid of the General Electric Company who later produced magnetrons for service use during the war.

The Klystron. In 1935, two German scientists, A. Arsenjewa-Heil and O. Hiel published an article in which they suggested that the principle of velocity modulation of electrons could be used as a means of producing very high frequency oscillations. Some further theoretical work on the subject was published in 1938 by two other German scientists, Bruche and Recknagel, but it was not until 1939 when two American publications of independent developments brought forth microwave oscillators using the velocity modulation principle.

The publications of the Varian brothers and Hahn and Metcalf made significant strides in the development of microwave circuit techniques. The Varian brothers gave the name of "Klystron" to their device which employed velocity modulation of an electron beam and special types of cavity resonators for the two tuned circuits associated with the device. A diagrammatic representation is given in Fig. 15 (see Refs. 10, 11 and 12).

This device was subsequently developed into the reflex klystron which used only one cavity.

It appears that the decade, 1930 to 1940, brought forth most of the significant developments which established the basic principles of microwave techniques.



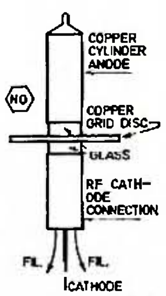
KLYSTRON OSCILLATOR WITH CAVITY RESONATOR FIG. 15

1939 TO 1945: THE WAR YEARS

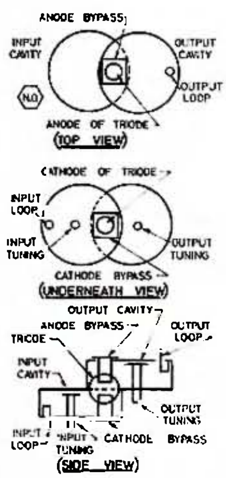
Radar. With the onset of war, first in Europe, then in America, an acceleration in scientific developments took place. In 1935, in Britain, Sir Robert Watson-Watt and a small team of coworkers laid the foundations of Radar. Subsequent developments, in Britain, America, France and Italy, improved the original techniques; but a stumbling block occurred which necessitated the use of much higher frequencies than 200 MHz. then in use.[10]

To overcome these difficulties the waveguide techniques of Southworth and his research team were exploited along with the klystrons and improved higher frequency magnetrons. The klystron of the Varian brothers was developed into the Reflex Klystron and used as a low power local oscillator or signal source in radar superheterodyne receivers.

U.H.F. The frequencies above 200 or 300 MHz. were now assuming some practical importance and techniques were developed and put into practice using the frequencies between 300 MHz. and 3000 MHz. Previously techniques for using these frequencies were purely experimental; now, lessons learned in the past were put to use.



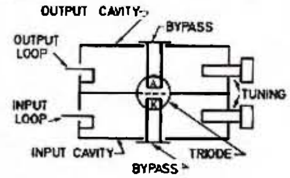
DISC SEAL TRIODE FIG. 16



TRIODE AMPLIFIER FIG 17

Efforts directed at extending the useful range of conventional valves by the logical suppression of their basic causes of inefficiency led to improvements like the disc-seal and grounded-grid triodes which function satisfactorily at frequencies up to 3000 MHz.[13]

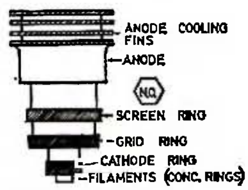
Figs. 16, 17, 18 and 19 amply illustrate the techniques developed for these frequencies.



UHF TRIODE AMPLIFIER FIG. 18

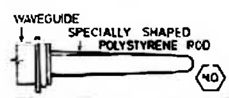
Antennas. Developments in the microwave field were many, rapid and had far-reaching applications. The demands of radar called for widely varying techniques to solve the various problems that arose. Waveguide techniques were extended into antennas and several people looked into the problem of developing a waveguide into an antenna.

In 1935 Dr's Barrow and Chu, of the M.I.T. (America) developed and explored the characteristics of sectorial and pyramidal horns. Also in that year A. P. King, of the Bell Telephone laboratories, experimented with conical horns and pyramidal horns. This research was taken up again in 1940 and 1941 by the people mentioned. The leaky guide antenna and the horn-parabola antenna were subsequently developed.



COAXIAL TETRODE FIG. 19

One fairly unique antenna that came from an idea originally investigated in 1920 by Otto Schriever and later by George Southworth was the polyrod antenna. This was developed from the idea of a dielectric waveguide and solved the problem of providing an antenna which "would give moderate directivity without occupying any considerable amount of broadside space".[6] An illustration is given in Fig. 20.

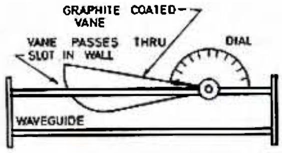


POLY ROD ANTENNA FIG. 20
(APPROXIMATELY 1941)

Also developed into practical, widespread use was the parabolic dish and its various truncated and sectorial sections. The optical properties of this antenna were first investigated by Hertz around 500 MHz. in 1888.[8]

Dr. J. D. Kraus (W8JK) did much investigation into a wide variety of antennas just prior to, and during the war. Most of these were for use in the region 50-3000 MHz.

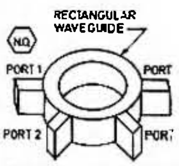
Circuit Elements. In 1941 the Radiation Laboratory was set up at the Massachusetts Institute of Technology and in this place many significant developments took place. The scientists and engineers working in this establishment modified, refined and further developed the techniques that were being developed at the Bell Telephone laboratories by Messrs. Southworth, Fox, King and Brown.



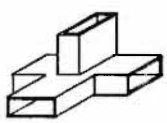
VANE TYPE ATTENUATOR FIG. 21

Amongst the devices developed by those two establishments were waveguide filters, including bandpass, bandstop and single frequency filters, fixed and variable attenuators, waveguide bridges (for even or uneven power distribution) and the magic-tee junction. The latter two devices were evolved by Dr. Tyrell (Bell labs.) in 1941 and have since been widely used in many applications. An outgrowth of these devices was the directional coupler evolved by W. W. Mumford (Bell labs.). This device has since seen widespread use also, mainly as a monitor and standing wave detector. Illustrations of some of these devices can be found in Figs. 21, 22, 23, 24.

Frequency limits were progressively pushed back and in 1942 10,000 MHz. radar sets came into general use for high definition radar. Experiments took place in the University of Michigan labs. with generating 28,000 MHz. (and above) energy by separating the harmonics produced from impressing energy on a silicon diode. Unfortunately power outputs were low.



RING-FORM OF WAVEGUIDE BRIDGE (TYRRELL 1940) FIG. 22


"MAGIC-TEE" WAVEGUIDE BRIDGE (TYRRELL 1940) FIG. 23

Both of the above bridges act like a 'hybrid' transformer.

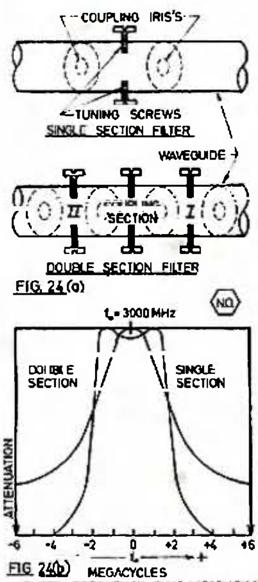
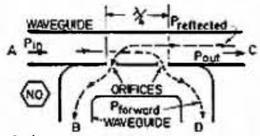


FIG. 24(b) MEGACYCLES
FILTER FREQUENCY CHARACTORISTICS

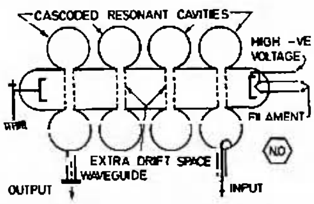
WAVEGUIDE FILTERS AND CHARACTERISTICS FIG. 24



SIMPLE FORM OF DIRECTIONAL COUPLER FIG. 25

Main power goes from A to C, some is bled off down to D but none down to B. Reflected power goes from C to A, some is bled off down to B, but none to D. Useful for VSWR measurements.

Microwave Amplifiers. The problem of microwave amplification, both of small signals and large signals reared its head relatively early in the war and variations on the devices developed by Hahn and Metcalf and the Varian Bros., also the Heil devices from Germany, were produced. Klystron amplifiers achieved some success, but output powers were limited until the idea of placing several cavities and drift spaces in cascade along the same electron beam was used and output powers increased enormously (see Fig. 26 for multicavity klystron).



MULTICAVITY POWER KLYSTRON FIG. 26

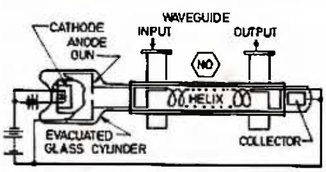
These devices were essentially narrow band devices and thus were suited only to particular applications.

Travelling Wave Tube. In a paper published in the "Proc. I.R.E." for Feb. 1947, Rudolf Kompfner, indicated that sometime prior to April 1943, he proposed the travelling wave amplifier and proceeded to immediately build working models. These were fairly well developed by the end of 1949.

With these devices it was possible to achieve gains of over 30 dB. over a bandwidth of 800 MHz. at a centre frequency of 3600 MHz. They could be constructed for low noise, wideband, small signal applications or for wideband power amplifiers capable of producing several watts output power.[13] An illustration is given in Fig. 27.

It is obvious that World War II. greatly accelerated the development of u.h.f. circuit techniques right throughout the portion of the spectrum spanning 30 MHz. to 30 GHz. Comparing the circuit techniques shown in the various diagrams for this period with the diagrams for the two decades preceding the war makes this fact plainly obvious.

(to be concluded)



TRAVELLING WAVE AMPLIFIER FIG. 27

Wave power to be amplified is passed along a helix through which an electron beam is projected.

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THE W.I.A. SUBSCRIPTION YEAR RUNS FROM 1ST JANUARY TO 31ST DECEMBER

New Members' Subscriptions Run to 31st December of the Year in Which They Joined, but Where a Full Year's Subscription is Paid When Joining This Runs Only for One Year. A Balance is Payable in Such Cases for the Following Year Based on a Pro-rata in Terms of Months up to 31st December of That Year.

BUILDING HIGH-Q INDUCTORS WITH FERRITES

BY A. G. BIRCH, VK3ZRQ*

● Following on from his recently published series of articles on Filter Design, VK3ZRQ gives in this article the information necessary to achieve desired values of inductance and Q for such filters, using ferrite pot-cores.

INTRODUCING THE MATERIAL

Ferrite materials are a homogeneous compound of FeO (an oxide of iron), with one or more metallic oxides, in a cubic crystal structure. In general, they are a non-metallic ferro-magnetic material with useful resistivity and low co-ercivity, made by a ceramic process. Thus these materials have a higher permeability than older materials, lower losses over a wide frequency range, and the inductance can be readily trimmed, in final adjustment of a filter, by means of a small rod inserted axially through the air-gap.

For the physics-minded it can be stated that to achieve the high initial permeability (necessary because inductance is proportional to permeability) and low hysteresis loss, the material structure must be free of stresses. This only occurs with a cubic crystal since only then is the cooling shrinkage equal in all directions—important when sintering temperatures between 1,000 and 1,400°C. are involved.

The commonly available ferrites are mixed crystals of manganese-zinc (Mn-Zn) and nickel-zinc (Ni-Zn). As a side interest, they crystallise with the characteristic structure of the spinel, beloved of amateur gem-collectors.

Uses of the Different Types

Trade terminology identifies the main ferrites with a number-letter classification associated with a particular frequency range:—

Mn-Zn, 3B material:
1 kHz. to 500 kHz.
Ni-Zn, 4A-4E material:
500 kHz. to 50 MHz.

Usual Specifications by the User

What we most commonly want to choose are the following:—

Inductance, L;
Operating frequency: f;
Quality factor: Q;
A.c. coil current: i (when used, this particular loss is calculated for an arbitrary 1 mA. because it is dependent on i).

PRACTICAL DETAILS

We need to either select or calculate the following:—

1. Grade of ferrite material—selected by frequency rating;
2. Size of pot-core—selected via guide lines to follow;
3. Size of air-gap—to enable ordering pre-gapped cores;
4. Wire size, number of turns, and copper space-factor f_{cu};
5. Estimate the actual Q-value—it generally turns out to be not more than 10-15% high.

* 5 Harrison Street, Bendigo, Vic., 3550.

Q-Factor Estimation

A knowledge of this is necessary as a guide to the performance to be expected. In practice, you will find that quite adequate performance in filters can be obtained with a Q-value as low as 50-80 for the coils.

It will be found that below about 5 kHz., Q-factor can be simply calculated in only one step, since only resistive winding loss is significant. Beyond about 50 kHz. we need to calculate all five losses as follows, but this is fortunately simplified by values provided by the different manufacturers.

Since this is only an introductory note, we can further thin out the forest of choice by restricting ourselves to only one or two cores, and the writer's own experience has been that one particular size will satisfy a wide range of common needs.

The Q-value is found from a loss-calculation.

LOSS-CALCULATION

Each of the losses may be considered as a resistance in series with a loss-free coil and expressed, most conveniently, as a ratio R/L ohms-per-henry. Hence if we add up all the R/L values and divide into 6.28f, we have the estimated value of Q as: $Q = 6.28\ f\ (L \div R)$. This will generally turn out to be not more than 10-15% different from the actual value at the lower audio frequencies. The condensed form of these loss-factors is given below—some of them can be derived from theory, others have to be approximated from research laboratory measurements.

The losses may be divided into two groups, namely winding losses and core losses.

Winding losses:
(1) D.c. resistive (Ro);
(2) Winding eddy current loss (Rcu);
(3) Dielectric (parallel capacitance) loss (Rd).

Core losses:
(4) Hysteresis (Rh);
(5) Residual and eddy current losses (Rer).

For the 26/16 core using 3H1 material, we find:

$$(1) \quad \frac{R_O}{L} = \frac{7420}{\mu_E\ f_{cu}} \text{ ohms/henry}$$

$$(2) \quad \frac{R_{CU}}{L} = \frac{480}{\mu_E} f_{cu}\ d^2\ f^2$$

$$(3) \quad \frac{R_D}{L} = [(2 \div Q) + 0.01]\ f^3\ L\ (52.1 \times 10^{-10})$$

$$(4) \quad \frac{R_H}{L} = 800\ \mu_E\ I\ f\ (L \div N)$$

$$(5) \quad \frac{R_{ER}}{L} = [(1.5 \times 10^{-6}) - (3 \times 10^{-12} f)]\ (6.28)\ f\ \mu_E$$

where μ_E = Effective permeability.
f_{cu} = Copper space factor.
f = Hertz (cycles/sec.).
d = Wire diam. in metres (mm. ÷ 1,000).
L = Henrys (mH. ÷ 1,000).
I = Amps. (mA. ÷ 1,000).
N = Turns.

Below about 4-5 kHz., only the first equation need be used.

Effective Permeability = μ_E is related to the tolerable temperature-caused change of inductance by what is called a temperature factor (T.F.).

$$\mu_E = \frac{\text{Fractional Change of L}}{\text{T.F.} \times \text{Temp. Range}} - 20$$

For the core specified above, T.F. $= 1 \times 10^{6}$.

Accepting that for non-precision purposes, a change in L over a liberal temperature range of 50° Celsius (5° to 55°) not more than 1% will be tolerable, the equation reduces to

$$\mu_E = \frac{1 \times 10^{-3}}{1 \times 10^{-6} \times 50} - 20 = 180$$

A higher μ_E can be used, but the change of L will then be greater.

GUIDE LINES

A high inductance requires a great number of turns and thus also a large volume if the losses are to be kept to a reasonably low figure by not using a very fine wire.

If the calculated Q turns out to have an unnecessarily large value, this amounts to an instruction to try the next smaller core.

If too small an air-gap is used in an endeavour (by increasing μ_E) to get high Q, then ageing effects cause L-value to change more over a period of time.

If too large an air-gap is used (in order to ensure that the coil inductance will not change significantly when temperature rises), we need a larger number of turns for given L, and again a larger volume or size of core.

CALCULATION PROCEDURE

1. From above discussion, $\mu_E = 180$ to give a temperature stability good enough for non-precision purposes.

2. This permeability value will be obtained (from Curve A of Fig. 1) with an air-gap of 0.2 mm. (approximately 8 thous.).

3. Curve B of Fig. 1 gives the number of turns/mH. = 45 = α.

4 (a). $N = \alpha \sqrt[3]{L}$, so number of turns for the coil: $N = 45 \sqrt[3]{2.5} = 71$. This would be, within a couple of percent., the number of turns on a 26/16 single-section coil former to give the required L = 2.5 mH.

(b) Inductor adjustment: Since the slug will only raise the L-value, we calculate N for a value of L reduced

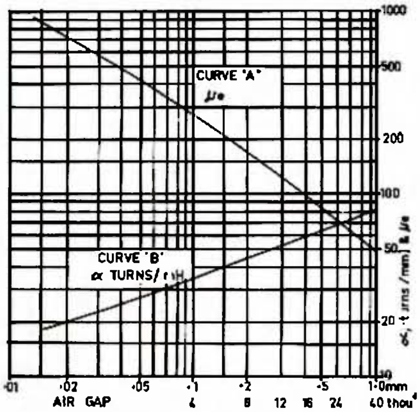

FIG 1 CURVES FOR 3B7 AND 3H1 MATERIAL

by 5%—this allows the slug adjuster to trim L by ±5%.

Thus we use N = 68 turns.

5. **Wire Size**: Table 1 gives the number of turns of any wire size that will just fill the bobbin. Line 16 suggests B. & S. 22 gauge will fit 79 turns on to the bobbin. We need only 68, so the real space factor will be about $68 \div 80 \times 0.55 = 0.47$.

B. & S. No.	Wire Diameter mm.	inch/1000	Turns, N
38	0.10	4 thou"	2500
36	0.12	5	1750
35	0.14	5.5	1200
34	0.16	6.5	1040
33	0.18	7	770
32	0.20	8	680
31	0.22	9	605
30	0.25	10	435
29	0.28	11	382
28	0.32	13	270
27	0.35	14	225
26	0.40	16	170
25	0.45	18	150
24	0.50	20	115
23	0.55	23	97
22	0.65	25	79
21	0.71	28	63
20	0.85	33	51
19	0.95	37	41
18	1.06	41	34

ENAMELLED COPPER WIRE

TABLE 1.—HIGH-Q INDUCTORS

Number of turns and wire size to fill the bobbin for 26/16 core, copper space-factor $f_{cu} = 0.55$.

6. **Loss Estimation**: For a single-section 26/16 bobbin we can show that:

$$\frac{R_o}{L} = \text{resistive copper loss}$$
$$= \frac{7420}{\mu_E\, f_{cu}}$$
$$= \frac{7420}{180 \times 0.47}$$
$$= 88 \text{ ohms/henry.}$$

Thus find $Q = \dfrac{6.28 \times 5{,}000}{88}$
$$= 350$$

(This, in fact, is about 40% above a more accurate value; see Appendix.)

7. **Other Values of L** (and corresponding Q): Table 2 gives a short list of standard pre-gapped cores with their μ_E and ∝ values. Using a high-μ_E core implies a looser temperature-stability of inductance.

Permeability μ_E	Turns/mH. ∝	Air-gap g
15	146	4 mm.
22	120	3 "
33	98	2 "
47	82	1 "
68	68.5	0.7 "
100	56.5	0.4 "
150	46	0.24 "
220	38	0.15 "
330	31	0.07 "
730	21	0.02 "

TABLE 2.—HIGH-Q INDUCTORS

Pot-cores with standard μ_E values and corresponding turns/mH. values.

Typical construction of pot-cores is shown in Fig. 2, as manufactured by Philips and Siemens.

For L = 36 mH., with the same core as above,
$$N = 45\sqrt[2]{36} = 270.$$

Choose, from Table 1, B. & S. 28 wire, which could fit 320 turns on the former.

Wind only 270, and find the real $f_{cu} = (270 \div 320) \times 0.55 = 0.47$. Since this is the same as before, Q still = 300 (approx.).

If we have only 22 B. & S. we might try a higher μ_E (which would give poorer temperature stability), and with $\mu_E = 300$, we would find ∝ = 31, giving $N = 31 \times 6 = 186$.

The best compromise (to avoid two wire sizes) would be B. & S. 26 which would give 170 turns on the former and be still 10% low when trimmed with the adjuster.

Alternatively, we could use 28 B. & S. on the 2.5 mH. former, and tolerate the poor space factor (0.20), and find the Q-value (now dropped to 150) still acceptable.

However, 4 ozs. each of (say) three sizes of wire will wind a number of these coils and only cost about a dollar.

To obtain the inductance more flexibly, a simple hand-made brass or aluminium tool used with a smear of 400-grit Si. carbide will remove about 1 thou. of material from the centre post in about 1 minute or less by hand. Check the increase in gap size by micrometer and read off the new ∝ and μ_E value from the chart, then proceed.

MOUNTING INSTRUCTIONS

Remove all dust from the core with a dry brush and wipe with cleaning fluid to remove grease.

Cement the coil halves with Araldite film, and leave under a weight about that of two building bricks for at least 1 to 2 days. Alternatively, cure in an oven at **not more than 100°C.** for about two hours, under about the same weight.

Mounting cases are available so that the core-halves need not be cemented (unless desired for severe shock and vibration conditions).

Pre-adjusted cores can be supplied already fitted with a nut for the inductance adjuster cemented into one of the core-halves.

The adjuster is screwed through the pot-core into the nut and is held in position by the lips of the adjuster head. The adjuster always increases L-value, and can do so to within 1 part in 1,000.

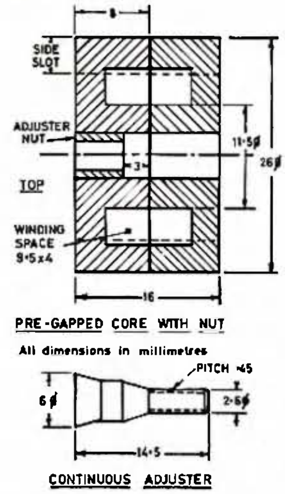

FIG 2 TYPICAL POT CORE

CONCLUSION

By the foregoing procedure, the inductances for two filters of the last article turn out to be as in Tables 3 and 4.

All coils are wound on 26/16 cores with 3H1 material, single-section bobbins, and Lewcomex enamel wire for heat-removable coating. The fixed quantities are ∝ = 46 turns/mH. for the core with $\mu_E = 150$, which has a pre-set air-gap of 0.009 inch.

Inductance mH.	B. & S. No.	N Turns	Q
L1 = 44.3	28	305	220
L2 = 52.4	28	330*	245
L3 = 24.7	28†	228	175

* 320 turns will give 47.5 mH. with 10% error. Adjusting slug should reduce this to about 1 or 2% error.

† B. & S. 27 would fill bobbin, but available B. & S. 28 only decreases Q-value.

TABLE 3.

5th Order Equal-Ripple Filter

APPENDIX

Full-loss calculation for 2.5 mH. coil at 5 kHz. = f.

(1) $\dfrac{R_o}{L} = \dfrac{7420}{180 \times 0.47}$
$$= 88 \text{ ohms/henry.}$$

(2) $\dfrac{R_{cu}}{L} = \dfrac{480}{180} \times 0.47 \times 5^2 \times 10^6 \times 3.5^7 \times 10^{-8}$

(for 27 B. & S. wire, diam. = 0.35 mm.)

$$= 2.7 \times 25 \times 0.47 \times 12.2 \times 10^{-2}$$
$$= 3.9 \times 10^{-2} \quad \text{(negligible)}$$

(Continued on Page 19.)

VARACTOR TUNED BFO

BY R. J. CALLANDER, VK3AQ*

● This is a simple, stable, economical, easy to build varactor tuned BFO (455 kHz. ± 5 kHz.). It was originally built to help Y.R.C.S. members resolve s.s.b. signals and also receive Morse Code.

This b.f.o. is not affected by hand capacity like most b.f.o's and no metal shielding is required. In fact the metal can around the i.f. transformer (i.f.t.) had been removed so that a link coupling coil could be wound around the i.f.t. and connected to a large coil around the short wave set.

Tuning the b.f.o. ± 5 kHz. is done by a 5K linear pot. (2-100K can be tried out if available) and the voltage change across the transistor in the b.f.o. alters the internal capacity of the base collector junction and this varies the frequency.

B.F.O. CIRCUIT

See Diagram A.

1. Midget transistor type i.f. transformer used—remove metal can first before soldering i.f.t. into circuit.

Put the 5 ohm coil in collector circuit; 1 ohm coil in emitter circuit.

Try reversing connections to either coil (but not both) if the b.f.o. won't oscillate.

Don't use the tap on the 5 ohm winding.

See if there is a condenser built into the base of the i.f.t. If not, put a 330 pF. across the 5 ohm winding (Styroseal best).

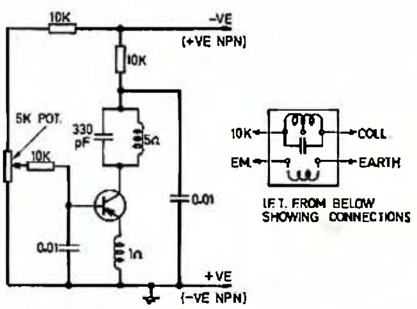

DIAGRAM A

2. Type of transistor—best to use r.f. transistor, although audio transistor will often oscillate.

Collector must be **positive** with NPN transistor; collector must be **negative** with PNP transistor.

3. 5K **linear** pot (try 2-100K if you have one handy). Wire 10K resistors direct onto the pot so that when pot is turned clockwise the wiper arm goes to 10K resistor and not 9v. (see Diagram B).

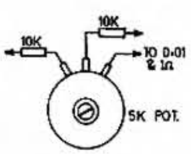

DIAGRAM B

* 383 Warrigal Road, Burwood, Vic., 3125.

4. Other parts required are:
   0.01 μF. disc condenser (two);
   10K resistor (three);
   300 pF. Styroseal if your i.f.t. needs one;
   9v. battery;
   Veroboard or printed circuit.

LINK COUPLING COIL BETWEEN B.F.O. AND SET

(See Diagram C). Use a piece of thin insulated wire about 4-6 ft. long. Take the middle of the wire and wind two or three turns tightly about the i.f.t. (can removed). Then twist the two leads together and lead out towards the short wave set and make a larger loop to go around the s.w. set or of valve or i.f. transistor or aerial input lead. Solder ends of the wire together so you have a continuous loop.

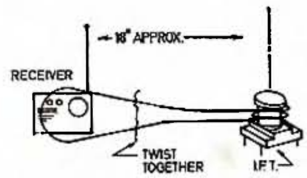

DIAGRAM C

TESTING YOUR B.F.O.

Having built your b.f.o., probably from the complete kit put out by the Y.R.C.S., proceed to measure the resistance across the positive and negative leads (with the battery not connected). It should be several thousand ohms and not a short circuit. Then with a milliammeter in one of the leads connect up the 9v. battery (positive to collector circuit for NPN transistor) and the b.f.o. should draw about 1 milliammeter.

Tough the collector with your finger and if it is oscillating the current should rise slightly.

You could also measure the voltage across the base-emitter junction and if the b.f.o. is oscillating the voltmeter will read backwards.

If you don't have a milliammeter connect up the link coupling coil between i.f.t. or b.f.o. and s.w. set, and listen for a strong signal as you tune between 3AR and 3DB—the b.f.o. will be oscillating on its second harmonic.

GETTING THE B.F.O. ON 455 kHz.

Connect up the link coupling coil between the b.f.o. i.f.t. and broadcast range on set. Set the 5K pot to the middle of its range. Then screw the slug in i.f.t. of the b.f.o. in or out until you get a **very loud** whistle on **all** stations on broadcast on s.w. bands. This applies only if your set has a 455 i.f. frequency, but this is the frequency most single conversion sets employ—turning the pot to right or left should alter the whistle as you alter the frequency. This should happen on all stations if you are on the i.f. frequency.

Turn pot clockwise from centre positions — this changes 455 to 450KHZ approx., and this is where you resolve your lower side band signals such as 40M and 80M. Turn pot anti-clockwise from centre position — this changes 455 to 460 KHZ approx. and this is where you resolve your upper side band signals such as 20 and 15 M.

The 5K pot varies the base bias which alters the collector current and thus the voltage drop across the resistor in the collector circuit. Thus the voltage across the collector — base junction varies as you rotate the pot and this gives rise to a varactor diode effect which alters B.F.O. frequency. You can mount the pot resistors directly on the pot and this makes the B.F.O. board less crowded.

HOW TO RESOLVE SSB SIGNALS ON YOUR SW SET

In an SSB signal only one side band is transmitted (upper side band in case of 15M and 20M, lower side band in case of 40M and 80M). The carrier is suppressed at the transmitter and the BFO re-inserts the carrier in the receiver but it must be re-inserted carefully in correct relationship to the upper or lower side band being transmitted.

1. First switch **off** the B.F.O. and tune in the duck talk for the loudest signal (there will be no carrier to tune into, so wait until the operator is talking).
2. Switch **on** B.F.O. and connect up the link coupling coil. Alter the 5K pot slowly only while operator is talking.
   Rotate clockwise for 40 and 80M SSB.
   Rotate anti-clockwise for 20 and 15M SSB.
3. The louder the SSB signal the more BFO carrier re-insertion is required —place the large loop close to the set and as a last resort remove the aerial from SW set if the SSB signal is in the next street (this attenuates the SSB signal). The weaker the SSB signal the less B.F.O. injection is needed, so move the larger loop further away from the SW set. If it is too close it will deaden the set (and the weak signal) by its action on the AVC circuit.
4. Mount the B.F.O. in a small plastic box (such as Kodak slide box) and bring out the link coupling loop.
5. Your BFO will also enable you to receive morse code.
6. Kits for this BFO complete with a printed circuit board are available from YRCS (contact VK3AQ) at a most attractive price of $2.
7. Don't forget to switch off when you have finished. ●

THE W.I.A. SUBSCRIPTION YEAR RUNS FROM 1ST JANUARY TO 31ST DECEMBER

THE QUARTER WAVE ANB FIVE-EIGHTH WAVE ANTENNA FOR TWO METRE MOBILE

BY GRAEME DOWSE, VK2AGV*

• This is not a constructional article, but by understanding how and why it works, and applying a small amount of commonsense, especially on the mechanical side, you should be able to get the best out of your present system.

Question: Why do some people use 5/8 wave whips instead of the good old simple 1/4 wave?

Answer: Simple . . . it works better.

It has a **theoretical** maximum gain of 3dB over a quarter wave on both transmit and receive, but only if properly matched to the transmission line (co-ax).

Considering that one S-point constitues a 6dB change in signal strength, half an S-point is gained over the 1/4 wave. If a comparison is made between 2 mobiles both using 1/4 wave. then both using 5/8 wave whips, the received signal is one S-point better in both directions in favour of the 5/8 wave whip. This may not sound much, but, remember that it is still an omnidirectional antenna, so any gain that can be obtained is worth the effort.

In fact, not one, but many S-points of difference were observed when making these comparisons.

A point quite often neglected by 2 metre FM operators is that a fairly weak signal — on the "guessmeter" say, 5 x 5 — when increased by only 3dB produces a remarkable improvement in signal-to-noise ratio. A 6dB increase can produce an almost noise-free signal from the loudspeaker and, in the absence of an S-meter, one could be excused for saying that the signal is now 5 x 8 or 5 x 9. This abrupt change in apparent signal strength is due to what is called the "threshhold effect" of an F.M. receiver, and is much less apparent on the other modes. The narrower the band width of an F.M. receiver, and the better the front end is, the more pronounced is this effect, which will oocur at a lower signal level. Note that the threshhold effect does not apply when slope detecting F.M. signals.

Question: Some amateurs are heard using a ground plane instead of a whip on their car. Some say that it performs better than a whip. Why?

Answer: There should be no difference in performance between a ground plane aerial and a whip mounted on a large flat metal surface such as the roof of a car. The metal roof does the same job as the radials on a ground plane antenna.

However, for reasons best known to themselves — or their XYLs — many amateurs do not favour the idea of drilling a hole in the car roof in which to mount a whip. A suitable alternative is to make use of a luggage rack or surfboard rack and mount the whip on this. Unfortunately the radiation pattern will be distorted because of the uneven ground system directly below the whip. This can be corrected by adding radials at the base of the whip, making it into a ground plane antenna. When a board rack is used only two radials need to be added, running north-south. The east-west ones being the rack itself. Radial length is not important, minimum length being 1/4 wave.

Any improvement in performance of the ground plane antenna over a roof-mounted whip will only be because of the few inches extra height above ground given by the roof rack.

The above applies to both 1/4 and 5/8 wave systems. A point worth noting is that a whip mounted on a vehicle will work best in the centre of the roof, being the highest point above ground and having the largest flat area of metal surounding it. A gutter-mounted whip doesn't work as well. The disadvantages are that it will be directional (usually in the direction of maximum metal, i.e. across the car). Also it is difficult to determine the base impedance because of the uneven ground system, making matching to the co-ax a problem. A mudguard-mounted whip has these problems plus the extra disadvantage that it is closer to the ground, where signals are weaker and noise level—car ignition, &c.—is higher. Also there is some shielding effect of the cabin on the car.

However, the mechanical advantages of mudguard and gutter whips are obvious and may outweigh their electrical disadvantages, especially on larger vehicles.

Note that placement of a 5/8 whip is less critical than that of a 1/4 wave because of its larger physical size by comparison with the irregular shape and size of the vehicle below it. For instance, the difference in overall performance between a 1/4 wave in the centre of the roof and a 1/4 wave on the gutter will be more noticeable than the difference between a 5/8 on the roof and a 5/8 on the mudguard or gutter.

A 1/4 wave on the mudguard will have a more irregular radiation pattern than a 5/8 wave in the same place.

Question: How can a 5/8 wave aerial have more gain than a 1/4 wave one? How can any omnidirectional aerial have gain?

Answer: Aerial gain and directivity are closely related. An aerial can have gain only in a specified direction and only at the expense of having a loss in other directions. When we say that a mobile aerial is omnidirectional we mean in a horizontal plane only. It is far from omnidirectional in the vertical plane, and you can see from the diagrams that most of the signal sent from a 1/4 wave aerial goes upwards at an angle of about 45°. This R.F. is wasted unless we want to talk to aeronautical mobile stations!

By lowering the angle of radiation, less signal goes up and more of it goes out in a concentrated beam along the ground where the other stations are.

It follows that the signal from a low angle radiator will go further before they get weak.

A 5/8 wave aerial will receive low-angle signals better than those coming from the sky. Its "capture angle" covers the area where signals emanate from.

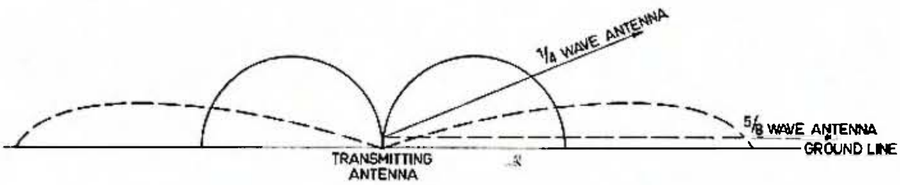

FIG. 1

The solid line shows the radiation pattern of a 1/4 wave aerial showing most of the signal going skyward.

The dotted line represents the low-angle signal radiated from a 5/8 wave aerial at the same location and using the same power.

Question: How long is a 5/8 wave whip?

Answer: It can be shown by experiment that as the length of a vertical antenna is increased above 1/4 wavelength its angle of radiation reduces until 5/8 wavelength is reached. Longer than this results in the main lobe becoming broken up into smaller ones, and average angle of radiation increases, causing the horizontal gain to drop. The optimum **physical** length of a vertical radiator is 5/8 of a wavelength for maximum gain in the horizontal direction. There are other types of arrays which give an even lower angle and more gain, such as the 7/8 wave capacitive loaded vertical, or multiple element vertical array, but because of their size are not really suitable for mobile use. Note that the exact length is important, and any change here is bound to affect gain.

There are some local manufacturers who make "high gain" mobile aerials for commercial use. At least one of these companies will make these to order for any frequency in the 2 metre amateur band. The high gain aerial is not a 5/8 wave but is in fact 3/4 wavelength long. Its gain is slightly lower than the 5/8 but is easier and less critical to match to 50 Ω co-ax.

The physical length of a 5/8 wave whip is affected slightly by its diameter. A

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large diameter whip will be slighlty shorter, but lets not start splitting hairs.

The length of a ¼ inch diameter ⅝ wave whip can be calculated from the formula:—

Length (in.) = 7010 ÷ frequency (MHz)

For 146 MHz this works out to be 48 inches. This is the length measured from the top down to the point where it joins on to the matching system, or loading coil. Any matching system or loading coil which is mounted at the base of the whip should be kept physically as small as possible consistent with ruggedness, and placed as close as possible to the point of entry of the co-ax, so as to avoid interference with the whip's radiation pattern.

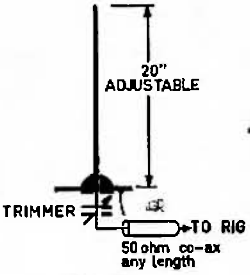

FIG. 2

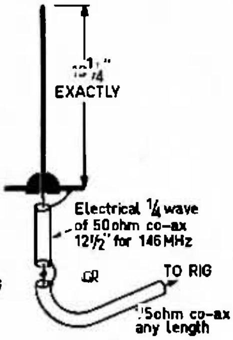

FIG. 3

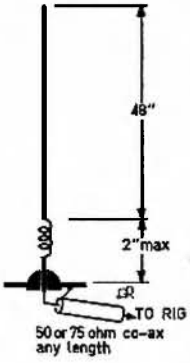

FIG. 4

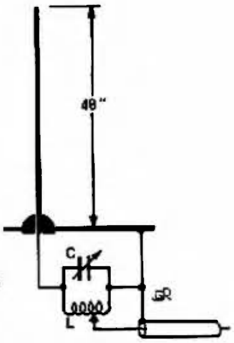

FIG. 5

Matching:

First, a few words about the quarter wave. The resonant length of a ¼ wave whip at 146 MHz is 19¼ inches. When mounted on a good ground its base impedence will be 39 Ω, resistive with no reactive component. If 39 Ω co-ax is used the s.w.r. will be 1:1 and highest possible efficiency will result.

However, 39 Ω co-ax is not easy to come by, but 50 Ω stuff is abundant. Besides which most transceivers are designed to work into 50 ohms. The mismatch by using 50 Ω co-ax is small, and an s.w.r. of better than 1.5:1 should result. If the whip length is increased by about an inch the resistive component at its base increases to a value approaching 50 Ω. The whip will now show a slight inductive reactance because it is now not resonant. The result is a better s.w.r. This is desirable because the transmitter can deliver more power into a low s.w.r. than it can get into a higher one. Note that it is impossible to get a perfect s.w.r. using 50 Ω co-ax and a ¼ wave whip, unless a matching system is employed.

One way is to use a slightly lengthened whip and tune out the residual inductance by inserting a variable series capacitor at the base of the whip. Fig. 2. Adjusting whip length and capacitor value alternately while watching s.w.r. will eventually give a perfect match at 50 ohms. The same method may be used with 75 Ω co-ax, the whip being longer still with a lower value for the series capacitor.

Fig. 3 is another way of getting a good match to a ¼ wave whip with 75 Ω co-ax. It makes use of an electrical quarter wave of 50 ohm co-ax connected between the 75 ohm co-ax and the base of the whip. This is a co-axial transformer which very nicely transforms the 39 Ω aerial impedance to 75 Ω.

The good old gamma match is ideal for matching a resonant ¼ wave antenna to any co-ax, but is not so easy to make for a mobile set-up.

Matching the ⅝ Whip

A ⅝ whip alone is not much better than the proverbial wet string because it is not resonant and won't absorb much power from the transmission line. Resonant aerials come in multiples of a quarter wavelength. The nearest resonant length to ⅝ wave is ¾ wave. The idea is to fool the RF into seeing a ¾ wave antenna so it will be absorbed from the co-ax and radiated. This can be done as in Fig. 4 by adding an extra ⅛ wavelength of wire in series with the base of the whip and reducing it in size by winding it up into a coil. Another approach is to determine the impedance at the base of a ⅝ whip and build a tuning unit which will transform this impedance down to that of the co-ax. Fig. 5.

The impedance at the base of a ⅝ whip is high and capacitively reactive. In the inductively loaded whip, the coil is adjusted so that it tunes out the capacitive reactance so that resonance is obtained.

The impedance at the base of a ¾ wave at resonance is about 65 ohms resistive. The impedance at the base of a loaded ⅝ whip at resonance is, of course, about the same. For a 1:1 s.w.r. the co-ax impedance should be 65 ohms. When using 50 Ω co-ax the mismatch represents an s.w.r. of 1.3:1. Using 75 Ω co-ax would give an s.w.r. of 1.15:1. In practice these figures are difficult to achieve and one should strive for something like 1.5:1 and 1.2:1 respectively.

If a choice of co-ax is available, it is obvious that the loaded ⅝ whip will work better with 75 Ω co-ax. In each case the coil is adjusted for lowest s.w.r. by winding on slightly more wire than necessary, then shortening out sections of a turn at a time until s.w.r. is at minimum. Shortened turns will have no effect on performance at all. The finished coil should be weatherproofed, otherwise rain water between the turns will have a rather detrimental effect on s.w.r. in wet weather.

For the perfectionist, lowest s.w.r. on any co-ax can be obtained using a tuning unit just below the base of the whip as shown in the diagram. This can be mounted behind the headlining of a car of, or inside a weatherproof box forming the base of a groundplane antenna.

C is a 0.5 to 3PF TV tuner type trimmer and L is 4 turns 18 gauge tinned copper wire (preferably silver plated) tapped one turn from the earthy end for 50 Ω and 1½ turns for 75 Ω co-ax. Diameter is ⅜". Lowest s.w.r. is obtained by adjusting the trimmer and the exact tap position alternatively. When using this type of matching it is important that a low loss low capacitance mount is used because of the high impedance at the base of the whip. This system will give the ultimate performance from a ⅝ whip.

NOTES ABOUT S.W.R. BRIDGES

You can't use a 50 Ω s.w.r. bridge on 75 Ω co-ax and vice versa. There are commercial bridges which have a switch for either 50 or 75 ohms.

Some commercial bridges have an upper frequency limit of around 150 MHz, so measurements made around 146 MHz may not be as accurate as they might have been on 6 metres.

I can think of two ways of checking an s.w.r. bridge. One way is to borrow another one, preferably the same type, and connect them in series about an electrical ¼ wave apart in the co-ax to a dummy load or good antenna. Both meters should read the same reflected power. If they don't then the one furthest from the transmitter is actually changing the s.w.r. seen by the other one. This means that the bridge is not suitable for use at this frequency, or the impedance of the bridge is not the same as that of the co-ax being used.

An excellent check is to connect up a low power transmitter to the input and a carbon resistor with short leads directly to the output of the bridge. For 50 Ω you could use 2 100 ohm 1 watters in parallel, and for 75 ohms 2 150 ohm units will do. A bridge terminated with its correct characteristic impedance should read zero reflected power. When the resistor is removed the forward and reflected power should read the same. Any length of co-ax can be used between the bridge and the resistor, and if the co-ax is good and of the right impedance, the reflected power will still be zero.

If an aerial is now connected instead of a resistor, the reading shown should be correct. If the s.w.r. is very high it will vary each time the co-ax is changed in length by ¼ wave. It is always a good idea to have handy an electrical ¼ wave of co-ax with male and female connectors (about 12½ inches long for 146 MHz). If the co-ax is truly flat (very low s.w.r.), no difference will be noted by connecting the extra ¼ wave of co-ax between the bridge and the antenna. Any length of co-ax may be used.

If you have to put up with a bad s.w.r. then it is wise to use an exact number of half wavelengths (25 inches) of co-ax between aerial and transmitter. The impedance at the base of the aerial is reflected at each half wave point along the co-ax, so this is what the transmitter sees. The losses in this system are higher, so it is always better to strive for lowest possible s.w.r.

Flutter

Flutter on a mobile signal is caused by the direct signal and reflected signals from buildings, hills or other large objects, arriving at the receiver at different times and different phases. These signals are continually changing in phase and strength with relation to one another, due to the changing position of the mobile signal source. At any particular instant any two signals striking the receiving antenna may cancel out or reinforce each other depending on their phase relationships. This leads to very large changes in signal strength coming from a mobile station, particularly if there are large obstacles between or near the two stations working.

Flutter is there all the time — you can see that on an S-meter—but is only heard when the lowest points in signal strength fall below the threshold level of the receiver where noise can be heard.

An increase in power or aerial gain will reduce flutter because the average received signal will be stronger so more of the signal will be above receiver threshold.

Obviously then a 5/8 wave aerial will have less tendency to cause flutter — or receive it — by comparison with a ¼ wave, simply because of its extra gain.

One disadvantage of a 5/8 aerial is that when travelling at high speed it will bend over to some extent under wind pressure. If the bending is excessive the lobe pattern will give a maximum in the upwards direction to the front of the vehicle and downwards towards the back, and tilted on both sides. This will reduce the signal strength at any point around the vehicle at a given distance. Under these conditions the 5/8 wave may not give as good results as a ¼ wave. Flutter will be more pronounced because of lower gain and the odd angles at which the signals are emitted.

See Fig. 6, which shows how the lobe pattern of a 5/8 aerial distorts when the aerial bends under wind pressure.

A good 5/8 whip must be rigid enough to remain vertical within about 15 degrees whilst travelling.

Comparing Difference Between Aerials

When using another station with an S-meter to make comparisons between signal strength from different mobile aerials it is a mistake to remain stationary in one place. It is best to find a car park, paddock or wide driveway which is flat and clear of obstacles. With the transmitter on, drive around in a complete circle so as to finish up at the same place. Have your friend note the maximum, minimum and average signal strengths on his S-meter. It is amazing how much variation there will be.

Change over to the other aerial and do the test again. Comparison of results will clearly show up any changes in gain and directivity of the two aerials.

6 Metres, Too !

If you cut a 5/8 whip down by 1½ inches to 46½ inches and compensate electrically by adding more wire to the loading coal, it will give an s.w.r. of better than 1.5:1 on both 146MHz and 52.525 MHz. It operates as a shortened quarter wave base loaded on 6 metres. Use only 50 ohm co-ax, otherwise the matching will be out on 6 metres. This is a compromise aerial on both bands, but has been in use for a year on the author's car and works well on both bands.

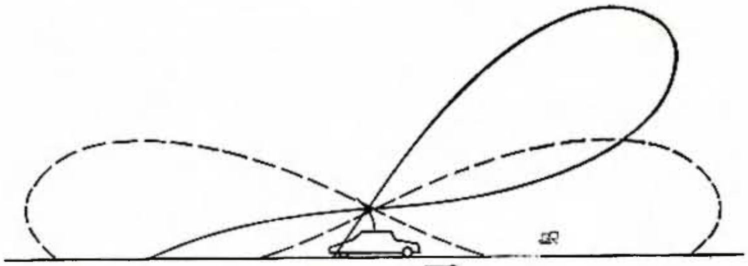

FIG. 6

NEWCOMER'S NOTEBOOK

With Rodney Champness,* VK3UG

This month something a bit different — a review of a simple BFO to add to your receiver. You may have noticed that the YRCS has recently advertised a small inexpensive BFO kit, for the princely sum of two dollars, and if you want it posted add 30 cents.

Ron Fisher, of Commercial Kinks fame, has one fitted into a multiband transistor portable radio. That will give you an idea of its size, about 1" x ½" x ½". As with any BFO, a tuning control is incorporated, but Ron found that the size of the control was almost greater than the BFO and there wasn't enough room to fit the control. Ron is satisfied to have the BFO preset for lower sideband. The performance of the set on lower sideband on the 160, 80 and 40 metre bands was amazingly good for such a simple system. Of course, the stability of the receiver local oscillator will limit the convenience of using the BFO on an ordinary inexpensive transistor or valve type short wave receiver; already mentioned in Newcomers' Notebook some months back.

I don't think there is really any point in going into a lengthy description of the BFO as the notes supplied with it are quite comprehensive. Perhaps the most interesting feature of this BFO is the method used to vary the frequency. This is not accomplished with a variable capacitor as such. A potentiometer is placed in the circuit so that it varies the base voltage of the oscillator transistor. By varying this the junction capacities also vary, causing the frequency of the oscillator to alter, in this case plus or minus 5KHz at a centre frequency of 455KHz. A potentiometer is cheaper than a variable capacitor, and the tuning control can be placed remotely from the actual BFO for convenience. By feeding in audio to the base of this oscillator you would have an elementary FM oscillator on 455KHz. This is something that you could experiment with as an exciter for a VFO-controlled transmitter. Not necessarily on 455KHz either.

These inexpensive little kits are available from Bob Callander, VK3AQ, the YRCS Projects Officer. In this issue a technical article features this BFO. I believe that a variety of other small kits will be making their appearance from time to time, so watch "Amateur Radio" for further news.

Within a few months I expect to have an article on a variety of ancillary devices to go with your receiver, such as BFOs, and a variety of other things such as "S"-meters.

In a recent letter I was asked what an "S"-meter did, and why so named. I believe that its name may have come from a contraction of Signal Strength Meter. The "S"-meter as such is merely a meter to indicate relative differences in signal strength. Initially they were calibrated such that S1 equals 1uV, S2 equals 2uV, S3 equals 4uV, S4 equals 8uV, . . . S9 equals 256uV. You may commonly hear stations say that a certain station is, say 60db over 9. This is a signal input to the receiver of ¼ volt . . . and from a 10 watt station 1000 miles away? The "S"-meter these days is commonly called a "guess meter", and perhaps this is a much more truthful name. Sets these days may be calibrated so that 50 or 100uV equals strength S9. The scales are not linear, and the over strength 9 figures are usually farcical. The sensitivity of sets varies from band to band, once again upsetting the calibration accuracy — if any. The value of an 'S'-meter is its ability to show a relative change in signal strength; it is not an absolutely accurate instrument. By adding a converter in front of your receiver you will once again make your 'S'-meter inaccurate, it will likely read higher than it should.

In conclusion it is a very handy meter to get relative signal strength readings, to use as a servicing aid in your set, and it is a worthwhile addition.

*44 Rathmullen Rd., Boronia, 3155, Vic.

NEW ADDRESS—W.I.A. EXECUTIVE:
P.O. BOX 150, TOORAK, VIC., 3142.

Magazine Index

With Syd Clark, VK3ASC

"73"—October
Frequency Synthesizer for 2 Metre FM Pt. 2; Solid State 6 Metre Crystal-Het-VFO; The FET Voltmeter as a Nano-ampere Meter; Time/Frequency Measuring System, Part 1; Active Filter Design and Use, Pt. IV; Transmission-Limit Timer for Repeaters; A ⅝ Wavelength Weather Balloon Vertical That Works; A Simple Inexpensive ID; Adjustable Time Delay Relay Circuit (Simple but effective VK3ASC circuit used 6 x 5 rectifier as delay element in bias supply circuit with pair of contacts used to ensure full heater voltage applied after delay operated); Power Lead Filters for 432; Portable House Power; Hot Carrier Diode Converter; RTL Decade and Driver; A Power-Supply Splitter for Linear ICs.

"BREAK-IN"—October.
The "Galbraith" R.F. Noise Bridge.

"BREAK-IN"—September
The "Climie" Transceiver; Keep It Cool Man; Stressed Paraboloid Antenna for 1296—2300 MHz.

"HAM RADIO"—SEPTEMBER
High-frequency Power Amplifier Pi Network Design; Quick and Easy Speaker Driver Module; Three-Band High-Frequency Log-Periodic Antennas; RTTY Distortion, Causes and Cures; Advanced Divide-by-Ten Frequency Scaler; Repeater Control with Simple Timers; Solid State Hang AGC Circuit for SSB and CW; Using Odd-ball Tubes in Linear Amplifier Service.

"HAM RADIO"—OCTOBER
Four-Channel Spectrum Analyser; High-Frequency Frequency Synthesizer; An Efficient All-Band Tuned Dipole; Five Frequency Crystal Deck for the Sonobaby; Pulse Snap Diode Impulse Generator; Adding 160 metres to a 40-Metre Vertical; New System for Predicting Six-Metre Sporadic-E Openings; Low SWR Dipole Pairs for 1.8 through 30 MHz; An Accurate RF Power Meter for Very Low Power Experiments. Two extremely good issues. Ham Radio takes a very workmanlike approach to the subject and is recommended as a valuable addition to anyone's library.

VHF UHF

an expanding world

With Eric Jamieson,* VK5LP

Closing date for copy: 30th of month.
Times: E.A.S.T.

VK0	52.160	VK0ZVS,	Macquarie Island.*
	53.100	VK0MA,	Mawson.
	53.200	VK0GR,	Casey.
VK2	52.450	VK2WI,	Dural.
VK3	144.700	VK3RTG,	Vermont.*
	144.925	VK3QZ,	Traralgon.
VK4	52.400	VK4WI/2,	Townsville.
	144.390	VK4WI/R1,	Toowoomba.
VK5	53.000	VK5VF,	Mt. Lofty.
	144.800	VK5VF,	Mt. Lofty.
VK6	52.006	VK6VF,	Bickley.
	52.900	VK6TS,	Carnarvon.
	52.950	VK6VE,	Mt. Barker.
	144.500	VK6VE,	Albany.
	145.000	VK6VF,	Bickley.
VK7	144.900	VK7VF,	Devonport.
VK8	52.200	VK8VF,	Darwin.
ZL1	145.100	ZL1VHF,	Auckland.
ZL2	145.200	ZL2VHF,	Wellington.
	145.250	ZL2VHP,	Palmerston North.
	431.850	ZL2UHF,	Palmerston North.*
ZL3	145.300	ZL3VHF,	Christchurch.
ZL4	145.400	ZL4VHF,	Dunedin.
JA	52.500	JA1IGY,	Japan.
HL	50.100	HL9WI,	South Korea.

*Denotes change.

The VK3 beacon appears to have changed already to the new allotted PMG callsign of VK3RTG. The VK6 beacons near Perth will assume callsigns in the future of VK6RTV. VK0ZVS is re-included in the list as it has not only been heard but worked (see paragraph further on). JA4IGY, JA5IGY, JA6IGY, JA8IGY and JA9IGY are all to be found on 50.500.

SIX METRES

Big things have been happening on six metres during the past month, so much so that it seems a pity these notes are prepared so far ahead (12/12/72) for the February issue. But the deadlines must be met! However, VK0 has certainly been in the news during the past few days. Believed to have been first heard and worked in VK2 on Sunday, 10th December, but it took Monday 11th to really get things going, particularly on the VK5 scene, where I am in close touch. VK0ZVS and VK0WW were both worked by Wally VK5ZWW and Barry VK5ZMW on 52.160 around 1830 hours with signals peaking to 5 x 7. VK2 and VK3 stations were heard calling them at the same time so it is presumed they also worked these two stations. At 2137 Bob VK5ZDX heard the beacon station VK0GR at Casey about S4 using AFSK ident. but did not work him.

So all this means a new call area added to the Australian scene of six metre workings. The distance would be about 3000 miles to Macquarie Island and represents probably triple hop Es. Congratulations to all those who have so far been succesful in working the cold South regions, and as the d.x. season progresses into 1973, perhaps many more will have their first VK0 QSO. Between 1800 and 2100 on 11th December just for the asking, in VK5 anyway, you could work VK2, 3, 6 or 7, with VK2 and VK3 mainly on backscatter. To add to the fun, Wally VK5ZWW and Bob VK5ZDX were having one of their usual hour-long natters on the band after the VK0 opening when ZM3AAN broke in, so conditions were still very wide open.

The good conditions continued again on Tuesday 12th, with VK1, 2, 3, 4 and 6 being worked. Extremely strong signals were available from VK3, indicating a rising MUF. VK2 were heard working to VK6, which is also a long path.

432 MHz RECORD

While all the good 6 metre d.x. was taking place there were those paying attention to other bands as well. The Channel 4 repeater from Adelaide was heard in Albany, W.A. Mick VK5ZDR and Tony VK5ZDY worked Wally VK6WG on 2 metres, with signals at 5 x 9 on the 11th, and then capped it all by working him on 432 MHz with signals 5 x 7. The distance to Tony would probably be the longest by several miles, somewhere around 1200 miles, which would be an Australian record, unless someone else has done something more spectacular while I write these notes!! Good work, chaps, all credit to you.

So now I can get out my trumpet and proclaim that months ago I had a feeling things would come to v.h.f. between now and 1975 and this surely is the beginning. With the greater use of SSB and its inherent advantages we will surely see some long-distance work being done on 144 and 432 MHz, with perhaps the peak years being 1973 and 1974. There is certainly something to be said for transceiving, knowing exactly where the other chap is, and keeping the frequency clear of other stations whilst making the contact. Anyway, December, 1972, will go down in v.h.f. history as being a great month.

NEWS FROM DARWIN

While all the d.x. has been going on Doug. VK8KK has been noted loafing around Adelaide on leave. Cornered in the shack of Bob VK5ZDX he did tell me that the Darwin gang has now completed its new all solid state 6 metre beacon, which uses a digital keyer. The previous beacon was heard in many places overseas, particularly KH6, so the new beacon with its improvements may be heard even further.

Doug. also mentioned having quite a lot of success with Oscar 6, having heard all ZL districts, and heard JA's. He also received SSTV, video from John VK7JV, quite good pictures, in fact, but was unable to complete a contact due to running out of time to leave for South Australia. Doug. anticipates big things for Oscar during the coming year when the first flush of excitement has died down, and people get down to serious work through the satellite. So far his workings through Oscar 6 have been to VK1, 2, 3 and 7, the 5's so far eluding him!

AMATEUR TELEVISION

A letter from Winston VK7EM outlines plans for ATV tests during January, February and March, 1973. Unfortunately the letter arrived too late for inclusion in January "A.R.", but Winston advises he will be running tests on 432 MHz a.m. and t.v. every evening when conditions are favourable, and the VK3 beacon is audible. He will transmit a.t.v. video at 2000 hours Eastern Summer Time for 15 minutes, and listen for reports at 2015 on 432 MHz and 2020 on 144 MHz a.m., s.s.b. and c.w. The transmitting frequency is 432.28, if QRM is noted he will change to 428 MHz. He will also look for other stations transmitting a.t.v. Winston would be pleased to have reports from anyone, and his work has distinct possibilities for both VK3 and VK5.

A letter from Mike VK2AM advises of several brief JA openings into the Sydney area during November, and remarks on the ever-increasing use of 52.010 MHz as an s.s.b. calling and monitoring frequency. He voices the opinion that he would like to see the first 10 kHz of the band kept for c.w. dx. Have you any thoughts? Mike also reports that Roger Harrison VK9RI on Cocos Is. has been hearing VK8VF for hours, also the VK6 beacons and VK5VF once. Roger will be running automatic transmissions with voice indent. with a periodic break. He will monitor the beacon for any callers, and will be using his callsign VK9RI.

FIELD DAY OPERATIONS

The VK5 v.h.f. Field Day on 3rd December went off well, with seven stations out in the field. After setting up their various stations the field day operators were treated to a big 6 metre dx opening, with signals being available from VK1, 2, 4, 5, 6, 7, and ZL1, 2 and 3, although no ZL signals were available during the hours the Field Day operated!! Two metres was disappointing; best contacts being to Kerry VK5SU at Ceduna and only as far as Mildura in VK3. So there is something to be said for having a Field Day around the start of the dx season, and run in conjunction with one in ZL adds to the interest.

That seems to be about the end of the news for this time. Not much use repeating a lot of the 6 metre dx scene, as all those likely to read these notes seriously will already be on 6 metres and hear the news first hand and much earlier than this. So at this point we will close with the thought for the month: "Since teenagers are too old to do the things adults do, they do things nobody else does."

The Voice in the Hills

CONTESTS

With Peter Brown,* VK4PJ

Bowls, fishing, cricket, radio . . . .

One often hears remarks to the effect that contests are of little value. Perhaps a large proportion of entrants participate because of a sense of loyalty, because they realise the value of contests to their hobby and would not like to see contests, competition if you wish, disappear.

The fate of those who do not have to try is known to most of us. A radio contest requires one to put forward his best efforts with equipment in top condition and operating ability at a high level, be it for two or 24 hours.

We must accept that there are fellow contestants with better or more powerful equipment, but make sure that they are kept to a high standard by your operating ability.

Operating ability includes a knowledge of conditions, paths, modes, &c., apart from speed and quality in voice and hand.

If you are not a designer or builder of new or advanced radio equipment or are not working directly for the WIA, you can help your hobby a great deal by trying hard and setting a high standard for the time that you can afford in any contest. If we can develop some of the world's best swimmers and yachtsmen surely we can do the same in radio.

Compete, try hard to set a high standard.

JOHN MOYLE MEMORIAL FIELD DAY CONTEST (December "A.R.")

You have probably realised that Rule 13 should have read . . . "Entrants must call "Mobile" or "Portable" as the case may be, e.g. "VK3XY mobile" if a mobile station, or "VK3XY portable" if a fixed field station.

Also in the SWL log example VK3ATL should be VK3ATL/P. I must have loked at the 1972 calendar when I showed on page 7 the National Field Day as 12th and 13th whereas it should have been 10th and 11th. The second weekend of February. If you have not planned for the Field Day (rules page 17, Dec. "A.R.") it is surprising what can be done in a few days.

* Federal Contest Manager, Box 638, G.P.O., Brisbane, Qld., 4001.

PREDICTION CHARTS

The prediction charts were discontinued because of the high costs of block making. Now the charts are received as computer print outs. For many months numeric predictions have been printed as a substitute on the basis that half a loaf of bread is better than no loaf. The interest in predictions however appears to be negligible and consideration is being given to omitting them altogether. What do you think?

W.A. RAFFLE

A Special "AR" Report

Like most societies, the W.A. Division of the W.I.A. is short of money. This point was high-lighted dramatically when, in 1971, the subcriptions were raised to $12.50 per annum. With only about 300 members scattered over a large area, services such as the weekly broadcast, the local Bulletin and the provision of club rooms for visiting country members were considered essential by many. Unfortunately, even with a $12.50 subscription, there was only sufficient money to cover the Bulletin costs, "A.R.", Federal dues and the like. Nothing remained for replacement of broadcasting equipment, provision of repeaters, and so on. With these problems in mind, the W.A. Council debated the question of how to raise money from inside and outside the Division. They agreed that perhaps a raffle would provide sufficient money to get some of these projects off the ground.

Having decided to go ahead with a raffle, a sub-committee was formed, comprising VK6HD, VK6NE, VK6EU and VK6PG. These four people quickly realised that they may have caught the proverbial tiger by its tail. Many hours were spent in deciding the number of tickets to be sold, the price of the tickets and the value of the prizes. In this regard much help was given by the W.A. Lotteries Commission.

It was finally agreed that approx. $900 would be spent on prizes to make the raffle attractive to non-amateurs as well as to amateurs, and that 25,000 tickets would be printed for sale at 20 cents each. It was also estimated that printing and postage costs would absorb another $350. All this sounded fine until one committee member pointed out that to sell this number of tickets, every 40th person in this State would have to be in the draw !

Initially one book of raffle tickets was sent to every W.A. member, together with a covering letter and an S.A.S.E. This was followed by writing (with books) to all known amateur clubs in Australia offering them 10 per cent. of ticket sales for their club funds. Finally books were sent to every newly licensed VK6 amateur and to every licensed amateur in Australia known personally by the members of the raffle committee.

After an initial influx of money during the first two or three weeks returns of sold books eased off alarmingly.

Four weeks before the draw date, thanks to pushing and prodding by numerous W.A. members, expenses were covered, and from that day on sold books and money just seemed to come rolling in. Daily sessions were then held to deal with requests for more books, to bank the cheques and to deal with the numerous associated problems.

At draw date, 19th December, over 14,000 tickets had been sold and it looked as if this Division would emerge with a profit of around $1700.

We were fortunate in having the Superintendent, Radio Branch, Mr. E. Trigwell, to draw the winning tickets, under the eagle eyes of over 100 members and their friends. The lucky prize winners are:—

PRIZE	WINNER	Ticket No.
FIRST:	M. Sharp, MAYLANDS, W.A.	16,130
SECOND:	P. Halden, LESMURDIE, W.A.	251
THIRD:	I. B. Williamson, EAST DONCASTER, VIC.	11,022
FOURTH:	W. Buck, JOONDANNA, W.A.	4870
FIFTH:	P. Alliss, HOLLYWOOD, W.A.	15,126
SIXTH:	J. Sweet, AITKENVALE, QLD.	6944
SEVENTH:	R. G. B. Vaughan, MORLEY, W.A.	14,738
EIGHTH:	Thomas W. Fehr, WOOMERA, S.A.	20,126
NINTH:	Vicki Male, GOSNELLS, W.A.	4650
TENTH:	F. G. Bail, BOX HILL NORTH, VIC.	2194

Obviously this satsifactory result could not have been achieved without the help of many, many people. We are grateful for the support given to us by amateurs in other Divisions and also thanks are due to our own members. Without this help the raffle project could have been doomed to failure. We now have a little money in the bank.

Drawing the first prize ticket. L. to R.: Peter Dew, VK6EU (Treasurer), Mike Bazley, VK6HD (President), Mr. E. Trigwell, Neil Penfold, VK6NE (Sec. and Fed. Councillor).

NEW YEAR BROADCAST

A Special "AR" Report

For those who may have missed it, here are extracts from the Federal President's end of 1972 recorded seasonal greetings address for transmission over Divisional broadcasts.

"From the Federal aspect undoubtedly significant is the fact that for the last 10 months the Institute's publication Amateur Radio has been conducted by the Federal body.

Your magazine has been under the control of an active and enthusiastic Publications Committee. They have tried valiantly to improve the magazine and I believe they have succeeded. But may be you think that there are other changes that could still further improve it.

I can assure you that the Publications Committee welcomes comment. If you have any suggestions please let the Publications Committee know your views.

Unfortunately, as in a number of areas involving finance, we are facing a bleak year in 1973 so far as the magazine is concerned. Costs have continued to rise. The money budgetted for next year for the magazine will almost certainly be inadequate.

We do not want to reduce it to 16 pages on newsprint. We hope we won't have to.

If the cost to the Divisions is increased then either the Division must take less for its own needs from each member's subscription or it must increase its subscriptions.

Our magazine is very dependent on advertising. Please, have a look at some recent copies of Amateur Radio. Note where the advertising comes from.

Are you surprised how little comes from your State ? This is an area where there are many who can help. Can you bring in some advertising ? If you can, you may not only enable your Division to avoid in the future fee increases, you will also enable us to improve, even further, your magazine.

Undoubtedly, one of the most important decisions of the Federal Convention this year was the decision to seek a new licensing structure, including a Novice Licence. Almost all the response to these proposals have been favourable. These changes will involve important administrative changes on the part of the Australian Post Office. I believe there are valid and compelling reasons why the Institute's submissions should be accepted. I am hopeful they will be accepted.

One pleasing feature of the last year has been the debate within the Institute on matters directly concerning our hobby. Matters such as repeaters.

To my mind these discussions are constructive and they are the sort of thing that the Institute is all about.

We must however guard against our own strongly held convictions leading us to disregard the framework within which these matters must be resolved.

We cannot hope for everyone to agree.

Our decisions are useless unless they are effective. Our decisions cannot be effective other than within the framework of our organisation.

As 1972 draws to a close I believe we can look back on a year that has been both interesting and constructive. Given a national body that has the continued support of the Divisions and of the membership I believe we can look forward to 1973 with some confidence."

"20 YEARS AGO"

With Ron Fisher, VK3OM

Feb., 1953.

Let us look at a copy of Amateur Radio dated February, 1953, so that we can see what it looks like in the physical sense. There were 16 pages of content printed on newsprint paper. The cover page was printed on a grade of paper similar to our present Amateur Radio and carried a price of one shilling. The cover advertisement will be remembered by many old timers—a Philips valve, with the caption, "It's the valve that makes the music". Out of 16 pages five were devoted to Federal, QSL and Divisional notes, five to technical articles, one each to dx notes, vhf notes (50 megacycles and above), contents and callsigns, a dx countries list plus, of course, the editorial page.

Well, so much for the general appearance of the magazine; now let us look at the contents in detail.

One of the more practical services of the Institute in those days was accurate frequency transmissions from Divisional stations. Feb. A.R. listed the transmissions that would take place from VK3WI over the next few months. Commencing at the edge of either the 40-metre or 80-metre band, transmissions would then be made every 20 kHz throughout the band. The frequency of each point was then checked with the PMG frequency measuring centre and corrections then broadcast. Very handy to calibrate a new receiver or VFO. In those days most of our gear was home built. Leading the technical articles for February, 1953, was "A Beginner's Approach to the Calculation of Inductance", by T. D. Athey. This was an extract of a lecture at the Queensland Division of the WIA's AOCP classes. Mr. Athey showed how to put theory into the practice of coil winding.

The concluding part of N. Southwell VK2ZF's article "A Phasing Type Single Sideband Suppressed Carrier Exciter" discussed the adjustment and tuning procedure. In all a most informative series and certainly worth looking at if you are contemplating the construction of a phasing-type transmitter.

Federal notes include news of the release of the 21 MHz band in South Africa, Finland and also Great Britain. Also that the Hawaiian Islands would soon become the 49th State of the U.S.A. Federal Executive posed the question as to whether KH6 would retain its separate country status.

INTRUDER WATCH

With Alf Chandler,* VK3LC

With the co-operation of some dedicated VK4 members I am now receiving regular read-outs of RTTY Intruders and have identified the following — TCX, Turkey, 14152 kHz; HMB22, HMD7, Korea, 14296 kHz; KJG, Korea or Vietnam, 14284 kHz.

There are still many more unidentified Intruders, and once again I urge Amateurs with RTTY facilities to join those members in taking read-outs of anything that they can copy, send it to their Divisional Co-ordinator, or to me direct.

Many A1 CW Intruders are being idtentified by callsign, too, and this is very good because by so doing I can expect full co-operation from the Radio Branch, and liaison at the moment is excellent.

It is very noticeable that when a CW contest is in operation Intruders disappear, particularly RTTY. The moral to be deduced from this fact is the necessity of populating our bands to the full extent.

A very sincere welcome is extended to our new VK5 Co-ordinator, Leith VK5LG, whom I am hoping will exercise his prerogative as do our other co-ordinators. It is regretted though that VK6 and VK7 are not represented by co-ordinators. How about it ?

*Fed. I.W. Co-ordinator, 1536 High St., Glen Iris, Vic., 3146.

Are you organised for the National Field Day ?

The National Field Day is February 12th and 13th

Commercial Kinks

With Ron Fisher.* VK3OM

Over the last month or so Melbourne weather has been more conducive to swimming, sailing and watering of gardens than writing Commercial Kinks. I am therefore presenting a slightly smaller edition than usual. However, I hope no less interesting.

Heathkit Single-band Transceivers.

The greatest drawback of these units is of course just this—they only cover one band, probably the wrong one. Some years ago a commercial kit (not Heathkit) was put on the market to tri-band any of the three models. I am not sure if these are still available or not. To try and duplicate this tri-banding procedure at home is quite a job, which has nevertheless been succesfully tackled by a few. Commercial Kinks is taking the easy way out. Bill VK2BWF solved the problem by changing bands permanently. Here is his account of how to do it . . .

Heath Kit HW12 80-metre Transceiver Conversion to 40 Metres.—The HW12 is a single band (3.8-4.0 MHz) transceiver and is one of the series of three units, HW12 (80 metres), HW22 (40 metres) and HW32 (20 metres) designed principally for mobile operation. All three units use a common printed circuit board and similar circuitry, the principal difference between the units being that the 80-metre unit employs V14 6BE6 as a V.F.O. cathode follower, whereas in the 40 and 20 metre units V14 6BE6 is employed as a V.F.O. heterodyne mixer. Fig. 1 shows the frequency generation scheme of the HW12 and HW22.

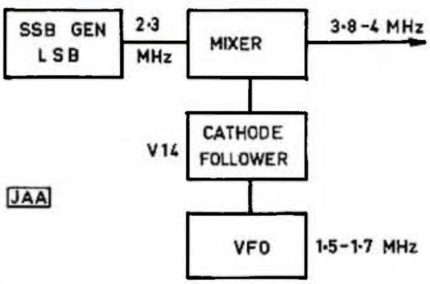

FIG 1a HW 12-80 METER, ADDITIVE MIXING, SIDEBAND UNCHANGED

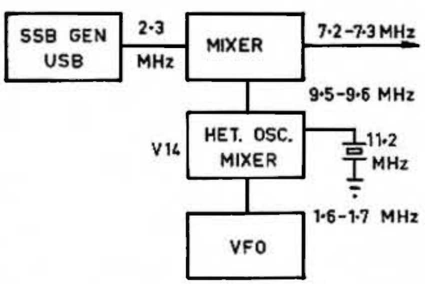

FIG 1b HW 22-40 METER, SUBTRACTIVE MIXING, SIDEBAND REVERSED

To convert the HW12 to HW22 it is necessary to obtain the heterodyne oscillator crystal (approx. 11.2 MHz), obtain USB carrier crystal and remove LSB crystal. Obtain or make a V.F.O. heterodyne transformer L5, replace or rewind the driver grid coil L2, driver plate transformer L3 and the TX output coil L4. The π output fixed loading capacitor C77 must also be changed from 1300 pf to 680 pf. The circuitry of the heterodyne oscillator mixer V14 must be rewired from the cathode follower circuit to the heterodyne oscillator circuit. As mentioned above the printed circuit board has all the necessary holes for this conversion.

In the case of my conversion it was decided to retain the original SSB generation arrangement—i.e., retain the original carrier crystal (LSB). This means that subsequent mixing of the SSB to 40 metres must be additive rather than subtractive as in the authentic HW22. The final arrangement is shown in Fig. 2.

*3 Fairview Ave., Glen Waverley, Vic., 3150.

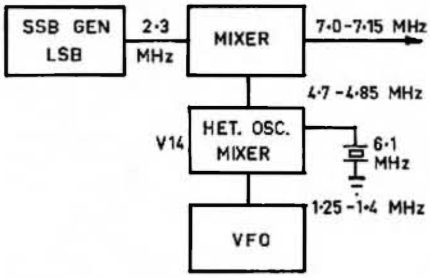

FIG 2 FINAL ARRANGEMENT

The heterodyne oscillator crystal was a disposals 5995 kHz ground up to 6.1 MHz. The V.F.O. was padded down to the frequencies shown by means of a fixed 47pf NPO disc ceramic and results in a 150 kHz frequency coverage.

Improving the Eddystone 888A for SSB.

In common with many other receivers of the late 1950s and early 1960s the 888A incorporated a product detector which in terms of resolving SSB just did not work. However a few simple modifications will make a vast improvement. The main problem is too much r.f. input to the product detector. The input coupling capacitor C72, 500 pf should be reduced to 10 pf. C72 is located towards the back of the chassis near V6 (6AT6) and connects to a coaxial lead feeding to the product detector. With this change even quite strong signals can be handled with both the r.f. and i.f. gain controls full up. Even the "60 db over 9" type signals can be brought into line with a touch of the i.f. gain.

Now the AGC has a chance to work and a small change here will help, too. R39 0.47 megohm should be increased in value to 2 megohms. This increases the decay time to a better value for SSB reception. The AGC connection to the first mixer should be disconnected inside the coil box—just tape up the end of the lead (brown plastic in my set) and leave it so that it can be reconnected later if need be. The reason for disconnecting the AGC is to reduce the frequency pulling of the first oscillator.

These small changes will give the 888A a new lease of life on SSB and also CW without affecting performance on AM for the 160 Mx men.

Letters to the Editor

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

44 Rathmullen Road,
Boronia, 3155. Vic.

Dear Sir,

I am establishing a private museum of old ex-army portable transceivers. The ones I am interested in are of immediately pre-World War II, World War II and immediately postwar. It is common knowledge that a large number of the sets I am interested in came on to the disposals market after the war.

The particular sets I am interested in include the No. 122, No. 22, No. 11, No. 19, No. 108, No. 109, FS6, 3BZ (tx and rx) and probably the Type A Mk. 3 and the Type 3 as well. I would like to obtain at least one of each of these sets, as well as service and/or operator handbooks. Probably the hardest information to obtain would be on the history of each type of set, its design philosophy, when and where used, and the opinions of the people who used and serviced the sets.

If I can obtain the information and sets listed in the above paragraph I can, I hope, assemble a worthwhile, comprehensive working museum of part of our history, and a tribute to the designers of these pieces of equipment. It is likely that some of the readers or their friends may have some of these pieces of gear, either complete or portions of same, lying about unused and possibly unmodified, or very little so. Can you help me to preserve this part of our history. I am willing to pay reasonable prices for equipment and transportation costs. Once completed the museum could be viewed by those interested by arrangement. My telephone number is 231-2028.

Yours faithfully,
Rodney Champness VK3UG

NEW ADDRESS—W.I.A. EXECUTIVE:
P.O. BOX 150, TOORAK
VIC., 3142

NEW CALL SIGNS

SEPTEMBER, 1972

A.C.T.
VK1AF—H. W. Heck, 17 Embley Street, Holder, 2611.
VK1BJ/T—B. J. Dwyer, c/- Hotel Acton, Canberra, 2601.
VK1ZSE—S. J. Edwards, 86 Vasey Crescent, Campbell, 2601.

N.S.W.
VK2CA—R. M. Hartnett, 40 Hermitage Road, West Ryde, 2114.
VK2IO—W. A. A. Brown, 3 Bedford Place, Brighton Le Sands, 2216.
VK2WI/R—W. I. Australia, 14 Atcheson Street, Crows Nest, 2065.
VK2AIG—I. E. Bain, 33 Bondi Road, Bondi Junction, 2026.
VK2AOA/R—Orange and District Amat. Radio Society, Station 255, Peisley Street, Orange Postal P.O. Box 802, Orange, 2800.
VK2ARA—E. C. Thrift, 5 Spencer Avenue, Armidale, 2350.
VK2BHS—H. J. Smit, 9 Moore Court, Faulconbridge, 2776.
VK2BKK. C. M. Colston (Jun.), 1/48-50 Edith Avenue, Leichhardt, 2044.
VK2BQK—M. J. Bredimus, 9 Johnston Crescent, Lane Cove, 2066.
VK2ZLZ—J. C. Mounsey, Station Add., 6/21 Park Avenue, Randwick, 2031. Postal, c/- Commonwealth Bank, Bondi Junction, 2022.
VK2ZTS—L. T. Scotney, 8 Sylvan Grove, Picnic Point, 2213.

Vic.
VK3DC—D. M. Clancy, "Imdkalee", Main Road, Sassafras, 3787.
VK3UK—V. E. Marshall, 33 Rendlesham Avenue, Mt. Eliza, 3930.
VK3VE—The Wireless Institute of Victoria, Rooks Road, Vermont, 3133.
VK3YG—R. G. Davey, 23 Greenwood Street, Greensborough, 3088.
VK3AEU—C. J. Schultz, corner Clarke and Grant Streets, South Melbourne, 3205.
VK3BGP—R. D. Blackshaw, 13 David Street, Glenroy, 3046.
VK3RAG—Geelong Amateur Radio Translator Group, "Bayview", Haines Road, Gnarwarre.
VK3YHD—A. Langer, 50 Windsor Avenue, Mount Waverley, 3149.
VK3YHE—W. S. Ely, 29 Field Street, Shepparton, 3630.
VK3YHP—H. J. Payne, 2/3 Pye Street, Swan Hill, 3585.
VK3ZBE—G. J. Butler, 26 Lorimer Street, Melton, 3337.
VK3ZBN—L. M. Cole, 10 Medway Street, Footscray, 3011.
VK3ZMB—N. W. G. Barker, 19 Lindsay Street, Middle Brighton, 3186.
VK3ZSS—D. J. Smith, 5 Rushall Street, Fairfield, 3078.
VK3ZUH—Educational Reform Association, E.R.A. School, Springvale Road, Donvale, 3111.
VK3ZZD—D. K. Morgan, 2 Huxley Court, Bayswater, 3153.

QLD.
VK4AM—H. C. Barlow, 42 Cook Street, North Ward, Townsville, 4810.
VK4EE—D. R. McLean, 62 Malakoff Street, Biloela, 4715.
VK4EG—G. N. Vayro, R.A.A.F. Base, Garbutt, 4814.
VK4FB—I. C. Fisher, 63 Collins Street, Woody Point, 4019.
VK4MK—M. T. K. Power, 35 Freda Street, Mt. Gravatt, 4122.
VK4ZV—R. L. Chadwick, Station Flat 2, Coronation Hotel/Motel, Brisbane Road, Ipswich, 4305. Postal, c/- U.S.A.F. Det. 436, R.A.A.F., Amberley, 4305.
VKZEZ/T—E. J. Roache, Flat 5/6 Riverview Terrace, Hamilton, 4007.

S.A.
VK5LS—E. L. Smith, 9 Feltus Street, Pt. Lincoln, 5606.
VK5VE—W. N. Thomas, 64 Eliza Street, Salisbury, 5108.
VK5ZRZ—W. S. Baynes, 29 Strathspey Avenue, Hazelwood Park, 5066.

W.A.
VK6CZ—C. F. Lloyd, 351 Egan Street, Kalgoorlie, 6430.
VK6SX—W. M. C. Quinlan, 175 Daglish Street, Wembley, 6014.
VK6UU—W. R. McGhie, 39 Edgewater Road, St. Lucia, 6152.
VK6VP—V. P. A. Magry, 1 Susan Street, South Perth, 6151.
VK6WH—W.A. VHF Group, Postal, 10 Hickey Street, Applecross, 6153. Station, Wireless Hill, Museum.
VK6ZBP—P. R. Beck, 41 Kurrajong Place, Greenwood Forest.
VK6ZEF—R. J. Wynn, 58 Clayton Street, Fremantle, 6160.

Tasmania
VK7US—R. A. Els, 20 Jillian Street, Launceston, 7250.
VK7NR—A. N. Richardson, 69 Georgetown Road, Newnham, 7250.
VK7ZRD—R. L. Davis, 29 Brimsmead Road, Mt. Nelson, 707.

N.T.
VK8OU—P. C. Kozup, Flat 24, Smith Street, Darwin, 5790.

Territories
VK9AP—K. C. Parker, P.O. Box 586, Madang.
VK9BP—R. Pearson, Postal, P.O. Box 5787, Boroko. Station, Section 37, Lot 6, Mavaru Street, Boroko.
VK9DG—D. W. Guthrie, Postal, P.O. Box 301, Rabaul. Station, Tunnell Hill Road, Rabaul.
VK9FD—F. Dowse, Postal, P.O. Box 301, Rabaul. Station, Lot 26 Section 58, Rabaul.
VK9FV—B. A. Stevens, Postal and Station EMQ, 144 Murray Barracks, Boroko.
VK9GO—R. S. Goldsworthy, P.O. Box 26, Panguna, Bougainville, N.G.
VK9IF—I. Fletcher, Manus High School, Lorengau.

Antarctica
VK0IN—K. V. Hanson, Mawson.
VK0JO—J. P. O'Shea, Davis.
VK0WW—R. W. Worden, Macquarie Island.

Y.R.S.

With Bob Guthberlet*

For many years I have been a firm believer that youth clubs are the answer to youth boredom, and in anticipation that shorter working hours will come to Australia in the near future it will mean more time, either for creative activity, or to pursue the fruits of boredom —the wastage of talents and the increase of delinquency. Westlakes Radio Club in N.S.W. has the slogan "Progress Through Activity" is one which we all could think about.

To promote knowledge and worthwhile use of leisure time is fundamental to the youth of Australia. Unfortunately, in the sphere of electronics, industry as a whole has not grasped the opportunities which face it. Youth radio is a tremendous sales potential, and manufacturers of components and equipment would reap great benefits if they awakened to this market for their products. Some form of liaison between industry and youth radio clubs would be worthwhile.

Youth radio is not asking for hand-outs from industry but, rather, for interest and an awareness of what we are doing . . . to encourage us in what we are doing and to recognise those who are giving their time and talents to foster a creative activity for young persons.

If Australian concerns are not interested in youth potential, be assured that others Overseas are not blind to the possibilities of an ever-increasing market for their products.

The understanding that Y.R.C.S. is an integral part of the W.I.A. prompts me to point out once again that every father has an obligation to foster the welfare of his offspring, and that the amateur fraternity, being the parents of youth radio in Australia, can and should accept some responsibility by offering their expert knowledge and giving practical assistance to a movement which rightfully expects some paternal expression of interest and support.

As an amateur you have been helped at some time to achieve the status you now have. Please help us to help the youth of Australia. ●

*Federal Y.R.C.S. Co-ordinator, Methodist House, Kadina, S.A., 5554.

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It is easy to remove a mailing plate, but harder to restore it. Moreover you might miss some issues.

Make every contest a success by joining in.

VARACTOR TUNED BFO

(Continued from Page 10.)

Inductance mH.	N Turns	Q
L1 = 16	184	Using one only wire size for all coils (that for largest L), L2 will have worst space-factor and Q, but this is still acceptable at 140.
L2 = 2.75	76	
L3 = 25.2	232	
L4 = 8.5	134	
L5 = 12.1	160	

TABLE 4.
5th Order Elliptic Filter

(3) $\frac{R_D}{L} = [(2 \div 200) + 0.01]\ 5^3 \times 10^9 \times 2.5 \times 10^{-3} \times 52.1 \times 10^{-10}$

(Assume the hoped-for-Q at this stage, and check later.)

$= 0.033$ ohms/henry (negligible)

(4) $\frac{R_H}{L} = 800 \times 180 \times \frac{2.5}{1,000 \quad 70} \times 1 \times 10^{-3} \times 5 \times 10^{3}$

(Assume a standard 1 mA. current at this stage)

$= 72 \times 0.357 = 26$ ohms/henry.

(5) $\frac{R_{SR}}{L} = [(1.5 \times 10^{-6}) - (3 \times 10^{-12} \times 5 \times 10^{3})] \times 6.28 \times 180 \times 5 \times 10^{2}$

$= 8.5$ ohms/henry.

$$\frac{R_{TOTAL}}{L} = 88 + 26 + 9 = 123$$

$$Q = \frac{6.28 \times 5,000}{123} = 250$$

Error in Q is quite significant at 5 kHz. (about 40% high) if only the first loss calculation is made. ●

Ionospheric Predictions

With Bruce Bathols,* VK3ASE — FEB., 73

Listed below are the Ionospheric Predictions for February, 1973, from information supplied by the Ionospheric Prediction Service Division.

These listings should provide communication between the times stated for most days of the month.

The 28 MHz band does not appear to provide much value from the charts. However, there are many spasmodic openings predicted particularly around noon local time, and at sunset. It may pay 10-metre users to tune the band around these times.

All times are G.M.T.

28 MHz.—

VK1/2	to	KH6		0200-0500
VK4	"	W6		2300-0200
"	"	JA		2300-1000

21 MHz.—

VK1/2	to	SU		0400-1100
"	"	KH6		2000-1100
"	"	ZS		0600-1100
"	"	G	S.P.	0700-1100
"	"	G	L.P.	0900-1000
VK3	"	VE3	S.P.	2000-0100
"	"	UA		0400-1100
"	"	W1		2000-0100
"	"	PY		0100-0400, 1000
VK4	"	W6		2000-0300
"	"	JA		2200-1500
"	"	5Z	S.P.	0700-1100, 2300-0300
"	"	5Z	L.P.	0800-1500, 2000-0300
VK5	"	G	S.P.	0700-1100
"	"	G	L.P.	1000
"	"	ZL		2100-1100
"	"	ZS		0500-1100
"	"	W6		2300-0300
VK6	"	W1		2300-2400
"	"	PY		0900-1200
"	"	5Z	S.P.	0100-0200, 0600-1300
"	"	5Z	L.P.	2300-0400, 0800-1100
VK7	"	PY		2400-0400
"	"	JA		2200-1000
VK8	"	VKO		0700-0900
"	"	ZS		0500-1300

14 MHz.—

VK1/2	to	SU		1000-0100
"	"	KH6		0400-1400, 1800-2100
"	"	ZS		0500-0600, 1200-1600
"	"	G	S.P.	0700-1900
"	"	G	L.P.	0800-1300, 2100-2300
"	"	VK0		2000-1300
VK3	"	VE3	S.P.	1300-2000
"	"	VE3	L.P.	1400-1600, 2100-0100
"	"	UA		0700-1600
"	"	W1		1300-1900
"	"	PY		2000-1300
VK4	"	W6		0400-0900, 1600-2000
"	"	JA		0300-1800, 2100-2300
"	"	5Z	S.P.	1400-2400
"	"	5Z	L.P.	0400-0500, 0800-1200 1500-2000
VK5	"	G	S.P.	0800-1900
"	"	G	L.P.	0800-1400, 2200-2300
"	"	ZL		2400-2400
"	"	ZS		1200-1600
"	"	W6		0400-0900, 1600-2100
VK6	"	W1		1400-2400
"	"	PY		2300-0400, 0500-1200
"	"	5Z	S.P.	2300-0300, 1400-1900
"	"	5Z	L.P.	0700-1100, 1500-1900
VK7	"	PY		1900-1300
"	"	JA		0500-1800, 2100-2300
VK8	"	VK0		2100-1500
"	"	ZS		1200-2300

7 MHz.—

VK1/2	to	ZL		2400-2400
"	"	SU		1500-2100
"	"	KH6		0800-1700
"	"	ZS		1600-2000
VK3	"	G	S.P.	1500-2100
"	"	G	L.P.	0800
"	"	VK0		2400-2400
"	"	VE3	S.P.	0800-1300
"	"	VE3	L.P.	2100
VK4	"	W6		0700-1600
"	"	PY		0800
VK5	"	UA		1300-2100
"	"	W1		0800-1300
VK6	"	JA		1000-2100
"	"	SU		1400-2100
VK7	"	ZS		1600-2000
"	"	W6		0800-1500
"	"	ZS		1200-1600

* 3 Connewarra Avenue, Aspendale, Vic., 3195.

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For full details, see January, 1972, A.R., Page 23.

FOR SALE

Ashbury, N.S.W.: Two AWA TV Monitors, 21" and 19", ex-deceased's estate. Write 12 First St., Ashbury, N.S.W., 2193.

Adelaide, S.A.: Lafayette HA800 Solid State Receiver, 80 to 6 m.x. bands only, double conversion, ceramic filter. In brand new condition, in original carton: $150. Phone (082) 71-3716, or Sydney (02) 929-0674 (bus.). Keith Gooley.

Dandenong, Vic.: Cossor 1049 Double Beam CRO, plus spare set valves; $50, O.N.O. University MVA-6, VTVM, with 250 MHz, r.f. probe, perfect condition, $40. VK3ZZG, Ph. (03) 795-2506, or QTHR

Boronia, Vic.: Computer, core memory, 65K bits in Four 16, 384 bit planes: ex IBM 7090 machine, ex Meshna, U.S.A. Sold as is, all address lines O.K., but some sense lines need reterminating. With IBM memory handbook. Approx. 1.5 microseconds read time. At cost, $70. E. T. Schoell, Box 30, Boronia, Vic., 3155. Ph. (03) 762-3308.

Alphington, Vic.: Signal Generator, sine and square wave. Calibrated 10Hz to 500kHz. Output 20 volts P.P. Valve type, with self-contained 240 v. A.C. power supply; $12. 49-6524. VK3AOH, QTHR.

Woomera, S.A.: Eddystone EC10 Mk. II., a good general coverage Receiver; $170. Bug Key, little used; $12. Mono. Cassette Deck, 6 v.; $10. VK5NQ Box 38, Woomera, S.A., 5720.

Ashfield, N.S.W.: Galaxy 5 Mark 2 Transceiver, good condition, complete with p.s. VK2AXJ. QTHR. Ph. (02) 798-9021.

Sydney, N.S.W.: SSB Transmitter, 150 w.; $50. Double Conversion Receiver; $50. 19" Rack Cabinets; $5. Command Receivers, LF; $10; HF, $5 VK2AAB. QTHR. Ph. (02) 487-1428.

Geelong, Vic.: Parabolic Dishes, alloy, 6'6" dia., with helical feed and mountings; $20 to $25. Geelong Amateur Radio-Television Club, Box 520, Geelong, 3220.

WANTED ..

Aspendale, Vic.: Helical Whips, 80, 40 and 20, for mobile work. B. Bathols, 3 Connewarra Ave.,

Melbourne, Vic.: To Buy or Borrow, for copying—Instruction Manual RCA AR77 Receiver. C. Gracie, Cavendish, Vic. 3408.

Mt. Isa, Queens.: Secondhand, good condition, Speaker 4 Drake. Price/details to G. Aigle, Box 1101, Mt. Isa, Queensland, 4825.

Dapto, N.S.W.: Morse Key (pref. Post Office type); cash setlement. VK2AFF. QTHR. Ph.: Dapto 61-4287.

Townsville, Queens.: For Hy-gain TH3-Jr. Beam Ant.: Require several Complete Traps or nylon centre Insulators for traps. VK4PY, QTHR. Ph.: (077) 72-1236.

Toorak, Vic.: Has anybody a copy of June A.R. to spare If so, please let me know. VK3CIF, Box 150, Toorak, Vic., 3142.

Victoria: Johnson Match Box. W. Colborne. Ph. (03) 85-4952. A.H. (03) 419-1666, bus.

Victoria: U.K. Amateur seeks Exchange Home(s) during 1974. Further particulars from VK3ZBB. QTHR. Ph. (03) 379-4242.

Victoria: Can anybody please loan, donate or sell at reasonable price, Bradma or compatible Embossing Machine for addressing Amateur Radio 3R Plates; upper/lower case preferred. Manual or power operated. Please write or phone Business Manager.

Ballarat, Vic.: V.T.V.M., for the shack; e.g., University MVA6, Rapar MV21, &c. Write or phone Jim, 15 Victory Ave., Ballarat, 3350. Ph. (053) 34-1425.

Melbourne, Vic.: Join the Direct Conversion (Synchrodyne) Receiver Club, whose aim is to swap ideas and circuits. Send name and address, plus S.A.E., and list of circuits you have and any circuits you want, to VK3AQ, QTHR. Mail only.

SILENT KEYS

It is with deep regret that we record the passing of—

VK6FG—F. G. Clinch
VK3LZ—C. A. Ellis

KEY SECTION

With Deane Blackman,* VK3TX

A few readers of this column were kind eonugh to write in and express their problems on finding c.w. to practice on, and I will pursue some of the suggestions made in the hope of improving the service offered. I would regard any attempt to obtain permission for holders of anything but a full licence to use c.w. on air as pretty forlorn (to mention one suggestion specifically): as I understand it the official position is rather like that of your driving licence — if you hold one you can drive (though common observation makes the truth of the rules questionable), and if you don't hold one you cannot drive. I will, however, ask.

For the more advanced student there are quite a number of commercials which put out press on c.w. They use a machine for sending and the result is as near perfect morse as you are likely to hear — though at speed. This material is copyright, but there is no problem if used only for practice and the rules regarding secrecy of radio transmissions are respected. I am collecting information on broadcasts which are suitable; if you know of any let me know and I will advertise them here.

Since October, we welcome these new members: 39, VK7RD; 40, VK3LV; 41, VK2AXK; 42, VK3BGF; 43, VK7ZD.

NFD is near, and scores in the c.w. sections count towards the President's Cup. Just about enough time to get that motor generator unseized from last year's NFD . . .

*Box 382, Clayton, Vic., 3168.

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MODEL OL-64D — **Price $19.75**

20,000 ohms per volt. DC volts: 0.025, 1, 10, 50, 250, 500, 1000 (at 20K o.p.v.), 5000 (at 10K o.p.v.). AC volts: 10, 50, 250, 1000 (at 8K o.p.v.). DC current: 50 uA., 1 mA., 50 mA., 500 mA., 10 amps. Resistance (ohms): 4K, 400K, 4M, 40 megohms. dB scale: minus 20 to plus 36 dB. Capacitance: 250 pF. to 0.02 uF. Inductance: 0-5000 Henries. Size: 5¾ x 4¼ x 1¾ inches.

MODEL C1000 — **Price $6.95**

This is the ideal low-cost pocket meter. AC volts: 10, 50, 250, 1000 (1000 o.p.v.). DC volts: 10, 50, 250, 1000 (1000 o.p.v.). DC current: 1 mA., 100 mA. Resistance (ohms): 150K. dB. scale: minus 10 to plus 22 dB. Dimensions: 4¾ x 3¼ x 1¼ inches.

MODEL CT-500/P — **Price $16.75**

Popular, medium-size, mirror scale, over-loaded protected. AC volts: 10, 50, 250, 500, 1000 (10K o.p.v.). DC volts: 2.5, 10, 50, 250, 500, 5000. DC current: 50 uA., 5 mA., 50 mA., 500 mA. Resistance (ohms): 12K, 120K, 1.2M, 12M. dB. scale: minus 20 to plus 62 dB. Approx. size: 5½ x 3½ x 1¾ inches.

MODEL A-10/P — **Price $55.00**

Giant 6½ inch meter. In-built signal injector, overload protected. AC volts: 2.5, 10, 50, 250, 500, 1000 (10K o.p.v.). DC volts: 0.5, 2.5, 10, 50, 250, 500, 1000 (30K o.p.v.), 5000 (10K o.p.v.). DC current: 50 uA., 1 mA., 50 mA., 250 mA., 1 amp., 10 amps. AC current: 1 amp., 10 amps. Resistance (ohms 10K, 100K, 1M, 100M. dB. scale: minus 20 to plus 62 dB. Signal injector: Blocking oscillator circuit with a 2SA102 transistor. Approx. size: 6½ x 7¼ x 3¾ inches.

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amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA. FOUNDED 1910

MARCH, 1973
Vol. 41, No. 3

Published monthly, as the official journal, by the Wireless Institute of Australia. Reg. Office: Above 474 Toorak Rd., Toorak, Vic., 3142.

Enquiries and material to:
The Editor, Phone (03) 24-8652.
P.O. Box 150, Toorak, Vic., 3142.

Copy is required by the third of each month. Acknowledgment may not be made unless specially requested. All important items should be sent by certified mail.

The Editor reserves the right to edit all material, including Letters to the Editor and Hamads, and reserves the right to refuse acceptance of any material, without specifying any reason.

Advertising:
Advertisement material should be sent direct to the Editor by the 25th of the month preceding the month prior to publication.

Hamads should be addressed to the Editor by the third of each month.

Printers:
"RICHMOND CHRONICLE"
Shakespeare Street, Richmond, Vic., 3121
Phone 42-2419.

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COVER STORY

VK3SS operating from Mt. Tamboritha in early December on a search and rescue operation. (See page 24.)

QSP

"... AND SO TO THE SECOND YEAR"

This issue of "A.R." marks the beginning of the second year of publication of the magazine by the Executive.

Early in 1972 a band of "volunteers" was gathered together to form a new Publications Committee—a committee charged, very early on, with the seemingly impossible task of placing "A.R." back on its financial feet without lowering the standard of publication.

As a result, a number of changes have occurred over the past twelve issues. Changes that were made in an attempt to improve the content and appearance of the magazine, but were constantly hindered by financial limitations.

The front cover layout and suitable photographs posed a problem. After several months of experimentation, a somewhat flexible make-up was devised which has attracted favourable comment. Because the old block was worn out the opportunity was taken to try a new method. This appeared on the January 1973 cover. Bob Dorin, our photographer, would like to see more photographs submitted by readers, not only for the cover but also to brighten the inside pages. Large, glossy, clear prints with plenty of contrast are essential.

The internal layout, column headings, and presentation of the articles have been modified, improved, updated—all at no increase in cost. In fact, when it became necessary to replace the service column heading blocks, a considerable savings was made with the new style headings.

The appointment of a highly qualified Technical Editor has ensured the consistently high level of technical accuracy in the articles published, and Bill Rice has been of invaluable assistance to many authors.

In keeping with our policy, only a very few of the articles published in the past twelve months have been reprints from other publications, and then only after careful consideration of the possible benefit and interest to members. Preference has been given to previously unpublished articles from local contributors. But many more of these articles are needed.

The new feature columns, "Commercial Kinks" with Ron Fisher and "Newcomer's Notebook" with Rodney Champness, have proved to be very popular. The service columns presented by our regular Contributing Editors, Deane Blackman, Don Grantley and Eric Jamieson, and newcomers Peter Brown and Geoff Wilson, are providing an increasing valuable service to our members.

Because of the shortage of competent draftsmen, the preparation of circuit diagrams and line drawings has posed a problem to "A.R." for some time. We now have a willing and capable drafting team in Neil Osborne, John Adcock, and assistants Andrew Davis and Gordon Row. A comprehensive instruction sheet to assist in the standardisation of drawings has recently been completed by senior draftsman Ken Gillespie and supplied to all draftsmen.

In addition to some drafting and other duties, assistant editor Bruce Bathols converts the information received monthly from the Ionospheric Prediction Services Division into the numerical format which appears monthly in the magazine at a considerable savings compared to the earlier graph method of presentation.

No longer do Divisional Notes, generally of parochial interest only, appear in the pages of "A.R." In a successful endeavour to save money for themselves, and for the magazine, VK2, 4, 6 and 7 have ceased publication and mailing of their independent monthly bulletins and now supply their members with Divisional news via inserts in "A.R." Technical articles which previously appeared in the bulletins now appear in the pages of "A.R."

Despite all the efforts of the Publications Committee. the cost of producing "A.R." has escalated considerably, mainly due to increases in the price of paper and wages in the printing industry.

In a continued effort to find a suitable compromise between cost of production and lowering of standards, more of the content is unavoidably being printed in the smaller type known as 6 point.

Unable to obtain even a small increase from the Divisions in the members' subscriptions for the current financial year (presently 22 cents per copy, of which in excess of 7 cents is absorbed in the costs of wrapping, addressing and postage) we are searching for other ways in which to remain economically viable.

For many years "A.R." has been printed by the letterpress method. Five years ago an investigative committee decided that offset printing offered no financial advantages. Today could be a different matter.

The Publications Committee will continue to seek every possible way in which to keep the cost of publication down, **but without lowering of standards.**

And so to the second year . . .

Editor and Member of the Executive
W. E. J. ROPER, VK3ARZ.

OSCAR 6

Because of the failure of the 435.1 MHz. beacon, telemetry recovery from the satellite is now gathered through the 2 to 10 metre transponder. As telemetry data is required at regular intervals the repeater could be "on" for short periods during the week. If it is found to be on please do not use it mid-week. It will be on for general use from Friday to Sunday nights.

Latest DX titbit to hand. VK4 worked into KX6, Marshall Islands, early February, and KH6 was heard by ZL1 through the transponder.

G5UM, writing in "Rad. Comm." of Jan., comments that G8RH working across the Atlantic noted that "watery" signals from U.S.A. remained audible after Europe had dropped out and the predicted time of orbit had passed. This was attributed to the 29.5 MHz. signals bending or reflecting even though the satellite was beyond the radio horizon. Much the same was reported by G3COJ being heard by ZE7JX on Orbit 283.

OSCAR 8

Yes, Oscar 8, which is due for launch about mid-1974 has been re-named "Australis-Oscar 8" and is planned to be built **wholly** in Australia. It will carry a number of 144 to 435 MHz. experiments and, if sanction can be obtained, a 2.3 GHz. beacon. The planned life of this satellite will be three years.

MEMBERSHIP GRADES

You will have seen this year a small notation such as 2F, 3A, 5C, 7T on your subscription notice. This, as many will know, shows the Division and the membership grade recorded for yourself in the EDP records. It also helps the office when processing the payments. The State in which you reside governs your Divisional listing. Mmbership grades are F A C T S (plus L for Life or Honorary Members and X for sub-divisions). F and C respectively mean Full City and Full Country membership, A and T mean Associate City and Associate Country membership and S is a special grade to cater for students, pensioners and similar members for whom a standard subscription rate applies. Your ordinary membership grading is governed solely by your Divisional authorities. The details you see on your subscription notice and "A.R." mailing plate are the details passed on to the Executive office from Divisional offices or, in the case of name and address changes, are those which you have submitted direct to the Executive office or via your Division. Membership information sent direct to the Executive office is recorded and then on-forwarded to your Division because of a time lag in processing EDP print-outs.

BOOKS

A member now in the U.S.A. was a Marine in the Pacific area and is interested in Marines activities during W.W.2 in the Solomons. He would like to acquire a copy of a published Diary by W. J. Martin Clemens of his days as a coastwatcher in the Solomons. Does anyone know where a copy of this (out of print?) book can be obtained. If so please write to the Business Manager.

(Continued on Page 16)

A 30-40 MHz. FREQUENCY COUNTER

PART ONE

H. L. HEPBURN, VK3AFQ*

● In the last year or so the cost of integrated circuits of all types has, as they have been brought into ever increasing commercial use, dropped very significantly. Today a very wide selection of most complex devices cost little, if any, more than the humble transistor cost only four or five years ago. One effect of this price drop has been to make possible for the Amateur a range of equipment that was so recently but a pipe dream. The frequency meter now described comes into this category.

Those who use frequency counters in their day to day professional activities, or who have access to them for their Amateur activities, will need no convincing that they are most desirable (if not essential) instruments when there is a need for accurate frequency measurements.

Current Amateur activities such as s.s.t.v., r.t.t.y. and v.h.f. f.m. net operations all call for accurate measurements of frequency from low audio to high r.f. The modern digital frequency meter, such as that now described, does all this. That the Amateur fraternity all over the world realises the utility of the d.f.m. is evidenced by the number of articles appearing in Amateur literature in the past two years. Whilst no originality is claimed for the instrument which is the subject of this article, it does, at least, bring to the pages of "A.R." something which is relatively new, which is fully engineered and which can be built of parts readily obtainable in Australia. Construction is absurdly simple and requires not much more than the ability to handle a fine soldering iron.

The design presented is basically a 30 (plus) MHz. digital frequency meter which is optionally extensible to 200-300 MHz. It is based mainly on the 7400 series of TTL (transistor transistor logic) devices marketed by National, Fairchild, Motorola and Texas among others. Two ECL (emitter coupled logic) devices are used in the input circuits—one in the h.f. pre-amplifier and one in the (optional) v.h.f. pre-scaler. A single regulated 5-volt positive supply powers the complete instrument.

DESCRIPTION

Fig. 1 gives the general schematic of the instrument and also indicates the component groupings.

Either the output of the h.f. pre-amplifier or the output of the v.h.f. pre-scaler are selected electronically. In both cases the outputs consist of rectangular pulses in the 20 Hz. to 30 (plus) MHz. range. These pulse trains enter a signal gate which is "opened" for periods of time accurately determined by the control circuitry. Output of the signal gate is then passed to the indicating decades for counting and display.

The crystal clock—which determines the length and accuracy of the signal gate "opening" uses a 5 MHz. crystal oscillator whose output is divided first by 5 to give 1 m.p.p.s. (1 mega pulses per second) and then divided by 10 six times so that the final output of the clock is 1 pulse per second. Intermediate speeds are selectable. The selected crystal clock output (1 p.p.s., 1 k.p.p.s. or 1 m.p.p.s.) is used to activate the control circuitry whose function is to open and close the signal gate and, also, to generate strobing and re-set pulses for the indicator decades. A 9 volt, 3 amp. transformer, a bridge rectifier, smoothing capacitors and IC regulators provide the necessary power.

A detailed description of each function will now be given.

THE H.F. PRE-AMPLIFIER

The function of the h.f. pre-amplifier is to accept low level signals in the 20 Hz. to 30 (plus) MHz. range, to amplify them, to square them and to convert them to the steep sided positive-going pulses of relatively constant amplitude required to drive the rest of the logic circuitry.

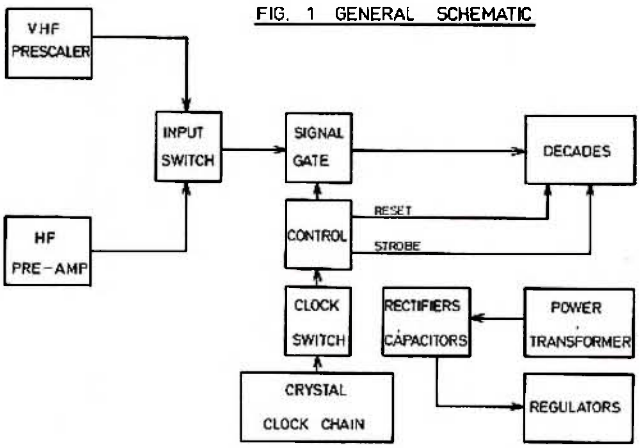
Another requirement of the h.f. pre-amp. is that its input sensitivity remains substantially constant over the whole frequency range to 30 (plus) MHz.

Within fairly wide limits the input waveform may depart from the ideal sine wave, but mixed waveforms (such as those from a two-tone test oscillator) will leave the instrument wondering which frequency it is supposed to be counting.

Fig. 2 gives the circuit diagram of the h.f. pre-amp. while Fig. 12 gives the component layout of both the h.f. and v.h.f. "front ends". A Motorola MC1035P triple line receiver is used to accept signals as low as 10 mV., to amplify them and to square them. The MC1035P is an ECL device so that its output is a train of negative-going pulses whose amplitude alternates between —0.8v. and —1.6v.

This output is unacceptable in both polarity and amplitude to the TTL logic used in the rest of the instrument and a BFY90 transistor and five 1N914 diodes are used to transform the ECL output of the MC1035 to the 3-4 volt positive-going pulses required by subsequent TTL logic.

FIG. 1 GENERAL SCHEMATIC



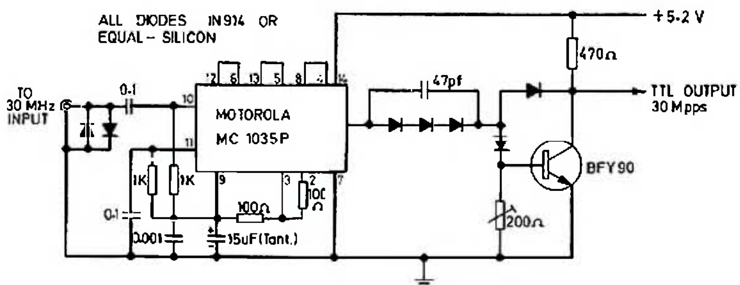


FIG. 2 HF FRONT END

* 4 Elizabeth Street, East Brighton, Vic., 3187.

Two back-to-back 1N914 diodes are used to prevent overload of the MC1035P and the 200 ohm "Cermet" (Motorola type C2-1-1) pre-set pot in the BFY90 base is to adjust that transistor to its correct operating point. The resistors and capacitors associated with the MC1035 are used to provide the necessary bias and feed back voltages required by the device. For a more complete description of the internal circuitry and operation of the MC1035, the reader is referred to the Motorola MECL handbook. Note that the h.f. pre-amplifier is perfectly capable of functioning up to 70 MHz. so that any restriction on operating frequency will be in the subsequent TTL logic. More will be said of this in the appropriate sections.

Input impedance of the h.f. pre-amplifier is around 1000 ohms and sensitivity is around 5-10 mV. at 30 MHz. The sensitivity increases slightly at lower frequencies, but drops to around 20-30 mV. at 70 MHz. The p.c.b. measures 2½" x 1½".

In essence, the v.h.f. pre-scaler needs to perform exactly the same functions as the h.f. pre-amplifier but with one important addition. In the case of the h.f. pre-amplifier the repetition rate of the output pulse train is exactly the same as the frequency of the input signal. The v.h.f. pre-scaler is also called on to divide by 10 so that the repetition rate of the output pulse train is one-tenth of the input frequency. Fig. 3 gives the circuit diagram of the v.h.f. pre-scaler, while Fig. 12 gives the component layout.

A BFY90 is used to provide some measure of wide band pre-amplification, and is protected by back-to-back high speed silicon diodes at the input. Use of this amplifier raises the sensitvity of the unit at 200 MHz. from around 250 mV. to around 100 mV. More sophisticated and complex circuitry could have been used to increase this sensitivity even further, but was avoided in the interests of simplicity.

The heart of the v.h.f. pre-scaler is a Fairchild 95H90 high speed decade divider. Whilst quite expensive at around $16.00, it is, at the present time, the only freely available v.h.f. divider obtainable in this country. Like the MC1035, it is an ECL device so that, once again, there is a need to convert its output to be compatible with subsequent TTL logic. A 2N4258 is used to do this. Again the reader is referred to the manufacturer's data for the internal "workings" of the 95H90.

The chokes designated as "F29" are Neosid F29 tuning slugs with single wire through the centre. The RFC in the collector of the BFY90 amplifier consists of 8 turns of 26 gauge enamelled wire wound on a 5/32" drill shank and stretched to cover 5/8". Slightly heavier wire, say, 24 or 22 gauge, will do equally well, and may be easier to handle. The p.c.b. measures 2½" x 1½". Input impedance approximates to 50 ohms.

Whilst the inclusion of the v.h.f. pre-scaler is undoubtedly an asset in that it extends the frequency of operation to over 200 MHz., its use is by no means obligatory and may be omitted if the worth/price ratio is considered too high for any individual application. The most likely use for the pre-scaler in Australian Amateur circles will be to measure the output frequencies of 52 or 144 MHz. transmitters. The next band up in VK is 430 MHz.—a frequency not covered in any case by the pre-scaler.

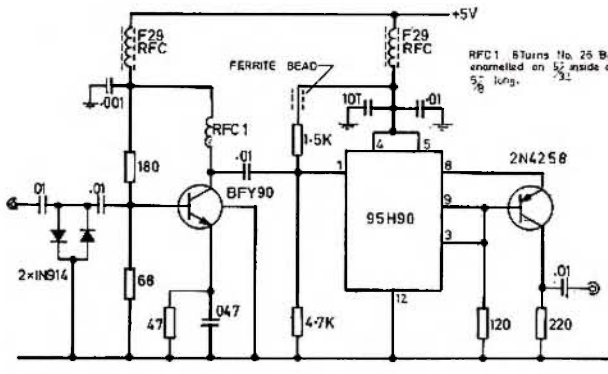


FIG. 3 VHF PRESCALER

With only a very minor loss in accuracy it is possible to use the h.f. pre-amplifier to determine v.h.f. output frequencies. Most current v.h.f. transmitter designs rely on generation of r.f. at a relatively low frequency (2-12 MHz.) and thereafter a series of multiplier stages raise this low frequency to the operating frequency. By selection of three ICs, it is possible to raise the maximum frequency of operation of the basic counter to in excess of 40 MHz. It therefore becomes feasible to measure the frequency of an appropriate multiplier in the unit under test and calculate accordingly. For example, the writer's d.f.m. is used in the "h.f." mode to set the operating frequency of the carphone described in the March and April 1971 issues of "A.R." This particular transmitter uses a 12 MHz. crystal and triples in the collector circuit of the oscillator. Thus, if setting this transmitter to Channel B on 146.00 MHz., the output from the oscillator is set to exactly 36.500 MHz., then the output will be very close to the required 146.00 MHz. Just how close it can be made is indicated later in the article. Similarly, other sub-multiples of receiver oscillators or transmitter oscillators can be measured in order to determine end use frequencies.

THE INPUT SWITCH

Reference to Fig. 3 shows that either a 7400 or a 74H00 may be used as an input switch. Both devices are quad 2 input NAND gates differing only in their maximum operating frequency. For operation up to 30 MHz. the 7400 is adequate, whilst the 74H00 is recommended for operation in excess of 30 MHz. Note that the input switch is not required if the v.h.f. pre-scaler is not used. In this case the IC is not put on the main p.c.b. (see Fig. 11 for layout) and pins 3 and 13 are joined by a wire link. For operation of this switch (and the crystal clock switches), the reader is referred to Fig. 8.

The "Truth Table" shown in Fig. 8 refers to the various voltages that can be found on the output of any single gate (there are four such gates in a 7400 or 74H00) for any of the four possible combinations of voltages on the two inputs. Note that, in this context, we are only interested to know if the input voltages are **"high"** or **"low"**, i.e. are 3-4 volts (**high**) or under 0.3 volt (**low**). Intermediate voltages are neither desirable or correct. Start with the assumption that both inputs

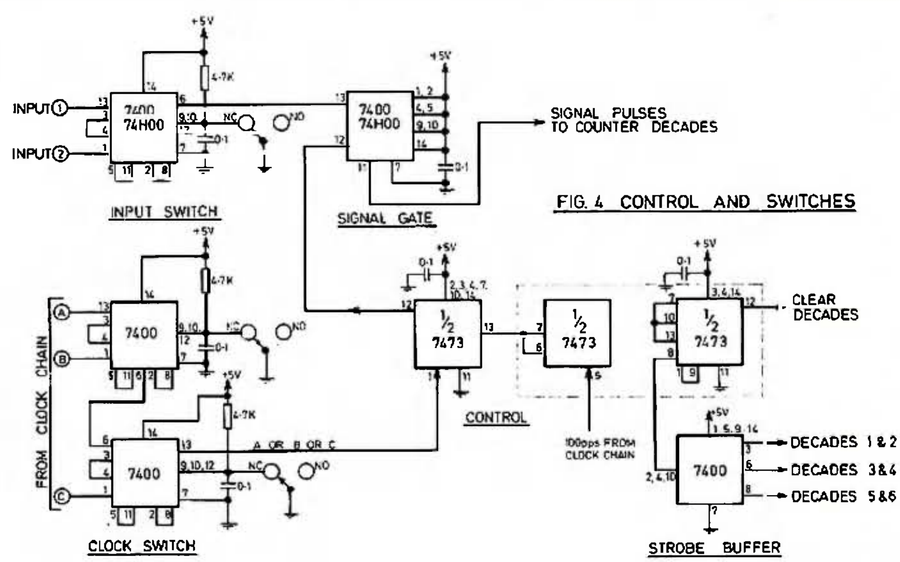


FIG. 4 CONTROL AND SWITCHES

X and Y are pulsing **high**—that is two input signals are presented to the four gate switch.

Further assume that the points B. D and E are held **low** by the earthing switch.

If point B is held **low** and point A pulses between **high** and **low** at the frequency of input X, then there will be no change in the voltage at point C. The truth table shows that no matter whether A and B are both **low** or one is **high**, and one is **low**, point C will remain **high**. In other words, the pulsing of input X will **not** appear at point C for transfer to point L. On the other hand, however, since both points D and E are held **low**, then points F and G must be held **high**. If this is so, input Y (which is pulsing between **high** and **low**), will cause points K and M to alternate between **high** and **low**. In effect, the pulse trains from input Y are being passed on to point M.

Since point L is held high and point M is alternating between **high** and **low**, then the output point N will alternate between **high** and **low** at the same frequency as input Y.

If now points D, E and B are made **high** by opening the earthing switch, then the opposite applies.

Input Y is blocked off and only input X appears at output point N.

We have thus achieved the selection of one of two high frequency inputs by using only simple d.c. switching. This method avoids r.f. selection by means of a front panel switch and its associated co-axial links. The method used is only marginally more expensive and, functionally speaking, much more efficient.

THE SIGNAL GATE

The function of the signal gate is a very simple one. At the command of the control unit it must either **open** and pass its input to its output, or it must **close** and not allow its input to appear at its output.

It must do this at the maximum frequency of operation desired, and it must do so for the precise periods determined by the crystal clock and control unit. Fig. 1 shows its logical position, while Fig. 4 shows its circuitry.

One gate only of a 7400 or 74H00 four-gate IC is used. As in the discussion under Input Switch, the maximum frequency of operation is determined by the type chosen. It is strongly recommended that a 74H00 be used to extend the operating frequency of the basic counter to at least 40 MHz.

Operation of the signal gate is covered by the "Truth Table" of Fig. 8. If one (control) input is held **high** by the control circuitry and the other (signal) input is pulsing between **high** and **low**, then the signal gate output will also pulse between **high** and **low**. The signal input pulse train is thus passed on for counting.

If, on the other hand, the control circuits hold the control input **low**, then no matter if the signal input is **high** or **low** the signal gate output will remain **high**. The pulse train at the signal input will thus not be passed on for counting.

THE CRYSTAL CLOCK

If the control section of the counter can be described as its "brains", then the crystal clock can aptly be described as its "heart". The function of the crystal clock is to provide pulses, of high accuracy with respect to time, to activate the control circuits. The accuracy of the counter will be that of the crystal clock.

Let it be assumed that a signal of precisely 10 MHz. is being measured. Let it be further assumed that the signal gate is to be opened for one second. 10 million pulses will thus be passed on to the indicator decades for counting.

If the accuracy of this one-second control interval is plus or minus 1 part in 1 million (10^6) the number of pulses passed on for counting will be in the range 9,999,990 to 10,000,010—that is an error of plus or minus 10 pulses. If the accuracy of the crystal clock is plus or minus 1 part in 10 million (10^7) the accuracy will be plus or minus 1 pulse. If the accuracy of the crystal clock is only plus or minus 1 part in 100,000 (10^5) then the count accuracy will only be plus or minus 100 pulses.

For highest accuracy the writer beats the 75th harmonic of the 100 k.p.p.s. output from the crystal divider chain against VNG at Lyndhurst, Victoria, on 7.5 MHz. The accuracy of the calibration is to within 1 Hz. at 7.5 MHz. or, say, 20 Hz. in the 2 metre band.

Fig. 5 gives the circuit diagram of the crystal clock, while Fig. 11 gives the component layout.

A Hy-Q 5.000 MHz. type Delta GF series resonant crystal is used in conjunction with a 74H00 NAND gate. Output from the 74H00 is a series of positive-going rectangular pulses with a repetition frequency of 5×10^6 pulses per second. Adjustment to precise frequency is by means of the 9 pF. trimmer in series with the crystal.

Note that the circuit is **not** suitable for crystals calibrated for use in parallel circuits.

Division down to 1 pulse per second is done by a series of 7490 decade dividers. The 7490 (whose flexibility can be seen if the maker's data is examined) is basically a bi-quinary divider. That is, it can divide by 2 or it can divide by 5, or it can divide by $2 \times 5 = 10$, depending on the way it is connected.

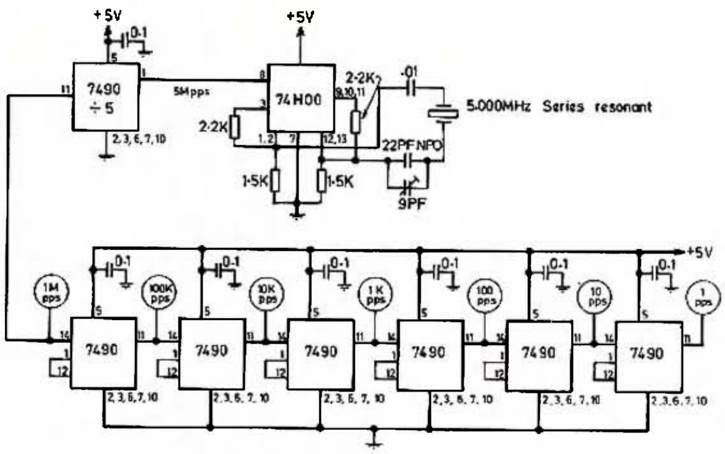


FIG. 5 CRYSTAL OSCILLATOR AND CLOCK DRIVERS

It follows, therefore, that the higher the frequency at which the clocking pulses are generated and the more stable the oscillator can be made, the higher will be the overall accuracy of the counter. In the design now presented, the generation frequency is 5.000 MHz., this being the current optimum of cost versus frequency so far as the crystal is concerned.

Whilst crystal ovens are used in professional equipment they are both expensive and not easy to obtain. A little thought will lead to the conclusion that for Amateur purposes such ovens are an unnecessary expense.

Provided that the crystal used is capable of being adjusted only a small fraction of a percent. either side of its nominal frequency, or, to be more precise, capable of being adjusted exactly on to frequency, then for the short periods of time needed to carry out accurate frequency determinations, the crystal can be adjusted to zero beat with WWV on 15 MHz. or VNG on 7.5 MHz., or any strong local frequency standard.

In this design a 7490 is used as a divide by 5 to bring the oscillator output down to 1 m.p.p.s. and then a further series of six 7490s connected as divide by 10s are used to bring the final output to 1 p.p.s. Access is made available at each divider output so that signals having pulse repetition rates of 1.0 m.p.p.s., 100 k.p.p.s., 10 k.p.p.s., 1 k.p.p.s., 100 p.p.s., 10 p.p.s. and 1 p.p.s. can be used. On the writer's instrument

(Continued on Page 11)

Output (p.p.s.)	Equivalent Time Interval (Seconds)
1 p.p.s.	1.00
10 p.p.s.	0.10
100 p.p.s.	0.01
1 k.p.p.s.	0.001 (1 millisecond)
10 k.p.p.s.	0.0001
100 k.p.p.s.	0.00001
1 m.p.p.s.	0.000001 (1 microsecond)

Table 1.

MOBILE WHIP CONSTRUCTION DETAILS

DOUG. PANNELL, VK6EP. VK6SP/Mobile*

● The author has had many requests for details of the techniques he has used with success in constructing mobile helical whip antennas. He has now provided the information in this article so that all who are interested in building their own mobile antennas may benefit from his experience.

This information applies to the whips at present in use. Details may vary somewhat from car to car, but the fundamental requirement is that the antenna must be resonated on its operating frequency by monitoring that frequency whilst energising with a grid dip oscillator (via a link at the antenna base).

All the whips are wound on standard 6-foot solid fibre glass fishing rod blanks. Start with a spool of tough enamelled wire in excess of ¾ wavelength long, as listed in Table 1.

Set up a winding area, preferably clamping a large hand drill in a vyce and providing a rest (or steady) for the rod. A stand for the wire spool should be about five feet away and allow for the four feet travel (the length of the longest winding) with ease.

Fit the sleeve and apply a quantity of Loctite to the base and sleeve bore. Tap the sleeve on until the ends are flush and add more Loctite as it wicks down. Set aside for the chemical action to occur. While waiting, measure the rod and make marks with a ballpoint at the winding terminations. Mark up the extra 3" for the braid tip, obtain a length of braid from a similar sized co-ax., clean the enamel from an inch of wire, wrap several strands of the braid around the wire and carefully solder, remembering that the braid has to be stretched and cemented in place. This can now be done.

The wire could be soldered after attaching the braid, but fibre glass is susceptible to heat and if the braid is fastened to the rod before soldering the resultant burning of the rod may cause embrittlement and fracture, so be careful.

Before commencing winding, attach several 2" lengths of masking tape to a convenient edge for quick accessibility. Secure the assistance of a friend (even an XYL). Pip the rod top off above the 3" length of braid, after the cement has set and fit it in the drill chuck. Set up the steady just beyond the end of the close wound mark, adjust the position of the spool stand, wrap two turns of masking tape around the braid to support the soldered joint, and with a glove or soft clamp to hold and guide the wire, commence winding. Allow the wire to roll on between the fingers for the first few turns, gradually applying more pressure and letting the wire roll hard against the preceding turn. If trouble develops, wrap a turn of tape on quickly.

Wrap the termination of the winding with two wide-spaced turns of tape forming a guide through which the wire is pulled to remove turns. Remove from the chuck after wrapping a few wide spaced turns down to the sleeve and adding a turn of tape. Fit the sleeve in the mount, which preferably is on the sunvisor or a bar over the roof, and lay the spool on the roof.

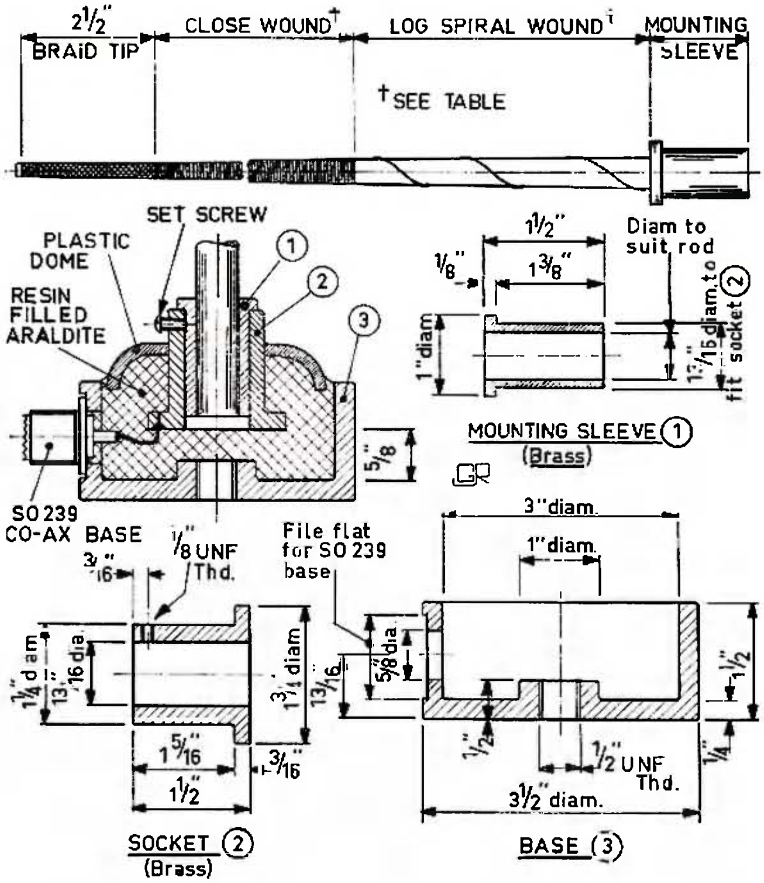
Scrape a small spot on the wire, attach a one-turn link with clips at each end to the bare copper and an adjacent earth, set an accurate monitor to the desired centre frequency and check the resonance with a g.d.o. Turns may be added or removed readily, providing that care is exercised in baring the copper.

Dip the whip to the monitor in a place free from frequency pulling effects, such as resonant overhead antennas, guy or fencing wires, poles or

(Continued on Page 11)

Freq. MHz.	Wire Mils.	Radius Mils. Base	Radius Mils. Top	Winding Inches C.W.	Winding Inches Spac.	Winding Turns C.W.	Winding Turns Spac.	Wire Ft. C.W.	Wire Ins. Spac.	Wire Av. T.P.I.	¾λ Ft.
3.6	22.6	380	130	53	9	2332	4	175	11	44	205
3.6	28.5	560	175	48	14½	1728	4	193	17	36	205
7.07	27.5	380	145	38½	24¼	1386	11	104	28½	36	104
14.2	27.5	366	180	24½	31½	882	9	41	35	36	52
21.3	27.5	380	145	13⅜	49	477	10	24	51	36	35
28.4	27.5	380	140	9½	55	346	11	16	57	36	26
52.6	27.5	183	95	3½	35	117	16	3	37½	36	14

Table 1.



* 20 Hare Street, Kalgoorlie, W.A., 6430.

NEWCOMER'S NOTEBOOK

With Rodney Champness,* VK3UG

LEARNING MORSE CODE, Part 2a

Sending—The Morse Key

Without a good quality key it is difficult and frustrating trying to send good Morse. The so-called cheap "beginner's" key is to be avoided like the plague. They are toys for all intents and purposes.

The key chosen should not be too small, either in length of arm or size of knob. It should have an adjustable back contact (this sets the contact clearance), and an adjustable spring (this sets the pressure necessary to close the contacts). There should be no discernible sideways movement or vertical movement when the key is closed, as this is disconcerting to the sender and can cause alteration of both the spring tension and contact gap. Most good keys will have "tipped" contacts.

Typical sources of suitable keys are disposals stores. Occasionally some advertisers in "Amateur Radio" do have suitable keys. A very good key is advertised in our sister magazine "Break-In". The disposals stores often have ex-service keys and some of these are quite good, notably the ex-Army keys. The Air Force flame-proof keys usually lack one or more of the desirable qualities listed above. Don't be satisfied with a key that is below par.

Would you like to build your own key– If so, I cannot do more than recommend that you consult the following articles in "Amateur Radio": "A Drop of Home-Brew", Feb. 1972, by VK3AXU; "After Thoughts," April 1972, VK3AXU; and "More on Morse Keys," October 1972, VK5TL.

Having obtained your key it will then need to be adjusted. The contacts should be adjusted to give a clearance of 1/32" to 1/16", with appreciable tension on the spring. This adjustment is suitable for the raw beginner at low speeds. As proficiency is attained, the spring tension is gradually reduced to the point where only enough tension is exerted to return the key smartly to the rest position. At the same time the contact gap is reduced to the thickness of good writing paper. This setting is suitable for the accomplished operator and is satisfactory for speeds of 25 to 35 w.p.m.; this depends on how supple your wrist is.

Next month: Part 2b, Audio Monitor Circuits. ●

* 44 Rathmullen Road, Boronia, Vic., 3155.

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THE HISTORICAL DEVELOPMENT OF U.H.F. CIRCUIT TECHNIQUES

PART THREE

ROGER LENNED HARRISON, VK2ZTB (ex VK3ZRY)*

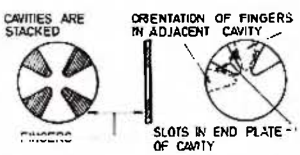
1945 TO 1955: SOLID STATE DEVICES, TRAVELLING WAVE TUBES AND EARLY MASERS

Travelling Wave Tubes. In 1947, Rudolf Kompfner published the results of his work on travelling wave amplifiers. During the latter years, and after the war, these were developed into a commercially practicable device. From the original device that worked near 3000 MHz., working models were pushed ever higher in frequency; leap-frogging right up to 48 GHz. and 55 GHz.

To obtain various results and to broaden the applications of travelling wave tubes, the basic helix slow wave structure (Fig. 27) had to be altered or different structures designed. This necessitated different structures for high power—wideband or low noise—wideband operation. Figs. 28, 29 and 30 illustrate various slow-wave structures designed and incorporated into travelling wave tubes. The ring and bar structure has broad bandwidth and is capable of tens of kilowatts peak power. The clover leaf has only medium bandwidth but is capable of high c.w. power and the Karp structure is suitable for narrow bandwidth, low power, high frequency use.

RING AND BAR SLOW WAVE STRUCTURE FIG. 28

In the above-mentioned devices the phase velocity of the wave mode is in the same direction as the electron stream and thus they are called **forward wave devices**. Sometime between 1950 and 1955, **backward wave devices** were developed. The phase velocity of the wave mode along the slow wave structure being in the opposite direction to the electron stream. These devices are used mainly as oscillators.[15]

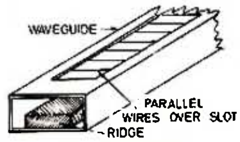


THE CLOVER LEAF STRUCTURE FIG. 29

Solid State Devices. In 1948 **Bardeen** and **Brattain** (Bell Telephone labs.) succeeded in making the first decisive steps towards the transistor while working on the germanium detector. The point-contact detector had been used in the very early days of "wireless" but was soon replaced by the vacuum tube. However, in 1936, Mr. Ohl (Bell labs.) researched the properties of silicon and improved the microwave diode detector. This sparked off research into germanium which Bardeen and Brattain took up in 1942.

* P.O. Box 702, Darlinghurst, N.S.W., 2010.

The invention of the transistor is officially credited to John Bardeen, William Shockley and W. Brattain from the Bell Telephone laboratories. The first public announcement of the transistor was made in June 1948.



THE KARP SLOW-WAVE STRUCTURE FIG. 30

Many solid state devices emerged around this time. In Germany, technical development in the Siemens plant led to the germanium detector whereas the Telefunken laboratories created a silicon detector for centimetre waves based on research into silicon.

Similar developments took place in England and the U.S.A. quite independent of the German efforts.

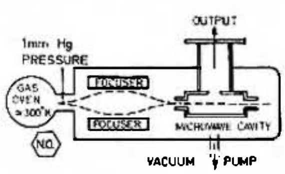
Masers. The first operating **maser** was constructed by J. P. Gordon, C. H. Townes and H. J. Zeiger at Columbia University. The device was wholly conceived, designed and developed by them and first worked in 1954. They coined the term Maser which stands for "Microwave Amplification by the Stimulated Emission of Radiation". I quote here from Ref. 14:

". . . The material utilised was an ammonia gas beam that had its upper state molecules separated from the lower state molecules by an electrostatic field. The excited molecules passed through a microwave cavity of the appropriate frequency (about 24 GHz.) and amplification or oscillation could then be accomplished. Since the operating frequency is established by the nature of the ammonia molecule, there is no provision for tuning. Therefore the major application of the ammonia beam maser is as a 'clock' or frequency standard".

As the principles of operation of masers became understood, other schemes were proposed and tried. In 1956, Bloembergen of Harvard University suggested the use of paramagnetic solids in molecular amplifiers. This was later put into practice.

An illustration (diagrammatic form) of an ammonia gas maser is given in Fig. 31.

The decade following the war appears to have been a period in which devices first constructed during the war were further refined. It also appears to have been a period in which research into fundamental physics turned up several very useful u.h.f. devices. These new devices appeared to be highly radical at first but later developments enabled them to solve many problems that had beset engineers and scientists working in many fields.

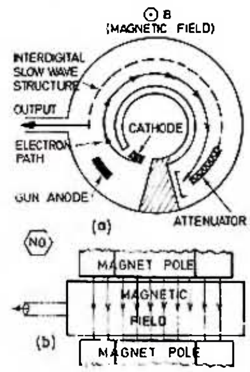


SCHEMATIC OF AMMONIA BEAM MASER FIG. 31

1955 TO 1965: SOLID STATE DEVICES EXPAND INTO U.H.F.; MASERS AND TRAVELLING WAVE DEVICES FURTHER DEVELOPED

In this decade, several fundamentally new devices and techniques were developed which changed the approach to then current problems, providing much improved, if not radical, solutions. These developments assisted, and were assisted by, the arrival on the scene of artificial earth satellites in 1957 (Sputnik I.). A general expansion of communications into u.h.f. during this decade also added impetus to developments.

The Solid State Maser (a). In 1956, Bloembergen, at Harvard University, suggested the use of paramagnetic solids in molecular amplifiers.[14] Later that year a solid state maser was successfully operated by Scovil, Feher and Seidal using lanthanum ethysulphate crystal. The device was mainly constructed to establish the feasibility of Bloembergen's proposal. The principle was later adapted for use at millimetric wavelengths (30 GHz. to 60 GHz.).



THE CARCINOTRON FIG. 32

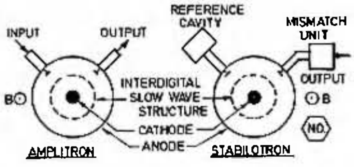
The Carcinotron. Also in 1956, both in Britain and America, the "carcinotron" or backward wave oscillator appeared as a practical working device. An illustration is given in Fig. 32.[16] The backward wave principle had been proposed before but the carcinotron was the result of research into the idea.

The Platinotron. Another travelling wave device appeared in 1957. It was called the "Platinotron" and was the result of research into the magnetron.

It is a device intermediate between magnetrons and carcinotrons (see Fig. 33). It can be used as an amplifier or an oscillator. As an amplifier, the input and output are match loaded whereas in the oscillator an external reference cavity and a mismatched load are used.

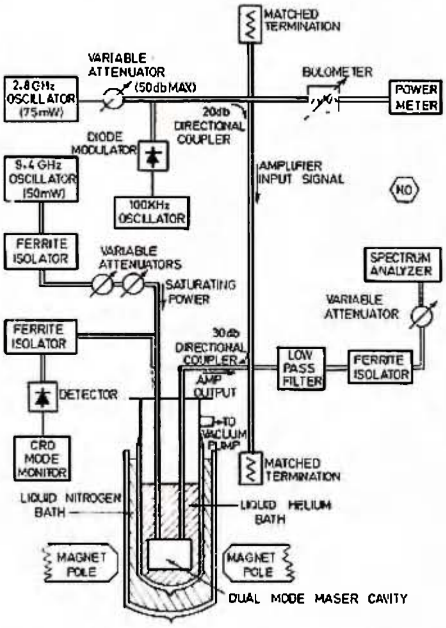
A typical device is capable of the following performance: 10% bandwidth, 50-70% efficiency, 10 dB. gain for high drive level, 20 dB. gain for low drive level. The frequency of operation depends on external circuitry.

As an external cavity is used with the oscillator, the stability is greater than that of a magnetron, often approaching 100 times the stability.[15]



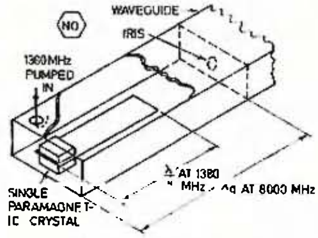
PLATINOTRONS FIG. 33

Solid State Maser (b). Between 1956 and 1958 much research was carried out concerning maser operation. In 1958, several groups published the results of their work and details of working devices. In America, McWhorter and Meyer; Artman, Bloembergen and Shapiro; and Morris, Kyhl and Strandberg were three groups to successfully operate solid state masers. In Europe, Markhov, Kikuchi, Lambe and Terhune achieved similar results. Illustrations are given in Figs. 34, 35 and 36.[14]

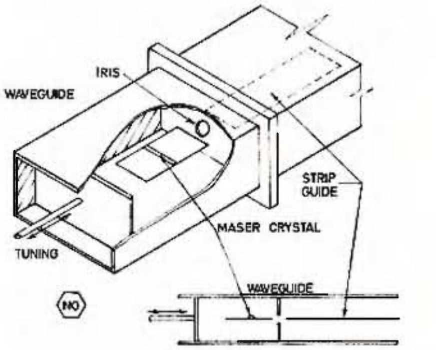


BLOCK DIAGRAM OF A THREE LEVEL MASER (McWHORTER & MEYER) FIG. 34

The Adler Tube (a). In 1958, H. J. Adler (in America) constructed an electron tube for low noise amplification. It utilised the cyclotron wave motion of an electron beam to achieve parametric amplification. The original device worked at 400 MHz. (see Fig. 37). Performance figures for the device were as follows: gain 20 dB., noise figure less than 1 dB.[16] The device was subsequently improved. It possesses the advantages of very low noise amplification, and a frequency independent amplifying mechanism.

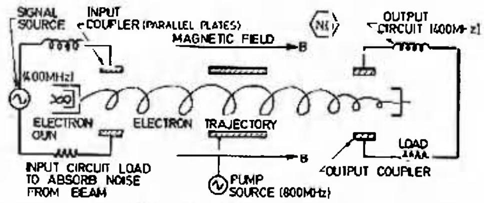


THREE-LEVEL MASER CAVITY BY ARTMEN, BLOEMBERGEN & SHAPIRO FIG. 35



THREE LEVEL MASER CAVITIES (SCOVIL FEHER & SEIDEL) FIG. 36

The Varactor Diode (a). In 1936 when R. S. Ohl developed the silicon crystal detector it was found that the diode terminal capacitance varied with impressed voltage—and varied in a non-linear fashion. This property, which is found in all diodes, was regarded as a nuisance for many years until the idea of parametric amplification and frequency multiplication using variable reactance devices was propounded and eventually accepted. Special varactor diodes were developed during 1956 and 1957 which exhibited the characteristics desired.



400MHz ADLER TUBE - FIG 37

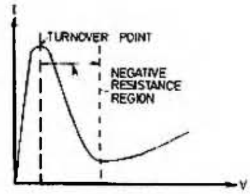
Parametric Devices. It appears that 1958 was the year for parametric amplification. Several theoretical works on "pumped" or parametric oscillations had appeared from as early as 1860. A device using non-linear reactance as the main element had been earlier suggested and one of the first working parametric amplifiers to incorporate a varactor diode was built by Sam Harris (W1FZJ) and described in the November issue of "CQ Magazine".

Parametric amplifiers are now very common, especially in satellite communications systems. The performance of these amplifiers is little short of the ultimate! At 1000 MHz., noise figures of 0.8 dB. can be achieved with a gain of 25 dB. and a 5% bandwidth. It has the disadvantages of drift problems and the difficulty of setting it up for stable operation.

Parametric mixers with low noise and high gain have also been developed utilising the parametric principle.

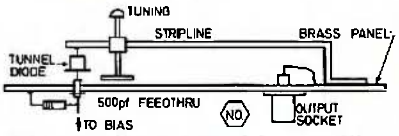
The Tunnel Diode. In October 1958 a radically new device, a diode, possessing negative resistance characteristics, was announced. It was called the "Esaki" Diode" (after its inventor) or the "Tunnel Diode" (after its operation).

A Japanese physicist, Esaki, discovered that if a diode junction was heavily doped with certain impurities then its forward conduction characteristics are drastically altered. The current/voltage curve exhibited a negative conduction region as shown in Fig. 38.



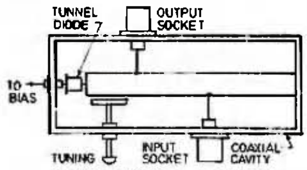
TUNNEL DIODE I/V CHARACTORISTICS FIG. 38

This property of the diode can be used to provide amplification, oscillation or regenerative flip-flop operations. Three typical circuits are illustrated in Fig. 39 (a), (b), (c).

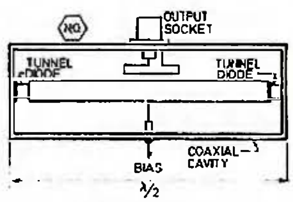


400MHz STRIPLINE OSCILLATOR FIG 39(a)

Travelling Wave Maser. In 1959, travelling wave devices again took a step ahead with the production of the travelling wave maser. This device utilised the principle of interaction between an active medium and a travelling wave (see Fig. 40). Performance at 19 GHz. was: 23 dB. forward gain, 25 MHz. bandwidth, 0.16 dB. noise

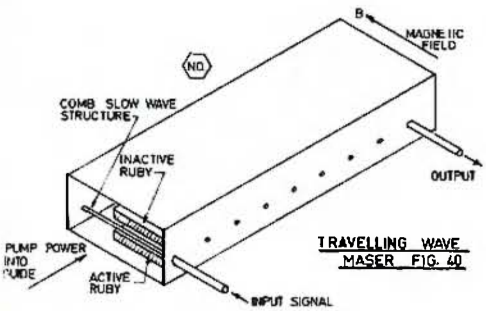


400MHz COAXIAL AMPLIFIER FIG 39(b)



5GHz OSCILLATOR FIG 39(c)

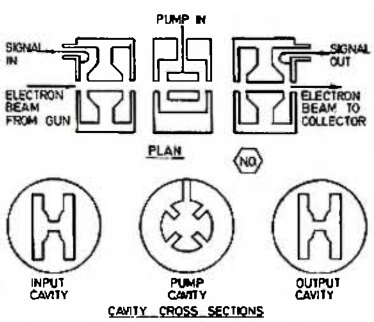
figure, and 100 mW. pump power. It was immersed in liquid helium to cool it for proper operation as with ordinary masers.



TRAVELLING WAVE MASER FIG. 40

Ferromagnetic Devices. Ferromagnetic devices were being widely investigated during this decade, and many useful properties (such as the ability to rotate the fields inside a waveguide) were uncovered. Ferromagnetics subsequently came into widespread use as attenuator components, dummy load components, field rotating components, etc.

The Microwave Adler Tube. In March 1960, Bridges and Askin published details of a microwave Adler tube.[10] An illustration is given in Fig. 41, and performance figures were as follows: gain 25 dB., noise figure approx. 0.8 dB., and pump power 1 watt at 8274 MHz. Signal frequency was 4137 MHz. The device was subsequently improved later the same year.

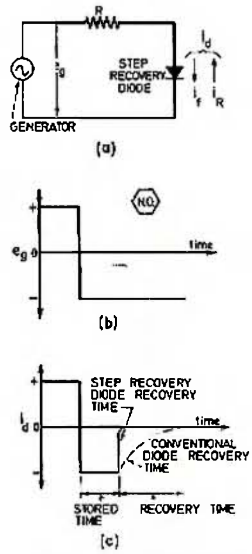


MICROWAVE ADLER TUBE FIG. 41

The Step-Recovery Diode. In 1961 the step-recovery diode was announced. This device was the result of research into fast-switching diodes. The device was subsequently recognised to have very desirable properties for u.h.f. circuits, particularly frequency multiplying. Fig. 42 illustrates its characteristics as against a conventional diode.

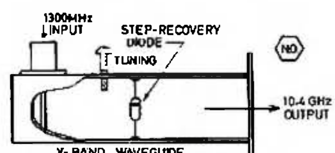
In the ensuing years these properties were investigated and it was found that these devices would multiply quite well by odd orders, i.e. 17 times. High orders of multiplication with good efficiency were obtainable also—typical being 80 times or more. A device multiplying from 1300 MHz. to 10 GHz. is shown in Fig. 43.

The device was constructed by an Australian Amateur, power output being in the region of 50 mW. for approx. 1 watt drive power. Step-recovery diodes are also known as "snap-diodes".



STEP RECOVERY DIODE REVERSE RECOVERY CHARACTORISTICS FIG. 42

This decade appears to have been one of rapid development and application of theoretical proposals put forward, and the further development of existing techniques.



STEP-RECOVERY DIODE MULTIPLIER (1966) FIG. 43

The introduction of solid state techniques has greatly simplified techniques employed in the u.h.f. spectrum and solved many problems that had arisen with the increased sophistication of communications equipment. This trend appears to be continuing at an ever increasing rate. ●

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FREQUENCY COUNTER

(Continued from Page 6)

the 1 m.p.p.s. and 100 k.p.p.s. outputs are permanently wired to two BNC co-axial sockets on the back of the cabinet for external calibration work.

It may assist readers to transform these outputs into terms of time. Table 1 does this.

Selection of the time interval to be used to activate the control circuits is by means of two 7400 switches. These operate in exactly the same way as those described under Input Switch. Their circuitry is given in Fig. 4, whilst the layout is given in Fig. 11. Using two 7400s, any one of three inputs are selectable. The board is laid so that at all times the 1 k.p.p.s. (0.001 second) and 1 p.p.s. (1.00 second) inputs are available, whilst the third input (probably 1 m.p.p.s.) can be wired in if desired. It is worthy of note that the use of two more ICs (a third 7400 and a 7430) would enable any one of six timing periods to be selected.

Interested readers are referred to "Radio Communication" of August 1971 for further detail. However, these extra timing periods were not deemed necessary (or found necessary in practice) and so were not included. ●

☆

MOBILE WHIP

(Continued from Page 7)

overhead shielding, feeders, etc. Should multiple dips be in evidence, the winding is much too long and a considerable number of feet can be removed. Be very wary about s.w.r. as this antenna, complete with its image, is equivalent to three collinear half waves in phase centre fed and each half wave has its own s.w.r., therefore you have three standing waves and two of them have end effect shortening while the centre one is fed, so stick with absolute resonance and be wary about pruning the braid on top.

Due to the length of winding and the collinear effect, there is a gain factor over a wound quarter-wavelength. Tests have shown several "S" points between the 1/2 and 3/2 wavelength whips checked over two to ten thousand mile ranges. Serious reading of A.R.R.L. Antenna Handbook chapter two is recommended as it will open the way to an understanding of image as well as physical antennas, their harmonic operation, lobe angle, feed impedance, etc.

Having resonated the whip, possibly had a look at the s.w.r., cut the spool free and carefully solder the bared end to the sleeve; now fire it up on a distant operator and check it out. Don't get it damp because it will become non-resonant and have to be dried out. When you have it to your satisfaction and dry, spread out the spaced winding, fix with small strips of masking tape and apply a liberal coating of Plastacoat 33. This does not affect the resonance but leaves a pleasing effect, a real finishing touch. Don't forget to have some Plastacoat Thinners on hand as it cleans off the brush, hands and splashes; turps won't. ●

AMATEUR RADIO—THE PRESERVATION OF ITS RIGHT TO OPERATE

T. R. CLARKSON, ZL2AZ

● ZL2AZ was a member of the I.A.R.U. team at the 1971 Space Conference. His comments on the existence and the future of the Amateur Service apply not only to Region 3 but throughout the world. No apologies are needed for re-printing this article from I.A.R.U. Region 1 News of December 1972.

PRESENT SIGNIFICANCE

Radio Amateurs operating today commenced their operations in an era of stability, as regards their right to operate. Even in the early days, half a century ago, there were rules and regulations, and within them there was scope for what Amateurs wanted to do and were able to do, at that time. Later, things expanded and became more complicated, but the general framework was the same, reasonable opportunities with official approval and encouragement. There naturally developed a kind of trusting attitude, a general belief among Amateurs that things would go along satisfactorily, and that Amateur operations would continue into the indefinite future.

This happy state of mind is engendered by the slowness of the controlling changes which can alter the general situation, and the remoteness of influence that may be at work to our disadvantage. We may be all right today, and next year—but there is not the slightest doubt that every five to ten years decisions are made which shape this subject of ours, a relentless control, on which the more distant future of Amateur Radio is directly dependent. The structure of our present subject was mainly identified with decisions made at Washington in 1927 and at Cairo in 1938—Amateur Radio for the rest of this century at least, will stand or fall, grow or decline, in terms of what is done in this present decade.

So my remarks are to draw attention to the present situation, and make some suggestions as to how we should safeguard our interests. First I should emphasise the need, and special opportunity **at this time**. Things have changed in the world of radio since the last major changes in operating conditions were introduced in 1947—demands by other services have increased, and so have Amateur ambitions.

The ionospheric era has declined, with the ascendency of space, and rules and practices prior to space technique are out-dated, with v.h.f. and higher frequencies being pre-eminent now. Changes in the world at large act to our detriment. At Atlantic City 1947 policies were pushed through by the radio advanced nations, who had an enlightened self-interest in Amateur Radio prosperity.

But now the international influence of less developed nations is discernible as opposing proper Amateur Radio development. The special message of the Space Radio Conference at Geneva in 1971 was that "in the world today, there is no majority opinion favourable towards the advancement of the Amateur Service". Individual and corporate action is needed to remove Amateur Radio from its position of weakness.

WHAT OUR NEEDS ARE

My remarks will conform to the principle adopted in international and national regulations that Amateur Radio constitutes a "radio service" in which the participants have motives only of personal interest, and no pecuniary purpose.

We know of the many compelling reasons that justify Amateur Radio, in the community, the nation, and the world, and they are excellently documented in our literature (e.g. Stanford Institute Research Report). Sometimes there is insufficient attention given to the "superior" position of Amateurs compared with other radio work by virtue of its being "voluntary". Its unique character arises from spontaneous motivation in the individual—the urge to communicate, with similarly imbued fellows, using skills and resources within their sole proprietorship.

When practising this kind of self-expression there are numerous desirable secondary products, community value, self training, research and development, etc., which are the obvious justification for a nation to support its Amateur Radio. The essentially personal nature of our thoughts and actions entitle them to recognition as a human right, which should not be denied by others. Nevertheless, practical politics bring the secondary effects into prominence, and for the present at least our welfare has to be thought of in the pattern of existing kinds of regulations.

Amateur Radio needs the opportunity to use representative parts of the radio frequency spectrum. But in general the parts for practical use are those where equipment limitations do not prevent individual ownership and operation.

Radio communications use frequencies as low as 14 kHz., but throughout its ascendency Amateur Radio has used frequencies higher than 1500 kHz. I am not aware that there has ever been a need expressed for Amateur transmissions at say 100 kHz. So there has been adequate scope for Amateurs in the higher part of the spectrum, and this has exploited the v.h.f. and higher bands. Now very much higher frequencies are coming into use for various services and the international regulations foresee allocations as high as 275 GHz. There is provision for Amateur work in bands extending up to 24 GHz.

During the next few years services will be making claims to get future assignments in the higher gigahertz part of the spectrum. Many of the needs are for intercommunication in space beyond earth's atmosphere and other earthly effects. The question will come up as to whether the Amateur Service should seek allocations for the future at frequencies above 24 GHz.

Present technical approaches to communications in space involve plant and equipment far removed in nature from the modest resources of Amateurs giving satisfactory scope for earth-bound activities. Beyond the realm of the geo-stationary orbit radio intercommunications seem to fall outside normal Amateur aspirations. So the very high part of the spectrum seems to be of little practical interest, the same as the very low part.

These considerations lead to the idea that **Amateurs need access to parts of the spectrum, say, between 1500 kHz. and 24 GHz.**, that is where techniques are attractive for operating individual links of communications. Amateurs should be free to explore parts of this spectrum having different characteristics, using both earth and space techniques. What I am suggesting is that we should concentrate our interests primarily to earth-bound links, but using space techniques to distances as far as the geo-stationary orbit. Those of our fraternity who wish to extend their interests further out in space may well find scope in some other radio service, for example radio astronomy.

By defining our interests to a part of the total spectrum, we should be able to strengthen the claims we have for it. We should also concentrate on having access, to operate, in representative bands from 1500 kHz. to 24 GHz., both on earth and in space.

THE SQUEEZE ON AMATEUR BANDS

It is only natural that in the progress of radio, the use of the spectrum should become more economical, with tighter standards and closer scrutiny among all users to avoid wastage of frequency space. Even so, Amateur bands have been compressed unduly, and the same effects can be expected, particularly at v.h.f. and higher. It has been a continuous process since some of our popular bands had their origin at the Washington Conference of 1927.

Then there was world wide access of 500 kHz. at 3500 kHz., 300 kHz. at 7 MHz., 400 kHz. at 14 MHz.—the latter two being exclusive. At Cairo in 1938 some broadcasting came into the 7 MHz. band and in Europe Amateurs lost access to 3950-4000 kHz. At Atlantic City 1947 Regions were introduced, Region 1 Europe and Africa, Region 2 the Americas, Region 3 the rest.

At 3500 kHz. the Amateur access became, Region 1 300 kHz., Region 2 500 kHz., Region 3 400 kHz. At 7 MHz. it continued 300 kHz. in Region 2 exclusively for Amateurs, but only 100 kHz. in Regions 1 and 3 but sharing with broadcasting in another 50 kHz. In those regions broadcasting took 150 kHz. of the original Amateur band.

In the higher Amateur band at 14 MHz., the U.S.S.R. claimed the use of 100 kHz. for a reduced Amateur band for fixed services. The overall Amateur band became 14,000 to 14,350 kHz. At Geneva in 1959 the general table at 3500 kHz. remained the same, except that Amateur access was reduced in Australia to 200 kHz. and in India 10 kHz. At 7 MHz. in Regions 1 and 3 Amateurs were reduced to the exclusive part only, i.e. 100 kHz., that is one-fifth of what it was once.

Despite the losses in this period of 30 years there was an important indirect gain—the fact that Amateur Radio became recognised as a "Service" in the international negotiations concerned with the control of radio.

Before mentioning other bands, and particularly those of most importance for the future, I will refer to the general world attitude as it exists at present, towards Amateur affairs.

HOW DO WE STAND IN WORLD OPINION?

Leadership in the use of the radio spectrum used to be taken by the leading countries in science and technology. They pushed through the international legislation necessary, and in general Amateur Radio received reasonable provision. There was not much actual voting, policies being advanced largely by "force of character" at the international conferences. The last example of this was in 1947 at Atlantic City where the main decisions were contributed by the U.S.A., U.S.S.R., France and China. There were 72 signatories at Atlantic City, but at the Space Conference last year there were 96, an increase of one-third. The new countries that have built up the membership of the I.T.U. and contribute to the decisions of its conferences include many that do not have a background of technology, or a national climate favourable to Amateur Radio. Some other services such as broadcasting are favoured. In some developing countries it is not just a lack of understanding about Amateur Radio, leading to indifference towards its interests, but there is actual antagonism, to oppose the moves made by enlightened countries. The altruism of such moves is also brought into question.

Some advanced countries use their influence against Amateur interests. This is probably because of economic, political and military reasons, and only a moderate degree of support within the particular countries.

In this unfavourable situation there are only very few countries in the world today who will come out boldly and advocate a helpful progressive attitude, when matters concerning Amateur Radio come into prominence, and when support is weak there is a readiness to vote quickly and dispose of the matter.

SPECTRUM DEMANDS AND CHANGING TECHNIQUES

The world of radio that we have mostly been concerned with has come about during the era of the ionosphere. We have experienced the good and bad features of ionospheric propagation. In negotiating for spectrum space the peculiarities of the ionosphere have had to be dealt with. While this kind of radio communication will now decline in importance and occupy a subsidiary role, it has meant that we have gained valuable experience, not only in operations, but in meeting the difficulties of obtaining satisfactory spectrum space for our activities. Valuable techniques of sharing have been developed.

Now major interest is in v.h.f. and higher frequencies. This applies to all radio services, brought about by improved equipment, the vast frequency width available, and most notably the improved types of services available by using space techniques.

One of the great changes due to space technique is that frequency bands once considered as of local, or national use, are now international. This has prevented the higher Amateur bands from being readily available for space use. It is also found that in many countries bands that were thought to be available for Amateur use are actually in operation for other terrestrial services. So new problems are coming to light.

The allocation table is rather complicated—at Atlantic City 1947 it had 120 footnotes detailing irregular use and these had increased at Geneva 1959 to 240 for a similar spectrum width. Last year at the Space Conference more were added. It becomes increasingly difficult to get anything in the nature of an exclusive world wide allocation, on any frequency whatsoever.

THE SPACE RADIO CONFERENCE, GENEVA 1971

Proposals were put before the Space Conference by a number of friendly countries to lead to Amateurs being able to use all their existing bands in space as well as terrestrially. There were pious hopes that there would not be much objection to this.

The result was the opposite. There was intense opposition, with a categorical denial for space operations in any of the shared bands. Space work was approved in exclusive bands, the only important ones of these being at 144 MHz. and 24 GHz. There was a very special exception for 3 MHz. at 435 MHz. to be used on a sharing basis with special restrictions, but apart from this there is no availability of space Amateur transmissions all the way from there up to 24 GHz. The allocation at 435 MHz. was only approved after the most exceptional actions by supporters at the conference.

The failure to get proper provision for Amateurs in space was accompanied by another failure. That is the obvious general lack of support for Amateurs and their requests, made through their respective governments.

This condition can be expected to continue at more general administrative radio conferences, when other bands also will be under scrutiny. (I have already referred to the general squeeze experienced in the last 25 years.)

I quote just one example to illustrate the atmosphere met at the Space Conference.

In the principal allocation committee, there were proposals for the five shared Amateur bands starting at 1215 MHz. to be approved for use in space. The chairman proposed that all five bands should be dealt with together. **New Zealand** disagreed and proposed that each band should be considered **separately**, and statements in support of this action were made by **Israel, U.S.A., U.K., Philippines, Denmark, Canada, Italy**. Statements against were made by **Sweden, Syria and Cuba.**

The chairman called for a vote on the New Zealand proposal and it was lost, 38 to 26 with 6 abstentions. So it was clear that of the 68 participants, a major favoured a summary package deal, rather than a close study that might well have found some little slice of a band that would have met Amateur needs. So the chairman called for a vote on the use of the bands by Amateurs, the result being:

Against Amateur use ..	46
For Amateur use	18
Abstentions	7

So it was not only the result, but the approach to it, that contains a lessen for us to study. There were numerous other somewhat similar examples.

HOW TO INFLUENCE THE SITUATION

The first thing is to deserve and retain the understanding and good will of the official government Administration. This is not only to promote good operating arrangements within our national boundaries, but also to try and have our country take its place **for** Amateur Radio at large when engaged in international negotiations. Obviously our own influence will only be the best if all our activities are pursued to the highest possible standard.

If all Amateur Radio National Societies in all countries gained support by their governments, things would be very different, and the kind of thing that occurred at the Space Conference would be unknown.

I.A.R.U. Headquarters has a continuance policy of promoting liaison of national societies with their respective governments. The Regional I.A.R.U. organisations work along the same lines. However, the road is by no means easy.

I.A.R.U. has access to I.T.U. conferences, as an observer, and this is a great advantage. In addition to what might be done through Administrations by Societies, it gives direct contact with the scene of action, when matters affecting Amateurs are being decided. In big international conferences dealing with all aspects of radio usage the official delegations have little time to spare for concentrating on Amateur matters. Here is where an international society can assist, in adding an element of continuity, performing useful functions on the side lines of the meetings. Moreover, this is the only way to find out details of what really happens to questions that are vital to us.

(Continued on Page 14)

AMATEUR RADIO

(Continued from Page 13)

Experience has shown that the presence of observers can make the difference between success and failure in some of the outcome.

Amateur Radio differs from all other radio services that it is, by regulation, voluntary. It, therefore, has no back-up of income to meet expenses. Attendance at conferences is an expensive business. It devolves on Societies, to see that the I.A.R.U. is present in effective strength at these critical times.

PRESENT IS TIME FOR OPPORTUNITY

Now is a unique time for Amateur Radio to use all its resources to advance its interests for the future, not only because of the importance of the present challenge, but also because the world organisation of Amateur Radio is in pretty good shape.

Despite the weaknesses we know of in many countries, I.A.R.U. and its set up, including organisations in the three I.T.U. regions, provides machinery through which proper actions can be taken. This has been proved in connection with the Space Conference last year, which conference was better prepared for in regard to Amateur interests than any other in history.

Moreover, such degree of success as was achieved can be linked very directly to the efforts of national societies and I.A.R.U. headquarters.

The radio frequency spectrum is in the process of being expanded right up to 275 GHz. and it is opportune for Amateur Radio to declare its ambitions, with a view to asserting their needs for spectrum space and sampling. Claims have been made in the past for Amateurs to be able to apply their talents to small sections through the whole spectrum.

The present is the time of the vast change in communications technique in which v.h.f. and higher becomes the principal important part of the spectrum. Old concepts of frequency allocation and regulation need to be scrutinised and perhaps changed in the light of this new order; Amateur Radio needs to be in the formative stages of new methods to ensure its rights are not missed out. (There is an opportunity here to wield influence through the I.T.U. Radio Consultative Committee, C.C.I.R.)

Countries who do not support the advance of Amateur Radio seem only recently to have been showing up definitely in this role. So it is opportune for Amateur Radio to identify its friends and marshal support as widely as possible while there may yet be a bit of flexibility in some of the attitudes.

ACTIONS TO TAKE

Our Association follows a policy of participating in I.A.R.U., and promoting its declared objectives, which include that of wielding international influence through the national amateur societies throughout the world. The points that have been made deal with features of the present situation which enhance the value of this participation.

We have tried, by our travelling to meetings in Sydney and Tokyo and collaborating with other member societies of the Region 3 Association, to get other countries in Region 3 to improve their influence, eventually through their governments.

This costs money. The present contribution both to Region 3 and in travelling expenses has to be regarded as a direct cost for some assurance of our satisfactory operating conditions in the future.

It is important for all Amateurs to be aware of this subject, and to have it in mind, whatever branch of Amateur Radio they may specialise in.

In conclusion, let me express the opinion that our strength will continue to be in pursuing Amateur Radio vigorously, and enthusiastically, and concentrating on the characteristics in which it is unique, and which cannot be usurped by others. If we continue to aspire to excellence in these, our position is secure. ●

(Reprinted from I.A.R.U. Region 1 "News" with thanks.)

MAILING PLATES WILL SOON BE REMOVED FOR UNFINANCIALS. HAVE YOU PAID YET?

WHY A CO-AXIAL SWITCH

*By S. A. SHELDAHL**

Much of the radio frequency circuitry below 5 GHz. in the world of communications uses co-axial transmission lines. Within the communications gear there are many requirements for switching the radio frequency signal without leaking energy from one circuit to another and without causing a large discontinuity in the total transmission line. One common need is to switch a single antenna between a receiver and a transmitter. The receiver must be protected from excess input power while a large discontinuity at its output could damage the transmitter. The co-axial switch solves the problem by maintaining the co-axial (or TEM) propagation mode and a good impedance match while providing both the necessary switching function and the same shielding against radio frequency radiation as a standard co-axial line.

The term "co-axial" is a slight misnomer, since most such switches incorporate a thin rectangular blade in either a round or rectangular cavity. The blade is moved to make contact with given output parts by an electro-mechanical actuator. The TEM propagation mode is maintained, however, and all the terminology of co-axial transmission line applies.

V.S.W.R.

The voltage standing wave ratio (v.s.w.r.) is the measure of discontinuity. Any discontinuity on a transmission line will reflect some power back toward the transmitter. The transmitted and reflected travelling voltage waves set up a standing wave whose peak to null voltage ratio defines the degree of discontinuity. A perfectly matched line has a v.s.w.r. of 1 to 1, whereas the v.s.w.r. of an open or short circuit is infinity. Most switches have a v.s.w.r. of less than 1.5 to 1 (usually less than 1.1 to 1) over the range of frequency to be applied.

V.s.w.r. can be measured directly by the use of a slotted line or indirectly by measuring the amount of reflected power using a directional coupler and converting this to v.s.w.r. The ratio of reflected power to transmitted power is called return loss and can be directly converted to v.s.w.r. by the use of published tables. Accurate v.s.w.r. measurements down to 1.04 to 1 are easily attainable with present equipment and calibrated terminations.

In general, v.s.w.r. increases rather smoothly with increased frequency and shorter wavelengths as small discontinuities become more noticeable. However, when the frequency is such that the electrical length of the switch is a sizeable fraction (¼ or greater) of the wavelength, the switch can become a transmission line transformer and peaks and nulls can occur in the v.s.w.r. characteristic. Care must, therefore, be taken in using any co-axial switch outside its published frequency range without some check on v.s.w.r. The above phenomenon can also work to the advantage of the switch designer and the user as it is possible to "tune" the switch to show a very good match over a small bandwidth at frequencies higher than expected.

The effect of frequency on v.s.w.r. also results in the fact that single input-multiple output and matrix switches are limited to lower frequency use than simple single pole double throw units unless special care is taken. For example, a radial configuration for a s.p. multiple throw can be used at much higher frequencies than an in-line configuration since all paths are matched and equal.

ISOLATION LOSS

Isolation loss, expressed in dB., is the ratio of power into the desired circuit to that leaking over into the undesired or "open" circuit. The degree of loss first depends on the air gap created by the movement of the blade. This gap is, in effect, a very small series capacitor in the transmission line. The capacitance can be measured or a reading of loss taken at any one frequency and the loss at any other frequency calculated rather simply. In general, the isolation loss across a simple air gap decreases 6 dB. for each doubling of frequency or 20 dB. per decade.

Higher isolation losses with less dependence on frequency can be had by using two blades to achieve a s.p.d.t. function. Each blade is common to one "pole" and can be designed to ground the centre conductor of the unused output connector. Now the air gap is of little consequence while contact resistance and shielding dominate. An increase of 25 dB. is not uncommon in the loss of a double blade grounding switch over that of a single blade unit.

The following table illustrates the comparative losses that can be expected:

Test Frequency	Typical Loss (Isolation) for Single Blade	Twin Blade (Grounding)
100 MHz.	50 dB.	75 dB.
400 MHz.	40 dB.	60 dB.
1 GHz.	25 dB.	50 dB.
3 GHz.	15 dB.	40 dB.

Special grounding connectors are also available which provide even better loss because of better shielding. Dow-Key offers a special connector on many series of switches which allows 100 dB. isolation at 300 MHz.

INSERTION LOSS

Insertion loss is the measure of power lost in the circuit as a result of passing through the switch. Losses of less than 0.2 dB. are common for frequencies up to 250 MHz. and most units can achieve losses of less than 0.5 dB. for their entire frequency range. Insertion loss is made up of at least four parts— IR loss, dielectric loss, contact resistance and reflected power.

IR or resistive losses (large at high frequencies) increase with the square root or frequency, but are held to a minimum by the use of short conductors in the switch and by plating all conductors with a good coat of silver or other highly conductive material.

Dielectric losses usually do not occur in co-axial switches since air (lossless) is the typical dielectric used. If other than air is used, losses are made negligible by using dielectrics such as teflon.

Contact resistance, dominant at low frequencies, is held at a minimum by gold plating all switch contact surfaces.

Reflection losses are a direct result of v.s.w.r. With higher v.s.w.r., more power is reflected by the switch and less power gets through to the load. The loss due to discontinuities is directly related to v.s.w.r. and return loss and is published in many places.

OTHER SWITCH CHARACTERISTICS

Field performance is also dependent upon other switch characteristics. Among these are operate and release times, pull-in and drop-out voltages, mechanical life and r.f. power ratings. The first three characteristics pertain only to electromechanically actuated switches.

Operate time is the measured duration between application of the coil voltage and the "at rest" condition of the blade contact in the actuated position. Typical operate time for a bladed switch is 15 to 20 msec.

Release time is the duration between removal of the coil voltage and the release of the blade contact from its actuated position.

Pull-in voltage is the minimum voltage that will actuate the switch. For a switch rated at 26v. d.c., pull-in might be 18 to 20 volts.

Drop-out voltage is the voltage at which the switch will release and return to the relaxed condition. For a switch rated at 26 volts, this might be 2 to 10 volts. Pull-in voltage is higher since the air gap between core and clapper must be overcome.

Mechanical life is the number of complete operating cycles to which a switch can be subjected while retaining rated performance. Typical life of a bladed switch is over one million cycles.

Power ratings for most bladed-type switches range between 100 and 1,000 watts maximum r.f. power. Hybrid co-axial vacuum switches can easily attain power ratings of 5 kw. at 30 MHz. and 1 kw. at 400 MHz. Unless stated otherwise, all power ratings assume that no power is on during the actual switching action.

Dow-Key makes many varieties of bladed switches including standard s.p.d.t. and d.p.d.t. units, radial and in-line single pole, multiple throw units, twin bladed switches and special patented connectors for high isolation losses, and manually operated units. We also make a line of hybrid switches using a co-axial cavity around a vacuum relay for high current and high voltage purposes (high r.f. power) and will soon be making remote operated step attenuators coupling the knowledge of good switch design to r.f. attenuators. ●

* Engineering Manager, Dow-Key; represented by R. H. Cunningham Pty. Ltd., P.O. Box 4533, Melbourne, Vic., 3001.

Commercial Kinks

With Ron Fisher,* VK3OM

The continuing saga of the FT200. A letter from Ken Chiverton, VK4VC, tells how he tackled the job of connecting an external v.f.o. to his older model FT200. Over to Ken.

AN EXTERNAL V.F.O. FOR THE ORIGINAL FT200

"I have the model prior to the one with the external v.f.o. facility, and was determined to incorporate the mod. in my rig, despite the fact that no kit is available and the advice that the modification was too complex for the Amateur to carry out. I have now completed the mod. to use the FV200 and have fed in a v.f.o. to prove it works." (Ken is working on a home-made version of the FV200.)

"The job is not difficult if carried out in a logical manner and although it does take a little time, any subsequent effort could be carried out in much less time.

"Just a few points which may be of interest are that I made up a mounting bracket to hold the v.f.o. relay, but included an Omron PM08 or PM10 socket so that the relay could be plugged in instead of being soldered.

"I mounted the v.f.o. socket by removing the earth stud and cutting the socket hole so that the retaining screws for the socket fit in the original earth stud hole and the Aux. hole above. With a washer on the screws inside the chassis, the socket fits quite neatly. The earth stud was moved between the v.f.o. socket and the key jack towards the bottom edge of the chassis so that the wing nut does not foul the v.f.o. plug or the key plug when they are in place.

"When running the wiring, I carefully removed the harness binding and laid the new wiring in the existing hardness, re-binding when the wiring was complete. One point easily overlooked, but not imperative, is that the spare relay contacts on the acc. plug are moved from the antenna relay to the v.f.o. relay, and the now spare contacts on the antenna relay are used to short the receiver ant. input to ground on transmit.

"Note that the supply voltage for the buffer board is now taken through an 18K 3 watt resistor from the 150 volt rail at the end of R55 and not from the voltage regulated supply as shown in some earlier circuits.

"The main parts required for the modification are as follows:—

1 buffer p.c. board.
1 panel switch (v.f.o.).
1 escutcheon (v.f.o. switch).
1 7-pin socket and plug.
1 v.f.o. relay.
1 PM08 or PM10 Omron socket.
Sundry wire, screws, etc."

Ken says that if anyone is enthusiastic, he could supply a drawing of the buffer p.c.b.

This is just a brief run-down of the main points of the modification, but if there are any further queries, Ken will try and answer them for you.

Before making these modifications it is of course necessary to have on hand a circuit of the later model FT200. If you have trouble in obtaining one, write to "Commercial Kinks". I will be able to supply circuits of the appropriate sections, including the FV200 on the usual basis. So forward your requirements with an s.a.e. for costs involved.

One final point. Ken encountered some v.f.o. frequency shift which was found to be due to a drop in mains voltage which in turn dropped the supply to the voltage regulator board to below 11 volts. To remedy this, he adjusted R75 to increase this to between 13 and 16 volts. However, make sure that the voltage is not more than 16 volts when the mains supply is normal.

Thanks to Ken Chiverton, VK4VC, for the above notes.

An interesting letter from Jack Kelleher, VK3AIJ, in which he suggests a couple of simple modifications for FT200 owners. Firstly, Jack found the dial illumination a bit dull for his aging eyes (Jack's quote). To remedy the situation he applied some gloss white paint to the under side of the cabinet immediately above the dial escutcheon. Perhaps I could make the suggestion that a piece of aluminium foil glued to the same spot might be even better.

Jack found that the calibrator output was too strong on his FT200. I guess that this might depend on your favourite band. A reduction in the size of C21, the calibrator output coupling capacitor, from 10 pF. to 5 pF. did the trick in Jack's case.

As mentioned a couple of issues ago, work is going ahead on a noise blanker for the FT200. I had hoped to publish details this month, but as yet, I am not fully satisfied with results. However, details will be published as soon as possible.

Next month a discussion on modifications in general—including how not to do them! ●

* 3 Fairview Ave., Glen Waverley, Vic., 3150.

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OPERATING FM HANDSETS ON AIRCRAFT

"QST" for Dec. 1972 recommends it is better for passengers to leave the rig in its case or your bag while in flight and goes on to say "The last thing Amateur Radio needs is a charge, founded or not, that we interfered with safety-of-life communications".

"A.R." WRAPPER CODES

New members and those who changed their address in the past year or so will have observed a coding which forms part of the address labelling. This is a simple code showing the month (01 to 12), year (2 for 72, etc.), Divisional membership (e.g. 4 for VK4), plus a letter showing whether an address change originated, as far as the Executive office is concerned, direct from the member or from a Divisional office. No letter indicates a new membership listing. Different codings (if any) appear on pre-1972 plates, which, because of cost and time involved, have not been re-done.

RECIPROCAL LICENSING

"Radio Communication" of Jan. 1973 advises that a reciprocal licensing agreement is now in force between the U.K. and Poland. Whilst on this subject, readers should note that the table printed on page 17 of Aug. 1972 "A.R." refers to reciprocity in relation to persons intending to settle in Australia. The tables do not refer to reciprocal licensing for visitors (up to 12 months) to Australia.

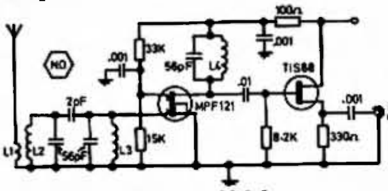
(Continued on Page 17)

TEN METRE PRE-AMP. FOR OSCAR 6

G. N. LONG,* VK3YDB, and
P. HAMMER,† VK3ZPI

● Besides a well matched ten metre aerial nothing else improves the reception of Oscar 6 like a good ten metre pre-amplifier. This article is intended to satisfy this need.

As may be seen in Fig. 1, the circuit utilises the very popular (and cheap) MPF121, which is the main circuit element, and a junction FET. Although a TIS88 is specified, a 2N3819 would be just as suitable and probably cheaper.



L1 2TURNS – L2, L3, L4, 10 TURNS
ALL COILS WOUND ON NEOSID FORMERS – F29 SLUGS
ALL COILS WOUND USING 24±2 GAUGE WIRE

FIGURE 1

The cascaded input coils were used to give greater protection against cross modulation in the MPF121 by providing better selectivity than one coil. The cross modulation characteristics are controlled by, firstly, the amount of unwanted signal reaching gate 1 of the MPF121 and, secondly (but no less importantly), by the bias on gate 2.

It was found that optimum biasing required a 2:1 resistive divider. Gate 2 is, in the case of the r.f. amplifier, bypassed for r.f. by a 0.001 μF. In the pre-amplifier a source follower is used to match the output impedance of the MPF121 to the input of the receiver (50 ohms).

If desired, this extra FET may be omitted if lower gain is acceptable. This may be done by using a coupling link coil (2 turns of 27 gauge wire) over the cold end of the drain coil.

Good v.h.f. constructional practices must be observed. Provided this is so, any sensible circuit board layouts may be used. ●

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BOOK REVIEW

THE RADIO AMATEUR'S VHF MANUAL—ARRL PUBLICATION

Although this edition of the Radio Amateur's VHF Manual retains the basic form and content of its popular predecessors, it has been completely revised for up-to-date v.h.f. and u.h.f. conditions.

Three new chapters on f.m. repeater principles and practice have been added. There are new single-sideband, solid-state, converter, pre-amplifier, transmitter and amplifier projects for the home builder of v.h.f. gear, with "how it works" information to back up the constructional chapters. Some 70 pages on antennas offer comprehensive information in this field. Wave propagation, u.h.f. and microwave techniques, interference causes and cures, test equipment for the higher frequencies, and even a history of hamming in the v.h.f. realm are covered in interesting detail.

All in all a very desirable book for all those interested in "an expanding world".

The review copy was received direct from ARRL through Magpubs. Copies are now available from book shops.

AMATEUR RADIO TECHNIQUES—RSGB PUBLICATION

For both the inveterate experimenter and those seeking a source of "State of the Art" inspiration, this Fourth Edition of a now well-established RSGB publication is a must.

Those who have an earlier Edition will find adequate additional material to warrant purchase of this issue.

For those who have not seen earlier editions the folowing chapter subject headings will provide some idea of the material covered:

1. Semi-conductors.
2. Components and Construction.
3. Receiver Topics.
4. Oscillator Topics.
5. Transmitter Topics.
6. Audio and Modulation.
7. Power Supplies.
8. Aerial Topics.
9. Fault-finding and Test Units Appendix—I.F. List.

Information is well presented, offering in many cases several alternative means of achieving an objective.

Both valve and solid-state circuit ideas are presented in an easily read and understood manner. Circuits presented represent an excellent reference to help in a transition from valve to transistor technology.

The review copy was received direct from RSGB through Magpubs. Copies are now available from technical book shops in Australia at an approximate price of $6.00.

☆

BAND PLANS

1.—**W.I.A.** official "gentleman's agreement" on band sharing (policy reference 62/2, 1971, Fed. Convention Doc. 09.02.01) (all frequencies are in MHz.):—

CW only:	PHONE and CW:
3.5 — 3.535	3.535 — 3.700
7.0 — 7.030	7.030 — 7.150
14.0 — 14.100	14.100 — 14.350
21.0 — 21.150	21.150 — 21.450
28.0 — 28.200	28.200 — 29.700

RTTY:
3.620, 7.040, 14.090, 21.090.

2.—**I.A.R.U. Region 1 Band Plan:**

CW only:
3.5 — 3.600
7.0 — 7.040
14.0 — 14.100
21.0 — 21.150
28.0 — 28.200

(U.S.S.R. stations use 3.635 to 3.650 for international working.)

3.500 — 3.510 and 3.790 — 3.8 reserved for international working.

PHONE and CW:
3.600 — 3.800
7.040 — 7.100
14.100 — 14.350
21.150 — 21.450
28.200 — 29.700

RTTY:
3.600 (plus/minus 20 kHz.)
7.040 (plus/minus 5 kHz.)
14.090 (plus/minus 10 kHz.)
21.100 (plus/minus 20 kHz.)
28.100 (plus/minus 50 kHz.)

3.—**U.S.A. and Possessions** (certain Pacific Islands are exceptions in the 80 and 40 metre bands):

CW:	PHONE and CW:
3.5 — 4.0	3.775 — 4.000
7.0 — 7.3	7.150 — 7.300
14.0 — 14.350	14.200 — 14.350
21.0 — 21.450	21.250 — 21.450
28.0 — 29.700	28.500 — 29.700

4.—**CANADA**

CW:
Same as U.S.A.

PHONE and CW:
3.725 — 4.000
7.150 — 7.300
14.100 — 14.350
21.100 — 21.450
28.100 — 29.700

QSP

(Continued from Page 16)

SAFETY

"QST" for Dec. 1972 cites a couple of motor vehicle incidents where petrol in closed cans was in the compartment with a two-way radio. Fumes leaking out filled the boot (trunk) space and when the operator pushed the mike button it caused a spark at the relay contacts . . . and explosion.

NOVICES

"A recent change in the Amateur rules, effective November 22, 1972, makes it permissible for the Novice operator to use a variable frequency oscillator (v.f.o.) rather than having his transmitter be crystal controlled." "QST" article by Lew McCoy.

D.X.C.C.

Top of the A.R.R.L. D.X.C.C. ladder are W6AM and W9BG with 351 countries confirmed in the last listings. VK4QM is listed with 346 confirmations, but ZL1HY beats him at 348. A longish way down at 307 is VK3YL, but several ZLs are in between. On phone, VK5MS comes in with 341.

U.K. AMATEUR LICENCES

As at 31/10/72 the number of Amateur licences in force in Great Britain totalled 21,938. —"Radio Comm." Jan. '73.

21 GHz. BAND

World record for DX on 21 GHz. was set up last November by G3BNL and G3EEZ exchanging n.b.f.m. signals over a 45-mile path. "Rad. Comm." Microwaves, Jan. '73 It should be noted that the 1971 Space Conference deleted this band and substituted a band at 24 GHz.—i.e. 24-24.25 GHz.

KEEN LEARNERS

Andrew, a Matriculation student, last year gained his Elementary, Junior and Intermediate Y.R.C.S. certificates with honours all in the same year. But that is not all; he also sat for and passed the Amateur operator's certificate to gain his Amateur station licence, VK5NI. S.A. WI Journal, Jan. '73.

READERS OF "A.R."

Do not read this if you know the correct new address for the W.I.A. Executive which includes "A.R.," Magpubs, Subscriptions, address changes, Project Australis and a host of other non-Divisional matters.

G LICENCES

A comment brought on from an article in Dec. "Short Wave Mag." Any G licence holder who has **not** passed the Radio Amateur's examination and lets his licence lapse will not be re-licensed as a G without obtaining a pass in the R.A.E. regardless of how the original licence was granted. It is understood that much the same applies in respect of the Morse test. It is, of course, also well known that a 10 w.p.m. VK Morse pass will not be recognised for obtaining a full G call on reciprocal licensing.

ZAIRE (9Q5)

By order of the Director of P.T.T. of the Republic of Zaire, all Amateur licences have been cancelled. The effective date of this order was 20th July, 1972. (I.A.R.U. Reg. 1 News, Dec. '72.)

MARITIME MOBILE SERVICE

A world administrative radio conference to deal with matters affecting the maritime mobile services will commence in April 1974 (22nd) at Geneva. The conference will deal only with frequencies above 4 MHz. . . . The 1967 Maritime Mobile Conference decided that all new ship stations shall be fitted with s.s.b. equipment after 1st January, 1973. Further, all coast stations shall be equipped for s.s.b. by 1st January, 1975. (I.A.R.U. Reg. 1 News, Dec. '72.)

ISRAEL SYMPOSIUM

An "International Symposium of Radio Hams in the Satellite Era" is scheduled to take place in Israel from 24th to 29th June next on the occasion of the 25th Anniversary of Israel and Israel Amateur Radio. Information details from P.O. Box 16271, Tel Aviv.

PROJECT AUSTRALIS

Dr Peter Hammer, VK3ZPI, who built the command system for Oscar 6, visited Amsat Headquarters in Washington during January to discuss plans for future Oscar satellites. From these discussions the following is an outline of Oscar 7 (previously referred to as AO-B) and Oscar 8 (hitherto labelled AO-D). Note that Oscar 6, which is now in orbit, was known as AO-C pre-launch.

The orbit of Oscar 7 will be similar to Oscar 6. The launch is planned for mid-1974 with a design lifetime of three years for the satellite which will carry more solar cells than Oscar 6, thus enabling it to operate seven days a week. It is planned to carry a 5w. 2 mx to 10 mx transponder, similar to the one on Oscar 6, plus a similar back-up transponder with a 1w. output. In addition, the Euroscar 70 cm. to 2 mx linear repeater of about 10w. p.e.p., beacons in the 2 mx and 70 cm. bands for use when the appropriate repeater is off and a 24-channel morse code telemetry system are all planned to be carried along with VK3ZPI's highly successful command system which is the one now in use on Oscar 6.

Oscar 8 may be launched in about two years time. It is hoped this will be an entirely Australian-built package except for the solar cells.

Meantime Oscar 6 continues to operate extremely well. Amsat have advised that because of the failure of the 435.1 MHz. beacon the power budget now enables the satellite repeater to be on from Friday to Monday nights.

Operators through the repeater are asked to stay away from the centre of the passband to reduce congestion. The response is no better in the middle anyway.

Some temperature increases have been noticed lately which could be contributed to the now much-reduced rotation period of the satellite and the fact that it spends long periods in sunlight during the southern hemisphere summer. The temperature of the repeater p.a. has risen to 60 degrees C. at times.

☆

Technical Correspondence

ANOTHER LOOK AT LOW PASS FILTERS

Editor "A.R.," Dear Sir,

Being a manufacturer of wave filters, I was interested to read in January "Amateur Radio" the article by A. G. Earwicker, "Constructing an L.P. Filter".

The importance of fabricating the housing and the manner in which it is done cannot be over-emphasised. It is the major factor affecting the performance of a filter and the facilities required to make such a box are usually not available to the home constructor.

The idea of housing the unit in a tube is not new and has been used by me for many years. With this scheme, it is possible to build what I call a co-axial type filter, which, when connected into a co-axial cable of matching impedance, operates with very high efficiency.

Like all pieces of apparatus, it has some limitations, the main one being the number of sections, which are limited to two.

The doubts expressed by the Editor about Mr. Earwicker's filter are, unfortunately, all too true. A two-stage filter of appropriate construction can be made which will give the same attenuation figures as the Editor has produced and the insertion loss will be less. The graph shows a peak at 50 MHz., but it is suggested that when the filter is inserted and correctly matched into a transmission line, this peak will disappear and the curve will flatten off at the 50 dB. level. Such a figure is sufficient for all but the most stubborn case of t.v.i.

The use of springy "fingers" is not a solution to the problem of earthing the partitions and proper electrical bonding is essential. This introduces another problem, that of final adjustment, which is obviously impossible with a three-stage filter. This may account for the unusual inductance values specified. Finally, an efficient and reliable filter unit can only be produced if the construction is in a manner that enables it to be correctly adjusted and electrically sealed.

—B. E. Cabena, VK3BEC.

Product Review

By "Technical Assistant"

"DICK SMITH ELECTRONICS CATALOGUE, 1973, 2nd Edition"

The catalogue is a 44-page presentation on high grade paper with numerous diagrams and pictures of the advertised items. These are labelled individually with a letter of the alphabet, which corresponds to a letter alongside the catalogue price and description. One unusual feature of the catalogue is the fact that most items advertised have a brief description of either usage or electrical/physical parameters. This feature is of particular use for a newcomer to electronics, as well as those who are remote from the stores and must use mail-order.

Another feature not seen in other catalogues is a variety of information on, for instance, transistor lead identification, Amateur Radio information, formulae, etc., amounting to several pages. Dick says he intends that this information should eventually fill 50% of his catalogue. The information already occupies approximately 12%, and it is all very handy, every day use, "good oil". Dick can supply you with photo copies of information on most items that he sells at a nominal fee of 10c. Most people charge 20c.

I looked hard for things to criticise in the catalogue, and I found little that could be considered inaccurate. In "Amateur Information" I perhaps found the most problems and these were not necessarily Dick's fault. One I think is a typing error, the 11 metre band doesn't go up to 27.35 MHz., another the location of the Gippsland repeater, which is on Mt. Tassie—not Mt. Bess; possibly misinformation. These couple of inaccuracies constitute most of the errors I noted, so that's good in a catalogue of 44 pages.

One suggestion I would make is in regard to the advertising of the walkie-talkie units. Most advertisers say "P.M.G. approved" and the customer in many cases thinks no licence is required, so why not be one step above the others and say "Licence required". I know of a few people who have been caught by the P.M.G. without licences.

There are several beginner's type kits advertised as well as kits for a wide variety of projects published in various electronics magazines. In addition, a few books helpful to both beginner and advanced amateur/experimenter are carried. It isn't practical to go further into what this catalogue contains and I would suggest that you see Dick's advertisements in "Amateur Radio" for further information. The prices quoted are on a par with most other firms which provide a similar service and I quote from page 35: "Special Offer! Discount buyers, we guarantee our prices cannot be beaten . . . Try us! Last." Why not take him up on this offer?

One final point common to all advertisers in "Amateur Radio"—please support them, because if you don't it is a waste of their time and money to advertise. Say you saw it advertised in "Amateur Radio".

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EXOTICA

RECEIVER FROM U.S. SURPLUS

Recent U.S. journals ("73" Magazine, Sept. '72, p. 121 is typical) have carried advertisements offering the U.S. Navy Receiver Type AN/WRR-2 for U.S. $495. The advertiser claims these receivers cost the U.S.N. over $10,000 each.

Type AN/WRR-2 is a general purpose h.f. receiver covering 2-32 MHz., with synthesiser control in 0.5 kHz. increments and stability of 1 x 10^7/day. I.F. bandwidths are 0.35, 1.0, 3.0 and 12.0 kHz. and the receiver is capable of handling c.w., a.m., s.s.b. (u.s.b., l.s.b. or i.s.b.), f.s.k. or facsimile signals. A valve type equipment built about 1964, the receiver uses some 60 valves and operates from 115v. 50/60 Hz. 250 va.; weight 300 lbs.

A copy of the handbook is available at VK3ASC, from which information may be extracted by anyone seriously contemplating the purchase of a receiver which can be expected to cost about $1,000 to land after payment of customs duty and sales tax. Write VK3ASC, QTHR, or telephone 45-3002 after 6 p.m. only please.

Magazine Index

With Syd Clark, VK3ASC

"RADIO COMMUNICATION"

Sept.: Thoughts on a Multi-Mode Tx for 4M; Aerial Masts and Rotation Systems; Part 2, Simple "No-Cost" Curve Tracer; Supergain Aerials; Consumer Integrated Circuits in Amateur Design; Pt. 2, FM Receivers.

December, '72: A Wide Range Digitally-Controlled Local Oscillator; Assessment of H.F. Aerials using V.H.F. Aerials.

"SHORT WAVE MAGAZINE"

November, '72: Simple Two-Band V.H.F. Converter, Transistorised; An S.W.R. Bridge; Terminal Unit in Solid State for R.T.T.Y.

"HAM RADIO"

Aug.: Freq. Synthesizer for the Drake R-4 Receiver; Solid State 2304 MHz Pre-amplifier; Inexpensive Audio Filters; N-way Power Dividers and 3-dB Hybrids; Phase Shift Monitor Scope; Crystal Oscillator Frequency Adjustment; Direct Reading Capacitance Meter; Oscilloscope Voltage Calibrator; Mobile Operation with the Touchtone Pad; Digital IC Oscillators and Dividers; Comparison of FM Receiver Performance; Solid State Vibrator Replacement.

November, '72: V.H.F. F.M. Receiver; Performance of R.F. Speech Clippers; Automatic Solid-State Antenna Tuner; 5 MHz. WWV Receiver; First Steps to Satellite Communication; Carrier Operated Relay.

"QST"

Sept.: A High-Performance Solid-State Rx for the Novice or Beginner; Wide-Band FM with Crystal Control; Build a Dual-Differential Capacitor for Your Antenna-Tuning Network; RF Matching Techniques, Design and Example; A 75-watt Solid-State, UHF Amplifier; Limited Speech Recognition; "OAKEY" An Op-Amp Electronic Keyer; 1100 Watts on 160 Metres, Using a BC-458; A Closer Look at the HF Resonant Dipole.

December, '72: A Simple Frequency Counter for Receivers; V.F.O. Operating Hints for the Novice; Triggered Sweep Conversion for Oscilloscopes; New Life for the Heath VF-1 V.F.O.; Add A.V.C. to Your Swan 260; The Anatomy of a Solid-State Dipper; A.T.V. with the Motorola T44 U.H.F. Transmitter, Part 1; Simplified Impedance Matching and the Mac Chart; Notes on Custom-Built Repeater Gear.

"CQ"

Oct.: The Envelope Elimination and Restoration Transmission System for s.s.b.; Extending Use of Filters; A Scope/VSWR Monitor for the Shack; CQ Review, Heath SB-650 Digital Frequency Display; These Things We Call Countries, What Are They?

Nov.: Design Notes on a Moderate Power Solid State Transmitter for 1.8 MHz; CQ Reviews. "The Milda Digipet-60 Digital Frequency Counter".

December, '72: Oscar 6: It's in Orbit!; Satellite Turnstiles; More Ham Bands—Let's QSY to 30 Metres; Make Your Meter Readings Count; Vertical vs. Horizontal Polarisation on the V.H.F. Bands.

This month your reviewer was supplied with copies of "The Victorian VHFer", Volume 2, No. 3, September, 1972, and "Tuned Lines" Vol. 1, No. 1, October, 1972. The former is published by the VHF Group, Victorian Division, and is available for 13 cents per issue to VK3 and 20 cents to other States. The latter is stated to be available from the VHF and TV Group, N.S.W. Div., W.I.A., 14 Atcheson St., Crows Nest, 2065, by sending "enough stamped, self-addressed envelopes." Page size is 8¼ in. x 10½ in. Postage will need to exceed the 7 cent minimum, and I suggest that senders attach 12 cent stamps.

TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

AWARDS COLUMN

With Geoff Wilson,* VKAMK

AUSTRALIAN D.X.C.C.

PHONE

VK6RU	318/346	VK4VX	300/302
VK5MS	317/343	VK5AB	295/314
VK4KS	313/329	VK4UC	292/293
VK3AHO	308/326	VK4PX	291/294
VK6MK	304/327	VK4FJ	287/310
VK2APK	300/329	VK4TY	282/288

New Members:

Cert. No.	Call	Total
138	VK2NM	99/100
139	VK6HE	103/104

Amendments:

VK4SD 126/128 VK3AMK 242/243

C.W.

VK3AHQ	307/326	VK3NC	272/297
VK2QL	302/327	VK6RU	264/289
VK3YL	293/312	VK3YD	262/281
VK2APK	292/301	VK4VX	258/259
VK4FJ	292/320	VK4TY	257/272
VK3XB	284/300	VK3TL	252/260

Amendments:

VK3RJ 249/265

OPEN

VK6RU	318/346	VK4VX	307/309
VK4SD	317/334	VK4TY	304/321
VK4KS	314/334	VK6MK	304/327
VK2VN	311/332	VK4FJ	301/329
VK2EO	310/335	VK4UC	301/303
VK2APK	307/323	VK2SG	299/306

Amendments:

VK4PX 298/305

W.I.A. 52 MHz. W.A.S. AWARD

New Members:

Cert. No.	Call	Additional Countries
104	VK3ANP	3
105	VK4ZTK	1
Amendments:		
92	VK3AOT	4
100	VK3AMK	4
102	VK4ZIM	6

AUSTRALIAN V.H.F./U.H.F. CENTURY CLUB AWARD

OBJECTS

1.1 This award has been created in order to stimulate interest in the v.h.f./u.h.f. bands in Australia, and to give successful applicants some tangible recognition of their achievements.

1.2 This award, to be known as the "Australian V.H.F./U.H.F. Century Club Award" will be issued to any Australian Amateur who satisfies the following conditions.

1.3 Certificates of the Award will be issued to the applicant who shows proof of having made one hundred contacts on the v.h.f./u.h.f. bands, and will be endorsed as necessary, for contacts made using only one type of emission.

REQUIREMENTS

2.1 Contacts must be made in the v.h.f. band (Band 8) which extends from 30-300 MHz., or in the u.h.f. band (Band 9) which extends from 300-3,000 MHz., but such contacts must only be made in the authorised Amateur bands in Bands 8 and 9.

2.2 In the case of the authorised bands between 30 and 100 MHz., verifications are required from one hundred different stations, at least seventy of which must be Australian. Previous Amateur bands 50-52 MHz. and 56-60 MHz. will be counted as the same band as 52-54 MHz. for the purposes of the Award.

2.3 In the case of the authorised Amateur bands between 100-200 MHz., verifications from one hundred different stations are required.

2.4 In the case of any one of the authorised Amateur bands in the u.h.f. spectrum between 300 and 3,000 MHz., verifications from one hundred different stations are required. The authorised bands are:

420 — 450 MHz.
576 — 583 MHz.
1,215 — 1,300 MHz.
2,300 — 2,450 MHz.

2.5 It is possible under these rules for one Amateur to obtain several certificates—one for each of the v.h.f. bands nominated in Rules 2.2 and 2.3 and one for each of the four u.h.f. bands nominated in Rule 2.4.

2.6 Commencing dates for the Award are as follows:

V.h.f. bands: 1st June, 1948
U.h.f. bands: 1st January, 1965.

All contacts made on or after these dates may be included.

OPERATION

3.1 All contacts must be two-way contacts on the same band, and cross band contacts will not be allowed.

3.2 Contacts may be made using any authorised type of emission for the band concerned.

3.3 Fixed stations may contact land portable/land mobile stations and vice versa, but land portable/land mobile station applicants must make their contacts from within the same call area.

3.4 Applicants, when operating either land portable/land mobile or fixed, may contact the same station licensee, but may not include both contacts for the same type of endorsement.

3.5 Contacts made with ship or aircraft stations or contacts made with the aid of repeaters or translators of any kind will not be allowed.

3.6 Applicants may only count one contact for a station worked as a Limited licensee with a Y or Z three-letter call sign who is subsequently contacted as full A.O.C.P. holder.

3.7 All stations must be contacted from the same call area by the applicant (except as below), although if the applicant's call sign is subsequently changed, contacts will be allowed under the new call sign providing the applicant is still in the same call area.

If the applicant moves to another call area, contacts must be made from within a radius of 150 miles of the previous location to qualify for award purposes. If the distance of the new location from the old exceeds a radius of 150 miles, a separate application for a new award must be made claiming only contacts made from the new location.

All contacts must be made when operating in accordance with the Regulations laid down in the "Handbook for the Guidance of Operators of Amateur Wireless Stations" or its successor.

VERIFICATIONS

4.1 It will be necessary for the applicant to produce verifications in the form of QSL cards or other written evidence showing that two-way contacts have taken place.

4.2 Each verification submitted must be exactly as received from the station contacted, and altered or forged verifications will be grounds for disqualification of the applicant.

4.3 Each verification submitted must show the date and time of contact, type of emission and frequency band used, the report and the location or address of the station at the time of contact.

4.4 A check list must accompany every application setting out the following details:—

4.4.1 Applicant's name and call sign, and whether a member of the W.I.A. or not.

4.4.2 Band for which application is made, and whether special endorsement is involved.

4.4.3 Where applicable, the date of change of call sign(s) and previous call sign(s).

4.4.4 Details of each contact as required by Rule 4.3.

4.4.5 The applicant's location at the time of each contact if land portable/land mobile operation is involved.

4.4.6 Any relevant details of any contact about which some doubt might exist.

APPLICATIONS

5.1 Applications for membership shall be addressed to:—

Federal Awards Manager,
W.I.A.,
P.O. Box 150,
Toorak, Vic., 3142,

accompanied by the verifications and check list, with sufficient postage enclosed for their return to the applicant, registration being included if desired.

5.2 A nominal charge of $1.00, which shall also be forwarded with the application, will be made for the issue of the certificate to successful applicants who are non-members of the Wireless Institute of Australia.

5.3 Successful applicants will be listed periodically in "Amateur Radio". Members of the V.h.f./U.h.f. C.C. wishing to have their verified totals, over and above the one hundred necessary for membership, listed, will notify these totals to the Federal Awards Manager.

5.4 In all cases of dispute, the decision of the Federal Awards Manager and two officers of the Federal Executive of the W.I.A. in the interpretation and application of these Rules shall be final and binding.

5.5 Notwithstanding anything to the contrary in these Rules, the Federal Council of the W.I.A. reserves the right to amend them when necessary.

* C/o. P.O. Box 150, Toorak, Vic., 3142.

INTRUDER WATCH

With Alf Chandler,* VK3LC

From reports received it is quite evident that some Observers' receivers suffer from the old bug-bear, images. If you hear VIX on 7 MHz. or any other shore or coastal station on our Amateur bands you can bet your life it is an image.

Leith VK5LG, our VK5 Co-ordinator, has come up with a version of an old idea called "The Image Dipper". It is simply a series tuned trap between the antenna and earth connections of your receiver, and the principle is said to be so simple that it almost seems it won't work, but it does!

Capacitor is 140 pF. variable, and the coil is wound on an octal tube base, close wound with 22 gauge wire. 6.2-14 MHz., 8 turns; 13.8-23 MHz., 5 turns. Components may be altered to suit conditions, etc.

To use the "Image Dipper" simply tune the gadget down through its range while listening to a suspected Intruder. If the signal you are listening to does not disappear or at least greatly reduce in strength when both receiver and dipper are tuned to the same frequency, then the Intruder is an image or something similar.

An Intruder Watch net has been proposed to operate around 7030 kHz. on the second Monday of each month at 0930z. Co-ordinators will participate and it is hoped that members will also break-in from time to time. Everybody is welcome, and you may learn something of interest from it. Further publicity will be given as the idea progresses.

* Fed. Intruder Watch Co-ordinator, 1536 High St., Glen Iris, Vic., 3146.

CONTESTS

With Peter Brown,* VK4PJ

1972 "CQ" W.W.P.X. S.S.B. CONTEST

Australian Results (*certificate winners)

VK6CT*	all-band	754,134	1024	237
VK4UA*	,,	48,160	235	70
VK4AK	,,	19,125	88	75
VK3ACR*	10 mx	40,869	242	57
VK3XB	,,	4,329	41	37
VK3SM*	15 mx	54,975	269	75
VK2APK*	40 mx	765,810	1011	254
VK3HE	,,	7,594	59	47
VK3BBB	,,	2,686	33	28

CONTEST CALENDAR

March 3-4: A.R.R.L. DX Phone, 0001z Sat. to 2359z Sun.
,, 10-11: Israel DX, 0001z 10th to 2400z 11th.
,, 10-11: B.E.R.U., 1200z Sat. 10 to 1200z Sun 11th. Br. Commonwealth, c.w. only, all h.f. bands from 3.5 MHz.
,, 10-11: World Wide V.H.F.
,, 11: Worked All Britain, 0900z to 2100Z, h.f. 20, 15 and 10 mx.
,, 17-18: A.R.R.L. DX C.W., 0001z to 2359z.
,, 24-25: "CQ" W.W.P.X. s.s.b., 0001z Sat. to 2400z Sun. All h.f. bands, two x s.s.b. only; exchange RS plus Serial.
,, 24-26: B.A.R.T.G. Spring r.t.t.y.
,, 25: W.A. Britain, 0900z to 2100z, h.f. 20, 15 and 10 mx c.w.
24th to April 1: I.A.R.C. Propagation, Phone.
April 1: W.A.B., Phone, 0900z to 2100z, l.f. 160, 80, 40 mx.
,, 8: W.A.B., C.w., as above.
,, 21-22: Bermuda, Phone.
,, 28-29: D.A.R.G. R.t.t.y.

Send s.a.e. for details of the above. I can cover most.

BRISTOL 73 ACTIVITY CONTEST & AWARD

1st Jan. 1973 to 31st August, 1973. To make contact with Bristol, England, Amateurs. A case of sherry to the highest scoring station outside U.K. ALL bands.

COMMENTS

You will see by the 1972 "CQ" W.W. P.X. s.s.b. results, from Frank Anzalone, "CQ" Contest Manager, that only ten of us forwarded logs in a world wide contest. I am sure that we can do better than that, so get a few log sheets prepared.

I do not get much time to even listen these days, but invariably I hear "There is not much about" from someone. If we could enter a few of the many contests, for this month at least, I am sure that we would find the bands quite active. Plan your openings and bands and put in a few hours. Everyone will benefit.

B.E.R.U. 1973 C.W. CONTEST

Trophy Medallions for VK Entrants

The B.E.R.U. Contest will be held from 1200 GMT on 10th March to 1200 GMT on 11th March, 1973, c.w. only, 3.5 to 28 MHz., between stations in British Commonwealth call areas. VK1-8, VK9 Papua, New Guinea, Christmas, Cocos, Norfolk and VK0 Heard, Macquarie and Antarctica are all separate areas.

Two trophies have been presented for competition between VK stations. A silver medallion for the highest scorer in the official R.S.G.B. results, and a bronze medallion for a middle placed scorer decided on total VK entries divided by two, i.e. for 18 entries, to 9th placing; for 23 entries, to 12th placing.

Scoring: 5 points for contact, 20 bonus points for 1st, 2nd and 3rd contact in each call area (G, GM, GI, etc., count as one area).

Logs: separate page per band, with details of date and time GMT, station worked, number sent, number received, bonus points, contact points, claimed total score. Declaration that station was operated within rules and spirit of contest, and showing equipment details, to R.S.G.B. H.F. Contests Committee, C/o. D. J. Andrews, G3MXJ, 18 Downsview Crescent, Uckfield, Sussex, England, by airmail, please. Official result of contest with rules, etc., for next year will be sent to each entrant.

*Federal Contests Manager, Box 638, G.P.O., Brisbane, Qld., 4001.

VK-ZL-OCEANIA DX CONTEST, 1973

W.I.A. and N.Z.A.R.T., the National Amateur Radio Associations in Australia and New Zealand, invite world-wide participation in this year's VK-ZL-Oceania DX Contest.

Objects: For the world to contact VK, ZL and Oceania stations and vice versa. Note: VK and ZL stations, irrespective of their locations, do not contact each other for contest purposes except on 80 and 160 metres.

Dates: Phone—24 hours from 1000 GMT on Saturday, 6th October, 1973, to 1000 GMT on Sunday, 7th October, 1973.

CW—24 hours from 1000 GMT on Saturday, 13th October, 1973, to 1000 GMT on Sunday, 14th October, 1973.

RULES

1. There shall be three main sections to the Contest:
(a) Transmitting—Phone;
(b) Transmitting—c.w.;
(c) Receiving—phone and c.w. combined.

2. The contest is open to all licensed Amateur transmitting stations in any part of the world. No prior entry need be made.

Mobile marine or other non-land based stations are not permitted to enter.

3. All Amateur frequency bands may be used, but no cross-band operation is permitted.

Note: VK and ZL stations, irrespective of their location, **do not** contact each other for contest purposes **except on 80 and 160 metres**, on which bands contacts between VK and ZL stations are encouraged.

4. Phone will be used during the first week-end and c.w. during the second week-end. Stations entering both sections must submit separate logs for each mode.

5. Only one contact per band is permitted with any one station for scoring purposes.

6. Only one licensed Amateur is permitted to operate any one station under the owner's call sign. Should two or more operate any particular station, each will be considered a competitor, and must submit a separate log under his own call sign. (This is not applicable to overseas competitors.)

7. Entrants must operate within the terms of their licences.

8. **Cyphers:** Before points can be claimed for contact, serial numbers must be exchanged and acknowledged. The serial number of five or six figures will be made up of the RS (telephony) or RST (telegraphy) report plus three figures which may begin with any number between 001 and 100 for the first contact and which will increase in value by one for each successive contact.

Example: If the number chosen for the first contact is 021, then the second must be 022 followed by 023, 024, etc. After reaching 999, start again from 001.

9. **Scoring:** (a) **For Oceania Stations other than VK/ZL**—2 points for each contact on a specific band with VK/ZL stations; 1 point for each contact on a specific band with the rest of the world.

(b) **For the rest of the world other than VK/ZL**—2 points for each contact on a specific band with VK/ZL stations; 1 point for each contact on a specific band with Oceania stations other than VK/ZL.

(c) **For VK/ZL Stations**—5 points for each contact on a specific band and, in addition, for each new country worked on that band, bonus points on the following scale will be added: 1st contact, 50 points; 2nd, 40 pts.; 3rd, 30 pts.; 4th, 20 pts.; 5th, 10 pts.

(d) **80 Metre Segment:** For 80 metre contacts between VK and ZL stations, each VK and ZL call area will be considered a "scoring area", with contact points and bonus points to be counted as for DX contacts.

Note: Contacts between VK and ZL on 80 metres only.

(e) **160 Metre Segment:** For 160 metres, contacts between VK and ZL, VK and VK, ZL and ZL, and VK/ZL to the rest of the world. Each VK/ZL call area will be considered a "scoring area" with contact points and bonus points to be counted as for DX contacts [Rule 9 (c)].

Note: A contestant in a call area may claim points for contacts in the same call area for this 160-metre segment.

For this purpose the A.R.R.L. Countries List will be used with the exception that each call area of W/K, JA and UA will count as "countries" for scoring purposes as indicated above.

10. **Logs:** (i) **Overseas Stations**—(a) Logs to show in this order: Date, time in GMT, call sign of station contacted, band, serial number sent, serial number received, points. Underline each new VK/ZL call area contacted. A separate log for each band must be submitted.

(b) **Summary sheet** to show the call sign, name and address (block letters), details of station, and, for each band, QSO points for that band, VK/ZL call areas worked on that band.

"All-band" score will be total QSO points multiplied by sum of VK/ZL call areas on all bands, while "single-band" scores will be that band QSO points multiplied by VK/ZL call areas worked on that band.

(ii) **VK/ZL Stations**—(a) Logs must show in this order: Date, time in GMT, call sign of station worked, band, serial number sent, serial number received, contact points, bonus points. Use a separate log for each band.

(b) **Summary** to show: Name and address in block letters, call sign, score for each band by adding contact and bonus points for that band, and "all-band" score by adding the band scores together; details of station and power, declaration that all rules and regulations have been observed.

11. The right is reserved to disqualify any entrant who, during the Contest, has not strictly observed regulations or who has consistently departed from the accepted code of operating ethics.

12. The ruling of Federal Contest Manager of the W.I.A. will be final.

13. **Awards.—VK/ZL Stations:** W.I.A. will award certificates as follows:

(1) To the top scorer on each band irrespective of single-band or multi-band operation and irrespective of call area, i.e. a maximum of one award may be made for VK and ZL, for each band.

(2) To the top scorer in each VK and ZL call district, i.e. a maximum of 15 awards, 10 VK and 5 ZL awards may be made.

To be eligible for awards in either of the above mentioned categories an operator must obtain at least 1,000 points or there must be at least three competing entries in the category.

Overseas Stations: Certificates will be awarded to each country (call area in W/K, JA and UA) on the following basis:

(1) Top scorer using "all bands" provided that at least three entries are received from the "country" or the contestant has scored 500 points or more.

(2) Other certificates may be awarded, to be determined by conditions and activity.

N.B.—There are separate awards for c.w. and phone.

14. **Entries:** All entries should be posted to **Federal Contest Committee, W.I.A., Box N1002, G.P.O., Perth, Western Australia, 6001**, or to **N. Penfold, 888 Hantrics Road, Woodlands, Western Australia, 6018. VK/ZL entries to be received by 31st December, 1973. Overseas entries to be received by 22nd January, 1974.**

RECEIVING SECTION

1. The rules are the same as for the transmitting section, but no active transmitting station is permitted to enter this section.

2. The contest times and logging of stations on each band per week-end are as for that transmitting section except that the same station may be logged twice on any one band —once on phone and once on c.w.

3. To count for points, logs will take the same form as for transmitting, as follows: Date, time in GMT, call of station heard, call of the station he is working, RS(T) of the station heard, serial number sent by the station heard, band, points claimed. Scoring is on the same basis as for transmitting section and the summary should be similarly set out with the addition of the name of the S.w.l. Society in which membership is held if a member.

4. Overseas stations may log only VK/ZL stations, but VK receiving stations may log overseas stations and ZL stations, while ZL receiving stations may log overseas stations and VK stations.

5. Certificates will be awarded to the top scorer in each overseas scoring area and in each VK/ZL call area provided that at least three entries are received from that area or that the contestant has scored 500 points or more.

NEW ADDRESS—W.I.A. EXECUTIVE:
P.O. BOX 150, TOORAK, VIC., 3142.

VHF UHF

an expanding world

With Eric Jamieson,* VK5LP

Closing date for copy: 30th of month.
Times: E.A.S.T.

AMATEUR BAND BEACONS

VK0	52.160	VK0ZVS, Macquarie Island.
	53.100	VK0MA, Mawson.
	53.200	VK0GR, Casey.
VK2	52.450	VK2WI, Dural.
VK3	144.700	VK3RTG, Vermont.
	144.925	VK3QZ, Traralgon.
VK4	52.600	VK4WI/2, Townsville.*
	144.400	VK4WI/1, Mt. Mowbullan.*
VK5	53.000	VK5VF, Mt. Lofty.
	144.800	VK5VF, Mt. Lofty.
VK6	52.006	VK6VF, Bickley.
	52.900	VK6TS, Carnarvon.
	52.950	VK6VE, Mt. Barker.
	144.500	VK6VE, Albany.
	145.000	VK6VF, Bickley.
VK7	144.900	VK7VF, Devonport.
VK8	52.200	VK8VF, Darwin.
ZL1	145.100	ZL1VHF, Auckland.
ZL2	145.200	ZL2VHF, Wellington.
	145.250	ZL2VHP, Palmerston North.
	431.850	ZL2UHF, Palmerston North.
ZL3	145.300	ZL3VHF, Christchurch.
ZL4	145.400	ZL4VHF, Dunedin.
JA	52.500	JA1IGY, Japan.
HL	50.100	HL9WI, South Korea.

* Denotes change from previous listings.

With the reading of these notes the equinoxial periods are not very far away and increased possibilities of trans-equatorial DX. Most of the JA IGY stations are to be found on 50.500 except JA1IGY on 52.500 (listed above). A listening watch is kept in Hong Kong on 50.100 by VS6DA and VS6BE, and other stations to our north will be gradually coming on the air.

SIX METRES

I am sure most operators would say the DX season which virtually finished last January was a very successful season. I was unfortunate enough to miscalculate the number of television receivers going faulty in the lead-up to the DX season with the result that the reconstruction of my 6 and 2 metre equipment to s.s.b. did not eventuate in time to operate but some listening was done, so have not been entirely left out of the picture, although the finger nails took a hammering whilst listening to some of the fine contacts being made at times! It was great to hear Rex VK9BP at Port Moresby getting so many contacts, his 400 watts of r.f. to a 6 el. yagi certainly made its present felt. When he has completed his 2 metre transverter and 4/250A linear he will be much sought after. Next season he will he the one to really be with it on 2 metres. (Please quote me as saying that, in your 1974 letters!!)

Channel 0 in Melbourne and Brisbane took a hammering this year, and so too did many other Channels up to Channel 3 here. ZL t.v. noted fairly regularly here, but the ZL4s once again were rather conspicuous by their absence, maybe conditions were just not right for them, but the ZL band seemed to be in pretty good order on plenty of occasions during the mornings when t.v.i. should not have been a problem. Noted the absence of much operating from Darwin, but Geoff VK8ZGF from Alice Springs provided plenty of interest for all. Notice also that Wally VK5ZWW, of m/s fame, has invested in r.t.t.y. devices for use on 6 metres, and testing on both programmed and manual operation—typical answer, "Thank you for the call, one moment please while I change to manual operation!!" Really, Wally!

TWO METRES

This band was not left out of the DX picture and a number of notable contacts were observed, particularly the one between Tony VK5ZDY and Mick VK5ZDR to Wally VK6WG, followed later by 432 MHz. contacts. Tony VK5ZDY also featured in another good contact, this time via Channel B to VK3AJN at Wangaratta, which is a good haul. There have been quite a number of unconfirmed reports of long distance reception on 2 metres, viz. VK7 being heard in Sydney and further north at Boggabri (VK2ZAY); VK7 advised heard in VK4 around New Year, and about 28th Dec. Jim VK5ZMJ in Port Pirie was heard in Sydney with very strong signals. I have been advised, however, that definite contacts were made between Lance VK4ZAZ in Rockhampton and Bob VK3AOT, Roy VK3AOS and VK3CI on 22nd Dec.—good work chaps!

So with the various good contacts made and reports of others, I repeat again, watch out for 2 metres for the next two or three years, particularly during the first half of December, and so much the better if you can have an s.s.b. transverter going as well.

OPERATING HABITS

Having an opportunity to do some listening this DX season there are two comments I would like to make, both relating to 6 metres.

Firstly, a great increase in s.s.b. operating this time, with more to come it seems, and much of the contacting done by transceive method; some very good sideband is to be heard, too. The QQE06/40 seems to be a popular tube for the band.

The other comment concerns the operating habits of a few, there being too much haste by some in rushing in and not giving the finishing station a chance to complete his final over and sign off. Quite often the last half of his signing over was obliterated by the inconsiderate operator jumping the gun.

On 20 metres it is barely acceptable unless there are good reasons; and on 40 metres you will be told so in as many words if you try it.

So let's get things organised chaps and be considerate—no one wants to get their names in the various black books kept by many stations, including my own, for ungentlemanly operating. So give him a go, let the signing be done, then go in with the rest of the dog pile, and take your chance. If you have got a good signal, clean and undistorted, you will get the contact without a great deal of delay—but shouting into the microphone, particularly with s.s.b., just doesn't earn you any extra marks, except perhaps in the black book!

AMATEUR T.V.

Winston VK7EM has written to say he has been successful in crossing Bass Strait with a two-way QSO via a.t.v. with the exchange of picture with Peter VK3ZPA, first such contact on 13th Dec. last, using 432 MHz. band. Winston received reports with thanks also from VKs 3ZBZ, 3YEC, 3YGB, 3ZBB and 3ZSB.

A.t.v. activity on the north-west coast of VK7 is on the increase. Noel VK7ZNS has a camera built and Winston and Tony VK7AX have carried out many tests over an 8-mile path with a 90 degree bend in it—successfully bouncing signals from Mt. Montgomery south of Penguin, this being the only way to get signals into Ulverston using low power. Thanks for the letter, and we all hope your continuing tests are successful.

TRANSVERTERS

I do not normally comment on technical articles in other bulletins, but feel the article by Mike VK3ASQ, "Some Notes on 6 and 2 Metre Transverters" in the Jan. issue of the Geelong Amateur Radio-TV Club Newsletter very commendable, particularly as I have just passed through the stage of completing 6 and 2 metre transverters myself, and found my final ideas coincided exactly with those of Mike. The main points which will interest those in the construction stage of transverters are that zener diodes up to about 35 volts allow a QQE06/40 to be driven to plate currents much higher than 150 mA., than when a negative bias is taken from the bias line direct. Minus 35 volts will give about 60 mA. standing current from a 600 volt plate supply.

I agree also with Mike that the QQE02/5 makes a better mixer than a QQE03/12, with better linearity, and I also found that it was better to feed the 116 MHz. in parallel to the grids of the QQE02/5, and when mixed with 28 MHz. s.s.b. from an injection winding also to the grids, the output from the QQE02/5 being in push-pull cancelled most of the 116 MHz. energy, and the following tuned circuits completely rejected it. Feeding the 28 MHz. into the cathode of the QQE02/5 made mixing levels very critical; mixing in the grid was certainly easier.

I mention these points here because so many people at the moment are building transverters, and anything which can help to smooth their problems (and there are plenty) should be shared information. Perhaps Mike might like to send his article to "Amateur Radio" for publication. In the meantime, anyone having problems might like to contact either Mike or myself and information and diagrams could be sent on. Good luck anyway, but get those transverters going on 2 metres ready for the DX at the end of the year!

OSCAR 6

Great to see Amsat-Oscar 6 is still going well despite a few problems, and judging from the orbital prediction information still being circulated much interest continues in the satellite. No specific information is intended in this short paragraph but this column continues to recognise the excellence of the Oscar performance.

That about wraps it up for this month, so the column is closed with the following thought: "Reading the fine print may give you an education—not reading it will give you experience".—The Voice in the Hills.

* Forreston, S.A., 5233.

SINGAPORE NEWS

The third A.G.M. of the Singapore Amateur Radio Transmitting Society (S.A.R.T.S.) was held on 25th January, 1973, when the following were elected to office for the ensuing year:

President—9V1QG.
Vice-President—9V1RA.
Secretary—9V1OK.
Treasurer:—9V1OD.
Council members: 9V1NQ, QO, RF, RH and Samuel Kwan.

The new council of S.A.R.T.S. extends a hearty welcome to any visiting Australian Amateurs and advises that Society meetings are held every last Thursday of the month at Sands House, Scout Hq., Clemenceau Ave., at 2000 hours. Correspondence to the Society should be addressed to:—

The Secretary,
S.A.R.T.S.,
P.O. Box 2728,
Singapore 1.

you and DX

With Don Grantley*

Times: GMT

Firstly, I must apologise for the intermittent nature of this page over the past months. It has been a very hectic period here, but at last we have finally made it and are now settled down in the "sunshine state". My address for all future letters should be P.O. Box 26, Imbil, Qld., 4570, and the phone number is Imbil 65. For those who don't know the area, Imbil is situated between Nambour and Gympie, some 20 miles west of the main highway. The QTH is ideal for DX and with an area of some 250 acres I should be able to have a vee beam or two. Finally, should anybody be in Gympie at any time, you can find me in the telegraph room at the main Gympie Post Office.

There have been many happenings over the past few months, but to me the saddest was the news of the passing of W2CTN, Jack Cummings. Nothing can be added to the many words previously written about Jack, and his passing leaves a void which will be very difficult to fill. Geoff Watts, in his DX Newssheet No. 555 on Jan. 2, made the announcement briefly and very much to the point, thus: "Silent Key—John M. Cummings—The QSL Manager." I feel sure that all of us will endorse this tribute.

Whilst on the subject, there are several other silent keys which I feel should be mentioned here. CR7BC, Manuel Da Silva, 22/10/72, from a heart attack; HC1FG, Carlos; G2UJ, W. H. Allen, at Lisbon on 5/10/72; G2PL, Peter Pennell, President of F.O.C. for '71/72; G3ILO, Tom Spencer; PA0WP, Wilvan Inganegeran, heart attack, former editor of "DX-press"; HI3JR, and finally HI8MMN.

There have been a number of special prefixes on the air to add to the confusion. CT7SH was Don CT1SH, using the special prefix for the last "CQ" Contest. His manager is CT1VE. The prefix 9C9 was used by EP stations for the Contest. 9C9TW had GI3HXV as manager. FY0RU used this one for the contests, QTH is Box 336, Cayenne. HH2JT counts only for the PX hunters, QTH is Box 586, Port au Prince. OA6CV is George K0WTM, new address is Box 825, Arequipa, Peru. A4FA regularly works manager G3LQP, and is ex-MP4MMB. DX4PAR was exhibition station commemorating 40th anniversary of the DU Radio Club; manager is DU1EJ.

JX6VO was Norman LA6VO, manager was LA1RQ. YA0CDRC is the A.R.A. Award Club station. OK5SZM, which went QRT on Dec. 31, was the Students R. Club from the first congress of Socialist Union of Youth at Bratislava; QSL to OK3TFM. TY5ABK, Mike, skeds manager W8CNL daily on 21325 s.s.b. at 1700. UK3OSB with all-band operation from Nov. 19 to Feb. 2 from Stalingrad to commemorate the 30th anniversary of the battle of that city in W.W.2. Several YB PXs are listed during Dec., YB5AAQ has W5ADZ as manager, YB-9AAT has W4YUU, whilst YB0ABE has K5GUZ.

IT9 stations are using IZ9 during Dec. HA25 prefixes can be used during 1973 by HA and HG stations to commemorate 25 years of postwar Amateur Radio. During Dec. and Jan., certain HA and HG stations were permitted to use the HA100 prefix to celebrate the Budapest centenary. WM4SFC was QRV from the Marshall Is. from the Marshall space flight centre, Alabama 35812 during the Apollo 17 mission. 9H3WPD, Ron, QRV from the World Peace Day Exhibition, send cards to the 9H1 Bureau.

IV5VEG is the special station, QRV Feb. 18, 25, and March 4 and 6, associated with the Viareggio Carnival Award which dates from Dec. 1, 1972. Manager is I5DOF. SQ5Z QRV from Warsaw technical exhibition; manager is SP5PMT. Finally, 5V7GE, Garland, is using this prefix for some unknown reason; QSL to Box 2, Bassari, Rep. of Togo.

A4FE has been on the air quite a bit of late. He is Steve ex-ZC4MO and he is QSL manager for all A4 stations. Cards should be sent to Box 961, Muscat.

VR3AC operators made 4,000 QSOs with 117 countries in 34 zones during their recent jaunt. They hope to return later this year and plan to work from KP6 and other rare spots.

YV0AA now QRV as from Jan. 10. They have been very active on all bands including 80 mx. All QSLs for this one go to Box 2285, Caracas, Venezuela.

VS6DR, HS3DR and XV5AC operators, John Lunsford and Scott Gant, planned to operate from Spratley Is. for five days from Jan. 18, signing 1S1A or their own calls/Spratley.

Alberto I2KCT/5U7 on a scientific expedition is reported on 10 to 20 mx during Jan., and hopes to sign on from 5U, 5N, TT, TJ, TY, 8G, TU, TZ, 6W, 5T, EA9 and CN8. He has been reported on 14148 s.s.b. at 1915z.

If you have worked 5X5NA since mid-June 1972 you have landed a pirate, as Roger went QRT at that time. 5X5NK uses 14039 c.w., 14238 and 14330 s.s.b. Name is Udo, and manager is DL1HH.

WM1CC operated from Jan. 13 to Jan. 18 from Cape Cod for the Marconi Commemoration. At 0256 on Jan. 19 a copy of the original Marconi message was sent at 14 w.p.m., and a certificate will be issued to anybody who took a correct copy.

The International Reciprocal Operators Club has been formed, membership is free to all operators who hold a reciprocal ticket. To join you have to send a copy of your home and foreign reciprocal licences, a QSL with details of your operation abroad plus twoIRCs to I.R.O.C., Box 11, Medway, Massachusetts, 02053, U.S.A. There is an award programme associated with this project and no doubt our award section has full details; if not, I have them here.

Bob VE6BAA, Bob VE6BAW, Gene VE6IP, together with film and sound crew, hope to head off in an ocean-going trimaran with the objective of activating the 40 most wanted countries, and they plan to devote their time in the next few years to a long stay in each of them. A DX-pedition trophy will be awarded each year to the station working them on most stops, bands and modes and the winner also gets a two-week expenses paid vacation aboard the trimaran. Transport troubles have caused them to postpone their Bhutan trip.

VQ9HCS is active from Aldabra until some time in March. He is using strong equipment, and is in keen demand. All cards should go to Box 84831, Mombasa, Kenya.

* P.O. Box 26, Imbil, Qld., 4570.

"20 YEARS AGO"

With Ron Fisher, VK3OM

The editorial pages of "Amateur Radio" during the early 1950s were greatly concerned with the introduction of television to Australia and its effect one way or another on Amateur operators. March 1953 looked at "Television Problems", which included such matters as t.v.i., the provision of regulations that would enable Amateurs to carry out television transmission and reception experiments. Up to this time all the television work carried out by Amateurs had been carried out over closed circuits. It's also interesting to recall that about this time, the Federal Government had set up a Royal Commission to investigate whether Australia could economically afford to run a television service, and if so, what changes could be expected to take place in the domestic life of the people. As the editorial predicted, the problems have been overcome.

Technical articles for March 1953 were quite diverse in their scope. A. H. Vonthethoff, VK5KW, described his method for "Neutralising an R.F. Amplifier with the use of a Grid Dip Meter". The grid dip meter is used as a field strength or r.f. output indicator. Quite simple and straight-forward. Dual grid modulation was the subject of an article by R. J. Whyte, VK2AHM. To provide amplitude modulation of an 807 or 1625 final amplifier, Jeff used a system of applying modulation to both the input and screen grids. A reprint from "Ham News" tells all there is to know about "Tank Circuit Qs".

Ed. Manifold, VK3EM, and Len Jackson combined in an absorbing article, "Hidden Xmitter Hunting—Whys and Wherefores". Ed. told how to construct a shielded loop antenna and then connect it to your receiver, then Len described the best way to track down the hidden transmitter. Hidden transmitter hunting, with the transmitter usually operating on the 80 metre band, was a sport that reached fever pitch during the fifties.

DX notes reported a general low in activity, with only twenty showing any signs of usable overseas contacts. V.h.f., on the other hand, appeared to be very busy with a good deal of portable activity on both two and six metres. The only DX reported was a ZL on six.

Ionospheric Predictions

With Bruce Bathols,* VK3ASE **MAR. '73**

Predicted band openings for March 1973 from Charts supplied by the Ionospheric Prediction Service Division are listed below. Times are G.M.T.

28 MHz.:				
VK2	to	SU		0500-0700
"	"	KH6		2200-0700
"	"	UA		0700-0800
"	"	VK9		2400-0700
"	"	W6		2200-0300
"	"	JA		2300-0800
"	"	5Z	L.P.	2200-0200
VK5	"	SU		0500-0600
"	"	KH6		2300-0700
"	"	UA		0600-0900
"	"	VK9		2400-0800
"	"	W6		2300-0300
"	"	JA		2300-0900
"	"	5Z	L.P.	2300-0200
21 MHz.:				
VK2	to	ZL		2200-0700
"	"	SU		0400-1000
"	"	KH6		2000-0900
"	"	ZS		0500-1000
"	"	G	S.P.	0700-1000
"	"	G	L.P.	0900
"	"	VK0		0100-0700
"	"	VE3	S.P.	2000-0100
"	"	VE3	L.P.	2300
"	"	UA		0400-1000
"	"	W1		2000-0100
"	"	VK9		2100-0900
"	"	PY		2200-0100
"	"	W6		2000-0400
"	"	JA		2200-1600
"	"	5Z	S.P.	0600-1000, 2300-0200
"	"	5Z	L.P.	2000-0300, 0800-0900
VK6	"	SU		0400-1200
"	"	ZS		0400 1200
"	"	G	S.P.	0600-1200
"	"	G	L.P.	1000
"	"	UA		0400-1200
"	"	PY		0900-1100
"	"	W6		2200-0400
14 MHz.:				
VK2	to	ZL		2000-1400
"	"	SU		1100-0100
"	"	KH6		0400-1500, 1700-2000
"	"	ZS		0400-1400, 2100
"	"	G	S.P.	0700-2000
"	"	G	L.P.	1900-0200, 0700-1200
"	"	VK0		2100-1200
"	"	VE3	S.P.	0300-0400, 1300-1900
"	"	VE3	L.P.	2100-0300, 1500
"	"	UA		0700-1800
"	"	W1		0300-0500, 1300-1800
"	"	VK9		2400-2400
"	"	PY		2000-1300
"	"	W6		0300-1200, 1500-1900
"	"	JA		0500-2300
"	"	5Z	S.P.	2100-0700, 1400
"	"	5Z	L.P.	0300-1100, 1500-1900
VK3	"	SU		1100-0100
"	"	ZS		0400-0800, 1000-1300
"	"	G	S.P.	0800-2100
"	"	G	L.P.	0800-1300, 2100-2400
"	"	UA		0800-1900
"	"	PY		2000-1300
"	"	W6		0400-1200, 1500-1900
VK4	"	SU		1100-2400
"	"	ZS		0400-0800, 1000-1800 2100
"	"	G	S.P.	0600-2000
"	"	G	L.P.	0700-1200, 1900-0300
"	"	UA		0700-1800
"	"	PY		2000-1700
"	"	W6		0400-1200, 1500-1900
VK5	"	SU		1100-0100
"	"	ZS		0400-0800, 1000-1400
"	"	G	S.P.	0900-1900, 2100
"	"	G	L.P.	0800-1300, 2100-2400
"	"	UA		0800-1900
"	"	PY		2100-1300
"	"	W6		0400-1200, 1500-2000
VK6	"	SU		1100-2000, 2300-0300
"	"	ZS		0300-0400, 1100-1700
"	"	G	S.P.	1000-2000, 2300
"	"	G	L.P.	0800-1400, 2200-2300
"	"	UA		0900-2000
"	"	PY		2300-1500
"	"	W6		0600-1200, 1600-1900
7 MHz.:				
VK3	to	SU		1500-2100
"	"	VK0		2400-2400
"	"	VE3	S.P.	0700-1200
"	"	VE3	L.P.	2100
"	"	PY		0800-0900
"	"	W6		0800-1500
"	"	JA		0900-2000

* 3 Connewarra Avenue, Aspendale, Vic., 3195.

EMERGENCY OPERATIONS

Licola (Vic.): **15 schoolboys and two teachers missing for two days on Mt. Tamboritha were rescued by helicopter.**

Amateur Radio operator Keith Scott, VK3SS, was the vital link between search headquarters and searchers. For 17 hours on the chilly summit of the mountain, Keith operated his well equipped mobile station.

A helicopter overhead and experienced bushmen on the ground searched the dense mountain timber for the missing people lost while on a school hike in the ranges.

Mobile 144 MHz. transceivers with the searchers kept in touch with Keith to relay their messages to police, whilst anxious parents and friends crowded round the radio van to listen to progress. They were delighted to hear that all had been found. They took for granted that the radio gear was part of the search headquarters equipment. They were unaware that the cost of that vital link was born by Keith in true Amateur fashion.

VK QSL BUREAUX

Because of the publication of incorrect information in some overseas magazines the following is the official list of VK QSL Bureaux with each appropriate address (all are inwards and outwards unless otherwise stated):

VK1: QSL Officer, C/o. Canberra Radio Society, P.O. Box 1173, Canberra, A.C.T., 2601, Australia.

VK2 correctly listed as: QSL Officer, W.I.A. Hunter Branch, P.O. Box 134, Charlestown, N.S.W., 2290, Australia.

VK3 QSL Bureau, Inwards: C/o. Mr. E. Trebilcock, 340 Gillies St., Thornbury, Vic., 3071, Australia.

(VK3 QSL Bureau, Outwards: C/o. Mr. W. L. Jackson, 23 Malane St., Carnegie, Vic., 3163.)

VK4 QSL Officer, G.P.O. Box 638, Brisbane, Qld., 4001, Australia.

VK5 QSL Bureau, C/o. Mr. Geo. W. Luxon, VK5RX, 203 Belair Rd., Torrens Park, S.A., 5062, Australia.

VK6 QSL Bureau, C/o. Mr. J. E. Rumble, VK6RU, G.P.O. Box F319, Perth, W.A., 6001, Australia.

VK7 QSL Bureau: G.P.O. Box 371D, Hobart, Tas., 7001, Australia.

VK8/9/0, SWL unlisted calls only: QSL Bureau, C/o. Mr. R. Jones, VK3RJ, 23 Landale St., Box Hill, Vic., 3128, Australia.

NEW CALL SIGNS

OCTOBER, 1972

VICTORIA

VK3GE—I. R. Wade, 156 Hastings Rd., Frankston, 3199.
VK3AFY—C. J. Gamble, Lot 19, Rosmar Circuit, East Rosanna, 3084.
VK3AHI—J. C. Eagan, Apartment 4, 17 Forster St., West Heidelberg, 3081.
VK3AMQ—M. G. White, 62 Peter St., Box Hill North, 3129.
VK3AYC—H. P. Caudell, Lot 77, Regina St., Kilsyth, 3137.
VK3AYE—Central Gippsland Youth Radio Club, Visual Education Centre, Gray St., Traralgon, 3844.
VK3BDT—R. D. Turner, 15 Killearn Ave., Point Lonsdale, 3225.
VK3RAM—The Wireless Institute of Australia, Race St., Midland Zone, Bendigo, 3550.
VK3RTG—The Wireless Institute of Australia, Colonial Gas Association, Rooks Rd., Vermont, 3133.
VK3YHF—R. J. Aberneathy, 62 Wiltonvale Ave., Werribee, 3030.
VK3ZBV—J. Quigg, 1 Walker Pde., Churchill, 3842.
VK3ZDJ—E. G. Jarman, Cr. Stanley's and Merricks Roads, Merricks, 3916.
VK3ZDM—R. M. Mullavey, 49 Pickford St., East Burwood, 3151.
VK3ZDP—G. Padula, 171 Lygon St., Carlton, 3053.
VK3ZHG—H. R. Gillis, 105 Bladen St., Laverton, 3028.
VK3ZWH—A. F. Whillance, 2 Tate St., East Geelong, 3219.
VK3ZWM—D. E. Hill, Cr. Riverside and Eleventh Sts., Mildura, 3500.

QUEENSLAND

VK4LU—R. J. Hinks, Station: 177 Ibis St., Longreach, 4730; Postal: C/o. Police Station, Longreach, 4730.
VK4NU—R. N. Boland, 44 Birch St., Cairns, 4870.
VK4ZAY—C. E. Benson, 30 Chandler St., Garbutt, 4814.
VK4ZBA—A. Christopher, 21 Keenan St., Margate, 4019.

SOUTH AUSTRALIA

VK5DQ—C. R. W. Ashton, 54 Harvey St., Whyalla Norrie, 5608.
VK5KQ—W. N. Hart, 12 John Ave., Tranmere, 5073.
VK5WB—I. J. Champion, 16 Tarranna Ave., Parkholme, 5043.
VK5ZAP—J. G. Badcock, 32 Forest Ave., Hawthorndene, 5051.
VK5ZAS—A. W. Q. Kriek, 36 Glyde St., Port Augusta, 5700.
VK5ZIX—A. J. Stacey, 5 Blacktop Rd., Hillbank, 5112.
VK5ZPB—C. Gilbert, 170 East Tce., Adelaide, 5000.
VK5ZRZ—W. S. Baynes, 29 Starthspey Ave., Hazelwood Park, 5066.

WESTERN AUSTRALIA

VK6MT—A. T. Mason, 127 Graylands Hostel, Graylands, 6010.
VK6NT—J. G. Denny, 29 Tonbridge Way, Morley, 6062.
VK6RT—R. H. Collier, 941 Wellington St., West Perth, 6005.
VK6RY—R. H. Latham, D.C.A. Residence No. 6, Fourth Ave., Wittenoom, 6752.
VK6ZBJ—D. L. Cline, 4/365 Cambridge St., Wembley, 6014.
VK6ZDF—T. W. Robinson, 5 Jarvis St., Bunbury, 6230.
VK6ZHC—R. H. Chapman, 6 Jenner Way, Ross-Moyne, 6155.
VK6ZKF—R. A. Fable, 6/3 Acton Ave., Bentley, 6102.

TASMANIA

VK7ZAD—D. M. Lawson, 47 David St., Launceston, 7250.
VK7ZAP—A. P. Boon, 37 Pottery Rd., Lenah Valley, 7008.
VK7ZKB—K. A. Brown, 7 Sunnyside Rd., New Town, 7008.
VK7ZSE—S. J. Elliott, 18 Adelaide St., East Launceston, 7250.

NORTHERN TERRITORY

VK8ZB—G. L. Stephens, 9 Wagaman Tce., Wagaman, Darwin, 5792.
VK8ZKA—P. M. Van der Velden, 2506 Henry Ellis St., Alawa, 5792.

TERRITORIES

VK9ZED—P. R. Harden, Station: Section 32, Lot 13, Le Hunt Rd., Port Moresby, P.N.G.; Postal: P.O. Box 139, Port Moresby, P.N.G.
VK9DD—D. E. Herbert, Station: Section 73, Lot 3 Boroko, P.N.G.; Postal: C/o. O.T.C. (A), P.O. Box 56, Port Moresby, P.N.G.
VK9CS—C. S. Shaw, Station: Section 46, Lot 41, Boroko, P.N.G.; Postal: P.O. Box 6653, Boroko, P.N.G.
VK9MF—R. A. Ford, Station: Flat 70, Karage St., Saraga, Port Moresby, P.N.G.; Postal: P.O. Box 6592, Boroko, P.N.G.

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For full details, see January 1972 "A.R.," page 23.

amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

APRIL, 1973

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MODEL AS-100D/P — Price $34.50

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MODEL OL-64D — Price $19.75

20,000 ohms per volt. DC volts: 0.025, 1, 10, 50, 250, 500, 1000 (at 20K o.p.v.), 5000 (at 10K o.p.v.). AC volts: 10, 50, 250, 1000 (at 8K o.p.v.). DC current: 50 uA., 1 mA., 50 mA., 500 mA., 10 amps. Resistance (ohms): 4K, 400K, 4M, 40 megohms. dB scale: minus 20 to plus 36 dB. Capacitance: 250 pF. to 0.02 uF. Inductance: 0-5000 Henries. Size: 5¾ x 4¼ x 1¾ inches.

MODEL C1000 — Price $6.95

This is the ideal low-cost pocket meter. AC volts: 10, 50, 250, 1000 (1000 o.p.v.). DC volts: 10, 50, 250, 1000 (1000 o.p.v.). DC current: 1 mA., 100 mA. Resistance (ohms): 150K. dB. scale: minus 10 to plus 22 dB. Dimensions: 4¾ x 3¼ x 1¼ inches.

MODEL CT-500/P — Price $16.75

Popular, medium-size, mirror scale, over-loaded protected. AC volts: 10, 50, 250, 500, 1000 (10K o.p.v.). DC volts: 2.5, 10, 50, 250, 500, 5000. DC current: 50 uA., 5 mA., 50 mA., 500 mA. Resistance (ohms): 12K, 120K, 1.2M, 12M. dB. scale: minus 20 to plus 62 dB. Approx. size: 5½ x 3½ x 1¾ inches.

MODEL A-10/P — Price $55.00

Giant 6½ inch meter. In built signal injector, overload protected. AC volts: 2.5, 10, 50, 250, 500, 1000 (10K o.p.v.). DC volts: 0.5, 2.5, 10, 50, 250, 500, 1000 (30K o.p.v.), 5000 (10K o.p.v.). DC current: 50 uA., 1 mA., 50 mA., 250 mA., 1 amp., 10 amps. AC current: 1 amp., 10 amps. Resistance (ohms): 10K, 100K, 1M, 100M. dB. scale: minus 20 to plus 62 dB. Signal injector: Blocking oscillator circuit with a 2SA102 transistor. Approx. size: 6½ x 7¼ x 3¾ inches.

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amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA. FOUNDED 1910

APRIL, 1973
Vol. 41, No. 4

Published monthly, as the official journal, by the Wireless Institute of Australia. Reg. Office: Above 474 Toorak Rd., Toorak, Vic., 3142.

Enquiries and material to:
The Editor, Phone (03) 24-8652.
P.O. Box 150, Toorak, Vic., 3142.

Copy is required by the ***third of each month.*** Acknowledgement may not be made unless specially requested. All important items should be sent by certified mail.

The Editor reserves the right to edit all material, including Letters to the Editor and Hamads, and reserves the right to refuse acceptance of any material, without specifying any reason.

Advertising:
Advertisement material should be sent direct to the Editor by the ***25th of the month preceding the month prior to publication.***
Hamads should be addressed to the Editor by the ***third of each month.***

Printers:
Printed by Research Publications, 418 Canterbury Rd., Surrey Hills, Vic., 83-9140.

CONTENTS

COVER
This close-up photograph of the discone antenna built by Tom Moffat, VK3AQV, clearly shows the high standard of workmanship employed.
See article on page 3.

QSP

CHANGE

At the Federal Convention held at Easter 1969, I was asked to accept the position of Federal President. I did so with considerable trepidation, far more trepidation than I believe I have ever admitted in public. That was four years ago. In these last four years there has been far greater change in our Federal body than I for one anticipated.

This issue of Amateur Radio marks yet another stage in our development. For the first time since 1948 this issue is not being printed by the Richmond Chronicle. Because of indifferent health our great friend Ron Higginbotham, VK3RN will be unable to devote, in the future, the time he has devoted to the preparation of the magazine in the past. We leave the Richmond Chronicle on the best of possible terms. We leave them grateful for all they have done in the past and with an awareness of the great deal we owe, in particular, to Ron.

This issue is printed for the first time by Research Publications Pty. Ltd. We believe that the facilities of this printer will enable us to continue to improve the magazine. Over the months ahead the Publications Committee hopes to take advantage of these facilities, and I am sure, you will find improvements gradually introduced. The Executive is advised by the Publications Committee that this change is in the financial and long term interests of the Institute.

This then is the first QSP to be published with this magazine being printed by a new organisation. It is also the last QSP that I shall be writing as Federal President. I have advised the Federal Council of my decision that I will be unavailable for re-appointment to the Executive at this month's Easter Federal Convention. I have reached this decision with considerable regret, but I believe that my other commitments, particularly in relation to my work, have now made it impossible for me to devote the time that is necessary to perform the functions of President — at least to my own satisfaction.

I see the immediate future as a period of consolidating the various changes that we have adopted and also a period of some re-appraisal. I believe, however, that given good will, and an acceptance on the part of all of us of the responsibilities that must go with an expanding and influential organisation, the future is bright indeed.

Of all the things that I have attempted to do over the past four years I have regarded the most important as the task of bringing the Executive into contact with as many members in each Division as possible. To this end I have travelled widely and I imagine that I have met more amateurs in more places than most of my predecessors. I hope that I have succeeded in this task to some small extent. The interest and friendliness with which I have been met is something that I would wish to acknowledge.

I am tempted, in this my final QSP, to offer some comment which, one might hope, may contain some grain of wisdom or truth. Putting this temptation aside, all I wish to say is, thank you for the opportunity you have given me to take some part in the affairs of amateur radio in Australia. I have regarded this as a privilege.

Michael J. Owen, VK3KI.
Federal President.

CHANGE OF PRINTER

Have you noticed that A.R. is late this month? That the magazine looks somewhat different? Perhaps some of the print seems smaller than usual? Stay with us. Minor problems, due to the change of printers, will be overcome in future issues.

APOLOGIES

Apologies are due to Neil Town, VK3ANK for omitting to give him credit for his article and front cover photograph on "Emergency Operations" in the March issue.

W.I.A. LOG BOOKS.

These are available from your Division or from the W.I.A. Victorian Division, P.O. Box 36, East Melbourne, Vic 3002. They are not available from Magpubs or through the Executive Office. The price is 90 cents each, postage paid and they are available in vertical or horizontal ruling.

AN AUSTRALIAN REVIEW.

It can hardly be said that wireless telegraphy is either a new industry or a new commercial activity, yet in regarding its growth we cannot but note the fact that it is just at present becoming generally recognised not merely as an indispensable force, but as an industry of very great importance and unbounded potentialities. The Marconigraph, March 1912.

STOP PRESS

Easter Federal Convention Venue now changed to Melbourne.

SUBSCRIPTION RECEIPTS.

Some members have taken the Executive office to task for not issuing receipts for annual subscriptions. It is repeated for those who missed the message earlier last year — no receipts are issued unless specially requested. Imagine the staff required to write out 4000 to 5000 receipts, quite apart from banking and accounting for each subscription. It is also, of course, modern commercial practice, particularly with crossed cheques, that receipts are not issued unless demanded. Acknowledgements that subscriptions have been received are also not issued — 4000 x 7c = $280.00.

COLOUR TV. TIME-BASE INTERFERENCE.

If you are living urban the noise created by almost any colour TV receiver sets up a racket such as to make weak signal reception our Top Band (160 Mx) almost impossible. Snort Wave Mag Jan '73.

24GHZ OPERATIONS.

We have just been informed by the Ministry (P. & T.) that in view of the health hazard (due to UHF radiation) no amateur will be allowed to operate in the new 24,000-24,250 MHz band without first obtaining (their) permission. Short Wave Magazine Editorial Jan 1973.

OSCAR 6

The satellite continues to function admirably. On Orbit 1700 the telemetry channel 6B failed — this measures the 10 mx tx output power. The reason is unknown as yet, but no effect has been observed on the satellite's performance. By reason of approaching winter-time and the inherent lull in ionospheric activity the downlink signals are expected to improve greatly and scintillation is expected to be reduced. The Project Australia Group reminds readers that reports are most welcome. They use 145.760 MHz FM for their communications if anyone in Melbourne would like to drop in on them.

WHY NO A.R.?

"Dear Sir, Although the fees were paid last year not one copy of the magazine was received. Please rectify." Is it any wonder when the addresses of the letter and the mailing plate do not coincide? There must be a moral in this story, perhaps two morals. One — please write in if your A.R. fails to arrive within a reasonable delay period. Two — please advise address changes remembering that up to two more issues could be sent to your old address before the new mailing plate can enter the system.

MEMBERSHIP MATTERS.

Members are reminded that the Executive of the W.I.A. and the Executive Office are not empowered, and do not in any way, interfere with membership affairs. This continues to be solely a Divisional responsibility. The Executive Office merely acts as a central agency to prepare and process subscriptions from data supplied by Divisions and keeps track of address and other changes through the centralised EDP system. It is from the latter that A.R. mailing plates are kept up to date.

MEMBERSHIP CARDS.

Several members in VK3 have berated the Executive office for failure to send a membership card immediately on receipt of the members subscription. Members are reminded that membership cards are entirely a Division matter and any complaints on this subject should be directed to your Divisional office. Indeed all membership matters remain the responsibility of your Division except that address changes can be sent directly to the Executive Office for A.R. mailing purposes.

DX ON OSCAR 6.

ZL1WB reports that many ZL's have now worked KX6 and activity in ZL is increasing. He has been copying RTTY from VK2ZWL but to time of writing had not succeeded with a QSO. He's looking for VK6, 8 and 9 to complete worked all VK areas having already worked all ZL areas on phone and C.W. Colin, VK5ZHJ has now topped 200 contacts through the satellite.

(Continued on Page 20)

THE DISCONE
The do-almost-anything antenna

TOM MOFFATT VK3AQV

ALTHOUGH the discone has been around for a long time, it has not been much used in the amateur service. The discone was first seen during the Second World War, and thousands of them are in use around the world today mainly in aviation and military service. In this article VK3AQV describes an amateur version.

This rather strange looking antenna has the rare distinction of being able to operate efficiently over a ten-to-one frequency range, in all directions at once.

If one is made with a low frequency cut-off of 50 MHZ, it will be usable on 52 MHZ, 144 MHZ, 432 MHZ, and possibly on 1296 with some loss of efficiency (although 1296 hasn't yet been tried by the author). The discone has a flattened omni-directional radiation pattern, with vertical polarization. The flattening means it has a small amount of gain, which averages about 2dB over a ground plane cut for a particular band.

As well as the amateur bands, of course, the discone works well on everything in between.

So when you don't feel like hamming, you can hook the discone up to the appropriate converter and listen to aircraft flying over, or country TV stations, or anything else within its frequency range. And another thing ... with the discone you can spend all your hard earned money on one piece of extra-good, ultra-low-loss coax, instead of running cheaper feedlines to a collection of groundplanes, one for each band.

So much for the good points ... here are a few bad ones. Since the same antenna is used for all VHF bands, you can't listen on six while talking on two.

Another problem involves the rig itself: Its output has to be absolutely clean. Any harmonics, or "wonkies" of any kind will be radiated far and wide by the discone without discrimination. So every transmitter you connect to it should be equipped with a low pass or band pass filter, and be thoroughly checked to ensure its output is perfect. Having said all that we will now try to explain how the discone works.

As you can see from the illustrations, the discone in its basic form consists of a disc on top, with a cone-shaped affair directly beneath.

The centre of the coax connects to the disc, the braid goes to the cone.

The discone operates as a taper transformer to match the 50 ohm line impedence to 377 ohms, which is regarded as the nominal impedence of free space. Any dipole, groundplane, or beam does the same thing, but only over a narrow band of frequencies. If the frequency goes too high or too low, its terminal impedence changes wildly and it won't work. The discone attacks the problem in a different way. Its impedence varies from 50 ohms at the apex of the cone to a much higher figure at the bottom.

When a wave of a given frequency arrives at the apex via the coax, it travels out along the disc and cone until it reaches a point that represents 377 ohms.

Then it says goodbye to the antenna and heads off into space on its own!

Exactly where the 377 ohm point lies on the cone varies with frequency. High frequencies find it near the bottom.

So you can see that the physical size of the discone has a direct bearing on its lower cut-off frequency. As the frequency is adjusted downward the 377 ohm point eventually falls off the edge of the cone. This is where it stops working. The low frequency cut-off point occurs when the slant height of the cone, dimension B on the drawing, is ¼ wavelength.

The upper frequency limit isn't so well defined. If the cone could be made with a sharp point its theoretical high cut-off frequency would be infinity. But it can't be made with a sharp point because the coax connection to the disc has to fit through the top. The best you can do is make the top diameter of the cone equal to the diameter of the coax, about half an inch.

In practice, as the frequency is raised past about ten times the lower cut-off frequency, the radiation pattern begins displaying some minor lobes in the vertical plane, and the SWR gets worse and worse. But the antenna still works, after a fashion. As for the disc, its diameter isn't terribly critical. It simply provides a sort of 'inverted ground plane' for the cone to work against. The disc diameter is usually specified at 70 per cent of a quarter wavelength at the design lower cut-off frequency.

The angle the cone makes with the disc affects the input impedence of the discone. A 60 degree angle represents 50 ohms. The distance between the cone and the disc also affects the input impedence somewhat. For 50 ohms this distance should be 20 per cent of the top diameter of the cone. Now to summarize the design factors (see drawing). Dimension B, the cone slant height, is ¼ wavelength at the lowest desired operating frequency. Dimension A, the disc diameter, is 70 per cent of dimension B.

Dimension C, the cone's top diameter, is as small as you can get it, remembering the coax has to fit through dimension D, the disc to cone distance, is 20 per cent of dimension C.

Let's see how this works out in a practical design: The most useful discone for the VHF

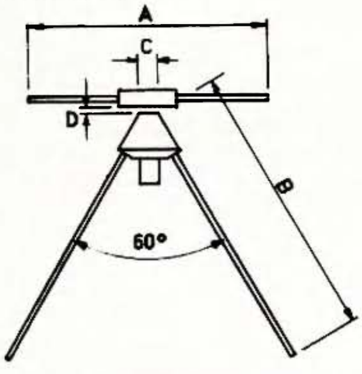
(Continued on Page 5)

amateur would be a 52-144-432 model. Just to be on the safe side we'll make the lower cut-off frequency 50 instead of 52 MHz.

The first thing to work out is dimension B, the cone slant height.

By formula an electrical ¼ wavelength is 2952/f(MHz) so 2952/50 equals 59 inches for dimension B. Dimension A, the disc diameter, is 70 per cent of dimension B, or 41.3 inches.

Dimension C, the top diameter of the cone, we will make ½ inch so ½ inch coax will match it. Dimension D, the disc to cone distance, is 20 per cent of C, or 1/10 inch.



ISOMETRIC & SPACE DIAGRAM

CONSTRUCTION TECHNIQUES: As you can see the 50 MHZ discone is a monster standing nearly five feet high! If it were made of solid metal sheet the first gust of wind would send it flying into the neighbor's yard!

But there's a solution to that problem. Build it of pieces of tubing arranged to approximate the disc and cone shapes. If at least sixteen tubes are used for each, spaced evenly all around, the loss of efficiency will be small. And the wind resistance will drop to almost nothing, and the discone will be lighter; the one at this shack weighs only 5½ pounds.

You now have to devise some way to hold all the pieces of tubing in their proper positions. The discone at this QTH uses a centre-piece machined out of a solid chunk of 3½ inch diameter aluminium bar. (See detail drawing.) Cut the cone section to a 60 degree cone shape, and drill sixteen holes all around the edge and plug in the tubing.

The dimensions given refer to the distance from the edge of the cone to the apex, and the dull diameter of the disc. Keep this in mind when calculating the length of the tubing pieces. The tubes must be slightly shorter to compensate for the part of the disc and cone represented by the centre-piece.

Once the disc and the cone are made up it's necessary to join them together with some kind of insulator.

A good insulator can be made from one of the various casting resins, remembering it should have good electrical characteristics at VHF and UHF. One that has been used successfully is the pink "goop" they sell in hardware stores to plug holes in mufflers.

Another choice is clear casting resin sold in hobby shops. Ask for the resin used to encapsulate rare coins or dead bugs.

Once the discone is together drill a ½ inch hole from the bottom of the centre-piece right up through its central axis until it reaches the disc on top. Use a 1/8 inch drill to go the rest of the way through the disc.

Now prepare a piece of 1/8 inch brass welding rod by cutting a 1/8 inch thread on one end. Solder the other end to a suitable coax connector.

The rod is now run up through the centre of the discone until the coax connector is flush with the bottom of the centre-piece. Drill and tap the holes and mount the connector, then run a nut on to the top of the brass rod until it is tight against the top of the cone. Be sure to waterproof the nut to prevent corrosion between the brass rod and the aluminium disc.

As you can see the 1/8 inch rod running through the half inch hole to the top approximates a piece of 50 ohm solid coax. Although it's a lot of trouble, doing it this way should help the discone's high frequency performance. All that's left to do now is find some way to mount the discone on the top of your tower.

At this QTH the centre-piece has a tail machined on the bottom. The tail plugs into a piece of aluminium pipe about 1¼ inches in diameter and eight feet long. The coax runs down the centre of the pipe. The pipe is then clamped to the top of the tower with a 'TV mast extension kit' available from TV mast suppliers.

PERFORMANCE OF THE 50 MHZ DISCONE.

First some SWR readings: On 6 metres, 2½ to 1. It sounds a bit high but forget it. It works very nicely.

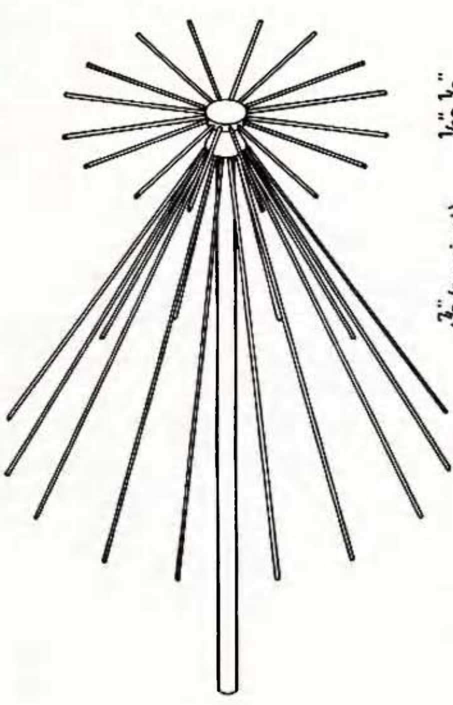
On 2 metres, 1.05 to 1. Obviously its best band. On 432, 2 to 1.

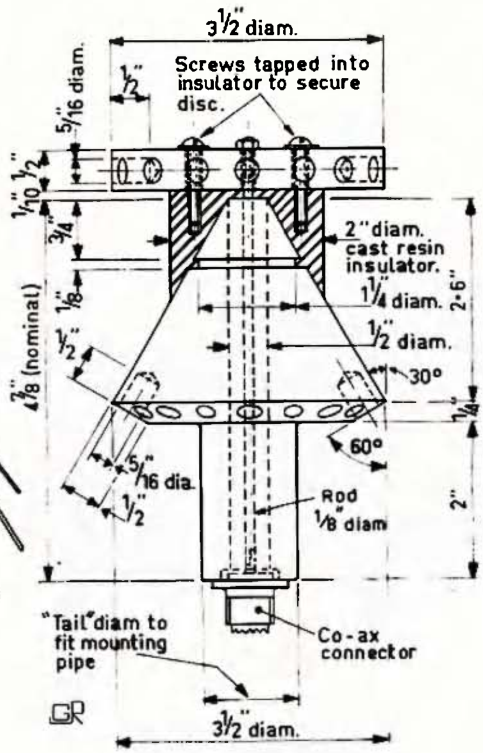
1296 ... not tried yet, as there's been no gear available to test it with.

On-air tests: On six, the discone transmits as well as a folded ground plane, with signals averaging 5 to 6 DB better. This is probably explained by the larger capture area.

On 432, the only test so far has been SWR with a borrowed transmitter. No two way contacts have been made due to a lack of 432 gear at this QTH. But now that the discone is up and operating, 432 operation is definitely on the cards, once some gear is built. At least the 432 antenna is finished!

AR





HUB DETAILS

A 30-40 MHz. FREQUENCY COUNTER

PART TWO

H. L. HEPBURN,* VK3AFQ

THE CONTROL UNIT

The function of the control circuits is, in sequence to open the signal gate for the selected time period, to close it at the end of this time period, to generate buffered strobing pulses for the indicator decades and, finally, to generate a re-set pulse so that the whole cycle can start again.

Fig. 7 gives the waveforms encountered in the control section and their time relationship.

Fig. 4 gives the circuitry of the control section while Fig. 11 gives component layout.

Two 7473 dual JK flip flops are used to generate the various control pulses while three 7400 gates are used as buffer/inverters for the strobe pulses. This latter addition was necessary

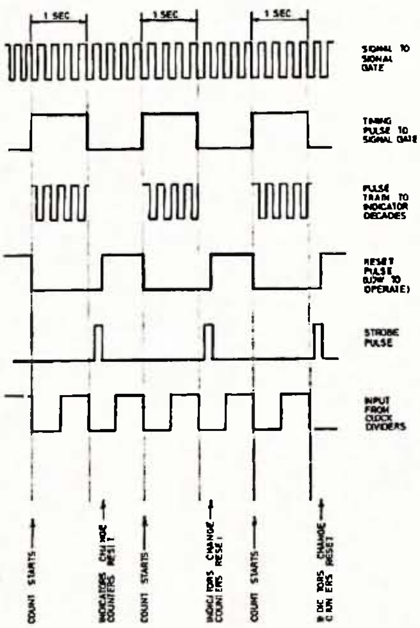


FIG. 7 WAVEFORMS

since the use of more than two indicator decades would overload the strobe output available from the 7473s.

THE COUNTER DECADES

The function of each indicator decade is—in correct time sequence:—

(a) To accept input pulses and count up to 9 of them.
(b) To pass on to the next indicator decade a single pulse for each 10th pulse received.
(c) To store its own "count" as at the end of the counting period.
(d) At the command of the strobe pulse (see Fig. 7) to pass on to the seven segment incandescent indicator the count stored.
(e) On receipt of a "**clear**" pulse from the control section (see Fig. 7) to re-set to zero and be ready for the next input pulse train.

Note that the indicators will continue to show the "count" set up as a result of step (d). This indicated count will remain on display until the next strobe pulse from the next count period causes the next "count" to be sent forward for display. This facility removes the "flickering" of the display which would result if the count was not stored, but passed straight through to the display.

Additional features of the decades described are provision for causing all indicator segments to be displayed on command to check for burnt out segments (lamp test) and provision for non significant zero suppression should this be required. There is also a decimal point display available.

Up to six indicator decades can be used in series to display up to six significant figures. It is recommended that six be used. However, if cost is a real consideration a minimum of three indicator decades can be used by selection of the appropriate timing pulse. An explanation may assist here.

For a Six Indicator Display

Assume an input frequency of 12.345678 MHz.

If a 1 millisecond (0.001 sec. or 1 k.p.p.s.) gating signal is used, then 12345 pulses will be counted in this period and the display will read 012345 (i.e. 012.345 MHz.).

If the gating period is increased to 1.0 second, then 12345678 pulses will be counted. Since there are only six indicator decades, the "12" part will "spill out" of the left hand side of the display which will thus show "345678" Hz.

For a six-digit display then, it is only necessary to use a 1 second or a 1 millisecond gating time to display the whole of a signal having up to nine significant figures.

For a Three Segment Display

Assume the same 12.345678 MHz. input signal.

A 1 second gate pulse will pass 12345678 pulses forward for display,

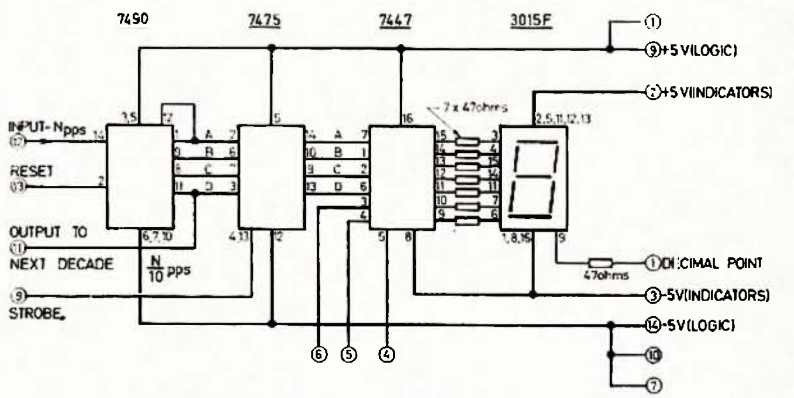
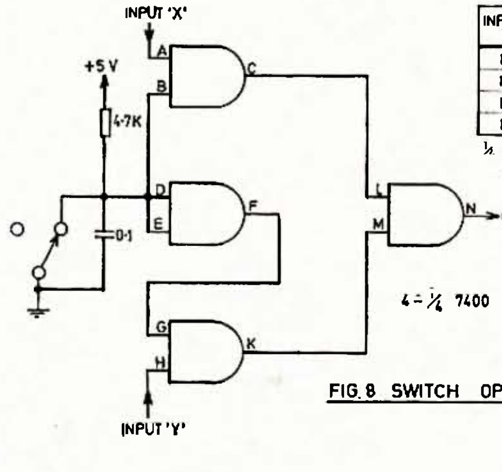


FIG. 6 DECADE COUNTING UNIT



INPUT 1	INPUT 2	OUTPUT
H	H	L
H	L	
L	H	
L	L	H

¼ 7400 (74H00 74S00) TWO INPUT NAND GATE TRUTH TABLE.

FIG. 8 SWITCH OPERATION

* 4 Elizabeth Street, East Brighton, Vic., 3187.

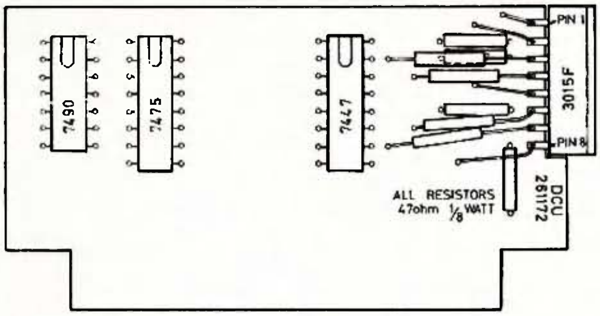
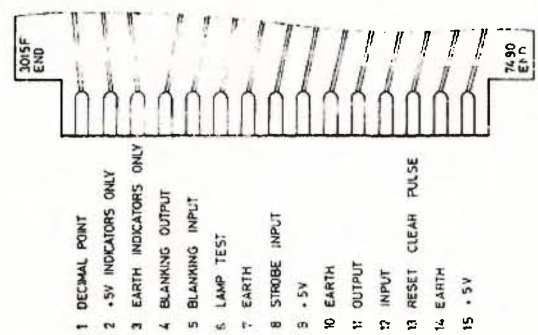


FIG. 9 DECADE LAYOUT

FIG. 10 DECADE PIN CONNECTIONS



but only "678" Hz. will be on display, the "12345" part "spilling out" the left hand side as before.

A 1 millisecond gate signal will allow 12345 pulses to be passed on for counting and the display will read "345" kHz., the "12" part again "spilling out" left hand end.

A 1 microsecond gate signal will allow 012 pulses to be passed on for counting and the display will read "012" Hz.

However, it must be noted that due to an inherent error of ±1 count in the right hand (or units) decade the readout may show 011, 012 or 013.

It is in this context that the provision of the previously mentioned option of a third timing pulse input to the control section can be appreciated. The actual circuitry cf each decade is given in Fig. 6, whilst Fig. 9 gives component layout.

A 7490 divider is used to count. It passes on a pulse to the next decade for each 10th pulse received. The BCD equivalent of the input pulses counted are passed on to a 7475 quad latch. It is this device which stores the count until commanded by the strobe pulse to pass the stored count on to the display. A 7447 is used to recode the BCD output from the 7475 to that required by the 3015F seven segment incandescent display.

These latter were chosen on the grounds of cost, the local price being of the order of $2.50 each—considerably lower than the current price of the LED or other more elegant displays available.

One problem associated with the use of incandescent displays is the surge current when any segment is switched on. There is a slight danger that this initial surge current may cause failure of the associated drive section of the 7447. To overcome this problem, 47 ohm resistors are used to each segment input. Provision of these resistors will also increase the life of each segment of the display.

Another point worthy of mention is the wiring to the display section of each board. Since each "switch on" or "switch off" of each indicator segment will cause a current pulse on its supply wiring, it is worth while to keep the indicator 5v. supply wiring independent of the logic 5v. supply right back to the power pack.

Provision has been made to do this (see both Figs. 6 and 10 where this separation of both positive and negative indicator supply rails is made clear).

POWER SUPPLY

Fig. 14 gives the schematic of the power supply. A 9v. 3 amp. transformer feeds a bridge consisting of four MR751 (Motorola) diodes. These diodes are rated at 6 amps. each and the over-design may be open to criticism. The more readily available one amp. diodes are, however, too marginal in their capability since the counter draws just on 2 amps. at 5 volts.

However, four 2 amp. diodes would be perfectly adequate if to hand.

Output from the bridge is smoothed by two 2,200 μF. 25 volt electrolytics. The smoothed d.c. is then applied to the paralleled inputs three LM309K (National) regulators. These regulators are rated at 1 amp. and are attached to the back of the instrument cabinet. Output of one LM309K is

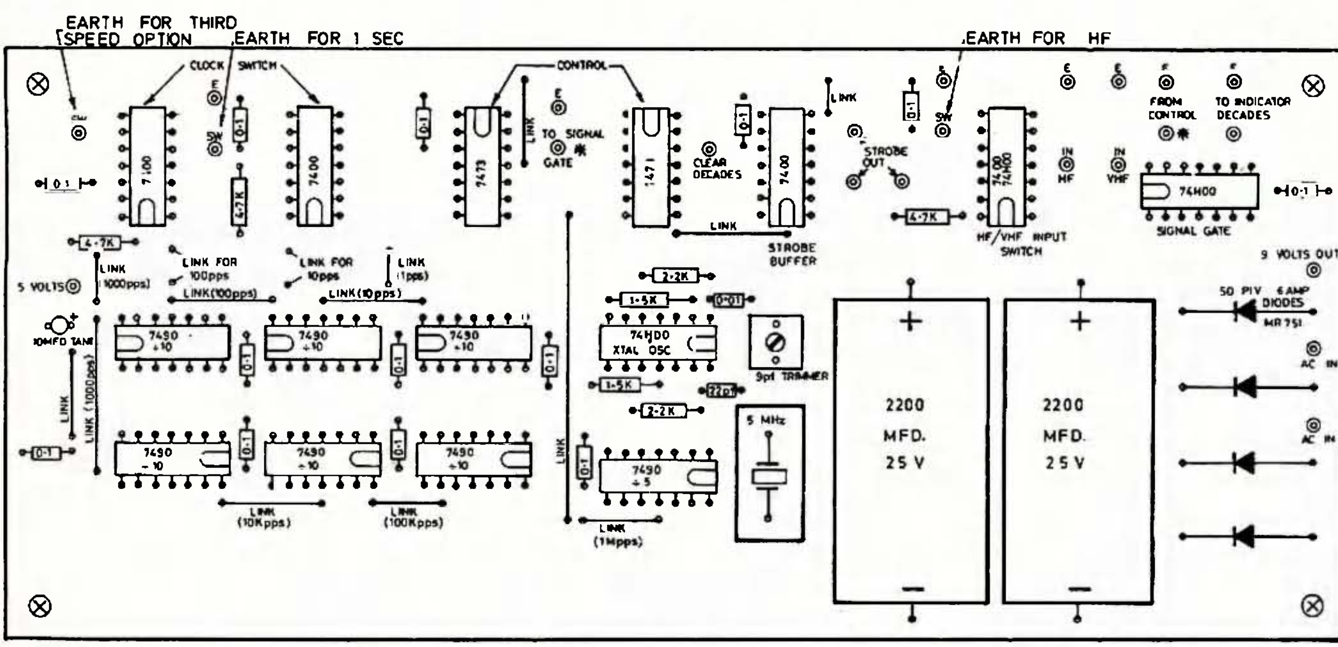
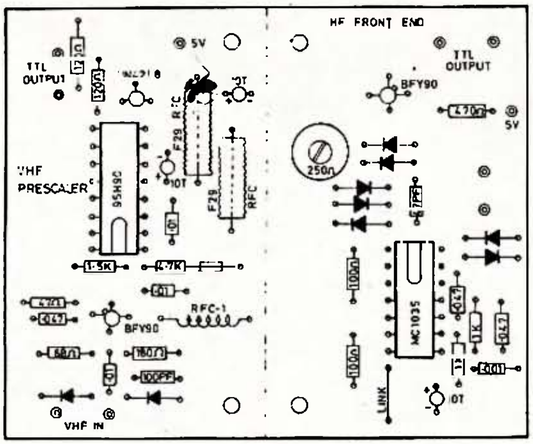


FIG. 11 CLOCK, CONTROL, POWER AND SWITCH LAYOUT



COMPONANT LAYOUT
VHF PRESCALER
AND HF. FRONT END
FIG. 12

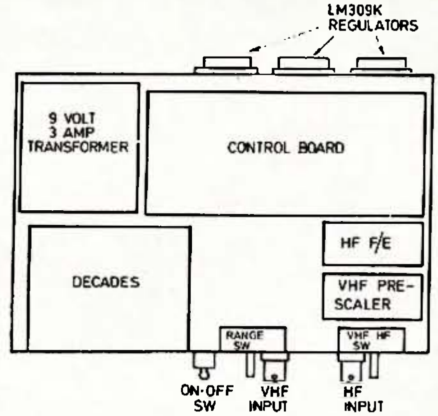


FIG. 13 GENERAL LAYOUT OF MODULES

used to power the control board, the h.f. pre-amplifier and the v.h.f. pre-scaler. Output of the second LM309K is used to supply the incandescent displays, while the third LM309K supplies 5 volts to the logic of the decade indicators.

The writer's initial attempt was to use a separate regulated 5 volt supply, but this approach turned out to be both more expensive and more space consuming than the method finally adopted.

CONSTRUCTION

Three basic printed circuit boards are used plus one for each indicator decade.

(i) V.h.f. pre-scaler, 2½" x 1½".
(ii) H.f. pre-amplifier, 2½" x 1½".
(iii) Control board, 8" x 3½". Contains crystal oscillators, clock dividers, signal gate, control circuitry, gate switches, rectifier bridge and smoothing capacitors. (See Fig. 11.)
(iv-ix) Decade divider boards, each 3¼" x 1¾", designed to plug into a Utilux 15-way socket (type H10075).

All parts are contained in a 12" x 4" x 8" deep cabinet. Layout of the parts within the cabinet is shown in Fig. 13. The sockets for the indicator decade boards are mounted on a small bracket which is attached to the front panel so that only the 3015F indicators show through the "window". This window may be covered with tinted perspex.

Interconnection has been kept to a minimum and construction is reduced to being able to put the "chips" into the board the right way round and being able to solder them in without accidental bridging. A fine soldering iron with a 1/8" or 3/16" bit is an essential tool.

CONSTRUCTIONAL SEQUENCE AND TESTING

It is recommended that the power supply and its associated LM309K regulators be first completed. This will provide a power source for subsequent testing.

The crystal oscillator and its divider chain should next be made. This will provide a signal source for testing the indicator decades and control functions. The fundamental or harmonics of the 5 MHz. oscillator can be picked up on any general purpose receiver at 5 MHz. intervals.

If the divider chain is working correctly, a 0-5 volt meter at the 1 p.p.s. output point will give clear indication of on and off or "high" and "low" at each transition.

The indicator decades should next be made. As each one is finished it can be powered with plus and minus 5 volts at the appropriate points (the indicator and logic 5v. supplies can be paralleled for this test).

Earthing the lamp test pin (pin 6, Fig. 10) should cause each segment to light and the indicator to display an "8".

Temporarily earth the re-set pin (pin 13, Fig. 10) and temporarily connect the strobe pin (pin 8, Fig. 10) to +5 volts.

Then apply the 1 p.p.s. second output from the crystal clock chain to the input pin (pin 12, Fig. 10). This should allow the indicator to count 0 through 9 and back to 0 again. A voltmeter between the output pin (pin 11, Fig. 10) and earth should give a pulse on each 10th input pulse.

Finally, complete the assembly and interconnect the various boards, but leaving out the v.h.f. pre-scaler at this stage.

With no signal input, the display should register all zeros.

Apply a signal of no more than 1 volt peak-to-peak at some mid frequency (say, from an audio oscillator set at 40 kHz.). Set the time period selector to give 1 p.p.s. to the control section (this can be checked by a voltmeter to pin 12 of the 7400 signal gate) and the input switch to select the h.f. pre-amplifier. Next adjust the 250 ohm pot. in the base circuit of the BFY90 on the h.f. pre-amplifier board until there is an indication on the display. Reduce the input from the signal source until the display keeps changing at random.

Re-adjust the 200 ohm pot. until the display is once again locked in. The correct position of the pot. is where it allows the input voltage to be reduced to a minimum and still retain a locked display.

FREQUENCY RESPONSE

Although the various makes of the TTL 74XX series of ICs are interchangeable and do the same things in any given circuit, there is a difference in the maker's rated maximum frequency response.

Fairchild, for their 74XX series only guarantee a 20 MHz. maximum operating frequency. For higher speeds their 74HXX devices are recommended.

National Semiconductor, on the other hand, quote 30 MHz. as the maximum operating frequency of their 74XX series.

In order to extend the frequency range of this counter beyond the nominal 30 MHz. limit, it is necessary to be specific about only three of the devices in the counter. Apart from these three the operating speeds do not exceed 3-5 MHz. and thus any maker's chips can be used.

(Continued on Page 19)

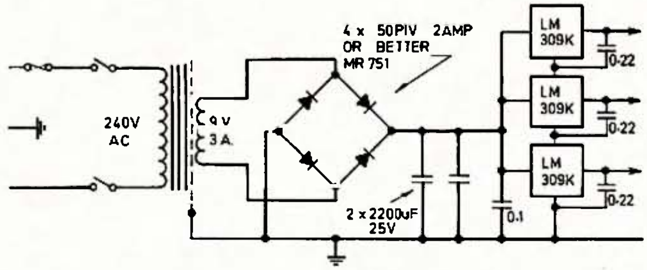


FIG. 14 POWER SUPPLY

Tasmania celebrates its

GOLDEN JUBILEE

By the late Lon Jensen, B.Sc., Dip. Ed., M.I.R.E.E. VK7LJ.

Mr. A. Harold Masters, Architect, Electrician and Lecturer in Electrical Engineering at the Launceston Technical College is credited with being the first in Tasmania to demonstrate communication by means of Wireless Telegraphy. These experiments took place prior to 1900, probably in late 1898 or 1899. Later, in 1906 he carried out two way experiments with H.M.S. Pioneer both in the Tamar River and along the northwest coast of Tasmania using Telefunken equipment obtained from Melbourne. There are few details available but apparently there was no two way contact along the coast. Mr. Master's signals were, however, heard when the ship was near Devonport. Some of the frame aerials belonging to this equipment are being held for the Institute's Museum. They consist of copper birdcage wire netting attached to a metal cross about 3 feet across and were apparently mounted horizontally one above the other.

L. J. CROOKS, VK7BQ
Patron of the Tasmanian Division
First licensed in 1925.

Mr. F. W. Medhurst ("Pop"), who was later VK7AH was also experimenting with 12" and 14" spark coils in Hobart. On July 2nd 1901, Mr. Medhurst and Mr. Hallam, who were both members of the P.M.G's Department in Hobart were successful in communicating with H.M.S. St. George which was one of the ships accompanying the Duke of York on his visit to Australia to open the first Federal Parliament. A number of successful contacts were carried out with the ship both in the Derwent estuary and on the east coast of Tasmania. The greatest distance over which communication was carried out was about 60 miles. This vessel had previously been contacted by Mr. H. W. Jenvey, (father of Bill, VK2ZO) at the entrance to Port Philip heads on May 6th 1901. These achievements are all the more noteworthy when it is remembered that they took place some six months before Marconi successfully spanned the Atlantic.

The Marconi Company erected stations at East Devonport, Tasmania, and Queenscliff, Victoria, in 1905-6. The stations were opened for traffic on July 12th 1906 with the exchange of messages between the Prime Minister, Governors of the States and other dignitaries. It is probable, however, that the first contact across Bass Strait took place during experiments conducted by the engineers late in 1905.

By 1913 there were about a dozen experimenters in Launceston and Hobart who were conducting experiments with spark equipment. The outbreak of war in 1914 put an end to the experiments until about 1920. "Pop" Medhurst was still active and was assisted by Mr. W. T. Watkins ("Watty") who was given the call sign 7AA, and later still VK7DX. He was one of Tasmania's most successful experimenters in the early twenties and was the first to demonstrate telephony in Tasmania, in association with Mr. H. G. Lewis in 1923. It was about this time that groups of enthusiasts began gathering together to discuss their experiments and equipment. These gatherings led to the formation of clubs in both Hobart and Launceston.

The Tasmanian Division of the Wireless Institute of Australia was first established in Hobart slightly before June 1923 and a branch was formed in Launceston two months later in August. There is little documented evidence of the early years of the Division, but a receipt dated 19th June 1923, has been preserved and indicates that Mr. J. C. Milne of Gretna, VK7AG, was a member at that time and that Mr. W. L. Scanlon was secretary. Probably Mr. F. W. Medhurst, VK7AH, was President and Mr. W. T. Watkins, VK7AA, the leading experimenter. In those days the Institute was regarded as being more of a nationwide association rather than a local one. Some strong dissension arose amongst some of the members and the Institute fell into disrepute. Local clubs then sprang up in the two centres - the Hobart Radio Experimenters' Club (later the Hobart Radio Research Club) in Hobart, and the Launceston Radio Experimenters' Club in Launceston.

In Hobart other active members of the H.R.R.C. were Messrs. G. W. Larsson, T. Green, W. O. Duffy, H. Lovett 7HL, C. Oldham 7XA, L. R. Jensen 7LJ, K. Lester, F. Dodderidge, C. Johnson 7ARE, Kirby, R. D. O'May 7OM, G. Fraser, C. A. Walch 7CW, R. Buring 7RB, J. Heine 7JK, W. E. Masters 7MM, W. Bousfield, C. Harrisson 7CH and many others whose names are not available.

In Launceston Mr. W. B. McCabe 7AQ was Patron of L. R. E. C., Mr. P. O. Fysh 7PF was President and Chairman, Mr. C. Scott 7CS was Secretary, and Mr. L. J. Crooks 7BQ was Treasurer. Other members were Messrs. W. Turner, R. Reynolds, E. Ferral, R. Ferral, N. Cave 7BC, H. Graham, E. Scheldrick 7BT, N. Symmons, A. Smith 7AB, W. Scanlon 7AL, G. King, A. Flounders, L. A. Hope 7LA, R. S. Hope 7RS, A. S. Gill 7AS, - Thompson, M. Graver, - Newton, - Wolfe, E. E. Cooper 7MK, - Phillips, and others.

A convention of the Wireless Institute of Australia was held in Perth in August 1925 at which all States were represented. The Tasmanian delegate was Mr. P. O. Fysh 7PF who stressed on his return the need for greater participation in the Institute's affairs by Tasmania. Accordingly a meeting was held in Launceston on the 3rd of September 1925 to discuss the re-organisation of the Tasmanian Division along the lines suggested at the Convention. As a result the Tasmanian Division was re-constituted with headquarters in Launceston. The Launceston Radio Experimenter's Club continued to function for another year but it gradually faded out in favour of the Institute which was incorporated in 1925 as a company under The Companies Act 1920. The Hobart Radio Research Club continued to flourish in Hobart although most of the transmitting members were also members of the Institute. For some reason (possibly lack of willing workers) the Headquarters were transferred suddenly to Hobart in June or July 1929. Pop Medhurst VK7AH became President, and Lon Jensen VK7LJ Secretary/Treasurer. The Headquarters of the Division has remained in Hobart ever since.

The officers of the Division have changed over the years but many of the early members are still active. Presidents of the Division have been Messrs. A. H. Masters (1925), W. Judd (1926), T K. Jebb (1927), P. O. Fysh 7PF, (1928), F. W. Medhurst VK7AH (1929-30-34-37-38), W. E. Masters VK7MM (1931-3), W. T. Hooker VK7JH (1935-6), A. E. Allen VK7PA (1939 - end of war), L. R. Jensen VK7LJ (1945-49 and 1959), J. Brown VK7BJ (1950), R. D. O'May VK7OM (1951-2), L. W. Edwards VK7LE (1953-4), F. J. Evans VK7FJ (1955-6), G. Aschman VK7GA (1957), P. E. L. Dunne VK7PD (1958), T. A. Allen VK7AL (1960-67), T. Connor VK7CT (1968-9), G. D'Emden VK7ZAS (1970-1), E. J. Cruise VK7EJ (1972).

Secretaries were Messrs. P. O. Fysh 7PF (1925-7), C. Scott 7CS (1928), L. R Jensen VK7LJ (1929), C. Harrisson VK7CH (1929 - 1932), B. Buring VK7RB (1933), H. M. Moorhouse (1933 until the end of the war), J. Brown VK7BJ (1945-8), R. D. O'May VK7OM (1949-50), L. W Edwards VK7LE (1951), F. J. Evans VK7FJ (1952-3), W. G. Tait (1954-5), M. Hurburgh VK7HM (1956), K. E. Millin VK7KA (1957-62), K. Spiegel VK7KS (1963-5), C. Russel-Green VK7CR (1966), E. Beard VK7EB (1967-8), I. Eadie VK7ZIE (1969-70), M. L. Conway VK7CL (1971-2).

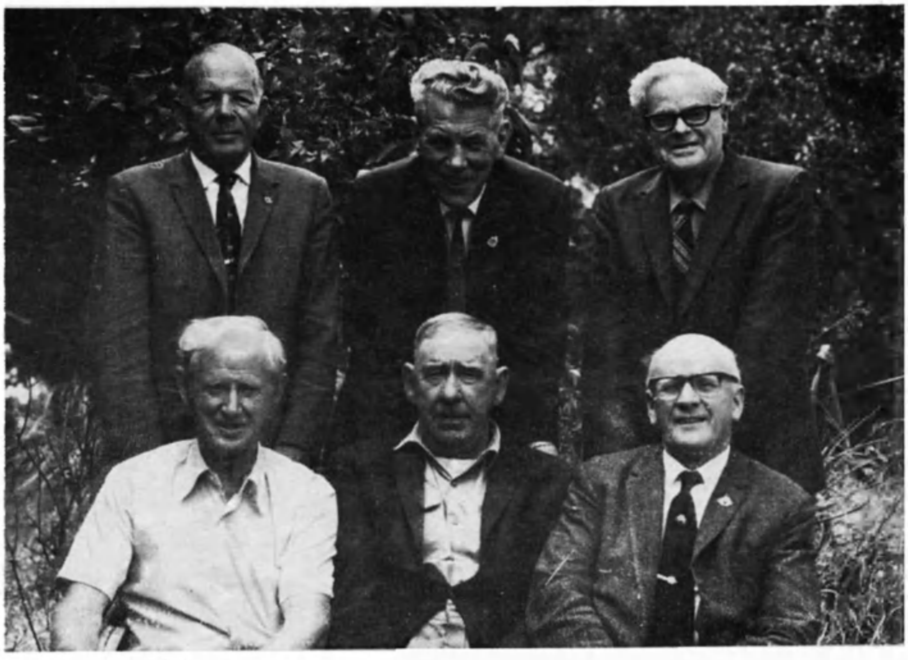
Patrons of the Division have been Messrs. F. W. Medhurst VK7AH and L. J. Crooks, VK7BQ, who is still patron. The accompanying photo shows this 'grand old man' of radio in Launceston.

The group photograph (taken in Dec 1972) shows six old timers all of whom are active on the air - many of them on CW. The dates show the date when first licensed.

Other old timers who are still active include R. M. Barker VK7RM (ex VK5RM 1927), R. Conrad VK7TR (1930), F. E. Nicholls VK7RY (1932), L. F. Clark VK7CK (1932), N. Campbell VK7NC (1932), C. P. Wright VK7LZ (1933), D. H. Fisher VK7AB (1934), T. Connor VK7CT (19??), M. L. D. Conway VK7CL (19??), etc.

(Continued on Page 20)

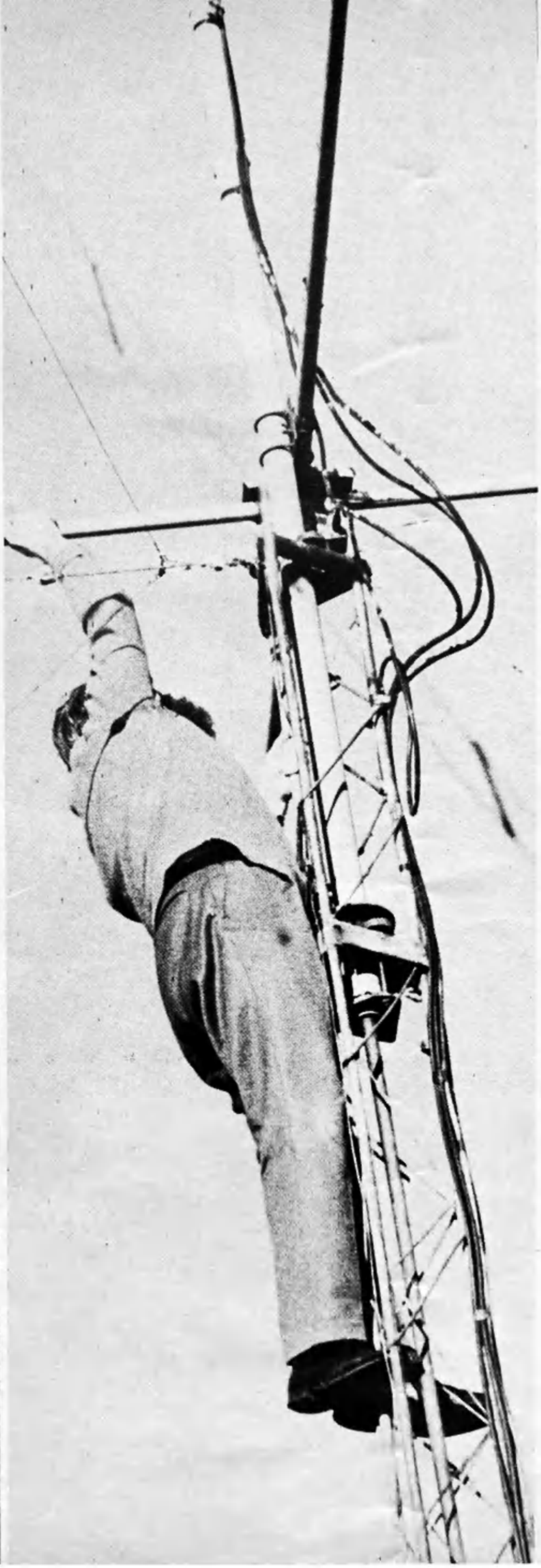
A group of VK7 Old Timers (with dates originally licensed) — left to right — back row, C. Harrisson VK7CH (1927), J. Batchler VK7JB (1932), R. D. O'May VK7OM (1923); front row, C. A. Walch VK7CW (1926), J. C. Milne VK7AG (1921), the late L. R. Jensen VK7LJ (1925).

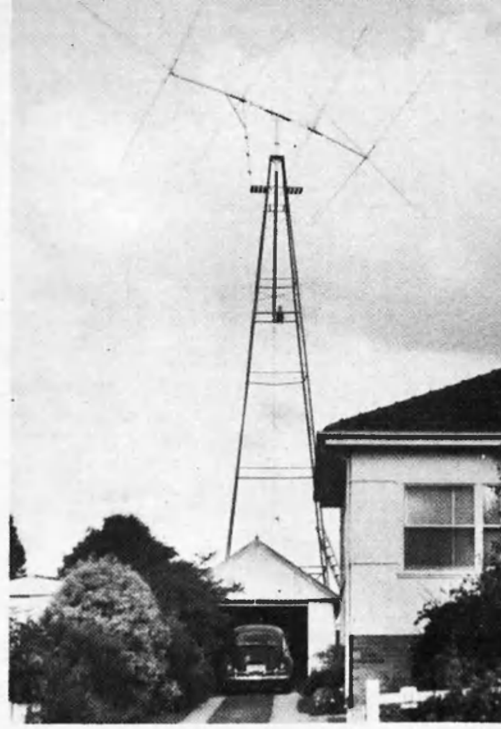


ABOVE: A working committee at the 1972 Federal Convention held in Melbourne, seriously ponders over matters concerning A.R. magazine.
From the left, Peter Dodd VK3CIF, Neil Penfold VK6NE, John Battrick VK3OR, Don Miller VK2GN, Keith Roget VK3YQ, and the Editor, Bill Roper VK3ARZ.
The 37th Annual Federal Convention will be held in Launceston later this month.

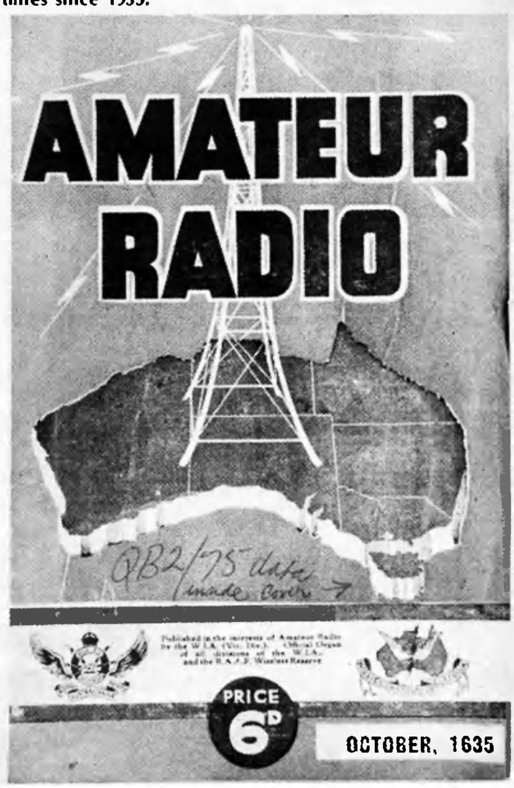
RIGHT: Just on 50 years ago the first two way contact was made across the Pacific using a wavelength of 250 metres.
This photograph by Norman Lusty, shows Max Howden, VK3BQ, sitting at the equipment he used in that historic contact.

OOPS! We nearly lost a Technical Editor.
Neither staff photographer Bob Dorin, who caught Bill in this precarious position, nor VK3ABP himself, will reveal how rescue was eventually effected.





ABOVE: Have you "built a monster?"
Does it look like the monster belonging to Syd Molen, author of the award winning article "I've Built A Monster"?
BELOW: Despite apparent photographic evidence to the contrary, Amateur Radio was not being published 338 years ago.
Interesting to note that the price, size and front cover make-up have changed many times since 1935.



A Special A.R. Report

THE CUSTOMS SCENE

THE QUESTION OF BY-LAW IMPORTS

Over a period of time many articles, studies and arguments, are produced in relation to By-Law importation; this applies to many industries as well as the efforts of Amateur Radio. The subject has not been forgotten by any means, and is still very much alive in Executive circles. Much of what is going on is known but as this By-Law Concession is not always fully understood an outline of its practical meaning and what is required to obtain it is thought might be useful.

Firstly the Import Duty as specified in the Customs Tariff is the Rate of Duty applied by Act of Parliament. Import Duties are often used to protect an Australian Industry and the employment of people in and servicing that industry. Usually a very thorough investigation is made before applying a duty but once it is imposed it is most likely to stay as a protection for the industry involved. That is the pattern of the past, - right now an investigation on Electrical Equipment is being carried out.

Obviously the Tariff in the Guide is a large volume. It is Indexed and Numerated under what is termed "Brussels Nomenclature", a standardised form of presentation understandable here and overseas.

Obviously the index could not list every detail on Australian Imports so often a general heading covers many similar items and care has been exercised over the years to make it as concise, effective, and as accurate as possible, leaving little scope for doubt on the correct Duty to be paid. Some items are listed that are free of Duty — The Tariff Guide tells you this if so applicable.

Like Radio operators the Customs Agent you may engage to help you or attend to paying Duty on your imports holds a Customs Agents Licence for that work, he guards his reputation by avoiding errors. A double check occurs here as the Agent's Customs Entry Sheet is checked by the Customs Tariff Office when paving the Duty.

Now let us consider a hypothetically case of importing an article believing it is not of a type made in Australia but nevertheless a duty is applicable under an "all covering" item. Suppose the item is a Grand Piano - upright pianos are made in Australia and therefore a duty is applicable and the Tariff Guide makes no consideration for a different Rate of Duty on Grand Pianos which are NOT made in Australia. Here is where you think of By-Law Concession for a Duty Fee import. If the Grand is for a concert pianist of recognised fame one would believe an upright piano would scarcely be a "suitable substitute"—so this is the type of situation where the Customs Department has officers who make decisions on such an application. These decisions are listed and available for public perusal. Decisions are not made without considerable thought. If an industry is affected by these decisions difficulty is encountered because the established industry is entitled to othe protection granted it by Parliament. Now do not think it is only the decision of the By-Law Office that counts in obtaining a favourable decision - the importing applicant for By-Law is required to produce documentary evidence that the equal or suitable equivalents are not available from Australian sources. (This has not always been the case).

Having read this far you will realise it is not an easy procedure to obtain a By-Law Concession unless it is done in detail and with much knowledge of what is involved. If you have a genuine case you would expect it to be granted. Hansard quotes in 1 year 21817 applications for By-Law were received of which only 4445 were rejected or refused; these figures reveal the applications granted are far in excess of those refused.

Much detail has to accompany an application on the prescribed froms and these details are treated confidentially. No application is accepted if the Duty saving is less than $100 per application.

Simplified, if by documents and correspondence you prove to the Department that there is no local manufacturer of an equivalent or suitable substitute you have every chance of favourable consideration. The evidence you submit which must be authentic to the best of your ability is the information needed. If there is anyone who can supply, and within reasonable time, that person has the right of protection which has been established by Act of Parliament.

The Institute as a corporate body expresses opinions on behalf of its members and does not engage in commerce. To those merchants or individual applicants it can lend its support and assist in requests — in fact it has done so and it still is negotiating to this end.

Advice has been received by the Institute that By-Law concessions are being granted. The details are on the lists published by the Customs and Excise Department.

If any favourable benefit from the work now being done by the Executive is made to Amateur Radio operators, you can be assured we will notify all members by the medium of A.R

NEWCOMER'S NOTEBOOK

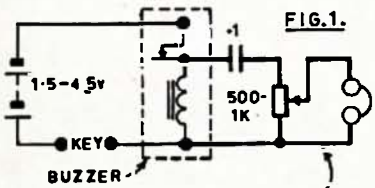
With Rodney Champness,* VK3UG

LEARNING MORSE CODE, Part 2b.

Audio Monitor Circuits.

To complete your sending equipment you will need a buzzer and battery, or preferably an audio oscillator. The buzzer/battery combination connected as shown on the left side of figure 1. is a reasonable sending arrangement. It cannot be considered the ultimate as the buzzer takes a reasonable time to start up and stop after application and removal of voltage to it.

The buzzer system can be improved by connecting the components on the right of figure 1.



SECTION TO BE ADDED IF REMOTE RECEPTION OR HEADPHONES REQUIRED

The buzzer should then be placed in a cotton wool filled box to dampen the acoustic sound of the buzzer. High impedance headphones will be the best in this circuit but low impedance ones should also be satisfactory.

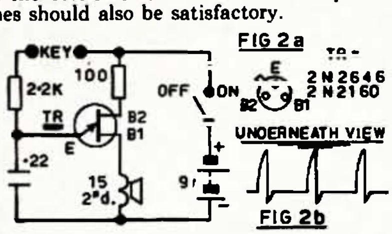
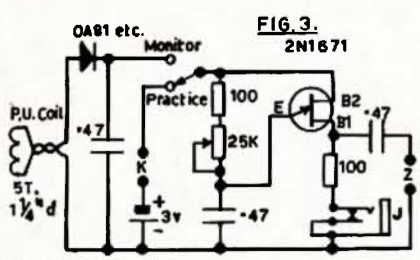
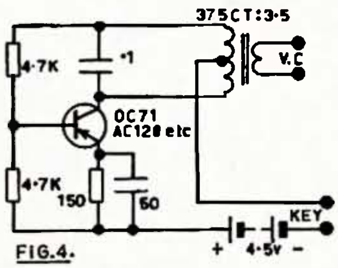


Figure 2a. shows a very simple oscillator using a unijunction transistor. If headphone reception is preferred a resistor of 15 to 22 ohms can be wired in place of the speaker and headphones can be connected across this resistor. If the level is too high a resistor in series with the phones will reduce the audio level. The value will be subject to experimentation and the impedance of the headphones used will have a large bearing on the value of this resistor. The value of the capacitor in the circuit can be altered to give the tone that suits best. This should be in the range 500 to 1500 Hz. Most CW operators use 800 to 1000 Hz. This circuit is not recommended if you want to tape record your sending. The waveform is similar to that in figure 2b. and some recorders have trouble reproducing this tone without audible unpleasant distortion.

Fig 3. shows a similar circuit which will record better and can also be used as an on-air CW monitor. In this mode, a little RF is coupled via the pick-up coil by proximity to the transmitter tank coil and rectified. This DC is used to operate the oscillator whenever the transmitter is keyed. For phone operation simply switch to the practice oscillator position. Tone is governed by the 25K pot.



K = PRACTICE KEY
J = SHORT CIRCUITING JACK FOR LO. Z PHONES OR LOUDSPEAKER.
Z = HI. Z OUTPUT FOR PHONES OR RECORDING



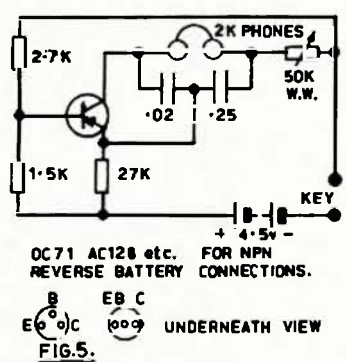
A slightly more complicated and expensive audio oscillator is shown in figure 4. This is a Hartley oscillator and its output more nearly resembles a sine wave than previous tone oscillators. The tone of this oscillator records quite well with no audible distortion. It will run quite well on voltages from 3 to 6 volts. NPN transistors can be used as long as the applied voltage and the electrolytic are reversed.

It was found that a 3.5 ohm speaker could not be placed across the 3.5 ohm winding of T1 as it loaded the oscillatory circuit too much. Speakers from about 8 ohms upwards should be satisfactory. It may depend on the particular transistor in use too. The value of R1 and R3 should be multiplied by up to 5 times in value if higher voltages than those specified are likely to be used, i.e. 12 volts. C1 and C2 can be varied to get a suitable quality sound output.

Finally in figure 5. is seen quite a novel tone oscillator. The headphones act as the inductance in this Colpitts circuit. This oscillator's waveform should also approximate that of a sine wave.

When sending or more particularly when receiving, headphones should be used to alleviate the distracting effect of room echos.

Next Month: Learning Morse Code. Part 2c. "Brass Pounding".



*44 Rathmullen Rd., Boronia, Vic. 3155.

Commercial Kinks

With Ron Fisher,* VK3OM

Modifications, good and bad.

After looking at numerous modifications on as many different types of equipment, I often wonder just what people have in mind when they start out. I guess that many actually start out to repair an actual fault, perhaps not even recognising that a fault exists at all. So our friend sets out to improve the sensitivity, stability or what have you when in actual fact a simple repair would have done the trick. I am often amazed at the time and effort put into improving old receivers when in many cases the owner has no appreciation of how the set should work in any case.

The number one requirement therefore is to make sure that everything is reasonably up to the manufacturer's original specifications. You might be quite surprised just how well the old set works with a few new capacitors and a general line up. If you have purchased a receiver or transceiver second-hand, try to locate someone in your area who has one of the same type and arrange to try them out side by side. Both of you might learn quite a bit.

With all this in mind, and if you are still determined to go ahead and modify old faithful then watch out on a few points.

You have of course made up your mind just what is needed, but let's say it's a better RF stage. It always seems that receiver front ends are not sensitive enough. Perhaps the other fellows have better antennas, but let's not discourage our hero so soon.

Firstly, make a close study of the original layout and wiring. The manufacturer of your set has spent a lot of time and effort to make the stage stable and effective. When you start changing components, make sure that your new wiring looks just like the original. In fact I always believe that this is the one sign of a good modification. It should be well nigh impossible to differentiate. Next thing is to write down everything you have done, including of course, the new circuit. This serves several useful purposes. One, if you are successful, make a second copy and send it off to "Commercial Kinks". Two, it will remind you just what you have done in a few years time when a better circuit comes up. And three, last but by no means least, if you sell the set, the new owner will know just what you have done. After all he might have different ideas to you. Don't forget that a well done modification with all the information included in the instruction book will definitely not reduce the resale price, but if done in a sloppy fashion with no information, then you cannot blame a prospective buyer from being a bit cautious.

If your modifications involve the use of additional controls, try to preserve the original panel lay-out as much as possible. One way to do this is to use existing control positions. For instance, the headphone socket on the Trio 9R59 receiver could be used as a mounting position for an IF gain control. The headphone socket can then easily be moved to the rear of the chassis. In the case of the original FT200 the dummy channel selector position is the ideal spot. Don't overlook the use of dual potentiometers in place of a single unit. It might be possible to combine the audio and RF controls. If it's good enough for Collins and Swan, it should be good enough for you.

The Eddystone '888a'. A couple of months ago, I had a few things to say about the product detector on this receiver. Since then, I have had time to take a further look into the SSB capabilities of this receiver. After using it for a few weeks it became obvious that the AGC was not up to standard for sideband. The time constants were designed with AM reception in mind. An easy modification is to increase the value of R39 .47 megohm up to 2 megohms. This will increase the decay time of the AGC to about two seconds which enables you to use a much higher setting on the RF and if gain controls with strong signals.

I also came across an odd fault in another 888a. The BFO could not be set on frequency. Even with the slug of the BFO coil right out, the frequency was too low. It was necessary to reduce the size of the BFO fixed padder C93 from its normal 200 pf to 150 pf. I can offer no explanation for this, as all components checked out OK and the IK was spot on frequency.

That's all this month. Next time, some hints on repairing communication receivers. [AR]

*3 Fairview Ave., Glen Waverley, Vic. 3150

NEW CALL SIGNS

OCT./NOV., 1972

A.C.T.
VK1CS—S. J. Strickler, 62 Carroll Street, Hughes, 2605.
VK1PM—R. E. W. May, 23 Parkhill Street, Pearce, 2607.
VK1ZGC—G. A. Cohen, 72 Spofforth Street, Holt, 2615.

NEW SOUTH WALES
VK2JJ—W. M. Gelvin, 17 Maher Street, Hurstville, 2220.
VK2SX—M. Barry-Cotter, 35 Beazley Street, Ryde, 2112.
VK2AAS—R. F. Woolley, Kings Road, Federal, 2480.
VK2BBN—G. N. Brown, 141 Rae Crescent, Kotara, 2288.
VK2BGE—G. W. Etheridge, 1/11 East Crescent, McMahons Pt., 2060.
VK2BPH—P. V. Halpin, 19 Morton Street, Wollstonecraft, 2065.
VK2BRW—R. W. Brown, 314 West Street, Crows Nest, 2065.
VK2BVA—K. J. Allcott, 1 Martin Street, Ryde, 2112.
VK2ZYT—A. D. Tilley, 6 Belmore Street, Villawood, 2163.
VK2BDC—E. J. McIntosh, Coraki Road, Gundarimba, 2480.
VK2BKD—K. J. Davies, 15 Russell Avenue, Winston Hills, 2153.
VK2BPD—J. C. Shackleton, 8 Avalon Crescent, Birrong, 2143.
VK2BPO—B. Popoli, 4/123 Lilyfield Road, Leichhardt, 2040.
VK2BPR—H. Pearson, 6 Whitehead Street, Khancoban, 2642.
VK2BPS—P. C. B. Bradley, 6 Dangar Street, Lindfield, 2070.
VK2BTH—T. S. R. House, 4/11 Milner Crescent, Wollstonecraft, 2065.
VK2ZIW—A. F. Beard, 106B Sydney Street, Willoughby, 2068.
VK2ZNY/T—G. F. Hughes, 61 Hancott Street, Ryde, 2112.
VK2ZVZ—C. Zvirblis, 133 The Boulevarde, Fairfield West 2165.
VK2ZWT—N. L. Thyrd, 41 Rickard Road, Warrimoo, 2775.

VICTORIA
VK3AW—L. J. Middleton, 3/6 Blamey Street, Ascot Vale, 3032.
VK3AIQ—J. Glenn, 1 Plunkett Avenue, Ormond, 3204.
VK3APL—J. T. Cunningham, 11 Catherine Parade, Frankston, 3199.
VK3AUN—A. E. Carlyle, 22 Owens Street, Doncaster, 3108.
VK3BHL—R. C. J. Fowler, 2 Field Street, McKinnon, 3204.
VK3BHM—M. M. Deladette, 7 Cottswold Place, Wantirna South, 3152.
VK3CCC—J. W. McCulloch, 19 Gap Road, Riddell's Creek, 3431.
VK3YHG—G. R. Hedley, 15 Strasbourg Road, Rosanna, 3084.
VK3YHM—M. A. Hedley, 17 Douglas Street, Rosanna, 3084.
VK3YJE—G. S. Eley, 11 York Street, Glen Waverley, 3150.
VK3YJM—J. M. Hodge, 372 Glenhuntly Road, Elsternwick, 3185.
VK3ZAA—P. J. Pendlebury, 13 Agnus Street, Mont Albert, 3127.
VK3ZCU—R. Muir, 27 McKehery Street, Coleraine, 3315.
VK3ZMN—D. J. Manley, 22 Douglas Avenue, Swan Hill, 3585.
VK3ZMT—M. M. Bennett, 34 Aroona Road, Caulfield, 3161.
VK3YJB—J. G. Buxton, 26 Toolernvale Road, Diggers Rest, 3427.
VK3ZTQ—G. P. Chenco, 21 Prospect Street, Rosanna, 3084.
VK3ZUD—A. M. Wehberley, 1 Lockerbie Court, East St. Kilda, 3183.

QUEENSLAND
VK4YO—T. W. Petersen, 77 Esplanade, Moreton Island.
VK4ID—J. M. Wright, Ocean View Flats, Eagle Heights, Tamborine, 4270.
VK4XD—R. J. Ford, 133 Riaweena Street, The Gap, 4061.
VK4ZHM—H. T. Moores, 6 Thomas Street, Wilston, 4051.

SOUTH AUSTRALIA
VK5AG/T—R. H. Delon, 15 Packard Street, North Plympton, 5037.
VK5CU—J. Wall, 44 Barmera Avenue, Hope Valley, 5090.
VK5TB—N. H. E. Weste, 20 Farmer Street, Barmera, 5345.
VK5VN—L. Muller, 52 Mitchell Street, Crystal Brook, 5523.
VK5ZAB—A. R. Eatts, Bletchley, Via Strathalbyn, 5255.
VK5ZAK—K. J. Gramp, 2 Elizabeth Street, Tanunda, 5352.
VK5ZAW—C. W. Maitland, 10 St. Albyns Street, Toorak Gardens, 5065.
VK5ZDL—K. P. Thompson, 68 Saints Road, Salisbury Park, 5109.
VK5ZEG—M. D. Clegg, 6 Reynell Street, West Croydon, 5008.
VK5ZML—M. W. Lee, 24 Berry Street, Whyalla Stuart, 5608.
VK5ZUR—M. J. Stacey, 5 Black Top Road, Hillbank, 5112.

WESTERN AUSTRALIA
VK6GT—G. B. Widnall, 120 Herbert Street, Doubleview, 6018.
VK6ZAZ—W. A. Rhodes, 13 Turnbull Way, Triggs, 6020.
VK6ZBV—J. E. McKenna, Flat 17, 56 Cape Street, Osborne Park, 6017.
VK6ZKB—B. Kelly, Flat 265, 26 Battle Street, Mosman Park, 6012.
VK6RTT—Carnarvon Amateur Radio Club, Postal: C/- A.W.A. P.O. Box 348, Carnarvon, 6701; Station: Tracking Station, Browns Range, Carnarvon.
VK6RTV—WA VHF Group, Postal: 10 Hickey Street, Applecross, 6153; Station: Channel 7 Transmitter, Bickley.
VK6RTW—Southern Electronics Group, Postal: Blue Waters, Little Grove, Albany, 6330; Station: Reidy Drive, Albany.

TASMANIA
VK7ZJM—D. J. Malone, 30 Erina Street, Launceston, 7250.
VK7ZJS—R. J. Simpson, 14 Malakoff Street, Somerset, 7322.

VHF UHF

an expanding world

With Eric Jamieson.* VK5LP

Closing date for copy: 30th of month.
Times: E.A.S.T.

AMATEUR BAND BEACONS

VK0	52.160	VK0WI, Macquarie Island.
	53.100	VK0MA, Mawson.
VK2	52.450	VK2WI, Dural.
VK3	144.700	VK3RTG, Vermont.
	144.925	VK3QZ, Traralgon.
VK4	52.600	VK4WI/2, Townsville.
	144.400	VK4WI/1, Mt. Mowbullan.
VK5	53.000	VK5VF, Mt. Lofty.
	144.800	VK5VF, Mt. Lofty.
VK6	52.006	VK6VF (VK6RTV), Bickley.
	52.900	VK6TS (VK6RTT), Carnarvon.
	144.500	VK6RTW, Albany.
	145.000	VK6VF (VK6RTV), Bickley.
VK7	144.900	VK7VF (VK7RTX), Devonport.
VK8	52.200	VK8VF, Darwin.
ZL1	145.100	ZL1VHF, Auckland.
ZL2	145.200	ZL2VHF, Wellington.
	145.250	ZL2VHP, Palmerston North.
	431.850	ZL2VHP, Palmerston North.
ZL3	145.300	ZL3VHF, Christchurch.
ZL4	145.400	ZL4VHF, Dunedin.
JA	52.500	JA1IGY, Japan.
HL	50.100) 52.010)	HL9WI, South Korea.
KX6	50.110	KX6HK, Marshall Islands.
	50.100	On this frequency will be found ZK1AA, Cook Is., 3D3AA Fiji; 5W1AR West Samoa; CE0TS Easter Is.

The beacon list this month carries a number of alterations, ad ditions and modifications, which results from information received from various sources following my request for details for inclusion of accurate beacon information in the new Call Book. I wish to thank all those who co-operated by sending information, one State only not answering, even a telegram brought no results!

The various beacons are in the course of call sign changes and where the new call sign is known this has been included alongside the existing call sign. All call signs will eventually be of the three letter series commencing with R. I hope the new Call Book will include the additional information I have supplied for each beacon which outlines its operating schedule, date, power, antenna, location, etc. with the name of the custodian, should you wish to send a report of reception.

VK0 ACTIVITY

An interesting letter is to hand from Phil, VK3FF, ex VK0PF of Casey, 1971/72, in which he outlines information re beacon operation in the VK0 region. Phil is QSL manager for Ron VK0WW, and was co-ordinator of the group that built the beacon for use on Macquarie Island. I can do no better therefore, than quote the relevant parts of Phil's letter:

"The VK0ZVS beacon has not operated since mid 1972, in fact was not on the air very much since March 1972. Tony le Grip, the holder of the call, is now back in VK3.

The beacon at Macquarie Is. is VK0WI on 52.160 MHz. This beacon was supplied and built by the VK3 Division of the W.I.A., in record time, less than 4 weeks from go to whoa, and got on the ship with 13 minutes to spare. It was swamped coming ashore and only inspired improvisation by Ron VK0WW, made it serviceable.

The first reported reception of the beacon was on the first day it was serviceable, the night of Saturday, 9th Dec. 1972, by VK3ANP and the first ever two-way VK to VK0 contact was on Sunday 10th December at 1735 with VK0WW working VK2NN, 5 x 9 both ways on SSB. The opening lasted to 1835 and 28 stations in VK worked Ron, including VK2, 3, 4 and 7. VK5 was worked next day at 1725 to VK5ZWW. At the time of writing VK6 had been heard but not worked.

Ron has facilities to work transceive SSB and CW or 52.525 FM. Macquarie Is. is situated at 54°½ south, 159° east and about 900 miles, south east of Hobart.

By the way, according to the Ionospheric Prediction Service, whose beacon it is, VK0GR, Casey, has not been on the air at all, and will not be until further notice."

Many thanks for the interesting information Phil, and will be pleased to hear further from you at any time. Maybe Ron VK0WW would like to fill me in with VK0 information so far in 1973?

Ron VK4ZLC writes from Townsville with quite a lot of local news, and also mentions that at the time of writing in late February nothing of consequence had appeared in the way of signals from the north on 6 metres. Many of the Townsville VHF boys are taking part in WICEN activities which are held on the 1st Sunday and 3rd Thursday of each month on 6 metres. On Sunday skeds start at 0830 on 40 metres and 6 metres, and on Thursdays at 1930 on 80 metres and 6 metres. Interested stations are welcome to call in. Suggest if anyone has a few spare minutes around those times they keep an ear to the ground, northern VK4 signals may well be available at times other than normal DX periods. Ron also advises that during the John Moyle NFD several VK5 stations were heard on 6 metres but not worked.

*Forreston, S.A. 5233

1296 MHZ. MOONBOUNCE

On 19th February, 1973, at 2228 E.S.T. Ron VK3AKC was successful in contacting WA2NFA, on 1296 MHz E.M.E. circuit, probably representing the first such QSO on this band from the Southern Hemisphere. WA2NFA gave VK3AKC a report of 339, and in the reverse direction WA2NFA was 559. As the contacts were separate 2 way contacts no record can be claimed for this particular effort. Skeds were arranged for 24/2 and 25/2.

Equipment at VK3AKC consisted of a horn-fed 20 foot parabolic reflector fed from a pair of 3CX100A in parallel, receiver home brew with 2 stages of RF amplification, one at the mast head, one at base. WA2NFA used a horn fed 60 foot parabolic reflector and two lots of two 3CX100A in parallel, giving approx. 500 watts of 1296 MHz. 3dB cable loss reduced this to about 250 watts at the dish.

Congratulations to these two gentlemen for their efforts and we are glad to see an Australian at one end of the contact.

It's rather unfortunate, but the notes are going to be short this month. Little information has arrived from other places and I have been burdened down with a seriously ill father-in-law, necessitating a 56 mile round trip to the Adelaide Hospital three times a week, hence very little opportunity of being around to gather information. Hope things will improve for next issue, in the meantime the Editor can make use of the space saved!

When Phil VK3FF wrote to me re the VK0 beacons he passed on word that he liked the thought for each month at the end of this column, and it seems quite a lot of others do too. Phil submits the following as a thought for this month: "Blessed are they who go round and round in little circles — For they shall be called 'Big Wheels'."

The Voice in the Hills.

A.R

VHF BAND USAGE

QUESTIONAIRE

Your answers and views are required.

If you have not received a copy of the questionaire please contact your local VHF Group or Radio Club.

Bulk supplies of questionaires have been forwarded to each Division.

Y.R.S.

With Bob Guthberlet*

A few weeks ago I listened to a conversation between two old timers" who swapped experiences in past days of amateur radio. They referred to UX210's for transmitting, tank coils three inches in diameter, lead and aluminium strips in saline solution for rectification. How things have changed! Now we have integrated circuits, solid state this and that, semiconductors, sophisticated transceivers, etc. etc.

However exciting and enlightening this may be, the fact is that the needs of youth haven't changed very much unless it be that today young people have more time on their hands than ever before.

In January of this year I received a letter from K.J. Watson, VK2BLW, Founder of the Maitland Radio Club, a portion of which I quote, "the people who give the time to keep clubs going do so because it is helping youth" and he closes with this sentence, "In my opinion the Y.R.C.S. is the greatest scheme ever to be organised."

Thanks O.M. for your letter. Communication is our business, and I would appreciate hearing from other club leaders, and especially from those amateurs who will offer a little time and know-how in the interests of those who will regard us (I hope) with affection as the "old timers" of yesterday; for ... it's later than you think!

Thank you to the State Supervisors who have extended to me the courtesy of answering my request for statistics, although my list is incomplete, and without it I may be dubbed a "schizophrenic!"

*Fed. Y.R.C.S. Co-ordinator, Methodist Manse, Kadina, S.A. 5554.

"20 YEARS AGO"

With Ron Fisher, VK3OM

The thoughts expressed by Geoff Taylor in QSP of February last were not new. Back in April 1953, Federal Executive told the story of the Federal Councillor in the Editorial for that month. Perhaps the concluding paragraph is worth repeating. "Get to know your Federal Councillor better — give him work to do — request information at every opportunity — in other words, let him enjoy the status his position merits — let him earn his spurs." Perhaps things haven't changed over the years at all.

Back in 1953 the component manufacturers were in the process of changing over to the preferred value system of labelling resistors, capacitors and the like. It was a bit hard to remember to ask the dealer for a 470 ohm resistor after 20 years of asking for 500 ohm resistors, however we got used to it in the end with very little trouble. An article reprinted from Wireless World told the whole story of the change over in the April 1953 issue of Amateur Radio. Other technical articles included "Carrier control with Self-biased Clamp Tube Modulator." This reprint from QST was followed by a practical example of such a modulator described by Gordon Bowen VK5XU. Gordon used his type 3 mark II as the transmitter along with a 6M5 modulator driven with a carbon mike.

A B.C. Converter for the S.W. receiver. Les Duncan VK5AX showed how you could tune into Blue Hills on your ham band receiver. Perhaps a good idea when your favourite band - (amateur type) is flat.

Chris Cullinam VK7XW was at it again with his version of a Crystal Controlled Service Oscillator. This employed several crystals to give typical spots for the alignment of Broadcast receivers.

2 metres opens for VK3/VK7 contacts. VK3CR's column, Fifty Megacycles and Above, reports this as the top news for VHF operators during the preceding month. VK3ABA was worked by VK7PF after a phone call got things under way. After this, contacts were made by VK's, 3RD, 7LZ and 7GM. About this time there was quite a bit of activity on 576 MHz around the Sydney and Newcastle areas according to a report from VK2HO.

We all complain about rising prices, but this does not always apply. William Willis & Co. made a big feature of 300 ohm ribbon at 1/3d. per yard. Present day price, about 8 cents per yard. Perhaps things are not as bad as we think!

A.R

It is with very great pleasure that we reproduce here a photo of Air Chief Vice-Marshall Suwondo, YB0AT, Chairman of O.R.A.R.I. the Radio Amateurs' Society in Indonesia. YB0AT, is a keen amateur and is often heard on 20mx SSB. (Photo courtesy Howard Rider, VK3ZJY.)

CONTESTS

With Peter Brown,* VK4PJ

Available space limits printing comments on our contests and information on a lot of other contests so don't think that your letters go unheeded. Just keep sending them along.

At this time February, the National Field Day returns are coming in at a greater rate than the Ross Hull so I am hopeful that we have gained substantially this year in the N F D.

Three of us had an excellent few hours down by the water, under the gum trees, away from the city heat. Most VK4s seemed to go for the high spots. We seemed to hear more mobile/portable stations than for some years but the returns will tell the story. Although we heard other VK4's and VK8's stacking up the JA's we were not very successful DXwise, nor did we hear many ZLs. A pleasing feature was the number of club stations.

May I suggest December 2nd for a V H F National Field Day when conditions will be so much better for V H F. There is no reason why Divisional Field Days should not coincide.

CONTEST CALENDAR

April 1 W. A. B. LF. 'phone
7—8 SP. DX. CW.
8 W. A. B. LF. CW.
21—22 Bermuda 'phone.
28—29 P. A. C. C. DX.
28—29 WAEDC. RTTY.
May 5—6 Bermuda CW.
5—6 Helvetia 22.
12—13 USSR. CW. DX.

Federal Contests Manager, G.P.O. Box 638, Brisbane, Queensland. 4001.

NOTES ON THE ROSS HULL VHF CONTEST 1972-3

Congratulations Kerry, VK5SU on another fine win and to Mike, VK3ASQ for his excellent 48 hour score.

Bob, VK3AOT as usual put up a sterling performance and if the VK4's keep up their efforts, first Ross Hull in some cases, I can see some winners among them in the near future.

Congratulations to two entrants who obtained new call signs during the contest.

I was disappointed thaat we have scarcely advanced since last year, 36 logs, but better representations in the open and CW sections. **ARE YOU AWARE THAT OVER 200 OPERATORS PARTICIPATED THIS YEAR?**

Some operators with over 40 contacts did not return logs. What do I, or you, have to do to get logs returned?

Thanks for all the comments and suggestions which are appreciated and to which I will reply later. I am off on long service. The main thing is that so many enjoyed the contest. AR

*Federal Contest Manager, Box 638, G.P.O., Brisbane, Qld. 4001.

The Area Five Contest, 1973. 1st Feb. to 9th Sept. 1973.

Frequency. 40 and 80 metre bands only.

Operators. Must be in Area Five, fixed, portable or mobile. Numbers must be exchanged, being RS or RST plus three figures starting anywhere between 000 and 500 and increasing in sequence by one per contact. On reaching 999 revert to 000. Score one point for each phone contact per day for each band, and two points when both stations are on C.W.

Listeners. Any listener may enter. Must log date-time and call sign of both stations. Score as for operators.

Logs must be in the hands of the Area Officer, P.O. Box 10, Long Grong, 2593 by the 24th Sept. 1973.

Prizes. Operators, $15 and Certificate. Listeners, $10 and Certificate.

Courtesy: Harry Cuthbert, VK2AEC

VK5SU DOES IT AGAIN!

ROSS HULL VHF CONTEST 1972-73 RESULTS

TROPHY WINNER
VK5SU—J. W. K. Adams
48-HOUR CERTIFICATE
VK3ASQ—M. R. Trickett

Section (a)—Transmitting Open

	7 Day	24 Hour	Contacts
VK1ZAD/JB	1032		95
2BHO	1256	356	127
3AOT	2428	1041	313
5SU	4225	1170	344
9BP	815	510	41

Section (b)—Transmitting, Phone

	7 Day	24 Hour	Contacts
VK2ZKK	1360	357	139
BMX	535	196	66
ZCT	330	114	107
HZ	—	161	17
ZZX	291	241	58
ZWP	Check	—	52
VK3ASQ	2385	1291	240
ZAZ	1150	465	78
ANP	960	275	126
AMK	880	347	130
BDL	716	265	123
ZYP/AUQ	712	228	170
ZYO	689	296	73
KK	556	238	66
YER	196	98	50
ZIM	8	4	8
VK4ZIS	2475	740	339
ZJH	2428	755	186
ZIM	2196	—	152
ZAI	1210	—	84
ZLC	556	—	113
ZTL	112	81	26
VK5ZWW	—	675	—
VK6PD	922	—	53
ZDY	457	262	45
ZFF	336	—	24
VK7KJ	1506	555	133
AX	—	201	188
VK8ZGF	1130	465	882

Section (c)—Transmitting, CW

	7 Day	24 Hour	Contacts
VK3KX	3	2	3
VK5MY	110	50	11

Section (d)—Receiving, Open

VK3/13062—M. Batt .... 824 pts.
L20074—J. M. Hilliard .... 1105 pts.

OBITUARY

Lon Jensen, VK7LJ

It is my sad duty to inform you of the passing of my very dear friend, Lon Jensen, VK7LJ while holidaying at Bicheno on the East Coast with his wife on Saturday last, 24th March.

Lon was one of the oldest VK7 Amateurs on the air, having obtained his licence in 1925, and very active almost continuously since that time. He was a very proficient CW operator and will be remembered for his very fine fist. He was an untiring worker for the W. I. A. and will be greatly missed by his associates in Hobart, who found him always willing to help others with their problems. He was a Past President and Past Secretary of the Tasmanian Division.

Lon is survived by his wife Huldah, daughter Florence (Mrs. P. Day) and son Robert to whom condolences are extended in their bereavement.

VK7OM

you and DX

With Don Grantley*

Times: GMT

At last I have settled down here in VK4 and have returned to work. More important to me however, is the fact that I have got the Trio functioning once more, and am more than pleased with the conditions up here. All bands seem to be performing fairly well, but what a wealth of DX there is on 40 metres. Unfortunately everybody and his dog seem to have occupied the band, and I have never heard the commercials and QRM as bad, nevertheless I have had a great old time amongst the DX on CW and I am sure that the keen DX man will be well rewarded if he hunts around there.

One short note in passing, would you send all items of interest to me at Box 26, Imbil, 4570, Qld., and for anybody in this area, I can be contacted from 8.45am to 12 noon, and 1pm to 5pm in the telegraph room at the Gympie Post Office.

My thanks to Hank VK2BHL for consistently providing me with the bulletin of the Illawarra branch. This progressive club as you know is occupied with their moonbounce project, reports of which have been made elsewhere. Hank spends a lot of time on the air as is evidenced by the log which he regularly submits, and if the signal he has been putting into VK4 is any criterion, then he will continue to do a really fine job in keeping the VK signals coming out. As a matter of interest, here are some of the stations which he has either heard or contacted. QSL manager or address is shown in brackets.

A2CCY (K4CDZ) A4FA (K3LQP) A4FD (G3XEC) A4FB (G3LQP) A4FE (Box 248) CR8AG (JA2KLT) CT3AR (Box 601 Funchal) FM7WN (K2KGB) F08DT (Box 374 Papete) FL8DS (Box 1279 Djibouti) VR3AC (K3RLY) VRIAA (K3RLY) YKIAA (Box 35 Damascus).

DX NETS. Here is a summary of the current crop of DX nets, I guess we don't all agree with this method of scoring new countries, but it's with us and we have to accept it as part of the scene.

South-East Asia Net Daily on 14320.No time given.

Carribean Net 14170/14195 Sunday, 1130z.

Pandoras Box Net, daily 0400z 14277.

African Net 0700z Sundays on 14195 with TU2DO as control.

Micronesia Net, Monday to Saturday 0800z 14305, Sundays and Tuesdays on 14105 at 0145z.

Saturday DX Net, 14280 at 1100z.

Commonwealth Net Monday to Friday 21300 at 1430z, also 14170 at 1500z.

Arabian Knights Net, Thursday 21270 at 1400z, Friday 14290 at 0400z, Mondays 14290 at 1700z.

VP Net, Tuesday, Thursday and Saturday 14127 at 2020z.

OD5 Net, Sunday 1300z on 14290, Hank says the QRM is bad.

Midnight DX Net, Sundays 1300z on 14280.

VHF Net, Wednesdays 14300 at 1300z.

JAMBOREE ON THE AIR. I have often voiced my opinion that the scout movement is a first class medium for the youth of the world. I have repeatedly expressed my opinion also that Amateur Radio properly controlled is one of the finest hobbies a young person could become involved with. Therefore, a combination of the two must produce something special, and I would ask you all on behalf of Noel Lynch, VK4ZNI the National Organiser to seriously consider joining in with the next jamboree. For those interested a Scout Net is in operation on the fourth Sunday of the month on 7070 mhz between 9am and 11am East, and on 14190 between 11am and 1pm. VK4QH operates the calling station, and several scout clubs are already taking part. How about you???

160 METRE NEWS The following is taken from WIBB's bulletin, dated Feb 5th. I will make this section a summary of the main points of interest, rather than string it out over a number of short paragraphs. Phenomenal, Super, Fabulous, Best ever on 160, are some reports of the band during January. WA8LJI made a first ever to JA7 in Dec 23rd, the furthest East JA ever heard. Another first when K6UA had a two way with G3ZEW. WIBB from Sept to January 31 with a two week break worked 120 stations in 37 countries. WA8IJI has 3 "Beverage" antennas each 1000ft. long, 30ft. high near end, 5ft. high far end on JA, VK/ZL and Europe.

Finally there is almost a half page of VK doings on this band with VK's 3CZ 6HD 5KO 3ABR and George Allen. Stew suggests a good season for the VK gang around the equinox period of Mar 17th, 3 weeks either side of that date should be worth watching.

DUTCH NATIONAL AMATEUR STATION. PAOAA using AM every Friday, broadcasts in English 14100 and 3600 at 1915z with CW for beginners in both Dutch and English at 19.30z, 2000z Advanced CW, 2030z RTTY broadcast followed by amateur news again.

There are occasional broadcasts on Mondays at 1900 for 12wpm code practice.

QTH'S

A35LT now returned home as VK6LT.
A51PN Pradhan, C/- P.O. Thimphu, Bhutan via India. FL8DJ
FL8DJBP 157 Djibouti, Territorie Francaise des Afars & Issas, Africa.
HCIJB N.A.S.A. Box 15, US Embassy Quito, Ecuador.
JY8DX Box 1065 Amman, Jordan.
KC6HC Box 514 Palau Is, West Caroline Is. 96940 USA.
KC6SK Box 55 Yap. West Caroline Is. 96940
KC0KCI Bob Dyson 5142 Nall, Shawnee Mission, Kansas 66202 USA.
KX6MD 30412 Sans Trap Dve, Agoura, Cal 91301 USA.
TR8VE BP 13112 Libreville Gabon Rep. Africa.
VP2DAI Box 141 Dominica, BWI.
ZD3M Box 463, Bathurst, Gambia Africa.
ZD2AK Radio Station Niue Is, via NZ.
ZB2BD as above.
3D2AN Box 184 Suva, Fiji
9M2BA A Avery Box 1197 Kota Kinabalu, Sabah, East Malaysia.

These QTH's are by courtesy of Monitor, the official magazine of the ISWL London, who, together with DX NEWS sheet and editor Geoff Watts, Stew Perry, Hank VK2BHL go my thanks for the information contained herein. My regular mailing of the DX news sheet from Geoff Watts will resume now that I have a permanent address, and upon receipt of this we should again have some more up to the minute information.

A.R.

*P.O. Box 26, Imbil, Qld. 4570.

INTRUDER WATCH

With Alf Chandler,* VK3LC

As exemplified in the following two extracts from letters received here from overseas recently we seem to be getting somewhere with the Intruder Watch.

From the International Amateur Radio Union Monitoring System (IARUMS) Region One —

"Language from KJG (read-out of which received from you) is Serbo-Croatian (Yugoslav) and not Russian. I shall send copy to YU1SJ at SRJ and try and get more information about the net. The sooner we get rid of this one the better. We now have same day translation facilities available for German, Polish, Russian, Czech and Serbo-Croatian so you can let me have any queries you may have. The page print-out of the RTTY incidentally was a political commentary."

From IARU Monitoring System, German Centralizing Office — "In 'Amateur Radio' of December 1972 I read about the Australian Intruder Watch and the intruder TCX on 20 meters. We have heard this intruder on 14100, 14150 and 14155 KHZ working CWY and BWH. QTF Turkey. We have sent our monitoring reports to the Fernmeldetechnische Zentralamt with a request to ask the competent administration (Turkey) to remove this station from the Amateur bands. Further requests have been sent to our MPT concerning an Arabian network working on several frequencies in the 20 meter band using no call-signs and making Commercial, Political, and Paramilitary traffic (SSB). You can see from this that you don't fight alone against intruders."

This is very encouraging to us and shows that we are getting somewhere. By the way, the Arabs are using trumped up call-signs such as KWM2, MP2, etc., and identification and reports would be appreciated. We are now organised for Arabic translations.

A.R.

*Federal Intruder Watch Co-ordinator, 1536 High St., Glen Iris, Vic. 3146.

Ionospheric Predictions

With Bruce Bathols, VK3ASE **APR. '73**

IONOSPHERIC PREDICTIONS FOR APRIL 1973

Predicted Band openings for April 1973 from information supplied by the Ionospheric Prediction Service Division are detailed below. Times are GMT. The times are approximate only, but should provide communicataion between the places listed for at least 50 per cent. of the month.

28 MHZ

VK3	to	ZL		0200
"	"	SU		0700—0800
"	"	KH6		2200—0600
"	"	ZS		0600
"	"	VK9		2200—0700
"	"	W6		2200—0300
"	"	JA		0100—0700
VK6	"	ZL		0300
"	"	SU		0700—1000
"	"	KH6		2400—0700
"	"	ZS		0600—0900
"	"	W6		2400—0100
"	"	JA		2300—1100
"	"	5Z	S.P.	0700—0900

21MHZ

VK3	"	ZL		2100—0700
"	"	SU		0400—1000
"	"	KH6		2100—0800
"	"	ZS		0500—0900
"	"	G	S.P.	0800—0900
"	"	"	L.P.	2100
"	"	VK0		0100—0700
"	"	VE3	S.P.	2100—2400
"	"	"	L.P.	2300
"	"	UA		0400—0900
"	"	WI		2100—0100
"	"	VK9		2100—0900
"	"	PY		2300
"	"	W6		2100—0500
"	"	JA		2200—0900
"	"	5Z	S.P.	2400—0100, 0700—0900
"	"	"	L P.	0800, 2100—2400
VK6	"	SU		0400—1100
"	"	ZS		0500—1100
"	"	G	S.P.	0700—1100
"	"	UA		0400—1100
"	"	PY		1000
"	"	W6		2300—0500

14 MHZ

VK2	"	SU		1200—0200
"	"	ZS		0400—1300
"	"	G	S.P.	0800—1800, 2100
"	"	"	L.P.	2000—0200, 0700—1100
"	"	UA		0100—0800—1900
"	"	PY		2100—0700, 1000—1100
VK3	"	ZL		2000—1400
"	"	SU		1200—0300
"	"	KH6		0300—2000
"	"	ZS		0400—1200
"	"	G	S.P.	0900—1900, 2100—2300
"	"	"	L.P.	2000—0100, 0700—1200
"	"	VK0		2100—1000
"	"	VE3	S.P.	0200—0400, 1200—1700
"	"	"	L.P.	2200—0200
"	"	UA		0100—0900—1900
"	"	WI		0200—0500, 1200—1600
"	"	VK9		2000—1800
"	"	PY		2100—0700, 0900—1100
"	"	W6		0300—1200, 1500—1900

14 MHZ

VK3	to	JA		0600—1900, 2100—2400
"	"	5Z	S.P.	2200—0900
"	"	"	L.P.	0300—1000, 1700—1900
VK4	"	SU		1100—1800, 2100—0100
"	"	ZS		0400—1800
"	"	G	S.P.	0700—1700, 2100
"	"	"	L.P.	2000—0300, 0600—1100
"	"	UA		0800—1700
"	"	PY		2000—0700, 1000—1700
VK5	"	SU		1200—2000, 2200—0300
"	"	ZS		0400—1300
"	"	G	S.P.	1000—1900, 2200—2300
"	"	"	L.P.	0700—1200, 2100—0100
"	"	UA		0100—0200, 0900—1900
"	"	PY		2200—0700, 0900—1200
VK6	"	SU		1200—2000, 2400—0400
"	"	ZS		0400—1400
"	"	G	S.P.	1100—2000, 2100—0100
"	"	"	L.P	0700—1300, 2200—2400
"	"	UA		1000—1900, 2300—0300
"	"	PY		2400—0700, 0900—1300

7MHZ

VK2	"	SU		1500—2100
"	"	G	S.P.	1700—2200
"	"	"	L.P.	0600—0700
"	"	VK0		2400—2400
"	"	UA		1500—2100
"	"	PY		0700—1000
"	"	W6		0700—1500

AWARDS COLUMN

With. Geoff Wilson,* VK3AMK

W.I.A. V.H.F.C.C. AWARD

New Members:

Cert. No.	Call	Confirmations 53 MHz.	144 MHz.
87	VK5ZSG	107	—
	(Now VK3ZAZ)		
88	VK4EZ	128	—
Amendments:			
24	VK3ZGP	311	—
44	VK3AMK	225	—
73	VK3AMK	—	133

W.I.A. 52 MHz W.A.E. AWARD

New Members:

Cert. No.	Call	Additional Countries
106	VK5ZSG	1
	(Now VK3ZAZ)	
107	VK2ZAY	1
Amendments:		
51	VK3ZGP	4
84	VK3AQR	3
91	VK3KK	2
92	VK3AOT	4
100	VK3AMK	4
103	VK3ADM	5
104	VK3ANP	3

Worked all VK Call Areas (VHF Award)

OBJECTS

1.1 This award has been created in order to stimulate interest in sustained long distance working in the V.H.F. bands in Australia, and to give successful applicants some tangible recognition of their achievements.

1.2 This award, to be known as the "W.A.V.K.C.A. (V.H.F.) Award" will be issued to any Amateur who satisfies the following conditions.

1.3 Certificates of the Award will be issued to the applicants who show proof of having made contacts with Australian Amateur Stations in the areas shown in the attached Appendix. The number of contacts required in each area is also shown.

REQUIREMENTS

2.1 Contacts must be made in the V.H.F. Band (Band 8) which extends from 30 to 300 MHz, but such contacts must only be made in the authorised Amateur Bands in Band 8.

2.2 Verifications are required from all of the call areas in accordance with the details given in the Appendix. A total of 22 confirmations will be required.

2.3 The commencing date for the Award is 1st January, 1958. All contacts made on or after this date may be included.

OPERATION

3.1 All contacts must be two-way contacts on the same band and cross-band contacts will not be allowed.

3.2 Contacts may be made using any authorised type of emission for the band concerned.

3.3 Fixed stations may contact land portable/land mobile stations and vice versa, but land portable/land mobile station applicants must make their contacts from within the same call area.

3.4 Applicants, when operating either land portable/land mobile or fixed, may contact the same station licensee but may not include both contacts in the one application.

3.5 Contacts made with ship or aircraft stations or contacts made with the aid of repeaters or translators of any kind will not be allowed.

3.6 Applicants may only count one contact for a station worked as a Limited Licensee with a Y or Z three-letter call sign, who is subsequently contacted as a full A.O.C.P. holder.

3.7 All stations must be contacted from the same call area by the applicant (except as below), although if the applicant's call sign is subsequently changed, contacts will be allowed under the new call sign providing the applicant is still in the same call area. If the applicant moves to another call area, contacts must be made from within a radius of 150 miles of the previous location to qualify for award purposes. If the distance of the new location from the old exceeds a radius of 150 miles, a separate application for a new award must be made claiming only contacts made from the new location.

3.8 All contacts must be made when operating in accordance with the Regulations laid down in the "Handbook for the Guidance of Operators of Amateur Wireless Stations" or its successor.

VERIFICATIONS

4.1 It will be necessary for the applicant to produce verifications in the form of QSL cards or other written evidence showing that two-way contacts have taken place.

4.2 Each verification submitted must be exactly as received from the station contacted, and altered or forged verifications will be grounds for disqualification of the applicant.

4.3 Each verification submitted must show the date and time of contact, type of emission and frequency band used, the report and the location or address of the station at the time of contact.

4.4 A check list must accompany every application setting out the following details:

4.4.1 Applicant's name and call sign and whether a member of the W.I.A. or not.

4.4.2 Band for which application is made.

4.4.3 Where applicable, the date of change of call sign(s) and previous call sign(s).

4.4.4 Details of each contact as required by Rule 4.3.

4.4.5 The applicant's location at the time of each contact if land portable/land mobile operation is involved.

4.4.6 Any relevant details of any contact about which some doubt might exist.

APPLICATIONS

5.1 Applications for membership shall be addressed to the
Federal Awards Manager,
W.I.A.,
P.O. Box 150,
TOORAK, Vic. 3142.
accompanied by the verifications and check list with sufficient postage enclosed for their return to the applicant, registration being included if desired.

5.2 A nominal charge of $1.00, which shall also be forwarded with the application, will be made for the issue of the certificate to successful applicants who are non-members of the Wireless Institute of Australia.

5.3 Successful applicants will be listed periodically in "Amateur Radio".

5.4 In all cases of dispute, the decision of the Federal Awards Manager and two officers of the Federal Executive of the W.I.A. in the interpretation and application of these Rules shall be final and binding.

5.5 Notwithstanding anything to the contrary in these Rules, the Federal Council of the W.I.A. reserves the right to amend them when necessary.

APPENDIX

TERRITORY	CALL AREA	QSL's REQUIRED
(Australian Antarctica (Heard Island (Macquarie Island	VK0	1
(Australian Capital Territory (Lord Howe Island	VK1	1
(State of New South Wales	VK2	3
(State of Victoria	VK3	3
(State of Queensland (Thursday Island (Willis Island	VK4	3
(State of South Australia	VK5	3
(State of Western Australia	VK6	3
(Flinders Island (King Island (State of Tasmania	VK7	3
(Northern Territory	VK8	1
(Admiralty Islands (Bougainville Island (Christmas Island (Cocos Island (New Guinea (New Ireland (Norfolk Island (Papua	VK9	1

NOTE:
In Areas above, where more than one confirmation is required, contact may be made with any or all of the Territories listed in brackets.

Federal Awards Manager, C/- P.O. Box 150, Toorak, 3142.

SINGAPORE AMATEUR RADIO TRANSMITTING SOCIETY
P.O. BOX 2728 SINGAPORE

The following Award Certificates are offered by the Singapore Amateur Radio Transmitting Society to Radio Amateurs and SWLs. throughout the World who fulfil the requirements for these Awards.

LION CITY AWARD

Requirements: (a) Radio Amateurs in Zone 28 must work forty different 9V1 Amateur Radio Stations in Singapore.

(b) Radio Amateurs in the rest of the World must work twenty different 9V1 Amateur Radio Radio Stations in Singapore.

PEARL OF THE ORIENT AWARD

Requirements: Radio Amateurs must contact at least five Singapore Stations on each Band — 10, 15, 20, 40 and 80-metre band, making total of twenty-five contacts.

Contacts can be made on any mode-phone, cw or mixed, with minimum reports of RS 33 or RST 338. Contacts from and including 10th September, 1969 only will count. A copy of the Log Extract showing the Date, Time (GMT), Frequency, Mode and Signal Reports of the Stations worked and Verified by two licensed Amateurs together with ten IRCs or US $1 should be submitted with the application.

Short Wave listeners may also apply for these Awards. Their reports must be confirmed by the QSL cards received from the Singapore Stations heard. A list showing the Date, Time (GMT), Frequency, Mode, and Signal Reports of the Stations heard, and verified by an official of a local Amateur Radio Club or Society, or two licensed Radio Amateurs together with ten IRCs. or US $1 should be submitted with the application. Only Singapore Stations heard on and after 10th September 1969 will count. For the Lion City Award SWLs need only report on twenty Stations.

AR

A 30-40 MHz. Frequency Counter

(Continued from Page 6)

The three critical TTL devices are:—

(i) The input selector switch. A 74H00 is recommended if this switch is used.

(ii) The signal gate. Again a 74H00 is recommended.

(iii) The 7490 on the first (digits) indicator decade.

All the National devices tried by the writer have operated in excess of 30 MHz. By selection from a batch of 20 being used elsewhere one was found which operated at 52 MHz. An attempt will be made to pre-select these "good" ones if there is a wide demand.

AVAILABILITY OF PARTS

So much interest has been shown during the development of this counter that arrangements have been made to make all parts (including transformer, drilled and plated p.c.b., fully drilled cabinet and metalwork, and full instructions) through the components section of the VK3 Division. Their address is P.O. Box 65, Mt. Waverley, Victoria. Any enquiries on supply of parts should be sent to them.

Any correspondence on other than supply matters should be addressed to the writer.

ACKNOWLEDGMENTS

This article could not be concluded without expressing the writer's gratitude to John Boyce, VK3AXF, for his patience in explaining the mysteries of digital electronics and for working out the control circuitry.

The transformation of the circuits into operating hardware could not have taken place without the unstinting help and shack facilities extended by Jack Gillham, VK2DG, during the writer's long stay in Sydney.

AR

Magazine Index

With Syd Clark, VK3ASC

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September, 1972: Slow Scanning Colour; SSTV: Electrostatic Deflection CR Tubes; CQ Reviews: The Yaesu Musen FTdx570 SSB/CW Transceiver; It is Better to Receive; Relativity and the S-Meter; Identifying Unmarked Surplus IC's; An External VFO for the Heathkit SB-102 Transceiver; Voltage Independent Ramp Generator; Considerations for Solid State Linear VFO's.

"QST"
November, 1972: Some tips on Successful QRP Operation; Antenna Traps of Spiral Delay Line; Fundamentals of Solid-State Power-Amplifier Design; Part 2; The FVGT Box. (RTTY A.F. Spectrum Analyser); The Mini-Gallon; Save the Ham-M: A Morse-Code Time Identifier; A Code Practice Oscillator for the Beginner; The Y Match: A Repeater Identifier; Review of The Ten-Tec Argonaut 505.

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"BREAK-IN"
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TECHNICAL ARTICLES

Readers are requested to submit articles for publication in "A.R.," in particular constructional articles, photographs of stations and gear, together with articles suitable for beginners, are required.

A.R. Direct Subscriptions:

The Air Mail extra amount of $1.60 per annum given in the Advertisements on Page 23 of September A.R. and subsequent issues refers to Air Mail to VK9. Air Mails elsewhere overseas vary in rate from 90 cents per copy downwards.

The W.I.A. still processes **overseas magazines subscriptions**. The rates are shown on Page 18

Send for lists to: **W.I.A., P.O. Box 150, Toorak, Vic., 3142, or from your Division.**

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Complete transmitting station in rack 80-10m 6+2m at 60w AM VFO on all bands. Includes power supplies, modulator, relays, and all transmitters. What offers. J. S. Bland VK1JB. 20 Heysen St., Weston, A.C.T. 2611. Ph. Bus. (062) 48 8911 x 25, Home (062) 88 2803.

3 Section commercial 100ft. galvanised tower, complete external galvanised ladder and platform, all guys, etc. $125. VK3BCL QTHR, Ph. (03) 4-4246.

Coaxial Cable equivalent PT11M PT29M double screen huryable PVC 20c and 30c yard VK4WR. P.O. Box 279, Namhour, 4560.

Sangamo Electric Time Clock. Hardly used. $11.00 incl. postage. VK2AAY, P.O. Box C184, Clarence St., Sydney.

Yaesu Type "F" sideband exciter, never used, $35. VK3ZTA, D. J. Laidlaw, 2 Simon Ct., Mulgrave, 3170.

Trio 9R-59D Comm. Rx. Good order. $120. Offers wanted Heath Monitor Scope, Morse Key PMG type. Bob Guthberlet, 3 Hay St., Kadina, 5554. Ph. 21 1085.

Collins 75A2Rx, double conversion, 80/40/20/15/11/10 Mx bands, AM and CW; superb Rx in excellent cond. $195. Heathkit HW17A transceiver 143-148 MHz AM/FM, 10w output, as new cond., includes DC mobile PSU $185. G. Scott, VK3ZIP, 30 Mitchell Rd., Mont Albert Nth., 3127. Ph. (03) 89 4645.

14AVQ Ant. $40. Honda 600 Watt 230v AC. Generator in new condition $195. VK3ZT QTHR. Ph. (03) 88 2897.

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Galaxy III transceiver, excellent condition mech. and elec. with VOX and AC PS/speaker unit. $260. Andrew Davis VK1DA, Ph. (062) 63 3039 Bus. Hours, 32 Kalgoorlie Cres., Fisher, A.C.T. 2611.

WANTED

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Vertical movement type 'Bug' key. Commercial or homebrew. Partics. to A. Shawsmith, VK4SS QTHR. Ph. (072) 44 6526.

Tasmania celebrates its GOLDEN JUBILEE

(Continued from Page 9)

A number of members of the Division have been made Life Members for meritorious work in the Institute. These are Messrs. F. W. Medhurst VK7AH (1925), P. O. Fysh VK7PF (1930), W. T. W. T. Watkins VK7DX (1930), C. Harrisson VK7CH (1934), J. Brown VK7BJ (1949), L. J. Crooks VK7BQ (1950), L. R Jensen VK7LJ (1953), P. E. Dunne VK7PD (1955), R. D. O'May VK7OM (1956), T. Connor VK7CT (1966), T. A. Allen VK7TA (1966).

Members of the Institute in Tasmania have undertaken many outstanding acts of community service. Among these are the maintaining of emergency communications both intrastate and interstate following interruptions caused by floods and cable failures, provision of communication facilities at Regattas in the north and south of the state, etc. In the years up to the beginning of World War II, the Tasmanian amateurs provided many broadcast programmes on medium waves for the benefit of listeners all over the island. Among these were VK7CS, VK7BQ and VK7JR in Launceston, VK7RS, VK7CW, VK7PA, VK7LJ, and VK7CH in Hobart, VK7LJ and VK7BC in Burnie, VK7DR in Devonport and VK7JW in Longford.

Anniversary celebrations will be held in Hobart and Launceston to mark the occasion, and the Federal Convention of the W. I. A. will be held in Launceston this year. Also a "VK7 Golden Jubilee Award" has been organised for stations all over the world contacting Tasmanian amateurs.

SILENT KEYS

It is with deep regret that we record the passing of:
VK2RE—R. W. Edwards
VK2AQX—R. Grivas
VK2BWS—M. W. J. Sheldon
L30176—C. J. Prior
VK4PK—S. J. J. McIntosh
L40105—L. G. Willett Sr.
VK5HY—A. A. Cotton
L60141—J. Ditmanas
VK7LJ—L. R. Jensen

QSP

(continued from Page 2)

TV STANDARDS.

The South African Digest of 23rd February quotes two directors of a West German electronics company as stating that nowhere else in the world did manufacturers of TV sets face tolerances of the stringency required by the South African bureau of standards. "South Africa is the only country, to our knowledge, which has compulsory specifications laid down for the manufacture of TV sets." As that country does not yet have a TV service perhaps the ZS amateurs might be spared much of the interference problems we have.

VU-LAND 80 mx BAND.

"The Indian Radio Amateur" of Oct '72 announces that their Ministry has allotted 3650-3700 KHz to VU Grade I amateurs in addition to their existing 80 mx allocation of 3890-3900 KHz.

MAIL DELAYS.

Some publications posted in the U.S.A. on 8th November arrived on 16th February.

RECEIPTS.

"Why do I not get a receipt when I pay my subscription to the Executive Office" is a common complaint. The short answer is that receipts are not issued unless requested. This is in line with modern commercial practice. The other reason is that if a receipt had to be issued for every payment the Executive Office would need either more staff or more time. Both of these are in very short supply indeed.

TOWER FOR A BEAM.

VK3BBB/T passes across a page out of the American Telephone Engineer & Management which describes the TV tower cum TV centre at Ostankino in N-E Moscow. This little monster weighs 45,000 tons and is 533 metres high which is near enough to 1749 feet. An intriguing detail is that the foundations are only 11½ feet deep on a diameter of 230 feet. Could be a useful sky-hook for a repeater or maybe some mobile work from the restaurant at the 1116 foot level.

ITU PREFIX BLOCKS.

In the ITU latest listings Australia has the blocks AXA-AXZ, VHA-VNZ and VZA-VZZ.

AR POSTINGS

"I am not sure if A.R. comes from Melbourne or the VK5 Division" writes a member in N.T. Yes OM, AR is posted in Melbourne — Cheltenham to be exact — in bulk bundles sorted strictly in Post Code order as required by the P.M.G. Dept. A.R.'s for the more distant states are posted first. Each month's posting of A.R. weighs about 700 lbs. and the postage bill is seldom less than $170.

Photograph of Thuji Yonten, A5ITY with Karl Kozlik VKZBKM on his right and Syd Molen VK2SC on his left. Thuji, is in Sydney for some 10 months to study English before returning to Bhutan, and is staying in the North Sydney area, but can be contacted through VK2SC. Whilst he is away, Bhutan will be kept on the map by A5IPN. (Material by courtesy VK2SC).

BOOKS OF INTEREST FOR AMATEUR OPERATORS

- DANISH—**WORLD RADIO & TV HANDBOOK** **$5.95**
- R.S.G.B.—**AMATEUR RADIO TECHNIQUES,** 4th Edition **$6.05**
- R.C.A.—**SILICON CONTROLLED RECTIFIER,** Experimenter's Manual **$1.50**
- DANISH—**HOW TO LISTEN TO THE WORLD,** 7th Edition **$4.00**
- SAMS—**HOW TO READ SCHEMATIC DIAGRAMS** **$4.30**
- NOLL—**SOLID STATE Q.R.P. PROJECTS** **$5.15**
- R.C.A.—**LINEAR INTEGRATED CIRCUITS** **$3.75**
- NOLL—**73 VERTICAL, BEAM, AND TRIANGLE ANTENNAS** **$6.95**
- G.E.—**ELECTRONIC EXPERIMENTERS CIRCUIT MANUAL** **$4.00**
- A.R.R.L.—**UNDERSTANDING AMATEUR RADIO** **$4.35**
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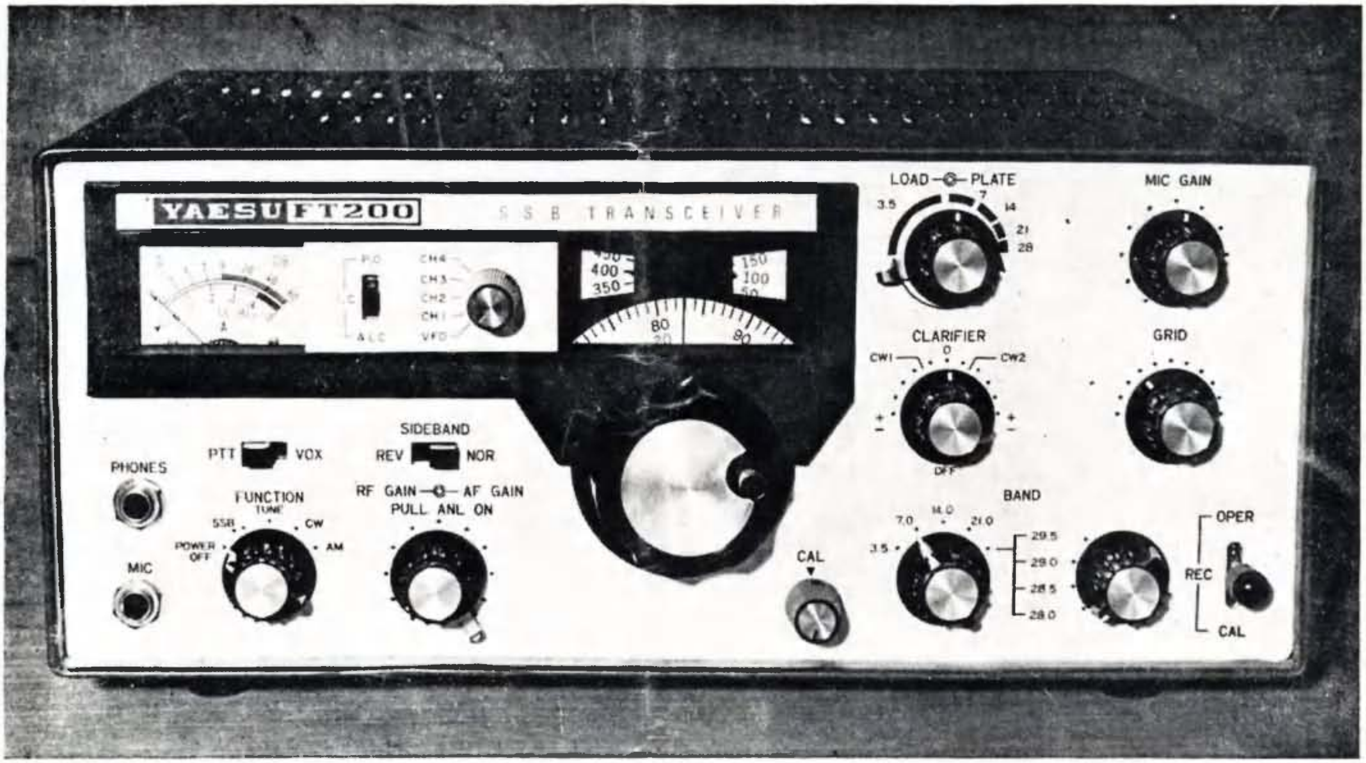
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amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

MAY, 1973

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	Receive	10,296.14	kHz.
Channel Z	Transmit	4,048.88	kHz.
	Receive	10,411.55	kHz.
Channel 4	Transmit	4,066.66	kHz.
	Receive	10,278.57	kHz.
Channel 1	Transmit	4,058.33	kHz.
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Price $5.50 each

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100 kHz. Marker	$12.00
1,000 kHz. Marker	$12.00
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HC6 Holders, ½ inch spacing

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Type PS62—240v. to 6 or 9v., 100 mA.	$9.50

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ADCOLA M70 1/8 inch tip, 240 volt	$8.00
ADCOLA M64 3/16 inch tip, 240 volt	$8.40
SCOPE 4 volts AC/DC, 100 watts	$8.40
MINISCOPE	$8.00
SCOPE De Luxe	$7.00

Postage 20c.

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240 volts/3.3 volts, 100 V/A. $8.40

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Five-Core, 40/60	$2.20
Solder Pack, 42 inches	18c

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Price $185.00

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13 transistors, 3-channel, and call system. Specifications: 13 transistors, 1 diode, 1 thermistor. Range up to 10 miles (depending on terrain, etc.). Frequency 27.240 MHz. (P.M.G. approved with licence). Freq. stability: plus or minus 0.005%. Transmitter: Crystal controlled, 1 watt. Receiver: Superheterodyne, crystal controlled. Antenna: 13 section telescopic. Power source: eight UM3 1.5 volt pen batteries. Size: 8¼ x 3¼ x 1¾ inches. Weight: 25 ozs. Other features: Leather carrying case, battery level meter, squelch control, earphone jack, AC adaptor jack, etc.

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Receivers, transceivers, ex-Army, and citizens band transmitters, test equipment, oscilloscopes, signal generators, multimeters, chassis racks, panels, computer parts and boards, power transformers up to 6.6 kv., valves, transistors, potentiometers, etc., speakers, amplifiers, cables—hook-up and co-axial 50 and 70 ohms, multicore up to 50 core—panel meters, AVO meters, valve testers and all types of electronic components.

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MODEL AS-100D/P — Price $34.50

High 100,000 ohm/volt sensitivity on DC. Mirror scale, protected movement. AC volts: 6, 30, 120, 300, 600, 1200 (10K o.p.v.). DC volts: 3, 12, 60, 120, 300, 600, 1200 (100,000 o.p.v.). DC current: 12 uA., 6 mA., 60 mA., 300 mA., 12 amps. Resistance (ohms): 2K, 200K, 20M, 200M. dB. scale: minus 20 to plus 63 dB. Audio output (volts AC): 6, 30, 120, 300, 500 1200 Battery: internal. Approx. size: 7½ x 5½ x 2¾ inches.

MODEL OL-64D — Price $19.75

20,000 ohms per volt. DC volts: 0.025, 1, 10, 50, 250, 500, 1000 (at 20K o.p.v.), 5000 (at 10K o.p.v.). AC volts: 10, 50, 250, 1000 (at 8K o.p.v). DC current: 50 uA., 1 mA., 50 mA., 500 mA., 10 amps. Resistance (ohms): 4K, 400K, 4M, 40 megohms. dB scale: minus 20 to plus 36 dB. Capacitance: 250 pF. to 0.02 uF. Inductance: 0-5000 Henries. Size: 5¾ x 4¼ x 1¾ inches.

MODEL C1000 — Price $6.95

This is the ideal low-cost pocket meter. AC volts: 10, 50, 250, 1000 (1000 o.p.v.). DC volts: 10, 50, 250, 1000 (1000 o.p.v.). DC current: 1 mA., 100 mA. Resistance (ohms): 150K. dB. scale: minus 10 to plus 22 dB. Dimensions: 4¾ x 3¼ x 1¼ inches.

MODEL CT-500/P — Price $16.75

Popular, medium-size, mirror scale, over-loaded protected. AC volts: 10, 50, 250, 500, 1000 (10K o.p.v.). DC volts: 2.5, 10, 50, 250, 500, 5000. DC current: 50 uA., 5 mA., 50 mA., 500 mA. Resistance (ohms): 12K, 120K, 1.2M, 12M. dB. scale: minus 20 to plus 62 dB. Approx. size: 5½ x 3½ x 1¾ inches.

MODEL A-10/P — Price $55.00

Giant 6½ inch meter. In-built signal injector, overload protected. AC volts: 2.5, 10, 50, 250, 500, 1000 (10K o.p.v.). DC volts: 0.5, 2.5, 10, 50, 250, 500, 1000 (30K o.p.v.), 5000 (10K o.p.v.). DC current: 50 uA 1 mA., 50 mA., 250 mA., 1 amp., 10 amps. AC current: 1 amp., 10 amps. Resistance (ohms): 10K, 100K, 1M, 100M. dB. scale: minus 20 to plus 62 dB. Signal injector: Blocking oscillator circuit with a 2SA102 transistor. Approx. size: 6½ x 7¼ x 3¾ inches.

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amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA. FOUNDED 1910

MAY, 1973

Vol 41, No. 5

Published monthly, as the official journal, by the Wireless Institute of Australia. Reg. Office: Above 474 Toorak Rd., Toorak, Vic., 3142.

Enquiries and material to:

The Editor, Phone (03) 24-8652.
P.O. Box 150, Toorak, Vic., 3142.

Copy is required by the ***third of each month.*** Acknowledgment may not be made unless specially requested. All important items should be sent by certified mail.

The Editor reserves the right to edit all material, including Letters to the Editor and Hamads, and reserves the right to refuse acceptance of any material, without specifying any reason.

Advertising:

Advertisement material should be sent direct to the Editor by the ***25th of the month preceding the month prior to publication.***

Hamads should be addressed to the Editor by the ***third of each month.***

Printers:

Research Publications Pty. Ltd., 418 Canterbury Rd., Surrey Hills, Vic., 83 9140.

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COVER
The Eddystone Point lightstation on the N.E. tip of Tasmania — see article "Fractured Bones and Little Yabbies on a Lighthouse" by VK7FB/T.

QSP

GOLDEN JUBILEE

It was 50 years ago this July when a group of young wireless enthusiasts got together and formed the Tasmanian Division of the Wireless Institute of Australia. This group, known as the Launceston Radio Club, thought it so important to have a close knit association of Amateur Radio Operators that they were prepared to disband their local club to become a part of a National Organisation.

It must be remembered that this was in the era when the neighbours crowded into the living room to hear an interstate BC, to log overseas DX made headlines in the national dailies, and the fact that young John built a Xtal set in a matchbox was good conversation at morning tea. The era of public appreciation! But our young men of those days had that foresight to realise the day would come when the General Public would not give a hoot when amateurs bounce signals off the moon, or that two-way ATV contacts were made across Bass Strait, or that an Amateur Radio Satellite was passing overhead daily or that it became common place to converse world wide not only by means of morse code but by RTTY, SSTV, and just plain voice.

It is true that some of those young men of yesterday are now silent keys, some of them are hale and hearty and are "with it", others are sometimes bewildered by the progress in the state of the art but it must not be forgotten that the young men who were radio amateurs in the twenties, who built TPTG Transmitter and receivers were then up with the latest and probably did more experimenting and construction than is done today just to find out why. These were the days before the books were written and in lots of cases before the parts were manufactured.

However, we salute the youth of today with its exuberance and speed at which they get things done, but on the other hand remind them that this is the era of NON-Public appreciation and NOW more than it was 50 years ago, it is important to belong and work for our National Organisation — The Wireless Institute of Australia!

Ted Cruise VK7EJ
President and Federal Councillor
W.I.A. Tasmanian Division

At the Federal Convention held in Melbourne at Easter, the following plan for two metre FM channels for simplex and repeater net operation in Australia was passed for immediate implementation, subject to PMG approval:

1973 FREQUENCY ALLOCATION PLAN

Repeater Channels	Input Frequency (MHz)	Channel No.	Output Frequency (MHz)	Channel No.
1	146.10	42	145.60	32
2	146.20	44	145.70	34
3	146.30	46	145.80	36
4	146.40	48	147.00	38
5	146.50	50	147.10	62
6	146.60	52	147.20	64
7	146.05	41	145.55	31
8	146.15	43	145.65	33
9	146.25	45	145.75	35
10	146.35	47	146.95	59
11	146.45	49	147.05	61
12	146.55	51	147.15	63

SIMPLEX CHANNELS — National FM Primary Simplex: 146.00 MHz (previously channel B now Channel 40).RTTY Net: 146.75 MHz (55)
National ATV Liasion Net 146.85 MHz (57)
SECONDARY FM SIMPLEX CHANNELS: 145.85 (37), 146.65 (53), 146.70 (54), 146.80 (56), 146.85 (57), MHz

Policy was laid down that the eventual intention is for all repeater channels to be above 146 MHz, i.e. Repeater Channels 4,5,6,10,12.

All channels will be available for allocation by State Repeater Committees as required. A channel numbering system on a numerical basis starting at 144.00 MHz as Channel "0" and subsequent channels in 50 KHz steps was adopted. Initially, this system will be applied only above channel 30 (145.5 MHz) All present two metre net frequencies will be rounded off to the nearest 50 KHz.

Fractured Bones and Little Yabbies on a Lighthouse

M. L. Jenner* VK7FB/T

What makes one become a lightkeeper? What is a lightstation like? What are the living and working conditions? What do you do to pass the time? These, and similiar questions are asked of us by tourists and amateurs alike.

The first question is a little hard to answer, and for Anne and myself, the last is easy. For those of you fortunate enough NOT to have worked us, and been "ear bashed" as only Fractured Bones knows how, I will attempt to paint a picture of what we have come to know as true civilisation!

Why

What makes one become a lightkeeper? Well, for a start, like many other professions, one does not have to be mad, but it is a big help! At the time I joined the Department of Shipping and Transport, both Anne and I had good jobs, and we lived right at the radio station I worked at. We each had a car, we were both on shift work so had plenty of day-light time at home and we had a console of home brew gear six feet high and five feet wide and an antenna farm to match.

Why give all this up? At heart I am a bit of a romantic or dreamer, and the idea of living in remote places had a great deal of appeal. It most certainly was not for the money. In fact my wages went down and expenses went up. I think most people have at some time during their lives, had a dream of living on an island, but few take the plunge and do it. We decided that as we were young it would do us no great harm to give it a try, and we did just that.

With a great deal of heartache the console was dismantled, all the VHF gear disposed of, the furniture and the cars sold, and what was left over was packed into tea-chests ready for transport. Due to power limitations on lightstations, the home-brew gear was out of the question so we procured an FT50, which consumes about 120 watts and which turned out to be ideal.

By the time we had set foot on the ship we had spent and lost a lot of money. The cars and furniture were sold at a loss, and in addition there was the expense of an inverter, DC motor for the washing machine and of course, the rig. So the material and financial cost for us was high, which brings us back to the question, what makes one become a lightkeeper? I'm blowed if I know, but I am not sorry I did!

The QTH

What is a lightstation like? I can only speak for the Tasmanian lights, but I think they must be much the same the world over. The one thing they all have in common is that they are all by the sea side! Visitors seem to have the idea that the weather must always be wild, the seas always rough and the life always hard. None of these is true. The weather is not much different to any seaside resort. Some stations do suffer from the weather a little more than the average weekend shack-owner would put up with. Maatsuyker Island for instance is located nearly ten miles south of the Tasmanian mainland and is in the path of the 'Roaring Forties', with little to shelter it from the full force; there is always a fair swell running, and there is only one spot on the island where a landing can be made safely. At the other extreme, Eddystone Point, on the north eastern tip of Tassy, has miles of beautiful white beaches stretching away north and south. There is rarely a big swell, and in fact for days on end the sea will be like a mill-pond. As the weather pattern in Tasmania is predominantly westerly, the climate is quite mild and many people would give their eye teeth for a shack in this area.

The remote stations are all equipped with HF radio, Eddystone Point acting as the base for Swan Island, and Cape Bruny the base for Tasman and Maatsuyker Islands and several skeds a day are made for passing weather reports for relay by telegram to the Weather Bureau. The equipment varies from 1940 vintage Hallicrafters and Bendix AM rigs through AWA 60A tranceivers, to the latest Racal SSB gear, and all rigs are capable of operation on 6204 in case of emergency. In addition, the Tasman Is. — Cape Bruny-Maatsuyker Is. link has a tone operated selective calling system installed.

Power Supplies

Power on the DC stations is produced by single cylinder diesels driving 2.2 KV generators and an 85 cell bank of alkaline batteries. The kero lights have only one generator, and the others, two. Battery power is used during the day when the load is generally light, and the generators are used direct to line while the light is operating. The batteries are charged whenever necessary, the line still being connected during these periods, so that the DC voltage can vary from around 100 volts just prior to light-up, up to 140 or so towards the end of the charging period. Each lightkeeper has his own rotary inverter to convert to 240 AC but the system has quite a few limitations. Inverters are available in two basic models, 250 and 500 watt, and a 500 watt unit drags about 6 amps or so from the DC supply. Depending on the type of equipment used in the main light, the drain of this varies from 6 to 10 amps and the supply is capable of 22 amps, so one has to be a little careful with the number of lights in the quarters when the inverters are in use. Voltage drop is also a problem with variations in load, and it is desirable to have some form of voltage control on the inverter, although few have. We have a home-brew device, installed as part of the "shack" in the corner of the kitchen, and the inverter is located in the pantry to keep the noise down a little. Ours is a 250 watt unit and I have a distribution system so that a check can be kept on the load.

Cooking and hot water is handled by a slow-combustion stove, and we have kerosene refrigerators and these, together with basic items of furniture, are supplied by the Department.

Some Limitations

What are the living and working conditions? Not too bad on both counts. Life is very much harder for the XYLs than for the OMs I feel. Due to the limitations on the power supply, electric fry-pans, steam and dry irons and vacuum cleaners are out. The inverter will just run the polisher but it is a bit tough on it, so we use it direct on the 110 DC. It runs at only half speed of course, but is still easier than the "armstrong" method! One has to be careful not to overload the trusty inverter, so combinations are worked out. The TV and rig together, TV and electric blanket or rig and blanket, etc. When the sewing machine is required, the rig goes off! We have become used to these things by now, and find it hard to get used to living while on leave. It feels peculiar going to bed without first stoking up and closing down the combustion stove, turning off the inverter, and checking the light. I regularly get caught with the water pressure too! Our pressure is quite low and is provided by a gravity tank which is filled from the main 10,000 gallon tank with the aid of a DC pump (which by the way, cannot be turned on while the generator is running, as it trips the breaker, and means a walk for someone up to the engine room, with alarm bells ringing and big panic all round! Too bad if one forgets to pump-up during the day!) Having been used to turning the tap on flat out, and waiting some time for a cup to fill, you should see the results when I do the same on city water mains! The cup is blasted into the sink and an extensive mop-up operation is required!

No Artificialities

It is a strange feeling too, to come back to so called civilisation after an extended period on an island. Although Anne had been ashore several times during our nine month stay on Tasman, I had not been into a shop, seen crowds of people, or for that matter, cars and what have you for that period. It was a harassing experience to cross the main road to buy some lunch from a shop in St. Helens during our move by boat from the island to Eddystone Point. Even from this station, the towns take some getting used to. If any cars come out here, they must stop, or meet a watery end, and mostly they are coming to visit us. In the town it is hard not to get up and go to the door when ever a car passes!

For those who are used to going to the footy on Saturday, or playing golf, or bending the elbow in the local, this is not the life. For Anne and myself it meant no great changes though. Neither of us were gad-abouts and although Anne missed being able to go shopping, and was not at all keen on giving up her position as Audio Continuity

*Eddystone Point Lightstation, via Gladstone, Tas. 7254.

operator with ABC TV, and I missed the radio meetings and the weekends off and so on, we both soon got used to the life, and neither of us can face the thought of going back to a city or town to live and work.

Communications

Perhaps the hardest thing to contend with, particularly at first, is the mail service. The islands have a fortnightly service, Tasman and Maatsuyker by fishing boat and Swan Island by light aircraft. Cape Bruny and Eddystone Point have a weekly service run in turn by the lightkeepers, to the nearest town, which in our case is twenty five miles away on a not so good road, and has a population of around 180! Try ordering food today which will not arrive for a fortnight and has to do you for the following fortnight! As the outgoing mail has already left before it is possible to read the incoming lot, it can take six or eight weeks to conduct any business in this way. The only other means of communication on the islands is per the radio, and this means dealing through a third person which is not always convenient or desirable. The stations lucky enough to have the telephone connected are invariably miles from anywhere and the very person you wish to ring is on the most expensive rate!

On the credit side though, there are many many advantages. Some are psychological and a little hard to put into words. The long wait between mail days which at times can be so annoying also has the effect of slowing down the whole tempo of living. One comes to live from fortnight to fortnight rather than from day to day and one day you suddenly realise that the pressure is off and life is much more civilised. Some advantages are very tangible. Where else can you work by the seaside with good swimming and fishing on the door step? As much crayfish as you care to eat. No pollution of any kind. No traffic noises or peak hour jams, no maddening crowds of people, no rush and bustle, and nothing stopping you from popping home at any time for a cuppa. Family life is much closer and the whole atmosphere is far more relaxed than one generally finds in more normal walks of life.

Chores

As far as the job is concerned, perhaps the most complicated and interesting task is that of compiling weather reports. This is done at three hourly intervals, the only real draw-back being the 0300 report, which on a two-man station entails crawling out of bed at that revolting hour for a ten minute job. Quite often it is necessary to rug up in winter woollies and wet weather gear just for a 100 yard dash and five minutes pushing a pen. But to me even this has its romantic side.

Our main job obviously is to keep the light in good repair, and alight! Cleaning the lens and prisms is a four or five hour effort for two of us, and in bad weather this has to be done fairly regularly. We have several acres of lawn to keep and we do almost all the painting on the station, inside and out, quarters and tower. Stopping the rust is just about a full time occupation in itself on external steel work. The business of living in these areas creates a good deal of work too. Wood to be split and carted, refrigerators to fill with kerosene, water to pump up and rubbish to collect and dispose of. The garbage service out here is lousy! And so it goes on. We are never in a position to say that there is nothing to do!

Wild Life Studies

Passing the time is easy. In addition to amateur radio one has the opportunity to do many things unheard of in the cities. We have acres of unspoiled and unpopulated bushland in which to roam, and study the wild life, and hunt wallaby both for pet food and our own consumption. We have a two or three mile long beach to the south of the point, which is virtually all ours, because, although there are a few holiday homes out here, practically no-one uses the beach, and here we can romp about and sunbake in the all-together quite freely if we so desire. We are both interested in the native flora and fauna and have collected many specimens for the Tasmanian Museum. We regularly see Tasmanian Devils, wombats, native cats, tiger cats and the beautiful Forester kangaroo. We have possum living in the roof, and have had several pet wallaby. Two cats, a hudgie, a pair of boxers and several coloured mice complete the menagerie of pets at the moment. Anne has all the normal duties of the housewife, and little spare time to worry about. She spends some time in reading and sewing, and manages to get on the air from time to time also. For outside recreation I have an old motor bike and also spend some time out fishing with a commercial fisherman who lives quite close to the station.

Quite a lot of our spare time has been taken care of recently with the generation of a harmonic, Peter, and now with him and the way we live and work, our lives are about as full and happy as one could wish for.

The Rig

On the amateur radio front, the gear consists of a Yaesu FT50 transceiver with the addition of several of my own gadgets attached to it, and is set up in semi-console fashion on a spare table in the kitchen. Antennas consist of a rather poor inverted "V" multidipole for 40, 20, 15 and 10, a half wave on 80 inverted "V" with tuned feeders through a "Z match" coupler (which I mostly use on all bands), and the hairiest "quad" imaginable for 20. I have operated from Tasman and Swan Islands and from here at Eddystone. All appear to be super locations. There is no man-made noise at all. As a reference, the audio gain control is calibrated 0 to 10, and an S3 signal can be heard all over the house on position 1. On all bands the gain can be run flat out without causing the speaker cone any discomfort at all! For 45 watts PEP output and poor antennas, I get consistantly good reports from all over the world. If I can hear 'em I can work 'em even if the S meter is not lifting off the stop! And no local QRM. The nearest amateur to the west and south would be seventy miles or so airline, and to the east all our neighbours are ZLs!

At the time of writing we are in the process of gearing up for SSTV. This has proved to be a rather frustating activity due to the long mail delays and the impossibility of shopping personally for gear, but we are slowly getting there. There are a great number of problems in setting up a reasonable station. The power supply limitations necessitate relatively QRP rigs. It would be possible to run higher power but the expense of providing an alternative source of mains does not warrant it. Antennas are a problem. There is any amount of space for them but once again, to build a decent high gain array for HF that would stand up to the weather conditions, and could be easily dismantled for transport, is a little beyond my pocket.

One cannot collect too much of anything either, including Amateur gear. When a move comes up, and this is a fairly regular occurence, everything must be packed right down to the last item, and in such a way that it will stand the rigours of much handling by gentlemen who have little heart when it comes to transporting radio equipment. It is likely to be moved from one's home by truck, to a fishing port, loaded onto a small boat, rolled about at sea for some time, off-loaded into a dinghy, hoisted out by flying-fox, lifted up a cliff face on a haulageway trolley and carted on a trailer over a rough old track before eventually coming to rest again! Enough to give anyone the horrors!

VK7FB and VK7LY can be heard regularly on 7050 and on Sunday mornings on 7110, and on odd occasions put in an appearance on 80 in the evenings. Operation on the other bands is spasmotic at the moment, but our operating routines will probably change somewhat when the SSTV is a going concern, or if we move again.

Why Not Try Double-Sideband?

T. MITCHELL,* VK3EZ

Double-sideband means, in amateur usage, removal of the almost-useless carrier from an AM transmitter signal by using the PA as a balanced modulator. This article describes how to do just that.

I could not open this article better than by quoting from Chapter 10 of the Third Edition of the R.S.G.B. publication "The Amateur Radio Handbook". To quote: "This chapter would be incomplete without a brief reference to the double sideband system of communication which is simpler, cheaper and more efficient than conventional A.M. A low-power modulator of the type customarily used for grid modulation is big enough to drive any of the popular tetrodes to a peak d.s.b. output greater than the same valves are capable of producing in anode modulated service. As d.s.b. is usually generated in the stage immediately preceding the aerial, the problem of linear amplification is avoided, and band changing is as simple as in a C.W. transmitter. There is no resting carrier, so voice control may be used as with s.s.b. Its disadvantages are that it occupies twice the bandwidth of s.s.b. and cannot be received without special equipment." (I will deal with the last few words of that quotation later.)

The expression "Double-sideband" in describing this system is not really correct. It should be called "double sideband suppressed carrier". However, it is commonly referred to as "DSB".

DSB has many of the advantages of SSB. However, it is clearly not as efficient as SSB because power is wasted in the unwanted, but transmitted, sideband.

If you, as an Amateur, want to communicate with SSB operators, yet have not the time to build an SSB rig, or for whom the cost of "going sideband" is prohibitive, then I suggest you seriously consider "going dsb". You probably have enough components in your junk box. You will need no filter crystals, heterodyne converters, or linear amplifier. If your rig works as well as mine you will work ssb stations who in most cases will be unaware that you are transmitting dsb.

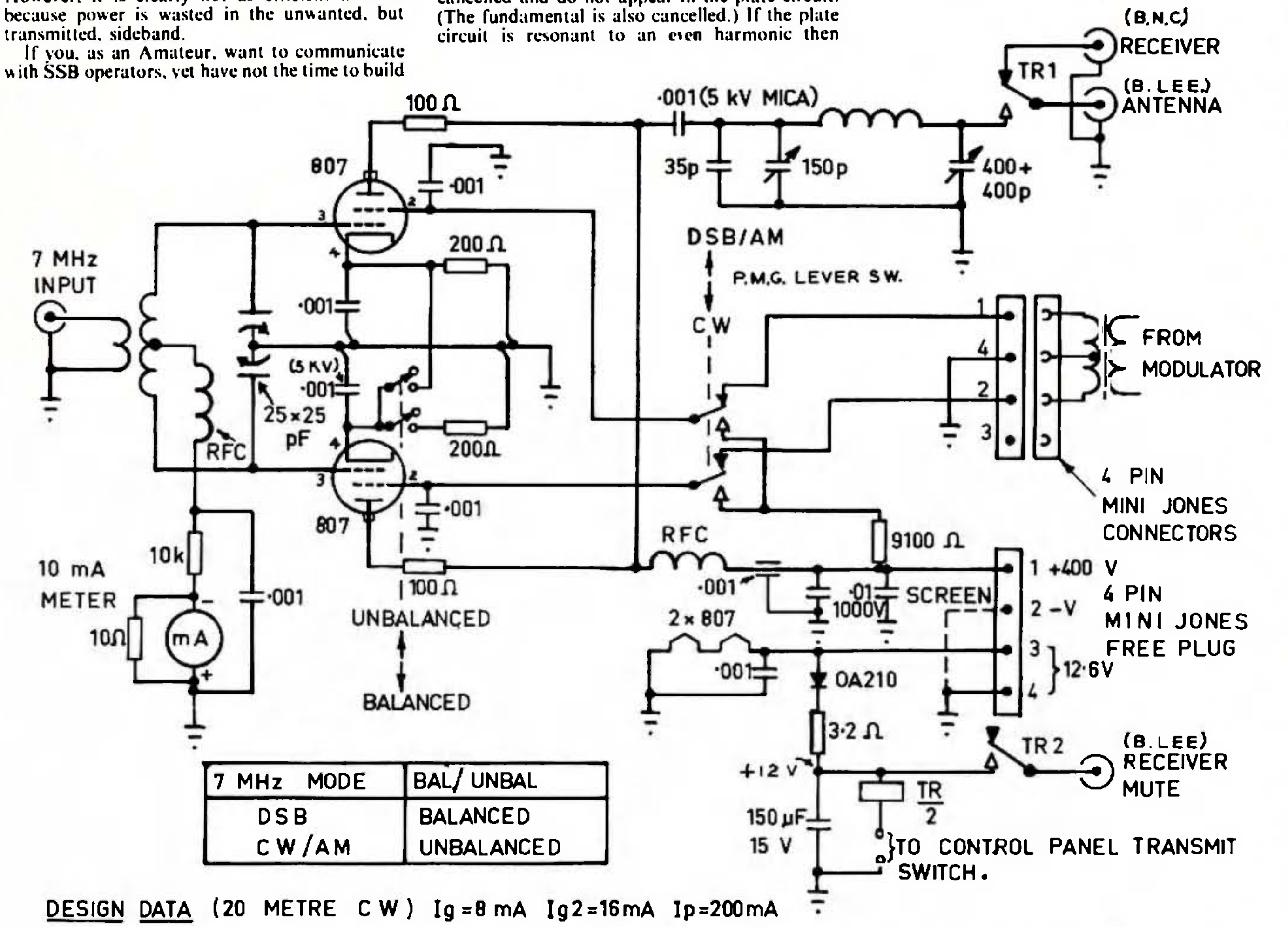
The principle of transmitting dsb is quite simple. Referring to the circuit diagram, the power amplifier tubes (2 x 807) act as a high level balanced modulator. Radio frequency energy is fed to the grids in push-pull and because the plates are connected in parallel the phase relationships are such that the symmetrical radio frequency signal is not present in the plate output circuit. Hence the expression "suppressed carrier". However, audio frequency energy applied to the screen grids in push-pull will "unbalance" the valves and the two sidebands (RF plus Audio and RF minus Audio) will appear in the plate circuit. Hence the expression "Double Sideband Suppressed Carrier". In the absence of modulation no signal is present in the output tank circuit.

I would like at this point to explain how I came to build this particular 7 MHz dsb transmitter. A few years ago I wanted to go on 14 MHz C.W. I built a "Push-push doubler" which is a circuit with the grids in push-pull and the plates in parallel. In a push-push RF multiplier the odd harmonics, due to phase relationships, are cancelled and do not appear in the plate circuit. (The fundamental is also cancelled.) If the plate circuit is resonant to an even harmonic then energy at that even harmonic will be present in the plate circuit. I will be pleased to send a photocopy of my original push-push doubler if anyone is interested. After many DX contacts on 14 MHz C.W. a few amateurs (including VK3VH and VK3BCX) appeared on 7 MHz dsb. It occurred to me that my push-push doubler could quite easily be converted to a 7 MHz dsb transmitter by replacing the 14 MHz plate resonant circuit with a 7 MHz resonant circuit and applying modulation to the 807 screens. By keeping the physical layout of grid tuned circuit components fairly symmetrical, absolutely no carrier could be detected in the plate circuit. (This can be checked by applying DC to the screens.) No balancing control was necessary. An alternative to the split-stator capacitor and inductor arrangement is a phase-splitting circuit in the RF driver stage.

Any audio amplifier capable of supplying two watts or so will be suitable as a modulator. I use a 6SN7 in cascade driving a 6V6. My modulation transformer is a small 50 Hz power transformer 240:240-0-240V. It is important to have an effective gain control because excessive modulation produces an over-wide transmitted bandwidth.

You will note from the circuit diagram that by open-circuiting one cathode the system becomes unbalanced. Even if you do not intend to work C.W. or A.M. the facility is useful for plate tuning purposes particularly if you have no audio tone available.

(Continued on page 19)



7 MHz MODE	BAL/ UNBAL
DSB	BALANCED
CW/AM	UNBALANCED

DESIGN DATA (20 METRE C W) Ig = 8 mA Ig2 = 16mA Ip = 200mA

DOUBLE SIDEBAND SUPPRESSED CARRIER (60 WATT PEP) AND CW/AM TRANSMITTER – 7 MHz

Cor 3

Postmaster-General's Department

Australian Post Office

COMMUNICATIONS HOUSE 199 WILLIAM STREET MELBOURNE VICTORIA 3000

TELEGRAMS POSTAL MELBOURNE • TELEX 30146 • TELEPHONE 63 0331 (AREA CODE 03)

Reference: 320/5/51

26 MAR 1973

Dear Sir,

Careful consideration has been given to your proposals for the introduction of four types of amateur radio licences but I cannot agree to the adoption of a licensing structure of this nature because of the additional administrative work which would be involved.

I am prepared to recommend the introduction of Novice licences, however, the examination for which would include the subjects of "Regulations" (at the normal standard), an elementary Theory paper and a Telegraphy test at 5 words a minute.

The conditions which would apply to the operation of an amateur station authorised under a Novice licence would be as follows :

(a) the transmitting equipment to be crystal controlled;

(b) operation to be confined to within the bands

3.525-3.575 MHz)
21.125-21.200 MHz)
26.960-27.23 MHz)

(c) types of emission A1, A3, A3A, A3B, A3H, A3J, F3 (± 3 kHz)

(d) power not to exceed 10 watts Pm except in the case of A3A or A3J emissions when it shall not exceed 30 Pp.

Novice Amateur Operators' Certificates of Proficiency would not be issued, Novice licences being granted to applicants who gain a pass in the examination.

Furthermore, it is agreed that Novice licences will be issued on a two year tenure only and the whole question will be reviewed after a five year trial period.

I would be pleased to receive your views on the above-mentioned proposals as soon as practicable please. You will appreciate that before Novice licences can be introduced it will be necessary to amend the Wireless Telegraphy Regulations which may take some time and will require the approval of the Minister.

Yours faithfully,

(H. S. Young)
Controller, Regulatory
and Licensing Section,
Radio Branch.

Mr. P.B. Dodd,
Manager,
Wireless Institute of Australia,
P.O. Box 150,
TOORAK. Vic., 3142

SEEN THE LIGHT

COL. HARVEY,* VK1AU

Essential reading for those who do not intend to depart this life with their boots on. Is your equipment really off? Wise men exist in Bible stories. They were also to be found among pioneer wireless experts; and much less frequently among electronic equipment production engineers.

It was one of the old wireless mens' wise teachings which probably saved me from electrocution recently, and could do the same for you. Nowadays, it is the in-thing to "Switch to Safety", whatever that incomprehensible American jargon is supposed to mean. In the olden days, those who knew what they were about simply pulled the mains plug out. Knowing now what we do about the Theory of Probability of failure, the oldies had the right idea.

Imagine now, if you will, a very common practice, intended to keep RF off the mains and/or hash out of equipment. Fig. 1A will refresh your memory. The practical version would usually follow Fig. 1B.

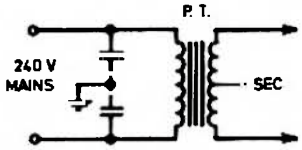


FIG 1A
TYPICAL CIRCUIT

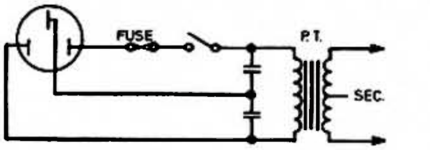


FIG 1B
TYPICAL PRACTICAL INTERPRETATION
(OLD FASHIONED)

Since thousands of power transformers are wired like this, it must be OK, you say?

Let's think it over. While we are at it, let's consider why another wise man advocates the use of a warning lamp across the transformer primary.

Take capacitor failure first. If the active to earth capacitor fails, either the fuse blows, or you have a small fire and no HT. If it is the other capacitor that fails, nothing happens, you say? OH YEAH?

Have a look at Fig. 2, redrawn to show the situation if the incoming mains leads are reversed so that the switch and fuse are now in the neutral line!!!

Note that because neutral and earth are virtually the same thing, failure of the capacitor WILL ENERGISE THE TRANSFORMER! This is bad enough if the secondary happens to be a low voltage one, but imagine the effect on honourable ham working on the linear tank circuit, "switched to safety" and all, when the capacitor decides to fail.

Left hand in pants pocket won't help much in this case, assuming that you work that way.

Modern terminology would opt for redundant failsafe switching, but the wise old men would settle for a completely fail-safe method called "pulling the plug out". Even then they would approach a possibly dangerous component with a delicately poised shorting crowbar. Slightly less wise men would possibly tie a string around their finger to remind them to pull the plug out.

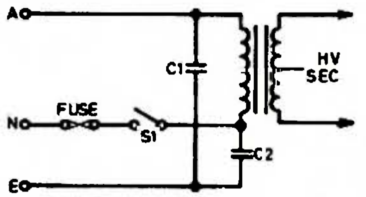


FIG 2A

With S1 open, failure of C2 will energise the transformer, with a gross safety hazard. The equipment is also effectively unfused. Even if correctly connected to the Mains, the fuse is alive at all times.

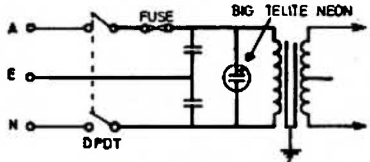


FIG 2B
RECOMMENDED PRACTICE

Nowadays, with nice bright amber or red fluorescent TELITE 240V Neons available for about the same price as a ball of string, the word is to put a Neon lamp across every potentially lethal transformer primary. If the thing glows, keep sticky fingers well away from rectifiers, filters, tanks, etc.

Far from theorising or pontificating on the subject, it has to eventually happen to you, before the message comes across loud and clear. Fortunately in my case I didn't have to receive the full treatment. One such Neon (reluctantly installed) glowing unexpectedly on a SWITCHED OFF (i.e. to safety!!) 1800 volt supply alerted me just in time to stop delving into a blacked out and supposedly dead linear. Yes, I had worked on the linear before with the mains switch OFF, and with this accident just waiting the "chance of failure" number to come up!!

A double pole mains switch would drastically reduce the chance of accident BUT NOT REMOVE IT. (Switches are and can fail). In fact, this supply was supposed to be switched and fused in the active lead, and the risk of switch failure due to inductive arcing was reduced by paralleling two switch sections. To be honest, the risk of energising the primary in the way described had not been considered. But for the timely glow from the NEON, fortunately while both hands were out of the linear, the trap would have been well and truly sprung when a newly installed 630 volt mains TVI by-pass capacitor failed.

As the wise old man used to say "Don't switch it off Lad. Pull the so and so plug out". Which is exactly what I am going to start doing again, before I get inside any chassis with more than 12 volts on it.

Strange, isn't it, how one's continued presence in Hamland can depend on the reliability or otherwise of a 20 cent capacitor. Since I dislike reading in Silent Keys the names of fellows I have had pleasant QSOs with, how about getting out the multimeter now, and checking your mains plugs and equipment for switching and fusing in the active lead. I thought mine were right. You could be in the same boat, and not as lucky. While you are at it, how about making sure that your earth leads can carry a 10 amp fault current?

Meanwhile, three cheers from Canberra for a wise old ham; for Mr. TELITE and his merry men; and for all those who promise to pull their plugs out.

FRONT VIEW OF SOCKET
REAR VIEW OF PLUG
(S.A.A. STANDARD)

*16 Leane St., Hughes, ACT. 2605.

Hints & Kinks

Modern circuit materials and components demand different types of tools from those normally available in the hardware shops. Dentists use probes which are extremely useful for removing components from PCB's and the "Spencer Wells" locking forceps used liberally in operating theatres and surgeries acts like a third hand. To solder a bunch of two or more wires together keep a long helix of tinned copper wire handy (26 or 28 swg is best) i.d. of helix should be about 0.125, and this will hold solder blob around up to six component leads. VK3ASC.

COMMUNICATIONS

"As amateurs we experiment in the art of communication and yet, being honest with ourselves, we do not seem to communicate with each other very well." Extract from Editorial in CQ.TV Feb '73.

DX CERTIFICATES

Jim Fisk W1DTY, has some sound comments to offer on DX certificates in his editorial for Ham Radio of March '73. He comments about the multitude of facets to amateur radio and picks out DX-chasing and wallpaper collecting as near the top of popularity. On DX certificates he comments that many are beautifully drawn up and a credit to the collection but that some, unfortunately, are not worth the paper on which they are printed and goes on to list three requirements for a good certificate.

HELPING HANDS

"As I have said before, the people who scream loudest are those who help least." Except from Editorial in Tuned Lines April '73. And so it is the world over and ever was so. BUT: Are all the loudest screamers, one might ask, members of the Institute?

CUSTOM IMPORT DUTIES

A recent letter from the Chief By-Law officer of the Department of Customs and Excise advises that equipment specifically for use by licensed Radio Amateur operators is currently the subject of Departmental enquiries in relation to by-law admission. The whole question is being actively pursued.

SATELLITE LANGUAGE

"Ascending nodes" — result of eating large quantities of radishes; also known as erp.

SSTV Sync Generator for Australian Standards

ALLAN B. MASON,* VK2GR/T

This generator provides stable line and frame sync pulses which are locked to the 50 Hz mains. It uses integrated digital divider circuits.

CIRCUIT OPERATION

IC1 is a monostable multivibrator which squares up to 50 Hz sine wave and provides positive output pulses to drive the divider chain.

IC2 is a dual JK flip flop connected in a divide by three configuations. Tis gives an output frequency of 16.66 Hz which is the line frequency.

IC3 is the line pulse monostable multi to provide the 5ms line pulse which is set with VR1.

Q1 inverts the positive line pulse to give the negative line drive output.

IC4 and IC5 which are a Decade Counter and a Divide by 12 Counter respectively, are connected in cascade to give a 120 division ratio from the 16.66 Hz line frequency. The output of this is a 7.2 Second period (the Frame Period).

IC6 is the frame pulse monostable multi and provides the 30ms frame sync pulse which is set with VR2.

Q2 inverts the positive pulse to provide the negative frame drive output pulses.

The two drives are mixed with the diode gate D2 and D3 and inverted in Q3, the sync drive amp, to provide Mixed Sync which is used directly to modulate the subcarrier oscillator in the SSTV modulator.

CONSTRUCTION

Any silicon NPN transistor can be used for Q1, Q2 and Q3, and any silicon diode should work for D1, D2 and D3 as the pulse rate is low and the rise times not really important at these frequencies.

Any two JK flip flops (RTL or TTL) can be used for the IC2 divider.

One big advantage with using a sync generator is that only one subcarrier oscillator is necessary for several sources of slow scan video, if all sources are locked to the generator.

Negative output pulses were chosen to keep with the standard used on my other ATV equipment. I also use the 50 Hz frame drive from the fast scan TV sync generator (which is locked to a 1 MHz crystal) to drive the SSTV sync generator, instead of the 6.3 volts 50 Hz, as the vidicon camera is locked to the fast scan generator.

As the price of IC's has come down quite low in Australia a project like this can be built for very little outlay and this is offset by its usefulness. Ref: Sync generator for SSTV. Ham Radio June 1972. Page 50.

AR

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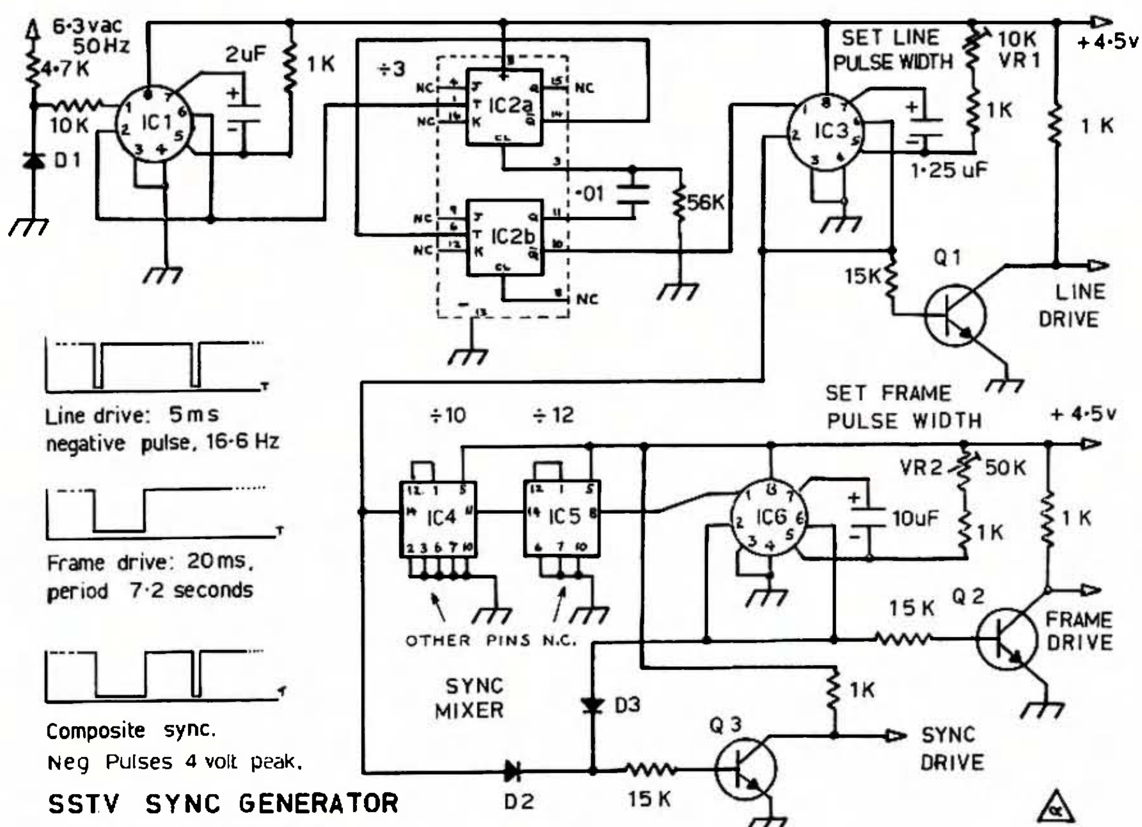


SSTV SYNC GENERATOR FOR 50Hz STANDARDS

IC1, IC3, IC6: μL914
IC2: SN7476
IC4: SN7490
IC5: SN7492
Q1-3: 2N706 (see text)
D1-3: IN914

FIXED CAPACITORS

C. A. Cullinan* VK3AXU

Are you confused by the vast range of types of capacitors in the catalogues, and which is best for what application? You should find most of your questions answered in this comprehensive series of articles on capacitors, and also benefit from the various practical examples provided from the author's long experience.

Much of the material in this series of articles has been extracted from publications of various Companies and "Amateur Radio" expresses its gratitude to the organisations concerned, without whose co-operation the article may not have been possible.

DEFINITIONS

"Capacitance.

"Electrical. 1. The ratio of an impressed charge on a conductor to the corresponding change in potential. 2. The ratio of the charge on either conductor to the potential difference between the conductors. 3. The property of being able to collect a charge of electricity.

"Capacity. Electrical. Same meaning as Capacitance.

"Capacitor. Electrical. A device for accumulating and storing a charge of electricity, consisting of two equally charged conducting surfaces, having opposite signs and separated by a dielectric.

"Condenser Electrical. Same meaning as Capacitor."

Extract from Random House Dictionary of the English Language.

"1. Capacitance is one of the three electrical quantities present in all radio circuits. The radio man endeavours to concentrate capacitance in definite well-known forms at definite points in the circuits, but capacitance exists between different conductors in the circuits and between the various conductors and the ground. Such capacitances, usually small, are ordinarily of no importance in the case of low or audio-frequency currents but may be of great importance in radio-frequency circuits particularly at VHF and UHF.

"A capacitor is an electrical device in which capacitance plays the main role. While some inductance and resistance may be present, these quantities are usually of such minor importance that they are negligible.

"A capacitor has three essential parts, two of which are usually metal plates separated or insulated by the third part called the *dielectric*.

"The amount of electricity which the capacitor will hold depends on the voltage applied to the capacitor. This may be expressed as $Q = C \times V$. The capacitance of the capacitor is the ratio of the quantity of electricity and the potential difference or voltage, ed as $Q = C \times V$. The capacitance of the farads and V in volts. The capacitance of a capacitor is dependent on the size and spacing of the plates and the kind of dielectric between the plates.

"2. Units of Capacitance. The unit of capacitance is the *farad*. A capacitor has a capacitance of one farad when one coulomb of electricity can be added to it by an applied voltage of one volt. This unit is too large for practical use so that a smaller unit, the microfarad, abbreviated *uf* or one-millionth of a farad, is used. Another unit, the micro-microfarad is used as well. It is abbreviated *uuf*. The micro-micro-farad is known also as the picofarad, abbreviated pf or pF.

"Yet another unit occasionally used is the Jar. One farad = 9 x 10[illegible] jars.

"Still another unit is the *centimetre* or absolute unit. One farad = 9 x 10[illegible] centimetres.

"3. Electrical Energy of a Charged Capacitor. Work is done in charging a capacitor because the dielectric opposes the setting up of the electric strain or displacement of the electric field in the dielectric. The energy of the charging source is stored up as electrostatic energy in the dielectric.

"The work done in placing a charge in a capacitor is

$$W = \tfrac{1}{2}Q \times V = \tfrac{1}{2}CV^2 = \frac{Q^2}{2C}$$

where W is expressed in joules,
Q is expressed in coulombs
V is expressed in volts.

"The work done in charging a capacitor is independent of the time taken to charge it.

"4. Power required to charge a Capacitor. The average power required to charge a capacitor is given by the equation

$$P = \frac{\tfrac{1}{2}CV^2}{t}$$

where P is expressed in watts,
C is expressed in microfarads,
V is expressed in volts,
t is expressed in seconds.

"If the capacitor is charged and discharged N times per second the above equation becomes

$$P = \tfrac{1}{2}CV^2 N$$

"If an alternating e.m.f. of frequency f is used in charging a capacitor, the equation may be written

$$P = CE_o f$$

where P is expressed in watts,
C is capacitance in farads,
Eo is the maximum value of voltage,
f is the frequency in cycles per second."

(The above was extracted from a paper by E. L. Hall, E.E. US. Bureau of Standards.

"No other electrical component is called upon to perform such a wide variety of functions in electronic circuits as the capacitor. Most of these applications are based upon the ability of the capacitor to differentiate between electrical currents of various frequencies. Such applications include; d.c. blocking, ripple filtering, r.f. and audio by-passing, coupling, frequency determination, R-C timing, and energy storage. Because of the varied requirements of these uses, fixed capacitors are made in many types and sizes, each especially engineered to fulfill a specific application or function. An important part of modern circuit design is therefore the choice of the proper capacitor for the circuit application at hand. In many cases, the success or failure of the design will actually depend upon this choice. The radio engineer, experimenter, and amateur must therefore have a firm background in capacitor design and application. This article will review this material and point out certain important 'kinks' in the use of fixed capacitors.

"Probably the most direct route to a mastery of the 'safe and sane' use of capacitors is to establish a thorough understanding of the characteristics and limitations of each general type. The choice of the proper type for each circuit application then becomes merely a matter of following good engineering practice. For this reason, we will commence with a discussion of the basic types of fixed capacitors which are encountered in electronic circuitry.

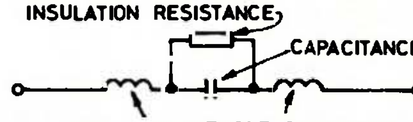


FIG 1 CAPACITOR EQUIVALENT CIRCUIT

"Since a capacitor is fundamentally two metallic conducting sheets isolated by a suitable dielectric material, the basic types are classified according to the type of dielectric used. They include:

- Air Dielectric Capacitors
- Mica Capacitors
- Ceramic Capacitors
- Tubular Capacitors
- Electrolytic Capacitors

"Just as all inductances have distributed capacity and resistance, and everyday resistors have some inductance and 'end-to-end' capacitance, practical condensers are not perfect capacitances. All have a certain amount of residual inductance associated with the leads and plates, and also a finite value of resistance called the 'insulation resistance'. Thus, the equivalent circuit of any capacitor can be considered as in Fig. 1. The magnitudes of these unwanted characteristics vary through wide limits as a function of mechanical design and type of insulation or 'impregnant' used, and must be considered along with such other characteristics as capacitance value, voltage and current ratings, temperature coefficient, stability, etc., in selecting a capacitor for a particular job. The actual choice is usually a compromise between mechanical and electrical perfection on one hand, and the dictates of economy, space, and the practical requirements of the application on the other.

---

*6 Adrian St., Colac. 3250.

The Air Dielectric Capacitor

"From the standpoint of low losses (high capacitor) and constancy of capacity value, the most nearly ideal capacitors are built with air (or vacuum) as the dielectric between the plates. Such capacitors are not perfect, however, for although air is a perfect dielectric having zero power factor, some losses arise due to dielectric hysteresis in the insulating material used to support the plates. Charging currents flowing in the leads and plates cause additional power losses and give rise to some residual reactance.

"The air-dielectric capacitor occupies much more volume for a given capacitance and is usually more expensive than any of the other general types. The reasons for this are apparent from an inspection of one of the simpler empirical formulas for the capacitance between parallel plates whose dimensions are large compared with the spacing between them, so that 'fringing' may be neglected:

$$\text{CAPACITANCE } (\mu\mu\text{fds}) = .2244\,K\,{}^{A}/_{d}$$

Where:
K is the dielectric constant of the material between plates.
A is the area of the smallest plate. (Sq.In.)
d is the distance between the plates (In.)

From this it is seen that the capacitance is directly proportional to the dielectric constant and the plate area, and inversely proportional to the spacing. Snce the dielectric constant of air is only 1.0, but is greater than unity for all other insulating materials used in capacitor construction, greater areas must be used in air capacitors to achieve a given capacitance. In addition, the dielectric strength of air is considerably lower than that of the other dielectrics, so that greater electrode spacings are necessary for a given working voltage. As a result, the volume occupied by an air-dielectric capacitor will be at least 500 times greater than that of a comparable capacitor using a high grade mica dielectric.

"Because of these factors, air as a dielectric is used only to a very limited extent in fixed capacitors, such as in certain laboratory capacitance standards. Fixed capacitors using vacuum or an inert gas under pressure are used to a greater extent, since the breakdown voltage is increased about four to ten times thereby. Air dielectric variable capacitors are, of course, widely used for tuning r.f. circuits because of their mechanical simplicity.

"In February 1937, the writer constructed a high-power R.F. 'Short-wave' therapy (diathermy) machine operating on approximately 37.5 MHz. Power output approximately 500 watts.

"A fixed capacitor was required and one was constructed using two aluminium plates, each 18" x 12" and spaced ¼", the dielectric being air. The plates were supported by stand-off insulators.

"This capacitor lasted the life of the machine, approx. 20 years. Its capacitance can be calculated from the formula given earlier.

Mica Capacitors

"Mica is widely used as the insulating material in capacitors manufactured primarily for r.f. applications. The mica capacitor is characterized by low power factor, high puncture voltage, good stability, high insulation resistance, and reasonable cost. As mentioned above, the size for a given capacity is considerably smaller than that of a comparable air-dielectric condenser. Due to the stacked construction usually employed, the inductance is quite low. A common construction is illustrated in Fig. 2. The plates consist of metal foil sandwiched between thin sheets of mica dielectric material. The ends of alternate foil strips extend beyond the

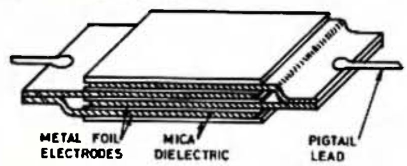


FIG 2 TYPICAL MICA CAPACITOR CONSTRUCTION

mica sheets at opposite ends of the stack and each group is clamped together and connected to a lead. Thus, the charging currents which flow into each plate do so through a relatively short, broad path. Therefore, the inductance is low, being mainly that contributed by the wire leads.

"Mica capacitors are used in a multitude of electronic applications where a high degree of capacitor excellence is required. Such uses include; r.f. fixed tuned circuits, r.f. by-passing, r.f. coupling, d.c. blocking, r.f. neutralizing, r.f. filtering, a.f. tone control, a.f. degenerative feedback, a.f. coupling where high insulation resistance is important (as in certain RC-coupled amplifiers), and many others.

"In radio frequency applications, mica capacitors are rated according to r.f. current handling capability as well as maximum instantaneous voltage. The observance of both of these ratings are equally important in practice. Excessive r.f. current results in capacitor heating, which, in turn, causes increased dielectric losses, capacitance deviation, and lowered breakdown voltage. The effect is thus cumulative. The r.f. current through a capacitor in any given application can be determined by connecting a suitable r.f. thermoammeter in series with it.

"In applications where stability of capacitance value is important, as in tuned circuits, r.f. filters, and other critical circuits, capacitors of the 'silvered mica' variety are used. These units have extreme capacitance stability and low temperature coefficients. These excellent characteristics are obtained by depositing a silver coating on the opposite surfaces of mica wafers and 'sintering'

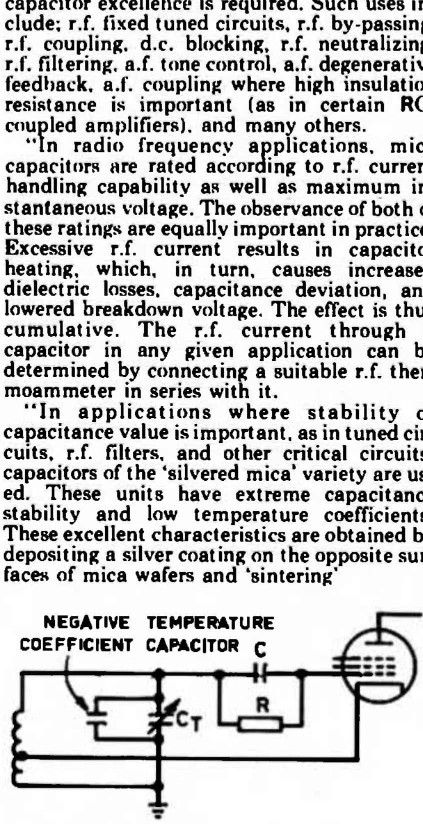


FIG 3 USE OF TEMPERATURE COMPENSATING CAPACITOR

this assembly at high temperature to form highly conducting metal 'plates' in intimate contact with the mica. The variable factor of stacking pressure is thus drastically reduced, with correspondingly improved stability.

High quality mica units are manufactured with either positive, zero, or negative temperature coefficients of capacitance. Capacitors of this type can be used for temperature compensation in tuned LC circuits in which low frequency drift with ambient temperature change is important. By such means, self-excited r.f. oscillators having frequency stability comparable to crystal controlled oscillators can be built. Stabilized oscillators of this type are used for receiver local oscillators, amateur v.f.o.'s, power oscillators where crystal control is impractical, etc. An example of the application of temperature compensating mica capacitors is given in Fig.3. Here it is desired to maintain the LC product (and hence the frequency) of an r.f. oscillator 'tank' circuit at a constant value over a wide temperature range. This may be accomplished by determining the approximate temperature coefficient of the uncompensated circuit in terms of capacitance deviation in parts per million per degree Centigrade. This coefficient will usually be positive with common circuit elements, i.e., the frequency decreases with increasing temperature. Temperature compensation then consists of the selection of a capacitor having a negative temperature coefficient approximately equal to the positive characteristic of the other circuit elements. Thus, with all circuit elements subjected to the same ambient temperature changes, frequency 'drift' is compensated. A trick frequently resorted to by circuit designers consists of placing the compensating capacitor at a location in the equivalent where a temperature gradient exists, such as near a vacuum tube. A 'vernier control' of temperature compensation is then obtained by adjusting the position of the capacitor within this gradient by trial and error until a point of best frequency stability is located.

The Glass Capacitor

"In the early days of Amateur Radio it was quite commonplace for Amateurs to 'home-brew most of their equipment and fixed high-voltage capacitors were no exception particularly in the days of spark transmitters.

"One such capacitor made by the writer about 1925 used twelve sheets of window pane glass, each sheet one foot square. The sheets, except for the outside of one and 12, were given a coating of Shellac on one side, then leaves of tinfoil placed over the wet Shellac and bonded into position. The final assembly was similar to that of the mica condenser shown in Figure 2.

"This capacitor was used in an amateur spark transmitter with a Model T Ford igni on coil as the spark high-voltage supply.

To be continued.

EUROPEAN Amateur
TV REPORTING SYSTEM

Picture Carrier
B0 Nothing receivable from the picture carrier
B1 A3 sound or speech audible, receiver on AM
B2 A3 sound visible, speech understandable.
B3 Non-lockable picture visible, A5 rumble available.B4 Lines can be locked, A5 rumble loud.
B5 Lines and picture can be locked.
B6 Call readable.
B7 Persons recognisable.
B8 Picture almost free from noise.
B9 Picture almost free from noise.B8 Details recognisable.
B9+ Picture completely free from noise.
N.B. The TV receiver is switched to AM for B1-B1

Sound Carrier
T0 Nothing receivable from the sound carrier.
T1 Test tones audible, speech unintelligible.
T2 Speech sometimes understandable.
T3 Speech understandable when picture is at black level.
T4 Speech understandable when picture contest is white.
T5 Speech understandable if tuned for best picture.
T6 Poor speech understanding if tuned for best picture.
T7 Good speech understanding if tuned for best picture.
T8 Sound almost free of distortions if tuned for best picture.
T9 Sound completely free of distortions if tuned for best picture.

Remarks
B1 The TV receiver is switched to AM. The vision carrier is to be modulated by speech in the A3 mode.B2 Again the TV receiver should be switched to AM. Horizontal bars should appear on the screen if the sound is tone of 200-800 Hz. Whistling into the microphone is an alternative.
B3 Sync pulses should be visible if the brightness is turned up.
B1,5 It should be possible to lock both frame and line by careful adjustment.
B6 The call sign should fill the screen, and it may be necessary to darken the shack to read it.
B7 The picture should be of a well known person, such as the Queen or some local personality.B8 Scales, and the hands of, watches should be discernible
B9 3 MHz on 625 should be resolved.
B9+ 400V should be available from the aerial
Re-printed from CQ-TV March 1973

CHRIS CULLINAN VK3AXU, WINS THE 1972 HIGGINBOTHAM AWARD.

The Higginbotham Award was described in AR of February 1965 thus — "The Publications Committee decided that as no technical article for 1964 merited the award, it would be better to broaden the scope of this prize to include meritorious service towards "Amateur Radio".

The Publications Committee decided that Chris Cullinan VK3AXU, qualified for the 1972 Higginbotham Award for his consistent contributions to AR over a long period of time. An Award cheque was presented to him recently by Rod Champness VK3UG, on behalf of the Committee and the photograph below, taken by Cyril Maude VK3ZCK, commemorates the occasion at the author's home in Colac.

Chris has been licensed for a great many years and a biographical sketch is being planned for a future issue.

Kerry Adams, VK5SU, winner of the past two Ross Hull VHF contests.

On six metres Kerry used the FT DX401 into an FTV650 to a 4 el beam at 57 feet for CW, AM, FM and SSB contacts.

On two metres, a VK3 pre-amp intc a VK3ABP converter into the FT200 was used to receive, and a 15 year old transmitter running 20 watts into a 832 to transmit.

Earlier this year, a lecture by Greg VK3YGB and Peter VK3ZPA, was presented to the VK3 VHF Group meeting by ATV over a 25 mile path from Sunbury.

Noisy but perfectly "readable" signals were received at the rooms in East Melbourne by reflecting signals from a nearby building.

Transmitter was grid modulated, 15 watts output, into a 10 element yagi.

Receiver was a VK3 432 mcs converter with pre-amp into a TV receiver. Antenna was a 2 x 13 element yagi.

Les Jenkins VK3ZBJ, author of several articles published in AR, demonstrates to his daughter his latest project, a hand held FM transceiver. A descriptive article should appear in a future issue of the magazine.

The Heathkit H.W.7 CW Transceiver

AR TECHNICAL STAFF

For quite a while now manufacturers in the Amateur Equipment business have catered rather well for those of us who required a medium to high power SSB rig. Notably lacking has been any transmitter or transceiver designed for CW operation only.

The Heath H.W.7 takes a novel approach to this aspect of our hobby. The design represents new thinking in almost all respects. Firstly, it is fully transistorised and as such is intended to operate from either a battery or small AC supply. As the transmitter runs a power input of about three watts, it would be quite feasible to operate the rig from a set of torch batteries.

The receiver uses the syncrodyne or direct conversion principle of operation and although it is very simple in overall design, the performance is surprisingly good. Operation is provided on three bands, 40, 20 and 15 meters. The actual coverage being 7.0 to 7.2, 14.0 to 14.2 and 21.0 to 21.3 MHz. The accurately calibrated dial is driven by a smooth-acting planetary drive.

The power requirements are: 12/13 volts DC with a current drain of 35 MA on receive and 450 MA on transmit with the key down. The matching HWA-7-1 power supply will deliver an output of 13 volts regulated at 600 MA with an input of either 110/130 or 220/260 volts 50/60 Hz.

DESIGN FEATURES

The most striking feature of the H.W.7 is the compact construction. The overall size is only 9¼ inches wide, 8½ inches deep and 4¼ inches high including knobs and feet, and the total weight is 4 lbs. 8 ozs.

The majority of the components are assembled on one printed circuit board which takes up most of the space inside the cabinet. The cabinet is made of heavy-gauge aluminium, assembled in such a way as to allow easy access to the various internal components. The finish is in the usual Heath colours, that is, a fine grey crackle for the cabinet and the usual Heath green on the front panel.

Controls include tuning, AF gain, receiver preselector, PA tuning and four push buttons for band selection and crystal or VFO operation for the transmitter section. There is also a crystal socket and a relative power meter for transmitter tune up. Supplied with our test unit was the optional AC power supply, the HWA-7-1.

CIRCUIT DESCRIPTION

The H.W.7 uses twelve transistors and one integrated circuit. As mentioned before the receiver works on the direct conversion principle and uses a dual gate MOSFET as the detector stage. This is followed by a sharp cut-off 2 KHz audio filter which provides the receive selectivity. The one IC is used as the audio amplifier and provides over 100 db of gain to feed to a pair of high impedence headphones.

The heart of the whole unit — the VFO — uses an MPF 105 FET and is followed up with an MPS 6521 silicon transistor which works as a doubler on forty and twenty meters and a tripler on fifteen meters. As we will see later, the VFO has quite exceptional stability in all respects.

The output of the multiplier stage feeds the second gate of the MOSFET detector in the receive mode, or the transmitter driver stage in the transmit mode. The final amplifier uses a pair of MPSU 05's in parallel feeding through a pi-coupler network to a fixed output load of 50 ohms.

All the PA tank coils are wound on miniature toroids which are mounted directly on the printed circuit boards adjacent to the band switches. An interesting feature of the transmitter is that full break-in keying with side tone is provided. Apart from the antenna change over which is relay operated, all the switching is controlled by electronic devices.

The H.W.7 on the Air. Just how does a simple receiver of this type really work? Considering that the RF portion of it really has only one transistor plus the VFO, I am sure the sensitivity will surprise everyone even if they are accustomed to quite sophisticated gear. Heath quotes the sensitivity as less than one microvolt and, in use beside the H.W.7's big brother an SB101 transceiver, it was hard to find a signal on the 101 which could not be copied on the H.W.7.

So, you might well ask, what is the catch. Well of course the price of simplicity must be paid for in quite a few ways.

Firstly, the front end selectivity is determined by one simple tuned circuit. This means in practice that strong adjacent signals will often be heard as a background to the required signal. Also, unless the receiver preselector control is tuned spot-on, all kinds of out-of-band signals will be heard. Next, the overall gain is rather limited and even with 100 db of gain available in the audio IC it is necessary to use headphones, there is no provision to use a speaker.

It was also noticed that when the preselector was peaked, a strong hum would often peak with it taking out all signals. We found that this effect would either appear or not depending on the location of the unit. The trouble was traced to the matching power supply. Operating from a different regulated supply, the hum problem disappeared. We did not trace the cause further.

The transmitter operation was excellent. The break-in keying was a delight to use with the return to receive delay being adjustable with an internal pre-set control. With a power input of a fraction over three watts, two watts output was measured on all bands. Incidentally, this power level would be ideal to drive a higher power final such as a single 6146 or 807.

The stability of the VFO is rated by Heath as better than 100 Hz drift after 10 minutes warm up. Checked on a frequency counter it was found that the total drift from cold did not exceed 100 Hz on any of the three bands. Quite an exceptional figure when it is realised that the actual VFO drift is either half or a third of this figure due to the multiplication used.

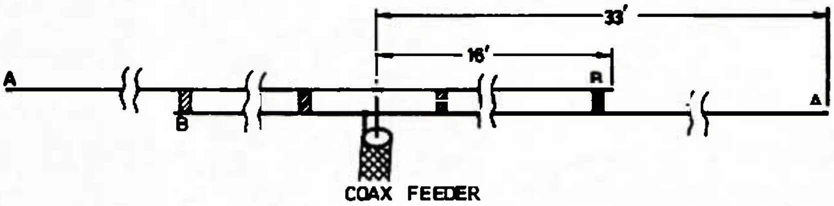
CONCLUSIONS

Just where does a rig of this type fit into the scheme of things. Apart from the obvious things such as portable operation when camping or caravaning, it seems to me that it might be useful to the amateur who has everything, perhaps in the same way that a mini-bike might appeal to the man who drives a Mercedes.

There is no doubt that there is quite a sense of achievement in working DX with low power, and there is no doubt that it can be done on this little rig; we did.

The reviewers wish to thank Schlumberger Instrumentation Australia Pty. Ltd., for the loan of a unit for test and evaluation purposes and from whom further details are available as set out in the advertisement appearing elsewhere in this issue.

A Simple Three-Band Aerial for Portable Use



A letter received recently from Keith McCarthy VK9AR of Port Moresby gives some details of a simple antenna for 40, 20 and 15 metres. It uses a common 50 ohm coaxial feeder for the three bands, can be constructed in a very short time, and apparently works well.

The material required is a 66 foot length of open-wire TV feeder of the type which uses spacer blocks at intervals. Keith describes the construction thus:

"Scrape away the insulation of both wires at the centre. Attach the outer conductor of the 50 ohm coax to one wire and the centre conductor of the coax to the other wire. Then cut opposite wires back to 16 feet from the centre feed-point."

Reference to the drawing should make this quite clear. It will be seen that the system amounts to a 40 metre half-wave in parallel with a 20 metre half-wave (A-A and B-B in the drawing). The 40 metre dipole will of course function in three-half-wave mode on 15 metres, and still present an impedance compatible with coax. In spite of the close proximity of the two antennas, Keith claims, "In each case the 'loafing' antenna just doesn't exist as far as the transmitter is concerned."

He goes on to suggest that use of insulators at each end would permit the antenna to be used horizontally. "However the writer has had best results with the aerial hung from one end and a weight at the other." Suspended from the mast of the motor yacht "Pandemonium", no doubt?

Bill Rice VK3ABP
Technical Editor

NEWCOMER'S NOTEBOOK

With Rodney Champness,* VK3UG

Learning Morse Code, Sending Part IIc "Brass Pounding".

This is the coloquial term for the manipulation of the morse key. If you talk with a number of CW operators you will find there are two or three different methods of sending with the normal hand key. The way to grasp the key is shown in figure 1, and is common to all variants of sending posture. I will endeavour to outline two methods. It will then be up to you to use the method you personally find satisfactory.

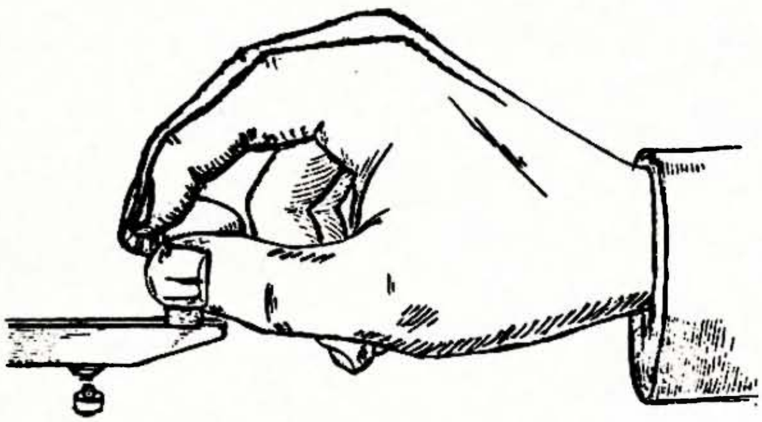


FIG.1.

One method required you to rest your elbow on the table and the second expressly forbids it. The former for want of a better name could be called the American method and the latter the British-Australian method. I have tried both, and found the American method good as have many others. Ken Gillespie found he could send better quality morse using the British-Australian method. This is the most used method here. The key, no matter which method of sending is used, must be firmly mounted on the sending table (or held by the left hand, but this tends to make sending more difficult).

THE BRITISH-AUSTRALIAN METHOD

When sending, sit squarely at your table, with your seat at such a height that your forearm is horizontal and in a straight line with the key lever. If the chair isn't high enough a cushion can be used to raise its height. The right upper arm should hang loosely below the shoulder slightly out from the body. Any tendency to carry the elbow out away from the body towards the line of the shoulder should be corrected immediately.

The left hand is placed on the table to hold the key, or to underline a text that is being sent, or just resting there. In my case I adjust my receiver for monitoring purposes and the checking of other transmissions during breaks in my transmissions.

Form the right hand into an arch and lightly rest the tips of the first and second fingers on the top of knob of the key, with the ball of the thumb on the left hand side of the knob as shown in figure 1. For knobs fitted with a thumb-plate, the thumb rests on that as well. The fingers are fairly loose, muscles are relaxed, and a definite grip should be avoided.

To make a "dit" drop the wrist down level with the elbow, bringing the lower arm parallel with the floor — then immediately to the up position. For a "dit" the key is not held down; the action is a continuous one, down and up. A "dah" is made in the same way as a "dit" except that the wrist is left in the down position for a period of three "dits" before returning it ot the normal position. Do not use force in any of these movements, and above all, avoid nerve sending (i.e. with a stiff wrist, fingers only flexing) or exaggerated wrist movement.

A newcomer to morse telegraphy may experience difficulty in judging the time for the "dahs", or "singing" them as you send, as you did for receive, will help to get the correct length of character. This will help you to develop sending which has a rhythm to it.

THE AMERICAN METHOD

The key is grasped in the same way as the previous method. The forearm should rest comfortably on the table. The key should be placed far enough back on the table so that the elbow can rest on the table. If this is not done, pressure of the table edge on the arm will restrict blood flow in many cases, resulting in fatigue of the arm. This will tend to upset both accuracy and the time the operator can send without rest. The wrist action using this method is identical to the previous method, and duplication of the common information is unnecessary.

SUMMARY

You should aim for good formation and regularity of spacing, rather than speed. Ask a proficient telegraphist to criticise your sending soon after you start practising — if possible even before. There are a number of inferior morse senders on the air — unfortunately — I hope you won't be one of them. Send morse of the quality and speed that you would like to receive. It must be sent correctly to be received correctly.

The characteristics of good morse code are:

All dots should be the same length, at the same speed.

All dashes should be the same length, at the same speed.

Consecutive dots and dashes in one letter should be equally spaced.

Letters should be equally spaced.

Words should be equally spaced.

SUMMARY OF THE MORSE CODE SERIES

With patience, morse code recepflon and transmission can be mastered by mbst people to examination standard within six monthbs. Receiving practice can be obtained on the air from various stations, from records or tapes, or via an accomplished friend's personal tuition. The WIA do have personal classes in many States.

A good key is essential if good morse is to be sent. A cheap "beginners" key is a waste of money.

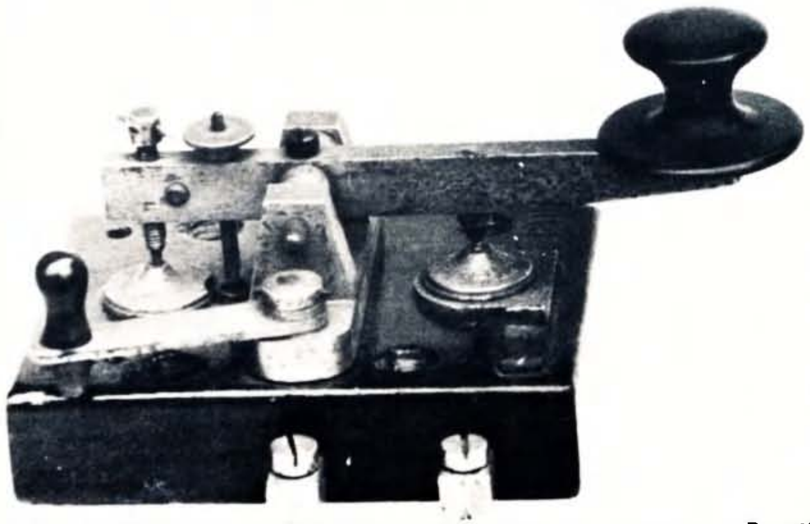
An audio monitor, either a buzzer or an audio oscillator system is necessary accurately to check your sending ability.

Good wrist action is necessary for effortless quality sending. If possible have a competent telegraphist criticise both your sending and receiving. Finally I wish to thank Ken Gillespie, VK3GK, for his valued help in the compilation of this series of articles on morse code.

Next month I hope to have the promised article on basic test instruments for the amateur station. Unfortunately my workshop has not materialised, due — so I'm told — to scarcity of some building materials, hence a few of the practical articles have been considerably delayed.

Thank you to those who have written with suggestions for future articles. Do you-the-newcomer-think that the articles have been suitable for you? I would appreciate further letters which will help me to plan future articles.

AR



*44 Rathmullen Rd., Boronia, Vic. 3155.

Commercial Kinks

With Ron Fisher,* VK3OM

This month a few words on servicing communications receivers, a trouble-shooting guide on the Yaesu FT 400 transceiver and a few items of interest to mobile operators.

SERVICING COMMUNICATIONS RECEIVERS

I hope that readers are not expecting a quick and easy run down on how to fix that particular fault in that favourite receiver of yours.

Indeed this article is more a collection of things NOT to do. One of the things most asked for in correspondence to this column is advice on how to line up this or that receiver. I often wonder why. Unless a receiver has been deliberately tampered with in some way, it is almost certain that the last thing it needs is a realignment.

After the initial thrill has worn off that new receiver our friend decides that perhaps the performance is not up to what it should be. What could be wrong? Must need lining up, and before long we do indeed have a set that does need lining up.

Resist that temptation to just peak it up a little. Now you might well ask — how do I know when the set is dropping off a bit. One thing I have got into the habit of doing with receivers over the years is to check the S meter reading against a standard signal, such as the built-in crystal calibrator. Make a note in the back of your log book of the S meter reading on a particular frequency on each band.

Probably most of the trouble in receivers is caused by defective valves. I feel it is always wise to have a spare set on hand so that you can exchange them from time to time to keep a check on performance. However make sure you do not get the new ones and the old ones mixed up.

After that if you still insist that your set needs lining up and you haven't the required data, drop me a line, I might be able to help.

THE FT 400 TRANSCEIVER

Once again I am indebted to Mr. Fred Bail of Bail Electronics for the following service details on the FT 400. While a few of these may seem to be self evident, it is nevertheless easy to overlook simple faults.

Symptom. Low output on all bands. Transmitter flat-tops at low output levels. **Probable cause:** Weak PA valves. Bias reduced to compensate. **Cure:** A low grid bias in the valves could cause grid current to be drawn at low drive causing saturation. Check and replace PA valves.

Symptom. Loss of output on one band only. **Probable cause:** Dry joint in driver plate coil. (6GK6). **Cure:** Repair or resolder coil. Check band switch contacts.

Symptom. Intermittent loss of IC meter indication. Transmitter output remains OK. **Probable cause:** Faulty meter or relay. **Cure:** Check and clean contacts of relay RL1 which changes over the meter functions.

Symptom. Antenna relay inoperative. **Probable cause:** Loose resistor R517 on power supply board. **Cure:** Check and resolder. Also check relay coil for continuity.

Symptom. Receiver sensitivity reduced intermittently during operation. **Probable cause:** Poor contacts in antenna relay. **Cure:** Clean contacts.

Symptom. ALC inoperative or ALC meter reading low. **Probable cause:** Valve V204 (6BA6). **Cure:** Replace valve. Check circuitry. Also check PA valves.

Symptom. VFO linearity poor after half an hour warm-up. **Probably cause:** VFO tuning capacitor stator-plate loose. **Cure:** Tighten stator-plate. Check tuning capacitor for any mechanical defects.

Symptom. Variation of resting IC reading. **Probable cause:** Faulty PA valves. **Cure:** Replace valves. Check bias voltage.

Symptom. VFO drops out of oscillation below 250 on the black scale. May be accompanied by spurious signals and birdies on receiver appearing on each side of filter. **Probable cause:** Dry joints in the VFO printed circuit board. **Cure:** Solder eyelets etc. on the board. Also check contact fingers on the VFO tuning capacitor. Clean with Pressure Pack contact cleaner.

Symptom. Drift in VFO when clarifier switch is in receiver position. Drift appears only on transmission. **Probable cause:** Cnnection of wire from R9 and R10 to receive position of S3a. Also could be contacts on relay RL1. **Cure:** Check continuity and solder where necessary. Clean relay contacts.

Symptom. Calibrator signal weak or intermittent. **Probable cause:** Faulty connections or dry joints on calibrator printed circuit board. **Cure:** Check voltages on board. Re-solder eyelets, rivets and supply voltage tags.

Symptom. VFO jumping in frequency after warm-up. **Probable cause:** Components and leads in wire eyelets on VFO printed circuit board not soldered to copper laminate. **Cure:** Remove board and re-solder all eyelets and components.

Symptom. VFO jumping in frequency during tuning. **Probable cause:** Bad contact between tuning capacitor wiper forks and shaft. **Cure:** First try cleaning with pressure-pack contact cleaner. If no improvement, remove forks, re-tension and replace in position.

Symptom. Pulling or FM-ing of VFO frequency on voice peaks. **Probable cause:** Defect in voltage regulator causing slight variation in regulated voltage to VFO. **Cure:** Check voltage regulator components, check for correct input voltage to VR circuits.

Symptom. Transmitter output down and poor CRO pattern on low bands. OK on 10 meter band and OK on 15 meter band, but plate tuning at 40 meter position. **Probable cause:** 15 meter tap shorted to 10 meter tap on PA coil HT lead to PA RFC insulation burnt. PA coil slightly discoloured showing signs of overheating. **Cure:** Separate and re-solder any shorted taps.

As there must be quite a number of FT400's about, perhaps our readers could add to the above trouble guide. In the meantime our thanks again to Fred Bail.

COMMERCIAL INTEREST

Whilst I was collecting the above information from Fred, I spent some time browsing round some of the many bits and pieces that he has in stock. I picked out the following as an interesting group for the mobile man.

There are three types of filters to reduce noise caused by generators and alternators. First the "Dot Line" AF 104 non-tunable alternator filter. This unit is easily connected to the average car and according to reports does a first rate job.

The "Dot Line" generator filter is of the tunable type, and instructions are included on how to tune it to your favourite band.

Also available is a coax type capacitor designed to be fitted into the field lead of the car electrical system. All these units are priced at $9 each and of course further details are obtainable from Bail Electronics.

Next month, the long awaited FT200 noise Blanker. I am sure a lot of people are waiting for this.

*3 Fairview Ave., Glen Waverley, 3150.

you and DX

With Don Grantley*

Times: GMT

Many thanks to those of you who have written in this month, and believe me your letters are appreciated, although it may be some time before they get answered. Quite a lot of news to hand for this issue, so without further ado let's have a look firstly at Geoff Watts DX News Sheet.

Once again we have quite a number of prefixes which are of use only to those who specialise in that form of scoring. I will list them here with any information provided about their activity. TY3ABF says QSL to DL8OA, whilst TY5ABK has been noted on 14206 ssb at around 1300z. Bux YB9ABH on ssb 14280 at 0900. QSL to 30-P River Valley Close, Singapore 9.GB5SC operation for the period March 6 to 10 incl. commemorates the 50th anniversary of the Glascow BBC station 5SC. YA0CDRC is the club station for the Camel Drivers' Radio Club which is QRV on 14285 ssb Saturday and Sunday at 1230z, with net control YA1AH, but like all others in this section, he is valid for prefix hunters only. As well as these, FC6CKM, GD2HCX, 1V5LN, XG1J and 7X0GM have been active in the past weeks.

A batch of mail for 9M80EA and 9M8SPD has apparently been lost and it is suggested that anybody who has not yet received their QSL for those operations, should contact the operator. Charles E. Schaub, Regional Relay Facility, PSC No. 2, Box 19047, APO, San Francisco, 96274, USA.

Recent operation by Tony 7P8AC should be completed at this point. However, he hoped to resume from 3D6 towards the end of April. Manager for his efforts is W2GLU. By the way, 7P8AB still remains active, and his cards should go direct to Dr. A. Jacques, P.O. Box 389, Maseru.

XT2 is well represented these days with XT2AF who has been worked on 14215 at 2240z, manager being VE2JH. XT2AJ, heard on 21 MHz at 1400 is Claude, ex-FH8CG. XT2AK is Michel ex-F5XU/FR7AF, and has been noted on 14 MHz at around 1800z, manager is F6AXP, whilst to round it up, XT2AA will shortly be QRV with RTTY.

VQ9HCS after having a very good session from Aldabra Is., went QRT on March 23rd and has returned to England, but shortly it is expected that he will activate either Astove or Farquhar Is. Manager is WA1HAA.

Whilst in the VQ9 area, Bob WA1RDH/VQ9 who has been operating from Chagos will return to the States shortly, in fact he should be there by the time you read this. After a stay at home, he will return to ET3. Manager will remain W4WFL.

In October last, KH6HLK/KH6 was on the air from Kure Is., and for some reason the wrong QSL manager was given, cards should in fact go direct to KH6HLK. At the same time as this operation, K5CII/KH6 was understood by some also to be on from Kure, but this was not the case and his cards should be sent to Captain Joseph Locascio, 98 1325 Akaaka St., Aiea, Hawaii, 96701.

Currently there is quite a bit of activity from the Pacific Area. KJ6CF on 14 ssb at about 0500, KJ6BZ Paul at about 14300 late afternoon VK time, as is KS6LR who appears at about 0700z. JD1AHC from Marcus Is. 14180 at about 0700z working to a list from OK1HA, also Sundays at about 14300 timed 0600z working to a list from one of his countrymen. He has been reported from the States on 14025 cw at 0030z. VR1O by the way has returned home and any outstanding cards can go to him as G3NRA David Appleton, 3 Boyne Rise, Kingsworthy, Winchester, Hants. Back to the Pacific area again, the YJ8's are represented by YJ8DE who is usually in the Pacific net, YJ8DS sometimes on 14269 at 0900z, YJ8EE Jack, QRV daily 14262 at 0745, whilst 3D2DM was due to appear as YJ8 on 14010 and 21110 CW for three weeks from March 19.

ZL3KK/C from Chatham Is., due to go QRT at the end of March, cards should go to ZM4CR. VR1AA went QRT on March 20, but will reopen from the same QTH at some time in September for a further two years. KX6RA Rudy is on from Majuro Is., 14305 at 0800 in the Micronesia Net, QTH Rudolf Aliven, Box 285, Majuro Marshall Is. 96701.

The gentlemen of the DX world are saying some kind things about VK3FF (ex-VK0PF) in his handling of the current operation from Macquarie Is. by VK0WW; seems that the QSL's really fly along quite rapidly.

During April 1971, WB8ABN and wife HC1MM were involved in a jaunt which covered F0MH, FG0MH, FG0MH/VE3, PJ8RD, VP2AAD, VP2AZ, VP2EEL, WB8ABN/HC1, WB8ABN/HK0, ZF1CW and C31ED. Maria alone was on from HC1NMM and HK0. They are about to close their logs for this jaunt, so if you missed out it would be advisable to contact them at once. Address OK in the call book.

VE8DJ Dave is active from Victoria Is. in Zone 1, he did a fb job from there during the past ARRL contest on March 17, and put out a very good signal on 7005. Manager is VE3DAM, but this home address for those who want to contact him direct is David McKerrow, Dewline Station, Cambridge Bay, Victoria Is., NWT.

Operation from Spratley Is. by 1S1A was apparently a most interesting one, in that it was con ducted in the worst conditions ever. Bad enougl that they had to do the trip in a 65 ft. ex-army Q-boat in winds nearing 30 knots and seas running some 30 ft. high, but worse was to come when Pete HS4AGN was swept away in a whaleboat whilst ferrying supplies to the island. He was safely rescued from the open sea some eight hours later. The operation was a great success, many contacts being made on all bands. Manager for the trip was W1YRC.

SHORT JOTS

The K4 operation to 3A0 scheduled for early this year was cancelled. Watch 7084 ssb daily at about 0615 for a possible appearance by the 5N2 gang. 5R8AG on 14020 at 1800, QTH is Box 60, Ivato Aeroport, Madagascar. Dave 6Y5DB, ex-VE3EDG on 7003 CW at 0530z. Manager is VE3EDC. QSL's for A35FX go to George, ZL2AFZ. OK5KBB operation from March 5 to 11 from military winter sports championship, Donovaly. QSL to OK3C1B. TL8LI now back in France as F6BFH, to whom all cards should be sent. QSL's for CR8AG now go to CT1SH. F9MS is manager for only FR7ZU/E/G and T, please don't send any other FR7 cards to him. Tom MP4TEE 14160 at 1500 working manage G3LQP, says his call has changed to A6XF a from March 31.

AWARDS

These are now covered by a special section, anc I no longer list them here. However Geoff Watt's news sheet No. 564 lists three newies, HQ25HG WAHC Ecuador, and the RAEM Certificate. I you want the info, drop me a "sase" and quote th DXNS number.

Speaking of Geoff Watts, as I often do, h reminds me the new edition of the W6GSV DX Managers' director is now available from him, apparently you send Geoff your order plus the equivalent of 2db sterling, and it is mailed direct from the States. More info or order to Geoff Watts DX News Sheet, 62 Belmore Road, Norwich, NOR 72-T, England. Geoff supplies us with most of the news in this page.

I must close at this stage, but before I do, an SOS from Murray VK4KX/5Z7OA, Brian ex-VR2FY, Box 30772, Nairobi, is anxious to contact John Weatherly, last heard of at Woomera. Should any of our chaps know him, would you please pass this on.

* P.O. Box 26, Imbil, Qld. 4570.

Why Not Try Double Sideband?

(Continued from page 5)

TESTING PROCEDURES

Connect a dummy load to the antenna output co-ax. Set up for 7 MHz C.W. (If you have built a dsb rig only you will have to provide a 9100 ohms screen dropping resistor and unbalance the 807s by breaking one cathode circuit.) With no H.T. applied to screens or plates, switch on your 7 MHz RF drive and tune the split-stator grid capacitor for maximum grid current, about 8ma. Now apply H.T. to screens and plates and adjust plate tuning capacitor and loading capacitor in the usual way. Use your absorption wavemeter to check the presence of 7 MHz radio frequency energy at the transmitter dummy load. Take a note of these 7 MHz C.W. screen and plate current readings. You are now ready to test the carrier suppression. Switch to the 7 MHz dsb condition, disconnect the modulation transformer from the 807 screens and connect the screens in parallel to the dropping resistor. Apply H.T. and with aid of the absorption meter check whether any RF at 7 MHz is present in the plate tank circuit. If the grid circuit is properly balanced there will be no indication of RF output. If there is RF output you will have to balance the system by one of two methods (1) wire a trimmer capacitor from one 807 grid to earth or (2) re-arrange the cathode circuit so that a variable resistor in one cathode can be used to adjust the plate current of one tube. Obviously method (1) is easier. Make your adjustment for proper balancing. However, I did not find any such adjustment necessary. Make a note of plate and screen currents. You can now proceed to test your rig to ascertain whether it performs as a dsb transmitter.

Remove the dropping resistor from the screens and re-connect the modulation transformer. With the modulator or microphone switched off, apply high tension. Because the screens have, in the absence of modulation, no high tension applied, there will be no plate current. Now bring in your modulator and adjust its gain so that the screen and plate currents kick up to about 2/3 of the previously noted values. At this stage (unless you are lucky enough to have some sophisticated test equipment available) you should enlist the aid of an Amateur about one mile distant. Get him to listen on his ssb receiver and adjust your modulation level until he reports your modulated bandwidth as about 6 KHz. Ask him to listen for splatter. When you are satisfied that your dsb signal is satisfactory take a note of the screen and plate current peaks and use either as a rudimentary modulation monitor.

I realise I am being cheeky in questioning anything written in the R.S.G.B. Handbook but I do question their statement that dsb "cannot be received without special equipment". Any reasonable quality ssb receiver will easily resolve dsb. The ssb operator, will, on 7 MHz, hear the unwanted (upper) sideband as inverted (quack-quack) speech. He may, if he has the facility, switch sidebands and resolve your upper sideband but in practice I suspect most ssb operators keep switched to lower sideband on 7 MHz. Therefore the ssb operator will resolve your lower sideband signal and be quite uninterested in your unwanted upper sideband.

(Continued on page 24)

TECHNICAL CORRESPONDENCE

The following letter to VK3CIF from Louis Varney G5RV (ex VK9LV) is printed for information.

Dear Peter,

I have just received "Amateur Radio" for January 1973 and was glad to see that you had printed the article (from "Ohm" magazine) on the G5RV antenna. As we left VK9 on May 3 1972, and spent three months leave travelling to the UK via several of the Pacific islands and several South American countries your letter of May 5 eventually caught up with me after we arrived home at the end of July last year. Frankly, I cannot remember if I sent a copy of the "Ohm" Article to you or not. I certainly intended to do so as I have not been able to find time to do a re-write because of many things that happened since our return — not least, a very serious motor accident in which I was involved — a head-on collision with another car in which I had two badly smashed feet and was in hospital and then recovering for four months! Still have considerable pain in the left foot but can now walk again OK and have just started to drive my car again! Thank goodness, I was wearing my seat belt, or I would have put my head through the windscreen — with very probably fatal results! This accident happened at the end of August last year, just a month after arriving in the UK.

One or two points that you may care to publish as a "follow-on" to the article:

1. 2nd para. 6th line, last word — for "two" read ½
2. 11th para. Reference to the use of the G3HZP balun — NOT now recommended. Tests show that, due to the wide reactance changes at the lower end of the 34 ft. stub at various frequencies, the advantage of using such a balun is questionable. It is excellent on 14 MHz but not really advantageous on the other bands.
3. It should have been mentioned that the G5RV works excellently in the form of an "inverted V" antenna. I used one with great success for six months while in Belgium as ON8RV in 1970.
4. Two G5RV antennas stacked, one 24 ft. above the other, preferably with the lower one a quarter wave (17.5 ft.) above ground, with the 34 ft. matching stub **transposed** and the "slack" suitably taken up by folding or suitably pulling out to one side or other of the array by means of a nylon cord, will act as a multi-band version of the "Lazy-H". This arrangement has given excellent results and has been used for many years by Pete Broome, G5DQ.

If you decide to publish these points, please also QSP73 from my XYL Nelida and myself to all the VK amateurs and especially to all those and their XYLs and families whom we had the pleasure to meet either in VK9 or in VK2, 3, 4 and 5 during our visits to Australia. We think the Aussies are a GREAT lot and will always remember them with pleasure and gratitude for their hospitality and real friendship.

Finally, I should like to say that I consider it a great honour to have held an Australian amateur licence and would be glad if you could mention this fact in "AR".

Yours
Louis Varney
G5RV (ex VK9LV)

PS. I am very proud to have qualified for the WIA DXCC certificate which has a place of honour on my radio room wall (this was for my VK9LV activities).

BOOK REVIEW

With Syd. Clark, VKASC.

"Television Interference Manual"

"Television interference is one of the most challenging problems facing the radio amateur today. While many cases of interference are due solely to deficiencies in modern electronic entertainment equipment, there are certain basic requirements with which the radio amateur must be familiar. This Manual examines the problems and suggests remedies. It also provides a wealth of technical information on many aspects of electromagnetic compatability."

The above extract from a letter accompanying the review copy of "Television Interference Manual", puts in concise form what the book aims to do. This is a British book, so due allowance must be made for the differences between the British TV systems and ours, and the fact that 75 ohm coaxial cable is used practically exclusively for TV feeder whereas we use mostly 300 ohm ribbon. The book not only deals with TVinterference but with the ever more common trouble of Hi-Fi-itis, or more plainly — interference to your neighbour's Hi-Fi system (EMC as they label it now). Cursory mention is made of broadcast band interference, and no mention is made of interference suffered by the amateur operator.

This book, despite a few minor limitations, is a wise investment for the amateur who values good neighbourly relationships. You won't learn everything there is to learn about TVI and how to cure it, but what it does say will put you on the right track.

Review copy received from RSGB through Magpubs. Cover price in the U.K. is shown as 0.80 pound.

VHF UHF
an expanding world

With Eric Jamieson,* VK5LP

Closing date for copy: 30th of month.
Times: E.A.S.T.

AMATEUR BAND BEACONS

VKO	52.160	VK0WI Macquarie Island.
	53.100	VK0MA Mawson.
VK2	52.450	VK2WI Dural.
VK3	144.700	VK3RTG Vermont.
	144.925	VK3QZ Traralgon.
VK4	52.600	VK4WI/2 Townsville.
	144.400	VK4WI/1 Mt. Mowbullan.
VK5	53.000	VK5VF Mt. Lofty.
	144.800	VK5VF Mt. Lofty.
VK6	52.006	VK6VF (VK6RTV) Bickley.
	52.900	VK6TS (VK6RTT) Carnarvon.
	144.500	VK6RTW Albany.
	145.000	VK6VF (VK6RTV) Bickley.
VK7	144.900	VK7VF (VK7RTX) Devonport.
VK8	52.200	VK8VF Darwin.
ZL1	145.100	ZL1VHF Auckland.
ZL2	145.200	ZL2VHF Wellington.
	145.250	ZL2VHP Palmerston North.
	431.850	ZL2VHP Palmerston North.
ZL3	145.300	ZL3VHF Christchurch.
ZL4	145.400	ZL4VHF Dunedin.
JA	52.500	JA1IGY Japan.
HL	50.100) 52.010)	HL9WI South Korea.
KX6	50.110	KX6HK Marshall Islands.

Various other beacons throughout the Pacific area operate on 50.100. There are rumours of a six metre beacon on 52.910 said to be operating or about to operate from Kalgoorlie with the call sign VK6RTU. Any news on this one please?

The West Australian VHF Group News Bulletin mentions the new solid state beacon to replace VK6VF is progressing gradually towards a finish, a further three months work at least.

Wonder if the VK1 beacon has been licenced yet?

Perhaps this column can lend support to the Geelong Amateur Radio & TV Club's campaign "RETURN TO TWO". There has most certainly been a large decline in two metre activity during the past few years, and it is noticeable that a lot of the present operators on the tunable section of that band are amateurs with full calls and those who have had their calls for a long time. It seems those who built their equipment in the 1955 to 1965 era (or thereabouts) don't easily give up. Many such rigs have been updated and now run SSB. When the chips are down, the oldies are there! The Geelong campaign hopes to stir more stations into activity on two metres, perhaps with properly recognised calling frequencies, e.g. 52.050 and 144.050, for any mode. Suggested back-up HF frequencies of 7090 and 14120, plus use of the local FM net.

One could go on a lot about two metres but this is enough for the present, hopefully the winter months might see an increase in the activity, culminating in some possible good contacts as the usual Es season comes around again in December. Despite what the sceptics say, two metres will surely provide some good DX during early summer months for the next few years, you wait and see!

6 UP RE-APPEARS!

After being missing from the VHF scene for five months, the controversial VHF magazine "6 UP" has re-appeared as an independent publication with Roger Harrison VK2ZTB as Editor. The March issue has set a very good pattern for reading, we wish them well. I commend the article headed "Meteor Scatter Propogation" by Rod VK2ZQJ as something really worth reading. Running in the March issue to five pages it is the first of a series and may well serve to stir some additional amateurs to take an interest in meteor scatter.

Although somewhat dated now, the exploits of Roger VK2ZTB on Cocos Island should be of interest to most if only because it concerns operation from a little known area. "On Cocos Island", Roger VK2ZTB, operated a beacon continuously from 1.12.72 to 8.1.73, running 30 watts output, voice ident on 52.210 MHz, it was heard in Perth by Danny VK6ZFF on 12.12.72 at about 0700 Perth time. On 7.11.72 the Darwin beacon was heard in Cocos Is. for a period greater than seven hours at good strength! No Darwin stations though. A long chart recording and a short tape were made of this event. "Vladivostok TV and the Korean broadcasting service stations were heard on a number of occasions in September-November as well as the beacon in Seoul, HL9WI, JA1IGY on 52.500 MHz was heard on several occasions along with some AM and SSB stations but no QSO's eventuated. TEP signals were heard past 100 MHz on several occasions. Unfortunately, owing to antenna limitations, signals were weak above 70 MHz and not recognisable. COME ON YOU Darwin blokes, when are you going to have a go at 144 MHz TEP?" ... from 6 UP.

BENDIGO REPEATER

John VK3AAA, the Translator Project Leader for the Midland Zone of the W.I.A., Victorian Div., has taken the trouble to write and advise me that the licence for the operation of their repeater on Ch.4 has been received, and as it contains conditions not previously required in Victoria, they may be of interest to other groups intending to apply for a licence. Briefly they are: Channel 4; 146.4 MHz input, 145.9 MHz output, emission F3 ± 15 KHz, authorised transmitter power, 50 watts. Suitable arrangements are to be made for:

(a) the prompt termination of transmission at the request of an Officer of the Radio Section.
(b) security of the equipment including the prevention of access by unauthorised persons.
(c) adequate and regular maintenance procedures.
(d) regular monitoring of transmissions by responsible Amateurs.
(e) adequate log keeping entries; should include actual transmission times, input power and frequency meter readings at regular maintenance inspections, a record of repairs and adjustments carried out and any other relevant information.
(f) fail safe operation — design must be such that it is impossible for the transmitter to "lock-on" in the absence of a received carrier, because of the failure of any component.
(g) means of access to the installation by departmental Officers at any time.
(h) no transmissions to be made in the absence of a received signal.
(i) automatic shut down to be effected by the application of an unmodulated carrier of five minutes duration by any transmitting station.
(j) the group to nominate a suitably qualified person or persons willing to accept responsibility for the operation of the station.
(k) all repeaters to incorporate facilities for automatic identification of all emissions.

The repeater call sign is generated in morse code by a digital identifier which frequency shift keys the outgoing signal. This means the identification is not audible in FM receivers and so does not affect normal operation through the system, but can easily read for monitoring purposes on a tunable receiver with a BFO. Code speed is approx. 10 w.p.m. and the call sign is repeated every 10 seconds while the carrier is on the air. The user stations do not announce the repeater call as this has not been required by the Department.

GROUP AND CLUB MAGAZINES

Throughout each month I receive a number of Newsletters and Bulletins from various Groups and Clubs. Those regularly received: "The Victorian VHF-er", journal of the VHF Group, Victorian Division of W.I.A.; "G.A.R.C." Newsletter from the Geelong Amateur Radio and TV Club; "Q.R.M." from the Northern Zone of W.I.A. of VK7; "West Australian VHF Group Bulletin"; "Tuned Lines", Official Journal of the VHF and TV Group, N.S.W. Division of W.I.A.; "6 UP" published by Amateur Communications Advancements, 47 Ballast Point Road, Birchgrove, N.SW. I have received an occasional copy of "Back Scatter" from the Townsville Radio Club, and the first two copies of "Blurb", journal of the South East Radio Group, Mt. Gambier, S.A. I know there are a number of other Club bulletins circulating, I would certainly be pleased to be placed on your mailing list and so give your Club an opportunity of a mention from time to time in these pages. I feel I should make it known that I don't pay for any of these bulletins, the cost of joining every organisation to obtain copies would be rather heavy on my purse, but it appears each organisation is willing to send me a copy of their news gratis and this is greatly appreciated. In return I quote from their news whenever items of national interest turn up, and due acknowledgement is given. Thanks fellas!

That's all for now, closing with the thought for the month: "A big corporation is more or less blamed for being big. It is big only because it gives service. If it doesn't give service, it gets small faster than it grew." 'Til next time.

"The Voice in the Hills"

*Forreston, S.A. 5233

Ionospheric Predictions

With Bruce Bathols, VK3ASE May, 1973

IONOSPHERIC PREDICTIONS FOR MAY 1973

Hereunder are the predicted band openings for May 1973 from information supplied by the Ionospheric Prediction Service Division. Times are G.M.T.

28 MHz			
VK2	to KH6		2400-0400
,,	,, VK9		2300-0100, 0300-0600
,,	,, W6		0100,0300
,,	,, JA		0200
VK6	,, SU		0900
,,	,, KH6		2400-0600
,,	,, ZS		0700-0900
,,	,, JA		0200-1100
,,	,, 9G1	S.P.	0700-0900
21 MHz			
t1VK2	,, ZL		2200-0500
,,	,, SU		0300-0800
,,	,, KH6		2000-0700
,,	,, ZS		0500-0800
,,	,, G	S.P.	0800
,,	,, ,,	L.P.	2200
,,	,, VKO		2300-0600
,,	,, VE3	S.P.	2400-0100
,,	,, ,,	L.P.	2300-2400
,,	,, UA		0400-0800
,,	,, W1		2200-0200
,,	,, VK9		2300-0800
,,	,, W6		2000-0500
,,	,, JA		2100-0800
,,	,, 9G1	S.P.	0600-0800
,,	,, ,,	L.P.	0700,2000-2100
VK6	,, SU		0300-1100
,,	,, ZS		0600-1100
,,	,, G	S.P.	0600-1100
,,	,, UA		0300-1100
,,	,, PY		1000
14 MHz			
VK2	,, ZL		2000-0800
,,	,, SU		1200-1900, 2100-0300
,,	,, KH6		0200-2000
,,	,, ZS		0400-1100
,,	,, G	S.P.	0900-1800, 2100-0100
,,	,, ,,	L.P.	2000-1000
,,	,, VKO		2100-0900
,,	,, VE3	S.P.	0200-0500, 1100-1600
,,	,, ,,	L.P.	2200-0300
,,	,, UA		1000-1800, 2100-0100
,,	,, W1		0100-0600, 1100-1600
,,	,, VK9		2000-1400, 1600-1800
,,	,, PY		2100-0200, 0500, 1000
,,	,, W6		0200-1200, 1400-1800
,,	,, JA		0600-1600, 2000-2300
,,	,, 9G1	S.P.	2200-0200, 0600-0900
,,	,, ,,	L.P.	0200-1000
VK3	,, SU		2200-0400, 1800-2000
,,			
,,	,, ZS		0400-1100
,,	,, G	S.P.	1200-1900, 2100-0200
,,	,, ,,	L.P.	2100-1000
,,	,, UA		1000-1900, 2100-0200
,,	,, PY		2200-0200, 1000
VK4	,, SU		2100-0200, 1200-1800
,,	,, ZS		0400-1300
,,	,, G	S.P.	0800-1700, 2100-2400
,,	,, ,,	L.P.	2000-1000
,,	,, UA		0900-1700, 2100-0100
,,	,, PY		2000-0200, 0500, 1000
VK5	,, SU		1200-0400
,,	,, ZS		0400-1100
,,	,, G	SP.	1200-1900, 2200-0200
,,	,, ,,	L.P.	2100-0400, 0800-1000
,,	,, UA		1000-1900, 2200-0200
,,	,, PY		1000-1100, 2300-0200
VK6	,, SU		2400-0400, 1200-1800
,,	,, ZS		0400-1200
,,	,, G	S.P.	2400-0400, 1300-1800
,,	,, ,,	L.P.	2300-0200, 0800-1100
,,	,, UA		2300-0300, 1100-1800
,,	,, PY		2400-0300, 0900-1200
7 MHz			
VK2	,, SU		1600-2200
,,	,, G	S.P.	1800-2100
,,	,, ,,	L.P.	0600
,,	,, KH6		0700-1700
,,	,, ZS		1400-2200
,,	,, UA		1500-2100
,,	,, PY		0600-1000, 2000-2100
VK6	,, SU		1600-2400
,,	,, G	S.P.	1800-2300
,,	,, KH6		0900-1700
,,	,, ZS		1400-2400
,,	,, UA		1600-2300
,,	,, PY		1900-2400

Smoothed monthly Sunspot number Predictions for May 36, June 34, July 32, August 30. Smoothed mean for July 1972 — 68.1, August 1972 — 65.4
Swiss Federal Observatory, Zurich.

Letters to the Editor

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

The Editor A.R.
Dear Sir,

I noticed in Feb A.R. that there was a notice requesting comment on the disappearance of the prediction charts.

I made great use of these and I am sure that lots of others will miss them — even if they don't write.

After all, we all have to use the Ionosphere and the predictions are pretty good on the average and they are meant to tell us average conditions. I prefer the old charts, but computer output would be fine if that is cheaper — As long as we get the information in some form or other.

Yours
D. S. Robertson VK5RN

The Editor A.R.
Dear Sir,

Re Ionospheric Predictions (without blocks).

These are useful indications of what might be worked. However, I have not used them very much. I only work DX when it and I are on together. I don't get into America or Europe very often, indeed Western Australia seems to be the end of the world as far as DX is concerned. The notable exception is the VK/ZL Oceania contest when I have heard many Europeans calling "CQ VK".

The predictions would probably be of much more practical use to a regular service relaying RTTY news, or picturegrams all over the world, but I would like to see it continue, as in Jan 1973 A.R.

Yours
Jon Kitchin VK6TU

The Editor, A.R.
Dear Sir,

Reference your par., Page 16 of "A.R." February '73, I would like to assure you that the Prediction Charts are of considerable interest and importance as a DX aid to anyone interested in long distance communications.

Rather than waste time in considering the deletion of this important feature of "A.R.", I would like to suggest that serious consideration should be given to reverting to the former chart type of presentation which conveys far more relevant information than the present numeric style.

"A.R." is a credit to all those concerned in its publication, therefore let it remain so by discarding any form of negative thinking.

Yours
Alf Matthews VK3ZT

The W.I.A. now receives computer-print charts. With maximum reduction only 12 could be fitted into a single column thus a complete page of A.R. would be required for reasonable coverage and appropriate explanations. It is regretted that this would occupy too much space at present — Ed.

OSCAR-6

Writing on 13th March, VK5ZHJ reported 202 QSO's with 45 different stations up to orbit 1875 and he had logged 69 stations including KX6HK on orbit 1749.

WHY WE BELONG — ONE GOOD REASON

Extract from a letter requesting pensioner re-grade. "Apart from the fact that I, like others, believe we should all be members of the Institute for the general advancement of Amateur Radio, and it is money well spent, I have no other requirement with the exception of the A.R. publication." Many other members have expressed similar sentiments. Thanks OM.

INTRUDER WATCH

With Alf Chandler,* VK3LC

The following text of a letter received from Dick Baldwin, WIRU, Asst. Gen. Manager of ARRL, is interesting enough to reproduce in its entirety —

"Many thanks for your June-December summary of Intruders. I will forward a copy of this to FCC, as usual, because they find it helpful to match up with the reports filed by ARRL.

"Our volume of reports filed continues to run very high, and our FCC continues to file many, many official complaints with the administrations concerned. Some of the complaints are successful, some are not, but we are pleased that we get such excellent co-operation from the Commission. KICLM, WINF and K6KA continue to be the largest individual contributors of reports, but I have so many smaller contributors that the total volume continues undiminished. The only problem I have not solved is how to arrange for the time to produce a summary similar to yours that I could furnish to people like yourself, G3PSM and K6KA.

"In the months ahead the operation of the Intruder Watch is going to gain increasing importance, as there now begins to be some indication that there may be an HF WARC in 1978-80. A number of government committees have been formed here to study the future spectrum needs of various services, including amateur, and the League will be stepping up the tempo of its preparation. The overall success will, of course, depend on the leadership of societies like the WIA and the dedication of individuals like yourself."

This is explanatory enough to make you all sit up and take notice. If we don't do something about it our bands will be cut again in 1978. How about that?

A welcome advangement for the Intruder Watch is the appointment of two more Co-ordinators in the persons of Ross Greenaway VK6DA and H. Hancock VK7MZ. We welcome these two gentlemen wholeheartedly. This completes the states Co-ordinators, and I list them below. Now it is the responsibility of all Members to rally around their Co-ordinators, and supply them with reports of intruders heard. That is the life blood of the Intruder Watch, and cannot be stressed too often by me or by anybody else.

The Co-ordinators are as follows —VK2ZO — Bill Jenvey, 9 Forsyth St., Willoughby, N.S.W. 2068. Albert Cash, 20 Alemein St., Morwell, Vic. 3384.
VK4KX — Murray McGregor, 6 Murray St., Red Hill, Q'land. 4059.
VK5LG — Leith Cotton, 64 Weeroona Ave., Parkholme, S.A. 5043.
VK6DA — Ross Greenaway, 22 Salisbury St., Leederville, W.A. 6007.
VK7MZ — H. Hancock, 6 Hgh View Cres., Devonport, Tas. 7310.

Get in touch with these gentlemen at any time when you require any information on Intruder Watch matters.

A station heard recently on 14010 KHz uses the call-sign of 3DN and sends weather reports in English for various Pacific Islands. We think that it is a legitimate station transmitting on its correct frequency but emitting a spurious signal. It has been reported by VK4 Members, but I would like reports from observers in other states.

*Federal Intruder Watch Co-ordinator, 1536 High St., Glen Iris, Vic. 3146.

NEW CALL SIGNS

DECEMBER, 1972

VICTORIA
VK3LJ—A. A. Solomon, 428 Ligar Street, Ballarat, 3350.
VK3APB—M. J. Williams, 9 Monteith Ave., Flora Hill, 3550.
VK3AKR—"KALORI" AMATEUR RADIO CLUB, 26 Lee-Anne Crescent, Bundoora, 3083.
VK3ASR—3RD SIGNALS REGIMENT AMATEUR RADIO CLUB, Albert Road, South Melbourne, 3205.
VK3BJM—J. D. McNally, 3 Avondale Grove, Mount Waverley, 3149.
VK3BKR—K. R. Baker, 12 Havelock Street, Maidstone, 3012.
VK3YJG—G. R. Hedley, 15 Strasboure Road, Rosanna, 3084.
VK3YHS—G. H. Smith, 18 Elwood Street, Surrey Hills, 3127.
VK3YIC—I. F. Collier, 123 Foster Street, Ballarat, 3350.
VK3YJA—J. A. Matheson, 30 Millers Road, The Basin, 3154.
VK3YJS—J. A. Sanlaureano, 100 Murray street, South Caulfield, 3162.
VK3ZAW—B. A. Walters, 1/13 Edwin Street, East Preston, 3072.
VK3ZBR—C. H. Reid, 16 Fyfe Avenue, Ringwood, 3134.
VK3ZCS—G. G. Baker, 4/71 Medway Street, Box Hill North, 3129.
VK3ZEK—A. Groen, 97 Waters Drive, Altona, 3018.
VK3ZFG—A. Chisolm, 120 Gower Street, Preston, 3072.
VK3ZFJ—A. M. Tilley, 19 Wallace Street, Toorak, 3142.
VK3ZGW—G. G. Williams, 1 Manna Gum Road, Ferntree Gully, 3156.
VK3ZHI—B. O. Marsh, 3 Ann Court, Aspendale, 3195.
VK3ZIL—P. A. Elton, 6/1328 High Street, Malvern, 3144.
VK3ZIO—D. A. Fraser, 8 Castles Road, Moorabbin, 3189.
VK3ZOP—I. D. Phelan, 11 Michael Street, Bendigo, 3550.
VK3ZQP—G. P. Percy, 22 Cotswold Crescent, Springvale South, 3172.
VK3ZWS—W. I. A. Stone, 20 Bristol Avenue, Chelsea, 3196.
VK3ZBQ—B. R. Bailey, Residence No.5, Mildura Airport, 3500.

QUEENSLAND
VK4IU—R. Miller, 3/18 Glena Street, Fairfield, 4103.
VK4JU—J. M. Joughin, 12 Attunga Crescent, Buderim Mountain, 4556.
VK3KE—M. R. Temple, 7 Floyd Street, Woodridge, 4114.
VK4KF—J. S. Temple, 7 Floyd Street, Woodridge, 4114.
VK4OZ—H. Cox, 32 Bellew Street, Wynnum North, 4178.
VK4PF—I. M. McCosker, 2 Lennie Avenue, Main Beach, Southport, 4215.
VK4XT—J. M. Taylor, 26 Patrick Street, Dalby, 4405.
VK4ZIK—K. Bouchard, 107 Hurdcotte Street, Enoggera, 4051.
VK4ZKB—K. L. Feltham, 3 Murray Street, Clontarf, 4019.
VK4ZKM—K. L. Marschke, 26 Howard Street, Gaythorne, 4019.
VK4ZMY—B. D. Mathieson, 108 Cutbush Road, Everton Park, 4053.
VK4ZNI—N. I. Lynch, 15 Noeline Street, Dorrington, 4060.
VK4ZSH—S. J. Hutcheon, 72 Jubilee Terrace, Ashgrove, 4060.
VK4UJ—J. E. Burnham, Burnham Street, Forest Hill, 4342.

SOUTH AUSTRALIA
VK5NI—A. J. Cannon, 30 High Street, South Brighton, 5048.
VK5NV—A. L. Harper, Station: Bayview Road, Stansbury South. Postal: P.O. Box 45, Stansbury, 5582.
VK5ZAJ—B. H. Buchanan, 2/72 Ninth Avenue, Joslin, 5062.
VK5ZDO—G. Baczocha, 3/92 Seventh Avenue, St. Peters, 5069.
VK5ZJA—N. J. Abraham, 41 Jetty Street, Grange, 5022.

WESTERN AUSTRALIA
VK6HO—J. D. Holt, 109 Forrest Street, Cottesloe, 6011.
VK6UG—J. H. W. White, 198 Brookdale Street, Floreat Park, 6014.
VK6ZFC—P. J. Fall, Currie Hall, Winthrop Avenue, Crawley, 6009.

TASMANIA
VK7LP—P. L. Dazeley, 5 Stroke Street, New Town, 7008.

TERRITORIES
VK9CW—R. W. Coulter-Thurley, Postal: P.O. Box 799, Port Moresby. Station: Tradewinds Flat No. 5, Airvos Avenue, Port Moresby.
VK9ZLG—G. J. Leedham, Postal: C/- P.O. Box 2087 Konedobu. Station: D.C.A. Aviat Mess, Konedobu.
VK9ZJT—T. S. H. Jones, Postal: C/- P.O. Box 335, Port Moresby. Station: C.D.W. House 8, Badili Hill, Port Moresby.

Magazine Index

With Syd Clark, VK3ASC

SHORT-WAVE MAGAZINE. December 1972.
Useful General Purpose PSU.; Terminal Unit in Solid State for RTTY.; Two-Metre FM with the FT-101.; Multi-Band Aerial for Restricted Space.
January 1973.
QRP Transmitter Circuits.; Frequency Modulation.; Speech Compression Unit.; Solid State Receiver for Two Metres.;
RADIO COMMUNICATION. January 1973.
The G3TDZ Portable 2M Transmitter/Receiver, Mk.4.; Amateur Bands in the U.K. (Effective January 1973).; Decimal Point Switching on DFM's.; The Barlow Wadley XCR-30 Mark 2 Receiver.; Technical Topics this month deals with a tripler power supply which gives 900 volts DC straight off the AC mains.; a 200 MHz scaler, and single band three element quad.; Microwave series continues. CO.TV. November 1972.
For the TV buff there is a video line amplifier; Amateur Colour (Pt. 4).
VHF COMMUNICATIONS. November 1972.
VHF Transequatorial Propogation.; An Integrated Receiver System for AM, FM, SSB & CW.; Dimensioning of Microstripline Circuits.; A Stable Crystal Controlled Oscillator (10-") for Frequency & Time Measurements. Amateur Television Pt. 3.
73 MAGAZINE. December 1972.
The AFSA IV SSTV Analyser.; Single Conversion Two Metre FMreceiver.; The MOS-Tone Encoder.; A Short Tone-Burst Decoder.; A Universal IF Amplifer for Standard or Panoramic Receiver.; Touchtone and Telephone Connecting Arrangements.; The Simplest Audio IC yet!.; Sideband Sniffer.; Crystal Frequency and Activity Checker.; 10 amp Variable Power Supply.; Transmission Line Sections.; Radio Astronomy for Radio Amateurs.; Direct Reading Inductance Meter.; Transverter for 20 metres.; A Primer on LEDs.; Forty Metre FET Preamplifier.; Liquid Plastic Waterproofing.; Improved Circuitry for KTI CW Filter.; A Transistorised VFO.
73 MAGAZINE. January 1973.
Handi-Talkie Touch-Tone.; How to Win in the Pileups.; In the Halls of the Giant Yaesu Establishment.; Another Integrated Circuit Frequency Counter.; An Improved Audio Speech Processor.; A Two-Tone Test Generator.; Speculations on Future DX.; FM Test Set.; DX-Missing Made Easy.; Installation and Method of Tilting a 60 ft. Tower.; Amateur Licensing in Japan.; Six Metre Converter using International Crystal Kits.; The Wife, The Ham, and the Other Woman.; Tunable Audio Filter.; Six Hand Linear at 5c per Watt.; Current Gain in High Power NPN Silicon Transistors.; IC Ten Metre Tuner for Use with Solid State VHF-UHF Converters.; A Different Method of Quad Construction.; Improving the Drake R4A Receiver.; Another Hedge Clipper.; Designing an Improved AGG System for CW & SSB Reception.
QST. January 1973.
A 40 metre CW Receiver.; A Linear Field Strength Meter.; Crossed Yagis for Circular Solarization.; The F2TU for VHF FM RTTY.; A CB Rig for 220 MHz.; A Simple Keying Monitor.; 160, 75 and 40 metre Inverted Dipole Delta Loop.; Review: Swan Twins (600-T and R).; Heath HW-7 CW QRP Tcvr.

AWARDS COLUMN

With Geoff Wilson,* VK3AMK

AUSTRALIAN D.X.C.C.
PHONE

VK6RU	318/347	VK2APK	299/309
VK5MS	316/343	VK5AB	294/314
VK4KS	314/331	VK4PX	292/296
VK3AHO	307/326	VK4UC	291/293
VK6MK	304/328	VK4FJ	286/310
VK4VX	302/305	VK4TY	282/288

Amendments: VK5WV 150/151 VK4RF 251/252

VK3AHO	306/326	VK3NC	271/297
VK2QL	301/327	VK6RU	265/291
VK3YL	293/313	VK3YK	261/281
VK2APK	291/301	VK4VX	261/263
VK4FJ	291/320	VK4TY	256/272
VK3XB	283/300	VK3TL	251/260

OPEN

VK6RU	318/345	VK4VX	308/311
VK4SD	316/334	VK6MK	304/328
VK4KS	315/336	VK4TY	303/321
VK2VN	310/332	VK4FJ	300/329
VK2EO	309/325	VK4UC	300/303
VK2APK	308/323	VK2SG	299/306

Amendments: VK4RF 273/287 VK4PX 299/307

AMENDMENTS TO AUSTRALIAN D.X.C.C. COUNTRIES LIST

NEW COUNTRY: MT. ATHOS — THEOCRATIC STATE WITHIN GREECE.
Credit is now being given for Mt. Athos as a separate country and SY1MA cards submitted have been added to Members DXCC totals.

DELETED COUNTRY: SWAN IS (KS4).
This country has been deleted from the list as from September 1, 1972. All future contacts with Swan Is. will count as for Honduras. All Members claiming Swan Is. have had their DXCC totals adjusted.

*Federal Awards Manager, C/- P.O. Box 150, Toorak, 3142.

Afterthought.
March A.R. Page 7 Table 1 third column for "Radius" read "Diameter".

HAMADS

For Sale

Collins KWM2, 516F2 Power Supply — latest model 240 volt operation, and complimentary Collins linear amplifier. As new. Both in immaculate condition with extremely little use. Rare opportunity. Roth Jones, 1 Albert Road, Melbourne, 3004.

Brand new 6B5, 6A6, 6AG7, 6N7, 3Q5, EBC33, 6H6, 266, 9003, 6130, 6BA6, 6EA8, 6AL3, 1B3GT, 6J6, 21A6, X78, 6CW7 also 2 x 4-1000A offers: 1 x 4CX250B and new socket unused $8, 1 new QEO 5/40 $4, 1 new 2E26 $3, DET24 new $1.50, 832 50c, QQV03/10 new $3, 852 $2, 7 x FT243 x tl 8-9 MHz offers, TY2/125 50c. All must go. H. Leupold, 9 Hland Ave., Darlington, S.A. 5047.

"AWA 5"-CRO, fair condition, $40 or best offer. Ph. (03) 89 9017 (John).

Double conversion amateur hand receiver. Crystal locked, turrett tuned front end. 80 to 10 metres. Crystal lattice filter. Eddystone dial. B. White VK2AAB, Ph. (02) 487 1428.

Must sell KWM2 now at Collins Radio Co. Victoria — being overhauled and completely modernised. Will be in perfect condition and with all Service Bulletins to date — complete with Clip-on Power Supply — USB-LSB-Calibrator — beautiful job. Price $1100. Packed 4 and O. R. Gympie. VK4LN QTHR.

Galaxy GT550 Transceiver with Galaxy 550 240V power pack and speaker, 4BTV vertical aerial. All complete with mike and coaxial cable. Reason for selling. Unable to complete course at W.I.A. due to business reasons. All new in original cartons — $950. J. Burns, 1046 Barrenjoey Road, Palm Beach, N.S.W. 2108. Tel: 919 4003.

Heavy duty Collins 12V DC power supply 516E suitable KWM2 good condition. Original cost $400 now $180. A. Swinton VK2AAK, P.O. Box 1, Kulnura, N.S.W. Ph. 76 1261.

Megacycle meter 420-960 mcs. Model 59UHF Oscillator. Use as GDO for UHF. Made by Measurements Ltd., USA. As new, complete with power supply and instrument. $90. A. Swinton VK2AAK, P.O. Box 1, Kulnura, N.S.W. Ph. 76 1261.

CC2 Carrying Case for Collins Equipment KWM2, 30L1, 51SL, 62S1. Cost $85 now $50. A. Swinton VK2AAK, P.O. Box 1, Kulnura, N.S.W.

Akai X4 Stereo or Mono tape recorder cross field type battery or AC operated. Tape speeds 15/16, 1⅞, 3¾, 7½. Complete with 2 Akai mikes and Akai AC adaptor. $145. A. Swinton VK2AAK, P.O. Box 1, Kulnura, N.S.W. Ph. 76 1261.

AWA car phone with Channel A & B plus crystals, good order. MR20A. $50. A. Swinton VK2AAK, P.O. Box 1, Kulnura, N.S.W.

Solid State HT supply 750V 150 ma. cont. 255 volt 125 ma. regulated, 6.3V 3 ma-110/240 input. $50. A. Swinton VK2AAK, P.O. Box 1, Kulnura, N.S.W.

Ameco transitorized converter model CHT2 for VHF to broadcast band 12V. $30. A. Swinton VK2AAK, P.O. Box 1, Kulnura, N.S.W.

Quantity of radio parts and units. Write for list, VK2QB QTHR.

Vinten. BTR1OR Fixed Station Unit. Six Channel. Crystals for A.B.1. & 4. Inst. Preamp. and Disc. Meter installed. Excellent condition. $110. ONO. VK3BAX. OTHR. Ph. (052) 95949 Bus. 97401 A.H.

Complete Station, comprising KW 2000A Transceiver 160m through to 10 $495. KW E-Zee Match $34. KW SWR Meter $19. KW52 ohm Dummy load $15. BC 221 Frequency meter with charts &. P.S.U. $27. 'A' Frame wooden tower plus 20ft pole $30. TA 32 3 band beam $50. TR 44 Rotator plus ind'ctr. $80. VK3AXO Ph. (03) 723 4279.

A.W.A. Universal Bridge A56048 and Manual. Several loudspeakers to 10" various. Offers please, deceased's estate. 12 First St., Ashbury, N.S.W. 2193.

Wanted

Required 5th Edition A.R.R.L. Handbook — Any reasonable price paid or 1973 handbook — contact VK2SK — Urgent. QTHR

Enthusiast requires early Radio Sets, valves, parts, speakers and books prior to 1930. Good prices paid. Details to Edgar Road, San Remo, 3925. Phone 107. M. O'Brien, Experimental VK30.

Morse keys wanted for W.I.A.—Y.R.C.S. Victoria Division students — please write VK3AH, Box 39, Mooroolbark, 3138.

By 80 year old blind ham-transceiver or AM transmitter 7/14 MHz. Condition unimportant. W. J. Zech, C/- The Burlington Rest Home, Main St., Katoomba, N.S.W. 2780.

Deltahet or similar H.F. Receiver, with 1 MHz bandspread and variable IF bandwidth. A. Brodie. Ph. (02) 498 3036.

A.R. September to December 1969. Buy or borrow. VK2TR QTHR.

Pye 9-0A or similar 9 MHz filter with or without carrier Xtals. Price and details to VK3AOH QTHR. Ph. 49 6224.

Data on UN Bendix Rx, data and circuit or handbook for No. 62 set, No. 19 set, AMR300, CR100. Also wanted teletype page printer. Will reply all letters. H. Leupold, 9 Hyland Ave., Darlington, S.A. 5047.

KEY SECTION

With Deane Blackman,* VK3TX

My apoligies to readers of this column for its absence over the past few months. I am glad to say that me and my files are all now re-united back in Melbourne, and I hope to maintain contributions on a regular basis again. If you have any information which might be of interest to CW operators please let me know.

The most exciting development over the past couple of months has been the establishment of a CW net on Sunday morning. VK4II, among others, has been active in setting this up. Everyone is invited to participate — you do not have to be a Key Section member.

The frequency is 7025 KHz, from 0930-1130 each Sunday. The net control station (NCS) calls CQ CWN, and you should in joining give your name and preferred operating speed. 10 wpm ops are welcome — be assured NCS will slow down for you. Subsequently NCS will offer you a frequency and station for a QSO.

NCS is using the "QN" signals for net control. These are listed in American amateur publications, but in case you do not have access to these I will list them in this column over the next month. The most commonly used are:

QNI Net stations report (call by NCS) I am reporting in
QNJ Can you copy me? Can you copy ...?
QNO Station is leaving net
QNP Unable to copy you (or ...)

All usual "Q" codes are used too, of course.

There is at the moment only one net operating. If support warrants it I imaging more than one may become necessary. So, join in, enjoy the fun of CWN operating, and swell the CW traffic on 40. CU Sunday?

*Box 382, Clayton, Vic., 3168.

WHY NOT TRY DOUBLE SIDEBAND?

(continued from page 19)

NETTING

If you hear an ssb operator and wish to net to his frequency, merely use your VFO to resolve his speech. Then you will be on his suppressed carrier frequency.

CONCLUSION

The transmitter can be used for C.W. on 14 MHz by switching to the Balanced condition and shorting out turns on the plate tank circuit inductor.

AR

SILENT KEYS

It is with deep regret that we record the passing of:

VK2ZW—A. J. Perkins

"20 YEARS AGO"

With Ron Fisher, VK3OM

The back cover presented the big news of May 1953. The introduction of the Geloso VFO. R.H. Cunningham Pty. Ltd., announced the arrival of the original 4/101 all band VFO unit. I guess that over the next few years almost every amateur in Australia purchased one of these units. I heralded the introduction of the all band table top transmitter to this country. Many of these are still in use, although the stability is not up to present day standards. I have one in daily use modified for the 160 metre band.

Editorially, concern was expressed about whether amateurs would be allowed to conduct on-air experimental transmissions, and which bands would be allocated for this. A special Multiband Antenna was described by Hans Albrecht VK3AHH. It consisted of two 67 foot sections, one horizontal the other at a 45 degree angle. By employing a separate feed system on each section, phasing could be changed to give different directive patterns.

Winners of the 1953 National Field Day contest were VK2ASW taking out both the open and phone sections, VK2ASJ won the CW section with VK3AHH winner of the fixed section, no doubt using the antenna described above.

Apparently the 1953 Urunga Convention was quite an affair. Almost one page was devoted to a report on the activities with Noel Hansen VK2AHH doing the reporting. Another page gave a running description of who toasted who at the Federal Council dinner for delegates to the Easter Convention in Melbourne.

Looking through the advertisements I noted the following bargains. Ham Radio offered AR8 receivers at 20 pounds. R1155 receivers at 29 pounds 10/- and an RA1B receiver at 35 pounds. In the Hamads a 2JU 8 valve receiver with coils for 80, 40 and 20 was offered for 'best offer'. News and technical articles must have been short in May 1953, the magazine ran only to 16 pages!

TECHNICAL AWARDS

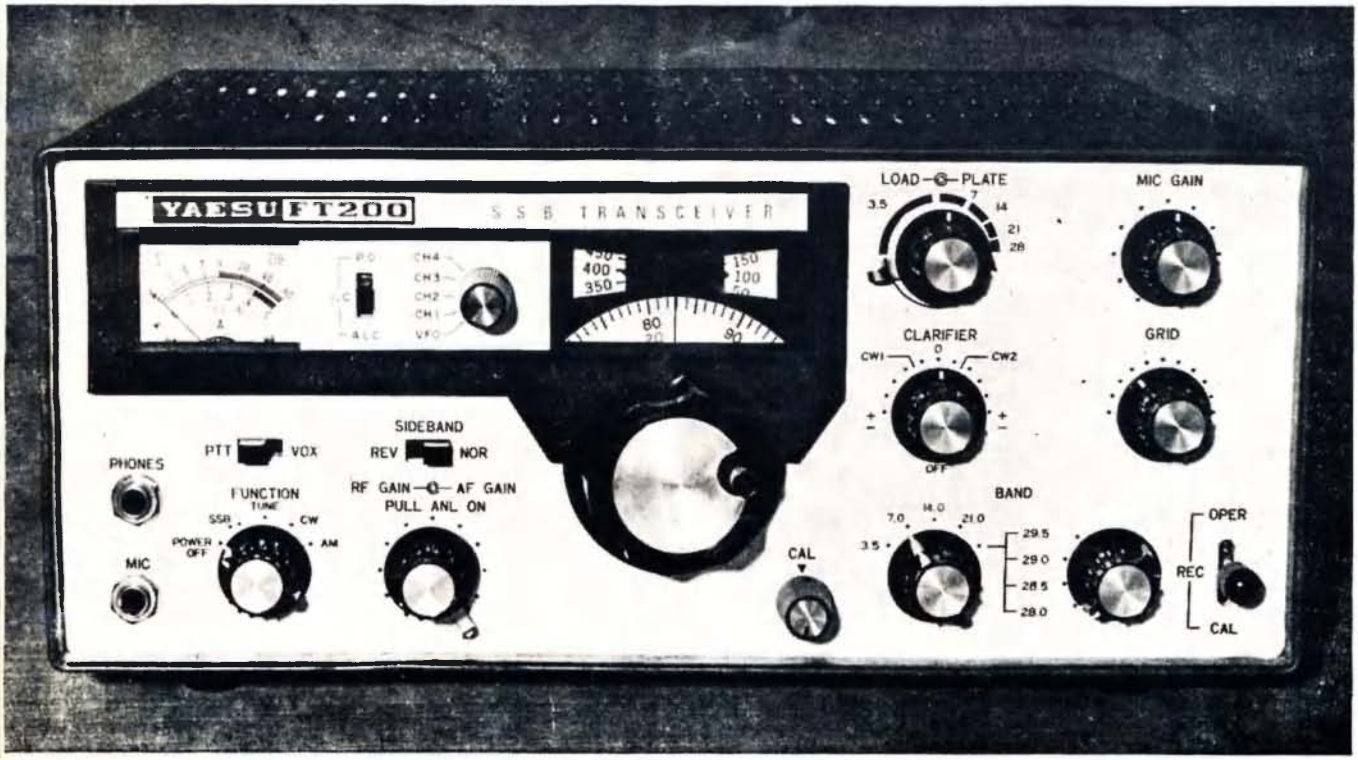
The Publications Committee have great pleasure in announcing that Awards for contributions in the interests of "Amateur Radio" for 1972 were decided recently after very considerable and extensive discussions.

These awards are known to be of considerable importance to authors and therefore consideration extended in depth to the merits of each article.

The following were decided:

Higginbotham Award: Chris Cullinan VK3AXU, as explained elsewhere in this issue.

Technical Award: Jointly to S. E. Molen VK2SG, for his article "I've built a Monster" in Dec. A.R. and R. L. Harrison VK2ZTB, for his articles on propagation in May A.R. and subsequent issues.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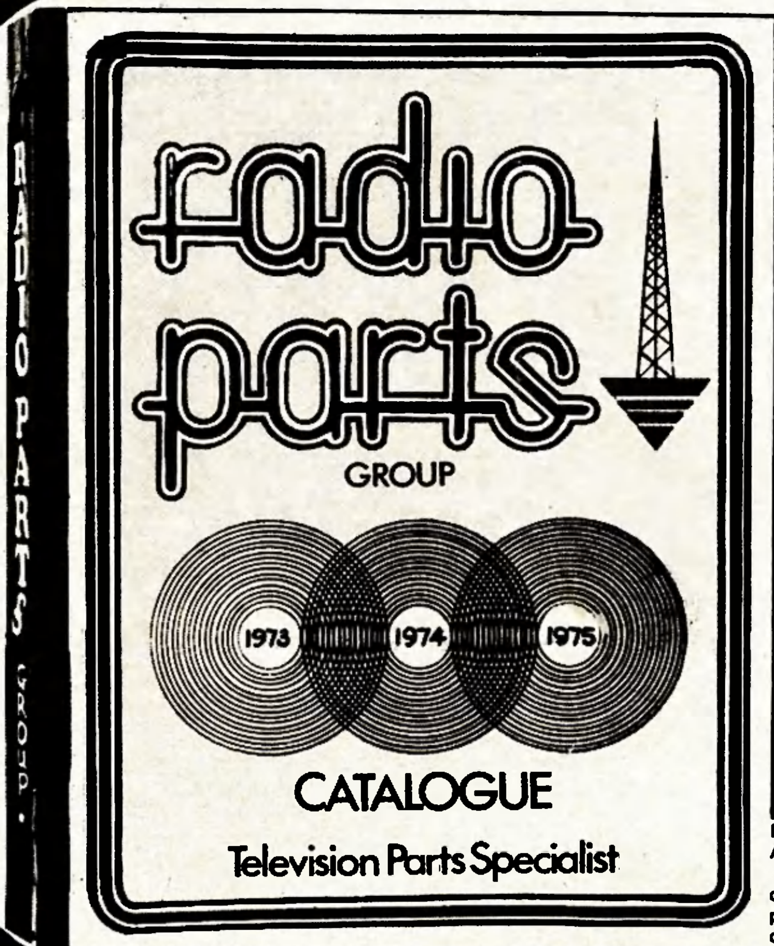

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amateur radio

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MODEL OL-64D — Price $19.75

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amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA. FOUNDED 1910

JUNE, 1973
Vol. 41, No. 6

Published monthly, as the official journal, by the Wireless Institute of Australia. Reg. Office: Above 474 Toorak Rd., Toorak, Vic., 3142.

Enquiries and material to:

The Editor, Phone (03) 24-8652
P.O. Box 150, Toorak, Vic., 3142.

Copy is required by the ***third of each month.*** Acknowledgment may not be made unless specially requested. All important items should be sent by certified mail.

The Editor reserves the right to edit all material, including Letters to the Editor and Hamads, and reserves the right to refuse acceptance of any material, without specifying any reason.

Advertising:

Advertisement material should be sent direct to the Editor by the ***25th of the month preceding the month prior to publication.***

Hamads should be addressed to the Editor by the ***third of each month.***

Printers:

Research Publications Pty. Ltd., 418 Canterbury Rd., Surrey Hills, Vic., 83 9140.

CONTENTS

TECHNICAL—

DEPARTMENTS—

GENERAL—

CONTESTS & AWARDS—

Barry Hartley, VK2FE, Publicity Officer of the W.I.A. Illawarra branch sent this picture of the Dapto Dish used in recent E.M.E. tests with K2UYH and W6FZJ. Signals were heard from K2UYH on 10th March at better strength than previously, probably due to the use of an MT4578 receiving preamp in place of the BFR91. The transmissions were acknowledged. A similar test on the same day with W6FZJ however, resulted in the receipt of weak signals possibly caused by rain in the feed system at the transmitting end.

QSP

REPEATERS

Nearly all the readers of A.R. will be aware ol current discussions concerning a 2 metre band plan in relation particularly to repeater channels and F.M. Simplex channels. At the 1973 Easter Convention, the 1973 2 metre band plan was evolved and this plan was described in brief on page 2 of last months A.R The "Albury" band plan recommendations were set out on page 15 in A.R. of August, 1972, and the "Wodonga" band plan was reported on page 17 in A.R. of November 1968. The 1973 band plan is under fire and a postal vote is under way to Divisions. In an attempt to place the viewpoint of Divisions before the readers of A.R. each Divisional Federal Councillor was requested, as a matter of urgency, to set out his views and those which were received in time are printed below

NEW SOUTH WALES:
Why Repeaters should follow the Wodonga Plan.

Following the conception of the 1973 2 Metre Band Plan and the various inter Divisional discussions which resulted from trying to find a suitable alternative which would satisfy all the requirements of those Divisions most vocal in the matter, the New South Wales Division set about finding out what justification existed for changing the present system.

Before seeking information from overseas we attempted to find out why change was being sought. From our enquiries it would appear that other States wish to change because:

(a) Concern is felt that interference to the satellite will come from ground based repeaters or interference to repeater users would result from stations working the satellite.

(b) It was avowed that satellites will require to operate between 144 and 146 MHz and we should therefore vacate this area and leave it wholly to satellite use.

(c) Australian Amateur Repeater operation should be the same as that used in the USA, i.e. above 146 MHz on 600 KHz spacing between input and output frequency on the Repeater.

(d) More Repeater Channels are needed and now snould be the time to make any changes which may be necessary.

(e) Any provisions made should cater for the simplex channels and be capable of being used with currently available equipment.

The New South Wales Council called a meeting of Council and invited each active Repeater Group to send Representatives. Other interested groups were also invited. At this meeting it was decided to contact the ARRL, IARU HQ, AMSAT and any other organisation or person capable of assisting in providing reliable information.

Telephone calls were lodged and extensive discussions were held with Dr. Perry Klein, President of AMSAT, Mr. Bill Dunkerley, Member of the Board of ARRL and AMSAT and Editor in Chief of QST and Wayne Green, Editor of "73" Magazine and the information received was as follows:

AMSAT recognise that a free band from 145.85 to 146 MHz is the best they can hope for internationally and hence their future planning centres on the spectrum 145.85 to 145.95 between which points 0db response into the satellite will be provided.

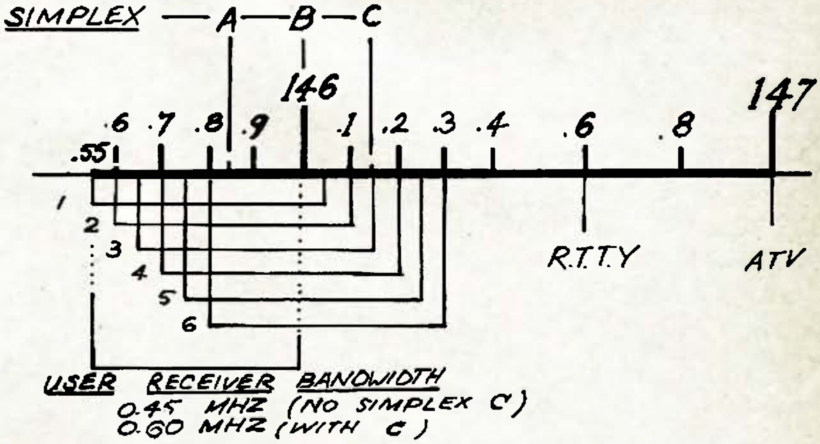
At 145.80 and 146 MHz the satellite receiver will be 10dh down on that in midband and hence as 100W ERP is required to work the satellite safely then 1KW ERP would be required at 145.8 and 146 MHz if one wishes to work through the satellite.

Perry stated that AMSAT were trying through the IARU to get an International agreement on Satellite frequencies and at the moment this would most likely be from 145.8 to 146. AMSAT see no problems from our repeaters if their output frequencies are at 145.8 or lower and in particular if they follow the IARU Region 1 Scheme, they will be taken into account in all future satellite operations together with European repeaters.

Perry Klein further stated that he had been informed that all States in Australia wanted to change repeaters to above 146 MHz and with this he stated he would have no argument, however he did not agree that any necessity existed from AMSAT's point of view that we should do more than remove the Channel 4 Repeater output channel from 145.9 and not allocate repeater output frequencies between 145.825 and 146 MHz.

The information from Bill Dunkerley and Wayne Green confirmed what Perry Klein had stated and Bill Dunkerley and Perry Klein stated they had jointly discussed the Australian problem and both ARRL and AMSAT officially concurred with what has been stated above.

The New South Wales Division therefore cannot agree that a repeater change is required because of future satellite operation and considers that those that argue this way are expressing their own opinions and not the opinions of the group charged with providing satellite services and we therefore suggest the existing Wodonga based scheme be expanded as shown in the diagram below:



It will be obvious that continuing with the Wodonga scheme ensures:

1. Users of Channels A, B & C simplex will not have to relocate to another set of simplex standards (If the Albury scheme is adopted present equipment will not cater for the new Channel 4 and Channel A or B without either B or 4 suffering attenuation).

2. A receiver bandwidth of 0.60 MHz is required to receive all repeater and Simplex channels and only 0.45 MHz if Channel C is not used. (The Albury Plan requires 1.15 MHz bandwidth to receive from Simplex A to Channel 4).

3. That only Channel 4 crystals become redundant, old Channel 1 Crystals become usable as Channel 2 of the new system. All simplex channels remain unchanged.

4. A total of six Repeater channels is provided at 50 KHz spacing and these could be increased to 11 channels at 25 KHz should the need arise in the future — by which time equipment having adequate selectivity would be available.

5. That if the suggested use of the New Wodonga Channel 2 for capital cities is proceeded with, Perth and Melbourne would not have to change Channels whereas if the Albury plan is adopted ALL users are affected. Due to the high prevalence of Channel B operation Channel 1 of the Albury Scheme would be required as a main Repeater Channel since, if members wish to continue Channel B operation they would have difficulty in providing front end bandspreads of 0.7 MHz to do this and trying to extend this bandwidth to the 1.15 MHz to receive both Channel 4 output and Channel A would be impossible for most Members.

6. The requirements of AMSAT are met and we have their assurance that no change would be required in the foreseeable future.

7. Changing Repeater output frequencies can be a major operation for some repeater sites where the repeater is co-sited with other Government and Commercial services. The new Wodonga system enables such change to be a minimum of 100 KHz whereas the Albury Scheme requires 800 KHz minimum and this could cause repeater sites to require re-evaluation for interference to other services, etc.

In conclusion we can see no justification exists for any change to the present system other than removal of Channel 4 and expansion of the number of available channels. Since this view is shared by AMSAT and ARRL officials (in so far as Australia is concerned) we fail to see why any major change is required.

The Council of the NSW Division,
A. MULCAHY,
President & Federal Councillor.

VICTORIA

During the past 12 months, the Victorian Division has attempted to have a logical, progressive plan for repeaters — a plan to be adopted nationally and which meets the following criteria:

1. Is consistent with present and projected Institute policy.
2. Is consistent with international requirements where amateur satellite working has to be considered.
3. Is technically acceptable.
4. Is designed to provide a minimum of conversion expense to users of the present system.
5. Is designed to make the most efficient use of the spectrum available in Australia.
6. Provides for minimum interference to non-repeater users and existing simplex channel users by using a section of the two meter spectrum not yet fully developed.
7. Is designed for expansion but in reference to 2. above.

With these points in mind a band plan was developed by all Divisions at Albury in July 1972, submitted to Federal Executive as recommendations and then circulated as a postal vote for formal agreement by all Divisions.

The N.S.W. Division having a differing point of view, used section 44 of the Federal Constitution to prevent a vote being taken. This meant that the question had to be resolved at the next Federal Convention — i.e. last Easter 1973.

During the Convention held in Melbourne, a compromise band plan was suggested and agreed to — a compromise which was inconsistent with this Division's policy and the criteria listed above.

Although Council supports the right of its Federal Councillor to vote as he sees the situation at the time, subsequent inspection of the plan from the Convention showed that it was unacceptable — a fact later confirmed by other Divisions.

An attempt was made by some of this Division's repeater committee to make a compromise agreement with VK2 and seek endorsement of this by other Divisions. On the evidence available at the time this band plan seemed reasonable, although again, the criteria listed above were not met.

Subsequently the Victorian Division has been accused of breaking a verbal agreement with the N.S.W. Division — we believe that the additional evidence produced by AMSAT only confirms that it was right and proper to pursue the original policy. There is no guarantee that satellite operation will stay at between 145.8 and 146 MHz; the Amateur Satellite Service has every right to go further down if circumstances require it.

Council, therefore, believe that a compromise to suit political ends in an effort to placate minorities is not in the best interests of the Division or the Institute as a whole.

It would appear that we have all lost sight of the intention to provide the greatest benefit to all sections of the amateur service — both members and non-members together with repeater and satellite users.

In conclusion the fundamental concept has not been highlighted in any of the discussions.

During 1971 you will recall that this Institute briefed and supported the attendance of T. Clarkson ZL2AZ at the ITU conference at Geneva.

Through his and other efforts, the Amateur Satellite Service was recognised internationally with permission given to operate between 144 and 146 MHz. We believe that Australian amateurs and Institute Divisions must act to be consistent with and in the spirit of this Satellite Service it helped to create.

Continued Page 3

"SWLing Behind The Bamboo Curtain"

ALAN SHAWSMITH*—VK4SS

Pictured here is Australian journalist, Francis James. It was taken as he walked unsteadily to freedom across the Bamboo Curtain, from China to Hong Kong.

Photograph courtesy "Courier Mail", Brisbane.

Three years previously, he had been arrested by the Chinese on an alleged spy charge. He was then, almost eleven stone in body weight. A few moments after this photograph was taken, he fell to the ground unconscious. He had lost fifty pounds through malnutrition, stomach ulcers and recurring dysentery. His eyesight was impaired. He could speak only with difficulty.

After recuperating in hospital, he emerged to face a variety of questions about his treatment while in prison. He told reporters that, at one stage, he was kept in solitary confinement for three months in a dark, aireless, damp, below-ground cell. The daily diet was two bread rolls and two glasses of water. When asked how he managed to maintain his sanity, the answer he gave was very surprising.

He said one of his guards (there were two per shift) had confided to him that he was an ardent SWL DXer. This guard was a rankless Captain in the PLA. He smuggled into Mr. Francis' cell a twenty-three transister SW DX receiver, proudly explaining it was all "homebrew". Almost every night for nearly a month the imprisoned journalist lay huddled beneath a blanket, phones on head, listening to DX from all over. After so many months of isolation and interrogation, the sound of his native tongue, from such sessions as the BBC news and not to mention dozens of Amateurs, was a rejuvenating experience indeed.

The immediate question is — why did this guard risk his neck in this way? To have been caught, the penalty for doing such a thing, would have been severe indeed. Was it simply an act of compassion for a man cut off from his family, friends and culture? In spite of years of political imprinting about the decadent Westerner did this Chinese PLA Captain clearly see that "ALL MEN ARE BROTHERS UNDER THE SKIN?"

Or was there some other motive — and just as human? The irresistable urge to share with another and particularly a stranger, the product of his own handiwork — his own creativity; to show how well his "homebrew" receiver performed? Whatever it was, it brought the two of them together, to listen in friendship through the long nights.

Officially, S.W. reception is "permitted" by law (tolerated, rather than encouraged, might be the truer description at this moment in time, because anyone caught listening to programmes from the USSR, Taiwan, etc., can find themselves in trouble with a capital "T"). However, the Chinese people are held captive to their Government's propaganda, because factory-built sets have no provision for S.W. and only operate to receive the local broadcast stations.

But, as the Francis James story shows, it is not possible to mind-bend all the people all the time. Simple things, sports and humble hobbies, draw different people together in a remarkable way.

Mr. James reports there is now an ever increasing number of SWL DX enthusiasts building gear and radio equipment; particularly among members of the PLA. Parts are plentiful and cheap. Will these people, mostly young, be content to listen only to Chinese transmissions — No.

Winds of change eternally blow. The Peoples Republic of China is now emerging from its past isolationist policy and has opened a new dialogue with the rest of the world. Many restrictions and barriers have now been relaxed. Is it reasonable to assume that these relaxations will eventually carry down the line as far as Amateur Radio? The answer is a possible YES — in time.

Communication, be it AR or eyeball, with any added country certainly promotes International friendship and understanding. It stimulates new thought and ideas. It removes doubt and suspicion. History demonstrates clearly how quickly idealogies come and go but the humanitarian concept that ALL MEN ARE BROTHERS UNDER THE SKIN remains a permanent truism.

*35 Whynut St., West End, Qld., 4101.

Mount Isa

The Mt. now has an amateur radio club of its own according to Graham Algie, L40451. Congratulations. Their President is Jain Morrison, VK4ZIG and a condition of membership is that senior members must also be W.I.A. members. Membership is listed as 16 senior members and a YRCS class of 14. Their first goal is a club building but meanwhile they appear to be concentrating on their Sunday YRCS classes and establishing a WICEN Branch.

REPEATERS

Continued from Page 2

We believe that with spectrum available it is inconsistent for any Division to maintain its equipment below 146 MHz to the detriment of the Amateur Satellite Service in this country.

To do otherwise is to pay lip service to ideals and totally ahrogate Institute responsibility.

SUMMARY:

ABOVE 146 MHz — WHY?

1. Satellite Service band is 144 — 146 MHz from ITU decision — it is responsibility of WIA to encourage interference free operation for the satellite band.
2. AMSAT has always urged that maximum band width be made available within the limits. (currently 145.5 to 146.0 MHz.)
3. The F.C.C. has legislated for all U.S.A. repeaters to be above 146 MHz — we do not follow blindly but similar philosophy prevails.
4. Any reference to Region 1 (Europe) must take into account that 144—146 MHz only is available. The stringent precautions taken against interference — i.e. low power, choice of antenna, minimum carrier time, low sitting, limited service area — serve to strengthen the case for shifting repeaters out of area of conflict.
5. VHF/UHF and Australian committees have recommended above 146 MHz.
6. Interference potential below 146 MHz has been amply demonstrated in this country.

WHY THE ALBURY PLAN SPECIFICALLY?

1. Is the only plan currently proposed from any quarter that satisfies all the requirements set out above.
   This does not exclude the possibility of other band plans which fulfill the same requirement.
2. Only one crystal change is required for any existing Australian repeater channel, thus minimising financial burden to existing users.
3. Other plans proposed involved total vacation of certain channels which placed disproportionate financial burdens on certain channel users.

P. D. WILLIAMS
President
Victorian Division

QUEENSLAND

Submission: 2 Meter Band Plan — May, 1973.

1. In view of the indecisive results concerning the 2 Meter Band Plan at the Easter 1973 Convention and later communications received from VK2 and VK3 Divisions on the subject, it becomes obvious that little progress will be made unless all concerned take an objective view of the problems involved.
2. It is the view of this Division that the proposed Band Plan agreed to by a majority decision at the Albury Conference held on 8/9th July, 1972, should be adopted and implemented in its entirety.
3. Perusal of the Minutes of the Albury Conference reveal that all parts of the proposed Plan were agreed to by a substantial majority and, as the Conference was truly representative of Australian Amateurs, the decisions as recorded in the Minutes of the Meeting clearly and emphatically demonstrated the wishes of the majority of Amateurs.
4. Whilst it is realised that certain minority groups have an interest in retaining the present frequency usage, there can be no doubt that the new proposed Plan will in the long term benefit all Amateurs.
5. The recent communication from A.M.S.AT. stating that O.S.C.A.R. vehicles planned for the immediate future will use frequencies in the segment 145.8+146 MHz clearly indicates that this spectrum must be kept free of possible interference. It should be remembered that O.S.C.A.R.'s 7 and 8 are planned with increased power capabilities.
6. It can be expected that the use of the Satellite service by Amateurs will increase sharply in the years ahead especially as future Amateur Satellites are expected to allow access by transmitters with lower power capability and, due to increased satellite transmission power, less sensitive receiving equipment will be required by ground stations.
7. The Plan proposed at the Albury Conference, apart from allocating frequencies for the O SC A R. programme, does make adequate provision for future repeater and simplex channel usage. Reference to the Plan does indicate that maximum use has been made of existing frequency allocations in that repeater inputs remain unchanged.
8. Although complete change may not take place immediately in all areas once the Plan has been adopted the new system will be one which will provide more channels if required in the decades ahead. It would be expected that by the time additional channels were required equipment available to Amateurs would be surplus commercial equipment or new equipment capable of operating with a channel spacing of 25 KHz, thereby doubling the number of channels available. This of course assumes a plan based on 50 KHz channel separation as outlined in the proposed Albury Plan.

Federal Councillor VK4

SOUTH AUSTRALIAN DIVISION:

A Statement on Repeater Frequency Allocations

In 1971, the S.A. Division, noting the trends in satellite operation, suggested that the existing repeater structure should be reviewed. This suggestion was ignored by the Repeater Secretariat, and no further action occurred until the Albury Conference in 1972.

Continued Page 4

Variable Voltage from a DC source

Bob Broughton VK3ZKO/T*

During a recent construction spree, VK3ZKO felt the need for a high current variable power supply to assist in the tuning of transistor R.F. power amplifiers. The two power supplies described below are the result.

Since an inexpensive design was one of the main characteristics, and since a 12V DC source was available, I decided that instead of going to the expense of buying another transformer, rectifiers, etc., I would attempt something which would drop the 12V input to the required output voltage. The first circuit (fig. 1) was very simple and appeared to work well, but it had some disadvantages. The main one was a high variation of output voltage with changes of load. This turned out to be most inconvenient when trying to tune the transistors. The output voltage had to be adjusted at almost every tuning adjustment. However, for those who wish to try this circuit some details are included.

The construction is very simple, but the 2N3055 must be mounted on a heatsink. I mounted mine on the outside of the small box holding the rest of the circuit. The potentiometer (RV) should have a logarithmic taper to obtain a more linear output swing. The minimum voltage (with a 6 ohm load) was found to be about 0.2 volts and the maximum about 10 volts. The maximum voltage is very dependent on the load resistance. For instance, under test the output varied between 2.3 volts and 9.5 volts with a load of between 1 ohm and 10 ohms (RV = 4.7K ohms).

*9/18 Wattletree Rd., Armadale, Vic. 3143.

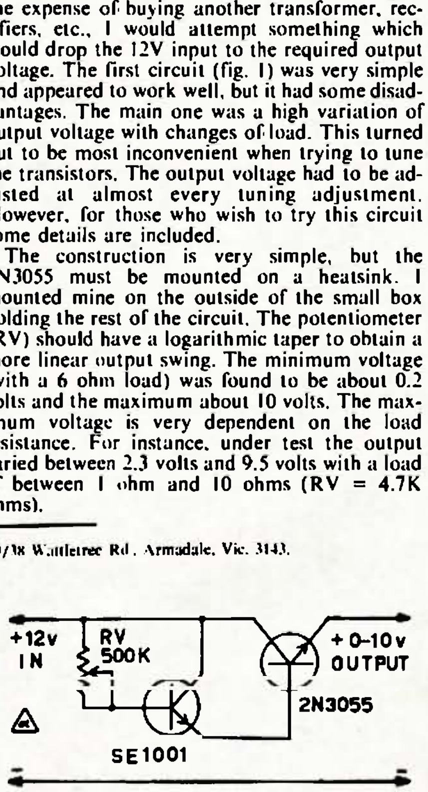


FIGURE 1

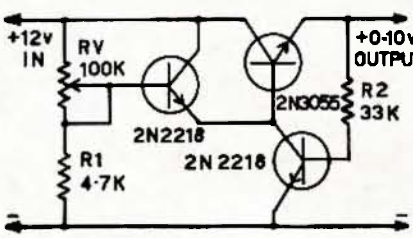


FIGURE 2

A number of circuits later (and two melted transistors) the circuit shown in figure 2 was arrived at. This circuit eliminated most of the disadvantages of the first effort. The resistance (emitter to collector) of Q1 is effectively varied by variation of RV, hense varying the bias on Q3. Q2 takes its bias from the output voltage rail, and provides a fair degree of regulation. The value of R2 is a compromise between good regulation and overheating Q2. Variations of output voltage caused by load changes, cause Q2 to shunt a portion of the bias on Q3, compensating for the output change. In each of the circuits the 2N3055 acts as a variable resistor in series with the supply.

The output voltage swing was found to be somewhere between linear and logarithmic with changes of RV, so RV was made linear. Adjustment is fairly linear over the range.

Again it is essential to provide adequate heatsinks for all of the transistors. The transistor I chose for Q1 and Q2 is a 2N2218, a rather elderly medium-powered switching transistor which happened to be in the box. Any similar switching or audio transistor will do, providing it has a maximum Ic of 800 mA or more. Before mounting Q1 and Q2 on a common heatsink check them to make sure the collectors aren't connected to their metal cases. If they are, like the 2N2218, they will have to be mounted on separate heatsinks.

The minimum output voltage of this circuit was found to be about 0.5 volts; tne maximum about 10.5 volts. Output voltage swing was less than 0.6 volts for a load change from 100 ohms to 2.7 ohms. Tests below this load resistance became impractible — I kept blowing up the resistors before I could get a reading. However, the circuit should supply up to at least 5 amps before serious drop in output voltage is experienced.

REPEATERS

Continued from Page 3

The Albury plan was accepted by a General Meeting of the Division late in 1972 and the Federal Councillor was directed to vote in favour of the Albury plan as outlined in the relevant postal motion. This postal motion was adjourned by the application of Article 44 of the Federal Constitution by the N.S.W. Division.

At the 1973 Federal Convention, faced with the situation of the N.S.W. and Vic. Councillors having specific voting instructions on repeater frequency allocations which were in direct opposition, the S.A. Division accepted a compromise plan. This plan was unwieldly, but as least was acceptable to all parties at the Convention. It satisfied our main objective, which was to clear the satellite area of repeaters, and also involved repeater operators in minimum cash outlay for new crystals. This plan was denoted as the 1973 Repeater Plan.

Despite acceptance of this plan at the Convention (on Sunday 22nd April to be precise), on Tuesday 1st May the N.S.W. and Vic. Divisions held a telephone conference and decided on a new plan which was forwarded to this Division by telephone on 2nd May. This new plan did not clear the satellite area as we desired, did not make as many repeater or simplex channels available as either the Albury or 1973 plans, and additionally involved all channel 4 users in the purchase of new crystals for both transmitter and receiver. Only Channel 1 remained untouched. The N.S.W. Division offered to buy any crystals already purchased for the Albury Channel 4 proposal. IN BRIEF, THIS PLAN INVOLVED THE N.S.W. DIVISION IN GREATER OUTLAY THAN THE ALBURY PLAN WITH NONE OF THE ALBURY PLAN ADVANTAGES.

The proposal was quite unacceptable to the S.A. Division, but before we could forward any comment we were advised (on 3rd May) that the Vic. Division were withdrawing their support for the joint plan in view of the advised satellite requirements and would instead press for the immediate adoption of the Albury plan in toto. The Queensland Division indicated that they would support the Vic. Division in this proposal.

We feel that as the N.S.W. Division were prepared to make such major concessions as required for the joint plan they should be prepared to accept the Albury plan which is satisfactory to the South Australian Division and apparently to the majority of other Divisions without further delay. The S.A. Division will vote in favour of adopting the Albury plan in any forthcoming postal motion.

Signed G. M. Taylor
Federal Councillor
S.A. Division

Federal Convention

The next Federal Convention, as decided unanimously at Easter, will be held in New South Wales at the invitation of that Division. It is interesting to observe that the term "Federal Convention" is defined in the articles as meaning the Annual General Meeting to be held in the month of March, April or May each year. Any other meeting is called an Extraordinary Convention.

6 metres

Fred Stirk, VK2ABC, sent a photocopy of two QSL cards confirming six metre phone contacts with KH6PP and VK9XK on 3rd May, 1950, and 6th January, 1952. He wonders if these could be claimed as firsts on six metres. Can anybody pre-date these?

Nicaragua Earthquake

Writing in a circular, YN1VMD, Secretary of the Club de Radio Experimentadores de Nicaragua, Apartado 925, Managua, alludes to the disaster in Managua last December in which the writer lost his QTH along with many other amateurs and friends. He gives thanks to everybody who cooperated in the emergency and states that the club wishes to construct a special trailer equipped with radio gear and power plant for use in the future. However, their club has almost no money but hopes that other amateurs might take pity on them by a donation.

Technical Articles

The Publications Committee recently re-organised and reviewed the flow of technical articles following upon the change of printer. One or two have suffered some delay but are being re-processed whilst others are appearing in print within a couple of months after receipt. However, a magazine such as A.R. is a very hungry animal for technical articles so please keep them coming in.

Illicit broadcasts

The APO News of May '73 features an article with the subheadline "The number of unlicensed operators of radio communication apparatus in Australia is growing, and the Post office is stepping up its war against offenders."

HF Beacons

VE3TEN on 28.175 MHz in Ottawa, GB3SX, on 28.185 MHz in Crowborough, 3B8MS on 28.190 MHz on Signal Mount in Mauritius and DL0IGI on 28.195 and 28.200 (15-20 & 45-50 mins. past each hour) near Salzburg, also DL0AR on 29.000 MHz. (IARU Reg. 1. News Apr. '73).

China

The People's Republic of China has acceded to the International Telecommunication Convention, 1965, but has made three statements including reservations concerning the assignment and utilisation of radio frequencies in the Radio Regulations. The form of call signs to be issued to amateur stations is the letter B followed by a letter designating the geographical area (e.g. U-Sinkiang) followed by a single digit and the letter A or A with one or two letters. (IARU Region 1 News, Apr. '73).

Restrictions on the Amateur Service

"But let the (F.C.C.) Commission not for a moment forget it is dealing with amateur radio. We take part in it because of the love of the game, the challenge, the satisfaction. The effort is entirely volunteer. For a successful amateur service, in the public interest, the regulatory atmosphere must continue to permit freedom and flexibility ..."
Editorial QST Mar. '73

160 metres

"Stew (W1BB) reminds everyone of the importance of not forgetting the 'DX' window (1825-1830 KHz) when the band is open for DX working." (Rad. Comm. Mar '73 — Month on the Air)

C.G.S

TYPE C MINIATURE VITREOUS ENAMELLED POWER WIREWOUND RESISTORS

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SPECIFICATIONS

The 'C' Series of miniature wirewound, vitreous enamelled resistors has been designed to meet the requirements of Specification BS 9114 - N002, and full Qualification Approval has been granted. A Test Report Summary is available on request; this report shows that many of the performance levels are in fact much higher than the specification acceptance levels.

The use of specially selected materials, combined with the application of exacting quality control throughout all stages of production ensures the consistent achievement of a very high standard of reliability.

ELECTRICAL SPECIFICATION

Tolerance: ±5% is standard on values of 1Ω and above and ±10% between 0.1Ω and 1.0Ω. For non standard values and tolerances please consult the factory.

Resistance values: C Series resistors are available with the preferred ohmic values of the E24 Series within the ranges shown in Table 1.

Temperature coefficient: Typically less than 100 ppm/°C and never exceeding 200 ppm/°C over the category temperature range −55°C to +200°C

MATERIALS

Core: High purity steatite ceramic. Chemically inert, capable of withstanding severe thermal shock and impervious to moisture. Ground to close tolerance finish to give maximum contact with wire element for rapid heat transfer.

Resistance Element: High quality nickel-chrome or nickel-copper alloy depending on resistance value; wound at minimum tension.

End Caps: Formed to close tolerances from a special nickel-iron alloy chosen for its consistent welding properties and glass sealing characteristics.

Leads: Solder coated nickel A.

Uncoated leads can be supplied for welding.

Specify – 'weldable leads'.

Preformed and cropped leads can also be supplied on request.

Coating: Humidity proof vitreous enamel with carefully controlled expansion matched to the materials of the resistor.

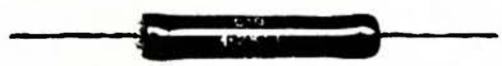

TABLE 1

C.G.S.				BS 9114 - N002							STYLE CROSS REFERENCE		
Style	Maximum wattage rating @ 20°C	Resistance Range Ω		BS 9114 - N002 Style	Maximum wattage rating @ 70°C	Approved Resistance Range Ω		Critical Resistance Ω	Limiting Element Voltage. Volts		DEF. 5111-1 Style	DEF 5115-2 Style	G.P.O. Style
		min.	max.			min.	max.		Normal	Low Air Pressure			
C3A	3	0.1	10K	2E-56-2.5	2.5	1	4.7K	3.9K	100	70	RWV3J	RFH3-2.5	P.O.35
C7	7	0.1	27K	2E-56-6	6	1	15K	6.8K	200	140	RWV4J	RFH3-6	P.O.40
C10	10	0.1	68K	2E-56-9	9	1	68K	27K	500	350	RWV4K	RFH3-9	P.O.36
C14	14	0.2	120K	2E-56-12	12	1	100K	47K	750	530	RWV4L	RFH3-12	–

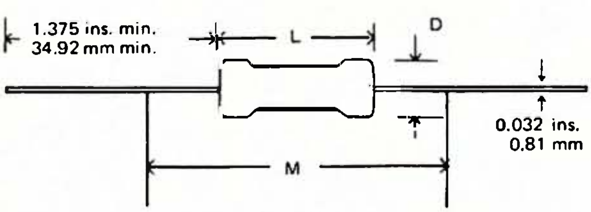

TABLE 2

Style	Length L		Diam. D		Measuring Distance M		Approx. Weight
	max. in.	max. mm.	max. in.	max. mm.	±0.062 in.	±1.59 mm.	grammes
C3A	.499	12.7	0.220	5.6	1.250	31.8	1.0
C7	.874	22.2	0.315	8.0	1.625	41.3	2.0
C10	1.499	38.1	0.315	8.0	2.250	57.2	3.5
C14	2.106	53.5	0.315	8.0	2.875	73.0	5.0

Note: M – resistance measuring points distance – below 10Ω only.

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1	PM-2	Power Supply for KWM2	140	220
1	75S-3C	Receiver	1,025	1,410

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2-08	5/8	8	3	No. 3006	88c
2-16	5/8	16	3	No. 3007	88c
3-08	3/4	8	3	No. 3010	$1.06
3-16	3/4	16	3	No. 3011	$1.06
4-08	1	8	3	No. 3014	$1.19
0-16	1	16	3	No. 3015	$1.19
5-08	1 1/4	8	4	No. 3018	$1.32
5-16	1 1/4	16	4	No. 3019	$1.32
8-10	2	10	4	No. 3907	$1.91

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7" length, 2" diam., 10 turns/inch.
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References: A.R.R.L. Handbook, 1961;
"QST," March, 1959;
"Amateur Radio," Dec. 1959.

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Remote Control of the Yaesu FT-101 Transceiver

This article by G3AZT and reprinted with thanks from the English Amis's "Mobile News" of August and September 1972, provides a wealth of information on the problems (and their solutions) involved in fitting an effective HF mobile installation into a rather small car.

The author is firmly against a non-engineered installation of any sort within a vehicle. the use of hand held microphones together with radio equipment perched on the seat or jammed into some convenient space could bring mobile operation into strong disrepute, as well as endangering the personal safety of the operator and other people.

The number of cars in which an FT-101 can be installed in safety is indeed very small, so that the majority of mobile operators have to think about remote control if they are to operate in a safe manner. The FT-75 is a step in the right direction but this still tends to have the wrong dimensions for the average British small car, as well as suffering from severe power output limitations.

Having recently changed his car to a Triumph "Dolomite", the author found that it was impossible to install his FT-101 inside the car in a convenient position so the only solution was to put it in the boot and have remote control by means of a unit placed in the small glove compartment alongside the steering column.

The following functions are available from inside the car.

(a) Tuning — a range of 350 KHz swing at 9 MHz approx. is adequate for all bands giving a lower limit of 7,050 KHz on 40 metres and an upper limit of 21,400 KHz on 15 metres.
(b) AF gain control only has proved satisfactory — FT-101 gain is set to position 6 with R.F. gain fully up and with the noise blanker switched on. If overloading problems are encountered on 40 metres or another band then the attenuator must be left in, but this is rarely done.
(c) P.T.T. switch mounted on the control unit.
(d) Main D.C. power supply switch.
(e) R.F. power output indication — no "S" meter is provided since it gives little useful information when the FT-101 is used with the car in motion due to changing meter reading with battery voltage.
(f) Loudspeaker output — the speaker is mounted in the usual car radio position.
(g) Microphone input — the author uses a lightweight 50 K dynamic microphone attached to a stiff piece of p.v.c. insulated wire bent into a "U" shape and fitted around his neck.

The necessity for "boot" band changing and re-tuning is not considered a disadvantage — usually the aerial has to be changed anyway — and it overcomes the temptation to attempt complicated band switching and tuning whilst driving.

The various parts of the control system will now be described separately

They comprise:

1. Mounting of FT-101.
2. Cabling running from front to rear of car.
3. Line amplifier bolted to FT-101.
4. Control unit near driving column.

1. MOUNTING OF FT-101 IN BOOT

This is carried out by means of wooden brackets and supports. A 90° angle section of 1" x 1" soft wood strip holds the FT-101 along the top of the front panel by means of wooden supports attached to each end of it and bolted to convenient holes in the boot structure. Soft wood is preferred rather than metal in the interests of non-scratching and resilience. See Fig. 1.

The cables are terminated at the control unit by four Pin Jones plugs. Since the cables must be 50 amp rating it is difficult to connect them into the Jones plugs so that a two pole connection block is used to reduce the 50 amp wires down to ones of smaller cross-section so as to fit into the plug. See Fig. 2.

R.F. This is merely Uni radio 70 type cable run from the control unit to the line amplifier mounted on the side of the FT-101 and terminating in coaxial plugs at each end.

3. LINE AMPLIFIER

This is built into a small Eddystone die-cast box 4¼" x 2¼" x 1" deep. The circuit and layout

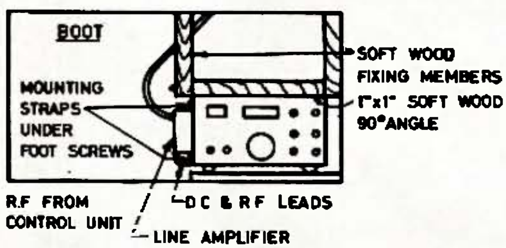


FIG 1 BOOT MOUNTING OF FT 101

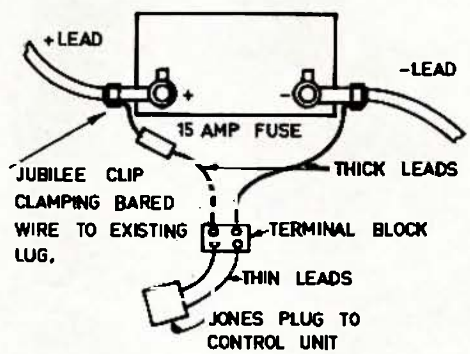


FIG 2 BATTERY CONNECTIONS

2. CABLE RUNS

Interconnecting Cables and Wires run under the carpeting and through bulk heads.

D.C. These are approximately 10-12 feet long. The main D.C. cables from the battery runs to the boot of the car via the control unit. One is attached to the negative terminal of the battery by means of a "Jubilee" clip around the lug and the other to a 15 Amp "Slydlok" fuse attached to the positive lug by similar means. See Fig. 2.

are shown in Fig. 4. The circuit is wired on an eight-way tag-board within the box, the input coaxial socket, gain control and lead grommet being positioned as shown.

The output of the amplifier is fed by means of a coaxial cable through the FT-101 C.W. jack socket together with the positive and negative power supply leads and soldered to the remote v.f.o. socket pins inside the FT-101. Fig. 5.

At the same time it is convenient to make the

REMOTE CONTROL OF THE YAESU FT-101 TRANSCEIVER

Continued from Page 7

additional internal connections at pins 2,3 and 7. The line amplifier is mounted firmly to the side of the FT-101 by removing the two rear feet as shown in sketch 1.

4. CONTROL CABLES

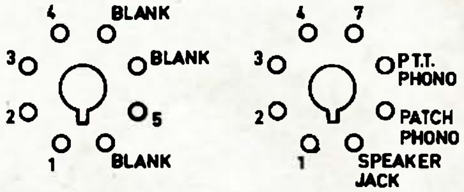
These consist of screened microphone cable with the screens bonded together at each end. The plugs are interconnected as shown in Fig. 3, except that the FT-101 plug pins are not connected at pins 5,6 and 8, the three remaining leads being connected to phono plugs. The leads are 10-12 feet in length and either taped together or enclosed in a length of plastic tubing before soldering into the actual plugs.

5. CONTROL UNIT

This is built into an Eddystone diecast box 7¼ x 4½ x 2 inches which is located in the glove box in foam rubber. Fig. no. 8 shows the main lay-out and details. It is necessary to space the Jackson drive and dial from the front of the box by means of aluminium or other strip material for a distance of one inch to accommodate the tuning capacitor. A plastic extension is provided on the PTT switch lever to facilitate change-over.

The circuit of the v.f.o. is shown in Sketch no. 6. The components are mounted on a ¼ inch thick insulation board by soldering to 8 BA screws attached to the board as shown in Fig. no. 7.

FIG. 3 — 8 Way Screened Cable Connections



FT101 PLUG (J13 SOCKET). CONTROL BOX PLUG.

Numbers, etc., on above signify connection at opposite end of cable consisting of eight screened microphone leads sleeved or taped together, e.g. PIN 7 on FT-101 plug goes to PIN 5 on Control Box Plug.

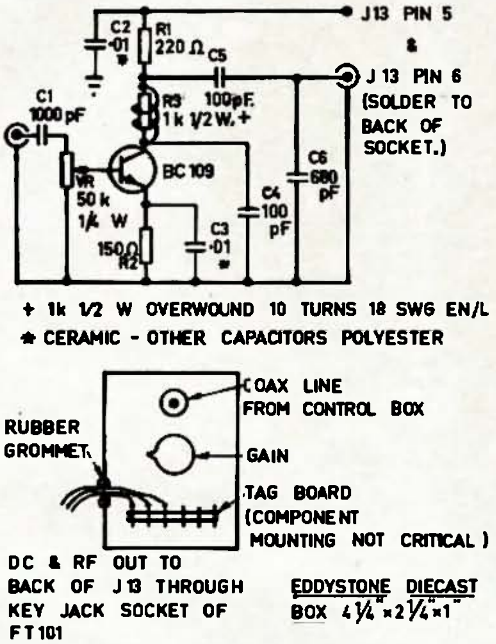


FIG 4 CIRCUIT AND LAYOUT OF LINE AMPLIFIER

FIG. 5 — Additional Soldered Connections (Internal) to FT-101 Octal Socket J13

PIN CONNECT TO

2* Earth End of AF Gain on front panel.
3* Slider End of AF Gain on front panel.
5 +12 Volt Lead to Line Amp through key socket.
6** Coax R.F. output from Line Amp.
7 VR6 Slider (C37) — side of PA Compartment.
8 Earth to Line Amp through key socket.
* It is necessary to run both these leads in separate screened cables with outers earthed at pin 8 only.
** Earth outer at both ends, i.e. pin 8 and line amp case.

EQUIPMENT REVIEW

The Yaesu YD-844 Desk Microphone.

Often seen in advertising photographs of Yaesu equipment the YD-844 is a microphone of most elegant design. It is a high impedance dynamic type microphone and as such is suitable for connection to most current sideband transmitters and transceivers.

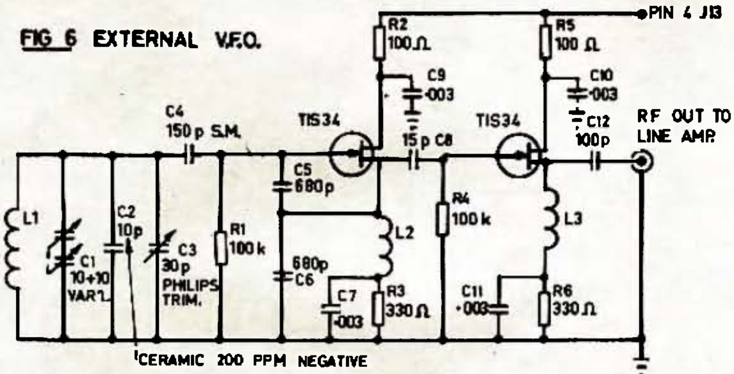
For the purpose of our test, the microphone was tested on air with various transceivers and also compared on a high fidelity tape recorder with a broadcast type dynamic microphone. On air reports all indicated very intelligible quality, while the output level was equal to two other test microphones. The biggest surprise occured when the Yaesu microphone was compared on tape with an STC 4037 — a broadcast type microphone. It was immediately noticed that the Yaesu had a very wide and smooth quality range and it could be confidently recommended for high fidelity public address work.

The push to talk switching was very smooth to use and could be actuated in two ways. As can be seen from the illustration there are two push buttons on the front of the base. One is a spring loaded PTT button while the second is a lock-on and release key. Then the PTT switch can be actuated by simply lifting the microphone from the desk.

The YD 844 is fitted with a five foot coiled lead and a normal tip, sheave and ring microphone plug.

The Yaesu YD 844 microphone is priced at $39.50 and is obtainable from the Australian Agents, Bail Electronic Services from whom we obtained our test model.

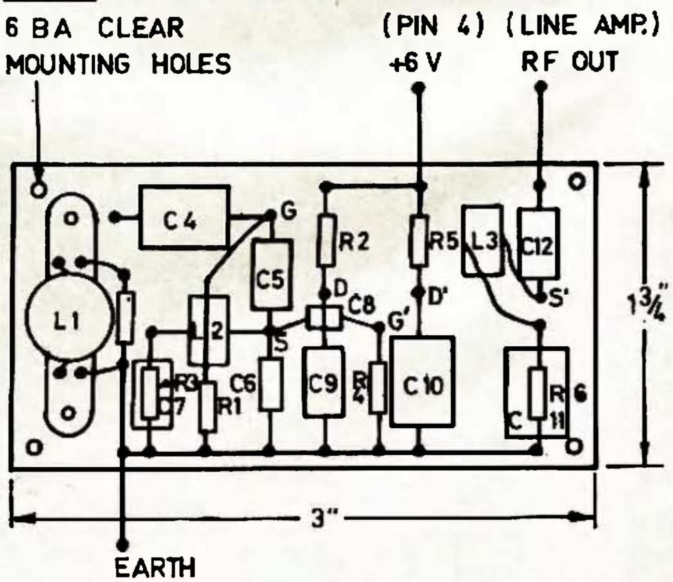
FIG 6 EXTERNAL V.F.O.



ALL CAPACITORS POLYESTER UNLESS OTHERWISE MARKED
L1 17 TURNS 7/16" DIA. FORMER 24 SWG ENAMEL
L2-L3 2·5mH. TELETRON R.F.C.

JAA

FIG 7 EXTERNAL V.F.O. LAY OUT



T.I.S. 34 FET'S not shown.
S.G.D. and S.' G.' D.' show connections.
Build on ¼" thick Insulation Board.
Components flush with board soldered to 8BA screws bolted through board.

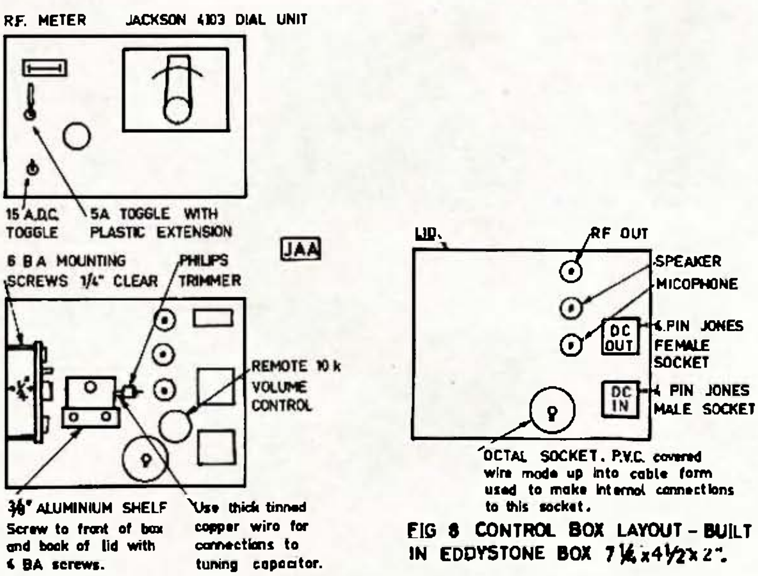


FIG 8 CONTROL BOX LAYOUT - BUILT IN EDDYSTONE BOX 7¼x4½x2".

TESTING

It is suggested that the Control Unit is tested on the bench first, using short connecting leads. The v.f.o. range can be adjusted by comparing it with the internal v.f.o. of the transceiver simply by switching over from internal to external v.f.o. Adjustment of C3 and possible L1 will enable the requisite frequency range to be obtained.

The Line Amplifier gain control can be set to give slightly more R.F. output and possible greater sensitivity on receive than with the internal v.f.o. In the writer's case, ¼ S-point on receive. The VR6 slider (on the rear of the FT-101) should be set to give adequate R.F. indication on the 250uA R.F. power output meter on the control unit. Finally, coil turns should be set in place with Durofix.

OPERATION

The unit has been in constant daily use for several months. Stability is excellent and the inside of the car does not look like a radio shack! The addition of attenuation, noise blanker and R.F. control was considered but rejected on the basis of complete operator satisfaction.

In good weather operation from a seat outside the car using the noise cancelling microphone in the normal socket and internal speaker with the boot lid open gives great satisfaction. Finally, the FT-101 can quickly restore to its original state — in about ten minutes — before possible resale.

AR

MEMBERSHIP SUBSCRIPTIONS

The response to timely payment of subscriptions has been quite encouraging this year even though many paid against "Final Notices". Apologies are due to a number of members with names beginning with A. A short trial run was done to line up the print out on the subscriptions form and due to problems with splitting the pages of printed notices some Final Notices which had been duplicated in the trial run slipped through undetected.

SWEDISH AMATEUR LICENSING

From the PMG's Radio Branch comes a copy of new and amended rules for amateurs in Sweden. They refer to both long-term and temporary visitors to Sweden requiring Swedish licences and, regardless of any reciprocity agreements in existence or to be negotiated in the future, each application is given similar consideration as applies to their own residents requiring a licence. The moral seems to be that if you want a licence when visiting Sweden you must apply well in advance.

LA BALSA

Syd Mulen VK2SG, writes that Vital Alsar will sail three rafts with 12 people aboard across the Pacific leaving on 24th May and arriving Mooloolabah (Qld) some time in October. Communications on amateur bands as for La Balsa. Request is made for clear frequencies, except for those assisting, although a listening watch would be of great help. For "La Balsa" details please see A.R. January 1971.

STANDARDS ASSOCIATION

A new Australian standard has been issued for fixed capacitors for direct current paper or paper/plastic film dielectric with rated voltages up to 6300V. The standard is No. 1381.

EXCHANGE RATES

Ever calculated how much the Australian dollar is worth in terms of overseas currencies? Recent rates were $1A equalled US.$1.41 (1.19), 1.76 pounds (2.06), DM 4.07 (3.77). Figures in brackets were those prevailing some eight or nine months ago.

WPX

What is this "WPX"? In simple terms it means collecting QSL's from as many different prefixes as possible. The "CQ Magazine" for February 1973 lists VK3AHQ as confirmed 809 on CW in conformity with the CQ Master Prefix List. However he is the only VK listed. Tops is a W with 1197 prefixes in the Mixed Section.

An A.R. Special

THE 1973 FEDERAL CONVENTION

As with every similar Convention in recent years the Agenda items generated more discussion than could reasonably be accommodated from Friday to Monday morning. Working Parties at night attended to those subjects which could be classified as capable of generating volumes of steam.

Justice cannot be done to the Convention business as a whole in a short article of this nature so a resume of the more important items only can be attempted. Also it will be appreciated that there is difficulty in selecting the reader's favourite topic in amateur radio out of the wealth of discussions. Whatever may be your interests, however, you can rest assured that almost everything of current topicality received a good airing.

Two questions which took up considerable time were finances and repeaters. Finances were particularly selected for examination because of a qualified report by the Auditor.

With costs rising all round us how could the Institute be kept going without subscription increases? But the unpalatable facts of life nad to be faced, so said the Chairman of that particular Working Party, when presenting the 1974 budget with a recommendation that the central administration's share of the Full and Associate Members' subscriptions for 1974 be increased to $7.20 instead of $6.19 applicable in 1973. This covers the costs of Amateur Radio, I.A.R.U. levy and the very small Executive office which includes centralised membership and subscriptions processing through EDP, salaries, wages and the normal unavoidable expenses in running any central office. The recommendations were accepted. It was accepted that the Executive office was grossly overloaded with work and various measures were suggested to rectify this unsatisfactory state of affairs.

The main details of the outcome of the repeater deliberations were published on page 2 of May A.R# These derived from a working party composed of every Federal Councillor.

A matter of considerable importance to future Institute activities was surprisingly finalised with little delay. This was the so-called "Novice Licensing" for which the Controller's letter arrived only a day or two prior to the Convention. This important letter was published in full on page 7 of May A.R. The Convention directed the Executive to accept the P.M.G. Department proposals subject to putting forward four additional points, namely an extra frequency allocation 28.100 to 28.300 MHz, a special "N" Series of call signs, Limited Licensees be permitted to hold both a "Z" and an "N" call if so qualified and that stations be inspected at the time of licence issuance so that the holder could be told of his responsibilities, etc. Some doubt exists about the success of the 10 metre proposal but the next two proposals appear to have been accepted favourably by the Controller.

Efforts were made to allow long-serving Federal Councillors a eagerly awaited Easter with their families, and simultaneously to explore the feasibility of more frequent Conventions on different dates with increased intercommunications possibly at less cost than one highly formal Convention per year. After much discussion no satisfactory alternative to the present arrangements could be discovered except that matters of interest to two or more Divisions should be discussed, and if possible, agreed in advance of any postal voting. The last mentionec also alluded to the use during 1973 of the notorious Article 44 of the Constitution.

VK2 Division put forward the desire of the Canberra Radio Society, upon incorporation, to form the A.C.T. Division of the Institute. A motion was passed agreeing to this admission after fulfilling the requirements of Article 3 of the Constitution.

The new post of a Federal WICEN Publicity and Liaison Officer acting through Divisional Councils was approved as also a new Section for RTTY on lines similar to the Key Section.

Several mechanical motions dealing with specific aspects of the Publications Committee work were passed which will mean the active participation of Divisions (other than VK3) in "Magpubs" and Call Book activities.

On contests the VK5 Division are to prepare a standard set of Contest Rules in respect of interstate contacts in Divisional contests which happen to be held on simultaneous dates. In the R.D. Contest the proposal to include a club stations' score in the Divisional total was passed to the Federal Contest Manager for necessary action although it could be too late to incorporate this in the 1973 R.D. Contest rules.

A motion to approach the PMG Department to liberalise the issue of licences to older persons with past services experience in radar (etc) was lost on an equality of voting. In relation to approaches to the Department the Report of the Executive high-lighted the continued excellent relations existing between the Institute and the Radio Branch. However, attempts to secure a change-over to a multi-choice type of examination by the Department were reported as unlikely to achieve success in the foreseeable future on administrative and financial grounds. Similarly unsuccessful were attempts to obtain the use of the AX prefix which the Department has reserved for use only on occasions of special national importance. Successes in 1973 however, included a considerable liberalisation in reciprocal licensing concessions (see page 17 of Aug '73 AR). The President reported, with statistics, that membership in the Institute of licensed amateurs was disappointing although associates showed a reasonable numerical increase.

Of the other Annual Reports all were received and all but one were adopted. A vote of thanks was iessee o the writers of the Reports and to the VK3 Division for having the Convention in Melbourne at very short notice.

Finally the appointment of new officers of the Executive were Dr. D. W. Wardlaw VK3ADW, as Federal President, Mr. W. E. J. Roper VK3ARZ as Editor and Messrs. D. H. V. Rankin VK3QV, K. V. Roget VK3YQ, J. J. Martin VK3TY and K. Connelly VK3ARD as members of the Executive.

R.D. CONTEST IS NEAR

Will your log be in to join the 700 wanted?

Magazine Index

With Syd Clark, VK3ASC

RADIO COMMUNICATION. February 1973.
The G2DAF SSB Transmitter Mk.3.; TT. Multi-band Loops, FET Regulator, High current Pwr. Sup. etc.;

RADIO COMMUNICATION. March 1973.
The G2DAF SSB Tx. (Pt.2).; Bilateral SSB.; Improved Harmonic Attenuation in HF Amateur Transmitters.; TT; Double Balanced FET Mixers, Setting NBFM Deviation, Crystal NBFM Discriminator, Transistor Car Regulator, Ergonomics and others.

SHORT WAVE MAGAZINE. February 1973.
Solid State Receiver for 2 Metres.; Adaptable 30 watt Transmitter.; R.A.S. Question, answered.

CQ. February 1973.
A Simple, Effective VFO for the Novice Operator.; The Three-Quarter Wave, Current Fed Antenna.; An RTTY Repeater.; Leader LDM-810 Reviewed.; CQ WW WPX SSB Contest.;

CQ. March 1973.
The Loop Box.; Teletype Test Generator.; CW. The Second Time Around.; Zener Diode Cathode Bias.; Modifying the Allied-Radio Shack Series 190 Receivers.; Simple R.F. Output Metering.; The Song of the Flea (40 countries in a month with 3 watts.).; Protective Circuits for Transistor Power Supplies.; An RTTY Repeater.;

HAM RADIO. February 1973.
Designing Communications Receivers for Good Strong-Signal Performance.; Integrated Circuit Speech Clipper.; VHF Receiver Scanner.; How to Use the Plessey SL600 Series I.C's in Amateur Communications Equipment.; Solid State Noise Blanker.; A Simple Receiver-Demodulator for RTTY Net Operation.; Grid Current Meter for HW-100 & 101 Integrated-Circuit Audio Oscillator. (15 Hz-40 KHz);

QST. March 1973.
The W2FMI Ground Mounted Short Vertical.; An Inexpensive Time-Domain Reflectometer Tips on Ten.; A Solid State SSTV Monitor Mark II.; An SSB Receiver for 7 & 14 MHz. A Contes Spotting Switch for the 32S-3.; Simple and Efficient Feed for Parabolic Antennas.; Solution to Fuel Injection System Interference.; A Universal Voltage-Multiplier Circuit.; Review:- ETO Alpha 77 Linear Power Amplifier.; Standard SR-C146 FM Transceiver.; DANGER: When you Transmit You Can Turn Off a Pacemaker.; Why Must We Moider Da King's English?;

MAGAZINE SUBSCRIPTIONS

Direct from Publishers

The list published on page 18 of April A.R. is still current except for subscriptions to VHF Communications. The new rates for this appear elsewhere in this issue.

Prices of overseas magazine subscriptions are being held at present levels until the exchange rates situation clarifies.

Because of mail delays and other circumstances beyond our control there has existed considerable time between ordering time between ordering an overseas magazine and actually receiving the first issue. All evidence points to a return to normality from last month — i.e. a "normal" delay of around 6 to 8 weeks.

W.I.A. MAGPUBS

P.O. Box 150, Toorak, Vic., 3142.

AMATEUR RTTY IN AUSTRALIA

DR. KEN KELLY *VK4MJ

For some years a small band of enthusiasts have been using the RTTY mode in Australia, but many of the Ham fraternity have little or no idea of the ins and outs of this fascinating facet of our hobby. However in the past three or four years there has been an increasing interest, and I have found that there are quite a number who have some interest, but feel that the complexity of the project may be too great. Fortunately, this is a misconception, and I will hope to show that most of the difficulties can be overcome fairly easily, and that you may enter a new world in this mode. I found that the transition to RTTY from SSB was just as rewarding and fascinating as was the earlier transition from AM to SSB.

DX galore

Most of the contacts at the present time will be with DX stations, as the number of active stations in VK at any one time is very few. There are of course the usual number of Stateside stations, but it is also easy to work many in the Oceania area, and Europeans galore. In fact you name it, and it can be worked. Further, the signals do not need to be S9 — with demodulators of modern design, the machine will print copy which is way down in the noise and barely audible. Many times I have been able to print signals which I would not have been able to copy as CW!

Local nets

As the interest grows, the possibility of forming VHF nets in an area is beginning to take shape. With transistorised VHF receivers, it is quite practicable to leave the receiver running, and a very simple system to be described in a later article will turn the printer on when the mark tone is received, so that a message may be printed at an unattended station, all ready to read when the operator comes home from work — or beach. A little more complex, but not unduly so is a similar system for use on HF bands.

RTTY QRM

Many RTTY stations can be heard on the HF bands, and on many occasions I have heard operators complain that Ham RTTY is a menace. This is not so. Most Ham RTTY is confined to a very small part of the band. Frequencies used are 14.075-14.100, 21.075-21.100, 28.075-28.100. In actual fact most of the 14 MHz traffic is between 14.090 and 14.100, and it is rare to hear of anyone on the other frequencies except during a contest. On the lower bands there is no regular traffic, but 3540, 7010 and 7040 are most commonly used. All the other stations you hear on the bands are commercial pirates!

Getting started

First of all, do not be discouraged because you can't type. This will come with a little practice. The great thing to realise is that it is unlike CW where the unfortunate recipient of a painfully slow operator has to sit and wait for each letter and write it down. If I make contact with a slow operator on RTTY I can do some other little job round the shack, or even go and get a snack. The thing will keep printing wnile you are away. You can hear when he stops, rapidly read the two or so lines he has laboriously sent, and go ahead with your reply. Most of the stations I have worked who have new and slow operators have been found to make remarkable progress within a very few weeks.

The basic theory of RTTY is covered in the ARRL and RSGB handbooks. There are also two American publications with more detail available at the bookshops — "RTTY, A to Z", and the new "RTTY Handbook". In addition the "RTTY Journal", published almost monthly, contains many items of interest, including technical and news features. Write to Box 837, Royal Oak, Michigan 48068, U.S.A. The subscription is U.S. $3.50 (airmail US $5.50).

The main problem is getting started is to obtain a machine. They are not plentiful in Australia, but they can be obtained from time to time if you keep watching the ads in "AR", and also the sales from the various Government instrumentalities. From time to time the WIA in some states has been able to obtain a few, and there is a strong possibility that some will become available in the next few months. It is best — in fact almost essential to obtain a page printer, although a tape printer can be used, but is rather inconvenient to use for ordinary QSO'S# The two types most likely to be obtained are the Creed Model 7, and the Teletype Model 15. Either of these should be satisfactory if in reasonable order.

Receiving RTTY

Receiving RTTY signals is dependent on a stable receiver. It is essential that the drift be of a low order, and the oscillator of the receiver must be stable and not subject to fluctuations. Remember that you will have to maintain tuning within a few cycles. With the type of SSB receiver found these days in most stations, this should be no great problem.

You will then need to build a demodulator for the RTTY signals. This equipment is also commonly known as a terminal unit or "T.U". You will find some simple ones described in Handbooks. The most popular one in use at the present time is the "ST-6" or some modification of it, which has been described in "Ham Radio" magazine (January 1971).

I will later describe a method whereby this unit may be made in convenient sections, using circuit boards designed for maximum flexibility, so that you may experiment with modifications to various sections of the circuit without having to scrap any of the unit in the process. It is a completely solid state device, and gives a high standard of performance. Templates of the circuit boards will also be published, making duplication a very simple matter.

Sending RTTY

There are several ways in which the carrier shift necessary for sending RTTY may be obtained. Note that the transmitter is in effect transmitting a constant carrier so that it must not be loaded to the input used for CW. It should be loaded as if for AM transmission to ensure that the dissipation of the final tubes is not exceeded.

The simplest method is to make an audio oscillator, which can be fed into the microphone jack of an ordinary SSB transmitter. This will produce a carrier, and alteration of the frequency of the oscillator will of course shift the carrier by the same amount. Such an oscillator may also be made on a circuit board, and incorporated in with the terminal unit. However, with this method — "A.F.S.K." it is essential that the SSB filter has a rejection of at least 50 dB.

Other methods of frequency shift mostly depend on some method of altering the VFO tuning by a small amount, usually with a varicap, or a small capacitor in conjunction with a switching diode. Usually this can be done with a very minimal modification to the station transmitter — the installation of a suitable connector, three small components, and one wire to the VFO.

In the next article a simple T.U. will be described, suitable for copying on VHF, and also useful on HF when conditions are good. From this basic unit, various additions will be described up to a final sophisticated unit.

Interested?

If you are interested, the writer will be happy to give you further information, or to put you in touch with your nearest active RTTYer, who will be delighted to have the opportunity of demonstrating his equipment and trying to make another convert.

AR

*285 Monaco St., Surfers Paradise, Qld. 4217.

700 LOGS WANTED FOR R.D. CONTEST — AUG. 1973

EASTER FEDERAL CONVENTION 1973 —"CANDID SHOTS"

KINDLY SUPPLIED BY CYRIL MAUDE VK3ZCK

L to R. David Rankin VK3QV, Mr. Horrie Young (Controller, Regulatory and Licensing of PMG Radio Branch), Ian McKenzie VK2ZIM, Tony Mulcahy VK2ACV (VKZ President and the F.C.)

Part of Members at Conference Table.

Bill Roper VK3ARZ
Editor — A.R.

Ted Cruise VK7EJ
(VK7FC)

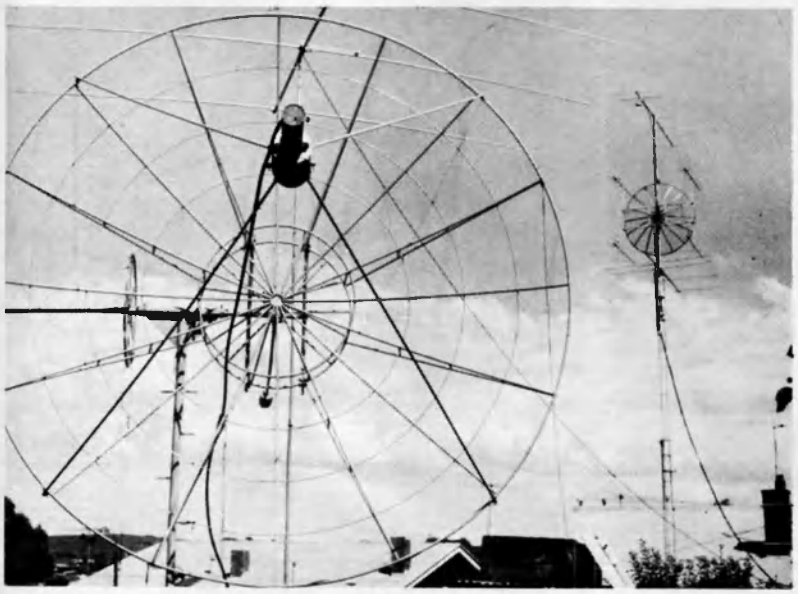
Russell Kelly
VK3NT

Neil Penfold
VK6NE

In this photograph, are Laurie Blagbrough VK4ZGL (VK4FC) and Surg. Capt. Jim Lloyd VK3CDR (VK3FC).

L to R. Tony Mulcahy, Geoff Taylor VK5TY (VK5FRES & FC), David Rankin, Mr. Young, Ian McKenzie, Ted Cruise.

The three photographs depicted here of Ron Wilkinson, VK3AKC, and his gear were kindly supplied by the PMG's Department, Engineering Division. And we are indebted to them for permission to publish. For details of the 1296 MHz moonbounce success please refer to page 15 in A.R. of April 1973. It is gratifying to observe that pictures and stories of Ron's achievements appeared in the Australian Post Office News (Apr. 1973) and in the VK3 press.



WICEN

Pictured below are some photographs taken during the WICEN exercise between the VK3 Division and Red Cross tor the Murray River canoe races over the last New Year holidays. Photographs by courtesy of Bob Broughton, VK3ZKO/T.

Operations at Picnic Point.

The Organiser, John Battrick, VK3OR, in a pensive mood — no doubt plotting permutations.

Peter Mill, VK3ZPP, operating 2 Mx from Yarrawonga Football Ground.

Shady comfort.

VHF UHF
an expanding world

With Eric Jamieson.* VK5LP

Closing date for copy: 30th of month.
Times: E.A.S.T.

AMATEUR BAND BEACONS

VK0	52.160	VK0WI Macquarie Island
	53.100	VK0MA Mawson
VK2	52.450	VK2WI Dural
VK3	144.700	VK3RTG Vermont
	144.925	VK3QZ Traralgon
VK4	52.600	VK4WI/2 Townsville
	144.400	VK4WI/1 Mt. Mowbullan
VK5	53.000	VK5VF Mt. Lofty
	144.800	VK5VF Mt. Lofty
VK6	52.006	VK6VF (VK6RTV) Bickley
	52.900	VK6TS Carnarvon
	144.500	VK6RTW Albany
	145.000	VK6VF (VK6RTV) Bickley
VK7	144.900	VK7VF (VK7RTX) Devonport
VK8	52.200	VK8VF Darwin

Note: Call signs in brackets indicated new call sign when change made.

Beacons listings this month are down to the winter listings — those of our own Continent. Other areas will be re-included when conditions are likely to be more suitable for their reception.

CANBERRA NEWS

Pleased to receive a letter from Andrew VK1DA with some information of what transpires in that area. He reports the VK1 beacon still works well in Eddie VK1VP's establishment, and still awaiting the P.M.G. licence! Let us all hope it can be heard next DX season. (Dec.)

Four VK1's are working through Oscar, VK1ZT, VP, MP and DA. They find some problems with interference between stations working Oscar and Channel B users, in that SSB and CW signals are rather disturbing to hear in an FM receiver!

Interesting to note Neil VK1ZT copied W2NFA during Ron VK3AKC's 1296 MHz EME contact, verifying the 339 report being sent to Ron.

Currently a renewal of interest covering the path between Sydney and Canberra, Mike VK2AM being the probable instigator, and stirring up Roger VK2ZRH and Rod VK2ZQJ, so, coupled with the Geelong Club appeal for a "Get back to Two" campaign, anything might happen, particularly since Reg VK1MP has heard VK2ZAY in Boggabri, a path distance of about 340 miles.

Finally, Andrew reports that Neil VK1ZT and Ron VK3AKC tried to work each other on 1296 MHz from Mt. Ginini near Canberra to Geelong, during the National Field Day weekend. Neil heard good radar pulses from Tullamarine Airport but nothing of Ron. Still, there may be better results on the next try. Good luck chaps.

NORTH WESTERN NEWS

Thanks also to Peter VK6ZDY for taking the trouble to write to me of happenings in the Port Hedland area of W.A. Peter was transferred in his job last February and expects to spend 12 months there. His equipment consists of an FT200, FTV650 transverter, 5 element yagi at 15 feet. First signals from Japan were heard on 4th March, but variable in signal strength. All districts worked, including JH1IGC who runs A3J into four bays of five element yagis stacked at 70 feet!! Peter makes the comment ... "he's very strong!"

The JA's have been working the northern regions of VK and hearing the beacons VK8VF and VK6TS. Ken VK6ZFQ is 125 miles south east of Port Hedland at Dampier and is working plenty of northern DX. The JA's have been consistently working DU1, DU9, and KG6 around 50.1 MHz. So it seems we southerners must move northwards if we are to work the exotic material which appears to be available.

JA's WORK INTO VK5

A brief report from Bob VK5ZDX mentions that Bob VK5PB worked three JA3's around 2000 hours on 24th April, signals S5-7. Well, you have got to be there to work them, and I wasn't!

OTHER NEWS

The April issue of "6 UP" continues the series of interesting articles on meteor scatter propagation by Rod VK2ZQJ, all making very good reading: when I finish my latest course of study (in 2 years time!) I might be tempted to go into this form of operation. In the meantime, the following date from "6UP" of Enhanced Meteor Shower Activity for the Southern Hemisphere could be of interest: June 8, 9, 10, 11, 12, 23, 24. July 26, 27, 28, 29, 30, 31. August 1. September nil. October 20, 21, 22. November nil. December 4, 5, 6, 12, 13, 14. These are from the International Geophysical Calendar 1973.

From the pages of "Q.R.M." comes the hint given by Joe VK7ZGJ that the best thing yet for protecting the copper side of printed circuits is hair spray! Apparently it is easier to solder through and gives good protection.

Note the "Get Back to Two" campaign has been supported by the Maitland Radio Club. Following on my opening remarks on this campaign last month, why not be in it and send the Geelong Amateur Radio and T.V. Club information regarding your stations. Briefly they want to know: Name — first and surname, address, call sign, phone number and STD area. Details of your 144 MHz station, e.g. VFO or crystal, power, mode, usual freq. antenna, best direction for beaming, what times are you available? Also they ask: Can you operate on 144.05, 52.05, 7090 and 14120? What beacons, repeaters or TV stations do you monitor? Any other info. Get the answers away immediately and you may be in time to be included in the results to be published in their Newsletter shortly. Postal address for information: P.O. Box 520, Geelong, Victoria, 3220.

TOWNSVILLE NEWS

Ron VK4ZLC writes from Townsville to say there have been plenty of JA openings on six metres so far, most call areas being worked, Ross VK4RO, Ron VK4ZTK and himself being the main operators. 146 MHz is gaining in popularity.

Ron also advises that the Townsville Amateur Radio Club is organising a North Queensland Convention to be held in Townsville during the weekend of 21st and 22nd July. Registration date is 30th June, and enquiries directed to Secretary of the Club at P.O. Box 964, Townsville, 4810. The programme caters for everyone and prizes are being arranged. Briefly the format is: Sat. a.m. Technical session, p.m. Foxhunts and scrambles, evening: Social evening, Sunday a.m. Family picnic, followed by lunch in the form of a barbeque.

BAND USAGE QUESTIONAIRE

I would hope that by the time this is read all copies of the Band Usage Questionaire provided by the VHF/UHF Advisory Committee would have been returned completed. If you are a VHF/UHF operator who has not taken the trouble to complete same, why not do it now, and post it right away to the address stated. It is a very important document and so necessary if the work of the Advisory Committee is to be guided along the lines most sought after by those using the VHF/UHF bands. Go to it.

The South East Radio Group Convention is to be held over the holiday weekend of June (9 & 10) at Mt. Gambier, and this page wishes the organisers a successful venture. These annual functions have provided an excellent means for amateurs and their families to meet and get to know one another, as well as to look around the country during the fox and hidden transmitter hunts! Why not go along yourself?

News is somewhat scarce this month, and the small print at present in use makes the information look even less. However, things might brighten up a bit for next month. In the meantime here is the thought for the month: "We have too many people who live without working, and we have altogether too many who work without living." 73.

— The Voice in the Hills.

MICROWAVE DEVELOPMENTS

Encouraged by the results of a 28 mile contact on 3.9.72, the old firm of VK2BDN and VK2ZAC have just completed a six month rebuild of their 2304 MHz equipment which was directed towards higher RF power output and improved portability.

A successful trial was conducted on Tuesday, 24.4.73 over a path of 53.5 statute miles with VK2BDN located at North Head near Manly and VK2ZAC at Kings Tableland near Wentworth Falls. Elevations of the respective sites were 250 and 2898 feet above sea level and the path was near optical. Weather conditions were mild and overcast with a light NE breeze, and the contact was maintained for one hour.

Signal Reports

VK2BDN reported VK2ZAC's signals as readability 5 and strength 9 plus. VK2ZAC reported VK2BDN's signals also as 5 and 9 plus, and created a sensation by removing the four foot paraboloid aerial and substituting a 1¼ inch ground plane which still resulted in a signal report of 5 and 6.

Equipment ... VK2BDN

Transmitter — Solid State 144 MHz exciter, solid state power amplifier running 28 watts input at 144 MHz, varactor doubler chain to 2304 MHz. Estimated power output 2 watts. Modulation NBFM. Feedline 5 feet 50 ohm coax cable. Antenna, 4 foot dish with dipole feed. Receiver, crystal controlled converter, 1N21D mixer, 144 MHz first IF to a mobile communications receiver.

VK2ZAC

Transmitter — 144 MHz exciter using tubes, power amplifier QQE03/20 with 28 watts input, varactor doubler chain to 2304 MHz with 2 watts output. Modulation, feedline and antenna as for VK2BDN. Receiver, crystal controlled converter first IF 50 MHz, second IF 15 MHz, third IF 1.6 MHz, fourth IF 455 KHZ.

That's a mighty fine effort chaps, and no doubt we will be seeing you lengthening that distance in the near future with signal reports like those exchanged. Thanks for letting me know Dick, and so allowing me to pass the good news on to everyone.

VK5LP

This has been verified as an Australian record — Ed.

Continued Page 18

*Forreston, S.A. 5233

AWARDS COLUMN

With Geoff Wilson,* VK3AMK

D.X.C.C.

PHONE

VK6RU	318/347	VK2APK	301/311
VK5MS	316/343	VK5AB	294/314
VK4KS	315/332	VK4PX	292/296
VK3AHO	307/326	VK4UC	291/293
VK6MK	304/328	VK4FJ	286/310
VK4VX	302/305	VK4TY	282/288

New Member: Call VK6DR, Cert. No. 140, Total 117/118.

Amendments: VK2SG 266/269; VK5WV 160/161

C.W.

VK3AHQ	306/326	VK3NC	271/297
VK2QL	301/327	VK6RU	265/291
VK3YL	293/313	VK3YD	261/281
VK2APK	292/302	VK4VX	261/263
VK4FJ	291/320	VK4TY	256/272
VK3XB	283/300	VK3TL	251/260

OPEN

VK6RU	318/345	VK4VX	308/311
VK4KS	316/337	VK6MK	304/328
VK4SD	316/334	VK4TY	303/321
VK2VN	312/334	VK2SG	302/309
VK2APK	310/325	VK4FJ	300/329
VK2EO	309/325	VK4UC	300/303

W.I.A. 52 MHz. W.A.S. AWARD

Amendment: Call VK3ZNJ, Cert. No. 78, Add. Countries 4

W.I.A. V.H.F.C.C.

Amendment: ~~Call VK3ZNJ, Cert.~~ No. 46, Confirmations 52 MHz 297.
Call VK3ZNJ, Cert. No. 47, Confirmations 144 MHZ 310.

"W.A.V.K.C.A. (V.H.F.) AWARD"

Certificate No.	Callsign
1	VK3AQR
2	VK3ZNJ
3	VK3ZGP
4	VK3AMK
5	VK3AOT
6	VK5ZWW

At present time certificates for this award are not to hand but will be forwarded to applicants immediately they become available.

*Federal Awards Manager,
P.O. Box 150, Toorak, 3142.

INTRUDER WATCH

With Alf Chandler,* VK3LC

INTRUDER WATCH REPORT FOR "AR" as at May 6, 1973

Further to a previous report let me announce that the Intruder Watch net is being held every second Monday of each month on a frequency of 3590 KHz commencing at 0930 GMT. This is a co-ordinators net, but any Member who would like to join is doubly welcome and could supply ideas that would enhance the operation of the Intruder Watch. Also it should be noted that the VK4 CO-ORDINATOR OPERATES A SIMILAR NET FOR Queensland Members on a frequency of 3620 KHz on the first Monday evening of each month at 1000 GMT.

As an exercise I am listing the known and identified Broadcast stations operating in our 7 MHz band. There must be narrow holes between these and other intruders where we can work DX, and it would be informative to other Members if such could be enumerated. A letter to me from any Member who consistently works DX on the 7 MHz band, with the frequencies would be appreciated. The following known Broadcast stations operate —

Radio Peking — 7010, 7025, 7035, 7058, 7065, 7095.
Radio Iran — 7034. Voice of Vietnam — 7040.
Radio Cairo — 7050, 7075. Radio Tirana — 7060, 7064, 7090.
Radio Pakistan — 7094. Voice of the Arabs — 7075.

There are many others, but as yet unidentified by me. Identification would be appreciated.

Alf Chandler VK3LC
Intruder Watch Co-ordinator for WIA. FE.

*1536 High St., Glen Iris, Vic. 3146

VHF Page Continued

Continued from Page 18

MOONBOUNCE PROJECT — FEBRUARY

An EML test with K2UYH and W6FZJ on February 13, did not produce any results due to them not getting on.

The LT4578 preamplifier was made ready for installation in the feed box of the dish but before doing sol it was checked out at the C.S.I.R.O. Radiophysics Laboratory in Sydney for noise figure and gain — bandwidth characteristics.

The MS175 post amplifier was also checked. Both preamplifiers were adjusted for optimum noise figure, which resulted in reduction of the MS175 post amplifier noise figure from 3.0db to 2.3db. The LT4578 preamplifier noise figure worked out finally at 1.2db!! The noise generator calibration was checked with a 50 ohm termination immersed in liquid nitrogen to confirm its accuracy. The gain-bandwidth was checked over a frequency range of 100-700 MHz with scope presentation.

It was most interesting to make adjustments and watch the characteristic curve vary! The automatic noise generator also allowed direct rending of noise figure to facilitate adjustment of the preamplifiers.

The STC converter used at Dapto and my home converter (Research Communications type) were also checked for noise figure.

Final Noise Figure results were
STC Convertor 5.9db
Home Convertor 3.4db
MS175 post amp 2.3db
MT4578 preamp 1.2db

Overall Dapto receiving system noise figure 1.6db.

The MT4578 preamp was placed in the feed box last Saturday (in place of the BFR91 preamp) and almost 2db more of Sun noise was received.

A tape of the 482 MHz NBL receiving tests, carried out in January, has been received from NBL together with photographs of the various signals as shown on the screen of a Spectrum Analyser. We showed up as more than 20db above noise. Comments on the test, included on the tape by the NRL group are most interesting.

Another EML test with K2UYH and W6FZJ is scheduled on 10th March.

Lyle VK2ALU

10.3.73 — EME Test with KLUYH and W6FZJ

The EME Test with KLUYH took place between 12.15 and 1300 EST on 10.3.73. Signals were heard from KLUYH at better strength than for previous tests, probably due to the use of the MT4578 receiving preamplifier in place of the BFR91 preamplifier at Dapto.

Some information was copied from each of his transmissions, best copy consisting of receipt of all the letters of the text. We were able to acknowledge this transmission with the standard report code letter "O".

KLUYH is using a 20 ft. dia. dish with linear polarised feed. He has recently obtained a 28 ft. dia. dish and advises that he intends to install both linear and circular polarised feed in it, probably by about next July. This should ensure a good readable signal to VKLAMW as the dish will have about 3db more gain and use of compatible circular polarisation will provide another 3db increase in signal strength.

The EME test with WGFZJ took place between 1300 and 1600 EST on 10.3.73.

Unfortunately only weak signals were heard and, although some letters were copied it was not possible to identify the callsign of the transmitting station. The problem may have been caused by rain at W6FZJ, which causes high losses in his transmitting feed system.

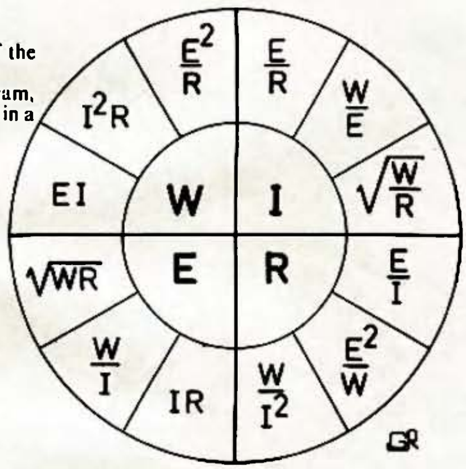
All letters have been sent to both of the above stations with regard to the result of these tests.

OHM's Law Simplified

Published hereunder is another version of the OHM's Law Tables.

For ready reference, cut out the diagram, mount on a stiff piece of cardboard, and place in a prominent position in your shack.

SUBMITTED BY
L. MARTIN—VK2II



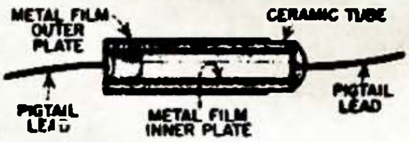
FIXED CAPACITORS

PART 2

BY C. A. CULLINAN*
VK3AXU

The Ceramic Capacitor

"Another type of capacitor which in some cases is comparable to the mica capacitor in electrical characteristics uses a ceramic as the dielectric material. A typical design is shown in Fig. 4. The capacitor plates are deposited on the inner and outer surfaces of a ceramic tube with connecting leads at either end. This unit is then sealed in a second ceramic tube and the whole assembly is wax impregnated for moisture proofing.



CERAMIC CAPACITOR CONSTRUCTION
FIG.4 A

"Ceramic capacitors are manufactured in a wide variety of characteristics, depending upon the type of ceramic used for the tube upon which the electrodes are deposited. Since some of the ceramics have very high dielectric constants, the volume efficienty (micromicrofarads, cubic inch) is high. Titanium dioxide ceramics, for instance, are used extensively for their high dielectric constants (90-170), low losses and low temperature coefficients. Since the temperature coefficient can be controlled by the ceramic mixture, units ranging from essentially zero to high negative values of temperature coefficient are available for temperature compensation.

"Experience has shown that in practice it is only necessary to provide three ranges of capacitors with temperature coefficients which correspond to changes in capacitance values of 0, -150 and -750 parts per million per degree C.

"These ranges are marked by the code symbols NP0, N150 and N750 respectively. "However for applications where these three ranges are not suitable capacitors are manufactured in the range of + 100 ppm. to — 4700 ppm. temperature coefficients. — — — —

"Due to the coaxial type of construction, tubular ceramic capacitors have low values of residual inductance.

"One grade of ceramic capacitor is used interchangeably with mica capacitors in critical r.f. circuits, while a lower quality variety which has very high volume efficiencies but poor stability, is used for general purpose applications such as by-passing. Ceramic tubular capacitors are usually more expensive than equivalent mica units. However, disk type ceramic capacitors are less expensive than equivalent mica capacitors."[1]

"Ceramic capacitors are manufactured in a wide variety of mechanical styles, such as Wire Wound Trimmers, Tubular, Disc, Stand-off, and Feed-through, the latter being available in many configurations for specific needs. "The wire-wound trimmers are designed for use in radio frequency circuits or any other electronic application where trimming of capacitance might be required. An ideal application is that of trimming the radio frequency circuits of radio receivers. Another use is the balancing of deflection yoke coils in T.V. receivers.

"The capacitor dielectric is a high quality ceramic material with good power factor, high leakage resistance, and excellent capacitance retrace characteristics under varying conditions of temperature and humidity.

"By unwinding the regulating wire the capacitance can be reduced continously from the maximum shown overleaf to the minimum. The wire is applied to the outside of the tube under constant tension and all turns are securely soldered. The inside of the tube is silvered in the normal manner and one connection is taken therefrom.

"In general three types of wire-wound trimmers meet the majority of needs. These may be listed as

TYPE 1 has a positive temperature coefficient of capacity to compensate the negative temperature coefficient of inductivity of iron powder coil tuning slugs.

TYPE 2 may be used where a high capacity value is necessary and medium temperature coefficient is acceptable.

TYPE 3 (High Voltage) is used where the voltage is in excess of 500V DC but does not exceed 2500V DC. A negative temperature ceramic dielectric body is used to provide the necessary capacitance range.

"By varying the ceramic dielectric of the trimmers or the tube dimensions wire wound trimmers can be made with capacitance values in the order of 10.000 pF."[2]

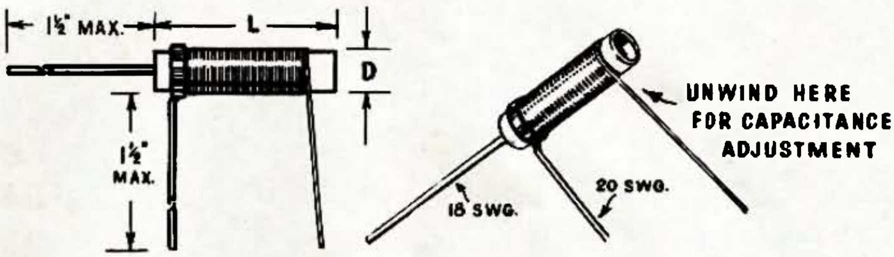


FIG 4B

Radio Parts Pty. Ltd., 1970-72[3] catalogue, lists a great variety of ceramic capacitors in ranges from 1 pF to 20,000 pF and in voltage ratings from low for transistor application to 5,000 V. DC. working.

The overall range in style, capacitance and voltage ratings is far too extensive to be detailed here, so reference should be made to the above catalogue.

Transmitting Capacitors

Generally there are three main uses for mica or ceramic capacitors in a transmitter. 1. They may be used as blocking capacitors in which application they may be subjected to a relatively high voltage, either DC or relatively low frequency AC and to fairly low RF currents.

Such an application would be in the plate circuit of an oscillator or amplifier in which the capacitor is used to block the DC voltage applied to the plate of the valve from the output circuit. i.e. interstage coupling or coupling to an RF output system.

2. The capacitor may be used in by-pass circuits where it may be subjected simultaneously to DC or AC voltages of relatively low frequency and to relatively high r.f. currents.

In one typical high-power installation mica capacitors are connected from each side of the directly-heated value filament to ground.

Each capacitor is of 10,000 PF, peak DC voltage rating is 2000V and maximum RF current to 1 MHz is 10 amperes. These capacitors effectively remove RF from the secondary of each of the modulated amplifier transformers and the cathode bias resistor.

In another application a high-voltage mica capacitor is connected across the output of the high-voltage power supply to reduce the possibility of RF energy passing back into the rectifiers because the filter condenser may possess considerable inductance and not be effective at RF.

Where audio-frequency amplifiers are to be used in the vicinity of transmitters it has been the writer's practice for a great many years to place an 0.01 MFd mica capacitor in parallel with the final HT filter capacitor to by-pass any RF currents that may get into the amplifier via the power supply. This by-pass is in addition to any AC line filter that may be used.

3. The third application is the use of the capacitor in tuned circuits, such as oscillator or amplifier "tank" circuits or RF filters handling large amounts of power. In such applications the DC voltage and RF currents may attain large magnitudes.

Where any doubt exists as to the suitability of a capacitor for a specified purpose it is advisable to consult the selected manufacturer of one's choice as failure of a capacitor could cause expensive damage to a transmitter.

In recent years Ceramic RF power Capacitors have been replacing mica capacitors in many transmitter applications up to a capacitance of about 2,000 PF for single units.

Such capacitors exhibit lower losses than their mica equivalents.

In one installation the substitution of ceramic capacitors for mica capacitors in an Aerial Coupling Unit resulted in a marked reduction of harmonics, together with better overall efficiency so that the transmitter could be run at a lower power output for the same aerial power.

*6 Adrian St., Colac. 3250.

For an amateur station this would have meant a few more watts into the aerial for the same DC input to the final RF amplifier.

In respect to RF Power Ceramic Capacitors the writer has had experience with only one make in which power ratings range from 5KVA to 50KVA. Capacitances are from 12 PF to 2,000 PF whilst temperature coefficients are from P100 to N750. RF current ranges are from 10 amps to 50 amps all up to 20 MHz.

Power factor maximum is 0.05% for all capacitors whilst maximum operating voltages are either 7,500 or 10,000 depending on the model. (Peak AC voltages plus DC components.) Minimum insulation resistance is 25,000 megohms. Various catalogues show a great variety of mica or ceramic capacitors for RF circuitary as well as high-voltage large capacitance units in either mica or other insulating materials for HT filters. One such oil-filled capacitor is rated at 2mfds 75,000 V.DC working.

TUBULAR CAPACITORS

Paper Types

"Capacitors using wax or oil impregnated paper dielectric are employed extensively in DC, audio, and low frequency RF applications where high capacitance per unit volume and low cost is required. They are characterized by generally poorer electrical characteristics than mica or ceramic capacitors, including; higher power factor, larger temperature coefficients, lower operating voltages, higher inductance and shorter life. These factors depend to a large extent upon the type of impregnant used, the purity of the impregnant, the method of construction, and the casing employed.

"Wax is used as the impregnant in a large variety of utility capacitors for the lower voltage ratings, where small size and economy are important. The tubular capacitors used in receiver audio, blocking, and by-pass work are examples. Moisture absorption shortens the life of cardboard-cased wax capacitors to some extent, as does high ambient temperature.

"Castor oil, mineral oil, and chlorinated synthetic oils such as 'askerels' are used in paper capacitors for higher operating voltages and greater dependability. Mineral oil filled units nave the best temperature characteristics and lower power factors, but are about 35% larger in volume because of the lower dielectric constant. For this reason, castor oil filled condensers are used in most non-critical applications or where space is at a premium.

"Typical paper capacitors have temperature coefficients of capacitance approximately ten times larger than high grade mica capacitors, such as the silvered-mica types. Power factors are greater by at least one order of magnitude and inductances are larger, especially in the types using

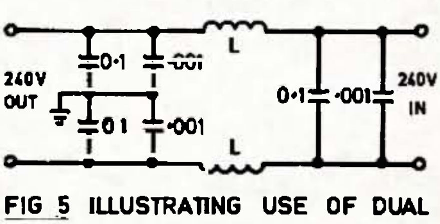


FIG 5 ILLUSTRATING USE OF DUAL BY-PASSING.

paper-foil rolled construction in which the contact tabs are at the ends of the rolled foil plates. In paper capacitors of advanced design residual inductance is minimized by the use of the extended electrode construction, in which electrical contact is made at the edges of the rolled electrodes, so that charging-current paths are short.

"In applications where a wide range of frequencies must be effectively by-passed, as in the line filter shown in Fig. 5, a high capacitance paper capacitor may be used in parallel with a small mica unit. Otherwise, the residual inductance of the paper condenser may make it ineffective as a by-pass for the high RF frequencies. "Here are some notes regarding the practical use of AC line filters such as shown in Fg. 5.

"The first concerns an AC/DC broadcast receiver. Reception of even a local station about three miles away was marred by high level noise from the AC power line. This noise was getting into the receiver via the AC power circuit as the set did not have an isolating power transformer. A filter similar to that of Fig. 5 was installed and effectively eliminated the noise. In this case the aerial did not pick up the noise.

"The second case was that of a manufacturer who installed a number of small AC/DC electric motors to drive small machines. These motors were located about 30 feet from the manufacturer's final test position for his radio receivers. The noise from the motors completely put a stop to 'sensitivity' and 'alignment' in the 'final test'. The solution was to mount filters similar to Fig. 5 in metal screening boxes which were attached directly to each motor in such a manner that there were no exposed leads from the motor. Referring to Fig. 5 the AC input was on the right-hand side and the motors connected to the left-hand side of the diagram.

"The third case was similar. A non-radio manufacturer had installed some commutator type motors and the noise from these had been suppressed at broadcast frequencies by connecting a small capacitor across the motor terminals. Local BC stations were only a few miles away.

"However during World War II, the manufacturer wanted some members of his staff to be able to listen direct to BBC news on short waves. For this purpose a good SW receiver had been purchased and a 'spider web' aerial erected.

"But the universal motors put a stop to shortwave reception. Again the cure was to fit filters as per Fig. 5 right on each motor.

"The last case concerns BCI of a rather different nature to the usual type. A licenced amateur was using mercury vapour rectifier valves in his transmitter power supplies and 'hash' was escaping through the AC mains into his neighbour's radio sets. (His own receiver was off when he was transmitting and the 'hash' did not get into his family's BC set. Many of the cheaper BC sets did not use an electrostatic shield between the primary and secondaries of the power transformer and such sets were very prone to noise getting in via the AC mains. It is also possible that his HT transformer did not have an electrostatic shield either.)

"Anyhow the simplest cure was to install a filter similar to Fig. 5, using heavy duty RF chokes, in the AC power lead to the entire transmitter. This filter completely removed all traces of the 'hash'.

"Another by-passing device used in video i.f. amplifier design consists of using capacitors which are self-resonant at the frequency to be by-passed.

"A value of capacitance is chosen which is series resonant with the inherent inductance of the capacitor and its leads. This type of single-frequency by-passing is very effective.

"Paper types of capacitors are still being manufactured in 1972 although plastic dielectric capacitors are rapidly gaining in popularity."[4]

Plastic Tubular Capacitors

In recent years, and particularly since the invention of the transistor there have been growing demands by the electronics industry for cheaper and smaller components. Also there has been a greater demand for better reliability, particularly from various Defence forces.

These demands caused capacitor manufacturers to investigate new materials, particularly dielectrics and recourse was had to the Plastics industry for a substitute for paper in the manufacture of tubular and block capacitors.

Possibly the earliest use of modern plastics was the development of paper dielectric tubular capacitors which were encased in a metal container instead of the previous cardboard container which could absorb moisture from the atmosphere as if there is one thing capacitors do not like it is moisture.

One of the plastics is PTFE (Polytetrafluoroethylene). This material possesses excellent electrical characteristics such as high dielectric strength, extremely high insulation resistance and low losses. Most importantly it is one of the few plastics that is completely impervious to water.

By using PTFE for hermetic end sealing of tubular paper capacitors it became possible to increase reliability of tubular capacitors through the exclusion of water.

The following data on PTFE makes interesting reading. Volume Resistivity $> 10^{15}$ ohms per cm^3

Surface Resistivity at 100% RH $>$ 3.6 x 10^6 megohms

Power Factor at 1 MHz $<$ 0.0005

at 10 MHz $<$ 0.005

Water absorption. Nil

Capacitors made as described can be used over the temperature range of $-100°C$ to $+160°C$ depending on the goodness of the paper dielectric.

There are three methods of manufacturing tubular capacitors.

In the first method two thin foils of aluminium are wound on a machine which interleaves the foil between two ribbons of paper or other dielectric material.

The ribbons of dielectric overlap the metal foils on both sides. As the ribbons and foils are wound on a rotating device each becomes a spiral as viewed end-on. When sufficient material has been wound on connecting wires are attached to the outer ends of each foil. The wound capacitor is then placed in a protective casing and sealed (after having been vacuum impregnated in a natural liquid impregnant). The capacitor is then tested for voltage breakdown and capacitance, and possibly power factor. If satisfactory it is then labelled. Each manufacturer has his own test procedure which may involve elaborate tests on each completed capacitor or on a random selection basis.

If a capacitor such as that just described is cut through to expose its cross-section it will be observed that each metal foil is in fact a single coil of metal each turn being slightly larger than its predecessor. This means that each metal foil has a definite amount of inductance. This inductance can be very troublesome in some circuits causing spurious oscillation in Amplifiers and distortion in Audio-frequency amplifiers.

The second method. In this the capacitor is wound with overlapping foils. In making these capacitors one metal foil projects over the side of one dielectric ribbon, whilst the second metal foil projects over the other side.

When the capacitor is wound the metal foils on each side are swaged together and the lead wires attached in such a way that contact resistance is negligible.

This method of construction reduces the self-inductance of the capacitor to a minimum and such capacitors are known as "non-inductive". The encapsulation and testing then follows.

The third method of construction makes use of a metallized film of dielectric instead of separate metal foils.

The dielectric film is metallized in equipment which consists of a vacuum chamber fitted with several evaporating crucibles, to evaporate the metal (aluminium) and a cooling system to condense the aluminium vapour on to the surface of the dielectric film.

The thickness of the metal layer is controlled by measuring its resistance as the film moves between rollers. The deposited metal covers the entire surface of one side of the dielectric film which has considerable width.

To metallize the dielectric film successfully it is necessary that the evaporated metal bonds well to the film, that the metal evaporates easily, has high electrical conductivity and be in a pure state. Aluminium meets all these requirements.

The next step is to slit the metallized film into desired widths and at the same time evaporate a thin strip of the metal from the edge of the film to prevent short-circuits between two metallized films when they are wound. The process is known as margin burning. Obviously the heat required for the margin burning must be sufficient to evaporate the metal yet not strong enough to burn the film.

Because of this not all dielectric films can be used for metallizing.

In winding the capacitor two films are wound together with a positive overlap.

After winding the ends of the winding are sprayed with a mixture of tin and zinc for lead attachments, thus making a "non-inductive" capacitor.

In 1972 it would appear that three plastic materials are being used in tubular capacitor manufacture. These are Polystyrene, Polyethylene, and Polycarbonate and each has its own advantages and disadvantages.

"Polystyrene, itself, is not employed in metallized film capacitors as it must be greatly derated.

The properties of capacitors normally reflect the intrinsic properties of the insulating material.

The following table shows the intrinsic properties of the three plastic insulating materials referred to above.

With all the research being done by the plastics industry and the capacitor manufacturers it is certain that newer plastics will be developed for insulation in capacitors.

With all the research being done by the plastics industry and the capacitor manufacurers it is certain that newer plastics will be developed for insulation in capacitors

	POLYSTYRENE	POLYCARBONATE	POLYETHYLENE TEREPHTHALATE
Dielectric Constant 1 KHz	2.9	2.8	3.3
100 KHz	2.9	2.75	3.2
Dielectric Loss 1 KHz	2×10^{-4}	9×10^{-4}	6×10^{-3}
100 KHz	3×10^{-4}	12×10^{-4}	17×10^{-3}
Volume Resistivity Ω—cm	$> 10^{18}$	2×10^{17}	1×10^{18}

Ref 5

Feed-through Capacitors
Stand-off Capacitors

Frequently a need arises to by-pass a circuit element where it passes through a metal chassis or metal screen. Such a need could appear in the H.T. lead or Bias lead to a transmitter. After all it is not much use if elaborate shielding is employed to keep harmful harmonics within a transmitter assembly if they can escape via connecting leads.

Feed-through capacitors are made so that they have a general tubular shape, with leads at each end, or a ceramic tube. The outer electrode is not insulated so that it may be attached directly to the chassis either by soldering or by a nut which is threaded on to the body.

In use part of the capacitor will be on each side of the metal wall or shield.

The stand-off type is made to be soldered or screwed directly to the chassis on one side and is used to by-pass circuits directly to the chassis, such as screen or cathodes of valves.

Note the distinction between feed-through and stand-off types.

Both types are available in capacitance values up to 4,700 pf quite readily. Usually their DC working voltage is 500V and insulation resistance not less than 10,000 megohms.

Both types are effective up to several hundreds of mega-hertz. They have very small lead inductance.

They are most useful in reducing T.V.I. from Amateur transmitters but care must be taken to watch the voltage ratings. There are some types rated to 3000V AC or 5,000V DC.

Co-axial Capacitors

Mention has been made of the use of Ceramic feed-through capacitors for insertion in H.T. and Bias leads in transmitters to reduce harmonic radiation from exposed leads.

Except in very low powered transmitters valves are still used in the output (final) amplifier and even with by-passing of the valve heater pins right at the socket it is possible for harmonics to escape and radiate if the power supply is on a different chassis.

One method of reducing this trouble is to fit co-axial capacitors in the heater leads at the transmitter chassis.

Co-axial capacitors have capacitances up to 0.5 mfd, are rated to 50 volts DC working and are effective up to at least 200 MHz, furthermore some types can carry up to 40 amperes.

Essentially they are three terminal devices, (in - out and earth) and are similar to a low-pass filter.

They find great use at HF VHF and UHF for filtering DC leads in vehicles, and boats where noise from such circuits is troublesome in receivers.

Radio Noise Suppression

Every time that an electrical circuit is made or broken there will be an arc or a spark depending on whether the circuit is DC or AC. In some cases the arc or spark may be so minute that it is not visible or it may be so large as to be readily seen.

From the viewpoint of a Radio Amateur, a radio listener, TV viewer or Hi-Fi enthusiast such arcs or sparks may cause objectionable interference either as sound in a receiver or to the vision and possibly the sound in a TV set, or FM set.

(To be continued.)

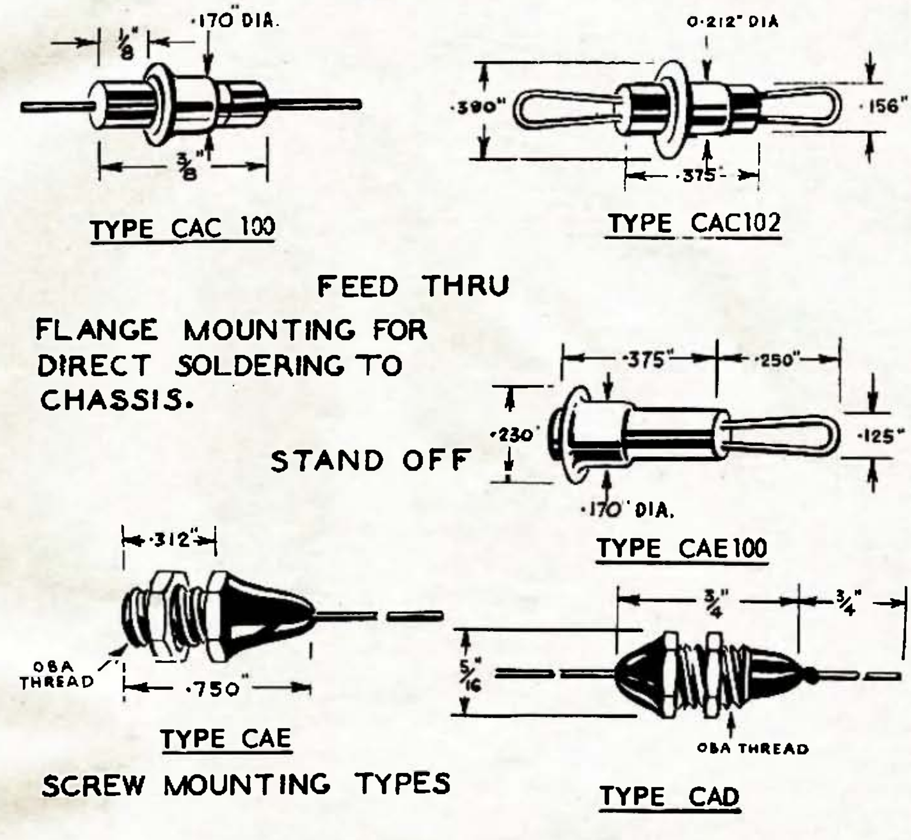


FIG 6 DUCON FEED THROUGH AND STAND OFF CERAMIC CAPACITORS.

NEWCOMER'S NOTEBOOK

With Rodney Champness,* VK3UG

Test Instruments for the Amateur "Shack". (Part 1)

What types of instruments are desirable for the SWL or new amateur? There are quite a few instruments either commercially made or which you can construct yourself to help with the proper operation of your station.

Number 1 on the list is without doubt the multimeter. I would suggest purchasing one costing not less than $10 and with a sensitivity of 20,000 ohms per volt. It should have low voltage ranges as low as five volts or less full scale for transistor work and voltage ranges to at least 1,000 volts full scale deflection. These ranges should be both AC and DC. The current ranges full scale should be from 50uA to 250ma at least, preferably up to several amps. Meters to do this are usually more expensive. Be very careful when using the very low current ranges as it is so easy to burn out a meter — even if it is "protected" with zener diodes. Most multimeters will have three or four ohms ranges. Sometimes these don't always cover some of the ranges that you may require. Usually the low ohms range that you would want is missing from every meter you see, so it is a matter of looking at as many meters as possible and finding out which one more nearly fits your requirements.

How is a multimeter used? A multimeter is used to measure voltages, currents and resistances in circuits. This is to ascertain what the correct operating conditions are, and to check when something goes wront to, where it has gone wrong. To measure voltage the test prods are placed across the part of a circuit where voltage is expected to be found. If it is not known what voltage is expected, it is desirable to start with a high voltage range and work down. To measure current it is necessary to insert the multimeter in series with the current drawing device. This involves unsoldering a lead, maybe, and putting the two multimeter leads one to each unsoldered end. Current measurements are not often done because of this messy procedure. Resistance measurements are only done with the circuit dead. It may be necessary to isolate the component being tested as other parallel resistance paths may exist so giving you erroneous readings. For instance you may have a series parallel system of resistances as per figure 1. To determine if any particular resistor is faulty one end of the resistor must be isolated, or one of the capacitor if you are testing for leakage. These are the basic things that a multimeter can do. With various adaptors a lot more things can be done.

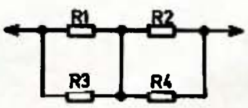


FIGURE 1

One simple addition to the multimeter is an RF probe. Figure 2 shows the circuit of a simple probe. The probe should have leads as short as you can make them from the probe tip to the capacitor through the diode to the earth terminal. This is more important as you go up in frequency. A suitable container for the probe would be inside a 35mm metal film cassette. Build the works on to the inside of the lid as this will make it much easier to work on. A small four lug tag strip mounted on the lid of the film cassette will do to mount the components. The probe is insulated from the case where it goes through it. Heavy single strand insulated household wiring should do. A small rubber grommett around this insulated wire will help to stabilize the wire and cause little strain on the tag strip. A couple of bends on either side of the grommet will help to hold the probe in position. Unfortunately the insulation just mentioned doesn't have good high frequency or very high frequency characteristics so it could be a bit "lossy". This is unavoidable unless you can get some other type of low loss insulation. Don't worry too much about this at the moment. The probe is capable of measuring RF voltages up to about 35 volts with the OA91 diode. It would be ideal for many transistor rigs and for low power sections of valved rigs. A physical diagram of the probe is shown in figure 3. The reading of this meter is relative but probably could be calibrated, although I doubt that many would worry about that. The complete container acts as a very effective shield.

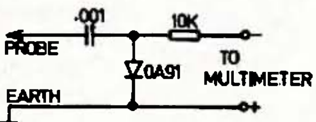
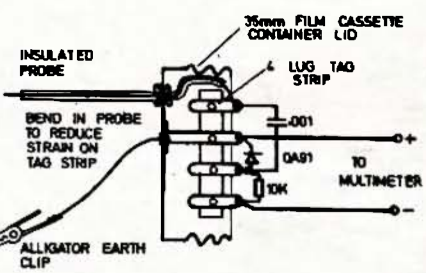


FIGURE 2

Having described the most useful of the instruments in the "shack" and an accessory, I wonder which could be considered the next on the list? I personally believe that the signal generator is next. The Leadeer LSG11 commonly advertised in "Amateur Radio" is quite good value for money. It is capable of giving signals from 120 KHz to 130 MHz on fundamentals and up to 390 MHz on harmonics. It can be modulated by either of two audio tones, which are also available on the front panel. Considering the price it is a remarkable stable instrument once warmed up and the dial calibrations are good. The modulation percentages are less than stated on the info that comes with the unit. In March 1970 issue is a conversion of the LSG11 to fets.



RF PROBE — FIGURE 3

A signal generator is used to generate signals on all the likely frequencies that a receiver is likely to pass through the various stages. It means that should your receiver appear "dead" and a check with a multimeter yields no results, a dynamic test with the signal generator is likely to show the defective stage — and possibly the component. Consider that the set is dead. The logical place then is to check the audio amplifier. Apply audio from the signal generator to the grid of the first audio stage or the base if transistorised. A convenient spot to apply the audio is across the volume control. If no output is heard at any setting of the volume control it can be fairly safely assumed the audio stages are at fault. In a simple BC mantel set this one test effectively cuts the set in half. If there is good output at this point, the trouble lies either in the IF stage(s) or the converter. Place the RF output via a small value capacitor (about 0.001uf will do) to the output must be on the supposed IF frequency, which is usually 455 KHz in the common domestic set. If you now get no output either you have troubles in the IF stage or you have forgotten to either put modulation on the signal generator or have the output at too low a level. You may think who would make this mistake. Plenty have. Let's assume that it doesn't work. What sort of thing could be wrong? Lots. Is the valve alight? If not, the voltages could be near correct because screens and plates of several valves could be near correct because screens and plates of several valves may be paralleled as far as DC is concerned. The same can apply to transistors. The coils could be faulty, or some jerk has wound down all the tuning slugs to "tighten them up". These are only a couple of faults of the many that can occur in this stage. The converter stage can be difficult to check if you don't know how to check it. The local oscillator when it is operating in a domestic set valved or transistorised has an output 455 KHz above the supposed received signal. For example, if you tune to 1,000 KHz the local oscillator should be on 1,455 KHz, which can be tuned in on another set, if it is operating. A simple test — yes!! There is much that I could tell you about basic servicing if you want. A very good book although only dealing with valves is "Wireless Servicing Manual" by W. T. Cocking published by Iliffe. The basic text can also apply to transistors. It may be a hard book to obtain.

An article has been passed on to me by the technical editor written by Harry Heathcote of Maidstone. I hope to present Harry's article along with some ideas which I hope to resurrect from some much earlier "Amateur Radio" Basically Harry's article is on modifications to standard broadcast receivers to get them on 160 metres as well as an aerial and a source of CW practice.

Does anyone feel like helping me with this column on subjects that frankly I need tuition on? If anyone can help it would be much appreciated by me and should prove more beneficial to the out newcomers than if I try to explain things. Has anyone got an old post war broadcast receiver preferably five valves which uses about 250 volts DC HT? If anyone has one and would like to donate it to the cause, a friend and I hope to be able to prove that a low power transmitter can be built using most of the parts in an old set. About the only parts that would be necessary to buy would be a microphone and a key. The most likely band that this would operate on would be 160 metres or perhaps 80 metres. Anyone feeling generous? The transmitter would run between five and 10 watts input.

In a month or so I hope to have further additions to the list of desirable equipment for the new amateur or short wave listener, for testing his station

* 44 Rathmullen Rd., Boronia, Vic. 3155.

VHF BAND-PLANNING; REPEATERS

The Committee spent some time on the Two Metre FM Band Plan — This plan is based on the decisions of the recent Region 1 meeting of the I.A.R.U. and the same basic channelling plan is used — An approach was also made to the PMG for permission to establish and operate repeater stations on VHF and — the PMG kindly agreed to this. Report from Johannesburg in Radio ZS of February 1973.

TRANSISTORS

Twenty five years of solid state. If you were 30 when these components began to see the light of day you would now be 55. The jet age, moon-walking, planetary probes — all arrived in your span of life. How remarkably does the development of one invention lead to advances in quite unrelated fields. What will follow the satellite era?

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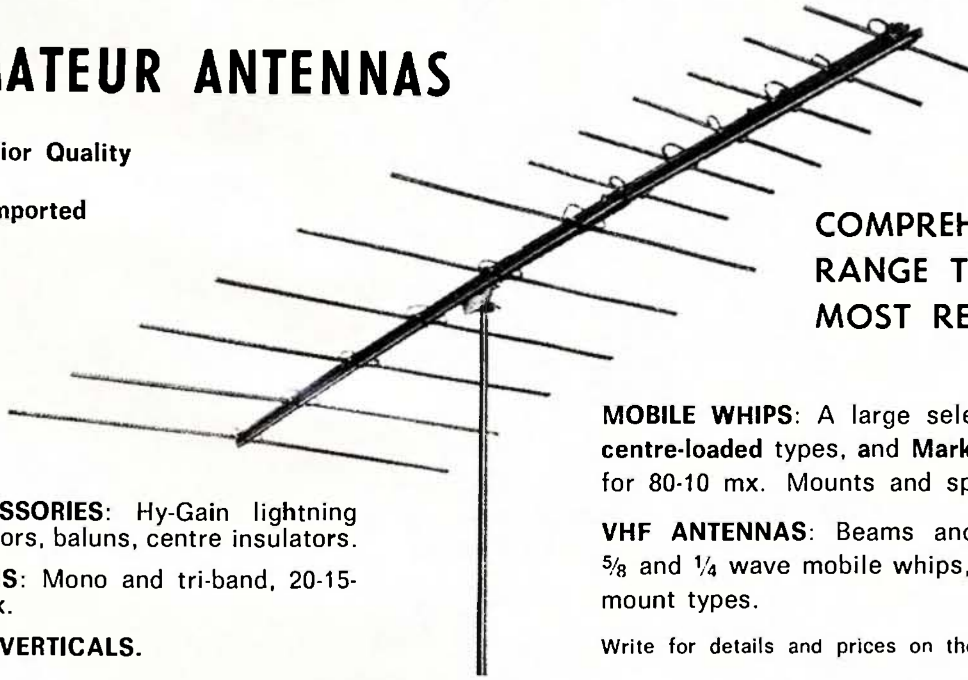

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NOTE: Past issues are normally available from stock but the price previously quoted was in error as including 1972. Correct prices are—

PAST ISSUES—*A few sets of 1969-70-71 with free binder are still available at $10.50 per set plus postage 50c.
Sets of 4 issues for 1972 are available at present for $4.20 plus 20c post.

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Ionospheric Predictions

With Bruce Bathols, VK3ASE — JUNE 1973

Hereunder are the predicted band openings for June 1973 from information supplied by the Ionospheric Predictions Service Division. Times are G.M.T.

28 MHz

This band has virtually closed for DX with very little activity predicted. JA's may occasionally be worked from Noon local time until sunset.

21 MHz

VK3 to	ZL		2200-0600
.. ..	SU		0400-0800
.. ..	KH6		2100-0700
.. ..	ZS		0600-0800
.. ..	G	S.P.	0800
.. ..	G	L.P.	2300
.. ..	VKO		0200-0400
.. ..	VE3	S.P.	0200
.. ..	VE3	L.P.	2400
.. ..	UA		0500-0800
.. ..	W1		2400-0400
.. ..	VK9		2200-0800
.. ..	PY		2200-0100
.. ..	W6		2100-0600
.. ..	JA		2200-0800
.. ..	9G1	S.P.	0700-0800
.. ..	9G1	L.P.	2300
VK6 to	SU		0400-1000
.. ..	ZS		0500-1000
.. ..	G	S.P.	0700-1000
.. ..	UA		0400-1000
.. ..	W6		2300-0600

14 MHz

VK2 to	SU		2100-0700
.. ..	ZS		0500-1000
.. ..	G	S.P.	1200-1800, 2100-0100
.. ..	G	L.P.	2100-0900
.. ..	UA		1000-1800, 2100-0100
.. ..	W6		0200-1800
.. ..	PY		2100-0100
VK3 to	ZL		2100-0900
.. ..	SU		1800-2000, 2200-0400
.. ..	KH6		0200-2100
.. ..	ZS		0500-1000
.. ..	G	S.P.	1200-0200
.. ..	G	L.P.	2100-0800
.. ..	VKO		2200-0700
.. ..	VE3	S.P.	0100-0600, 1100-1600
.. ..	VE3	L.P.	0900, 2300-0500
.. ..	UA		1000-0200
.. ..	W1		0100-0800, 1100-1500
.. ..	VK9		2100-1800
.. ..	PY		2200-0100
.. ..	W6		0200-1800
.. ..	JA		0800-1800, 2100-2300
.. ..	9G1	S.P.	0600-0900, 2300-0300
.. ..	9G1	L.P.	0200-1000
VK4 to	SU		1200-1700, 2100-0300
.. ..	ZS		0500-1100
.. ..	G	S.P.	0900-1600, 2100-2400
.. ..	G	L.P.	2100-1000
.. ..	UA		1000-1600, 2100-0100
.. ..	W6		0200-1600
.. ..	PY		2100-0100
VK5 to	SU		1200, 1600-0400
.. ..	ZS		0500-1100
.. ..	G	S.P.	1300-0200
.. ..	G	L.P.	2200-0900
.. ..	UA		1000-1900, 2200-0200
.. ..	W6		0200-1800
.. ..	PY		1000, 2300-0100
VK6 to	SU		1200-1300, 2000, 2400-0500
.. ..	ZS		0400-1200
.. ..	G	S.P.	2400-0400, 1300
.. ..	G	L.P.	2300-1000
.. ..	UA		1100-1300, 2300-0300
.. ..	W6		0300-1800
.. ..	PY		1000-1100

7 MHz

VK2 to	SU		1600-2200
.. ..	ZS		1400-2300
.. ..	G	S.P.	1900-2100
.. ..	G	L.P.	0500-0600
.. ..	UA		1600-2100
.. ..	PY		0500-1000, 2000-2100
.. ..	W6		0600-1400
VK6 to	SU		1600-2400
.. ..	ZS		1400-0100
.. ..	G	S.P.	1800-2300
.. ..	UA		1600-2300
.. ..	PY		0900-1000, 1900-0100
.. ..	W6		0900-1400
VK7 to	SU		1600-2300
.. ..	ZS		1400-2400
.. ..	G	S.P.	1800-2200
.. ..	G	L.P.	0500-0600
.. ..	UA		1600-2200
.. ..	PY		0400-1000, 2000-2300
.. ..	W6		0600-1400

Smoothed Monthly Sunspot Number Prediction for June is 36. The smoothed mean for September '72 was 62.0 Predictions for July, August, September are 34, 32, 30 respectively. (Swiss Federal Observatory, Zurich.

PROJECT AUSTRALIS

With George Long, VK3YDB

OSCAR 6

Effective from early May AMSAT has implemented, on a world-wide basis, the following schedule for the satellite—

ON: Thurs, Sat, Mon GMT
OFF: Fri, Sun, Tues, Wed GMT

In terms of Australian E.S#T. this means the satellite will be on from

10.00 hours Thurs to 10.00 Fri
10.00 hours Sat to 10.00 Sun
10.00 hours Mon to 10.00 Tues

i.e. ON for Thursday, Saturday and Monday nights and Friday, Sunday and Tuesday early mornings.

OSCAR 6 REMINDERS

If you discover the satellite is ON at any other times than listed above please do NOT transmit through it because it may be on for special reasons—e.g. command station taking telemetry data.

Please take heed of the radiated power limitation.

GENERAL

The new schedule for OSCAR 6 is designed to provide more frequent battery recharge periods.

From I.A.R.U. Headquarters comes the news that AMSAT believes OSCAR 6 will achieve the one-year design lifetime but the complete co-operation of users now becomes an increasingly vital factor. There is evidence of some battery degradation but this is not a necessary indicator of shortened life.

OSCAR MOBILING

The rest of these notes were written by Fred J. Murray, W2GN, and were received from the President of AMSAT.

"As many of us know, part of the fascination in OSCAR 6 operation is in hearing just about how your signals are doing as you listen to them on the ten meter down link. While I was installing two meter gear in a new car recently, it came to mind rather readily that all I had to add to the two meter gear to have a mobile OSCAR 6 ground station was to provide crystals for the up-link, keying facilities, a ten meter receiver and a ten meter antenna. One trial after the installation was complete indicated that we were 'in business'. On an overhead pass the signals came through on the down-link for almost the entire pass from s3 to s6.

"The rest is history of what are apparently the first mobile to base station contacts through an amateur satellite. A schedule was made with Jack Colson, W3TMZ, for the first QSO on orbit 1983, March 22, 1973. This contact was made immediately although with some difficulty due to a high noise level at my end. I thought I had packed a good spot, overlooking the city of Albany, N.Y. and for miles around. It was good when I tried it in the daytime but on the evening overhead pass of OSCAR 6 the noise from all those lights in the city came up to a point which almost masked Jack's signal which is normally easy copy. Thus was learned the first lesson on locations. Now, I look for an electrically quiet location off the main highway where it is flat for a few miles around and free from any nearby obstructions. OSCAR has the 900 mile altitude built in. Communications through OSCAR 6 can be had anywhere that you can 'see' the satellite and are free of excessive electrical noise. Quiet spots are easy to find out in the countryside so receiving conditions are usually just great compared to the home location.

"Completely fascinated by my easy success, I drove to various nearby spots to try the overhead passes. Contacts were made as follows: Orbit 1990· W5VY, orbit 2002: W9SGH, orbit 2003: W9MAL, K1HTV, orbit 2008: K1HTV, W9RGH, W1JSM and orbit 2015: W4PSJ, W7ZC.

"With the confidence inspired by these QSO's, I drove over to ARRL Headquarters on March 26, and made a demonstration in the parking lot under all those W1AW antennas with Bill Dunkerley, WA2INB and Dave Sumner, K1ZND in the car. A readily made contact on orbit 2028 with W7ZC, K4TI, and K6DS generating some enthusiastic discussion during the lunch hour.

"The two meter antenna up to this point was a 5/8 wave base-loaded whip. I next tried a squalo mounted the standard distance above the car roof. With this antenna, I worked K0DDA on orbit 2065 and W4PSJ and W9JIY on orbit 2077. It didn't seem any better than the whip so I put that back on and worked W7ZC and W8DX on orbit 2078. Next I tried the 'big wheel' setting on a box over the car roof. I worked W0JKF, VE3TW and K4TI on orbit zogo with the wheel but again it didn't seem any better than the whip. These meagre tests are not conclusive of course. Some day we will know what is the best vehicle antenna for these overhead passes.

"The next episode took form on the Monday evening OSCAR 6 net on 3855 KHz on April 2. On my turn, I briefly summarized the results of the mobile operation suggesting that we know it works hut what, for the present, can we do with it?

"The obvious answer to this question was Vermont, less than an hour drive from my location with no known OSCAR 6 activity. As luck would have it, I had to make a trip over to Bennington on April 5. So, while the net was buzzing along, I figured the orbit times for the 5th and it was left on the net that I would be on at Bennington for orbits 2152 and 2153. We hadn't scheduled the wx, and the morning of the 5th found me in an April snowstorm a couple miles west of Bennington working K1HTV, W3TMZ, VE2BYG and WB2DEI on orbit 2152, for what are probably the first OSCAR 6 QSO's from Vermont.

"For the next orbit 2153, with some help from a QST by W3TMZ, the boys had found me and I worked K1HTV, W3LUL, W0JKF, K7BBO, W5VY, W7ZC, W6BGJ, W8DX and WA4JID from the battle monument hill in Bennington. I got a tremendous kick out of this as it was the first time in my over 50 years of operating that Stations were trying to work me. It is testimony to OSCAR 6 coverage that all U.S. Districts except 9 were worked on these two passes.

"The hardware used is depicted in the photograph below. It is all standard commercial gear — easily duplicated. If you plan, as I did, to use CW, an operating platform is needed ... I used a piece of plywood hooked under the dash and held down by a seat belt. For safety, everything must be securely fastened. This plywood board and the gear on it can be removed in five minutes or less if the wife insists on riding in the front seat.

"I hope my experience will prompt some more mobile work. OSCAR 6 offers the world's most exciting repeater operation."

Commercial Kinks

With Ron Fisher,* VK3OM

A Noise Blanker from the FT 200.

At long last the long awaited blanker designed especially for the FT 200. Firstly, all the credit for its development and design goes to Mr. Fred Bail and his staff at Bail Electronics of Box Hill.

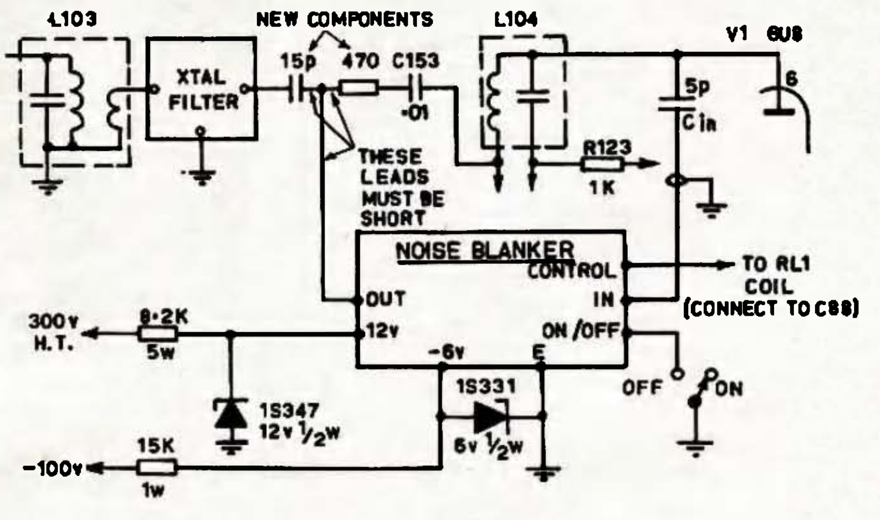
It is not intended to go into a lengthy description of its operation or construction as it is felt that the circuit is self explanatory. The blanker was built up on a small piece of Vero Board, the actual layout following the circuit layout.

At first glance it might be assumed that the blanker on/off switch could be connected in place of the FT200 noise limiter switch, however, the operation of the blanker is greatly assisted by the old limiter. It seems that the limiter introduces a degree of audio top cut which cuts off some of the higher audio pulses. Therefore it will be necessary to wire in a separate blanker switch. The placement of this must be left to the individual, bearing in mind my previous remarks on this subject.

As this blanker is as untuned device, it seems probable that it could be used on almost any type of transceiver or receiver with good results, although we have only tried it up till now out on the FT 200.

Perhaps one of our readers might be able to come up with a printed circuit board layout for it, and if so perhaps we could arrange distribution of it. Any takers?

*3 Fairview Ave., Glen Waverley, 3150.

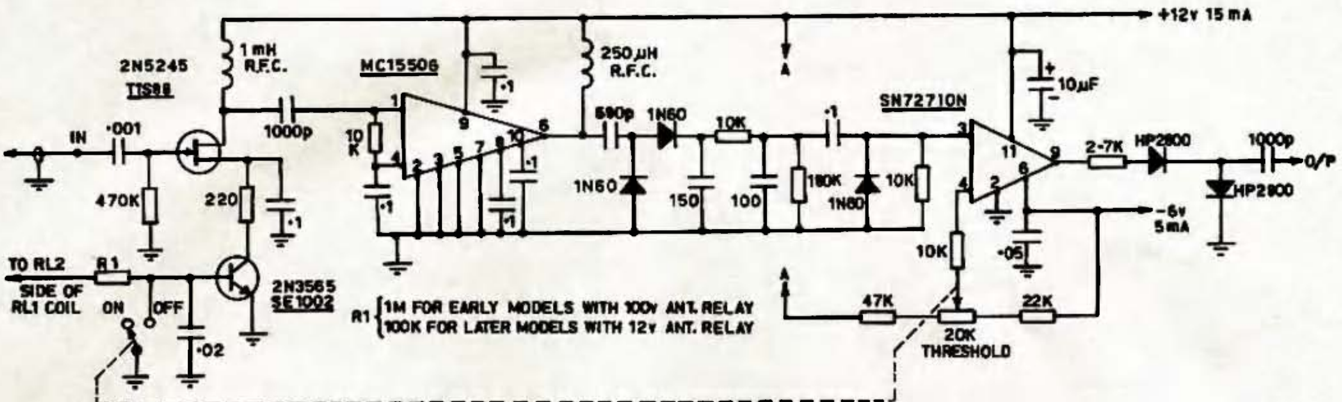


CONNECTION OF N. B. TO FT200

This month I am going to let the diagrams do all the work, so I can slip away quietly but not before I tell you about a few of the commercial modifications coming up.

Next month Yaesu again, but this time the FR50 receiver. A very neat and easy conversion to cover the 160 meter band.

Also, although it seems impossible, more modifications on the FT 200 including audio derived AGC which goes a long way towards overcoming some of the AGC problems in the earlier models. So until next month, good luck with your blankers.



EXPERIMENTAL NOISE BLANKER FOR FT-200

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Please note that all applications, amendments, inquiries, etc., relating to W.I.A. Federal Awards should be directed to "Federal Awards Manager", "W.I.A. C/- P.O. Box 150, TOORAK, Vic., 3142." All QSL cards must be accompanied by sufficient postage to cover their return to the sender.

DO NOT address any further mail to the home address of the Fed. Awards Manager.

Letters to the Editor

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

The Editor A.R.
Dear Sir.

The following is a true story, only names and places have been changed.

Women In Action

This is a group for the old women in the community. At the moment they are busy re-organising the shelves in their house, but the owner of the house will not let them do it until they can agree on how the shelves should be organised.

They re-organised their shelves a few years ago, but this was when the shelves were not so full, with the result that everyone was happy. Now the process must be repeated, but problems have arisen. For example, recently tney wanted to watch the Oscars, but were unable to do so because of shadows from their shelves.

The biggest member of the group insisted that this was not a problem, presumably because it was inconvenient for her to move the contents of her shelves. Despite this, servants were sent around the house to gather ideas, but no ideas suited everybody.

Now, some of them want to put objects on the shelves, but are reluctant to do so, for fear they may be forced to move them in the near future.

This problem may be "shelved" for the present, but it will surely arise again. Thus, let us hope that this situation is soon resolved, and that sensible actions overcome heated words.

73's,

Martin J. Fox VK7ZMF
Stephen D. Fraser VK7ZSF

The Editor A.R.
Dear Sir,

Just a note of appreciation to you and your assistants for the new look Amateur Radio Journal.

I have held a ticket since 1938 and have seen "AR" through many changes.

I feel the presentation and printing have improved greatly with the April 1973 issue.

Keep up the good work.

V. H. Leonard
(VK3PJ)

The Editor A.R.
Dear Sir,

I enclose news items from the Illawarra Branch (Wollongong N.S.W.) and trust they may be of sufficient interest for publication.

Barry Hartley
Publicity Officer
Illawarra Branch

Illawarra Branch News

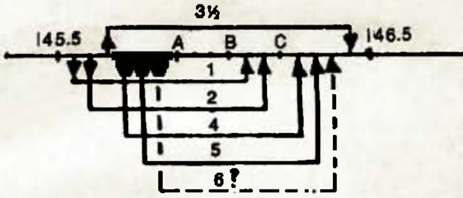
The Annual General meeting of the Illawarra Branch held at the Wollongong Town Hall in March summarisd the past year with reports of successful completion of three major ventures, being the Dapto Moonbounce project, the Wollongong Channel 1 repeater and the acquisition of club rooms at North Wollongong.

The repeater installation proved to be something of a physical challenge due to the terrain.

Located at Mount Murray on the eastern escarpment of the Southern Highlands of N.S.W. the tower and cubicle were positioned atop a 50 ft. rise to which all materials, pipes, concrete, sand water, etc., had to he carried by hand or bucket and conduit for power cables had to be laid in rock and shale. A 15 ft. tower base supports an 80 ft. mast which supports the gamma matched dipoles, receive at 80 ft. and transmit at 40 ft. A weatherproof cubicle houses the modified EX commercial repeater which provides CW. identification every five minutes which acts as a beacon and assists in turning receivers, etc.

Power output at this time is 10 watts and there is no de-sensitizing at all with both transmitter and receiver in the housing. Some de-sensitizing is experienced when the high power final (75w) is used and it is hoped that with adjustment of vertical separation of Antenna this will be minunized sufficiently to use high power permanently.

While receiver sensitivity is far from optimum, (approx. 2uv) mobiles as far as Newcastle have worked into the repeater and mobile coverage is very good over most of the Sydney and Wollongong areas.



The Editor A.R.,
Dear Sir,

I am disgusted by the events which have occurred over the last six months, with respect to the 2M F.M. band plan. Ultimatums, unilateral action, vetoes, propoganda — are we radio amateurs or amateur politicians.

At the Federal Conference delegates went prepared to support the particular system advocated by their state and none other. The so-called compromise plan was so patently ridiculous that I am lost for words.

The one high point of events was the discussion between the VK2 and VK3 councils on May Day (not that the May Day plan is better than the others), but even this seems to have gone by the board.

Perhaps it is time to look dispassionately at the motives to be achieved by a new band plan. These are:

1. Clear the band 145.8—146.0 of Repeater operation.
2. VK5 was desirous of wider spacing between input and output frequencies.
3. The number of repeater channels should be increased.

It is instructive to examine the Albury Plan and the May Day plan in the light of the above.

Albury Plan

Advantages

(i) 600 KHz spacing on all channels.

(ii) Existing Ch1 and Ch4 inputs retained.

Disadvantages

(i) All uses of repeaters (Ch1 and Ch4) will have to purchase one new crystal.

(ii) As ChB will be retained many users will experience difficulties with the Receiver band width required (1.15 MHz).

May Day Plan

Advantages

(i) Existing Ch1 frequencies retained.

(ii) Only 500 KHz receiver B.W. required.

Disadvantages

(i) Ch4 operators will need to purchase 2 new crystals.

(ii) Only 500 KHz channel spacing.

(iii) Ch3 input is ChC simplex.

National unity is far more important than 2M band usage, and if necessary one of the above plans must be adopted by all states.

However, there is a plan which achieves the desired aims, at lower cost.

The only frequencies which MUST be changed are those which fall in the band 145.8—146.0, viz. Ch4 output on 145.9. There is no reason to change the Ch1 frequencies or the Ch4 input.

Using the May Day plan as a basis 145.65 could be used as the "Ch3½" input and the proposed Ch3 dropped.

This still leaves six channels and only Ch4 operators will need to purchase a crystal. The band spread is within the capabilities of virtually all units in use by amateurs, and Ch3½ provides 750 KHz spacing between input and output for those who feel that this is necessary.

This system will facilitate the changeover, as only the minimum number of crystals must be supplied by crystal manufacturers, and the P.M.G. will be involved in a minimum of investigation and replanning of frequency usage.

Only one part of this plan is contentious — Ch6. It is suggested that this be allocated only when and if an international agreement is reached to reserve 145.825—146.0 for satellite use. If the full 200 KHz 145.8—146.0 is required, then Ch6 must be dropped. This still leaves five repeater channels (the Albury Plan only provides four) which should meet our needs for some time into the future.

I trust that you will examine the above recommendation dispassionately, and attempt to arrive at a solution which is in the best interests of amateur radio.

Yours sincerely,
Ian Binnie VK2ZIU

"20 YEARS AGO"

With Ron Fisher, VK3OM

TWENTY YEARS AGO, JUNE 1953.

The second of June 1953, is a date that will be recorded in the annals of history as depicting one of the most colourful historical and awe inspiring events of modern times — the Coronation of a Queen regnant — ELIZABETH II of ENGLAND. So opened the June Editorial.

However, back to technical matters, we find three interesting articles that have been well used over the years. Under the heading "Double Converting Disposals Receivers" are two sections, referring to two popular receivers of the day. The BC 348 by Frank O'Donnell VK3ZU (now operating under the call of VK2QC), and Command Receivers, by K. B. (Bud) Pounsett, VK3ABP. The BC348 was changed to include a 175 KHz second IF, while the Command finished up with 110 KHz second IF. Incidently, the article included a circuit of the Command Receiver if you happen to be looking for one.

The third article was a reprint from QST of November 1952, entitled "More Effective Utilisation of the small Power Transformer". It described the now familiar bridge rectifier set up, but as silicon diodes had not appeared on the scene use was made of two 6x5GT's and a 5V4G. I am sure a lot of amateurs of the time looked at the circuit with a great deal of suspicion. After all, here was a 110 mA transformer delivering a total of 160 mA's and we all knew that that just could not be done. Truly an article before its time. In "Bring Your Regulations Handbook Up to Date" was a full page of amendments up to 28th of February, 1953.

"Fifty Megacycles and Above", reported a good deal of 144 MHz activity, both from field days and DXpeditions to mountain tops. An interesting inclusion was a report of a contact via the moon between W4AO and W3LZD.

Today, if you want to stir up an argument, just mention novice licencing. In 1953 there were a few heated letters regarding the introduction of Limited Licences. One correspondant even suggested that people who qualified for the limited ticket, "Have no right to call themselves Amateur Radio Operators". Indeed.

One of the places where Amateurs mét in Melbourne in the late 40's and early 50's was Collins Radio Store at 409 Lonsdale Street. An advertiser in AR at the time, they have long gone. Even the building they occupied has been pulled down. I guess quite a few old timers bought their first bits there as I did.

CONTESTS

With Peter Brown VK4PJ

LOGS ... and you

Without doubt the most disagreeable part of a radio contest is making out the log in a form suitable to forward to the contest authorities.

Strangely enough it seems that generally the higher scorers enter the neatest logs ... some logs are so well done it seems a pity that they have to be discarded ... and one can expect errors to be a minimum.

I have been pleased, and proud of the average amateur, to note how few errors occur in logs received by me and I would be surprised if the operators were aware of their errors.

Consider the massive problem of the high scorers in ensuring that duplications are avoided. (It is no mean task checking either.) I asked a few "top scorers" of their methods and little that you or I could not devise came forth except that log keepers are invaluable.

I am looking for some scheme whereby log preparation for the majority is minimised so that we may get better returns and of course contestants work is eased.

One obvious solution is a statutory, or other, declaration that so many points have been scored.

Could we rely on our fellow who signs a declaration??

What do you think???

Anyhow think it over and in the meantime get ready for this year's Remembrance Day Contest when we have to return 700 logs or better. A suggested simplified log is as follows.

QSO No.	Dwe Time	Freq. Mode	Station	Sent RST	Rec'd. RST	QSL SR	Points
18/8	18/8	80	VK2AB	57001			
	9		BC	6 2			
	1900		3ZA	9 3			
	9		SB	5 4			
	18		XA	8 5			
	59		QC	5 6			
	2000		4AB	4 4 7			
	6	40		5 5 8			

Generally, unless the DATE, HOUR (tens of minutes) BAND, CALL AREA, or hundreds and tens of serial number changes, do not write in the log. Check a log and see how many units you can save by doing the minimum. This is only a suggestion to help you as overall I guess a log completed in detail is easier for me ... you are the customer. So many are doing this in various ways ... as long as there is no doubt it is OK with me.

If you make an error, as giving a serial number twice, just put a mark against the entry and count in your score. Don't do it too often though.

About the Remembrance Day Contest. We are out to make the big Friendly Contest better ... How will VK2 and VK3 make out?

C.W. Contest?

Quite a few mentioned, of the last Remembrance Day Contest, that they could not get a CW contact after a "phone contact". Of course there are not so many confident operators on CW. Also, more than once has come the suggestion for a CW contest. Could we try an unofficial CW contest for June and July so that the not so confident and others may get some practice for the RD Contest??

Time. 3rd Sunday, 17.6.73 and 15.7.73. 6 p.m. to midnight local, or 0800 to 1400 GMT.

Bands. 80, 40 and 20. Usual R S T. CW to CW only. VK call areas only.

Scoring. One point per contact. One contact per band per station.

Logs are not required ... just your call sign and total score with any comments you may wish to offer.

Results of your efforts must be in before the end of the month so that I can publish in August/Sept., "AR", space permitting. Of course if there is sufficient interest this could develop into an official contest ... it is up to you.

Contest Calendar

7th/8th July.
Z L Memorial Contest. 2000 hrs. to 2400 hrs. NZ time.
Each night. 0800 to 1200 GMT.
80 meters only. One contact per station. Usual R S T.
Logs to ZL2GX, 152 Lytton Rd., Gisborne, NZ.

18th and 19th August.
Remembrance Day Contest. The Friendly Contest.
Keep it the BEST contest by entering.
700 logs or bust.

HAMADS

- **A free service for individual members.**
- **Four lines of print free (200 characters/spaces); full charge at $6 (min.) per col. inch if exceeded or for repeats: includes name/address— use QTHR if correct in Call Book.**
- **Copy, please in typescript if possible, and aligned.**
- **Excludes commercial-class advertising.**
- **Exceptions only by PRIOR arrangement.**

For Sale

National Organ Console with single keyboard and speakers but less electronic components. Best offer. VK3ZBS. B. M. Stares, 11 Malmesbury St., Wendouree, 3355.

Audio amp., chokes, valves, Power supply, Transceiver Type 3 $20, No. 62 $10. Ph. (03) 347 7491.

Swan 350 Transceiver 5 band, PSU. A1 cond. $300. VK3ZXB. Box 246 Mildura. Ph. (050) 23 2455 after 5 p.m.

Hydraulic drive complete with 3 phase motor 5/8HP 150V 50Hz infinitely variable hnth directions by remote servo. Suit moonbounce. Weatherproof $60. Ph. (02) 50 7937 Jones OR VK4LQ QTHR.

2 Mx F.M. Transceiver and frequency meter, suitable up to 2 Mx. Both in going condition. For new call. Greg Nieuwenhuis, 34 Bellevue Road, Figtree, N.S.W. 2525 Ph. (042) 28 8620

SSB Filter 455 KHx Mech., Xtal or Ceramic. Also 2 Mx, F.M. Mobile Transceiver. VK2ZXI. A. Wollin, 3 Kinsey St., Moama, 2739. Ph. (054) 82 3062.

FT101 160-10 Mx. 4 months old. What offers. Replies C/- D. Bell, P.O. Danger Island, Brooklyn, N.S.W. 2253. Ph 611 1335.

Marconi studio sync gen. BD.637D $80; Labcraft turntable type 605 with Decca Deram cartridge and arm $55; ½" Video tape rec., $350 o.n.o.; Solid-state TV camera $140; VW Kombi Van $400. VK2ZTY, Ph. (02) 30 4312.

Channelmaster Rotator complete. Suitable small beam antenna $35. VK3AOH, QTHR. Ph. (03) 49 6224.

SB31 Transceiver made by Sideband Engineers/Raytheon, in 1st. class condition, complete with book, microphone and plug-in VOX unit. Makes a complete station; you just supply antenna and either 110 colt AC or 12 volt DC. $300.00. VK3AHR QTHR Ph. (03) 83 4203.

Drake TR3 Transceiver 5 band SSB-CW-AM comp. with ext VFO, mobile P.S. mike, etc. Perfect condition — $475 or TR3 $320. AC.PS $50, Ext. VFO $75, DC.PS $70, SPK unit $10 — also Heathkit Linear Warrior, as new with heavy duty 240/110V Transformer — $200. VK2ASA QTHR. Ph. Gosford 96 4231 (043).

Bendix frequency meter. LM13 type $20.00. Boom for commercial made 10.15.20 meter spider quad $3.00. VK3TG QTHR. Ph. (058) 52 1636.

Aluminium 20 Metre quad antenna $85; "S" power supply, 12V 550V DC complete $10; Command TX 4-5.3 MC $6; QST 1935 to 1972, all prices negotiable. VK3PW, Ph. (03) 50 6023 QTHR

Trio 9DE HF Rx, Practical Wireless and AR mods., SPKN, VK2ZZX, Ph. (02) 399 9077.

Drake 2B Hall HT37 and Linear Amp. Swan 240, Swan 240 VFO and TCU DC/DC Supply for Swan 350 or 500C, ATR2B T/R 3-8 MHz. ATR2C T*R 3-7-5 MHz. A.T.V. Transmitter, A VIDK on Camera. Pye Ranger 6 Mx., Pye Ranger 146, MR10 6Mx. Palec, VTVM, 144 Am Tx-Xtal and VFO. All band amateur Rx AM, CW, SSB. Lots more write for price list. VK2AJY QTHR.

Collins 75S1 excellent order $375. Heath HR10E. Amateur Band Rx. Inc. 100 KHz Cal. $135. Swan 500C Type Filter plus carrier crystals $25. Class "C" Freq. Meter & AC/PS $10. VK3OM QTHR. Phone (03) 560 9215.

Courier 25W Xistorised F.M. Transceiver Type F.M. 400/30 SCR522 Rx and PSU. Offers to T. J. Moloney 3 Laurence St., Manly 2095. A.H. Ph. (02) 94 3160.

Wanted

General Cov. Receiver HE30, old Eddystone or similar. VK3OM QTHR. Ph. (03) 560 9215.

Receiver ARC-49. Good condition or any 150-160 MHz Rx. Details and Price to T. J. Moloney, 3 Laurence St., Manly. Ph. (02) 94 3160.

Signal Generator, Marconi TF801/A or similar 3-300 MHz. VK3YAZ QTHR. Ph. (03) 25 2689.

KEY SECTION

With Deane Blackman,* VK3TX

As do many others, the key section mourns the passing of VK7LJ. Lon was a noted CW operator, and as one of the original divisional coordinators has contributed very much to getting the section going. Vale, Lon.

Two entries in the CW section of the 72/73 Ross Hull — not many but a pretty significant improvement on the previous year when there were none. While congratulating 5MY on his total, perhaps I can express the hope that there will be a few more chaps round to talk to Ross 3DX next time.

Pictorial material is not a feature of a column like this, but the collection of keys held by AL 4SS is too good to describe so we have a photo. The collection dates back 100 years, and includes vintage overland telegraph "pumps", an assortment of "bugs", and some of the incredible variety of keys produced for military service. Al is anxious to enlarge his collection (or just talk about it!) — QTHR.

The "Lady with the Keys", says Al Shawsmith, VK4SS, is Lou Moreau, W3WRE. She is now searching for something Australian to add to her collection of over 200 keys and her forte is the history of each key in her possession. Al suggests if anyone could oblige why not write to her at 305 N. Llanwellyn Ave., Glenolden, Penn., U.S.A 19036.

SILENT KEYS

It is with deep regret that we record the passing of:

VK7RM—Mr. R. M. Barker
VK2RE—Mr. R. W. Edwards
VK2-SWL— Mr. W. A. Smith

BOOK REVIEW

With Syd. Clark, VKASC.

WIRE ANTENNAS for Radio Amateurs. Author. William I. Orr, W6SAI. For Beginner of Experienced Amateur, this book tells in simple terms, how to build and adjust wire antennas and feedlines with appropriate chapters covering just about every variant and the SWR meter for adjustment of the antennas and appropriate tuning units.
Publisher Radio Publications Inc.

"A Course in Radio Fundamentals". Author. George Grammar. One hundred and eighty pages of information for the newcomer to Radio. Twenty six chapters covering from the "Electric Field" to "Radio Frequency Amplification". Problems and questions are posed on each section of the work and the correct answers are given in a separate section of the book.
Publisher. American Radio Relay League.

TWO METRE F.M. *from YAESU*

FT-2FB All Solid State TRANSCEIVER

Up-to-date advanced semiconductor techniques. 25 silicon transistors, 16 diodes, 1 SCR, 2 ICs, 1 FET.

The YAESU FT-2F opens the door to noise-free, broadcast quality two meter FM operation. And thanks to repeater stations in operation around the country, the two metre band is no longer limited to line-of-sight communications.
The FT-2F Transceiver is a highly advanced, all solid-state unit complete with an automatic tone-burst signal, with an on-off switch, for repeater actuation. The FT-2F has channel capability of 12 simplex or duplex frequencies. Three channel frequencies are included in the purchase price of the FT-2F. (Sets imported by B.E.S. will have simplex Ch. B and duplex (repeaters) Chs. 1 and 4 with crystals installed and aligned —six crystals.)
Advanced circuit design protects the rig automatically from the damage of transistors caused by antenna trouble, or reverse connection of the power line.
Nothing could be simpler than the operation of the FT-2F. Just select your channel and begin push-to-talk conversation with fellow two metre enthusiasts. A simple meter on the front panel indicates battery condition and relative power output. The meter automatically reverts to S meter operation in the receive mode.

FT-2FB SPECIFICATIONS

GENERAL:
- Frequency Coverage: 144 to 148 MHz.
- Number of Channels: 12 Channels (three supplied).
- Modulation: Frequency Modulation.
- Transmitter Control: Push-to-Talk.
- Power Drain: Receive 0.5 amps., transmit 2 amps.
- Power Source: DC 13.5 volts, plus or minus 10%.
- Dimensions and Weight: 6⅝-in. w. x 2½-in. h. x 10-in. d.; 4 lbs.
- Standard Accessories provided: Dynamic Microphone, Connector Plug, DC Cord—Fuse, Mobile Mount.

TRANSMITTER:
- RF Output Power: 10 Watts (high position), 1 watt (low position).
- Frequency Deviation: 15 KHz. maximum.
- Frequency Stability: Plus or minus 0.001% or less.
- Spurious Radiation: At least —60 dB. below Carrier.
- Tone Burst: Nominal 2800 Hz.

Portable or home-base operation can be achieved with the addition of the optional FP-2 power pack. This AC power pack provides regulated DC power for the transceiver and charging voltage for optional leak-proof re-chargeable colloidal type batteries. In addition, a high fidelity elliptical style speaker is built into the pack. The FT-2F of course has its own self-contained speaker for independent use.

In the event of a disaster causing AC power failure, the FP-2 automatically switches over to DC operation from the battery pack. The battery pack will then provide up to eight hours of dependable emergency communications.

Like all YAESU Amateur gear, the FT-2F comes to you with our 90-day warranty. Plus all the hardware you need to get on the air immediately—mike, connectors, DC power cord and mobile mounting bracket.
A hand-held PTT microphone is included

If you have ever wanted to explore two metres, the time is NOW! And the rig is the YAESU FT-2F!

FT-2FB SPECIFICATIONS (continued)

RECEIVER:
- Receiver Circuit: Crystal-controlled Double Conversion Suparhet.
- Intermediate Frequencies: 10.7 MHz. and 455 KHz.
- Sensitivity: 0.3 uV. for 20 dB. S plus N/N Ratio.
- Selectivity: Plus or minus 15 KHz. —6 dB.
  Plus or minus 25 KHz. —50 dB.
- Audio Output: 1 Watt.
- Speaker: 2 inch Dynamic. **PRICE $259**

FP-2 AC POWER SUPPLY SPECIFICATIONS
- Output: 13.5 volts, 2 amps.
- AC Input: 100/115/220/234 volts, 50-60 c.p.s.
- Speaker: 5 x 3-1/5 Inch. **PRICE $69**

BATTERY PACK **PRICE $28**

ALL PRICES inc. S.T., Price and specifications subject to change.

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60 SHANNON STREET, BOX HILL NORTH, VIC., 3129. Telephone 89-2213

N.S.W. Rep.: **STEPHEN KUHL, P.O. Box 56, Mascot, N.S.W., 2020.** Telephone: Day 67-1650 (AH 37-5445)
South Aust. Rep.: **FARMERS RADIO PTY. LTD., 257 Angas St., Adelaide, S.A., 5000.** Telephone 23-1268
Western Aust. Rep.: **H. R. PRIDE, 26 Lockhart Street, Como, W.A., 6152.** Telephone 60-4379

amateur radio

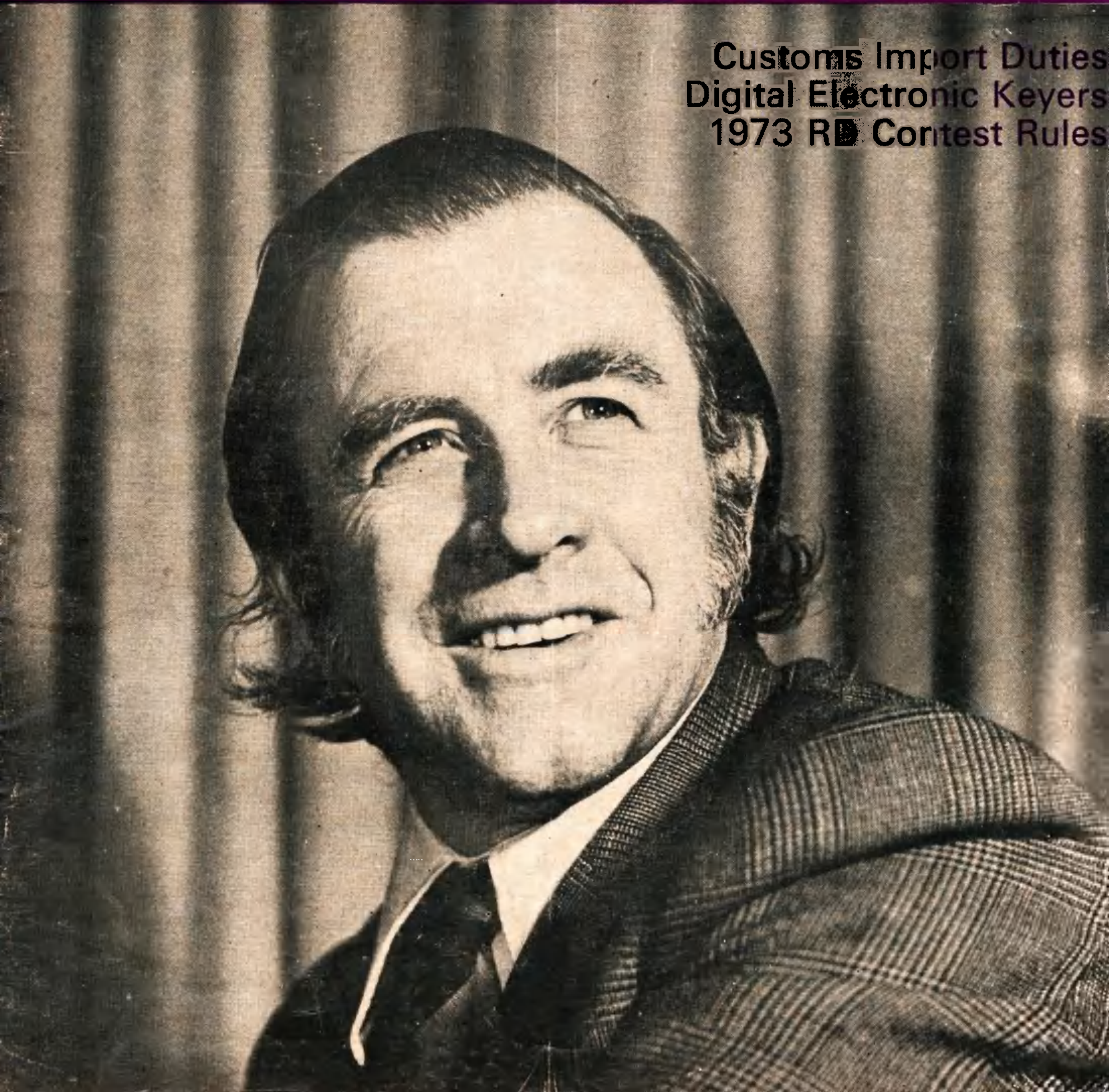
JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

JULY, 1973
Vol. 41, No. 7

Registered at G.P.O., Melbourne for transmission by post as a periodical Category "B".

Price 40 cents

Customs Import Duties
Digital Electronic Keyers
1973 RD Contest Rules



amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA. FOUNDED 1910

JULY, 1973
Vol. 41, No. 7

Published monthly, as the official journal by the Wireless Institute of Australia. Reg. Office: Above 474 Toorak Rd., Toorak, Vic., 3142.

Enquiries and material to:
The Editor,
P.O. Box 2611 W, Melbourne, 3001.
Phone: (03) 67 8201 (ext. 38).
AH (03) 232 9492.
Copy is required by the **third of each month.** Acknowledgment may not be made unless specially requested. All important items should be sent by certified mail.
The Editor reserves the right to edit all material, including Letters to the Editor and Hamads, and reserves the right to refuse acceptance of any material, without specifying any reason.

Advertising:
Advertising material should be sent direct to **P.O. Box 150, Toorak, Vic., 3142,** by the **25th of the second month preceding publication.**
Hamads should be sent direct to **P.O. Box 150, Toorak, Vic., 3142,** by the **3rd of the month preceding publication.**

Printers:
Research Publications Pty., Ltd.,
418 Canterbury Rd., Surrey Hills., Vic.
Phone 836 1311.

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FRONT COVER:
David Wardlaw, VK3ADW, newly elected President of the Wireless Institute of Australia. David has been a member of the Institute since 1947, and was first licensed in 1948. He served as the VK3 Federal Councillor during 1956-57-58, and was VK3 Divisional President from 1959 until 1963. From 1963 to 1965 David was overseas and operated with the calls VE3CAY and G3RYW. Since 1967 he has been a member of the Federal Executive.

Photo: Bob Dorin, VK3ZU

QSP

AS I take the office of the Federal President, my mind goes back to my introduction to amateur radio 28 years ago. The days when the bands were just being opened for use after "WW2".

I am reminded of the great changes that have taken place since then. At the 1948 Atlantic City I.T.U. Conference, the amateurs obtained significant recognition. The term "Amateur Services" was written into the International Radio Regulations.

In more recent times (at the W.A.R.C. Space Conference of the I.T.U. held in Geneva in 1971), the I.A.R.U. representatives were able to obtain privileges for the amateur service. These would not have eventuated had the I.A.R.U. not been present, observing and lobbying, as representatives of a recognised service.

Regardless of how kindly disposed official government delegations may be towards amateur radio, it is quite understandable that they may not realise all the implications made by non-amateur aligned countries. The I.A.R.U. delegates were able to correct some apprehension in delegations whose contact with amateurs was either un-informed or unfortunate (mainly due to indiscrete expatriate operators).

It is now sixty years since the formation of the Wireless Institute of Australia and the time when it was possible for one man to comprehend most of what was known about radio.

In the early days all amateurs had basically the same technical interests and modes of operation. However, in common with all other scientific disciplines, the rate of expansion of knowledge in electronics has been explosive.

Today's amateurs have a tremendous variety of interests around a central theme.

Often the interests of specialised groups impinge on the interests of other amateurs.

Equitable arrangements have to be reached which are in the best interests of everyone. Not to the advantage or detriment of any one section.

This is essential in order that the maximum fulfillment and enjoyment of the hobby may be achieved by all.

David Wardlaw, VK3ADW,
President.

"A.R." — your magazine

After considerable discussion and investigation, "A.R." changed to the offset method of printing with the April issue. This has resulted in savings in the cost of production as well as increasing flexibility in the type of material printed. An encouraging number of favourable comments have been received about the new style magazine.

However, the changeover has not been without its problems. Some anticipated, some completely unexpected.

Gradually we are overcoming these problems.

You will notice that this issue has arrived in your letterbox a lot earlier than the past few issues, and that with larger print, more line spacing and the use of different type style when fine type is used, it is easier to read.

An enormous amount of volunteer time and effort is being expended by the Publications Committee to produce for you, the members of the Institute, the best possible magazine at least cost.

We would like some assistance.

Much of the content of "A.R." depends upon articles submitted by contributors. We are very short of such articles at the moment.

We need short and long articles, hints and kinks, complete equipment descriptions and circuit details of single stages, practical and construction and theoretical articles, HF, VHF, and UHF articles, simple beginners and state-of-the-art articles, and so on. Anything connected with radio communication. Humerous, historical, travel, events.

If you are hesitant about your ability to produce suitable material, we can assist you. Write and ask.

At this time we cannot pay, but awards are made each year for the best articles published.

Photographs are needed for the front cover, the pictorial pages and for interest between articles and standard features throughout the magazine. Glossy, high contrast photos, printed a little on the light side, preferably 10" x 8", are preferred, but we will consider everything submitted.

I look forward to your contributions and support to your magazine.

Bill Roper, VK3ARZ
Editor, "A.R."

IARU

By May 1973, the International Amateur Radio Union could count 88 member countries. 13 countries in Region 3 are listed as members, these being Australia and of course, New Zealand, Japan, Malaysia, Singapore, Hong Kong, Philippines and Western Samoa, India, Ceylon, Burma, Thailand and Korea. Various possessions would come under U.S.A. and U.K. umbrellas. The ARRL is the IARU Headquarters Society.

Q CODE

"QLF" — Would you mind sending with your left foot for a while?
Answer — I am already sending with my left foot.
(ARNS Bulletin)

WHAT OTHERS SAY

A USA magazine which includes reviews on various amateur radio journals has this to say about "Amateur Radio" —

"Amateur Radio, December, runs an excellent article on an exhaustive test of directive antennas, commonly used by amateurs. Read this if you can possibly lay your paws on the club's copy! Part 2 on filters also is good. There's very good advice on learning the International Morse Code too."

SILVER JUBILEE

Congratulations to the Geelong Amateur Radio-TV Club. Formed at an inaugural meeting on 7th June 1948, the club has grown from the 14 members at that meeting, many of them being still active.

THE WELL-ROUNDED AMATEUR

What is a well rounded amateur? A well rounded amateur is an operator who does not let one narrow facet of amateur radio monopolize his entire talents and efforts at the expense of other interests both within and without amateur radio. Unfortunately, the well-rounded amateur is becoming more and more rare in t.m. circles. Just talking day in and day out, or just building, or just anything that is one single effort tends to warp one's opinion of other facets of amateur radio. CQ, May '73.

Q CODE

"QXX" — Do you know anyone who will lend me the money for a KWM-2 until I get this bankruptcy affair fixed up? (ARNS Bulletin)

(Continued on page 9)

how to succeed in electronics
(by studying legs)

BILL CURRIE *VK3AWC

Since the writer was bitten by the radio bug as a school boy, vast strides have been made in the fields of electronics and communications.

Where once regenerative receivers and honeycomb coils were the order of the day, we now have multi-legged intergrated circuit phase locked loops — orbitting communication satellites, and digital readout multiband multimode solid state transceivers.

In endeavouring to keep abreast of the "state of the art" I have amassed and absorbed vast amounts of literature in the shape of magazines, manuals, and data sheets. Being of a gullible and optimistic nature, the reading of this has left me with an uncontrollable urge to try out each and every new device that appears on the market. This has resulted in—

1. Isolated cases where the device under test actually functioned for a short time as stated in the data sheet.
2. A fair sized pile of smouldering defunct devices.
3. A growing awareness that the more sophisticated the device, the less is the effort needed to render it totally useless, and the less spectacular is its demise.

The days of the red hot anodes and sputtering arcs that heralded the departure of earlier devices, have gone. I once spoke to an old timer who had been so fascinated by the fireworks display of an overloaded 866 that he could not bring himself to switch it off.

No more do we get a "run for our money" when we accidentally blast into oblivion the latest solid state wonder. The products of today's electronic laboratories whilst each containing enough circuitry to keep a conscientious draughtsman busy for some weeks, can be disintegrated within microseconds without uttering the slightest squeak of protest.

Here may be a good opportunity to lodge a plea with the designers of tomorrow's electronic marvels, to build into each device a warning system that will emit a squeal and/or a puff of smoke when the end is in sight. Analysing the results of many years experimenting I have reached the following conclusions that most devices were destroyed because:

1. They were wired in upside down.
2. They were wired in back to front.
3. The leads were transposed.
4. I thought pin 4 went to positive (?).

It was reasoned that the less connections (legs) a device has, the less chance it has of being wired incorrectly.

A diode has two legs, and so has a 50 per cent chance of being wired into a circuit correctly.

A transistor has three legs but can be wired up six different ways (try it) and therefore has only a 16-2/3 per cent chance of being wired correctly.

A further hazard appears when multi-legged devices are used. I recall wiring into a circuit, by mistake, a small spider which incidentally gave better results than a Fairchild U A 709C. This probably was no fault of Fairchild's but was possibly due to the type of circuit used, or the activity of the spider, after being subjected to eight "blobs" of molten 60/40 solder.

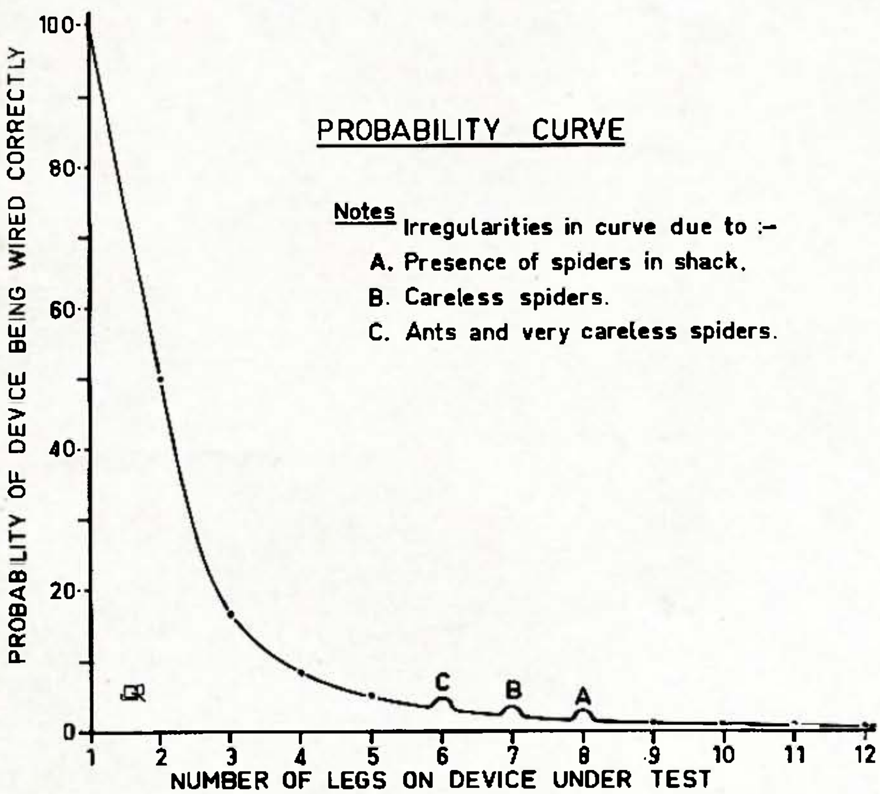
Feeling a need for guidance in future experiments, it was decided to obtain a computer analysis of the problem. The relevant information was fed to the nearest computer (teenage student daughter) and the following readout obtained in the form of a probability curve.

After studying the probability curve for some weeks it was decided to confine all experiments to one legged devices. This resulted in almost 100% success. However it became evident that one legged devices were not over-abundant. After having tried:

1. Every single earth connection within one mile of the shack.
2. Every single fed antenna ever invented.
3. "Peg Leg Pete".

I looked for further fields to conquer. I am at present working my way through the diode circuits handbook, and might add that results have been as predicted.

Does anyone want to buy one half of my entire stock of diodes. (Still slightly warm). Also for sale — one spider to 5 size (cold).



*1 Dowling Avenue, Seymour, Vic., 3660

C.G.S

TYPE C MINIATURE VITREOUS ENAMELLED POWER WIREWOUND RESISTORS

Approved to BS 9114 – N002 style 2E–56

SPECIFICATIONS

The 'C' Series of miniature wirewound, vitreous enamelled resistors has been designed to meet the requirements of Specification BS 9114 - N002, and full Qualification Approval has been granted. A Test Report Summary is available on request; this report shows that many of the performance levels are in fact much higher than the specification acceptance levels.

The use of specially selected materials, combined with the application of exacting quality control throughout all stages of production ensures the consistent achievement of a very high standard of reliability.

ELECTRICAL SPECIFICATION

Tolerance: ±5% is standard on values of 1Ω and above and ±10% between 0.1Ω and 1.0Ω. For non standard values and tolerances please consult the factory.

Resistance values: C Series resistors are available with the preferred ohmic values of the E24 Series within the ranges shown in Table 1.

Temperature coefficient: Typically less than 100 ppm/°C and never exceeding 200 ppm/°C over the category temperature range −55°C to +200°C

MATERIALS

Core: High purity steatite ceramic. Chemically inert, capable of withstanding severe thermal shock and impervious to moisture. Ground to close tolerance finish to give maximum contact with wire element for rapid heat transfer.

Resistance Element: High quality nickel-chrome or nickel-copper alloy depending on resistance value; wound at minimum tension.

End Caps: Formed to close tolerances from a special nickel-iron alloy chosen for its consistent welding properties and glass sealing characteristics.

Leads: Solder coated nickel A.

Uncoated leads can be supplied for welding.

Specify – 'weidable leads'.

Preformed and cropped leads can also be supplied on request.

Coating: Humidity proof vitreous enamel with carefully controlled expansion matched to the materials of the resistor.

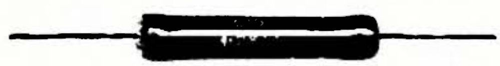


TABLE 1

C.G.S.				BS 9114 - N002							STYLE CROSS REFERENCE		
Style	Maximum wattage rating @ 20°C	Resistance Range Ω		BS 9114 - N002 Style	Maximum wattage rating @ 70°C	Approved Resistance Range Ω		Critical Resistance Ω	Limiting Element Voltage. Volts		DEF. 5111-1 Style	DEF 5115-2 Style	G.P.O. Style
		min.	max.			min.	max.		Normal	Low Air Pressure			
C3A	3	0.1	10K	2E-56-2.5	2.5	1	4.7K	3.9K	100	70	RWV3J	RFH3-2.5	P.O.35
C7	7	0.1	27K	2E-56 6	6	1	15K	6.8K	200	140	RWV4J	RFH3-6	P.O.40
C10	10	0.1	68K	2E-56-9	9	1	68K	27K	500	350	RWV4K	RFH3-9	P.O.36
C14	14	0.2	120K	2E-56-12	12	1	100K	47K	750	530	RWV4L	RFH3-12	–

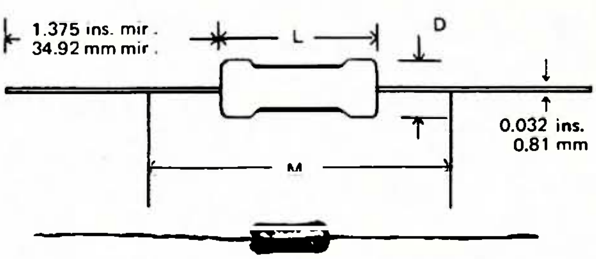


TABLE 2

Style	Length L		Diam. D		Measuring Distance M		Approx. Weight
	max. in.	max. mm.	max. in.	max. mm.	±0.062 in.	±1.59 mm.	grammes
C3A	499	12.7	0.220	5.6	1.250	31.8	1.0
C7	.874	22.2	0.315	8.0	1.625	41.3	2.0
C10	1.499	38.1	0.315	8.0	2.250	57.2	3.5
C14	2.106	53.5	0.315	8.0	2.875	73.0	5.0

Note: M = resistance measuring points distance – below 10Ω only.

the unsuccessful ham

CHRIS de COMBE*—VK5NQ—G4AWL

Nearly everyone who writes in an Amateur Radio Magazine tells of some successful venture or equipment design. I thought it was about time the true story was told about all the failures that make amateur radio so much "fun"?

I am interested in QRP operation using morse code. The main reason being, I figured that with QRP operation less people would hear my poor morse. Having an Eddystone EC10 MK II receiver I decided to build a matching transistor transmitter. For QRP operation a VFO is essential, but with the lack of bandspread on the EC10 and the fear of frequency instability a crystal controlled oscillator was settled on.

The frequency chosen for operation was 7 MHz. I should put down a reason, but I can't think of a good one. The oscillator was one of my successes, the second circuit I tried worked. With this success gone to my head I pressed on to the class A buffer. Once again it worked. Well I thought the 100 mA drawn by the stage a bit high at the time, but I will come to that later.

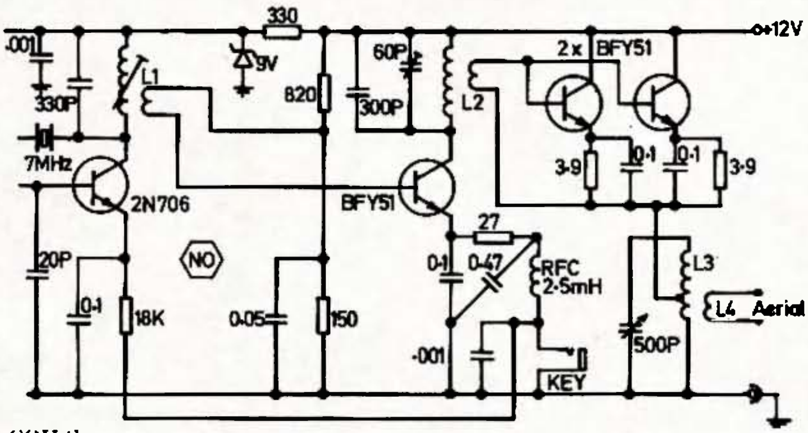
With head swelling I pressed on to the P.A. stage which consisted of three BFY51's in parallel for a power of about 6 watts.

Well I got as far as tuning the slug in the driver collector when the fuse blew. Disaster had struck — I had committed a fundamental error of over driving a transistor stage. One of the BFY51's had gone short circuit.

MORAL 1: DON'T OVERDRIVE TRANSISTOR CIRCUITS.

*C/o P. O. Box 38, Woomera, 5270.

By removing the slug in the driver tuned circuit and tuning the circuit with a variable capacitor the drive was at a reasonable level and with two transistors in the P.A. I had a QRP transmitter running about 4 watts input.



COILS

L1 15T primary 4T secondary ¼" former with core.

L2 15T primary 4T secondary ¼" former less core.

L3 15T tap at 7 turns ⅜" diam. former.

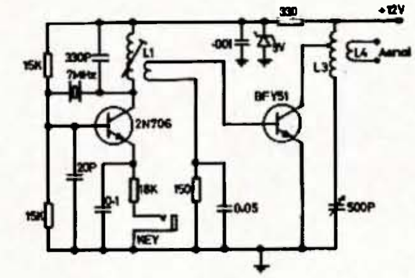
L4 5T wound over earth end of L3.

All coils wound with 26 BS enamelled wire.

The transmitter was put on the air and after only half an of hour of sending CQ VK5DW heard me. I was so excited I could hardly operate the key, but an enjoyable QSO followed. You might well say now that it all ended well, but I committed sin number 2 which is to touch a circuit when it is working well. The 100 mA of the driver had been nagging in the back of my mind and a close inspection of the driver circuit showed the fault. "You colour blind twit", I cried as I spied a 2.7 Ohm resistor where a 27 Ohm should be. Out came a soldering iron and the resistor was changed. The power was switched on again and then, oh no, the fuse blew again. My first trouble again and I was now left with one P.A. transistor.

It hardly seemed worth having one transistor in the P.A. and so I turned the driver into a class C stage and it ran the great power of one and a half watts input.

I put the transmitter on the air again and after several unsuccessful attempts to call several amateurs calling CQ, I called CQ and was rewarded by VK5DW answering me again. I had a transistor transmitter which worked and had a lid glued on with Araldite.



Unfortunately curiosity killed the cat and I now have no transmitter. I decided I could improve the transmitter, the lid was hacked off and the circuit modified. The P.A. stage burst into self oscillation and it destroyed itself. Needless to say it failed to work after that.

I was so fed up with transistors that I dug in the junk box and out came a 5763 and a 6L6. A two stage valve transmitter was built with a power input of 20 watts. It worked first time. good old valves, but still I was destined for failure because before I could put the transmitter on the air the oscillator stopped oscillating.

The fault was traced to my newly purchased crystal.

This leads me to MORAL 3: Don't run your crystal oscillators at high power, and can anyone tell me where to buy a good commercial transceiver?

pre mixing with a 5 MHz crystal filter

JONATHAN KITCHIN *VK6TU

This article, which might be subtitled "Where did the birdies come from?" is a rather amusing account of a situation which most home-constructors of SSB receivers will recognise. The author has not suggested any solution to the problem, but a footnote by the Technical Editor may be of some help to 6TU and others.

I had built a transceiver operating on 80 and 20 metres using a Yaesu 5174 KHz crystal filter and 9 MHz VFO (8674 to 9176 KHz). So how to get on 40? Switch the VFO to 12 MHz, or pre-mix? The VFO was built-in, with no room left, so it had to be pre-mix. There are a couple of commercial rigs which do this so I guessed it must be OK!

After a little figure work I reckoned I needed a crystal on 21144 KHz. 21144 minus VFO 8970 = 12174. 12174 minus filter 5174 = 7000. This would give 7 MHz at the same VFO setting as for 3.8 MHz (actually 8974). The tuning would be reversed, so 7.2 MHz would correspond to 3.6 MHz (VFO on 8774).

RESULTS

The above calculations suggested all would be OK, but when tried out I found a terrible birdie near 7.2 MHz! This is due to VFO third harmonic (3x8772 = 26316) minus 21144 = 5172. There were a couple of minor ones about 7000 and 7150 KHz but out of the band so all was well. Actually this birdie is useful for dial-setting. It just cannot be overlooked!

On 21 MHz the problem of how to operate was overcome in a similar manner. Crystal on 25 MHz, subtract the VFO to give 16 MHz, and add the 5 MHz SSB to come out on 21 MHz. But birdies are all over the place! Several major, and many more minor ones. The major ones are:

2 x 25000 - 5 x 8965 = 5173 on 21207
3 x 25000 - 8 x 8728 = 5173 on 21444
9 x 8908 - 3 x 25000 = 5173 on 21264
12 x 8764 - 4 x 25000 = 5173 on 21408

Among the minor ones are two close together near 21310, and others near 21050, 21110, 21170, 21225 and 21385. But it is quite workable. Ten metres has not been tried in the homebrew rig, but a little calculation shows that a 32.5 MHz pre-mix crystal will cause major birdies on 28563, 28661 and 28756 KHz.

OUR TECHNICAL EDITOR COMMENTS AS FOLLOWS

VK6TU has encountered the problem which plagues all of us who attempt to build heterodyne VFO's, dual conversion receivers, and similar systems involving more than one oscillator. If harmonics of the oscillator frequencies were not present there would be no problem. Unfortunately, no matter how cleanly sinusoidal the oscillator waveforms may be, most practical mixers will distort them, thus generating harmonics. This is particularly true of diode and bi-polar transistor mixers, where mixing depends on the same non-linearity which produces the harmonics. Balanced mixers are little better. They may cancel out one of the input frequencies and perhaps its even harmonics, but at the best, imperfectly.

The author does not indicate whether his transceiver uses valves or transistors, but in either case, if possible, the oscillators should be separated by shielding and filtering so that harmonics of both oscillators will not appear together in any part of the system. Obviously this cannot be achieved in a heterodyne (i.e. pre-mix type) VFO, since both oscillators feed into one mixer.

This is therefore a disadvantage of the pre-mixing system as compared with dual-conversion, where the oscillators feed separate mixers and steps can be taken to keep their harmonics confined to separate areas.

Fortunately, modern solid-state devices have provided an answer to the oscillator harmonic problem. Not only can FET oscillators be constructed without difficulty to have very low harmonic output, but dual-gate FET's have been found far superior to other types of mixers. This is because the absence of forward-biased junctions allows the mixer to present a constant linear impedance to the oscillator, thus producing no distortion of its waveform.

POSTSCRIPT

The foregoing discussion was almost on its way to the printers when a further contribution arrived from VK6TU, in which he produced an alternative to his original scheme. This is to limit the VFO tuning range to 200 KHz (from 9.8 to 10 MHz). By subtracting the filter frequency from the pre-mixer output on 80 and 40 metres, and adding them for the higher bands, the correct tuning sense is achieved on all bands (i.e. no reverse tuning on some) yet the one carrier crystal only is required for LSB on 80 and 40 and USB on the higher bands. Either 5 or 9 MHz filters can be used, suggested frequencies being—

5.172 MHz filter

Band	Xtal	Pre-mix out
3.5- 3.7	18.672	8.672- 8.872
7.0- 7.2	22.172	12.172-12.372
14.0-14.2	18.828	8.828- 9.028
14.2-14.4	19.028	9.028- 9.228
21.0-21.2	25.828	15.828-16.028
21.2-21.4	26.028	16.028-16.228
28.5-28.7	33.328	23.328-23.528

9 MHz filter

Band	Xtal	Pre-mix out
3.5- 3.7	22.5	12.5-12.7
7.0- 7.2	26.0	16.0-16.2
14.0-14.2	15.0	5.0- 5.2
14.2-14.4	15.2	5.2- 5.4
21.0-21.2	22.0	12.0-12.2
21.2-21.4	22.2	12.2-12.4
28.5-28.7	29.5	19.5-19.7

VK6TU claims, without actually trying it out, that this later scheme should give much less trouble with birdies. This may be so, due to the much more restricted tuning range, but this imposes its own penalty in requiring many more heterodyne crystals to cover the range, particularly on 10 metres. It may be that birdies from high order harmonics can still occur, nevertheless, but a complex computer programme might be needed to predict them? For the amatuer lacking such facilities the only course is to try the scheme in practice, with a strong recommendation to use dual-gate FET's for the mixers!

A TRIO OF HARD WORKING FEDERAL COUNCILLORS AT THE 1973 FEDERAL CONVENTION

Jim Lloyd, VK3CDR.

Laurie Blagbrough, VK4ZGL

Geoff Taylor, VK5TY

* 10 Phillip Way, Osborne Park, W.A. 6017.

fixed capacitors

PART 2 Continued

C. A. CULLINAN *VK3AXU

Just in case someone feels like writing a vitrolic letter, in red ink, to the Editor on the basis that the great advantage of FM reception is its freedom from noise, it must be pointed out that some forms of interference may be in the form of Amplitude Modulation or Frequency Modulation or both combined and can cause considerable interference to FM as many Amateurs using FM on 144 MHz and above know only too well.

As this is being written the writer's TV set is suffering from TVI. In this case there are objectionable lines of dots across the screen and these lines crawl vertically as well. At the same time there is interference in the FM sound. This TVI will go off shortly when the car outside the house moves away and takes its radiating ignition system with it. At present the engine is idling.

"The main sources of disturbances on a car are the battery charging generator, and the ignition circuit. The former causes interference because of its commutator, and the latter because there are regular surges in both the high tension and the low tension circuits. The generator is satisfactorily suppressed by fitting a .5mf Suppressor capacitor capable of resisting the engine temperature, close to the engine frame, with the flexible lead connected to the unearthed brush of the generator. If ignition is obtained from a coil, the circuit may be suppressed in three places. A distributor suppressor, with a resistance of 10,000 to 15,000 ohms, is connected in the high tension lead as it enters the distributor — a spark plug suppressor of 5,000 to 10,000 ohms may be connected in the high tension lead very close to each plug (this is done normally after the distributor suppressor has been deemed not sufficient to suppress the particular noise).

"An 0.1 mfd capacitor completes the equipment when fitted so that its case is connected to the engine frame, and its flexible lead connected to the side of the coil not connected to the contact breaker.

"With magneto ignition the distributor suppressor is not fitted as the disturbance is not so pronounced, and the added resistance tends only to impair engine performance unless the magneto is exceptionally good. In this case the contact suppressor is fitted so that its case is at frame potential and its lead connected on to the lead as it leaves the magneto on its way to the ignition switch. "Modern cars do not use a distributor suppressor resistor, except in cases of extreme interference, but rely on carbon trace ignition leads instead, each lead being its own resistor. The resistance of a typical lead is 275 ohms per centimetre.

"This type of suppression is very effective at TV frequencies.

"Also modern cars are fitted with what are called 'Alternators' for battery charging. These 'Alternators' use built-in solid-state diodes instead of a commutator to derive DC output. Alternators' are three phase devices and the stator may be connected in either 'star' or delta'.

"Alternators' have two slip-rings and two carbon brushes to supply DC to tne enciting rotor.

"'Alternators' can be prolific generators of noise in car radio sets. For broadcast frequencies a capacitor of 0.5 mfds may not be large enough. 3.0 mfds is a typical value of capacitance.

"However at HF and VHF it may be necessary to take the DC output current through a co-axial capacitor.

"Any electrical contrivances on a car such as a horn, petrol pump, starter, heater fan motor, electrically operated radiator fan, etc., may need noise suppression. Usually an 0.5 mfd capacitor of tne type to be fitted to a car generator will be effective, except in the case of an electric windscreen wiper where it may be necessary to connect a 25 mfd electrolytic capacitor across the motor. Additionally it may be desirable to connect a low resistance RF choke in series with the active lead. For HF and VHF a non-inductive capacitor may be needed and the lead to the suppression devices might have to be screened.

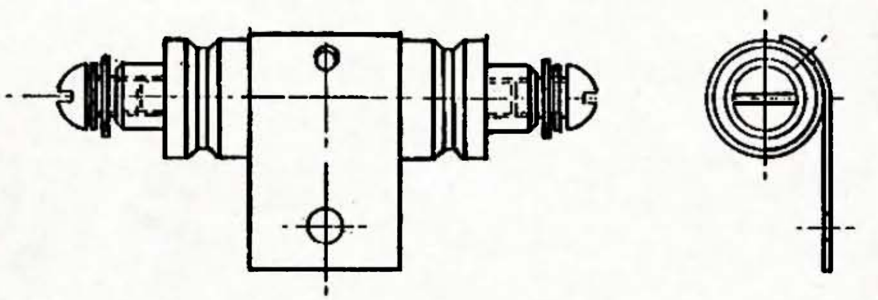
"In locating an aerial on a car it is advisable to keep it as far away as possible from the electrical devices.

"There are a great many other devices besides the automobile that create radio noise.

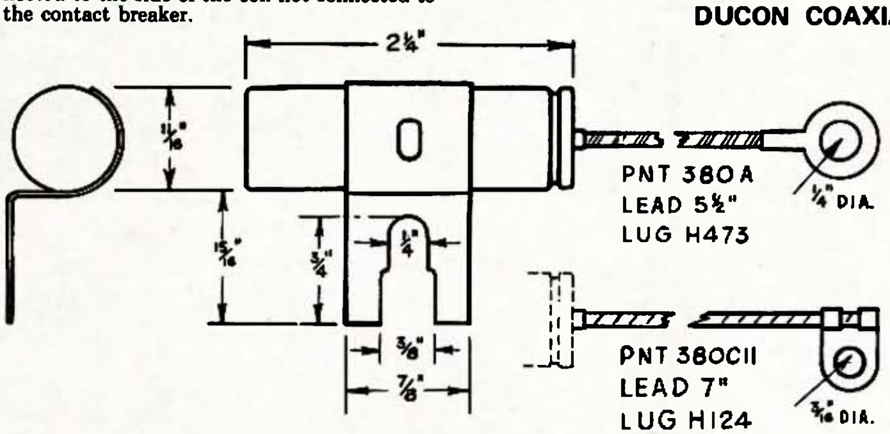
"One of the most prolific is the petrol engined lawn mower. It too can be suppressed along the lines described for cars.

"Where the interference is due to simple switching processes it is quite a common practice to connect a suppressor directly across the switch terminals. Such a suppressor may consist of a capacitor of 0.01 mfd in series with a resistor of 150 ohms."[3]

(To be continued.)



DUCON COAXIAL CAPACITORS



DUCON NOISE SUPPRESSOR CAPACITORS

*6 Adrian St., Colac. 3250.

digital electronic keyers

L. H. VALE *VK5NO

Two solutions are provided here to the same problem, as developed by VK5NO over a period of some years. The earlier approach employed two general purpose operational amplifiers while more recently, use was made of digital integrated circuits.

DIGITAL KEYER

This Keyer (Figure 1) has character completing, correct dot/space and dot/dash ratios and was designed to be as simple and inexpensive as possible.

Two of the units have been made on tenth-inch-spaced matrix board to the approximate layout shown in Figure 2, although there is no need to use two separate pieces of board.

The monitor terminal goes approximately 5 volts negative on "key down". Loading on this terminal should not exceed 1 OK to earth (terminal 3). In units built here it keys a multivibrator driving a small speaker.

If you have room, it may be as well to increase the values of C3 and C4.

The relays used here had 12 volt coils, approximately 300 ohms resistance.

The value of C2 determines the speed range limits; C1 and C2 can be ceramic or polyester.

The following notes are applicable only when transistor keying is used, as shown in Figure 2:

(a) The value of RK must be such that the transmitter is cut off on "key up" whilst limiting the voltage between the key terminal (6) and earth (3) to less than 65 volts for the 2N3645 (find the value before connecting the Keyer).

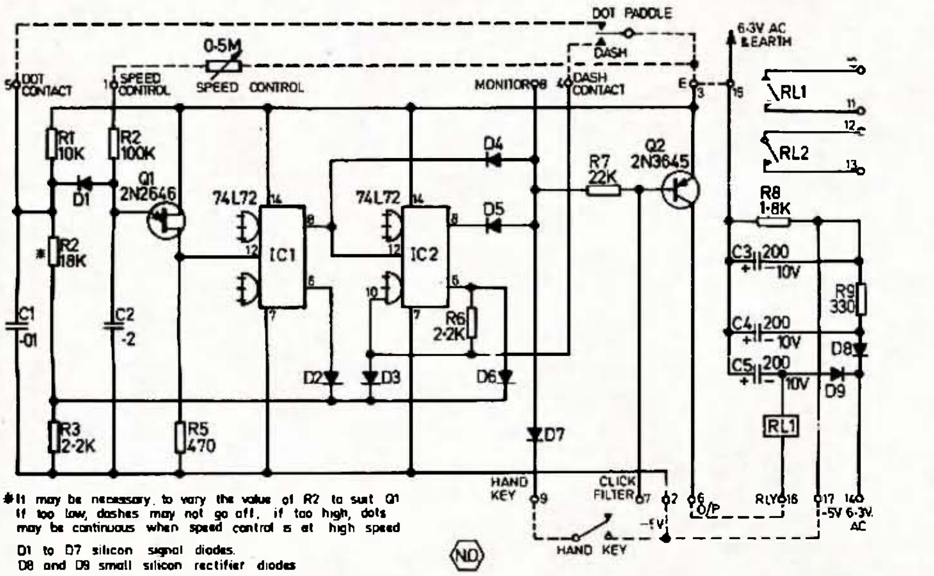
(b) CK and DK are used for key click suppression and can be omitted if your transmitter is free of clicks without them. CK approximately .002 mfd, value found by listening, DK can be almost any diode.

(c) For transistor keying, C5, D9 and the relay can be omitted.

DIGITAL KEYER USING OPERATIONAL AMPLIFIERS

The circuit shown uses two inexpensive operational amplifier ICs and an output transistor to form a digital Keyer that gives equal mark/space ratio on dots regardless of speed setting, character completion, a wide speed range, and correct dot-dash ratio.

The output circuit shown is for Keying an FL100B transmitter but can be readily modified if required to suit other transmitters, or to drive a relay, as shown. The value of R22 must be such that the transmitter is cut off on "Key up" whilst limiting the voltage across the

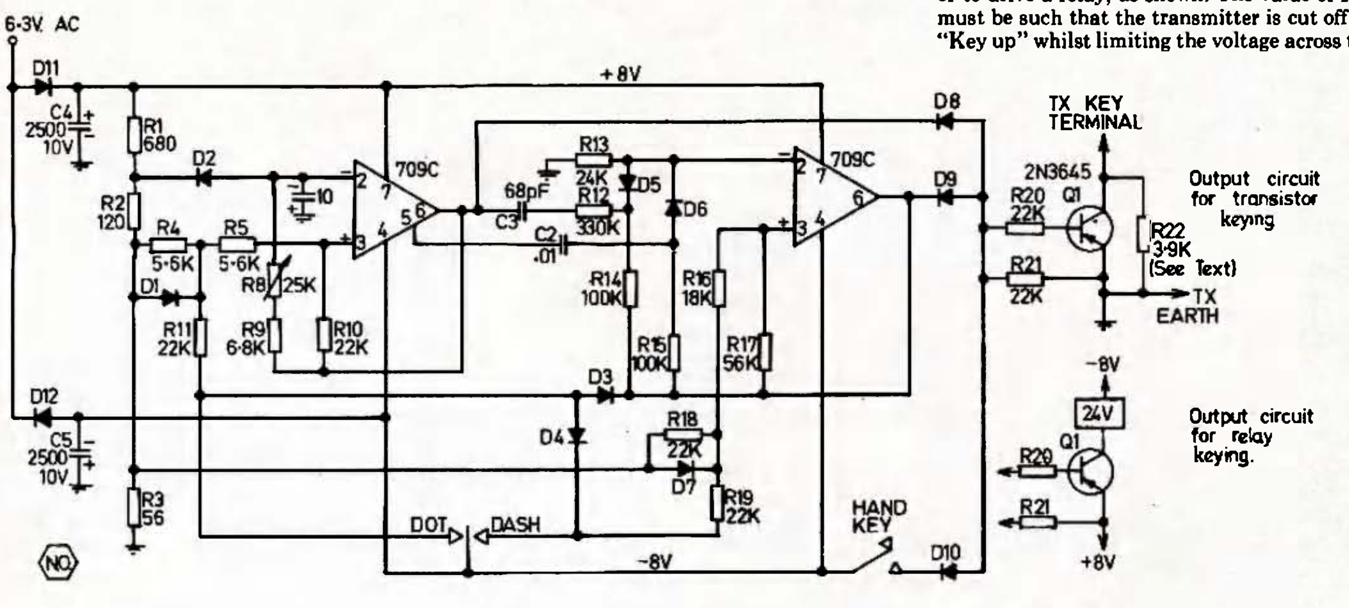


*It may be necessary to vary the value of R2 to suit Q1. If too low, dashes may not go off, if too high, dots may be continuous when speed control is at high speed

D1 to D7 silicon signal diodes.
D8 and D9 small silicon rectifier diodes

Dashed connections shown above are for relay operation

DIGITAL KEYER CIRCUIT DIAGRAM FIG. 1



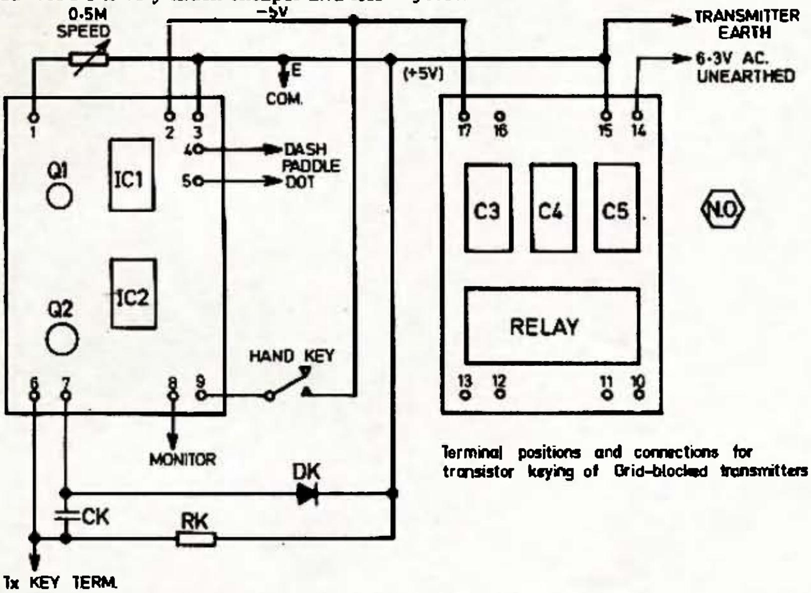
DIGITAL KEYER USING OPERATIONAL AMPLIFIERS

C/- Box 309, Fyshwick, A.C.T., 2609.

Key terminals to less than 65V for the 2N3645 (the value should be found before connecting the Keyer).

In the writer's Keyer an MC1437 dual op-amp is used but at present prices a pair of individual 709C's is very much cheaper and less bother to use. The diodes D1 to D10 can be small silicon diodes like OA200, AN914, etc., and D11 and D12 low p.i.v. rectifiers.

Two of these Keyers have now been operating satisfactorily for more than two years.



LAYOUT OF MATRIX BOARDS FIG. 2

QSP

Continued from Page 2

I notice when some fellow dies, No matter what he's been
Some saintly chap, or one perhaps, who's life was stained with sin
His friends forget the bitter words, they spoke but yesterday
And now they think of a multitude of pretty things to say.

Perhaps, when I am laid to rest, someone may bring to light
Some noble deed, or kindly act, long buried out of sight.
If it's all the same to you, my friends, Just give to me instead
A clear frequency while I'm living, and the QRM when I'm dead.

(ARN's Bulletin)

SATELLITE DICTIONARY

Doppler shift; a hunt by a learner driver for the proper gear; a red chemise; movement of a dopple.

NORTH QUEENSLAND CONVENTION 1973

Peter Renton, VK4PV, writes that plans are being made for the Convention in Townsville on 21st/22nd July with high hopes that the newly-formed Mt. Isa, the Mackay and Cairns Clubs will join in also. As he says, it should prove to be a unique gathering of amateurs in that area.

INDONESIA

The archipelago covers a land area of 735,381 sq. miles of about 13,677 islands (6044 inhabited) and a population estimated for 1971 of 119,000,000; language — Bahasa Indonesia. Electricity only in main centres, 50H, 127 to 240V A.C., 2 pin European type sockets.

RADIO AMATEUR POPULATIONS

Break-In for April 1973 quotes 70% of the world's radio amateurs as being in USA and Japan — i.e. 425,000 out of 580,000. Then follows DL, G, LU, USSR, PY and VE each with 10 to 20 thousand. Of the remainder, only 3000 are in Africa and half of these are in ZS. The question, "And how many ITU votes are there in Africa?", seems most pertinent.

TROUBLE-SHOOTING

The time will surely come when trouble-shooting a transceiver will consist of looking at a few LED's (light-emitting diodes) that are a part of the "go-no-go" system of each module in the set. It will work like this: Any module that is not functioning properly will be indicated as "no-go" by a LED. You need merely pull out the module, ship it to the factory and receive a new one. CQ, May '73.

OSCAR-6

The largest-range QSO reported to date is K7BBO-SP2DX about 5,050 miles. The Satellite DX Achievement Award has had a total of 30 qualified applicants — KL7MF, JA1JRK and JA8PL — all have confirmed four continents. QST Apr '73.

UNUSUAL PROBLEMS

To put through an access road to the top of Mount Bellenden Ker, to establish a TV transmitter to serve the Cairns region and areas west of the Great Dividing Range, would have been too costly because of the tropical rain forest. Instead a passenger ropeway rising nearly a mile high in ten stages, of which two are each nearly a mile long, was constructed to transport the people and equipment required to build the station. The press release, presumably put out by W. R. Carter and Associates the consulting engineers for the Commonwealth Department of Works, does not say how the nine large towers for the ropeway were transported.

The St. George Amateur Radio Society held a colour TV demonstration at the Civil Defence Headquarters, The Mall, South Hurstville at the Annual General Meeting on May 2, 1973. The meeting was well attended and members and visitors saw an excellent display of PAL colour videotapes played through colour videotape recorders and onto colour TV monitors. The colour quality was excellent and a tribute to the amateur radio operators who had built and co-ordinated the equipment used. Ian Mackenzie (VK2ZIM) gave the demonstration to the people present and answered questions of a technical nature after the demonstration was over. The St. George Amateur Radio Society meets first Wednesday of each month at the above address starting 7.30 p.m.

Mr. J. M. Dixon of the Australian Broadcasting Control Board was the guest lecturer at the June general meeting of the Victorian Division. The topic was "The UHF FM Broadcasting Network". It was an extremely interesting and topical lecture, and a full report should appear in the next issue of "A.R."

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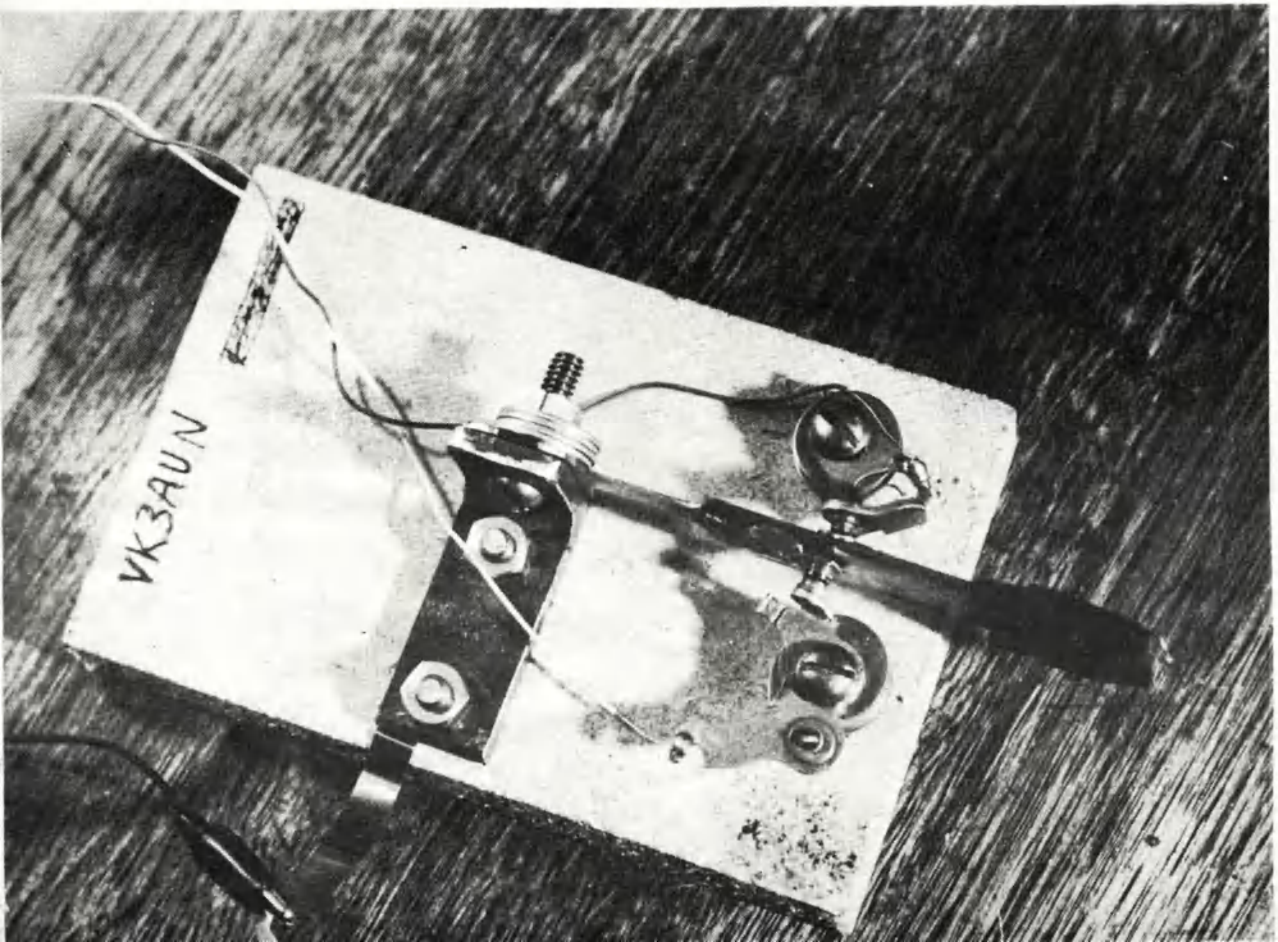
first Wednesday of each month at the above a

The picture of VK3AUN's morse key might interest the home brewer. He writes that the simplicity of it fascinated him — some old motor points, a piece of pine board, a machine hack-saw blade. The blade at the fixed end was ground away until just stiff enough to maintain a central position. He finds it as light as a feather in use and hopes it may be helpful to others.



'd a colour TV demonstration at the
ith Hurstville at the Annual General
s well attended and members and
colour videotapes played through
ur TV monitors. The colour quality
radio operators who had built and
ckenzie (VK2ZIM) gave the demon-
ed questions of a technical nature
George Amateur Radio Society meets
above address starting 7.30 p.m.

Pictured is a specimen of the ARRL'S new Satellite Award which is in colour—mainly yellow on a moire-effect dark background. The Satellite '1000' Award, as it is named, requires 1000 points for acquisition; 10 points for each new station contact, 50 points for a new country and 250 points for a new continent. QSL cards are required as proof of contacts on or after 15th December, 1972, the effective date of the Award. Apply to ARRL, Newington, Conn., U.S.A. 0611, for application form.

Several members of the Executive of the W.I.A., and the Federal Manager, listening intently as Bill Colborne, VK3BFN, details the results of his submissions regarding Customs Import Duties. (See page 16 of this issue). The listeners, from left to right, are Keith Roget VK3YQ, Peter Dodd, VK3CIF, David Wardlaw, VK3ADW, and Jack Martin, VK3TY.

modifications to the R390A/URR ... PART ONE

JOHN WEIR *VK3ZRV

Even such an impressive receiver as the R390A/URR leaves scope for improvements when some of the more stringent amateur needs are considered. Many of the improvements possible are to be found in this account of VK3ZRV's experience with these receivers.

Numerous ideas and suggestions prompted this article, and while it may have only passing interest to a lot of readers, a few may possess one of these receivers. It may provide food for thought when trying a few things on the station receiver. The ideas were as follows:

1. Is it possible to obtain better reception of SSB than could be obtained in the unmodified condition?
2. As there is a fair amount of AM, and FM on the bands (especially in the VHF region) as well as SSB, would it be possible to modify the receiver simply to enable it to demodulate all these modes?
3. Is the noise limiter effective on SSB or would the fitting of a noise blanker type of circuit be more effective?
4. Is the AGC in its present form effective enough for SSB?
5. Finally, there are some hints and manufacturer's modifications included which may be of value to some owners.

Looking at the receiver as a whole there are basically three models which are obtainable locally. They are R390/URR, R390A/URR, R391/URR, and closely akin to these is the R392/URR which I believe is rather a rare one (or two). The main difference between the models is in the IF region (both fixed and variable). The R390/URR and the R391/URR are identical circuit-wise and differ only in that the R391/URR has an added facility for autotune to some 8 preset channels. Both models have six stage 455 KHz IF's and the bandwidth is controlled by various degrees of coupling between primary and secondary windings of the IF transformers. Both models can be powered from 117V or 240V AC, 40-60 Hz but BEWARE of the 240V. I will explain more on this later in the article.

The R392/URR is a mobile version of the R390/URR with a few less refinements. It requires 20-28V DC only for both heaters and HT, and as well has only three IF bandwidths controlled by the same method as in the R390/URR. The R390A/URR exhibits its main difference in that its IF bandwidth is controlled by four mechanical filters, and it has NO autotune. The performance of all four models is identical when correctly aligned to makers specifications.

The models all exhibit linear tuning throughout their tuning range (500 KHz-32 MHz). This is accomplished by the movement of powdered iron cores in the RF and variable IF coils at a rate controlled by the mechanical arrangement of gears, shafts, and cams. This mechanical section is the heart of the receiver, and a note of warning here, DO NOT attempt any adjustments on this section unless you are fully conversant with the handbook or are able to follow it step by step, as I know a few people who took the challenge and lost!

I would be glad to try to answer any queries on all models except the R392/URR if a large S.A.E. is sent with your query to my QTH, or if you hear me on the air, as I personally have or have access to, handbooks of the models concerned.

Let's now have a look at what I have done in the way of modifications A quick look at the schematic will show in the IF/detector stages that both the detector and AGC diodes are half sections of double triodes strapped as diodes. (V506B for the detector and V509A for the AGC). If these are replaced by solid state devices it would mean that the equivalent to one valve can be removed. So far so good but before one valve can be removed, a small amount of rewiring has to be done. This I did using a IN60 for the detector and an OA202 for the AGC.

UNDERCHASSIS VIEW OF I.F. SECTION

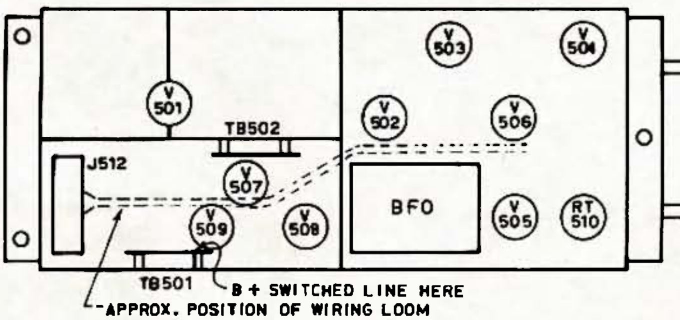


FIG. 1.

Looking at fig. 1 which is an under chassis view of the IF section of the receiver, note where the valves are positioned. V506B and V509A are now spare if you have fitted the diodes as mentioned. V506A is used as the AGC time constant valve and V509B is used as the IF cathode follower. It is now possible to change the function of V506A to the unused section of V509A. Having done this V506 as a whole is now redundant.

All the main wiring for the IF chassis comes from J512 to various parts of the chassis and so the existing wiring can be utilized to rewire V509A for the function of V506A. The wiring from V506A can, once identified, be pulled back through the loom from J512, cut to length and re-terminated on the respective pin numbers of V509A. A point to note here is to change one wire at a time, fitting new components where required or the salvaged ones if they are undamaged. A few standoff type of wiring tie points should be used to support the components (even the IN60 and the OA202). The only component to cause any concern may be R549 (82K), the plate load for the AGC time constant tube, which connects to the switched RF/IF B+ line. This line is available at TB501. It is the terminal closest to you on the right of TB501 when the chassis is viewed as shown in fig. 1. Don't at this time remove any filament wiring from V506.

Before going on with other changes there are a few modifications that may or may not be incorporated in the sets in your possession. I will list them as per their circuit reference number, their function, and their value (old and new).

1. Remove the connection between pin 2 and 7 of V201 (RF amp. 6DC6) and connect pin 7 to ground. This could be left till later as I intend to describe the replacement of V201 with a 6GM6 to lift the sensitivity.
2. C275 (5000 pF) which keeps the 150V Reg at RF ground is changed to 3300 pF (see circuit around 1st Xtal Osc).
3. C612 (68 pF) is added in parallel with R601 on the AF subchassis (grid of 1st AF amp. V601A).
4. C257 (47 pF) is added in parallel with C227 (.04 uF) cathode bypass for V201, 1st RF amp.
5. ADD a series network of C256 (0.1 uF) and R235 (47 ohms) between terminal 1 of HR202 and ground. 6.3V AC is at this point and the network is used to suppress any transients caused by the operation of the thermostat in the XTAL oven.
6. C232-1 and C232-2 (each 2400 pF) located in Z201-1 and Z201-2 respectively, are changed to 1500 pF. These capacitors are used as a divider network to reduce the loading of Z201-1 and Z201-2 by the grid circuit of the 1st mixer V202. Realignment is necessary.
7. Grid suppressor E213 added between pin 9 of S204 front and test point E208, in the grid circuit of V201. The values of the inductor and the resistor (in parallel) are not known as the unit was fitted in my receiver and it is also encapsulated. (Sorry!)
8. R504 (1000 ohms) is changed to 560 ohms. It is the cathode resistor of the first IF amp V501 and raises slightly the gain of this stage to overcome aging of the valves and yet still maintain the overall required gain of the IF strip. (Preset in the alignment procedure by R519 IF gain adjust.)

As mentioned earlier there is a trap about

(continued on facing page).

*55 Shandon St., Mornington, Vic., 3931.

modifications to the R390A/CRR Part One continued

running these receivers on 240V AC although the handbook says you can. The offending item is the mains input filter FL101 or to be more precise the capacitors therein, namely C104/5/6/7. If you look at Fig. 2A you will see that the American system for 240V is a balanced system and hence no problems. With the Australian system the neutral is at earth potential (or very nearly so), as will be seen in Fig. 2B. The capacitors are only rated at 250V working. With the American system the peak voltage across any one of the capacitors is 165V (117V x 1.414), this voltage being within the rating of the capacitors. When however, 240V on the Australian system is used the peak voltage across the two capacitors between the active side of the filter and earth is 340V (240V x 1.414) whilst the peak voltage across the other two capacitors between neutral and earth is zero. Usually something has to give and it is normally the capacitors.

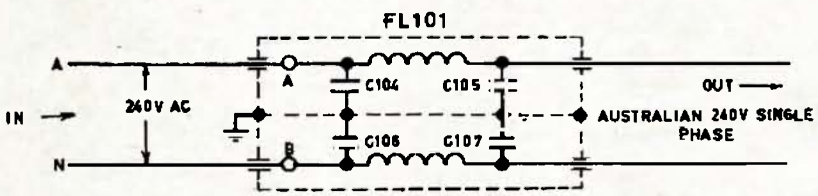


FIG 2b

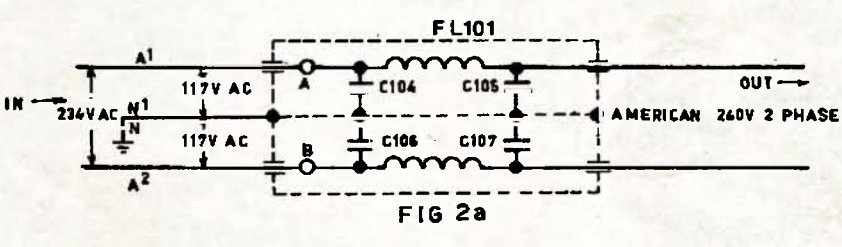


FIG 2a

The filter can be modified or repaired fairly simply by removing it from the receiver (don't forget to switch off the power and pull the plug from the power point before trying this as 240V can bite; I know!) and carefully unsolder the lid from the filter box. Remove wax from the box as well as the offending capacitors and replace them with .01 uF 2000V DC disc ceramics. Check for shorts, etc. with a "MEGGER" or something equivalent, refill with wax, solder on the lid, and refit to the receiver and all the problems should be cured.

One closing thought and that is these modifications and reference numbers are for the R390A/URR ONLY as other models use different valve lineups and circuit reference numbers. Best of luck to those who dare.

A following article will provide details of the modifications for the product/FM detector, together with changes to the AGC system, the RF amplifier and some thoughts on the noise limiter/silencer.

(Part Two of this article should be published in the near future — Ed.)

commercial kinks

with Ron Fisher VK3OM

3 Fairview Ave., Glen Waverley, 3150.

Converting the Yaesu FR 50 receiver to cover 160 metres.

First off, I think it would be an idea to give a description of this set. In fact, I think I might continue with this in future articles. No doubt when sets of this type come on to the secondhand market they are unknown to a lot of amateurs and listeners.

Well anyhow back to the FR50. It first came on to the local market early in 1967 and was often teamed up with a matching transmitter, the FL50. The FL50 was reviewed in the October 1968 issue of AR.

The FR50 is a double conversion receiver with a 5172 KHz first IF to a 455 KHz second IF which used ceramic filters to give a three KHz band pass that was reasonable for both AM and SSB. The selectivity was fixed with no provision for change.

The front end was of the tunable type as distinct from the larger FR100 receiver which was crystal locked. Although the oscillator was transistorised, its stability was not one of the good points of the receiver. To date, I have not heard of any one who has been able to cure this fault. The tube line up was straight forward with a 6BZ6 RF, 12AT7 first mixer, 6CB6 second mixer with a crystal locked transistor oscillator, two 6BA6's as the 455 KHz IF, 6BE6 product detector, 6BA6 BFO, and a 6AW8 for the audio.

The FR50 of course is a ham-band-only receiver, in its original form, covering from 80 to 10 metres with a special band for WWV on 10 MHz. The dial was the same type as used on all the Yaesu gear of that time and featured one KHz calibration. Although the accuracy of this was not comparable with the larger receivers and transceivers. Overall performance was quite fair with the exception of the tunable oscillator stability, and a rather high front end noise level.

The modifications to enable the receiver to cover the 160 metre band were worked out by Bob, VK3BOB. (Wonder how he got that call?) The band switch position labled JJYl the Japanese WWV, is used for 160. Since it is possible to tune VNG on 7.5 MHz at the high end of the 40 metre range, it is easy to get by without WWV.

When the receiver is set up for 10 MHz the oscillator for this band is tuned to 15,172 KHz. In order to cover 160 it is necessary to drop this to 6,972 KHz. All that is needed is a single 330 pf silver mica or NPO ceramic condenser across the JJY oscillator coil in parallel with the existing fixed padder.

The antenna and RF coils are re-tuned in rather a different manner. Here, of course, it is rather a long way to pad the 10 MHz coils down to 160, but not so far for the 80 metre front end coils and this is just what we do. First, on top of the chassis you will see the trimmers for the antenna and RF coils. Yaesu have kindly put in a few spares, three in fact. Wire these in parallel and add a 220 pf NPO condenser also in parallel. Then wire the next section in the same way, disconnect the JJY antenna and RF coils and tape up the connections for future use. Now wire the paralleled trimmers to the JJY position on the band switch and at the same time arrange the 80 metre coils to connect also to the JJY position.

To align the set for 160, set the tuning dial to "0" and adjust the oscillator trimmer to bring in 1800 KHz. Now 1860 will appear at 450 on the dial. To complete alignment, peak the antenna and RF coils with the three parallel trimmers.

As the dial now covers only 60 KHz it will be necessary to make up a graph of the new calibration against the old — or perhaps exact frequency is not so important on this band.

This completes the conversion to 160 metres. I have noticed in some of the English magazines that a new FR50B is available in Europe and that for an extra 5 Pounds the agents will convert them to cover 160. Just how they do it is not stated, I wonder if anyone knows.

That's all for now, but I'll be back next month with more hints and kinks.

AR

[redacted]

44 Rathmullen Rd., Boronia, Vic., 3155

A few problems this month. The promised information from Harry Heathcote's article combined with my own research has temporarily been delayed. Some of my bright ideas for a simple transceiver worked out to be more complex than I had anticipated, and I think many may have run into bother with it. So I decided to scrap it. A lot of research down the drain! But that is what experimentation is about.

Perhaps there is a lesson to be learned from this. This being that not all projects you may want to play around with can be expected to succeed first time. This is more likely to occur with you the newcomer, as naturally enough, you are less experienced than the person who has been working on electronic equipment of various kinds for many years either as a hobby, or as a profession.

It is unwise to tackle a very complex piece of equipment as one of your first projects. You may get it going but more than likely you will not succeed. If you are designing something you should aim for a much simpler item than copying someone else's design. Until you gain experience resist the urge to "improve" someone else's design. It is not uncommon to hear that someone has copied so and so's design for an XYZ and it doesn't work as it is supposed to. The designer is at fault in the eyes of the builder. On enquiry it is often found that critical parts are substituted, layout is altered, etc. Kitsets with printed board layouts get rid of most of these problems, but even here some constructors have managed to get components hooked up wrongly. Goodness knows how!

I notice in May "Amateur Radio" that there is a possibility of a Novice Licence being introduced. "Newcomers' Notebook" is already aimed at this level; as well as the SWL and more advanced amateur. The Novice Licence would seem to be a logical stepping stone to the higher grades of licence.

Next month I hope to have Harry Heathcote's article as well as amended ideas on simple transmitters. I must include in an early article ideas on how to design and build equipment which will suit your own individual requirements. The drawing board definitely precedes the use of the drill and chassis punch.

Postmaster-General's Department

Australian Post Office

COMMUNICATIONS HOUSE 199 WILLIAM STREET MELBOURNE VICTORIA 3000

TELEGRAMS POSTAL MELBOURNE • TELEX 30146 • TELEPHONE 63 0331 (AREA COD

Reference: 320/5/87

24 MAY 1973

Dear Sir,

Thank you for your letter of 30th April, 1971, concerning the proposal to introduce "Novice" licences in Australia.

Careful consideration has been given to the suggestions put forward by your Federal Convention and I am pleased to advise that the Department will agree to those outlined in (b), (c) and (d). The inclusion of an additional frequency allocation in the 28.100-28.300 kHz section of the 10 metre band, requested in (a), will not be authorised as it is considered that the bands already suggested for "Novice" licensees are sufficient for the purpose at this stage.

Use of the letter "N" after the state identification numeral in the callsign, to identify transmissions by "Novice" licensees, appears to be practicable and will be adopted. Where a "Limited" licensee is granted a "Novice" licence also, in accordance with your suggestion "C", it is proposed that two licences will be issued with a separate fee for each. One callsign will be allocated using the "Z" identification for the "Limited" licence and "N" for the "Novice" licence. The licensee would of course, be required to use the appropriate callsign when operating in bands exclusively authorised by a particular licence.

As indicated in our letter of 25th March, 1973, it will be necessary to amend the Wireless Telegraphy Regulations before "Novice" licences may be introduced and the necessary Ministerial approval will now be sought for such action to be taken.

Controller,
Regulatory and Licensing Section,
Radio Branch.

Mr. D.A. Wardlaw,
President,
Wireless Institute of Australia,
P.O. Box 150,
TOORAK. VIC., 3142.

Further interesting correspondence regarding Novice Licensing.

PROJECT AUSTRALIS

OSCAR 6

Peter Frith, VK7PF, has logged 94 stations working through the satellite to date. These are — VK1's DA, MP, VP; VK2's AF, AM, BX, JR, NN, RX, ASI, ZQJ, ZRH, ZWL; VK3's OG, ACA, ALZ, AMH, AOT, ASQ, ASV, ATN, AUU, YFL, ZDH, ZUR; VK4's LC, NO, NP, QD, ZQ, ZEL; VK5's DK, MC, NY, RO, SU, WB, ZK, ZDR, ZHJ, ZTN; VK6's BO, DR, GL, HK, WA, ZCX; VK7's IR, JV, KK, LZ, MR, PF, WH, ZAZ, ZGJ; VK9's BP, GN; ZL1's WB, AOF, AVZ, TAA, TNS; ZL2's CD, GL, HP, AJU, AJZ, ARW, BJO, TCU, TDC, TFJ, THZ, TKC, TKP, TOJ; ZL3's OI, NH, QL, THC, THQ, THV; ZL4's DS, HS, JW, LV, NH, OX, PJ, TBB, TCP. Also DU1POL and KX6HK.

an a.r. special

customs import duties on transceivers

The Wireless Institute of Australia, properly recognising the legitimate claims of domestic manufacturers to reasonable Tariff protection, has pressed for many years that specialised amateur radio equipment should be recognised as articles suitable for importation duty free or at low rates of duty if nothing suitable or equivalent is produced in Australia.

These efforts are now receiving recognition although as might be expected, success carries certain limitations. Work has not stopped in this field but is being continued with the objective of attempting to secure results of a more permanent nature and hopefully on a wider range of apparatus with less restrictive qualifications.

In a letter dated 15th May to the Institute from the Department of Customs and Excise the following two paragraphs are significant:

"Extensive enquiries have now been conducted in this matter and it has been decided that by-law admission of certain tranceivers specially designed for use by licensed amateur radio operators would not be detrimental to local industry.

Accordingly applications for by-law admission of transceivers accompanied by details of the equipment and supported by evidence that the user is a licensed amateur radio operator will receive consideration in the light of availability of suitably equivalent goods of Australian manufacture."

Several important aspects of this should be noted. Firstly it covers only transceivers and there is good reason to believe that such transceivers must be amateur band transceivers in the range from 160 metres to 10 metres covering one or more of such bands. Transceivers which also cover or are designed to cover, other parts of the spectrum may be refused the by-law admission. Presumably some additional evidence can be demanded by Customs for any transceiver which is not described as amateur transceivers although it might be designed for use solely on one of the bands allocated to the amateur service. It is not known at this stage whether or not certain transceivers or certain kinds of transceiver will be excluded from this by-law admission but indications are that transceivers in the higher price bracket might be affected.

Secondly, although the wording is such that there is no requirement that a licensed amateur must himself import the article there is hope that he can obtain his transceiver through the trade (importer/agent/retailer) in the normal way but he must co-operate fully with the trader by producing a photo-copy of his licence with a certificate that the transceiver is for his own use. If the amateur does not fully co-operate with the trader there seems little hope of him obtaining his transceiver duty free. It is reasonable to assume that any extra work which a trader has to do to obtain duty free admission of a particular transceiver for a particular amateur must normally involve extra expense which will assuredly be added to the final price.

Thirdly, it is reasonable to assert that nobody should order or attempt to import a transceiver in the expectation of obtaining by-law admission until actually receiving the prior approval in writing from the proper authority. Such approval does not constitute an obligation to import — it merely confers a right on the importer. It should be noted that applications for this by-law admission must be sent to the proper authority on the proper form fully completed in detail and supported by illustrated descriptive matter. The form states that where the duty remission is less than $100 the application will not be processed. Because amateurs who might wish to import more than one transceiver could be claimed as traders as opposed to users' caution must obviously be exercised in this respect in the same way as applying more than once within a long period of time without good reasons. There are no grounds for believing that importation of a transceiver as accompanied or unaccompanied baggage would be excluded from the concession but it would obviously be prudent to state this fact on the By-Law application form.

It is known that the import duty exceeds $100 each on most of the more popular new transceivers for HF band DXing purposes. On a used transceiver however, the duty could be less than $100 and in this event an anomalous situation could arise which, in the case of an importation in household and personal effects, should have been resolved in advance at the by-law application stage anyway.

Fourthly, because of all the factors involved, a long delay must be anticipated in attending to all the details. Naturally it is not known if any trade importer will find it worth his while to bring in stock of acceptable transceivers to be held in bonded warehouse so as to reduce the inevitable delivery delays when amateurs succeed in obtaining by-law approvals. Any amateur having full information available to him and having the means to import a transceiver will have to weigh the cost and other advantages and disadvantages of the various methods available to him. However, anyone who has no knowledge of importing goods would be unwise to embark on this activity and should therefore order through the trade, preferably through one of the reliable dealers regularly advertising in A.R.

Fifthly sales tax is paid on the duty-paid price of transceivers. Consequently the amount of this tax will be less on a duty-free transceiver.

Perhaps a word of warning is worth inserting at this point. It could take some time before this by-law concession could lead to reduced prices "in the shops". Traders hold stocks at present of duty-paid transceivers and they do not know precisely how these concessions can be converted into practical use for the future let alone relative to the turn-over of their existing holdings. It might well be considered impracticable by Customs to specify by-law approval for a transceiver with a particular individual serial number. Hence the delivery to an importer of a duty-paid transceiver at a duty-free price against the assurance of a future importation of a duty-free replacement is a matter which the trade will have to probe and consider. All these factors are the inevitable outcome of a duty concession based on end-user criteria.

The W.I.A. is aware of these, and other disiderata and believes that positive import-free identification of an article in its own right is preferable to the end-usage concept. The reader can readily appreciate this if, instead of particular kinds of transceivers, the whole question revolved around, say, cricket bats or washing machines. We are grateful for this concession but are aware of the problems.

If any member of the Institute would like to have further details please write, enclosing a stamped self-addressed envelope to the Executive office but please be tolerant of a much delayed reply because this office is still severely overloaded, with other work. Any amateur obtaining or being refused a by-law remission on an amateur transceiver is requested to send in details (make, model, number, etc.) to the Executive office so as to compile a central record. Finally, for the benefit of visitors to Australia, it could be useful to obtain a by-law concession in advance on any transceiver you might want to import temporarily as this obviates the necessity of (a) claiming other import concessions and (b) restrictions as to disposal in the country if you later decide not to re-export it.

(An article listing duty free concessions under by-law for other of the more important items of amateur equipment is under preparation for a future issue of A.R. — Ed.)

awards column

With Geoff Wilson, VK3AMK

DANNEVIRKE CENTENNIAL AWARD (NEW ZEALAND)

Made available by the Dannevirke Branch (Number 06) of N.Z.A.R.T. for amateur radio station operation to stimulate contacts with Dannevirke Branch Stations; to celebrate 100 years establishment as a Country Town and District.

1. Australian and DX to contact two Dannevirke Branch members stations.
2. New Zealand; 5 stations
3. All contacts between 1st October, 1972 and 1st October, 1973.
4. Any bands or modes or mixed bands or mixed modes.
5. Send list of stations worked giving Date, Time, Band and Mode certified by two other amateur stations.
6. Australian and DX charge three IRC's.
7. New Zealand 40 cents.
8. QSL cards not needed for Award.
9. To: Award Custodian,
   Mr. C. B. Howard, ZL2AHY,
   19 Queen Street,
   Dannevirke,
   NEW ZEALAND

The following Dannevirke Branch members are active: ZLs 2CF, 2HE, 2JB, 2WM, 2AAS, 2ABT, 2ADF, 2AGM (Branch Station), 2AHY, 2AOW, 2AQM and 2AYD.

Dannevirke is a small country town (population 5,000) of dairying, sheep and beef, settled in 1872/73 by Scandinavian settlers. The town is located 100 miles north-east of Wellington.

W.I.A. V.H.F.C.C. AWARD

	Cert. No.	Call	Confirmations 52 MHz	144 MHz
New Member:	89	VK3YBM	—	100
Amendments:	46	VK3ZNJ	300	—
	47	VK3ZNJ	—	312
	80	VK4ZIM	797	—

W.I.A. 52 MHz W.A.S. AWARD

Cert. No.	Call	Additional Countries
91	VK3KK	3

W.I.A. D.X.C.C.

In the May listing VK3YD was shown incorrectly as VK3YK.

As from 30th June 1973, I will no longer be Federal Awards Manager and would request that no further applications, enquiries etc. be directed to me.

THE NEW FEDERAL AWARDS MANAGER IS:
MR. BRIAN AUSTIN, VK5CA
P.O. BOX 7A
CRAFERS, S.A. 5152

ALL CORRESPONDENCE CONCERNING AWARDS SHOULD HENCEFORWARD BE SENT DIRECT TO VK5CA.

VHF UHF

an expanding world

With Eric Jamieson, VK5LP

Forreston, S.A., 5233.

Closing date for copy: 30th of month.
Times: E.A.S.T.

AMATEUR BAND BEACONS

VK0	52.160	VK0WI Macquarie Island
	53.100	VK0MA Mawson
VK2	52.450	VK2WI Dural
VK3	144.700	VK3RTG Vermont
VK4	52.600	VK4WI/2 Townsville
	144.400	VK4WI/1 Mt. Mowbullan
VK5	53.000	VK5VF Mt. Lofty
	144.800	VK5VF Mt. Lofty
VK6	52.006	VK6VF (VK6RTV) Bickley
	52.900	VK6TS (VK6RTT) Carnarvon
	144.500	VK6RTW Albany
	145.000	VK6VF (VK6RTV) Bickley
VK7	144.900	VK7VF (VK7RTX) Devonport
VK8	52.200	VK8VF Darwin

GEELONG

The Geelong Amateur Radio and TV Club Newsletter comes to hand on time again and continues with further information about SSB on 2 metres by Mike, VK3ASQ. There is also an interesting article on the subject of Tariff Board protection for colour TV manufacturers — quite interesting indeed! Also from its pages comes advice of a record-breaking 2 metre contact ... I quote "A good start to the 'Return to Two' campaign was made by Ken, VK3ZNJ, with a record contact from Geelong to Wentworth Falls in the Blue Mountains of N.S.W. approximately 60 miles west of Sydney. This is a record for a tropospheric contact on a north-south path on 2 metres from Victoria. Contact was made on Friday 11th May at 2205 on 144.050 and was held for five minutes with signals 5 x 9 both ways. Station worked was Tom VK2NN ... Ken running 1/5 watts PEP to 7 element beam, Tom using 350 watts PEP and 10 element yagi." Quite a good effort boys, shows what can be done if you are on the band when conditions are right ... next step to Brisbane?

Before leaving the Geelong boys, I am sure readers will join with me in wishing their Club successful celebrations for their 25th anniversary of operation to be held shortly. The first meeting was held on 7th June, 1948. First President Mr. A. Bell, VK3ABE, first Secretary Mr. R. Wookey, VK3IC.

FEDERAL CONVENTION

This page does not comment very often on such occasions as results, etc. are generally fully tabulated in other ways. Certainly I don't propose entering the "Repeater Arguments" which have been given prime reading space in most publications, suffice to say however, that the proposed "1973 2 metre Bandplan" was not the most popularly received item from the Convention.

The Novice Licencing structure was passed with a request for a 100 KHz segment of 28 MHz as well. Already I know of several boys still going to High School who have shown an interest in such a licence. It is hoped if such a licence is implemented it will see a re-kindling of interest in amateur radio.

An item which of course was of immense interest to me, and to many others too I guess, was that in relation to the proposal to allow use of a segment of 50 MHz outside of Channel 0 hours and service areas. It has been one of the main frustrations in Australia that our band is removed by 2 MHz from the centre of main activity of overseas in the 6 metre band. No one could deny that probably many useful contacts could have been made in the past had stations in both areas been on the same portion of the band.

Contacts with KR6 and W come to mind as increased possibilities, and across the Indian Ocean to Africa and VS6. WB6KAP runs annual TEP observations and these might be assisted considerably if our area could have access to some of his frequencies. Successful moonbounce has been achieved in the US using 50 MHz — what chance have we for any participation under present conditions?

With the present state of the art producing first rate equipment with extremely good stability (e.g. moonbounce and meteor scatter operation on precisely known frequencies), with the greater use of commercial SSB equipment as the frequency determining side of things, a widening of the scope of activities would seem merited. Any thoughts?

432 MHz

Whilst news of overall activity on this band is scarce except for continuing high level of activity in VK5 with ATV three Adelaide stations are conducting experiments with colour TV, namely, Maitland VK5AO, Graham VK5ZOF and Ray VK5ZEF; some of it I have seen and it looks good. In the field of black and white, additional stations operating are Pat VK5ZFX and Bill VK5HD.

On the construction side, the May issue of "6 UP" has a very fine article by Roger VK2ZRH on a 70 cm SSB transmitter, with excellent detailed circuits of the various sections, ending with a pair of 4CX250B for the PA. Useful information is given, plus a very generous page on the tuning and alignment procedure. All in all an outstanding contribution for the currant state of the art for that band.

144 MHz

The very large stable high pressure system over southern Australia during the middle of May extended the range of two metre contacts quite considerably, on this occasion the FM networks were well to the fore.

For those interested in looking further afield, I have been advised that a number of stations in VK1 and south-eastern N.S.W. will be looking for contacts. There are VK3ANP and VK3AJN at Wangaratta, VK1MP and VK1JL in Canberra. The latter runs low power but has a good location, which is more important. In N.S.W. we have VK2ZBP near Junee. VK2SW at Wagga, and of course VK2ZEI at Deniliquin. Further north there are VK2ZAY at Boggabri and VK2ZCV at Tamworth. Most operate on SSB so it need only be a matter of time for the right conditions to open the way to some of these stations.

SOME THOUGHTS ON CONVERTERS

With the present "Return to Two" campaign getting under way, I feel the following article in the May issue of the W.A. VHF Group News Bulletin quite relevant, and may help some of our less experienced amateurs to start on or continue with VHF. The article has the above heading and is by VK6ZCX.

"Thinking of building a MOSFET converter? Unless you are planning some moonbounce work, you may be disappointed with the results. What about your old valve converter? Can it be updated to serve until you get around to the MOSFETS? Let's see.

"Perhaps it never worked very well.

"If you can see the lead on any screen or cathode bypass capacitor, it is too long and the gain and stability of the converter would improve markedly if you bypassed it properly. And don't bypass the end of the socket pin. Solder right up near the socket.

"In a critical position (cathode of RF stage) two bypass capacitors in parallel may be needed. Two 100 pF's can be much better than a single .001 uF at 144 MHz.

"If something is supposed to be earthed. EARTH IT, solid. THE PINS OF A 9 PIN SOCKET WILL REACH THE RING AROUND THE SOCKET IF FORCED WITH A SCREWDRIVER. Don't use the central spigot for anything. Earth it, but don't bypass anything to it. Using this as a standoff insulator is just inviting instability.

"If your layout is such that you have to use a connecting wire in the signal path (i.e. near any tuned circuit) use shim brass, cut into ¼" strips. 1" of tinned copper wire is ludicrous at 144 MHz and poor at 52 MHz unless it is intended to be part of a tuned circuit.

Speaking of tuned circuits, if you are using more than 14 pF at 52 MHz then you need a bigger coil, if you want efficient operation. Just resonating a tuned circuit does not make it efficient.

'Incidentally, do your tuned circuits actually go through resonance, or just approach it at one end of the capacitor's range? That extra few pF should make a difference if your tuned circuit is working OK.

"If you want to couple two tuned circuits together, couple the coils end to end, not side by side. All that flux comes out the end of the coil, only part of it goes along the sides

"Have you got enough injection? To check, measure the mixer plate current. Application of injection should cause a reduction of about 10% in the plate current. All the above comments were just as true 15 years ago as they are now. They are things that make the difference between good converters and unstable, gainless wonders.

"Overtone oscillators using VHF crystals will improve most birdie problems. If you have less rubbish you have less birdies obviously. But don't just use a "Robert Dollar" with 90% feedback. These rocks don't need to be thrashed into overtone. They like overtoning. If you thrash them they get hot and drift. So easy does it.

"A bugbear of most converters is output coupling. Cathode followers used to be about the best compromise between a simple resistive load on the mixer (yuk!) and a tuned transformer with its narrow bandwidth.

'Now we have ferrite baluns. Wind 20 turns of 26 SWG enamel wire on one of the figure 8 type TV baluns (winding in one hole and out the other) and then 2 turns of insulated hookup wire on top of the 1st winding.

'Use the 20 turns as a plate load and take the output (50-75) from the secondary. It is broadbanded and presents a reasonable load to the mixer. Just one more thing, a 10 pF capacitor from plate to earth, just to stop the mixer taking off.

"Tube types don't actually have much obvious effect as long as they are capable of operating at the frequency in use. Probably more important is the convenience of the pin layout for the circuit we are trying to use.

"In general, pentodes should not be used at 144 MHz as signal amplifiers, although they make good frequency multipliers. If the RF stage has worthwhile gain, a pentode can be used as a mixer, if absolutely necessary.

"If your convertor uses a free-running oscillator or octal valves, perhaps a decent burial would be in order. Otherwise, why not drag out that old converter and see if it can be given a new lease of life?"

And a comment or two from me to add to the above. The basic R.T.V. and H. 52 and 144 MHz converters using a 6ES8, 6BL8 abd 6U8 which were featured back around 1963 are still a good start for anyone going along with valves. Many were built and are still operating. Sure, there are some better ones, but you will hear plenty with those mentioned. High gain is not particularly necessary, and a darn nuisance if you are subject to cross-modulation from nearby stations, particularly on 52 MHz. Bob VK5ZDX, has done very well over the years using a single 12AT7 for the front end of his 6 metre converter, half the 12AT7 as the RF amp, and the other half as the mixer. Bob lives in an area of very high activity, and he has worked plenty of DX.

Additionally, what helps to make the DX audible is to have a quiet location. These are few and far between today, but quite an improvement can be made by narrowing down the bandwidth of the tunable IF receiver. If you are able to feed your converter into an SSB receiver or transceiver, and resolve all stations as sideband signals (true SSB stations are now common on VHF, and AM stations which are stable enough can be copied quite well by listening to one sideband only) you will be quite surprised at the results.

That about wraps it up for this time. Activity from the point of national interest is not bright at the moment, the winter doldrums having set in. However, this is the time to overhaul the gear but keeping an ear on the bands whilst doing such work in the shack.

Closing with the thought for the month: "You must change with the times unless you are big enough to change the times."

— The Voice in the Hills

[redacted]

(We regret that again this month, no copy has been received from Don Grantley. However, the following notes were compiled from information that filtered into the Federal Office — Ed.)

Willis Island

A recent caller at the Executive office was Kevin Collins, VK4TU. Kevin advises he is moving QTH to Willis Island late in June for five months and hopes to begin operating as VK9ZC about 1st July. On the way over to Willis he intends to operate Maritime Mobile about 23rd to 25th June.

Amateur Radio at the American National Scout Jamboree

Amateur radio will be demonstrated in early August to more than 100,000 participants and visitors at the National Scout Jamboree, sponsored by the Boy Scouts of America. Special amateur radio stations will be in operation at each of the two Jamboree sites: Farragut State Park, Idaho, and Moraine State Park, Pennsylvania. The purpose of these stations is to promote amateur radio among youth, to interest scouts in earning the radio merit badge, to handle messages between the scouts and their homes in co-operation with area radio amateurs and nets, and to provide contact with the Jamboree for those not able to attend. Communication will also be provided between the two widely-separated Jamboree sites.

Three separate operating positions are expected to be manned almost continuously, using the special events call signs KJ7BSA July 28 — August 9 from Idaho, and KJ3BSA July 30 — August 11 from Pennsylvania. QSL requests accompanied by a stamped, addressed envelope may be directed to 225 Main Street, Newington, CT 06111. All other contacts will be confirmed via the bureau. Suggested frequencies for finding KJ3BSA and KJ7BSA are 5 KHz above the lower limit of the General and Novice subbands: for example, 3530, 3705, and 3895 KHz on 80 meters.

Scandinavia

NRRL (Norsk Radio Relae Liga) in Oslo advises that the Norwegian Telecommunication Authorities have granted all types of conventional emissions (except A2) to Norwegian amateurs, including RTTY, SSTV, VHF-TV repeaters, 600W P.E.P. input any mode. In addition they have been granted for Norwegian citizens over the age of 14 years a new Novice Licence valid two years, 15W input, CW only, any band, with the prefix LB. The other Norwegian prefixes are LA and LG, plus JW for Svalbard with Bear Island, JX for Jan Mayen and 3Y for Bouvet Island and Norwegian area in Antartica. In 1973 Norwegian amateurs will be managing the 15th Scandinavian Activity Contest 15th and 16th September for CW and 22nd and 23rd September 1973 for phone.

The same source included in their envelope a note by ARIM about the call signs LG5GL and SK9WL allocated to the independent territory of Morokullen situated between Norway and Sweden and established, ARIM states, by agreement between the Governments of the two countries in conjunction with the International Refugee Year of 1959. The two stations were set up on 30.6.1966, as Memorial Funds to provide for education and amateur radio equipment for blind and physically handicapped radio amateurs. QSL cards, it is stated, should be sent with 3 IRC's (four if direct return QSL is required) to P.O. Box 1, N2242/S 67044, Morokullen, Scandinavia. If you want to become a "Citizen of Permanent Standing" of Morokullen send the equivalent of U.S.$4 which entitles you to a letter of Citizenship.

Random Jottings

L.A.B.R.E. (Liga de Amadores Brasileiros de Radio Emissao) advises that their QSL Bureau from January 1973 onwards is P.O. Box 070004-70000 Brasilia-DF-Brasil and that the prefix PT is used for the city of Brasilia. Is any VK amateur likely to be in Greece about mid-November 1973? The National Amateur Radio Union of Greece advises they are considering a First International Congress of Radio Amateurs in Athens at that time. The International Amateur Radio Club of Geneva (4U1ITU) gives publicity to recommending the period July 26 to August 14, 1972, being a Retrospective World Interval in view of the exceptional solar and geophysical events which occurred therein. The I.A.R.C. also advised that further contributions of logs under the CPR-Special Award relating to observations during that period of time will continue to be received.

Awards

In one week's mail one member requests A.R. to publish a reference list of awards and where to apply whilst another asks "Do you chase Awards?" — Got quite a collection — or just starting? No matter. Join A.H.C. and receive all the latest info on awards, certificates, trophies, etc. Life membership is $1 and includes a certificate plus bulletin sheets approximately four times a year. For further particulars write to A. Shawsmith, VK4SS, (QTHR, enclosing S.A.S.E.) the Oceania Sec., Award Hunters Club International.

contests

With Peter Brown, VK4PJ

Federal Contests Manager, G.P.O. Box 638, Brisbane, Qld., 4001.

remembrance day contest, 1972

"the friendly contest" August 18th and 19th

at least 700 log entries required

(The Friendly Contest) notes for 1973.

We have gone back to the scoring table of 1971 because comment generally favoured that table.

Also please note that "one operator — one log" does not hold any longer. In future an operator may, in addition to his own log, submit a club and/or divisional station log. More than one log under any one call sign is not acceptable.

FOR 1973 R D.

Make sure that everyone you contact enjoys the Contest and there will be no doubt that you will enjoy it.

Make sure that we achieve at least 700 log entries by talking about the contest with all your friends, on and off the air.

Make sure that your Division puts up a good show.

Help the ZLs with their MEMORIAL CONTEST .80 meters. 7th and 8th July.

RULES FOR THE 1973 REMEMBRANCE DAY CONTEST.

A perpetual trophy is awarded annually for competition between Divisions of the Wireless Institute of Australia. It is inscribed with the names of those who made the supreme sacrifice and so perpetuates their memory throughout Amateur Radio in Australia.

The name of the winning Division each year is also inscribed on the trophy and, in addition, the winning Division will receive a suitably inscribed certificate.

Objects: Amateurs in each VK call area, including Australian Mandated territories and Australian Antartica, will endeavour to contact Amateurs in other VK and ZL call areas on all bands.

Amateurs may endeavour to contact any other amateurs on the authorised bands above 53 MHz, (i.e. intrastate contacts will be permitted in the VHF/UHF bands for scoring purposes).

Contest Date: 0800 hours GMT on Saturday 18th August, 1973, to 0759 hours GMT on Sunday 19th August, 1973.

All amateur stations are requested to observe 15 minutes silence before the commencement of the contest on the Saturday afternoon. An appropriate broadcast will be relayed from all Divisional stations during this period.

Rules:

1. There shall be four sections to the contest—
   (a) Transmitting, phone.
   (b) Transmitting, CW.
   (c) Transmitting, open.
   (d) Receiving, open.
2. All Australian Amateurs may enter the contest whether their stations are fixed, portable or mobile. Members and non-members are eligible for awards.
3. All authorised Amateur bands may be used and CROSS-MODE OPERATION IS PERMITTED. Cross-band operation is not permitted.
4. Amateurs may operate on both "phone and CW during the contest", i.e. 'phone/'phone, CW/CW, or 'phone/CW. However, only one entry may be submitted for sections (a) to (c) in Rule 1.

   An open log will be one in which points are claimed for both 'phone and CW transmissions. Refer to rule 11 concerning log entries.
5. For scoring only one contact per band per station is allowed. However, a second contact on the same band using an alternate mode is permitted. Arranged schedules for contacts on the other bands are prohibited.

   On bands 52 MHz and above, additional contacts may be made with the same station provided that two hours elapse after the previous contact with that station on that band.
6. Multi-operator stations are not permitted. Although log keepers are permitted, only the licensed operator is allowed to make contact under his own call sign. Should two or more wish to operate any particular station each will be considered a contestant and must submit a log under his own call sign. Such contestants shall be referred to as "substitute operators" for the purpose of these rules and their operating procedures must be as follows:

   Phone. Substitute operators will call "CQ RD, or CQ Remembrance Day" followed by the call of the station they are operating, then the word "log" followed by their own call sign, e.g. "CQ RD from VK4BBB log VK4BAA".

   CW. Substitute operators will call "CQ RD de followed by the group call sign comprising the call of the station they are operating, an oblique stroke and their own call", e.g. "CQ RD de VK4BBB/VK4BAA".

   Contestants receiving signals from a substitute operator will qualify for points by recording the call sign of the substitute operator only.
7. Entrants must operate within the terms of their licence.
8. CYPHERS. Before points may be claimed for a contact, serial numbers must be exchanged and acknowledged. The serial number of 5 or 6 figures will be made up of the RS (telephony) or RST (CW) reports plus 3 figures that will increase in value by one for each successive contact. If any contestant reaches 999 he will start again with 001.
9. ENTRIES must be set out as shown in the example, using one side of the paper only and standard W.I.A. log sheets if possible. Entries must be clearly marked "Remembrance Day Contest 1973" on the envelope and must reach the Federal Contest Manager, W.I.A., Box 638, GPO, Brisbane, in time for opening on Wednesday, 20th September, 1973. Early entries will be appreciated.
10. Scoring will be based on the table shown.

    Portable operation: Log scores of operators working outside their own call area will be credited to that call area in which operation takes place, e.g. VK5ZP/2. His score counts toward VK2 total points score.
11. All logs shall be set out as in the example shown and in addition will carry a front sheet showing the following information:

    Name ....
    Address ....
    Section ....
    Callsign ....
    Claimed score ....
    Number of contacts ....

    Declaration: I hereby certify that I have operated in accordance with the rules and spirit of the contest.

    Signed ....
    Date ....

    All contacts made during the contest must be shown in the log submitted — see Rule 4. If an invalid contact is made it must be shown but no score claimed.

    Entrants in the "Open" sections must show CW and phone contacts in numerical sequence.
12. The Federal Contest Manager has the right to disqualify any entrant who, during the contest, has not observed the regulations or has consistently departed from the accepted code of operating ethics. The Federal Contest Manager also has the right to disallow any illegible, incomplete, or incorrectly set out logs.
13. The ruling of the Federal Contest Manager of the W.I.A. is final and no disputes will be entered into.

Awards:

Certificates will be awarded to the top scoring stations in Sections (a) to (c) of rule 1 above, in each call area, and will include top scorer in each Section of each call area operating exclusively on 52 MHz and above. VK1, VK8, VK9, VK0, ZL1, ZL2, ZL3, ZL4 and ZL5 will count as separate areas for awards. There will not be an outright winner. Further certificates may be issued at the discretion of the Federal Contest Manager.

The Division to which the Remembrance Day Trophy will be awarded shall be determined in the following way—

Average of top six logs +

$\dfrac{\text{Logs entered.}}{\text{State Licensees}} \times$ Total points from all entrants in Sect. (a,b,c).

VK1 scores will be included with VK2, VK8 with VK5, and VK0 with VK7. Also VK9 logs and score will be added to the Division which is geographically closest. ZL scores will not be included in the score of any W.I.A. Division.

Acceptable logs for all sections shall show at least five valid contacts. The trophy shall be forwarded to the winning Division in its container and will be held by that Division for the specified period.

Receiving Section: (Section d)

1. This section is open to all short wave listeners in Australia and New Zealand, but no active transmitting station may enter.
2. Contest times and loggings of stations on each band are as for transmitting.
3. All logs shall be as set out in the example. The scoring table to be used is the same as that used for transmitting entrants and points must be claimed on the basis of the State in which the receiving station is located. A sample is given to clarify the position.

   It is not sufficient to log a station calling "CQ" — the number he passes in a contact must be logged.

   It is not permissible to log a station in the same call area as the receiving station on the MF and HF bands, (1.8-30 MHz), but on bands 52 MHz and above, such stations may be logged more than once per band, for one point on each occasion. See example given.
4. A station heard may be logged once on phone and once on CW for each band.
5. Club receiving stations may enter for the Receiving Section of the contest but will not be eligible for the single-operator award.

   However, if sufficient entries are received, a special award may be given to the top receiving station in Australia. All operators must sign the declaration.

Awards:

Certificates will be awarded to the highest scorers in each call area. Further certificates may be awarded at the discretion of the Federal Contest Manager.

SCORING TABLE

To

From	VK0	VK1	VK2	VK3	VK4	VK5	VK6	VK7	VK8	VK9	ZL1	ZL2	ZL3	ZL4	ZL5
VK0	-	6	8	6	6	8	6	8	6	6	2	2	3	4	1
VK1	6	-	1	1	2	3	5	4	6	5	1	2	3	4	6
VK2	6	3	-	1	2	3	5	4	6	5	1	2	3	4	6
VK3	6	4	1	-	2	1	4	3	6	5	2	2	3	4	6
VK4	6	3	1	2	-	3	6	5	4	3	3	3	3	4	6
VK5	6	5	2	1	3	-	4	3	3	6	4	4	4	5	6
VK6	6	6	2	1	4	2	-	3	5	6	4	4	5	6	6
VK7	6	5	1	1	3	2	5	-	5	6	2	2	3	4	6
VK8	6	5	1	1	2	3	8	4	-	3	4	4	8	6	6
VK9	6	5	1	2	3	4	5	6	1	-	5	5	8	6	6
ZL1	6	1	1	1	2	2	5	3	5	6					
ZL2	6	1	1	1	2	2	5	3	5	6					
ZL3	6	3	3	3	4	4	6	4	6	6					
ZL4	6	4	4	4	5	5	6	5	6	6					
ZL5	1	6	6	6	6	6	6	6	6	6					

Read table from left to right for points for the various call areas. In addition, all intrastate contacts on 52 MHz and above are worth 1 point each per band.

EXAMPLE OF TRANSMITTING LOG

Date/time GMT	Band	Emission Power	Call sign Worked	RST Sent	RST Rec'd	Points

EXAMPLE OF RECEIVING LOG. VICTORIAN SHORT WAVE LISTENER.

Date/time GMT	Band	Emission	Call sign heard	RST Sent	RST Rec'd	Station Called	Point Claim
Aug '73							
19/0612	7 MHz	A3	VK5PS	58002	-	VK6RU	1
19/0615	7 MHz	A3	ZL2AZ	59103	-	VK3KI	2
19/0700	52 MHz	A3	VK3ALZ	57012	-	VK3BQ	1
19/0723	52 MHz	A3	VK4ZAZ	56013	-	VK5ZDR	2

an a.r. special

australian amateur radio—and history

A member writing from Brisbane enquires if such a thing exists as a permanent display A.R. Museum and is any detailed documentation being done on past amateur radio VK personalities. So many OT's pass on and nothing or little is recorded about them. Many in their own way or fashion did a lot for amateur radio.

The 1971 Federal Convention held in Brisbane passed a Motion which read — "THAT the Divisions make use of the facilities provided by their various State Authorities for the preservation of historical records and items of equipment of historical value. A catalogue should be retained locally and a copy sent to (Federal) Executive of all such items to enable ready reference to where such items may be found and to form the basis of maintaining a central index." Various Fed. Councillors mentioned State museums and libraries because of the storage, expense and systematic preservation and retrieval problems on a centralised Institute basis.

In his Annual Report tabled at the 1973 Federal Convention the Federal Historian (Mr. G. M. Hull, VK3ZS) wrote "In my report for the year 1972, I suggested that Federal Council give thought to the formation of a proper historical committee composed of at least four persons and that a continuous arrangement of House Advertisements be run in A.R. calling for donations or gifts of old books, magazines and documents which would assist in the compilation of the history of amateur radio." His report also included a suggestion that as A.R. can now reproduce photographs without extra expense the Historical Section might release selected historical photographs with a brief extract from history for publication. "In this way", he wrote, "the Australian amateur will be aware that the Institute is doing something about its history, and those who have contributed records will know that the information hasn't been filed somewhere to gather the dust of time. In addition, such publication of history may attract others to contribute documentary records which may serve to fill the still existing gaps. I can only say that work is proceeding within the limitation of available time for both myself and George Glover, VK3AG".

The Brisbane writer also wrote "I have often thought that a Historian for each State — all being responsible to the Federal Historian — would be a progressive idea.

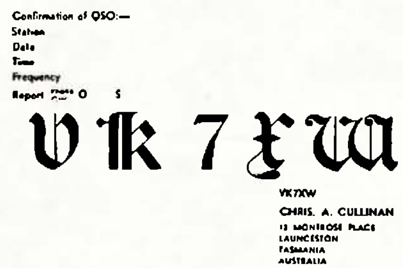
There the matter rests for the time being. Except that no central index has begun and no details are available from Divisions about their own efforts to preserve in good time that which would otherwise be lost to posterity.

On the centre page of May A.R. was a picture of Chris Cullinan, VK3AXU, receiving the 1972 Higginbotham Award. Chris first became interested in Wireless in 1920 and built many crystal sets at his home in Diggers Rest near Melbourne to listen to VIM at the Domain in Melbourne, ships at sea and occasional DX from VIA Adelaide, VIH Hobart and VIS Sydney. He gained the PMG 1st Class Wireless Operators' Certificate endorsed for "spark" signed by J. Malone, Chief Manager, Telegraphs and Wireless and J. W. Brown, Sec., PMG's Department, in 1924, which prior to that time was issued by the Prime Minister's Department. Soon afterwards he was licensed as A3XW which in later years became OA3XW, VK7XW, and now VK3AXU. In 1924 he commenced his writing career and joined the staff of the newly created weekly radio magazine "The Listener In" during 1926.

In the late 1920's "The Listener In" conducted a number of public competitions to determine the most popular Amateur Wireless station. In those far-off days amateurs could transmit music on a non-commercial basis and he was one of a team visiting competitors' stations to measure DC input power. He remembers many of them including the late Howard Love, Holst OA3BY, Bert Maddocks, OA3EF, Max Howden, OA3BQ, Bill Sievers, Bill Sones and many others. He was also one of those who assisted in the arrangements for the fledgling 3LO to re-broadcast the famous American short-wave station KDKA received at the home of Mr. Arthur Goode, Tech. Ed. of the Listener In and relayed by PMG land-line to 3LO.

Chris was one of those present at the W.I.A. Victorian Division's big dinner in 1925 probably at Anzac House, Collins Street. On his move to VK7 he remained relatively inactive in the amateur radio field (except as a 2mx "fox") until 1950. He retired on May 27 this year as Chief Engineer to 3CS and celebrated his 67th birthday the previous day. He has been reluctant to go on the air in Colac fearing TVI as this is an ultra fringe area for Melbourne TV necessitating the extensive use of mast-head amplifiers. Many will welcome his re-appearance on the amateur bands in the future.

AR



Three of the QSL cards issued by Chris Cullinan during his many years as an amateur radio operator.

around the trade

R. H. Cunningham Pty. Ltd. announce a working display and demonstrations during July in Melbourne, Sydney and Canberra of Sennheiser equipment currently available. Personal invitations to attend are obtainable from the Marketing Division of the company. The Sennheiser Company is headed by Professor Fritz Sennheiser — a lecturer for many years at the Hanover Institute of Technology and since the inauguration of the Company 28 years ago very ambitious research, design and planning have been carried out to make Sennheiser products the world's most acceptable radio, audio, film and television application leaders. Much of the equipment to be demonstrated will be products launched for the first time at the Hanover Fair in April 1973. These included five channel wireless microphones, new high-quality stereo headphones, various microphones and speakers.

AR

20 years ago

With Ron Fisher, VK3OM

July 1953.

With so much talk of television during 1953, the July issue of Amateur Radio saw the start of a very popular series, "Amateur Television" by E. Cornelius, VK6EC. The series continued over the next five months with complete details on building a flying spot scanning system. A series well worth consulting even today if you are contemplating a bit of TV construction.

A. E. Williams, VK5BO, described his "Practical Three Element 14mc. Rotary Beam". This was a complete system, antenna, rotator, the lot.

"A Simple Three-Band Two-Stage Transmitter" by L. B. (Jock) Fisher, VK3AFF, showed how a fairly typical transmitter of the day was put together. Jock used a 6N7 as a two stage doubler, driving a single 807 in the final. Other technical articles for July were, "Design Data for use with Band-Switched Exciters" by R. G. Lane, G2BYA, Stabilizing that I.F. Channel by Jack Duncan, VK3VZ, the Technical Editor of "AR" at that time.

With the introduction of the Limited Licence just around the corner, correspondence was really hotting up. Four interesting letters putting the case both for and against were published. "Let Us Not Forget", the editorial page for July 1953, combined the sentiments of the forthcoming Remembrance Day contest with the ideals of the "Amateurs Code".

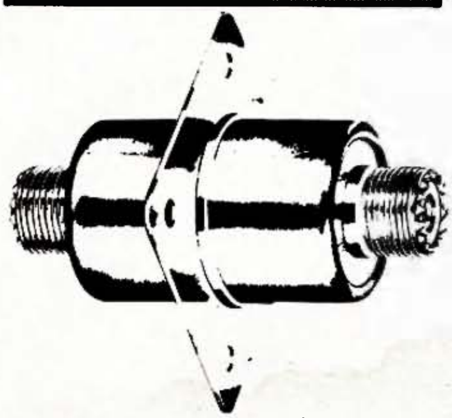
VK7RK reports, in his DX Notes page, that band conditions are very poor. It was about this time that the sun spot cycle was going through its low point.

Federal notes included details of amateurs who received awards from The Queen on the occasion of her Coronation. They were George Glover, VK3AG, Alan Brown, VK3CX, Stan Gadsen, ex VK3SW, J. W. Redrop, VK3BN, and H. Bain, VK3CC.

Another interesting piece of news was that one of the members of the C.A.F. Australian Contingent in London to take part in the coronation was L.A.C. Peter Downie, VK3APD.

AR

new products



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AR

hamads

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Complete File of A.R.'s Jan 1960 to Dec 1972 (or portion of period). R. Cook, P.O. Box 192, Mahland, N.S.W. 2320.

Gill Motor urgently required. Please search dark corners, tell friends. Gray, VK2IJ, 34 Beauty Drive, Whale Beach, 2107. Ph. (02) 919 4417.

Swan 240 Transceiver with Power Pack. Particulars to VK4TI, QTHR.

H.F. Mobile Antenna for 10 to 80 metre operation. Write M. Taylor, 36 Patrick St., Dalby, 4405.

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Ken 2 Metre Tx Rx FT2F. FT101 or FT200, FTV650. Ph. (02) 663 7336 or write VK2ZKA, 151/3 Slattery Pl., Kingsford. 2032.

letters to editor

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

Dear Sir,

I was dissapointed when the form of presentation of Ionospheric Predictions was changed in our magazine. The efforts of those compiling this data in its present form are appreciated but the former presentation was more helpful.

Being a technical magazine, I feel A.R. should be concerned with the causes and reasons for variations in propagation conditions. The charts showing MUF, ALF, etc. encourage comparisons with actual conditions and as well indicate the reasons for limitations. I would suggest that commentary on past disturbances and prediction of likely disturbances would be helpful. The April issue of "Wireless World" (P.173) is an example.

One could take issue with the Editor's note referring to correspondence on this matter in the May issue of A.R. Surely we should make space available for this type of information. Perhaps a limitation to, say, one page for non technical type articles, and editing of reports on various activities, could assist in providing a more informative and educational presentation of ionospheric data.

Yours faithfully, G. E. Wiencke, VK5GN.

(The exclusion of Ionospheric Predictions from this issue is due only to the non-arrival of the July information from the Ionospheric Predictions Service Division — Ed.)

16th jamboree-on-the-air

The 16th Jamboree-on-the-Air will be held over the weekend of 20th-21st October, 1973.

As in the past two years, the starting time will be 00.01 hours LOCAL TIME on Saturday, 20th October, and the event will terminate 46 hours later, i.e. at 23.59 hours on Sunday, 21st October. Please note that these are only suggested times, if it is more convenient for you to operate on the Friday evening then, by all means, do so, for you will be sure to find many other stations doing the same.

The basic rules remain unchanged.

This year's participation certificate has been designed by a Brazilian Scout and bulk supplies are being mailed to the National Organizer, Noel Lynch, VK4ZNI.

Thanks to a grant from the Japanese Expo '70 Foundation, a 16th J.O.T.A. poster has been produced and supplies of these will also be forwarded direct to the National Organizer for distribution.

BRANCH ORGANISERS

National Headquarters, The Scout Association of Australia, has confirmed the appointments of the following Branch Organisers:

Geoff Perkins,
P.O. Box 5395, Boroko, Papua New Guinea.

Branch H.Q. Commissioner Ian Clarke,
C/- Queensland Branch Headquarters,
Box 50, P.O. BROADWAY, Brisbane, Q. 4000

Mr. Ray Lawrence,
Branch Commissioner for Leader Training,
New South Wales Branch Headquarters,
203 Clarence Street, SYDNEY, N.S.W. 2000

Mr. Leslie D. Marmo,
50 Howitt Street,
South Yarra, Melbourne, V.3141.

Mr. Ray Jeffrey,
8 MacRobie Road, SOUTH HOBART, T.7000

Mr. Steven Johnston (VK5ZNJ)
7 Hayles Road,
ELIZABETH PARK, Adelaide, S.A. 5113

Branch H.Q. Commissioner Peter Hughes (VK6HU)
58 Preston Street,
COMO, Perth, W.A. 6152.

V.H.F. PARTICIPATION

"I cannot help but feel that not enough use is made of the services of those groups of very keen members of the W.I.A. known as the V.H.F. Group and I certainly commend their interest in JOTA to you all. Whilst the range of some of the equipment operated by their members may not be as extensive as their counterparts on the H.F. frequencies, their services have been very much appreciated by those Groups to whom they offered their services in the past. The association has generally been a most happy one for both the Groups concerned and the Operator and I would appreciate some indication of their participation in your Branch activity in this year's Reports."

This statement by Noel VK4ZNI, is included in a bulletin issued to all parties in Australia concerned in organising and publicising the 16th Jamboree-on-the-Air.

silent keys

It is with deep regret that we record the passing of—

VK3HL—Mr. Allan Hutchings
VK7BQ—Mr. Len Crooks

OBITUARY

Cecil Waring, VK3YW writes about Allan Hutchings, VK3HL of "Bryn Avon" Callawadda passing away about May 8. "Allan", he writes, "was a real, 'old timer' being licensed in 1922 in the spark era. The family at 'Bryn Avon' was unique from the Amateur radio angle as at one period both Allan's mother and sister held amateur licenses at the same address. He was well known in the DX field and a few years ago turned his contacts into personal ones via a world trip. His passing leaves one more break in the line of our pioneers, and as one of radio's gentlemen he will be missed."

key section

with Deane Blackman VK3TX

Box 382, Clayton, Vic., 3168.

Peter 4PJ, sent me a note, too late for June A.R., concerning an "unofficial" CW contest as a pipe opener for the RD It will be on again July 15, 0800-1400A. One contact per band; 80, 40, 20; VK call area. No logs required! Tell me or Peter how you enjoyed it and we will try and make it suit you better next time.

VK3AXZ has been running slow morse on 160 mx at 1900 K nightly on 1806 KHz for some months. It is a single handed effort of considerable magnitude and Stephen would appreciate some help. Anybody willing — ring 306 4957.

160 mx is an attractive band for slow morse because a broadcast receiver can be coaxed into service, which helps those just starting. Without a BFO, of course, one still has problems, which might be met if the transmission were A2 (MCW). I have had few (and mixed) replies to my call in this column last year for views on allowing MCW on 160/80. Do you have any thoughts?

When we were getting started, there was some discussion about the name "Key Section". The name in fact was the name of an actual group within the W.I.A. in the 20's and 30's. But not everyone, Stan 4SS tells me, calls them keys. They are also "manipulators" (F), "tasto telegrafico" (I), telegrafnokkel (LA). Marconi called them "correspondents" — hardly an apt term nowadays considering how many are unable to respond to a corresponder.

The QSL card, designed by a Brazilian Scout, for the 1973 Jamboree-on-the-Air. It is deep red card with the details in yellow.

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Western Aust. Rep.: **H. R. PRIDE, 26 Lockhart Street, Como, W.A., 6152.** Telephone 60-4379

Amateur Radio

AUGUST, 1973

INSIDE

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

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Amateur Radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA, FOUNDED 1910

Published monthly, as the official journal by the Wireless Institute of Australia. Reg. Office: Above 474 Toorak Road, Toorak, Vic., 3142.

AUGUST, 1973

VOL. 41, No. 8

40 cents

Enquiries and material to:
The Editor,
P.O. Box 2611W, Melbourne, 3001.
Phone: (03) 67 8201 (ext. 38).
PH (03) 232 9492.
Copy is required by the third of each month. Acknowledgment may not be made unless specially requested. All important items should be sent by certified mail.
The Editor reserves the right to edit all material, including Letters to the Editor and Hamads, and reserves the right to refuse acceptance of any material, without specifying any reason.

Advertising:
Advertising material should be sent direct to P.O. Box 150, Toorak, Vic., 3142, by the 25th of the second month preceding publication.
Hamads should be sent direct to P.O. Box 150, Toorak, Vic., 3142, by the 3rd of the month preceding publication.

Printers:
Chas E. Tully Pty. Ltd.
40 Hume Street, Huntingdale, 3166.
Phone: 543 1242.

Registered at the G.P.O. Melbourne for transmission by Post as a Periodical—Category "B".

CONTENTS

FRONT COVER :
Broadcasting in Australia is 50 years old this month. Shortly after commencement, this was the type of receiver available to the listener. Note the price relative to today's prices, and the reminder of the speed of "wireless waves".

QSP

BROADCASTING INDUSTRY CELEBRATES ITS GOLDEN ANNIVERSARY

In August 1923 — 50 years ago this month — the then Postmaster-General, Hon. G. Gibson, MHR, formulated the first Regulations governing broadcasting in Australia.
The Wireless Institute extends its cordial expressions of goodwill and congratulations to the Broadcasting Industry on this auspicious occasion of its fifty years service to the listening public throughout the Commonwealth.
The early years were beset with many problems — both technical and administrative. They were overcome with the usual tenacity of purpose attributable to Australians as a people. With less experience than countries in other more advanced parts of the world, and with a dearth of equipment which would send the modern engineer to distraction, the Industry made good in its early stages of development when voices were heard saying that 'wireless' was a nine days' wonder, that the country couldn't afford to pay for it, that advertising should never be permitted and that only the city people could enjoy the benefit of such a costly venture.
But that was the very early days. Wireless was a mystery to most people. It needed promotion by men of vision, it needed public demonstrations, it needed good programme material, it needed to spread its wings into the rural area and the interior of this big country and above all it needed the devotion to duty and the expertise of its technicians and engineers.
The full story of its 50 years of progress and the way it overcame its difficulties would make a fascinating story in its complete context. The fact that it did is obvious by the modern engineering complex of even the lowest powered station today by its financial prosperity and its contribution to what is now an important part of the Australian way of life.
The Wireless Institute of Australia is proud to have been closely associated with the Industry in its early formulation and to have fostered many engineers and technicians who first became radio amateurs before seeking their livelihood within its many activities.
Elsewhere in this issue of Amateur Radio magazine is a brief article about the wireless amateurs' contributions to its success. The Institute joins with all other services in wishing the Broadcast Industry continued success in a world 'alive' with entertainment media. It has plenty to be proud about in celebrating its golden anniversary.

G. Maxwell Hull, VK3ZS
Federal Historical Section.

Remembrance Day Contest

AUGUST 18—19

THE FRIENDLY CONTEST

AT LEAST 700 LOGS REQUIRED

STOP PRESS

1973 Cross Australia DXpedition

Keith VK3SS and Geoff VK3ZJS, both in Land Rovers, depart Alice Springs on 31st July heading across the TANAMI Desert for 1000 miles, thence down the west coast of VK6.

Scheds: 0230Z on 14.125 MHz
1100Z on 3.600 MHz nightly
1000Z on 3.650 MHz on Sundays

N.Z.A.R.T.

"It should be noted that all material presented in the (official N.Z.A.R.T.) broadcast from ZL2IY on 3900 kHz at 20.00 hrs. N.Z.S.T. on last Sunday of each month has the prior approval of the Post Office."

N.Z.A.R.T. Call Book 1973

DEADS.

'Darkness — emitting arsenic diodes.' According to ARNS Bulletin of April '73 'a recent development fabricated of gallium arsenide'. It is interesting to speculate on such a development.

Doppler anomaly on Oscar 6.

Writing in "The World above 50 Mc" in QST for May '73 W7JNK records that two Minneapolis amateurs, WOLER and WOMJS, had observed "inverted" Doppler effects on certain orbits of the Oscar 6 435 MHz telemetry beacon. The movement in the unpredicted direction was approx. 450 Hz lasting some 7 minutes only on evening north-bound passes in a window extending from 50 to 105 degrees west longitude. Observations are now being made on other satellites transmitting in this frequency area.

Radio Stations.

Feel aggrieved because your call sign details might be wrong? Spare a thought for the PMG's Radio Branch coping with 180671 authorised stations as at 31st March 1973. This figure includes 151943 mobiles, 6538 amateurs, 187 repeaters, 62 gliders and 7 space stations. Of the amateur stations 4422 were unrestricted and 2016 restricted; about 30% of the total were in N.S.W. and another 30% in Victoria; 120 were in A.C.T. and 48 in VK8.

SLOW MORSE.

Several members have enquired lately about the availability of slow morse practice tapes. These were obtained until last year from the R.S.G.B. but they advise that such tapes are no longer available. Efforts are being made by "Magpubs" to obtain an alternative source of supply. Perhaps even this short article might evoke some response within Australia. A slow morse course is available through our good friends Wm. Willis and Co. Pty. Ltd. and this was reviewed in January A.R. but practice material for home use, as opposed to teaching aids, seems hard to find.

Lionel L. Sharp, VK4NS, sends along details of slow morse transmissions broadcast by the Royal New Zealand Air Force station ZKY on 3236 kHz and 6885 kHz. On the former frequency MCW is put out at 10 wpm from 21.00-21.15 Z and at 15 wpm from 21.15-21.30 Z. On the latter frequency 5 wpm goes out from 05.15-05.30 Z, 10 wpm from 05.30-05.45 Z and 15 wpm from 05.45-06.00 Z. The Schedules may change after 3rd August. Also, the station broadcasts morse tests for NZART on the first Tuesday of every second month (the next is in August) from 07.00-07.15 Z at 15, 20 and 26 wpm plain language for five minutes at each speed.

History

"Some considerable discussion centred around the possibility of forming an All Australian Wire (less) Institute." Extract from the Minutes of the W.I.A. Federal Executive Council held in Sydney on 16th December, 1943. ●

ZL Counties Award
VK Electorates Award

ALEX SLIGHT, VK2ZA
Bondi Beach N.S.W. 2026

At the May 1972 meeting of the N.S.W. Division of the W.I.A., Alex had the honour of being presented with two awards from the New Zealand C.H.C. Chapter No. 67. The New Zealand Counties Award, for working 100 Counties, and the special award known as the N.Z.C. 112 for successfully working all 112 New Zealand counties. Alex, President of the newly formed C.H.C. Chapter No. 66, tells his story.

After the presentation I was very surprised indeed to find that nobody present seemed to have heard of the awards made available by our goods friends "across the pond", although listening around on the various bands today it appears that a few more VK amateurs are aware of, and trying to obtain, these certificates.

The basic award is comparatively easy to obtain requiring only twenty counties confirmed. Even so, I was surprised to find that my award is registered as VK No. 13. Additional stickers are awarded for 40, 60, 80 and 100 confirmations.

The special award, the N.Z.C. 112, is given when confirmations are held for the whole 112 New Zealand Counties, and I am very proud of the fact that my certificate is the first issued to an Australian amateur (VK No. 1) and is further endorsed as being the second certificate issued to a station outside New Zealand, the first being held by KR6IZ, "Doc" Blasi, who has since returned to Georgia, U.S.A.

A further interesting point is that at the time of issue, the overall number of my award was 24, indicating that only 22 were held within New Zealand. This makes it obvious that the award is not an easy one to obtain, and this should make it a premier and coveted award indeed. In my opinion it is much more difficult to obtain, and an even greater challenge, than the D.X.C.C.

In the first place, for D.X.C.C., we have the possibility of obtaining the required 100 cards from well over 300 countries; but to obtain the N.Z.C. 112 you must work, and receive a Q.S.L. from all 112 counties.

Well, it's "just across the pond". It would appear to be easy, but there are a number of counties in which there are no active amateurs, and in one county at least there are no people resident, and no roads as such, only the odd tracks. In one of the largest counties in the South Island there is only one licenced amateur, who is not very active even though possessing SSB equipment.

So how do you obtain the Award?

Here you get one of the finest lessons and experience of real "ham" spirit and co-operation and it is one of the main reasons why this article was written.

I came across details of the award when applying for the N.Z.A.R.T. Cook Bi-Centenary Award, their Awards Custodian, Jock White, ZL2GX, having included a double sided sheet listing the awards that were available from both the N.Z.A.R.T. and C.H.C. Chapter No. 67. It is a good indication of the hearty co-operation that exists between these two organisations so that ZL2GX is the Awards Custodian for both of them.

The Counties Award — N.Z.C. — intrigued me, and I obtained the necessary and obligatory, checking sheet from ZL2GX for the modest outlay of a couple of I.R.C.'s and an S.A.E. The checking list contains the full list of the 112 counties and the names of some of the principal towns in each. If a request is made to Jock he will doubtless be pleased to forward a sheet showing the awards available from New Zealand.

With the checking list in hand I went through my ZL/ZM QSL cards and found that I had more than enough for the basic award, but I was determined to try for "the whole bit" as modern idiom would put it. I also noted that the majority of N.Z. amateurs have their county printed on their QSL cards.

Then came the start of the greatest experience in friendship, fantastic enthusiasm, and co-operation I have ever experienced in amateur radio and I have been an active amateur with this call-sign for nearly 43 years.

Listening around on 20 metres one evening I came across an obviously American voice calling "CQ CQ New Zealand Counties" from KR6IX". I made contact with him during a lull and exchanged notes on our experiences with the N.Z. stations.

From that time we came on as regularly as possible each evening calling for New Zealand counties and picking up the occasional new one. The "Kiwis" passed the word via the grapevine, and the fortnightly C.H.C. Net, that a couple of overseas amateurs were looking for counties.

Just how it all happened is difficult to remember, but slowly we were joined by Les VK4LZ, who holds the No. 2 N.Z.C. 112 in V.K., Charles VK2AXL, with one very elusive county still required, Muriel VK2AIA, VK2JK, VK3BBV (now VK3APL), VK4VC, VK3SF, VK5QI, VK9RS, and many others. On top of this we were joined regularly at weekends, propagation permitting, by G8JM in London.

From then onwards we received the wonderful assistance I have referred to; fellows who came up on the frequency to pass on information regarding projected mobile or portable operations, news of changes in plans, and offers to go mobile or portable. Many, many such operations were undertaken for our benefit, and I think it fitting to record just some of these operations. I sincerely hope that if I miss the exploits of some of our "Kiwi" friends that they will know that we have not forgotten and never will forget, what they contributed.

Charles Parton, ZL3CP, who went mobile at night on many occasions around the various counties in and around the Christchurch area, as well as going down towards Dunedin to provide two of the more difficult counties. Charles, like the rest of the "Kiwis", very promptly sent a confirming QSL. He also provided an excellent, detailed Government Survey map of both the North and South Islands, at his own expense.

Bert Neilson, ZL2ANA, and X.Y.L. Pearl as log keeper, who journeyed by car and caravan from Otaki to Hokianga county, and others, and then especially altered their route home to provide some of those other counties we needed.

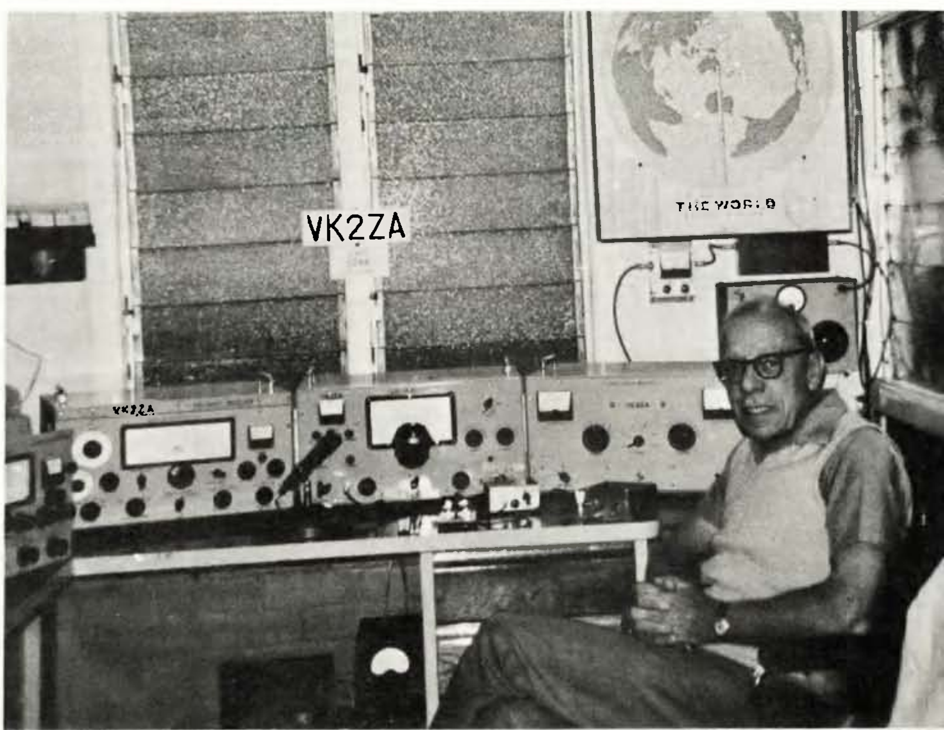
John Luxford ZL2BCX, who went mobile on a number of occasions, but whose crowning effort was a run of some 240 miles after lunch on Sunday, passing through some twelve counties and making some 60 odd contacts with the aid of a second ham as log keeper. He could have made many more contacts but the operation was controlled from V.K. and only those who needed a particular county made contact, the rest refraining from cluttering up the atmosphere.

Ivan Hansen, ZL2OI, George Mayo, ZL3QX, "Casey" Harris, ZL4CA, (first ever to gain the N.Z.C. 112 Award), Joe Hill, ZL2AFH, who, like several others, went to the trouble and expense of booking into a hotel in order to go portable.

ZL2AGB, ZL2AH, and so many others to whom we owe thanks.

I can also remember the happy gent from Christchurch who drove around the narrow, winding, mountain roads inland from that city, at night in a 50 MPH blow, to provide a couple of new counties.

Golden Bay county is one in which there are



no resident hams, and access can only be gained by someone going mobile by road from Motueka or some other town near at hand. Or as was done by Roy Sharland, ZL2LH, who sailed his boat from Nelson to a spot in Golden Bay and was so obviously "having himself a ball" and thoroughly enjoying the job of helping other amateurs.

Then came the time when "Doc" KR6IX, and I only required two counties to complete the score; Fiordland and Steward Island and both a story in themselves.

Fiordland is the county previously mentioned on the south-west corner of the South Island, south of Milford Sound, the latter spot being outside the county, which makes things more difficult. Those who have been in Milford Sound will readily appreciate the type of rugged country concerned. No roads, only bush tracks which require a Land Rover or similar vehicle.

Alan Frame, ZL4GA, from Invercargill, finally solved the problem by going mobile in a four wheel drive vehicle. At the time set down for the venture the group were all checked and waited in suspense for the first sign of life from Fiordland. Then "Casey" ZL4CA came up and advised that he had telephoned Alan's home and received no reply. It therefore seemed that he must be en-route.

At last, to everyone's relief, he came up RS 5-7/8 in Sydney and apologised for keeping us waiting: but who cared about that? Fiordland was in the bag and among those who made contact were G8JM and G4JZ.

We did hear later that the delay was caused whilst looking for a suitable site. The vehicle, and trailer with a 240V Honda alternator on board, were left on the main track while Alan walked into three side tracks looking for a likely spot. It was later reported that having made his choice he backed the trailer and vehicle well over half a mile because there was nowhere to turn and come out. I would personally like to hear more about this effort.

This left "Doc" and myself with one to go — Stewart Island — and on the 15th April '72, Maurie Treweek, ZL4MY, also from Invercargill, flew across to Stewart Island, set up his gear and then had to wait until evening for the local "power supply", all 5kVA of it, to come on.

As an indication of the "spirit" which had built up in the Group, it was tacitly agreed that when Maurie came on the air, "Doc", KR6IK, was to have the honour of being the first to work him, followed by myself. These are the little gentlemanly gestures you never forget, and before the rest took their turns, the air was flooded with "congrats". Then things settled down and away they went.

It is also interesting to note that we were often joined by some of the ZL stations, always hopeful that propagation would be such that they might pick up the odd rare county. They were often rewarded.

I wonder if we have hams like them in this country? I think we do!

The experiences related above have inspired many of those who took part, and others who are at present trying for the N.Z.C. and N.Z. C.112, with the desire to provide a similar incentive in this country. After a great deal of discussion and solid "spade work", a C.H.C. Chapter No. 66 was inaugurated on 11th May '73 and two awards comparable to the N.Z.C. and N.Z.C.112 have been instituted.

The awards are based on the 125 Australian Commonwealth Electorates — The A.C.E. Award — and while it is appreciated that boundaries may be altered, and new electorates formed, the rules have been so framed that the accepted boundaries for the award are those existing on the Official Maps as at 1st May 1973, and will remain.

It is sincerely hoped that the VK amateurs will enter into the spirit of things as do our ZL cousins; that they will operate mobile or portable in those electorates where there are no licensed operators, or perhaps inactive ones; and that they will be prompt with their QSL cards.

Incidentally, C.H.C. is not an institution which can be joined by paying fees and being a licensed amateur.

Entry can only be gained by a points system which covers such things as grade of licence, morse code speed, membership of a radio society and/or radio club/s. (W.I.A. and so on), awards held (such as D.X.C.C. W.A.C. W.A.S. Cook Bicentenary), active office held in a society or club, technical articles contributed, and many others.

In other words, an intending member must earn his right to membership by showing that he endeavours to participate in a number of phases of ham activity. Under these conditions a licenced amateur, but inactive as far as operating is concerned, may well obtain the necessary 25 points minimum required for full membership.

C.H.C. firmly believes that an amateur should be a member of his national society or institution!

For those who may be interested, and it is hoped that many will be, it is recognised that most amateurs pay dues to a national body such as the W.I.A., (although some cheerfully accept the privileges gained by that body without accepting the responsibility of membership) and consequently fees for entry to C.H.C. and annual dues are kept to an extremely low figure indeed.

If any ham would like further details and information, a letter to myself, or VK3APU, will be very promptly answered.

If you are not certain of your Federal Electorate (your State one will not do!) write to VK3APL (was VK3BBU) if in Victoria, or to myself if in N.S.W., noting particularly that in some cases in metropolitan electorates you may need to indicate on which side of the street you reside. We can even assist you with information on other States.

A letter to VK3APU with 20 cents in stamps will obtain a list of all Commonwealth Electorates and full details of the awards.

Let's see if we can do as well as the "Kiwis". I think we can and should. So here's to happy "Electorate Hunting" and please mark your QSL cards with the name of your Federal Electorate. ●

50 Golden Years of Broadcasting

THE AMATEUR CONTRIBUTION

G MAXWELL HULL, VK3ZS
Federal Historical Section
Wireless Institute of Australia

This article celebrates the 50th year since Postmaster-General Hon. W.G. Gibson, MHR., formulated the first Regulations governing Broadcasting in Australia.

This action was taken at the insistence of the Broadcasting Companies, the Retail and Wholesale Traders and the Wireless Institute of Australia.

Without such regulatory control chaos was reigning with both commercial and amateur experimenters transmitting at any old time and anywhere on the available wavelengths; without regulatory control the envisaged advantages to peoples all over the world would have been useless.

Amateur experimenters were the only people who understood the 'secrets' of wireless and they were composed of professional engineers, chemists, accountants, salesmen, manufacturers, draughtsmen — in fact from every walk of life came those who participated in this new found science. The electrical and mechanical engineers perhaps had the advantage over some of those from other professions, nevertheless hundreds of people entered the fascinating field of wireless.

This article cannot hope to relate in detail every contribution made by these early experimenters but it is hoped it will serve to revive the knowledge of the part they played in the development of broadcasting in the Commonwealth of Australia.

The Wireless Institute of Australia is proud of its association with the men who played such an historic part in what can only be described as one of the greatest achievements of mankind.

In doing so it extends its congratulations to the Broadcasting Industry on its Golden Anniversary. It is certain the industry has benefitted from the dedication to its work of those amateur transmitting licensees it employs.

An Armistice between warring Nations had been signed on the 11th of November, 1918, and the long, drawn out first world war had come to an end. Great advances had been made in 'wireless' technology during the conflict to the advantage of the Navy, Army and the Australian Flying Corps as it was then known.

The wireless experimenters who went to war, and those who stayed at home, were anxious to recommence where they left off in 1914 but the possibility looked forlorn. At the outbreak of hostilities most transmitting equipment was fitted on board ships and the land based stations belonged to the Maritime Services. For this reason the Navy had taken over control of wireless and was loath to part with this authority. There was much agitation from many quarters for the granting of experimental privileges and various sectors vocalised in opposition to the restrictions imposed by the Department of Navy. These might be summed up in the words of Mr. E.T. Fisk (later to become Sir Ernest Fisk) when speaking to the Australian Aero Club at the Royal Society's Rooms in Sydney in September, 1919 when he said — "The highways of the air for navigation and the highways of the ether for wireless communication should be free to all people in a free and democratic country and no Government department or other body should be permitted to erect barbed wire entanglements about these common airways. All you will require in aviation, as in wireless, are definite rules of the road for using your common highway and some authority to see that these rules are observed". These words of wisdom were spoken so far back and yet are as true today as when uttered.

However, the authority to control radio was invested with F.G. Cresswell — Radio Commander in the Australian Navy — who, on his return from naval operations in the Pacific during the early stages of the 1914-18 war was selected to take over the control, under the Naval Board, of the Wireless Telegraphy Department of the Commonwealth, which had been transferred by Act of Parliament to the control of the Royal Australian Navy. His first work was that of organising the Commonwealth Radio Service on naval lines and under naval discipline.

In 1920 only 21 land stations existed and they were under the control of the Government; there were no private land stations or experimental stations; there were a number of ship stations on Government vessels as well as on vessels privately owned. In the same year Commander Cresswell issued temporary Permits to use Wireless Telegraphy (W/T) apparatus for the purpose of receiving wireless telegraphy signals. The permit was issued pending legislation on the matter of the issue of licences to amateurs and others to conduct experiments in transmitting. Under very special circumstances a transmitting licence could be issued.

This was a bitter pill to the many anxious experimenters who, before the outbreak of war in 1914, had licences granted to them by the Postmaster-General's Department (at that time the authority in wireless matters) to conduct experimental transmissions. But with typical aptitude they set about experimenting with receiving equipment, organising themselves into Clubs and Associations (including the Divisions of the already existing Wireless Institute of Australia) and using every avenue to gain permits for transmitting privileges. Although by 1922 some licences to transmit had been issued, it was not until July of that year that amateur experimenters were successful in obtaining a general licence.

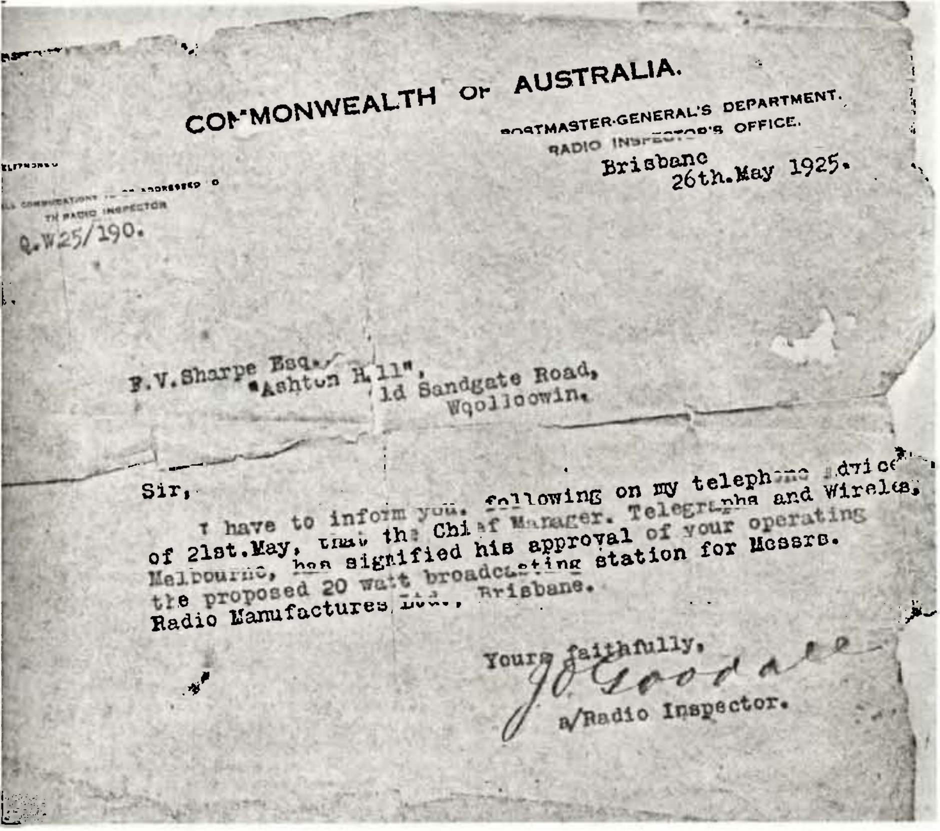
By a concerted action on the part of the W.I.A. and other organisations (including commercial interests) the Prime Minister — Mr. W.H. (Billie) Hughes — was prevailed upon to act in the interests of promoting the tremendous advantages seen in the newly developed science of wireless, experimental facilities for which had been available to overseas experimenters for some time. "The Wireless Weekly" magazine, Volume 1 Number 1, dated 4th August, 1922, carried the good news in which it was stated the Prime Minister had said that facilities granted in other parts of the world would be given to amateurs here under proper control. No restrictions, other than those to prevent interference, would be imposed. One can imagine bells being rung on that occasion!

One of the early licences to transmit was granted to Mr. Chas. Maclurcan of Strathfield. An engineer of some renown (as were many of the early experimenters) Chas. Maclurcan was possibly one of the first to transmit music and 'live' programmes over the Sydney area between 1921-22 on a wavelength (the measure used widely in the early days) of 1400 meters; actually the desirable spectrum territory exploited by commercial interests following the 1914-18 war ranged between 1000 and 30,000 meters with an accepted minimum of around 200 meters. It was following the granting of general licences in 1922 that amateurs were relegated to bands below 200 meters where they set about proving long distance communication a practical proposition. But that is another story to be told on another occasion.

With the announcement of a general licence by Prime Minister Hughes there followed tremendous activity. Experimenters everywhere took out licences, including commercial interests, and, as far as the general public were concerned — broadcasting was born. The experienced engineering amateur soon demonstrated his ability in the newly developing field. His transmissions were logged and reported by the listening enthusiasts. His experiments included the playing of gramophone records (referred to at the time as "canned music") as well as 'live' artists on occasions. He tried out various kinds of aerial systems and read avidly of his transmission reports to assess the coverage. And he developed useful forms of microphone and microphone techniques to improve the quality of his transmissions.

By 1923 there were severe interference problems between transmissions on or adjacent to similar wavelengths; there was an even worse interference problem caused by maladjustment of regenerative receivers causing what were called "Joeys" (said to be peculiarly an Australian expression) between receivers for sometimes miles around; and there were the complaints of amateur transmissions interfering with commercial transmissions. And so by pressure from public organisations, those repre-

GEOFFREY THOMPSON, VK3AC, (then 3GT) experimenting with early transmissions of recorded music when a member of the "Listener-In" technical staff, a publication printed by the Melbourne "Herald & Weekly Times". Geoffrey Thompson conducted these tests under the calls VHM and VHL which were granted to the Company by the Postmaster-General's Department. In addition to carrying out the construction of equipment specially suited for the transmission of news from distant parts directly to the Herald Office in Flinders Street, Melbourne, Mr. Thompson also designed and tested new circuits and wrote two of the first Listener-In Handbooks, the first being—The ALL ELECTRIC RECEIVER in 1929. Some of his other exploits, as those of many other experimenters, will be another story of amateur history to be published in this Magazine.


COMMONWEALTH OF AUSTRALIA.

POSTMASTER-GENERAL'S DEPARTMENT.

RADIO INSPECTOR'S OFFICE.

Brisbane
26th.May 1925.

Q.W25/190.

F.V.Sharpe Esq.,
"Ashton Hill",
Old Sandgate Road,
Wooloowin.

Sir,

I have to inform you, following on my telephone advice of 21st.May, that the Chief Manager, Telegraphs and Wireless, Melbourne, has signified his approval of your operating the proposed 20 watt broadcasting station for Messrs. Radio Manufactures Ltd., Brisbane.

Yours faithfully,

a/Radio Inspector.

EARLY BROADCASTING STATION licenses were taken out by private companies but were frequently built and operated by amateur experimenters. This illustration is of a permit issued in 1925 by the Postmaster-General's Department giving approval for an amateur licensee to operate the 20-watt (!) station of Radio Manufactures Limited of Brisbane. Mr. Frank V. Sharpe (then 4AZ now relicensed as VK4ZFS after some years' absence from the bands) was one of the amateurs so authorised, and claims to being the first in Australia. Any Contenders?

senting the trade and the professional and amateur experimental people, statutory Regulations Governing Broadcasting were drawn up by the Postmaster-General's Department, having again taken over control from the Naval Department, and these became law on the 1st August, 1923, when announced by the then Postmaster-General, the Hon. W.G. Gibson, MHR. The — "definite rules of the road for using the common highway and some authority to see that the rules were observed" — had come into being; the wise words of E.T. Fisk in 1919 had become necessary.

It heralded an era which was to radically change the way of life in Australia as in other countries all over the world. Its problems have been great but its advancement has been tremendous in overcoming these problems. The amateur experimenter played a vital part in the progress of the Broadcasting Industry.

By 1924 there were probably few licensed amateurs who were not members of the Wireless Institute of Australia or of one of the numberous Clubs and Associations formed for the purpose of extending the knowledge of its members in the exciting field of wireless. The public and commercial enterprise looked to the amateur experimenters for advice and guidance because they were the only people in the community who understood wireless. Almost every publication dealing with the subject was written or edited by amateur experimenters (excluding engineering text books to some degree), and many of these in magazine form were, from time to time, the official organ of the Wireless Institute of Australia which was the largest of the many Associations, being, as it was, represented in every State of the Commonwealth.

The amateur experimenter had trodden a hard road to reach the position of public acceptance achieved by 1924. Because he had been restricted to 'Receiving Permits' only for a number of years he had, by virtue of the restriction, become an expert in receiving and this stood him in good stead when transmitting licences became available.

Through the years from 1924 to 1929 he was in everything to do with wireless. Every newspaper and periodical wrote about the amateur experimenters and their achievements. He was employed by commercial stations (and later the government owned National Broadcasting Service) and experimented with his own wireless station at home in his spare time. He went into manufacture, producing many component parts and producing wireless receivers of improved standards. He even designed and built many of the first broadcasting stations.

His ability was widely made known to the public through his own Club or Association. The Wireless Institute of Australia was in the forefront in its exemplification of the ability of the wireless amateur. The Victorian Division of the Institute organised and conducted the first Wireless and Electrical Exhibition at the Melbourne Town Hall between May 14th and May 19th, 1924, followed by a second exhibition at Wirth's Park (the site of the present Melbourne Cultural Centre) the following year. The W.I.A. — N.S.W. Division — also organised a huge Exhibition in the Sydney Town Hall in 1925. These Exhibitions received the support of most of the commercial manufacturers of wireless receiving sets and component parts. They were in fact 'the hard sell' to the public of the marvels of wireless reception. People flocked to these exhibitions in their thousands.

They were fascinated by the many demonstrations of radio frequency phenomena by amateur experimenters; the reception of music and 'live' broadcasts from both commercial and amateur stations situated remote from the exhibition sites; the ability of some receivers to 'give good loudspeaker strength' of transmissions from other states; and the 'high fidelity' of one transmission compared with another.

These were indeed the golden days of broadcasting. The country was crazy with 'wireless-mania'. It had captured the minds of the populace to the point where unskilled people — young, middle-aged and on-in-years — would have a go at building a crystal receiver so that they could listen-in to broadcast programmes. It rapidly reached the stage in 1925-26 where there were thousands of listeners-in who had paid high prices for their receivers and the reception of broadcast programmes was now a part of living. The listeners became critical of the quality of transmissions when sometimes it was the fault of a not-so-good receiver; they criticised the lack of 'live' artist programmes and the 'canned music' they had to suffer; by 1926 a Listeners' League had been formed whose main contention was that if you owned a radio receiver you owned a slice of the ether and were therefore a shareholder in one of the greatest enterprises of modern times. The League's objective was for better programmes by greater co-operation between listeners and the broadcasting companies. The same period saw the formation of "The Association for Developing Wireless" in Australia, New Zealand & Fiji.

These were perhaps the problem years. Articles appeared stating — inter alia — that not all voices and instruments were suited to broadcasting!

References were made to the poor quality of receivers foisted on the market in some instances. Aerials had been erected by amateurs (this time the literal meaning) and Insurance Companies framed regulations for Victoria under the Fire Underwriters' Association Rules which set down a standard for the safe erection and installation of this part of the listeners' receiving apparatus. The broadcast stations themselves had financial problems. In 1925 the listener licence fee was 35/- ($3.50) and the broadcast station relied on a portion of this fee for its finance. Hundreds of people purchased receivers but didn't pay a fee hence the stations were not receiving the finance required to improve their programmes in accordance with public demand.

But all the time the general standard was slowly improving. Engineers were devising new ideas and new and useful products were appearing on the market. New techniques had been developed overseas and system engineers were able to travel overseas — particularly to America where broadcasting was at a high standard — and return with new ideas for their Company's station. By 1932 many changes had taken place. Old transmitters had been scrapped and modern ones constructed using the latest techniques. Amateur experimenters had kept up with modern trends and in some instances were ahead of the commercial broadcasters, often being praised in the press for the superior quality of their transmissions; a large number of the amateur experimenters had also left the 'broadcast' bands and were steadily pioneering the so called useless 'low wavelength' bands.

There were many notable contributions by Australian amateur experimenters to the broadcasting industry which space does not permit of writing about in detail in this article. Perhaps two of the most outstanding were the Holst brothers. Their own experimental station, 3BY, transmitted an exceptionally high quality signal in its day. When 3DB (Herald & Weekly Times Limited) was rebuilt in 1929 the Holst brothers received the contract to design and construct the new station and for many years it enjoyed what was reported at the time as the station with the most outstanding modulation quality anywhere in Australia. The Holst brothers were exceptionally fine engineers being the manufacturers of transmitting and audio equipment which was highly respected by the industry. No doubt the reference in the Melbourne "Herald" of August 9th, 1928, wherein the inaugural meeting of the Listeners' League, in calling for a Class "C" station licence for the broadcasting of high class music, would have included the Holst brothers (and many other skilled amateurs) when it suggested that amateur experimenters should make representations to the Government for encouragement with their experiments because in the opinion of the League the broadcasting stations were in their forward position because of the work of distinguished amateurs. The meeting was reminded that the quality of transmission from the high class amateur stations was considerably better than from many of the "A" Class stations.

However, around this time, amateur stations were in peril of being closed down, particularly in the region of 200 meters, because the Government was due to take over these bands as a result of decisions made at the International Radio Conference at Washington, USA, in 1927. The Wireless Institute of Australia had established itself as the governing body of the Australian amateur, having been successful in encouraging most Clubs, Societies and Associations to affiliate with it for the purpose of speaking with one voice. The Administration of the Postmaster-General's Department encouraged this amalgamation of organisations. With this representation the Institute was successful in getting the Government to agree to amateurs continuing to broadcast musical programmes to the listening public on Sunday mornings before "A" and "B" class stations came on the air in the afternoon, and after about 10 p.m. in the evening when the "A" and "B" class stations had closed down. Thousands of people will remember the very excellent programmes transmitted by some of these amateur experimental broadcasts.

This arrangement pertained up to the outbreak of World War II when all amateur stations were compulsorily closed down for the duration for reasons of military security. Following the resumption of amateur transmitting stations in 1947 applications for broadcast band permits were refused. The reason given was that amateur stations in this band were not justifiable whilst the Government was faced with applications for commercial licences from some hundreds of private enterprise companies. And so ended one of the most colorful periods of amateur activity directly involving the public. Amateur experimenters went on to establish themselves in their own right as the real pioneers of the shortwave bands but that is the context of another story.

With the knowledge and expertise which amateur experimenters had given to the broadcasting industry it survived the many problems of its infancy and went on to develop from 13 stations in 1925 (not including amateur broadcasters) to a far flung series of networks in excess of 181 stations in 1973.

1930 brought with it the depression years when the Industry went through difficult financial times. Engineers worked long hours and at times even had their wages cut back. However, there had been interesting technical advances. The electric pickup had been developed in the late 1920's and this dramatically changed the whole concept of transmitting music compared with the old method of placing a microphone in front of an accoustic gramophone. The Amalgamated Wireless Company had commenced manufacturing transmitting valves of a good quality in Australia which stood the Industry in good stead at the end of the 1930 decade when the world was plunged into war for the second time in 20 years and replacement parts were difficult to obtain because of defence requirements. These were the days when transcription discs rotated at 33 r.p.m. and standard discs at 78 r.p.m. and playing needles were so difficult to obtain that some stations retained their own equipment for resharpening old needles. Long playing records might have been in the development stage but as yet hadn't been born. Stereo records had not even been contemplated. Unknown to the industry but just around the corner were wire recorders which revolutionised broadcasting as dramatically as the electric pick-up had done a decade before. The post-war years of the second great world conflict brought these into being along with long playing records. After a short few years of wire recorders the oxide tape recorder came on the scene, a development which brought about particularly high quality recordings and, due to the broadcasting of recorded music, a 'boom' in the record industry. More latterly came stereo recorders and records.

Today the "A" and "B" Class broadcasting stations ("C" Class never eventuated) are now referred to as "National" and "Commercial" stations. Many of the early engineers – including those from the ranks of amateur experimenters – have passed on; some have retired but can vividly recall their experiences in the development of the broadcasting art as though it was yesterday; and a few are still the 'Chief Engineers' of the modern station where only memories remain of the early days of broadcasting.

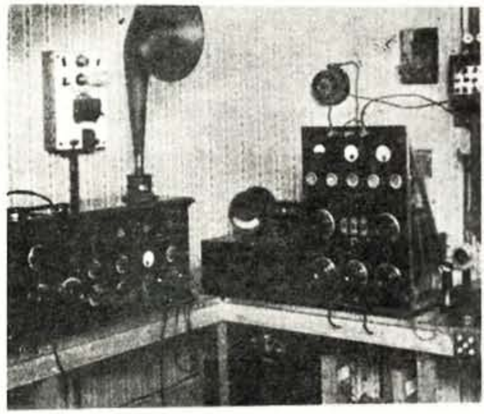
The Broadcasting Industry is certain to enjoy another 50 Golden Years. But will it ever be the same as those first 50 Golden Years? Transmitters, whilst not having changed a great deal in form, utilise components of very reliable quality permitting the equipment to be remotely controlled and generally unattended for other than routine checks. The studio equipment is now mostly solid state incorporating the 'push-button technique' of the 70's.

Perhaps new problems will rear their heads in place of the old ones; perhaps the fun will be in diagnosing – "Which faulty IC caused the breakdown" and replacing it with a solder-sucker without really knowing what was inside it!

But whatever .... the industry today, despite its size, has to bear the fierce competition of television and other entertainment media of this day and age. That it will survive and continue to flourish there seems no doubt. Whilst the Australian Government continues to encourage amateur radio, there is also no doubt that the technological ability of many licensed amateur transmitters will continue to be of service in the broadcasting industry. It is a pity the Postmaster-General's Stamp Advisory Committee did not see fit to accede to the Institute's request for an amateur radio motif to be incorporated in the design of the commemorative postage stamp to be issued in November to celebrate the golden anniversary of broadcasting in Australia. The radio amateur experimenters contribution deserved recognition.

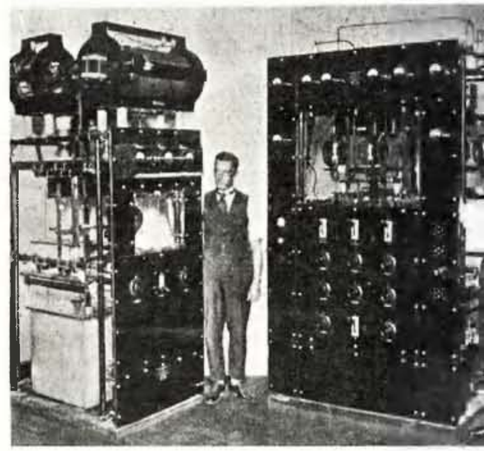
We wish the Broadcasting Industry the continued success it has earned for it has indeed been a magnificent – 50 Golden Years of Broadcasting.

Acknowledgements
Facts and dates for this article were extracted from early technical and semi-technical wireless publications; from early magazines devoted to amateur experimenting and broadcasting; from information kindly supplied to the Wireless Institute from Trevor Evans (VK2NS), Frank Carey (VK2AMI), H. A. Stowe (VK2CX), Arnold Holst (VK3OH), Geoffrey Thompson (VK3AC), P. J. Sebire, (VK3MX), Frank V. Sharpe, (VK4ZFS – previously licensed as 4AZ); from the Divisions of the Wireless Institute of Australia; and from information in cuttings from early issues of the Melbourne "AGE" – "ARGUS" – and "HERALD" newspapers.



THE MELBOURNE "B" CLASS station of 3UZ whose licensee was Oliver J. Nilsen & Co. of Bourke Street. Note the similarity to amateur experimental stations of the day. The transmitter used two 5-watt valves as oscillators and two as modulators and was reported as "delighting enthusiasts in every State of the Commonwealth with its excellent transmissions of entertainment". The year was 1925 when broadcasting was really commencing to 'boom'.

QUEENSLAND was slow to get started when the Broadcasting Regulations were gazetted in 1923, its Government being of the opinion that the State should control wireless transmissions. The first station was therefore built for the Government under the call sign 4QG. The illustration shows the Master Oscillator (left) and the Main Amplifier (Right) of 4QG which was a 5-Kw. station. It commenced transmissions in mid 1925 at a time when arguments were in progress as to whether 'long waves or shorter waves' should be used. Queensland, with a larger area of land to cover than most other States opted for 'shorter waves' and commenced transmissions on 385 meters. It was built by the same manufacturers who designed and constructed 3LO (Melbourne), 2FC (Sydney) and 6WF (Perth).



C.G.S

TYPE C MINIATURE VITREOUS ENAMELLED POWER WIREWOUND RESISTORS

Approved to BS 9114 – N002 style 2E–56

SPECIFICATIONS

The 'C' Series of miniature wirewound, vitreous enamelled resistors has been designed to meet the requirements of Specification BS 9114 - N002, and full Qualification Approval has been granted. A Test Report Summary is available on request; this report shows that many of the performance levels are in fact much higher than the specification acceptance levels.

The use of specially selected materials, combined with the application of exacting quality control throughout all stages of production ensures the consistent achievement of a very high standard of reliability.

ELECTRICAL SPECIFICATION

Tolerance: ±5% is standard on values of 1Ω and above and ±10% between 0.1Ω and 1.0Ω. For non standard values and tolerances please consult the factory.

Resistance values: C Series resistors are available with the preferred ohmic values of the E24 Series within the ranges shown in Table 1.

Temperature coefficient: Typically less than 100 ppm/°C and never exceeding 200 ppm/°C over the category temperature range −55°C to +200°C

MATERIALS

Core: High purity steatite ceramic. Chemically inert, capable of withstanding severe thermal shock and impervious to moisture. Ground to close tolerance finish to give maximum contact with wire element for rapid heat transfer.

Resistance Element: High quality nickel-chrome or nickel-copper alloy depending on resistance value; wound at minimum tension.

End Caps: Formed to close tolerances from a special nickel-iron alloy chosen for its consistent welding properties and glass sealing characteristics.

Leads: Solder coated nickel A.

Uncoated leads can be supplied for welding.

Specify – 'weldable leads'.

Preformed and cropped leads can also be supplied on request.

Coating: Humidity proof vitreous enamel with carefully controlled expansion matched to the materials of the resistor.

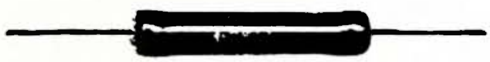


TABLE 1

C.G.S.				BS 9114 - N002							STYLE CROSS REFERENCE		
Style	Maximum wattage rating @ 20°C	Resistance Range Ω		BS 9114 - N002 Style	Maximum wattage rating @ 70°C	Approved Resistance Range Ω		Critical Resistance Ω	Limiting Element Voltage. Volts		DEF. 5111-1 Style	DEF 5115-2 Style	G.P.O. Style
		min.	max.			min.	max.		Normal	Low Air Pressure			
C3A	3	0.1	10K	2E-56-2.5	2.5	1	4.7K	3.9K	100	70	RWV3J	RFH3-2.5	P.O.35
C7	7	0.1	27K	2E-56-6	6	1	15K	6.8K	200	140	RWV4J	RFH3-6	P.O.40
C10	10	0.1	68K	2E-56-9	9	1	68K	27K	500	350	RWV4K	RFH3-9	P.O.36
C14	14	0.2	120K	2E-56-12	12	1	100K	47K	750	530	RWV4L	RFH3-12	–

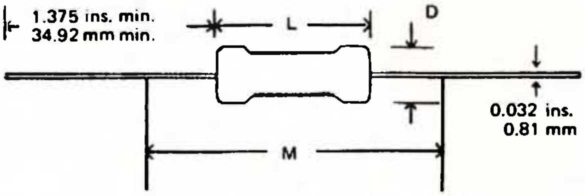


TABLE 2

Style	Length L		Diam. D		Measuring Distance M		Approx. Weight
	max. in.	max. mm.	max. in.	max. mm.	±0.062 in.	±1.59 mm.	grammes
C3A	.499	12.7	0.220	5.6	1.250	31.8	1.0
C7	.874	22.2	0.315	8.0	1.625	41.3	2.0
C10	1.499	38.1	0.315	8.0	2.250	57.2	3.5
C14	2.106	53.5	0.315	8.0	2.875	73.0	5.0

Note: M = resistance measuring points distance – below 10Ω only.

Fixed Capacitors PART 3

C. A. CULLINAN, VK3AXU
6 Adrian Street,
Colac, Vic., 3250

Block Capacitors
In the early days of valve receivers, power was obtained from batteries and HT filtering was unknown. Later "Battery Eliminators were developed to use the AC mains so that "B" and "C" batteries could be replaced. In some cases, too, rectifiers were available to supplant the "A" battery used for filament supply. In those days valves used directly heated filaments which were their own cathodes. Any attempt to use AC on the filaments resulted in considerable hum being audible so valve manufacturers turned their attentions to improving valve design to make completely AC operated receivers a practicability.

This was achieved through the development of a coated uni-potential cathode. This cathode consists of a coated sleeve into which is inserted a heater, the two being insulated from each other. The heater can use AC to operate at the desired temperature and heat from it heats up the insulated cathode independent, electrically, from the heater most of the hum problems were overcome as far as AC operation of the filament (heater) was concerned.

This development opened up the way to manufacture of all AC operated receivers without the need for a filament rectifier system.

In high quality audio-frequency amplifiers using valves it is still a common practice to operate the heaters ot valves in early stages with DC from a rectifier ana filter to remove every vestige of AC hum that could get into the valve via its heater.

Now in the conversion of AC to DC for plate and bias supplies it is necessary to provide adequate filtering of the current supplied by the rectifier and this filtering calls for large values of capacitances. In the early AC sets a "pi" filter was used with a capacitance of 4 mfds being used in each shunt arm.

Also DC voltages rose above the usual 135 volts supplied by "B" batteries for battery operated receivers thus the filter capacitors had to have better insulation than those used in Eliminators.

Early types of capacitors for HT filters were usually made of two strips of aluminium foil wound between paper strips. Leads were taken from one end of each foil, the whole assembly placed in a straight sided metal container, then the air spaces filled with an insulating medium such as paraffin wax hot poured.

After cooling a top was soldered to the container, with some type of insulated terminals being brought through the top.

Some of these capacitors were made in ratings of 4 mfds and 600 volts DC working.

Because of the manner of connecting the leads to the metal foils these capacitors had a certain amount of inductance.

These capacitors were given the name of Block capacitors or condensers.

Block capacitors are still manufactured, the usual capacitance range being from 0.05 mfd to 4 mfds in voltage ratings of 200, 400, 600 or 1,000 V D.C. Also for some purposes, Block capacitors have been made up to l6 mfds at l00 V. DC.

Modern Block capacitors are made with better insulating materials and the terminals are usually brought out through hermetically sealed ceramic insulators.

Some makes use the "Non-inductive" technique of lead termination whilst others use the old fashioned inductive construction.

In some cases it may be necessary to use the "non-inductive" types and it could be a wise precaution to ascertain the inductive nature of a Block capacitor from the manufacturer.

For instance, inductive capacitors can play havoc with equalizers and audio-frequency networks, as well as cause mystifying upsets in by-passing.

For instance an audio-frequency amplifier made to the specifications of "An Outside Broadcast Amplifier" Lecture No. 9 Amateur Radio, November 1970, had excessive distortortion at 50 HZ although three other similar amplifiers were free of this problem. The distortion was traced to the screen by-pass capacitor of the first EF86 valve. This capacitor was a Block type which was found to be inductive.

High voltage capacitors for transmitting purposes may be manufactured in the same manner as Block Capacitors but are far larger and are referred to as Transmitting capacitors. One USA made "ham" transmitting filter capacitor of 4 mfds, 4,000V. DC working measures 8" x 3¾" x 4-9/l6". In Australia this would not be known as a Block capacitor.

The Electrolytic Capacitor
The development of AC operated radio receivers and Audio frequency amplifiers was paralleled with improved power amplifier valves and better loud-speakers with the electrodynamic type starting to take over from the earlier diaphragm and cone types.

The improved loud-speakers developed better bass response and quickly showed up hum due to inadequate power supply filtering of the rectified AC.

The better equipment would use a two section low-pass filter, the capacitors being at least 4 mfd Block types. However these capacitors were large physically, so took up a lot of space on a chassis. To increase the capacitance of the shunt arms of the power supply filters meant the addition of extra Block capacitors or one or more very large filter reactors.

One imported radio receiver chassis of around l930 weighed about 50 lbs, most of the weight being in the AC power supply.

In the late 1920's and early 30's Electrolytic Capacitors began to find favour with radio-set designers as filter capacitors in AC power supplies because the electrolytic capacitors offered very large capacitance in relatively small space for voltages up to about 500 volts. For instance an early "wet" electrolytic capacitor of 8 mfds, 500 volts was about 3.5 cm diameter by ll.4cm high.

Certain metals, such as Aluminium, Tantalum and Manganese, to mention a few, can be readily coated with an oxide film about .00063cm thick when subjected to an 'Electrolytic' forming process. Such oxide films possess a high resistance in one direction but very low resistance in the other direction. It is this oxide that forms the dielectric in electrolytic capacitors.

Aluminium is readily available and is cheap and can be obtained with a purity of 99.998% so is ideal for the manufacture of electrolytic capacitors.

Tantalum is another metal which is finding acceptance in place of Aluminium for modern electrolytic capacitors. The forming process consists of immersing an Aluminium Anode in a tank filled with electrolyte and containing a suitable cathode such as Aluminium or stainless steel.

When a positive DC voltage is applied between anode and cathode a critical value is reached at which Aluminium Ions are released from the anode material and combine with electrolytically produced Oxygen Ions to form a thin film of Aluminium Oxide on the surface of the metal.

For any constant voltage above the critical value for Ion movement, the initial current is high then gradually decreases as the oxide film is deposited on the surface of the anode. The process is completed, when the current has decreased to a constant residual value. Thus the thickness of the oxide layer may be controlled accurately by selecting the value of the 'forming' voltage applied.

Early electrolytic capacitors were known as "wet" types as the electrolyte was a liquid generally containing a large quantity of water.

It consisted of a metal container which also holds the liquid electrolyte. Into the container was placed a number of corrugated aluminium plates which we bent into ridges to increase their surface area, and consequently the capacitance of the capacitor.

These aluminium plates were all connected together to form one electrode, the anode, of the capacitor. The electrolyte forms the other electrode, cathode. A flat aluminium plate placed opposite each corrugated plate serves as a means of passing into and from the electrolyte. A film of oil was floated on top of the electrolyte to prevent evaporation and it was usual to have vent holes for safety should the liquid electrolyte expand unduly because of excessive heat. Old timers will recall that sometimes the top would blow out of a wet electrolytic capacitor when overheating occurred so rapidly that the vents could not cope.

Various types of electrolytes will operate in an electrolytic capacitor. To mention two, there is ammonium citrate as one and a solution of borax and boric acid in water as the other. The latter was perhaps the most commonly used, it being non-combustible, non-poisonous, and non-injurious to clothing.

"Wet" electrolytic and "semi-dry" electrolytic capacitors do not appear to be manufactured in l972 as far as can be determined having been superseded by the "dry" type.

Semi-dry" electrolytic capacitors contain an electrolyte in liquid form having a viscosity between 3 and 4.5.

The electrolytic capacitor has a uni-lateral conduction characteristic, that is, it has an exceedingly high resistance to current flowing in one direction, but a very low resistance to current in the opposite direction.

The voltage which may be impressed across the capacitor before the film constituting the dielectric breaks down and permits an appreciable leakage current is called the CRITICAL VOLTAGE of the capacitor. The voltage which may be impressed on the capacitor safely without danger of rupturing the dielectric film is called the WORKING VOLTAGE. At the present time the maximum working voltage of an electrolytic capacitor is about 500V.

Dry electrolytic capacitors consist of an aluminium foil anode (positive plate) with an oxide film dielectric, which has been preformed as described earlier.

Layers of porous paper are saturated with an electrolyte paste and positioned against both faces of the anode.

The electrolyte is the true cathode (negative plate) of the system, however for convenience of electrical connection a second aluminium foil is used as a connecting electrode.

The start of the anode foil is crimped on to a central aluminium pin and a sandwich of anode foil, electrolyte soaked paper and the contacting electrode foil are then interwound about the pin. Tinned copper connecting leads are attached to the pin and the connecting electrode.

The sandwich with its leads is placed in a metal can with an effective insulating seal fitted over the open end of the can.

Because of the electro-chemical nature of the oxide dielectric, the anode must always be maintained at a positive potential relative to the electrolyte cathode. Reverse polarity gives rise to a large electron current through the oxide film which seriously impairs the capacitor.

Consequently care must be taken, always, to ensure that whenever an alternating voltage is superimposed on a direct voltage, the negative peak of the alternating voltage is less than the amplitude of the direct voltage. Additionally, the positive peak of the alternating voltage must not exceed the specified peak working voltage of the capacitor.[9]

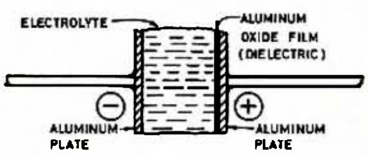


FIG 9 ELEMENTARY ELECTROLYTIC CAPACITOR

Tantalum has taken over from Aluminium in some types of Electrolytic capacitors. These have an extremely small tantalum anode with tantalum oxide film. The electrolyte is a solid semi-conducting material which will neither leak or corrode if the hermetic seal of the outer case becomes broken. These capacitors are extremely rugged, being designed for severe conditions.

Aluminium electrolytic capacitors usually have an operating temperature range from 10°C to about 60°C. with high temperature types going to 85°C. Below 10°C the electrolyte resistance may increase quickly and the capacitor ceases to behave as one. However, there are some types mainly for use in Solid State circuitry having an operating range from -10°C to 60°C.

Tantalum capacitors are made in a variety of temperature ranges, the extremes appearing to be -80°C to $+200$°C and with working voltages up to 540V, although this is governed by the temperature. For instance one Tantalum Capacitor is rated at 8 mfds 360V. DC working at +175°C but at 85°C the DC working voltage becomes 540 volts.

Electrolytic capacitors are available in wide ranges of capacitance values, working voltage ratings, physical sizes, single or multiples in the one container and a variety of containers.

Examination of several catalogues would indicate that the lowest value in capacitance of electrolytic capacitors is 1 mfd and the greatest is 100,000 mfds 3.5V DC working.

Series or Parallel Connection of Capacitors

Quite frequently an amateur will find that he doesn't have available a certain value of capacitance called for in a circuit but he does have several capacitors of other values. If he has several, each having less capacitance than that called for, he can connect some of them in parallel to make the desired value remembering that most circuits will call for a tolerance not better than + 5%.

Let us take an example. A circuit calls for a capacitor of 0.066 mfd. This value can be made up of two capacitors of 0.033 mfd each or three capacitors of 0.022 mfd each or from uneven values such as 0.01 mfd. 0.05 mfd, 0.006 mfd. The main precaution to take is to ensure that each capacitor has sufficient voltage rating. Also if being used at Radio-frequencies it is better to use a single capacitor if possible.

Electrolytic capacitors may be added together in parallel to obtain a greater value of capacitance but care must be taken to ensure that the voltage ratings are correct, also that the leakage current is not greater than that of a single capacitor of the correct value should leakage current be important.

Series Connection

Capacitors may be connected in series but the resultant capacitance will be less than the value of the lowest value capacitor.

When capacitors are connected in parallel it is only necessary to add up the various capacitance values by simple addition but when the series connection is used it is necessary to calculate the final value by using a different formula.

For parallel connections:

Total capacitance = A + B + C + D + N where A,B,C,D, and N are the capacitance values of the individual capacitors. For series connection of Capacitors the formula is:

$$C = \frac{1}{\frac{1}{A} + \frac{1}{B} + \frac{1}{C} + \frac{1}{D} + \frac{1}{N}}$$

There are three reasons for connecting capacitors in series.

The first is to obtain an unusual value of capacitance.

The second to obtain a higher voltage rating in say a power supply system.

The third is to make use of existing capacitors rather than buying a new one.

Many amateurs operate transmitters which use HT voltages above the working voltage of electrolytic capacitors and as high voltage high capacitance oil-filled capacitors are expensive the simple method of connecting electrolytic capacitors in series is used. However there are several precautions to be borne in mind.

Firstly, equalizing resistors must be connected across each capacitor. This is to ensure that each of the capacitors in a series string has the same voltage across it. If this is not done most of the voltage may appear across one of the capacitors with its complete destruction as a consequence. Secondly each of the capacitors in the series string must have the same nominal capacitance value and should be of the same working voltage rating.

Approximately 20 years ago the writer made up a transmitter power supply to give 600V. DC at 100 ma for an amateur transmitter and this power supply has never given a moment's trouble in all that time.

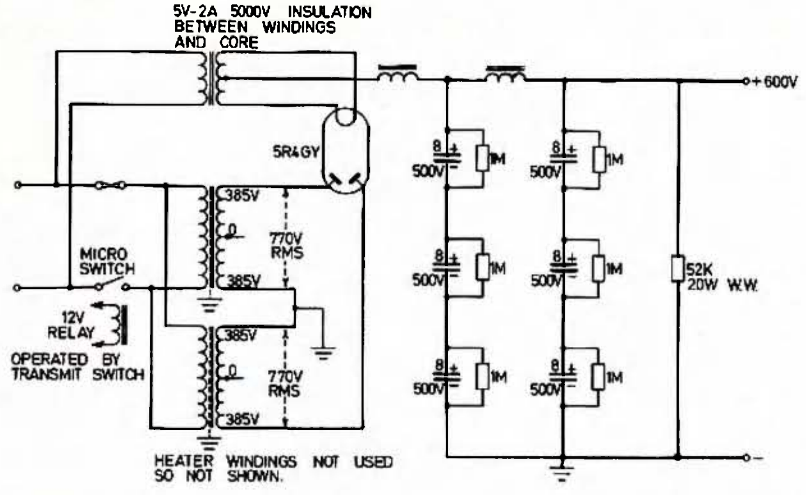
Here are the details.

Two new Trimax power transformers for receivers or amplifiers were bought for $1 each from a radio stores unwanted stock. You can be lucky some times! Each transformer had a 385-0-385 volt secondary at 100 ma. Knowing that these transformers had to pass test voltages of 1,000V. RMS between windings and windings to frame, a simple calculation showed that if the whole secondary of each transformer was used as one half of a fullwave system then the peak voltages should be well inside the manufacturer's test ratings.

By connecting the whole secondary winding of one transformer in series with that of the other and using the junction as a centre-tap then it would be possible to obtain 770-0-770 volts RMS for a full-wave rectifier. The primaries of each transformer had to be connected in parallel and phased so that the two secondaries would not be in opposition. Switching of the HT output was to be done in the common lead to the primaries via a relay operated micro-switch. Due to this method of switching it was not practical to use the heater windings of either transformer. For CW Time-sequence grid block keying has been used, with the HT on until sending was completed.

The 5R4GY rectifier valve obtains its filament supply from its own transformer which has extra high voltage insulation between primary and secondary.

The heaters of the valves in the r.f. portion of the transmitter are supplied from 6.3V wind-



VK3AXU 600V POWER SUPPLY - FIG. 10

ings on a 300V power supply transformer, as are the heaters for a screen grid modulator. A plate modulator has its own power supply.

As the circuit shows there is a two section low-pass filter with choke input, so that the regulation of the power supply is improved. Also it so happens that with the chokes used the DC output voltage is exactly that required, 600V. This was luck! The reactors (chokes) were some 125 ma. types that were on hand.

The circuit reveals that both the capacitive arms of the filter use three 8 mfds 500V. DC working electrolytic capacitors in series, each capacitor being shunted with a 1 megohm 1 watt resistor to obtain proper voltage distribution across each capacitor.

In each arm the effective capacitance is 2.66 mfds and has proved satisfactory for the purposes for which the power supply was made.

Note that there is a 52,000 ohms 20 watt W.W. resistor connected across the output of the filter. This acts as a bleeder resistor for safety, as well as assisting regulation of the power supply.

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Gratitude is again expressed to the above organisations for the extensive use of their information in this series of articles. ●

Y.R.S.

with Bob Guthberlet

Methodist Manse, Kadina, S.A., 5554

Report of the Syllabus Committee.

In coming to its conclusions the committee has tried to anticipate what the P.M.G. may require for the Novice Licence. An important recommendation is that the Senior and Advanced Certificates be eliminated. The State Supervisors will be studying the proposals and will let me know their reactions.

"It was unanimously agreed that there be three study Certificates and that the present Senior and Advanced Certificates be discontinued. It was further agreed that the three new Certificates be called Elementary, Junior and Senior Certificates and that the three Certificates be aimed towards modern electronic trends i.e. Transistors, Integrated Circuits and other Solid State Devices. It was agreed that the study notes be printed as one complete book as the three new syllabi will overlap work covered in each Certificate."

"This committee feels that most electronic requirements are based on Solid State Devices with valves fulfilling operations where transistors cannot fulfil that function. With this in mind the fundamental theory is based on transistor operation. The Committee in determining the content and order in which things will be taught considered modern trends in teaching and teaching aids, the capacity of youth to absorb information, a sequence of events that will create more interest by youth in the Scheme and a syllabus that will be current in five to ten years hence. In determining that 'Transmission' should be dealt with before 'Reception' the committee agreed that in order that a signal can be received it must first be transmitted and it was logical that our syllabus and notes follow along these lines." ●

CQ Oscar 6

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Since the inception of the Oscar Satellite Programme I have always looked forward to the day that a successful active translator would materialise and thus enable a prolonged study of the systems being flown in that particular package. I hasten to add that the study would be on a truly amateur basis, using equipment most likely to be in the possession of the average amateur. The launch of Oscar 6 on October 15, 1972, fulfilled that desire and now, 8 months later, I shall attempt to summarise my findings based on contacts made from this QTH during that period.

PRE-LAUNCH PLANNING

Whilst Oscar 6 was in the design stage, and known as the AOC Package, the specifications were widely publicised in most amateur magazines; satellite parameters were published to enable amateurs like myself to determine their equipment capabilities. For the reception of translated downlink signals on the bandpass 29.450 to 29.550 MHz the prospect of using a trackable azimuth-elevation system on 10 metres was not a practical proposition and a compromise receiving aerial, the turnstile, was selected. On the transmitting side using an uplink of 145.90 to 145.95 MHz. and realising that a theoretical effective radiated power (e.r.p.) of 100 watts was necessary for full acquisition of Oscar 6 at a range of 2000 miles, there were two distinct systems that could be employed.

Firstly there was the fully trackable azimuth-elevation rotator using a beam and low power transmitter to achieve the e.r.p. specification, or secondly the simpler approach of feeding 200 watts output to a 2 metre turnstile antenna to achieve the required 100 watts e.r.p. without the associated tracking problems of the AZ-EL system. Although this latter system had the advantage of easier tracking, we were now committed to one mode only, A3a, Single Sideband, to comply with PMG Licencing regulations. Notwithstanding, the latter system is in use at this QTH and has proved very successful!!

Therefore, by launch day, the following equipment had been assembled for experimentation with Oscar 6.

Receiving:- 10 Metre Turnstile to Drake 2B.

Transmitting:- FT200 exciting HB Transverter including linear amplifier delivering 160 Watts PEP Output to a turnstile. Although this combination provides only 80 watts e.r.p. it has presented no significant disadvantages.

POST LAUNCH OPERATING TECHNIQUE.

Following a series of postponements, word was received in Australia that Oscar 6 had at last been launched into orbit. Then began a familiarisation programme in which a whole new era of operating procedures had to be established to cope with:—

1. Netting onto stations calling CQ via Oscar 6 as the signal slid through the receiver passband due to Doppler shift.
2. Extreme QSB on the received 10 metre signals due to the high spin rate of Oscar 6 until magnetic stabilisation of the package was achieved, and
3. The relatively short "window" of 22 minutes maximum in which QSO's could be made.

Most amateurs soon learnt to adequately cope with these problems and within a very short period extended QSO's between VK and ZL were a reality.

SSB — PRACTICAL OR IMPRACTICAL?

Prior to launch some theorists predicted that SSB would not prove to be a practical mode through Oscar 6 due to Doppler shift. But it was soon realised that SSB, from the practical point of view, was superior to all other modes. Total shift on the 2 metre and 10 metre circuits combined, amounts to approximately $\pm$ 4.5 kHz for the 910 mile circular orbit of Oscar 6 and, although you need to continually tune your receiver to maintain "in pitch" demodulation, especially at the centre point of each pass when the rate of change of doppler shift is maximum, the technique of left hand on the receiver tune, VOX control on the transmitter and logging with the right hand, soon becomes automatic. It is noteworthy to mention that SSB can undergo considerable frequency shift before readability is totally impaired; hence continual receiver tuning is not paramount.

10 METRE PROPOGATION

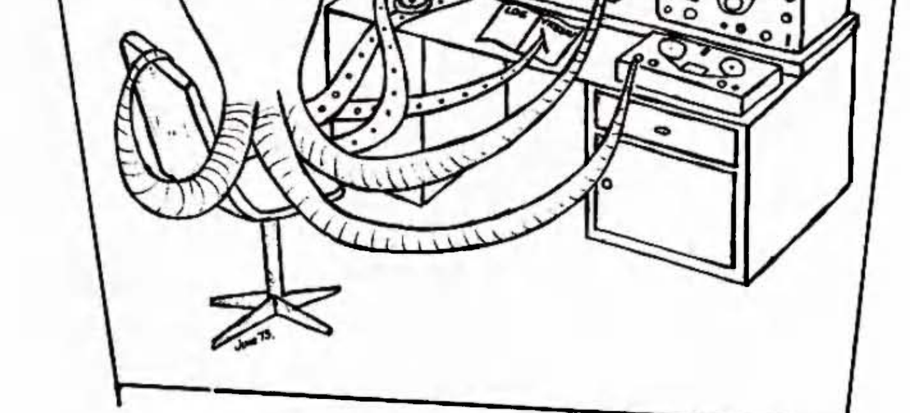
Without doubt the only limiting factor yet encountered with Oscar 6 is the varying propogation of the received 10 metre signals. It had to be expected that this would occur due to continually changing conditions in the tropospheric region. Consequently there have been times that communication ability has been seriously affected. Observations made from this QTH reveal:-

1. Extended 10 metre propogation signals at times audible both prior to and after loss of acquisition for periods up to 10 minutes in duration.
2. Extreme phase distortion at the beginning and end of passes during the VK summer, due to multipath hop through the ionosphere, making SSB readability impossible. CW communication was a marginal proposition under the same conditions.
3. "Staccato Sideband" a phrase originating from this QTH to describe the effect of Scintillation upon the received signals, especially when the rate of scintillation was syllabic. During periods of extreme scintillation, signal attenuations in the order of 20 to 30 db have been noted which make interesting viewing on the receiver S-meter in the fast AVC position.
4. Of late, diversity reception has also been noted. Because of an extremely slow spin rate that is now being introduced into the system due to the relative motion of the earth's magnetic field and the stabilisation magnetic system on board Oscar 6, the 10 metre aerial system on the package is continually rotating producing a horizontal-vertical-horizontal polarisation sequence. However the effect is slight and it requires the previously mentioned propogation effects to be minimal to fully observe this effect. There have been occasions when other oddities have been observed but, due to their irregular nature, they have only been noted for posterity.

PRACTICAL LIMITATIONS

From the outset activity through Oscar 6 was high within VK and ZL. It was interesting to observe the varied equipment in use at the time, ranging from the simple dipole up to the complex azimuth-elevation tracking systems. However, having made the decision to use turnstile antennae on both 10 and 2 Metres (considered to be suitable and, more importantly, within the budget of the average amateur), I faithfully continued to use them.

Over a period of some months it became apparent that the turnstile did appear to be the best compromise when compared to others being used. Notwithstanding, because it is a



"—left hand on the Rx—"

compromise, it does have the limitation that satellite elevations less than 20 degrees above the horizon pass below the main lobe of the antenna. On reception, signals are weaker and on transmitting, although acquisition is always possible, the translated signal is down in strength. This does not present any serious problems except for extreme eastern or western passes.

On an overhead pass an elevation of 20° is usually achieved very early in the pass. Therefore it became apparent that if one wished to work low elevation Oscar 6 passes, with the lure of prospective DX over the natural VHF horizon, additional antennae were required. Consequently, in line with the previous policy of average amateur and budget limitations, a standard half wave dipole was constructed for 10 metres and mounted vertically off the side of my tower. It markedly improved low angle pass reception at this QTH and filled the apparent hole in the turnstile pattern. So much so, that a QSO to DU1 resulted soon after installation.

The transmitting aspect raised the question whether the reliable 10 element yagi mounted 50 foot up on the tower could be successfully utilised without the need to elevate it, and use basic azimuth positioning. The procedure adopted from the outset has proved very successful. This consists of positioning the beam for acquisition and then rotating to the loss of acquisition point in 3 or 4 steps. Invariably you forget to reposition the beam, and lose 2 metre acquisition! The obvious disadvantage is that the higher the maximum elevation attained on an orbit on which you are using the beam without the provision of elevating, the greater will be that period of time in the centre of the pass that non-acquisition will occur. Switching back to the turnstile may well increase available transmission time.

Hence we note that complexity in aerial system switching and station control technique has eventuated and is necessary for these low angle passes. It is at the discretion of the individual operator to deduce what his stations capabilities are and operate within them, or subsequently improve them.

QRZ – PLEASE CALL AGAIN

Despite all the trials and tribulations mentioned to date, we have been most fortunate to have had 374 QSO's up to and including Orbit 3115, all on SSB. Some contacts have been brief and others have included a marathon 15 minute QSO on Orbit 2076 with Don Graham VK6HK. This contact ranks favourably to one on Orbit 1481 with Allan Hennessy VK2RX of 14 minutes duration. On both occasions readability was R5 for most of the time.

As is to be expected, signal strengths vary considerably. On the average signals are S5 to S6. However, on Orbit 1743, the strongest signals ever recorded from Oscar 6 at this location peaked S9. Using SSB, signals peaking slightly above noise in a relatively noise free location, are perfectly readable. An effective noise blanker is an indispensable item on any receiver under low signal conditions, especially over weekends to combat lawn mower ignition QRM.

TELEMETRY DATA

As well as operating through Oscar 6, data logging of the telemetry has been undertaken since the failure of the 435.1 MHz beacon. Although we have had to cope with FM Channel 4 QRM, retrieval of data from the 29.45 MHz beacon has been most satisfactory. Interpretation of the telemetry has at times proved most rewarding and, without it, the success achieved to date with Oscar 6 may not have been fully realised.

FUTURE OSCARS

Oscar 6 to date has been a tremendous success and, with Oscar 7 now being constructed with a package similar to that of Oscar 6 but with a power output of 5 Watts in lieu of 1 Watt, I can assure any amateur interested in satellite communication that successful contacts can be conducted using the average equipment found in most amateur radio shacks today.

Without fear of contradiction I highly recommend the turnstile antenna for 10 metre reception with the possible addition of some form of vertical low angle antenna. For 2 metre transmitting the turnstile is again recommended provided you can obtain the required e.r.p. for acquisition. Failing that I feel that a small, circularly polarised array, permanently elevated to an angle of approximately 20° with motorised rotation azimuthly, would more than suffice. A backup turnstile for directly overhead orbits, irrespective of low transmitter output, would also be advisable to optimise acquisition.

CONCLUSIONS

In this summary of my operations through Oscar 6 I have purposely attempted to restrict the more technical and complex observations that I have documented, in order to convey the belief that operating through an Oscar package is not exclusively for the advanced VHF enthusiast. I make no apologies for this as I honestly consider that a great number of Australian Radio Amateurs have misinterpreted the basic requirements for operation through Oscar 6, and are missing the great opportunity to explore the frontier of space communications. Will I contact you through Oscar 6 or 7 in the foreseeable future?

CQ OSCAR de VK5ZHJ, CQ OSCAR de VK5ZHJ . . . . ●

The UHF FM Broadcasting Network

Report from John Adcock VK3ACA
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At the Victorian Division general meeting in June 1973, a lecture was delivered by Mr. J. M. Dixon of the Australian Broadcasting Control Board. The subject, "The UHF FM Broadcasting Network", is of wide general interest and therefore a brief summary is presented here.

First a brief technical explanation. The system in use in FM stereo broadcasting in most parts of the world is the **PILOT CARRIER** system. The signal intended for the left hand speaker is referred to as **A** and that for the right hand speaker as **B**. The base carrier is modulated with A plus B to allow mono receivers to demodulate the signal as mono.

An ultra-sonic signal in turn is modulated with A and B inverted, or A minus B, and this in turn is modulated on the base carrier.

The second carrier is called the pilot carrier or sub-carrier. It appears in the sidebands but when tuned on a mono receiver is inaudible. When demodulated in a stereo receiver, the A Plus B and A minus B signals are added and subtracted to produce A and B separately.

And now to the lecture.

The Australian Broadcasting Control Board has to choose a system of UHF broadcasting and there are a large number of systems and factors to be considered. The large variety of systems is mainly brought about by the need for stereo and mono reception, and the many ways it can be modulated.

Experimental VHF FM broadcasting commenced in Australia in 1947, and continued until 1961. In 1957/58 an enquiry recommended its suspension due to an almost total lack of interest. A further enquiry in 1970/71 recommended its re-introduction. VHF FM broadcasting became necessary overseas firstly because of overcrowding in the broadcast band, and secondly because of the demand for better quality. In this country there is some need to ease congestion on the broadcast band. As a result of TV allocations in the international 88 to 108 MHz band, the new services must be UHF. Existing VHF channels cannot be shifted!!

There is no UHF system of broadcasting elsewhere in the world to use as a precedent, so Australia must break new ground. The requirements of the new system are that it should be stereo and possibly quadraphonic, high fidelity, UHF, and capable of being tuned in on a simple receiver as mono. There are three types of listening services to be catered for. Stereo high-fi in the home, stereo or mono in the car, and simple hand held portables. The system chosen will be a compromise between the cost of the receiver and the performance.

The systems to be considered are either FM or pulse. There are three FM systems using pilot tones.

1. The system used in most parts of the world. It consists of broad band frequency modulation with A plus B and an amplitude modulated sub carrier with A minus B which is in turn narrow band frequency modulated on the base carrier. This system was developed for compatability with the existing mono FM system but it is not ideal. It has a higher signal-to-noise ratio on the pilot carrier than the base carrier.
2. As above, but the pilot carrier is broad band frequency modulated on the base carrier.
3. The pilot carrier is broad band frequency modulated by the A minus B signal and the pilot carrier is broad band frequency modulated on the base carrier.

Both the latter systems have a better signal-to-noise ratio but suffer from a higher threshold of improvement. A further FM system being considered consists of two separate FM signals with A and B separately modulated.

There are several pulse systems to be considered. These pulse systems would use time division multiplex and would probably have provision for four channels from the start.

1. Pulse amplitude modulation.
2. Pulse position modulation. Both the above systems have a similar signal-to-noise ratio improvement to FM with the same band width.
3. Pulse Code modulation. This system has the advantage of constant signal-to-noise ratio, as long as the signal is above the threshold of improvement.
4. Delta modulation.

During the discussion some interesting points were made by Mr. Dixon. Receivers for each system are to be supplied by the trade and each system will be tested in the field. The band to be used is the section at present allocated to the broadcasting service above 500 MHz, but some consideration is being given to the band above 470 MHz. The band will be no wider than 40 MHz with a probable 1 MHz spacing between carrier frequencies. It is likely there will be more areas of poor reception on UHF than VHF. Surprisingly, the noise interference at UHF is similar to that at VHF. ●

Newcomers Notebook

with Rodney Champness VK3UG

44 Rathmullen Rd., Boronia, Vic., 3155

Converting BC Receivers to 160

This information is supplied by Harry Heathcote, and will assist the SWL chap who has nothing better than a standard 5 valve SW mantel radio as a receiver.

My favourite band is 160 metres. It may not be known to the SWL, but this band can be covered on the BC set by altering the oscillator trimmer, aerial trimmer and, in extreme cases, the oscillator slug or padder. When operated in conjunction with a simple aerial matching arrangement results are excellent and good reception of the weekly broadcast is assured. Even if you do not have a SW set, you can now receive the 160 metre band, listen to the broadcast, and quite a few amateurs using this band. I suggest this alone will stimulate your interest, and if your knowledge is limited you can always get help from the SWL group.

The following notes will give in more detail the methods of accomplishing this conversion. It is desirable that your set have an RF stage for maximum sensitivity. The first step is to make sure that the set is working well. Alignment of the IF channel is the first requirement. I am assuming that you either have, or can borrow, a signal generator. Connect the signal generator to the aerial of the set and set it to 1860 kHz. The receiver tuning gang should be rotated until it is about 5 to 10 degrees away from minimum capacity. Adjust the trimmers on the oscillator, aerial and RF stage (if fitted) to approximately half capacity.

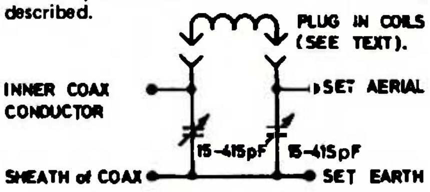
With the signal generator set at full output, adjust the oscillator coil core, or padder if no core is fitted to the coil, until you hear the signal in the receiver. You will be winding the core out of the coil or reducing the capacity of the padder to do this. If you still cannot hear 1860 kHz in your receiver adjust the oscillator trimmer out until you do. In some extreme cases there will not be enough range of adjustment on the coils and it will be necessary to take turns off the tuned windings. This can be messy so if you are stuck this way it might be as well to wind completely new coils to tune the range from about 1500 kHz to 4 MHz, and so get two bands, 160 and 80.

I will assume that the core adjustment brings results. Next, adjust the aerial and RF coil cores for best performance. A snag can develop here; some aerial coils have no cores to adjust. Should this prove to be the case you will have to take turns off the tuned windings. If it is Litz wire, make sure each turn is soldered, otherwise the circuit Q will be reduced. If you have to do this, it may be possible to fit a core after the removal of portion of the winding. This core will then give you some latitude in adjustment. Assuming that each coil has been able to be peaked in 1860 kHz, you retune until you have the tuning gang nearly fully meshed. Adjust the aerial and RF coil cores for best performance on a signal from the signal generator set to whatever frequency the set now tunes to with its gang meshed. The set will not tune the full broadcast band now, so the minimum frequency may be as high as 700 kHz.

Retune to 1860 kHz and adjust the aerial and RF trimmers for best performance, remembering to reduce the output level of the signal generator as the set comes into tune. Other than the initial adjustment the oscillator circuit is not touched again. Go over all these adjustments several times finishing up with the adjustment of the trimmers on 1860 kHz.

Aerial Matching Unit

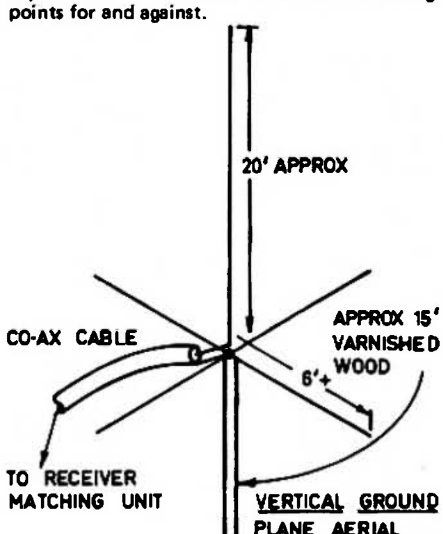
Harry goes on further to describe a simple aerial matching unit. It is in the form of a Pi coupler to match between the coaxial cable and the receiver input. He suggests that plug-in coils would make it easier to tune various bands, and as a starter he found that 12 turns on a 1" diameter former gave good results on 40 metres. No doubt this is probably most suitable for Harry's vertical aerial which will now be described.



AERIAL TUNING UNIT (SEE TEXT)

A Vertical Aerial

Harry writes: "In recent copies of AR there have been some excellent ideas for antennas, but probably space is the major factor in the construction of any aerial. I found that I obtained the best results from a standard SW receiver with a ground plane type, not cut or tuned to any particular frequency, leaving the matching unit to give reasonable Z at desired f. The whole thing is cheap, takes up little space, looks reasonably neat, and works. I would like to stress one point. If one is putting up any type of vertical antenna please have a thought for the people behind you and in line with the TV towers. By all means put the aerial up. Then be a good fellow and check. Ghosting can be annoying. Excluding beams this antenna works better than anything else I've tried." This aerial has worked well for Harry but it may not suit your particular needs. I would suggest you consult the various aerial books for other ideas. I commonly use a G5RV as a horizontal and a loaded quarter wave vertical fed against earth as my vertical aerial. Each of these has strong points for and against.



VERTICAL GROUND PLANE AERIAL (SEE TEXT)

Where to Get Odds and Ends

What sort of wire do you use for an aerial? I use 16 gauge tie wire for horizontal aerials, which costs about ½c per foot. All joins must be soldered, otherwise they soon become corroded and noisy (electrically). For the elements of VHF yagis I use 12 gauge fencing wire, and for the boom I use 1" dowell painted to prevent rot. The supports for these aerials can be TV push up type masts which go to 50 feet or single section galvanised tube 20' x 1½" used with a chimney bracket to give a height, when attached to a chimney, of about 30 feet above the ground. The wire can be obtained at hardware stores and the masts from TV aerial manufacturers and distributors. The old porcelain insulators are hard to come by today but a common source of insulators is from stores that sell electric fences and ancillary equipment.

Many people seem to think that the only place to buy radio equipment or parts is a radio store. This is not the case if you are an improvising home-brew addict. I am not referring to the amber liquid that comes from bottles; One of the main places to look is your local hardware store, particularly if it is a big one. For instance, plumbers' water piping (the plastic type) makes reasonable low frequency coil formers as well as ducts for cables. The galvanised pipe clamps that attach to the facia for toilet vents are suitable also for aerial mast brackets. Galvanised piping saddles are good for attaching masts to fences and walls. ¼" diameter coach bolts make good extension shafts. Small fishing tackle boxes, preferably the plastic ones, make good storage containers for small components. Can you think of other non-radio things that could be of use in radio construction as a cheap but satisfactory equivalent? If so, could you let me know so I can include it in this column. ●

20 Years Ago

with Ron Fisher VK3OM

August 1953.

Amateur Advisory Committees. The Editorial page of the August 1953 issue of Amateur Radio looked into tha development of the Advisory Committee from the pre-war Vigilance Committee, and then went into the why's and where-fores of the group at that time. On a later pega a full list of the WIA members of the Advisory Committee in each State is printed. A most informative article at that time, and perhaps it's time for an updated version.

The 1953 approach to 144 MHz. hand-held portable operation was described by Jim Bail VK3ABA. The receiver side was handled with a super regenerative detector driving a single audio amplifier which also doubled as the transmitter modulator. A three stage crystal controlled transmitter completed the picture. 1.4 volt tubes were used throughout. No doubt about it, we have come a long way. Just take a look at the new multi-channel hand-held two metre FM units that are available now. Part two of 'Amateur Television' by VK6EC discussed the flying spot scanner, the associated EHT power supply, and the photocell pre-amplifier.

Notes on VHF Converter Design was reprinted from an earlier issue of QST.

A good deal of space in the AR's of that time was taken up with Divisional Notes. Perhaos a look at the reports of the preceding month's meeting might bring back a few memories.

At the June meeting of the VK2 Division, the President Mr. J. Corbin was in the chair and Joe Reed, VK2JR, pointed out the pros and cons of 3.5 MHz versus 144 MHz for field days.

VK3 members enjoyed a 'tender' night with Len Moncur, VK3LN, doing his usual job as auctioneer.

At the Brisbane Meeting Jim, VK4OB, was appointed the new secretary and a lively discussion arose around the subject of incoming QSL cards for non-members.

Dr. Jallenik, Reader in Chemistry at the Adelaide University, entertained the VK5 general meeting with a talk on 'Ultra Sonics and Super Sonics'. The meeting set a record by finishing at 9.30.

In VK7 things were running a bit later; their lecturer did not even show up until 9.15, so a general natter was held until VK7LE arrived to discuss Vacuum Tube Voltmeters. Unfortunately VK6 did not report on their meeting. ●

Afterthoughts

Page 5, JULY 1973, AR

Astute readers will have noted that part of the oscillator circuit of the larger diagram were deleted in the printing process.

Reference to the other circuit will disclose the missing 15K resistors.

AMEND YOUR COPY NOW!

Commercial Kinks
with Ron Fisher VK3OM

3 Fairview Ave., Glen Waverley, 3150

Over the past months, "Commercial Kinks" has included more information on the FT200 than all other amateur journals put together. Although there is still more to come, this month I am going to devote some space to the FT101. With the new Custome Duty situation as applied to transceivers it eems likely that the FT101 will become as popular as the FT200 in the not too distant future.

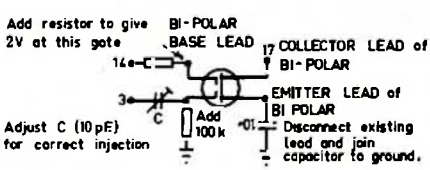
Even though there must be many hundreds of FT101's in Australia at the present time, information on problems and modifications is rather scarce. Perhaps all the present owners are completely satisfied with their sets. Anyhow I have discovered a few good modifications that have been included in the English Mobile News, and with due thanks to the Amateur Radio Mobile Society, present from their September 1972 issue the following modification:—

"The mobile operator has somewhat of an advantage over the fixed station user since usually he will have a high "Q" sharply tuned antenna ahead of the transceiver which will tend to discriminate against out of band signals. Amateurs using multiband dipoles, for example, may find any receiver problems accentuated. G3AZT wonders if anyone has carried out the tests suggested in the RSGB Test Reviews and would like to contact anyone with suitable test equipment. Cyril writes:—

"In the absence of good measurements and based purely upon my listening experience, I propose the following:—

"The Heath SB-303 had good performance when tested by the RSGB reviewers and owners find no problems. The general circuitry and frequencies are similar to the FT-101 but with the addition of an i.f. stage before the crystal filter.

"The f.e.t's are different and the first receiver mixer is a bi-polar device, therefore change the first mixer to an f.e.t. as suggested in the dirgram, fig. 1, also the r.f. stage, receiver second mixer and first i.f. stages. The 40673 f.e.t as used by Heath is preferable for the r.f. stage as it is diode protected. Consequently it is less likely to be ruined when passing close to another mobile or when wiring up.



"VK5PX cleared certain troubles by changing the receiver second mixer to a double balanced mixer I.C. plus a crystal across the tuned circuit. Whilst this probably cleared i.f. signal leakage through the mixer, I am not sure how badly the cross/inter modulation must have deteriorated."

VK-ZL-OCEANIA DX CONTEST 1972 RESULTS

VK — PHONE

Call	80	40	20	15	10	Total
1AOP	525	275	6330	2300	1710	11140
1BC	530	220	3335	3080	905	8070
1GM	..	..	4435	1880	..	6315
2SG	385	1645	11775	5735	2110	21650
2APK	405	2555	8250	5125	3840	20175
2XT	325	1065	8310	5720	1225	16645
2AHK	..	..	8620	..	..	8620
2EB	..	..	7685	..	..	7685
2AOV	..	..	2345	..	..	2345
2WN	..	..	..	110	..	110
3JF	..	..	7555	2300	1415	11270
3SM	..	..	..	2980	..	2980
3BBV	315	..	2535	..	..	2850
3WW	..	..	1050	375	..	1425
3EF	430	110	..	295	55	890
3BDJ	(160 metres only — 230)					230
4VU	..	..	6255	4270	3210	13735
4FH	..	..	1735	4685	4180	10600
4SF	..	..	6435	..	..	6435
4DO	..	..	5425	..	..	5425
4XY	..	..	2500	2335	..	4835
4PJ	210	..	2265	2025	275	4775
4AT	..	..	1085	..	..	1085
4AK						Check
4KX						Check
5HS	470	..	5445	3015	830	9760
5WV	..	..	6055	1165	..	7220
5OR	..	..	2485	1100	765	4350
5NO	..	..	..	3715	..	3715
6TU	255	..	925	1090	..	2270
7GK	365	3630	8340	5760	3410	21505
8CM	..	835	2755	2750	5395	11735
8AZ	..	..	1485	655	..	2140
9RY	..	..	1555	7630	3580	12765
9XW	..	215	3320	265	4320	8030
9XI	..	..	4150	..	..	4150

VK — CW

Call	80	40	20	15	10	Total
1AOP	..	..	2470	1110	..	4020
2APK	675	2580	7285	8230	3040	21810
2AHK	..	..	11585	4140	..	15725
2CX	..	..	5735	7490	1890	15115
2GR	675	2415	8040	2365	1035	14530
2GW	155	1355	6270	5735	..	13515
2BAN	..	..	..	6825	..	6825
2AGI	..	..	5565	..	..	5565
2QL	165	415	339	1935	1750	4635
2BRK	..	3850	..	..	..	3850
2WN	220	55	..	..	..	275
2BQQ•H						7670
3KX	300	2410	5895	6845	1945	17395
3ZT	..	..	8120	5430	1210	14760
3MJ	..	..	..	7250	..	7250
3APN	430	1615	..	..	..	2045
3YK						Check
4KX	..	..	..	6080	..	6080
4XY	..	..	..	3405	..	3405
5NO	..	..	9640	..	..	9640
5FM	..	..	4610	2160	1035	7805
5OR	..	..	2890	1555	..	4445
5UY	..	..	1410	1930	..	3340
6HD	1560	4985	7740	9335	4115	27735
6CH	..	220	4805	1675	..	6700
6CT	1735	..	..	..	..	1735
7GK	1595	5590	7840	3590	2145	20760
7LJ	..	..	4715	735	..	5450
8HA	55	110	2235	6970	1150	10530

VK — S W L

L 2161	5695
L 3377	5940
BERS 195	3920
L 40104	5445

ZL — PHONE

Call	80	40	20	15	10	Total
1BKX	610	1015	9745	7100	3770	22475
1AXB	..	..	13015	..	..	13015
1AMM	165	..	3950	4155	2340	10610
1AKY	55	165	830	5820	3065	9935
1BKR	..	..	9670	..	..	9670
1AIZ	730	1285	1095	4210	1610	8930
1AGO	..	..	..	8685	..	8685
1AMQ	..	905	3090	920	1760	6775
1MQ	..	..	6045	55	..	6100
1AYV	2175	..	..	..	..	2175
1BHQ	..	1750	..	..	..	1750
(• 1BKX also 235 on 160)						
2ACP	620	1400	6580	4960	3570	17130
2TG	..	..	6340	3095	825	10260
2AH	..	..	..	7715	..	7715
2GJ	275	670	6090	..	..	7005
2SS	..	110	2970	2335	..	5415
2AWH	2090					2090
3US	..	..	7400	6335	2445	16180
3NS	..	..	11210	..	..	11210
4OP	..	..	1990	480	975	3445
4BO	..	..	..	..	2340	2340

ZL — CW

Call	80	40	20	15	10	Total
1ARV	..	..	9432	4685	..	14117
1ARV	..	1415	6140	2665	1845	12065
1AMQ	355	2290	4660	1675	2875	11855
1IL	..	..	3805	3980	3425	11210
1AIZ	1400	1685	11505	4160	2380	11130
1AMM	380	1445	1445	3770	2410	9450
1HV	..	2100	3080	2510	580	9395
1BKR	..	..	7130	..	..	7130
1AMO	..	6470	..	..	..	[illegible]
1MQ	..	..	4175	55	..	[illegible]
1BHQ	..	4070	..	..	..	[illegible]
2TG	..	1940	5190	2725	4920	14775
2AH	..	..	..	8595	..	8595
2AWH	1200	..	..	..	..	1200
3GQ	220	3765	8610	4565	3085	20245
3IS	..	..	..	5065	..	5065
3CP	..	..	1685	290	..	1975
3ABC	..	..	1865	..	..	1865
4AT	510	640	7120	..	..	9275
4BO	..	4520	..	..	..	4520

OVERSEAS PHONE

EUROPE		OK1KCP	343
DL8PC	3614	OK1MGW	110
DK3SE	2006	OK3CFA	18
DK8FZ	1995	OK1AVD	18
DK4TA	147	OK1NH	Check
DK3FB	21	OH2BO	9688
DM2AYK	546	OH2HN	1404
EA3JK	70	OH2BMG	708
F9RM	4122	OH6ZH	189
F2QQ	1241	OH7NW	75
F6BVS	450	OH3JR	42
F6API	168	OH2LV	30
GM8AXY	8	OH5PA	18
G3PHO	3024	OH5YF	Check
G3NSY	1885	OH6RY	Check
G3NAS	816	OZ6RT	4704
HA4XX	400	OZ7HT	2425
HA5KF	304	OZ1RH	[illegible]
HA6NN	216	OZ4PM	[illegible]
HA3KNA	42	OZ7PM	[illegible]
HA2KMR	30	SP3DOI	4056
HA5KFA	Check	SP9PT	112
I3MAU	3159	SP9AI	75
I4LX	3128	SP9ABU	40
ON5MG	4424	SP2BBD	18
LA8NC	1005	SP1AGE	4
LA6GF	680	SP9BLF	4
LA5QK	423	SP9KRT	4
LA8RL	186	SM7ACB	5478
LA5KO	8	SM0AJU	3052
LA3YQ	Check	SM3BUS	792
PA0JR	52	SM7ANB	280
OK3YCE	804	SM7BBV	Check
OK1ADM	585	SM0BDS	Check
ASIA			
JA1ILN	10920	JA3AER	486
JA1CMD	4572	JA3BJN	133
JA1OMH	1391	JA4BNT	5130
JE1NAA	440	JA4BBN	4608
JA1BUI	178	JA4TR	64
JA1AAT	80	JA4DZ	39
JA0CZC/2	7325	JA5FDJ	756
JH2FTH	216	JA5BRL	640
JH2KTY	80	JA5FYK	301
JH2FCA	20	JA4AQR/5	138
JA3MGX	9250	JA5DQH	2
JA3DGC	8382	JA6YCU	15876
JA3LVP	1212	JA6BIF	4380

JH6CAW	1164	9M2CY	370
JA6EFT	1024	JA9BMG	4200
JA7MJ	5670	JA9EQN	990
JA7AQR	4628	JA9BKW	210
JA7CDV	4156	JA0JTO	490
JA7JW	105	JA0JIZ	32
JA8BB	1458	EP2BQ	4209
JA8MWU	1040	XW8EV	132
JA8GO	696	YA1OS	720
JA8AIP	400	9V1RH	1001
JA8DFD	245	9M2CJ	340

NORTH AMERICA

W2FCR	4900	K8VIR	1254
W3TV	5184	W8FJS	156
W3QDR	125	HP1JC	480
W4WSF	14850	XE1LLS	2794
W5SBX	5940	XE2LLX	168
K5LVZ	360	KL7HDX	252
W6OXS	1598	VE7VP	6237
W7SFA	22140	VE6MP	2850
WA7PAB	1777	VE3SLC	885
		VE6AYU	50

OCEANIA

KG6JBO	59535	9J2GJ	1264
YJ8BL	54135	VR1AA	40866
KH6IJ	21336	KH6RS	19894

AFRICA

9J2GJ	1264

SOUTH AMERICA

CE8AO	280	LU3HAK	22
6M2AGD/CEO	3211	PY2EZB	18
CP1EU	4283		

U S S R.

UA1CS	2835	UO5BZ	175
UA1MU	16	UI8CD	1530
UA3AAO	13580	UB5WE	3819
UA3VAM	168	UK5LAA	396
UA3DAO	88	UY5OO	203
UV3DN	27	UB5VY	70
UK2GAA	236	UH8AE	1395
UR2QD	837	UH8BO	60
UK2WAF	790	UA9QDX	132
UC2WP	80	UA9MT	114
UK4WAB	1470	UA9CBO	4
UK4WAC	966	UA0MI	1666

S.W.L.

BRS 15822	1444	JA1-8065	256
DM5323/M	176	JA1-12490	27
DM6405/N	132	JA2-1885	1008
HA5-185	50	JH2IRH	96
HE9EVI	1720	JA3-7604	533
LA-M5605	1230	JA3-6362	2
14-15645	2088	JA4-6600	1140
IL-12387	840	JA0-1320	12152
ONL-383	440	UC2-00915	1666
DNL-1090	312	UA1-149-23	1344
OK1-15835	840	UA3-142198	1222
SM5-2735	896	UA3-127-1	504
YO8-8013/SV	—	UA3-142198	440
JA1-11166	9900	UA4-09543	6844
JA111614	5858	UB5-060351	340
JA1-8065	2912	UA6-150-2	272
JA1-4876	400	UA0-10316	1728

OVERSEAS — CW

EUROPE

DL8NU	4239	HA2MC	192
DL1JW	4000	HB9IK	620
DJ5GG	2080	HB9UD	100
DL1JF	1680	HB0NL	132
DL1JC	598	I3ASE	3014
DM2BJD	3978	I1CRW/P	216
DM4YEL	1649	LA6GF	671
DM2CYO	408	PA0JR	880
DM2BZ·		PA0LO	351
	387	OE3AX	132
DM2CHM	300	OK1KOK	4648
DM2DEO	120	OK2QX	2163
DM3UE	78	OK1TA	1602
DM2FBL	55	OK1TS	792
DM3BE	18	OK2PDL	368
DM3XHF	Check	OK1DIM	270
DM4ZEL	Check	OK2BKI	217
EA2AI	360	OK1MGW	210
EA2HR	2	OK2RO	154
F9YZ	330	OK2BKL	72
G2DC	2288	OK2BCI	44
G6XL	690	OK2PAM	40
G3VW	416	OK1MSP	30
G6CJ	Check	OK1EP	18
HA5K8M	9855	OK3CEV	8
HA6NN	480	OK3BT	8
HA4KYB	315	OK2BDE	8
HA5KO	266	OK1AEH	8
OK3IFM	2	SP5GH	8
OK1KZ	2	SP6DMJ	2
OK1AII	Check	SP8AQN	2
OZ7HT	1692	SP9BDQ	2
OZ2X	60	SP2AHD	1
OH2BJY	280	ON4XG	767
OH1QB	210	SM0CCE	1314
OH2LV	72	SM5BPJ	583
OH7SP	65	SM0FY	70
OH2BFX	12	SM0CGO	48
OH5UX	8	SM0BVQ	27
OH2BMG	2	SM7BBV	Check
OH1NW	2	SV0WTT	363
SP9CTW	960	SV0WH	272
SP7ASZ	175	YO8FZ	910
SP3CDQ	108	YU1EXY	1116
SP9DT	108	YU1NGO	477
SP9ABU	70	YU1YE	210
SP2FBC	32	YU2OB	154
SP5EXA	24	YU1ODO	150
SF9EEL	12	YU1SF	18
SP2AVE	8		

ASIA

JA1SJV	9240	JA5DQH	781
JA1ILN	8066	JA4AQR/5	294
JA1NI	7440	JA6MJV	3973
JA1CMD	7332	JA7FS	6747
JH1TGU/1	4160	JA7FC	5684
JA1SR	3612	JA7KXD	2712
JA1BNW	1088	JA7HAF	2346
JA1KNZ	1068	JA7GAX	1840
JA1BSU	574	JA7IKH	1584
JA8BI/1	506	JA7MJ	207
JA1AS	843	JA7JW	80
JR1IIN	261	JA8DIO	1140
JR1PUO	92	JA8AIP	780
JA1UTC	72	JA8GR	490
JH1HMC	24	JA8GSX	110
JA2WK	1452	JA8LOK	70
JA2DNA	530	JA9CAF	6634
JA3YAW	6510	JA9BMG	3380
JA3JRI	1221	JA9EQN	207
JH3SOP	154	JA0AJH	1350
JH3FOR	95	JA0EPV	649
JA3YEJ	80	JA0EZP	516
JA3NXC	48	JA0KSK	70
JH3BJN	2	EP2BQ	2925
JA4BNT	5544	HM1AQ	1476
JA4DZ	91	KR6RU	1092
JA5XX	3072	XW8EV	5

NORTH AMERICA

W1EVT	8778	W6TZD	7100
W2LWI	6006	WA6JVD	6208
W8CQN/2	2325	W6OXS	2200
W3TV	2832	K6RU	1092
W3QR	184	W7IR	15980
K4RDU	892	HP1AC	224
W4HOS	492	HR1AT	880
W4JUK	130	VE7HQ	714
W5OB	1650	VE3CDK	25

OCEANIA

VR1AA	29302	KG6JAR	6690
C21TL	2670	KH6RS	19188
KX6BB	7602	KH6IJ	7619
KX6JS	742	KH6GJY	5117

SOUTH AMERICA

OA4AHA	344
LU3HAK	57

U.S.S.R.

UA1DZ	4704	UK5EAG	564
UA1AAA	3775	UB5NS	520
UK1WAB	6	UK5LAA	280
UA1DX	Check	UT5HP	210
UA3AAO	8330	UY5OO	192
UK3YAB	4185	UB5IF	192
UW3HV	3425	UY5TH	48
UA3TAM	90	UB5QAP	Check
UA3GP	24	UK5VAA	Check
UW3YS	Check	UY5GG	Check
UA3DBG	Check	UA6LO	948
UK4WAC	2583	UD6CN	396
UK4WAB	1445	UK6DAU	275
UK4LAD	280	UF6QAC	12
UK2WAF	600	UK7GAA	2040
UK2PAF	4455	UL7GW	864
UC2WP	3	UL7CT	560
UK2PAR	1353	UL7CH	450
UK2GAY	1717	UL7GP	Check
UK2GAA	1292	UH8AE	2380
UK2GBY	196	UH8BO	144
UK2GCG	95	UW9PT	3476
UB5VY	1768	UA9NN	2358
UB5UAL	1508	UW9WL	2196
UK5WBG	1296	UK9MAA	1957
UK9HAC	864	UA0DV	1365
UA9CAL	66	UA0CBR	603
UA9MK	32	UA0CAV	360
UA0JAD	5564	UA0LU	133
UA0MI	2975	UA0TD	39
UV0EK	1674	UA0LEX	21

It was the pleasure of N.Z.A.R.T. to organise the 1972 VK/ZL/O DX Contest and while the number of logs received was a disappointment, it is recognised that conditions were not very encouraging. In spite of this, it is evident from some of the scores that dedicated operators utilising their many talents are able to cope very well under adverse conditions..

Full results are being mailed to all certificate winners and we trust that publicity with local results will be given by the Societies concerned. Remember — the 1973 Contest will be organised by WIA — N.Z.A.R.T. will welcome you again in 1974. Good DXing and 73 from N.Z.A.R.T.

JOCK WHITE, ZL2GX, Contest & Awards Manager.

(In all the recent changes affecting AR, the results of this contest were mislaid. We apologise for the delay in publication. — ED.)

Awards Column

with Geoff Wilson VK3AMK

D.X.C.C.

PHONE

VK6RU	318/347	VK2APK	301/311
VK5MS	316/343	VK5AB	294/314
VK4KS	315/332	VK4PX	293/297
VK3AHO	307/326	VK4UC	291/293
VK6MK	305/329	VK4FJ	286/310
VK4VX	302/305	VK4TY	282/288

Amendments: VK4SD 127/130 VK3TG 201/206 VK3JF 228/230 VK4DO 247/261 VK2AHH 268/280

C.W.

VK3AHQ	306/326	VK3NC	271/297
VK2QL	302/328	VK6RU	265/291
VK3YL	293/313	VK3YD	261/281
VK2APK	292/302	VK4VX	261/263
VK4FJ	291/320	VK4TY	256/272
VK3XB	263/300	VK3TL	251/260

Amendments. VK2AHH 140/150 VK4DO 199/218 VK3JF 202/210

OPEN

VK6RU	318/345	VK4VX	308/311
VK4SD	317/335	VK6MK	305/329
VK4KS	316/337	VK4TY	303/321
VK2VN	313/335	VK2SG	302/309
VK2APK	310/325	VK4FJ	300/329
VK2EO	309/325	VK4PX	300/308

New Member: Cert. No. 149, Call VK3AXO, Total 109/110

Amendments: VK3QV 144/145 VK4DO 258/279 VK3JF 259/268 VK2AHH 276/292

W.A.V.K.C.A. AWARD

The following additional stations have qualified for the award since 30th June, 1972:

Cert. No.	Callsign	Cert. No	Callsign
530	JA1FNZ	551	ZL3VJ
531	JA8BZL	552	XE1J
532	SM0PX	553	JA1ILN
533	W0CDC	554	JA7BVA
534	ZM3SX	555	F9OW
535	RA3ACQ	556	G3JFC
536	UA9HM	557	OH2QQ
537	UW0IX	558	I1WT
538	UK5MAG	559	ZL4NH
539	UA0NM	560	4S7DA
540	UK0CAS	561	ZE6JL
541	UK0CAE	562	JA2ACC
542	UW0FP	563	UA1IG
543	JA2AHR	564	UA6LAH
544	JA4BEX	565	JA7MJ
545	XE1LLS	566	OM2BJD
546	JA1FNA	567	ZL2NP
547	JA7HZ	568	G3JEQ
548	UM8FM	569	JA8AIP
549	UK4WAB	570	JA1CKE
550	UQ2GW		

VHF UHF
an expanding world
with Eric Jamieson VK5LP

Forreston, S.A., 5233
Times: GMT

AMATEUR BAND BEACONS

VKO	52.160	VKOWI, Macquarie Island.
VKO	53.100	VKOMA, Mawson.
VK2	52.450	VK2WI, Dural.
VK3	144.700	VK3RTG, Vermont.
VK4	52.600	VK4WI/2, Townsville.
VK4	144.400	VK4WI/1, Mt. Mowbullan.
VK5	53.000	VK5VF, Mt. Lofty.
VK5	144.800	VK5VF, Mt. Lofty
VK6	52.006	VK6VF (VK6RTV), Bickley.
VK6	52.900	VK6RTT, Carnarvon.
VK6	144.500	VK6RTW, Albany.
VK6	145.000	VK6VF (VK6RTV), Bickley.
VK7	144.900	VK7RTX, Devonport.
VK8	52.200	VK8VF, Darwin.

A letter to hand from Peter VK7PF advises his appointment as VHF Officer for VK7 and he starts the ball rolling with advice that the VK7 beacon located at Devonport was off the air at time of writing (27-8), for identification change to VK7RTX, and re-location due to a change of job of the North West Zone Member who looked after the beacon at the 7AD broadcasting station site. The beacon is included in the current list above under the new call sign as it may well be in operation again by the time you read these notes.

Peter further advises that nine VK7's have used the AO6 satellite and worked all States except VK8, plus ZL's. VK7PF has worked KH6HK (3800 miles), has heard DU1POL several times, and has now logged 98 call signs through the translator. Good work Peter, and I will be pleased to hear from you whenever you can write.

Roy, VK6ZFL Secretary of the Carnarvon Amateur Radio Club in N.W. Western Australia, writes with advice that they have completed changes to the keyer of their beacon which now uses the call-sign of VK6RTT. The old call sign VK6TS has been retained as the local Club call.

Roy advises that there have been interruptions to the continuous operation of their beacon during VHF tracking periods, and in particular the Skylab missions, as the telemetery pre-amps are very prone to intermodulation. To overcome such problems the Club is hoping to move the beacon to the QTH of John VK6DR where it should be possible to revert to continuous operation. The life of the beacon and the Club is dependent upon the further operation of the Carnarvon Tracking Station, and we all hope this period may be extended for some time yet. Thanks for the news Roy, always pleased to hear from you. Good luck with the JA's which you work from time to time.

2304 MHz DISTANCE RECORD EXTENDED

Some news which did not arrive at my desk direct, but through the medium of "6 UP" from VK2, and is worthy of mention is the extension of the 2304 MHz distance record from 53.5 miles (refer June A.R.) to 100.5 miles, again by the old firm of VK2BDN and VK2ZAC. The details from page 17 of "6 UP" . . . "On the weekend of 19th and 20th May, Dick VK2BDN travelled to Mt Gibraltar at Bowral (2830 feet) and Bill VK2ZAC to Mt Kulmura (1180 feet). Contact was established between the two stations and signal reports of 5-8 were exchanged, the contact being maintained for one hour . Equipment used was the same as for the contact reported last month. Note that this path is not an optical one, the earth's curvature obscuring it." Further congratulations gentlemen; we all look forward to news of your contacts.

432 MHz ATV RECORD.

It is officially confirmed that the Australian 432 MHz A.T.V. record on file is for a distance of 256.594 miles between VK3ZPA-T in Sunbury and VK7EM-T in Penguin on 13th December 1972. Congratulations to both stations but with the ever-increasing interest in ATV on VHF-UHF it may not be too long before this is bettered.

NORTH QUEENSLAND NEWS.

Ron VK4ZLC, the Publicity Officer for the Townsville Amateur Radio Club has written advising plenty of openings on 6 metres to JA, with VK4RO, VK4ZTK and VK4ZLC taking the main share. Looks like several more additional 6 metre operators from Townsville for the next DX season too.

Channel 8 is gaining in popularity in the North too, with Ross VK4RO generating 45 watts. Dave VK4ZLZ converting equipment, others constructing beams. Guess all this activity will help on the occasion of the North Queensland Convention for sorting out lost cars etc.

My thanks also to Ron for the copy of "Back Scatter" with news from Townsville. Will be pleased to receive copies as available.

RETURN TO TWO.

The Geelong Amateur Radio and TV Club sponsorship of the "Return to Two" campaign is proving very successful, and many copies of the requested information have been returned to the Club. It is noted in "Q.R.M." from Northern Tasmania that they are lending their support to the campaign, and Geelong is making Wednesday night a 2 metres activities night, so people in other areas might well follow suit, and some good contacts could result.

FT200 AND HIGH POWER VHF SSB.

As there are many FT200 transceivers acting as SSB generators for VHF transverters, the following modifications may be worth keeping in mind if you are having any trouble with your equipment. The brief article is reprinted from the Geelong Amateur Radio & TV Club News letter under the pen of Ken, VK3ZNJ, and I quote:-

"When I built up my Transverter for 2mx I found that with the low power of 10w pep I was not getting enough contacts so I decided to build up a linear to give me a louder signal on the band. So after several weeks the "Loudenboomer" was ready to go and in tests into the power meter it gave well over 75w RMS out and it was time to put it to air. After several QSO's the reports were the same "loud and lousy" so I had a listen to my own signal and it was' . . . back to the drawing board.

"I rebuilt the linear and transverter twice but the result was the same so it did not seem to be the homebrew rigs, and to make sure I took my FT200 round to 3ASQ, and the same result was experienced using his transverter. After thinking about the problem and listening to the signal I decided the problem was RF feedback and with a printed circuit board tool

"However, looking at the map I noticed that the heaters were not bypassed, so I installed a .001 to earth on the 12AX7 mike pre-amp heaters and a .001 across the 10uF bypass on the cathode of the second half of the same tube, as the 10uF doesn't pass RF too well. Well, the rest is history. With 150w PEP out now I was lucky to work VK2NN, and the rig is receiving good reports all round after three months of frustration!" End of quotation. The above may save somebody a lot of work.

TWO METRES.

Last month I commented on the 2 metre activity between Sydney and Victoria, and points between, with various attempts being made for two way contacts. The month of May provided some very high pressure ridges which extended from VK5, across Victoria into the southern areas of N.S.W. Partucularly outstanding was the contact between Tony VK5ZDY at Stirling near Mt Lofty, to VK2BDT about 90 miles SW of Sydney, on 20.5.

Another good opening occurred on 11.5. with excellent signals between VK2NN at Wentworth Falls to VK3AJN at Wangaratta, and Ken VK3ZNJ at Geelong. Further north, VK2ZAY at Boggabri was hearing VK3AJN and VK2ZEO, Deniliquin.

Canberra also comes into the news with Reg VK1MP being well received in Sydney, using 3 watts PEP, on 27th. Believe Eddie VK1VP has also been able to take a share of the Sydney path for a change. Following up these efforts the next night saw the following stations being worked in Sydney, VK3AJN, VK3ANP, VK3APF, VK2ZEO, VK2ZAA (Tumut). Thanks "6 UP" for the info.

The signal path from Sydney to VK3 has often been considered a poor one, and probably generally is, but the late tropo openings in May this year show what can be done if you are set up for the job. Seems a pity only four Sydney stations were on to take advantage of such excellent conditions.

6 UP STATE OF THE ART CONTEST.

Although the "6 UP" Magazine State of the Art Contest will probably be over by the time you read this, you are reminded to send your entries and logs to reach the Editor 6UP 47 Ballast Pt. Road, Birchgrove, 2041, by 14th September. This column hopes the contest will be a successful one, and a warm-up for the Remembrance Day Contest to follow shortly after — how about the VHF types getting on the air again this year and indicating their support for the RD Contest.

GENERAL NEWS.

Congratulations to the South East Radio Group at Mt Gambier S.A. for a successful 9th Convention over the June holiday weekend. Despite changes to planning due to the holiday in Victoria being one week earlier than VK5, everything appeared to go smoothly, and I for one had a very good time. The excellent prizes were shared among many, although I did note Bevan VK5TV coming up to the rostrum quite a few times. "The Voice in the Hills" was this year invited to present the various trophies to the winners, which he did dressed in clothes most suited for hidden transmitter hunts — no warning to allow a change to tails and bow tie!

That will have to do for now. Off the air at present whilst the new shack is being built. It will be much warmer than the old one and maybe Bob Murphy VK5ZDX will stop complaining when next he visits me! Consequently, on-air activity is rather limited.

Closing with two thoughts for the month: Firstly, isn't it nice to read some VHF without being thrashed with news of the current FM "debacle" . . . and secondly: "Politicians are like ships: Noisiest when lost in a fog!"

The Voice in the Hills

Intruder Watch
with Alf Chandler VK3LC

1536 High Street, Glen Iris, 3146

A report from the International Amateur Radio Union Monitoring System is interesting and reads:- "The situation on 40mx remains fairly static with the Radio Peking transmissions being heard world-wide. Although the Chinese Administration has acceded to the International Telecommunication Convention 1965, they have made reservations regarding the assignment and utilization of frequencies. It is hoped that a solution will be eventually found to this problem, but probably only in the long term.

Both 20mx and 15mx show a slight increase in the number of intruders listed. On 20mx the activity in the Middle East of a number of SSB stations is causing concern. Although some of these stations use amateur callsigns, the traffic passed includes diplomatic are para-military messages. One station has been identified as being located in Kuwait and another in Morocco. On the high end of the band a Moroccan CW net is also causing some problems. On 15mx there are still a number of diplomatic stations of unidentified origins. Although Information regarding the location and controlling administrations of these stations is still being collected, more information would be very welcome.

Out of a total of 41 intruders on the 10mx band, at least 27 are known to be harmonics. It can be seen that if adequate harmonic suppression was carried out the 10mx band would be comparatively free from intruders. The national societies in the countries concerned have been asked to bring pressure, where possible, on the administrations in charge of the broadcasting stations. RSGB headquarters station GB2IW is again operational and stations are invited to arrange skeds."

Thus it can be seen that the RSGB in Great Britain is active in identifying and reporting intruders, and it is only by so doing that we in Australia can play our part. I have sent a summary of intruders heard in this area for the past six months to the UK. Please note that the I.W. Sked or net is operating on 3585 Khz on the second Monday of each month at 0930 GMT.

The VK4 Co-ordinator operates a net for Queensland Members on a frequency of 3580 Khz on the first Monday evening of each month at 0930 GMT. Not as specified in June issue.

Contests

with Peter Brown VK4PJ

Federal Contests Manager, G.P.O. Box, 638 Brisbane, Qld., 4001.

1973 JOHN MOYLE MEMORIAL NATIONAL FIELD DAY RESULTS

24 HOUR DIVISION

Section (a). Tx. Phone
VK3YAP 440
VK3AVJ 393
VK4IE 1779
VK4AL 1161
VK4XZ 745
VK5LM 278
Section (b). Tx. CW.nil.
Section (c). Tx. Open.
VK3BMD 1465
VK3AUG 1251
VK3EZ 638
Section (d). Tx. Multiple Operation.
VK1ACA 3038-7 Ops
VK1JC 2330-7 Ops.
VK2WG 1753-7 Ops
VK3ATO 3810-11 Ops
VK3APC 3131-10 Ops.
VK3ANR 1774-8 Ops.
VK3AWS 1620-
VK3YQ 650-3 Ops.
VK4TC 2532-10 Ops
VK4BW 936-3 Ops.
VK4JI 897-5 Ops.
VK5LZ 1891-7 Ops.
VK5AW 1678-6 Ops.
VK6II 670-8 Ops.
VK8DA 2254-9 Ops.
Section (e) Tx. Mobile.
VK3OR 608
VK4OW 74
VK5LM 278
Section (f) Tx. Fixed Station
VK2VM 335
VK3XB 1130
VK3AYL 660
VK3RN 600
VK3LJ Check
VK4VX 560
VK5NO 1625
VK5LM 279
Section (g) Receiving
W. Newport 1420 O. Vale 1380 L. Smith 1135 T. Hambling 750 E. Trebilcock 260 (all CW)

6 HOUR DIVISION

Sktion (a). Tx. Phone
VK3BBC 737
VK3AKJ 668
VK3AHG 618
VK3EF 583
VK3AAM 476
VK3HE Check
VK4GT 644
VK4ZML 182
VK7BM 285
VK7AX 165
Section (c). Tx. Open.
VK3AVP/T840
Section (d). Tx. Multi Operation
VK3CEC 663-3 Ops.
VK4PJ 419-3 Ops.
Section (e). Tx. Mobile
VK1GM 437
VK3BCF 550
VK3LC 186
VK3ZIM 146
VK4ZTL 91
VK4PJ 15
Sction (f). Tx. Fixed Station.
VK3KK 375
VK3HE 235
VK3WP 165
VK3PR 130
VK7AL 225
Section (g) Receiving.
J. H. Zinkler 1525
M. O'Connor 1395 S. Dwight 1110
T. Hannaford 775
R. Everett 425.

You will no doubt be pleased with the greater interest shown this year. Comparing with last year's results you will find that we have made a 20%+ improvement ... it needed but 15 logs to do that. I doubt that overseas publicity helped much so, with ZL and other Oceania help, we must generate our own activity.

The cry is always that contestants are not kept active enough but we are heading for a really active Field Day.

If you were not in this year's contest make sure that you are in next year ... preferably portable. We do not have enough operators who can transmit without mains power.

Who can forward a constructional article on a Homebuilt IC generator outfit, suitable for our Field Day?

It is good to see the list of multi-op stations. These consider, without detracting from the more valiant efforts of the single-op stations, bring a team spirit into the contest. Some will comment "Look at all the operators they had?" But it takes some co-operative effort to get a large number into the field for 24 hours.

Thanks to the fixed stations who helped out.

Are you happy about the 6 hour and 24 hour Divisions??

It appears that we are catering for quite a range of operating requirements.

Thanks for the comments, which I will correct for next year. Any photos for "A.R."?

European DX Contest

CW: August 11th and 12th. 0000GMT Saturday to 2400 GMT Sunday.
Phone: September 8th and 9th.
Single operator and multiple operator.
36 hours of 48 by single op., 12 hour rest in up to 3 periods.
Usual RS/RST exchange. One point per OSO and one per OTC reported.
Multiplier is number of EU stations worked on each band.
Final score equals total OSO points plus OTC points by total multipliers.
Mail deadline. Sept. 15th for CW, and Oct. 15th for phone.
D.A.R.C. WAE Contest Committee. D-895. Keufbeuren. PO Box 262. West Germany.

All Asian DX CW Contest.

1000 GMT. Saturday August 25th to 1600 GMT Sunday August 26th. Logs to J.A.R.L. Contest Committee, Central Post Office, Box 377, Tokyo, Japan.

Inaugural Gold Coast Radio Club Annual Field Day Contest.

0400 GMT Saturday 1st Sept., to 0400 GMT Sunday 2nd Sept., 1973. Open to all stations. Portable/Mobile stations will endeavor to contact other Portable/Mobile stations and fixed stations, and vice versa.

Section 1.	(A)	Fixed HF.	(B)	Portable/Mobile HF.
Section 2.	(B)	Fixed VHF	(B)	Portable/Mobile VHF.
Section 3.	(C)	Fixed HF & VHF	(B)	Portable/Mobile HF & VHF.
Section 4.	(A)	Fixed SWL	(B)	Portable/Mobile SWL.

Portable/Mobile may use any power source except at the home address. All multi/ops must be located within a 1m circle and one log, one call sign. Simultaneous operation permitted.

Scoring Fixed Stations.
1 point to Fixed stations
5 points to Portable/mobile.
10 points to VK4OG portable.

Portable/mobile stations.
5 points to Fixed stations.
8 points to Portable/Mobile stations.
20 points to VK4OG/P.

One contact with the same station per hour per band.
SWLs score as above but count both stations logged on each contact.
Entries by 1st November to The Contest Manager, Gold Coast Radio Club, P.O. Box 588, Southport, Qld. 4217.
Give the Gold Coast Club a good start for their Field Day Contest.

The 15th Scandinavian Activity Contest.

CW. September 15th & 16th. Phone September 22nd & 23rd.
1500 GMT Saturday to 1800 GMT Sunday
Non-Scandinavian's call CQ "SAC" on CW, and CQ Scandinavia on phone.
3.5 through 28 MHz. CW/CW and phone/phone only.
Prefixes . . . LA/LJ/LG., JW, JX, OH, OHO, OJO, OX, OY, OZ and SM/SK/SL.
(a) Single op., (b) Multi op., single TX, (c) Multi op., multi TX (All Clubs). Class (c) separate serials for each band. Usual RS, RST and 3 serials.
One point per OSO. Multipliers . . . Max. of 10 per band, of prefixes above.
Logs to be mailed prior to 16th Oct. to Contest Manager, Alf Almedal, LA5QK., N-4052, Royneberg, Norway.
Here is a chance to work some new countries as QSLs are encouraged.

Contest Calendar

August 11-12th. Worked All Europe DX. CW Contest.
August 18-19th. Remembrance Day Contest.
August 18-19th. S.A.R.T.G. RTTY Contest.
August 25-26th. All Asien CW Contest.
September 1st-2nd. Gold Coast A.R.C. Field Day.
September 8-9th. Worked All Europe DX. Phone Contest.
September 15-16th. 15th Scandinavian Activity Contest. CW.
September 22nd-23rd. 15th Scandinavian Activity Contest. Phone.
October 6-7th. VK/ZL Oceania Phone.
October 13 14th. VK/ZL Oceania CW.
October 13 14th. R.S.G.B. 21/28 MHz Phone.
October 20th-21st. R.S.G.B. 7 MHz CW.
October 27-28th. CQ. WW DX Phone.

Who said the bands are dead????

If you have not yet achieved your DX, DXCC now is the time!

VK/ZL Oceania Contest. 1972.

You will be pleased to know, particularly those who helped, that we have bettered the previous contest by around 15%.

In case you become complacent, the improvement was but 10 logs, and you will agree that we should do a lot better in our only international contest. Here is the Division participation table.

VK1	1971-4	1972-4	
VK2	1971-11	1972 20	up.
VK3	1971-6	1972 11	up.
VK4	1971-15	1972 11	
VK5	1971-5	1972-8	up.
VK6	1971-8	1972-4	
VK7	1971-8	1972-3	
VK8	1971-1	1972-3	up.
VK9	1971-3	1972-3	
Total	67	67	

If VK2 and VK3 had not come good we would have "been down the drain".

How did you come to lose the lead, VK4???

1973 VK/ZL rules appeared in March 1973 "A.R". Make sure that you do your bit in 1973.

CW contest

I did a quick count of 878 amateurs in the USSR CQ/M DX CW contest (1972) and was pleased to note we were represented. Thanks VK6WT.

Unofficial CW Contest.

From comments received (not many) it should be worthwhile persisting with this unofficial CW contest for a while. There was not much notice, but about 17 took part in June.

The object is to provide CW practice for VK amateurs, particularly those who are not so confident.

These CW blokes are a pretty good crowd so don't hesitate to come on in the next contest and gain some speed.

Next Contest. 12th August. (3rd Sunday is RD) 6 pm to midnight local.
0800Z to 1400Z. Bands 80, 40, 20 meters.
Usual RST. CW/CW only. VK call areas only.
One point per contact per band per station.
Logs are not required. Just total score and call sign with your comments. 7 cents and an envelope.

1973 B.A.R.T.G. RTTY Contest

Ted Double, G8CDW sent along the results of the British 1973 RTTY Contest in which VK6PG and VK2EG were the only VK's to appear — 23rd and 31st in the list respectively.

GET TOGETHER GANG. WE HAVE A CONTEST COMING UP!

When you listen to Oldtimers and not so old-timers reminiscing, you will find that, invariably their most memorable events were in the company of their gang, team, club, associates, whichever you prefer. When your turn comes, make sure that you have some happy events with the gang to recall.

Of course, I am leading up to multi-operator entries in contests. While the National Field Day is our only opportunity, in VK contests, for multi-ops, there are quite a few overseas contests that cater for multi-ops.

Off hand I cannot recollect when I saw an Oceania multi-op station listed in a results column, except NFD.

What about getting a group together in your locality and putting in a multi-op entry in at least one overseas contest per year.

We have some very strong "operating" clubs who should do well.

Look at the Contest Calender and pick your contest. ●

Key Section

with Deane Blackman VK3TX

Box 382, Clayton, Vic., 3168

Since the last list, we welcome the following new members: 44. VK2QL; 45. VK3ANU; 46. VK2AM; 47. VK2HQ; 48. VK2VM; 49. VK2BPR. There has been a bit of delay (on my part) in preparing certificates, fellahs. You should get yours soon.

Frank, VK2QL, qualified with a self-imposed task — 25 different countries on the 5 bands and in all continents. The main aim of the section is to encourage CW activity, but most people choose an easier road than Frank's.

In QSO with VK3AKN some time back he mentioned that he had been practising Russian morse, and (I inferred) making some progress. Anyone else who feels secure enough with the ordinary stuff to join Don? If you haven't lost all your adventurous spirit here's a new world to explore; you don't have to go far, either, as there are a couple of funnies there on 20m. . .

August is RD month, and there is plenty of opportunity for personal satisfaction in the CW section, for swelling your division's total (by actually sending in your log!), and competing in the new annual competition for the President's Cup. I have de-pitted my key contacts — see you in the R.D. ●

Ionospheric Predictions

with Bruce Bathols, VK3ASE August, 1973

7 MHz:–

This band is predicted to provide world wide DX from late afternoon (local time) to well after midnight, providing of course that a spot can be found between the "Commercial" stations. More regular use of this band in the evenings will most certainly result in the removal of intruders.

Predictions of the Smoothed Monthly Sunspot. Numbers for August 36, September 34, October 32, November 30 – Smoothed mean for November 1972 – 58.5 – Swiss Federal Observatory, Zurich.

14 MHz

VK2 to SU		1200-1900, 2200-2400
" " ZS		0400-1100
" " G	S.P.	0800-1700, 2100-2200
" " G	L.P.	0600-0900, 2000-0200
" " UA		0900-1700, 2100, 0100
" " W6		0200-1200, 1400-1700
" " PY		2100-0100
VK3 to ZL		2100-0900
" " SU		0300-0400, 1200, 2200-2400
" " KH6		0300-1500, 1700, 2000
" " ZS		0400-1100
" " G	S.P.	1000-1900, 2200-2300
" " G	L.P.	0600-0900, 2100-0100
" " VKO		2200-0800
" " VE3	S.P.	0200-0400, 1200-1600
" " VE3	L.P.	2300-0200
" " UA		0100-0200, 0900-1800
" " W1		0100-0500, 1200-1300, 1600
" " VK9		2100-1700
" " PY		1000, 2200-2400
" " W6		0200-1200, 1400-1700
" " JA		0600-1700, 2100-2400
" " 9G1	S.P.	2300-0300, 0600-0900
" " 9G1	L.P.	0600-1000
VK4 to SU		1200-1700, 2100-0200
" " ZS		0400-1200
" " G	S.P.	0700-1600, 2100-2200
" " G	L.P.	0600-1000, 2000-0200
" " UA		0800-1600, 2100
" " PY		1000, 2100-0100
" " W6		0300-1200, 1500
VK6 to SU		0300-0400, 1200-1400
" " ZS		0400-1300
" " G	S.P.	1200-1800, 2400
" " G	L.P.	0700-1200, 2300-0100
" " UA		0100-0300, 1000-1900
" " PY		0900-1200, 2400
" " W6		0400-1100, 1500-1800
VK7 to SU		0300, 1200, 2300
" " ZS		0400-1100
" " G	S.P	1100-1200, 2200-2400
" " G	L.P.	0700-0800, 2000-0100
" " UA		0100, 0900-1200, 2200
" " PY		1000, 2200-2400
" " W6		0200-1100

21 MHz

VK2 to SU		0400-0800
" " KH6		2100-0700
" " ZS		0500-0800
" " G	L.P.	2200
" " VKO		0200-0400
" " UA		0500-0800
" " W1		2300-0100
" " VK9		2100-0700
" " W6		2100-0500
" " JA		2200-0700, 0900
" " 9G1	S.P.	0600-0800
VK6 to ZL		2400-0600
" " SU		0400-1100
" " KH6		2300-0800
" " ZS		0500-1000
" " G	S.P.	0700-1100
" " UA		0400-1100
" " VK9		0200-0300
" " PY		1000
" " W6		2300-0500
" " JA		2400-1200
" " 9G1	S.P.	0600-1000
" " 9G1	L.P.	0800-0900

28 MHz

There are several spasmodic openings predicted from most VK areas to various parts of the globe from around Noon local time to late afternoon. Countries situated within or near the tropics feature the best possibilities for propagation.

obituary

J. R. Goding

To Jim Goding VK3DM, a somewhat unstable and a somewhat distorted cubical quad was "a thing of beauty and a joy forever". The achievement of actually succeeding in keeping his RTTY equipment operational throughout a contest and ending up with a respectable score was indeed significant.

No holiday could be complete without the "gear". A field day was an important occasion, particularly if the technical bugs kept away. A visit overseas was a magnificient opportunity of meeting other amateurs in other countries and also for acquiring a marvellous variety of new components and equipment. On one's return, of course, one had to face up to Her Majesty's Customs who usually, thankfully, gave up in despair. Then one's garage became a warehouse that was the envy of all.

This was the Jim Goding known to so many amateurs not only in Australia but in the U.S.A. and Europe. I can think of few people who personify for me what amateur radio was all about as well as Jim. To him amateur radio was an escape, something to be enjoyed to the full. Innovation and home brewing were to be encouraged and admired.

What most amateurs did not know was that Dr. Goding was a highly respected worker in medical research. He was born in 1915 and graduated M.B.B.S. from the University of Melbourne in 1938. In 1940 he married, and joined the army. Initially he served in the Middle East and then in the Far East. He was a Prisoner of War in Java and Singapore for four years from 1942 to 1945. This was a black period of his life. It was only rarely that he was subsequently to speak of the appalling conditions that he had survived. From 1945 to 1947 he was Senior Registrar at Prince Henry's Hospital and from 1947 to 1948 Medical Superintendent. During that period he commenced studying specialised surgery.

He then joined a busy group general practice in Hartwell. At the same time he continued his surgical studies. Gradually he became more and more involved in experimental surgery with the Physiology Department at the University of Melbourne. At the age of 40, he left general practice to work full time in one of the most complex and highly specialised areas of medical research. It was in this period that he obtained his amateur licence. Initially he was working in primitive conditions, pioneering a technique for the transplantation of the adrenal gland of a sheep from its abdomen to its neck, as well as developing many other experimental surgical techniques. His work had direct application in the treatment of heart disease and hypertension and understanding renal function.

His group subsequently moved into the Howard Florey Laboratories of Experimental Physiology at Melbourne University where his work expanded under ideal conditions. In 1965 he worked for a year at the Worcester Foundation of Experimental Biology in the U.S.A. His work diversified into other areas of endocrinological research, including the development of new techniques for the experimental transplantation of ovaries in animals. His discoveries in this field had direct application in the treatment and control of gynecological condition. He was an author or joint author of more than 110 significant papers.

He had three sons and one daughter. Two of his sons have also obtained amateur licences.

Few amateurs knew that Jim was a medical researcher with a world reputation. To them he was simply an enthusiastic amateur. It was a measure of his enthusiasm that he in fact found time not merely to pursue his hobby but also, in 1972, to serve as a member of the Federal Executive. As a member of the Executive he contributed a deep, practical enthusiasm for improving the amateurs position in respect of the importation of amateur equipment. He also brought an incisive logic to deal with a wide variety of practical matters.

I believe that it would be his wish to be remembered among amateurs as an amateur. I will remember him as a kind and good man. Jim Goding passed away on the 27th June, 1973.●

MICHAEL OWEN VK3KI

J. R. Goding, VK3DM

L. J. Crooks, VK7BQ

It is with regret that we have to record the death of Len Crooks VK7BQ, on the 24th May. He was Patron of the Tasmanian Division of the W.I.A.

One of the "old timers" of Amateur Radio, Len will be remembered by many of the older citizens of Launceston for the excellent programmes he used to broadcast every Sunday on the 200 metre band. His signature tune "Sunday Afternoon" was eagerly awaited by practically everyone who possessed a radio in Northern Tasmania in the 1920's and early 1930's.

He was keenly interested in every facet of Amateur Radio and operated on all bands 200 metres through to 432 MHz.

His shack was always the focal point of local and visiting Amateurs and his help and advice to those interested in radio was instrumental in several of todays Amateurs first obtaining their Amateur Licence. He played an active part in the foundation of the Wireless Institute of Australia and, until his death, he retained this interest and was a life member of he Tasmanian Division.

Len lived by the Amateur Code and was a true gentleman—one that everyone who has met will always remember with respect.

He will be sadly missed by all and, to his family, we extend our deepest sympathy.●

L. J. Crooks, VK7BQ

PROJECT AUSTRALIS

with David Hull VK3ZDH. Chairman, Project Australis.

Report on Federal Australis Convention June 23/24

On the weekend of June 23/24 1973, a federal convention of Australis state co-ordinators was held in Melbourne. Together with the Melbourne based Australis personnel were Mr. Alan Hennessy VK2RX, Mr Laurie Blagbrough VK4ZGL, Mr. Colin Hurst VK6ZHJ, Mr. Don Graham VK6HK, and Mr. Peter Frith VK7PF. The fares of some of these gentlemen were subsidised by their own divisions to whom Australis is most grateful.

The meetings proved most useful in that, for the first time, the operations and problems of the Australian participation in the Amateur satellite program could be reviewed on a national scale. The problems relating to the day to day operation of Oscar 6 were discussed, the present plans for Oscar 7 reviewed, and opinions sought on the possible next Australis-Oscar satellite, Oscar 8. One problem that did come to light with regard to Oscar 6 is that a lot of potential users still do not understand how to convert the standard orbit tables published some time ago in A.R. An effort will be made to republish these tables together with a fresh explanation.

Several of the more unusual aspects of Oscar 6 operations were discussed, including Don 6HK's exceptional QSO with ZE7JX, well beyond the normal range of Oscar. The QSL of this contact is reproduced here. It was pointed out that the percentage of Australian amateurs using Oscar is far greater than that of the U.S., despite the restrictions of negligible activity from several of the South East Asian countries within range. On the plus side, some stations such as 5ZHJ are approaching the 500 contacts mark, in Colin's case all on SSB. The continued activity of several OU stations is also keeping interest high "Nets" have been forming on high orbits. My own station, VK3ZDH, is often involved in four ways with the co-ordinators 5ZHS, 7PF, and 6HK. Several 15 min. QSO's have also been noted on 'high' orbits. New Zealand activity continues at a very high level. Once again activity lists are sought from all stations using the satellite so that Australis can let Amsat have the information required for the world wide computerised list being compiled.

The meeting was briefed by Mr. Ed Schoell on Amsat's latest plans following his visit to the U.S. and talks with Amsat management. Mention was made of the probability of very high orbits for Oscar 7, heights as high as 22000 statute miles on apogee, and the power requirements for these hemispherical coverage orbits. It is almost certain at this stage that Oscar 7 will carry.

1. Karl Meinzer 70 cm to 2 m linear translator, 10 watts PEP max. output.
2. Amsat 2 m to 10 m linear translator, 5 watts.
3. Amsat 2 m to 10 m linear translator, 1 watt back-up translator.
4. 2 Beacons. 2 m + 10 m + codestore.
5. Morse code telemetry as per Oscar 6, + Australis RTTY 60 channel telemetry used on 30 data points.

The convention discussed the probable next Australis satellite, Oscar 8, with regard to what should fly. It was generally agreed with Amsat that the proposed Australis 4 channel hard limiting translator is impractical in the light of experience with Oscar 6. Four channels are simply not enough, especially in view of the fact that the loudest signal captures the channel and the signal strength of any one signal will vary from second to second, thus causing the signals to chop in and out. The meeting discussed the merits of a 100 kHz wide hard limiting system as opposed to a 100 kHz linear translator, and came to the opinion that the linear system is more practical in view of the type of communication that amateurs desire. In view of the above it was decided to go ahead with the design and development of Oscar 8 on the following basis.

1. Australis to build a 2m to 10cm linear envelope elimination and restoration translator.
2. Amsat to provide a 2m to 10m translator (as per Oscar 6 or 7).
3. Possibility of 2.3 GHz beacon (Amsat).
4. Three types of telemetry output (A) Australis 60 channel RTTY. (b) Australis P.C.M. system (c) CW system as per Oscar 6.
5. Codestore (Amsat).

A fourth form of telemetry, the AO5 type of variable frequency tone, was discussed but not generally favoured by the meeting. Finance and education was also discussed, as well as a number of problems of local origin.

In general the two day convention, which included a very pleasant social gathering at the QTH of Dr. Hammer VK3ZPI, was a great success. The co-ordinators felt that the advantage of being able to meet the Australis people, and air their grievances in person, was alone worth the effort. In return Australis was able to gather a fresh outlook on their plans and problems. I would like to thank the Divisions concerned for contributing to this success, and a special word to the XYL's who catered so nicely and shared their homes with the interstate visitors.

Project Australis — VK3 — Executive

As a result of the Federal Co-ordinators Conference held in Melbourne on the 23rd and 24th of June 1973, it would appear that the following points need to be re-stated regarding Project Australis.

Apparently it is the opinion in some states that Project Australis is attached to the Victorian Division. It is now made quite clear that this is not the case. Project Australis is controlled directly by the Executive of the WIA, it is funded by the Executive, and is directly responsible to the Executive. In no way does the Victorian Division exercise any control. The fact that Project Australis is resident in Melbourne is purely geographic. The group was founded at Melbourne University!

All state co-ordinators are approved by their respective Divisions.

Finally, Project Australis, is not involved in repeater discussions. This is purely a matter for Executive and the individual States. Project Australis does not influence any decisions, as the satellite frequencies are determined on a world wide basis and not by any one country.

Hamads

HAMADS FOR SALE

MR10C with A,B,C - $60: Q Meter Marconi TF886A - $80: Q Meter AWA Type No. A50589 - $80: VK3AUI QTHR. Ph. B.H. (03) 615 3275.

Collins 75A4 serial No. 5227, manufactured in final batch 6KHz, 2.1 KHK2 & 500HZ filters plus W2VCZ mod. Immaculate as new condition. Also KWM2 & 516F2 PSU wired 240 volt. Roth Jones, 1 Albert Road, Melbourne, 3004.

2-5FP7A C.R.O. Tubes. 2 ea. AD161 & AD162. Quantity of SST.V. Transistors all new. Heath Kit VTVM, Heath Kit SB610 & G.D.O. 240V Auto Transformer, 240V P.R.I. 10.3V Sec. & 6.3V. Sec. Transformer. 1-4 Gang & 1-2 Gang Condenser with Dial. Also Miscellaneous Transformers, etc. No reasonable offers refused. VK2AGO QTHR. Ph. (02) 43 2427.

Stepped 4" x 4" Oregon timber mast, one piece, 39' long, good condition, requires painting. $10 ONO. VK3EM, QTHR, PH. (03) 56-7745 after 1800 hrs.

Galvanised Steel Tower 40 feet approx. Prop motor. Alum. Boom. Some fittings for beam. Also 522 TX, AT6 TX, best offers. VK3AKV QTHR.

Eddystone 888A Ham bands RX as new with original packing: AWA TX type AMT 150 NA-CD M564-44 as new with PSU & Mod. CW only homebrew TX/RX with Geloso VFO & PSU: Class C Wavemeter: Calibrator Mk 10 perfect: Sheet metal bender: ARRL H/Bks 1927, 34, 35, 37, 45, 53, 62, 69: QST May 1927 — Nov. 1969: CQ Mar. 1948 — Mar. 53, Nov. 59 — Dec. 64: "73" Mag. 1964-67. Estate of late VK4AG. Offers please to VK4VU, G.P.O. Box 8638, Brisbane, 4001.

20 Mx Cubical Quad antenna aluminium. Commercial quality construction. $55 O.N.O. VK3PW, 18 Cavell St, Beaumaris 3193. Ph. (03) 99-5527.

Drake 2B Receiver, complete with 2B Q Mult. Extremely stable, excellent condition, converted to include 160M, $240 ONO. AR7 in cabinet complete all coil boxes, XTAL Filter, $65 ONO. VK3TY (03), 560-0986, QTHR.

HAMADS WANTED

To Buy — A, C, D, E, Coil boxes R20/C55184 ex-DCA AWA-built RX: Handbook for AMR 300 No's 19, 22, 62 sets, urgently: Circuit phase locked loop RTTY TU: data on PRC 26 RX/TX: Ham Radio Issues 1968-70, QST 1960, 66, 1959-67, 1970-72. H. Leupold, 9 Hyland Ave., Darlington, S.A. 5047. Ph. (082) 96 4250.

Pre 1930 radio periodicals such as Wireless Weekly; Radio in Australia and N.Z.; Wireless World; QST, etc. Also wireless sets of any type including crystal sets of this period. VK2AAH QTHR Ph. (02) 73-2369.

Tranceiver TR1935 handbook or ccts. to buy or borrow. VK2ZVJ QTHR.

"S" meter Cat. No. 668 for Eddystone RX 888A. VK7ZBE, 36 Lyons Ave., Devonport, 7310.

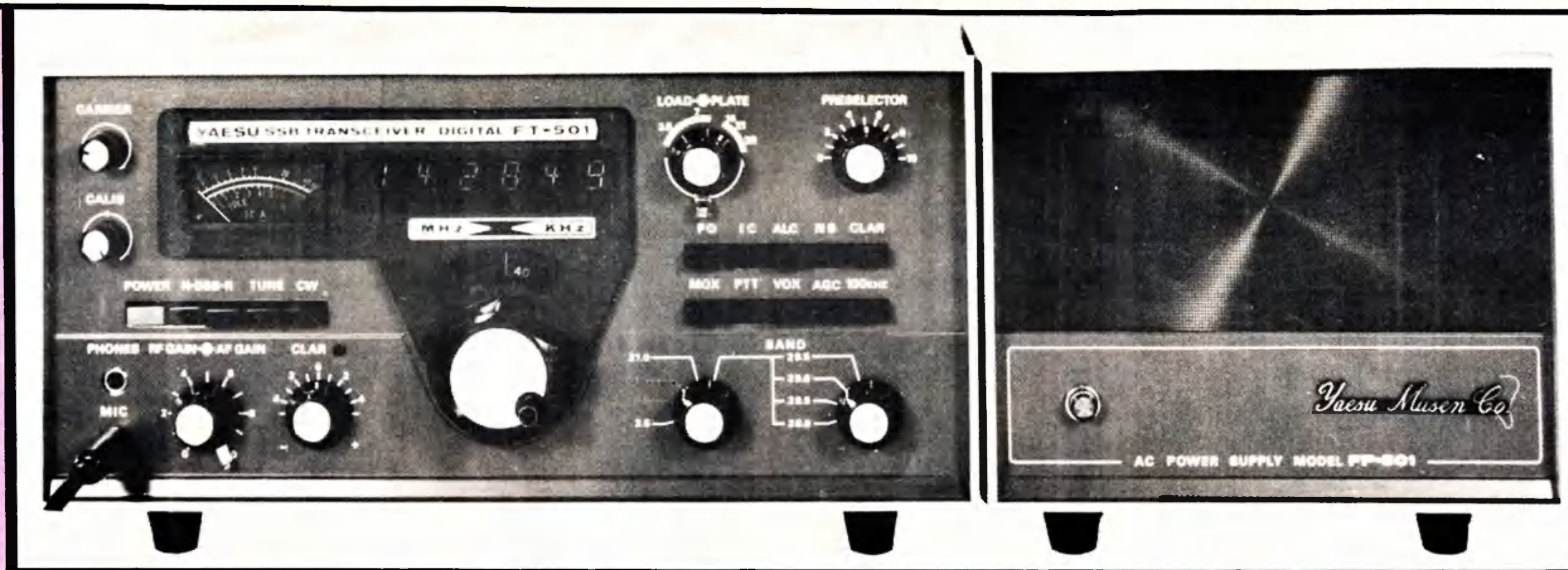
KWM2 and PSU. Any condition. Kloppenburg, VK6-PK, Box 348, Carnarvon, 6701.

Enthusiast requires early Radio Sets, valves, parts, speakers and books prior to 1930. Good prices paid. Details to Edgar Road, San Remo, 3925. Phone 107. M. O'Brien, Experimental VK30.

Silent Keys

It is with deep regret that we record the passing of—

Dr. J. R. Goding—VK3DM
Mr. A. L. Matthews—VK3ZT
Mr. F. Robb—GI6TK
Mr. Bob Glover—VK6RG



The NEW Yaesu FT501, 560W Transceiver with Digital Readout

This is the one we've all been waiting for—incorporating the best features of the Yaesu range—the high power capability of the 401—the modular construction similar to the FT101—the suberb single conversion pre-mixed oscillator system of the FT200—separate 9MHz filters for USB, LSB and CW.
For optimum r.f. performance with excellent I.M. and cross modulation characteristics, the proven combination of a 6BZ6 r.f. amp. and 6U8 mixer has been chosen.
Separate Rx input coils for optimum front end performance.

SPECIFICATIONS

FT-501 DIGITAL TRANSCEIVER

FREQUENCY RANGE:
3.5-4.0MHz, 7.0-7.5MHz, 14.0-14.5MHz, 21.0-21.5 MHz, 28.5-29.0MHz. Crystals optionally available for ranges 28.0-28.5MHz, 29.0-29.5MHz and 29.5-30.0MHz.

TYPE OF EMISSION:
LSB or USB (selectable) CW.

POWER INPUT:
SSB 560 watts (Pep output approx. 350w). (slightly lower on 10 meters.)

CARRIER SUPPRESSION:
40 db.

SIDEBAND SUPPRESSION:
50 db at 1000Hz.

SPURIOUS RADIATION:
Down 40 db or more.

TRANSMITTER FREQUENCY RESPONSE:
300Hz-2700Hz.

DISTORTION PRODUCTS:
Down 30 db or more.

ANTENNA OUTPUT IMPEDANCE:
50-75 ohm unbalanced.

FREQUENCY STABILITY:
Less than 100Hz drift in any 30 minute period after warm-up.

SENSITIVITY:
0.5uV input for 20db S/N.

SELECTIVITY:
SSB 2.4kHz at —6 db, 3.8kHz at —60 db.
CW Filter (option) 600Hz at —6 db,
1.2kHz at —60 db

IMAGE RATIO:
50 db or more.

I.F. INTERFERENCE RATIO:
50 db or more.

AUDIO OUTPUT:
3 watts/5 ohm load (10% THD).

POWER CONSUMPTION:
Receive 140VA, Transmit 650VA max. (with separate power supply Model FP-501, 234V 50Hz A.C.)

DIMENSIONS:
160mm (6-¼ inches) high, 350mm (13-¾ inches) wide, 290mm (11-½ inches) deep.

WEIGHT:
Approx. 10Kg. (22 pounds).

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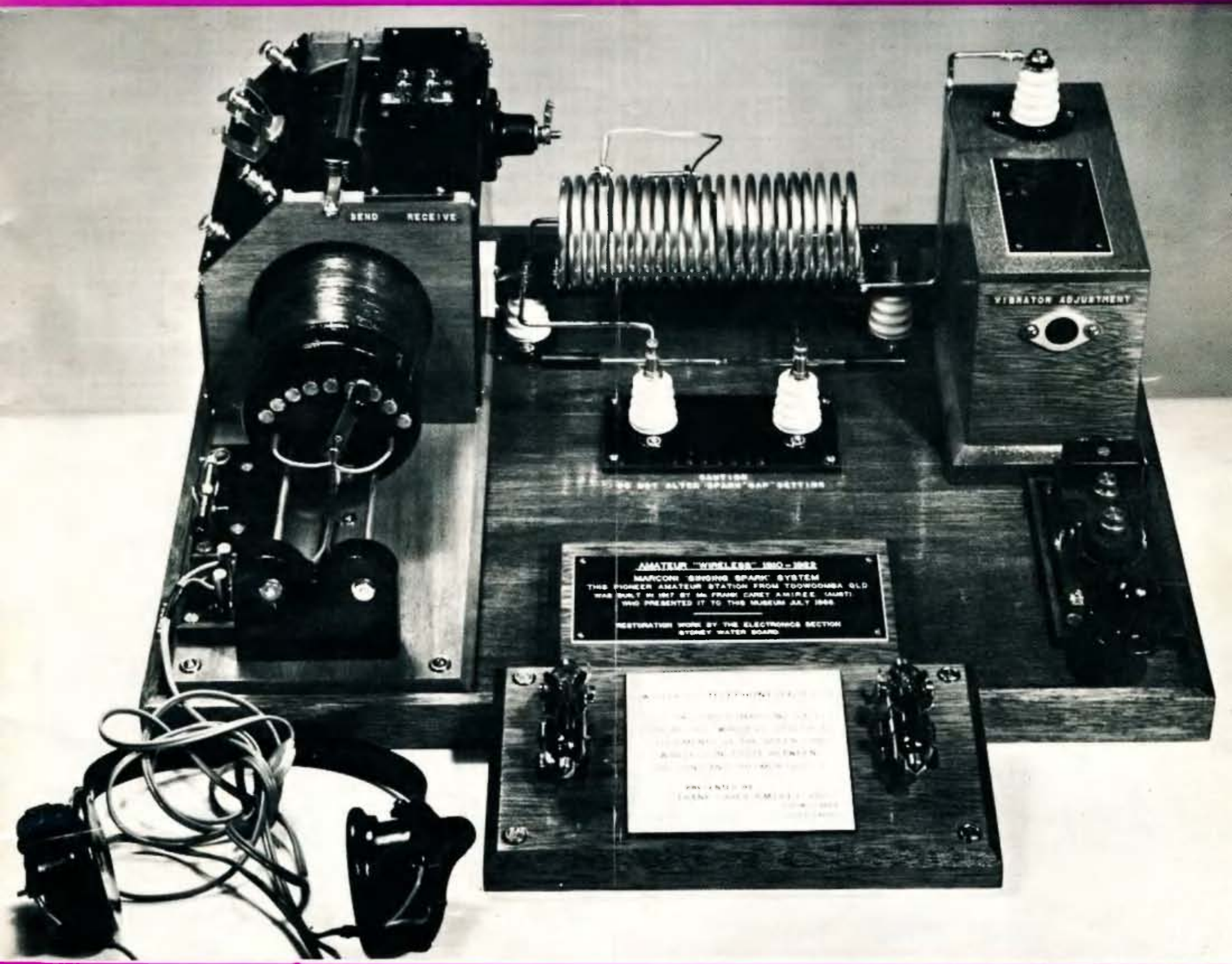
SOLE AUSTRALIAN AGENTS FOR
Yaesu "F" Series
S.S.B. EQUIPMENT

amateur radio

SEPTEMBER, 1973



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C.G.S

TYPE C MINIATURE VITREOUS ENAMELLED POWER WIREWOUND RESISTORS

Approved to BS 9114 – N002 style 2E–56

SPECIFICATIONS

The 'C' Series of miniature wirewound, vitreous enamelled resistors has been designed to meet the requirements of Specification BS 9114 - N002, and full Qualification Approval has been granted. A Test Report Summary is available on request; this report shows that many of the performance levels are in fact much higher than the specification acceptance levels.

The use of specially selected materials, combined with the application of exacting quality control throughout all stages of production ensures the consistent achievement of a very high standard of reliability.

ELECTRICAL SPECIFICATION

Tolerance: ±5% is standard on values of 1Ω and above and ±10% between 0.1Ω and 1.0Ω. For non standard values and tolerances please consult the factory.

Resistance values: C Series resistors are available with the preferred ohmic values of the E24 Series within the ranges shown in Table 1.

Temperature coefficient: Typically less than 100 ppm/°C and never exceeding 200 ppm/°C over the category temperature range −55°C to +200°C

MATERIALS

Core: High purity steatite ceramic. Chemically inert, capable of withstanding severe thermal shock and impervious to moisture. Ground to close tolerance finish to give maximum contact with wire element for rapid heat transfer.

Resistance Element: High quality nickel-chrome or nickel-copper alloy depending on resistance value; wound at minimum tension.

End Caps: Formed to close tolerances from a special nickel-iron alloy chosen for its consistent welding properties and glass sealing characteristics.

Leads: Solder coated nickel A.

Uncoated leads can be supplied for welding.

Specify – 'weldable leads'.

Preformed and cropped leads can also be supplied on request.

Coating: Humidity proof vitreous enamel with carefully controlled expansion matched to the materials of the resistor.

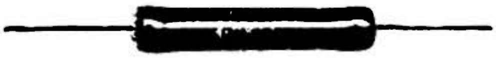


TABLE 1

C.G.S.				BS 9114 - N002							STYLE CROSS REFERENCE		
Style	Maximum wattage rating @ 20°C	Resistance Range Ω min.	Resistance Range Ω max.	BS 9114 - N002 Style	Maximum wattage rating @ 70°C	Approved Resistance Range Ω min.	Approved Resistance Range Ω max.	Critical Resistance Ω	Limiting Element Voltage. Volts Normal	Limiting Element Voltage. Volts Low Air Pressure	DEF. 5111-1 Style	DEF 5115-2 Style	G.P.O. Style
C3A	3	0.1	10K	2E-56-2.5	2.5	1	4.7K	3.9K	100	70	RWV3J	RFH3-2.5	P.O.35
C7	7	0.1	27K	2E-56-6	6	1	15K	6.8K	200	140	RWV4J	RFH3-6	P.O.40
C10	10	0.1	68K	2E-56-9	9	1	68K	27K	500	350	RWV4K	RFH3 9	P.O.36
C14	14	0.2	120K	2E-56-12	12	1	100K	47K	750	530	RWV4L	RFH3-12	–

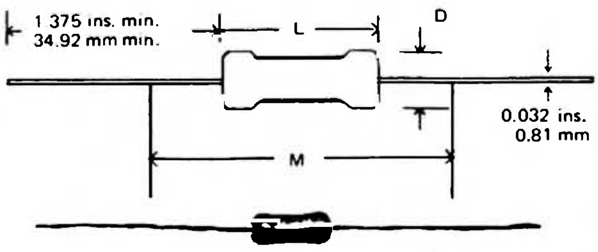
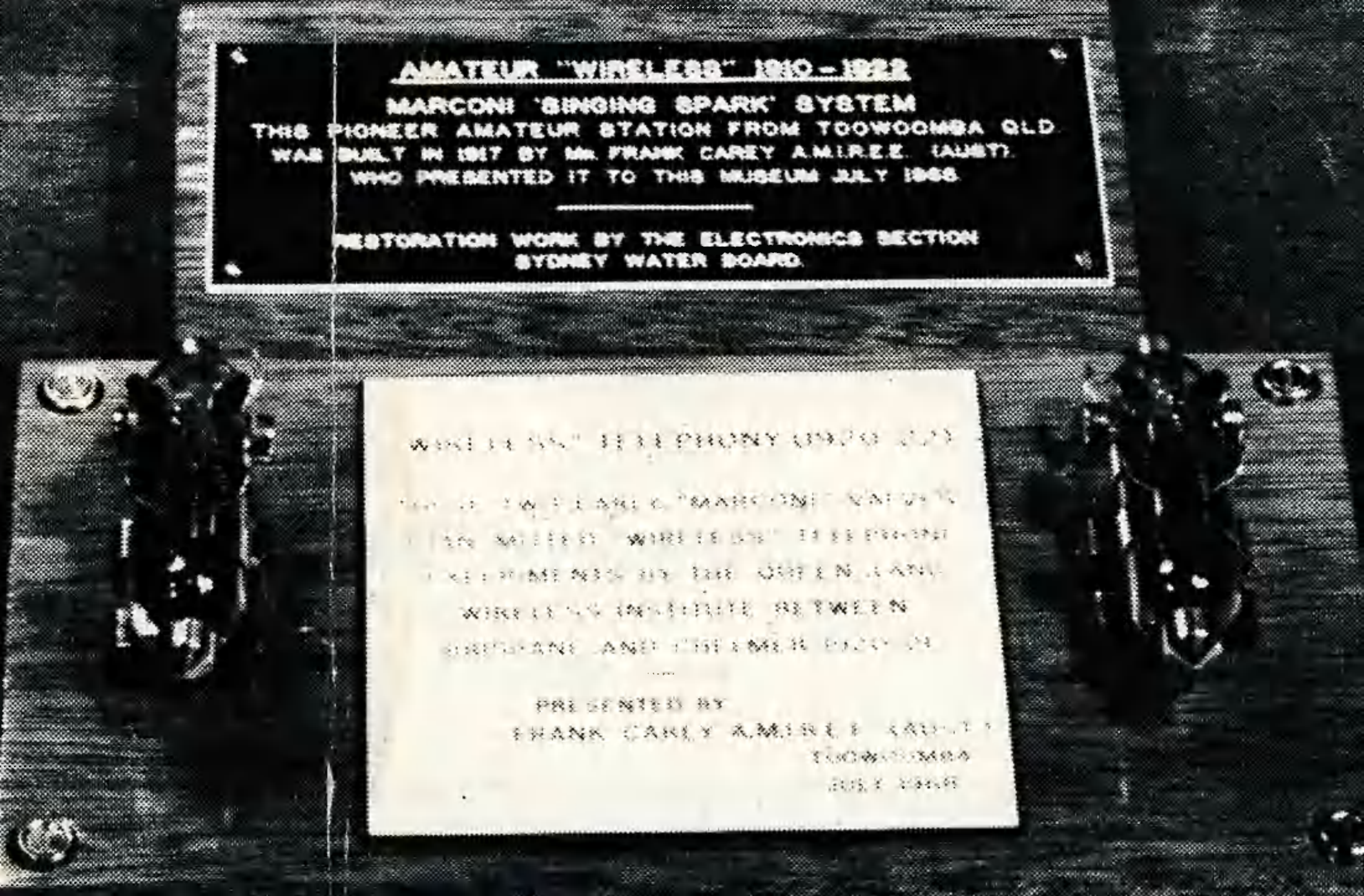


TABLE 2

Style	Length L max. in.	Length L max. mm.	Diam. D max. in.	Diam. D max. mm.	Measuring Distance M ±0.062 in.	Measuring Distance M ±1.59 mm.	Approx. Weight grammes
C3A	499	12.7	0.220	5.6	1.250	31.8	1.0
C7	.874	22.2	0.315	8.0	1.625	41.3	2.0
C10	1.499	38.1	0.315	8.0	2.250	57.2	3.5
C14	2.106	53.5	0.315	8.0	2.875	73.0	5.0

Note: M = resistance measuring points distance – below 10Ω only.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amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA, FOUNDED 1910

SEPTEMBER, 1973
Vol. 41, No. 9
Price, 40 cents

Registered at the G.P.O. Melbourne for transmission by Post as a Periodical— Category "B"

Published monthly as the official journal by the Wireless Institute of Australia.
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Above 474 Toorak Road, Toorak, Vic., 3142

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Copy is required by the **third of each month.** Acknowledgment may not be made unless specially requested. All important items should be sent by certified mail.
The Editor reserves the right to edit all material, including Letters to the Editor and Hamads, and reserves the right to refuse acceptance of any material, without specifying any reason.

Advertising:
Advertising material should be sent direct to **P.O. Box 150, Toorak, Vic., 3142,** by the **25th of the second month preceding publication.**

Hamads should be sent direct to **P.O. Box 150, Toorak, Vic., 3142,** by the **3rd of the month preceding publication.**

Printers:
Chas E. Tully Pty. Ltd.
40 Hume Street, Huntingdale, 3166.
Phone: 543 1242.

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FRONT COVER:
A typical example of the fine engineering of an early transmitter built by VK2AMI in 1920 and presented to the Queensland Museum.
Photo supplied by G. M. Hull, VK3ZS

QSP

What's in it for me?

A familiar Australian expression—one which is often heard in reference to our Institute.

What is there in the WIA for you and me?—two members of the oldest organisation of its kind in the entire world of Amateur Radio!

Chances are that I don't know you and you don't know me yet, but my sincere hope is that, through QSP, we'll get to know each other pretty well.

Although we've never met, there are, when you think about it, many things we do know about each other.

First and foremost, we're both interested in Amateur radio as a hobby or pastime; probably for vastly different reasons, but are bound by the common interest of Amateurs the world around--the desire to communicate--That we know.

Whether you are a DX man, or VHFer, a ragchewer, a newcomer, an antenna experimenter or whatever, there is always something I can learn from you.

Some new wrinkle or some benefit from your experience in communicating is readily available and willingly given—should you be asked—I know, because that's the nature of our "game" and in 28 years af amateur radio I've never been disappointed.

We're both members of the WIA, otherwise you probably wouldn't be reading this Magazine!

Now, what's in the WIA for you and me?

That's something I'm working on—the job of letting you know what's in it for us—not just you and me but the *us* represented by our entire membership and the *us* who are amateurs but do not belong to the WIA.

The Executive of the Institute has given me the task of keeping you informed about the things which the Institute does in your name—representing the Amateur Service—and about which you have a right and a need to know.

The Executive feels that, for too long, there has been a communication gap between them and you, the member.

So, every month some topic or topics will be the subject of this page to keep you in touch with Institute affairs.

Meeting each month, Executive handles all sorts of problems which are of great importance to us all in maintaining the privileges of the Amateur Service.

For example, during the two most recent Executive Meetings, considerable complex discussions took place concerning:—negotiations with the Australian Post Office on frequency allocations; the matter of reciprocal licencing arrangements with other Administrations; the formation of the VK1 Division; use of the 11 metre band, and the planned Extraordinary Convention on Repeaters.

You will hear more of these in future editions—particularly the Extraordinary Convention scheduled for September 15, which will be fully reported next month.

Executive has re-arranged its calendar, thus allowing their deliberations and actions to be available to AR within days of the meeting.

Therefore, what you see in QSP in future should be an accurate and up-to-date statement of activities at the Federal level.

Believe me, there is a GREAT DEAL in the WIA for both of us, no matter what our particular interest in radio may be.

JOHN McL. BENNETT, VK3ZA

A.R. AWARDS

The Publications Committee now have three awards available for contributions to A.R. There are the existing Higginbotham Award, and Technical Award; and to these has been added the Al Shawsmith Journalistic Award (ASJA) which carries with it a handsome plaque and a monetary token.

ASJA takes into account clarity of expression, conciseness, logicality, grammar and spelling, full and sufficient treatment of the subject matter, as well as originality and readability adjudged likely to be the best to enhance the image of amateur radio as an activity and to promote interest in it.

Although preference would normally be given to articles of a technical nature this does not exclude other articles, especially humorous articles, on a subject of amateur radio interest. Copies of articles in other publications would of course be excluded.

The Committee would like to thank Al Shawsmith, VK4SS, for his kindness and interest in putting forward the various suggestions which led up to the creation of this award.

TRANSCEIVERS — IMPORT DUTIES

Continuing the AR Special article in the July issue, Customs By-Law determinations have now been seen, or are known to have been issued, for Yaesu transceivers Models FT101, FT200, FTDX401 and FT501. Applications have been rejected however for any separate power supply unit for models without built-in supplies. One amateur received his approval only five days after sending in his application. Another amateur plans to buy his transceiver in Singapore but because of double freights, exchanges and profit (quite apart from whether or not any such amateur equipment might be available 'off the shelf' in Singapore) he might find it just as reasonable to try the Australian import market first.

STOP PRESS AX Prefix

The AX Prefix may be used by all VK amateurs (except TPNG) from 1-10-73 to 31-12-73 ,to mark HM Queens Visit

PMG letter RB 4–8–1 of 23 Aug 73

11 METRE BAND

The amateur allocation on the 27MHZ band is 26960 27230 kHZ — i.e. 270 kHZ. This allocation applies for amateur use in Australia, New Zealand and Region 2, but of course in the last-mentioned it is given over in part in the U.S.A. to the Citizens Band. It is thus easy to note why commercially manufactured amateur equipment seldom includes this band allocation. However, the band is designated for industrial, scientific and medical purposes. Other users must therefore accept any harmful interference from ISM. Radio Control (model aircraft etc.) occupies the band 26957 to 27282 kHz — i.e. 325 kHz, 27120 kHz ISM, 27240 and 27270 kHz for portable hand-phone equipment and 26978 and 27212 kHz for radio paging systems. All these are part of the general allocation for Fixed and Mobile, except aeronautical mobile, extending from 26100 to 27500 kHz.

REPEATER IN U.K.

The first repeater in G-land was commissioned on September 14, 1972 with the callsign GB3PI operating with a max. dc input of 150w transmitting on 145.75MHZ receiving on 145.15MHZ and licensed for one year experimental use. A progress report in Radio Communication for June 1973 asks "where do we go after the GB3PI experiment? Do we apply for licences for one or two more repeaters in other areas? Do we try a vhf repeater? Do we want repeaters at all?"

improving loudspeaker reproduction for SSB dx

Bruce Mann, VK3BM
9 Connell Street, Swan Hill, 3585

How often have you reported that the other station would be perfectly readable if he was not buried in the static? Perhaps something can be done about it after all, rather than giving up in disgust!

The range of frequencies required for good speech intelligibility is 300 - 2200 Hz but most loudspeakers have a natural cone resonance between 50 Hz and 120 Hz. In fact a very marked resonance. You can test this by holding the speaker near your ear and tapping the cone with a finger — a bass note will be heard.

At this frequency the cone will tend to vibrate freely with any noise pulse — electrical, static, etc.

Instead of a single oscillation, when pulsed it tends to make a number of diminishing excursions.

The two methods employed in Hi-Fi to reduce this effect are (a) to load the voice coil electrically by correct matching to a low impedance circuit — i.e. by choice of driving tubes or transistors and transformer, and use of a speaker with a strong magnet. (b) to load the cone acoustically by use of a baffle or enclosure.

But in voice reproduction we do not need the bass frequencies — in fact they reduce intelligibility by masking the higher frequencies containing the consonants, which are of major importance in clear understandable speech. So why not insert a filter in the speaker leads to remove all frequencies below 300 Hz?

EXPERIMENTS

In a series of experiments I have come up vith a simple filter, and a speaker enclosure which has worked wonders with "duck talk" on a noisy band. The intention was to improve reception for my faulty hearing (which falls off drastically above 1000 Hz) but visitors with normal hearing prefer the gadget switched in.

First I made a box to fit the speaker, using ¾" Particle Board. In my case, to fit a 6" speaker the box was 8" wide x 6" high x 4 ½" deep internally. It was lined with sound absorbent material — Tontine wadding in my case. The front, with a 4" dia. cut-out, was fastened by suitable screws, so that various available speakers could be tried.

Testing speakers without the filter it was observed that there was a marked difference between them. Those with the most powerful magnets seemed best. Just loosening the screws, thus producing a crack in the enclosure, very noticeably altered the tone and reduced the crispness of reproduction.

Then, referring to tables, a 2 stage filter was made to cut off below 300 Hz:- see fig. 1.

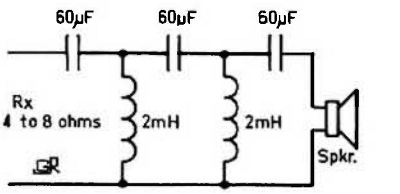
The capacitors should be bi-polar types as ordinary polarised electrolytics do not like a regular diet of A.C.!

The junk box R.F. chokes that I used were rather high in D.C. resistance so I found 2 stages an advantage, but probably a choke made for the job (such as the Rola SOL 36, would be sufficient with one stage.

RESULTS

Comparing by switching between the enclosed speaker and a similar speaker on a small flat baffle, there was a noticeable loss of volume with the enclosure but a marked improvement in clarity. Static became more of a sharp crack than a rumble, and similarly with other QRN. But switching in the filter made a further great improvement by removing the unnecessary bass and further loading the voice coil.

In conjunction with a receiver having sharp I.F. filters, adjustable passband tuning, and a good notch filter, it's wonderful what it will pull out of a crowded "staticy" 40 or 80 metre band. ●



mobile linear amplifier for the FT75 transceiver

Cyril Walker, G3AZT

Reprinted from Mobile News, January, 1973

The popular QQE06-40 twin tetrode, beloved of the VHF fraternity, also has vary suitable characteristics for use on the HF bands. Although reference is made in this article to some components of U.K. manufacture there should be little difficulty in obtaining equivalent items in Australia.

GENERAL DESCRIPTION

The amplifier with invertor power supply is built into a 9 x 5 x 5 inch "Electrokit" box. Using the FT-75, which was reviewed recently, as a driver, a peak power of 200 watts can be achieved with this linear. A passive grid configuration was found to be the most satisfactory, using a QQV06-40A tube.

The more usual "sweep tube" amplifiers as used in most American and Japanese equipment were rejected on account of their high heater consumption. Although with the amplifier switched on, three tubes are in use — the 12BY7 and 12DQ6B in the FT-75 plus the QQV06-40A — compared with only two in the FT-101, table 1 shows that it is more economical on overall battery drain and has the great advantage that the linear can be switched off when listening. Probably 75% of my time is spent listening.

This set-up has been compared with the FT-101, and measurements of battery drain and field strength using a common antenna indicate slightly better transmitter performance.

Equipment	Current Consumption — Amperes			
	Receive	Transmit		
		No. speech	Average speech	Peak speech
FT-150	4	3,5	10	13
FT-101	5	9	17	22
FT-75 + Amp.	5	11	17	28

Table 1: Comparison of Battery Current Consumption.

POWER SUPPLY

I obtained an invertor supply — ex Pye equipment — from Messrs. Garex Ltd. of Chinnor, Oxfordshire, and this fits conveniently into the back of the "Electrokit" box. Both of the high voltage supplies were changed to voltage doublers by disconnecting two of the rectifiers in each bridge and wiring one of each of them in series with the remaining rectifiers.

Two 16 uF 450 volt electrolytics are used in the high voltage circuit and two 8 uF 350 volt ones in the lower voltage, screen supply. A test was made on the higher voltage rail on resistive load and at 14 volts input, 870 volts at 250 mA was obtained.

The screen supply, of the order of 400 volts, is dropped to 300 volts by a feed resistor with two, series connected, 150 volt, zener diodes across the screen to ground. The 25-30 volts grid bias voltage is obtained by removing some of the resistors and replacing them with a potentiometer.

AMPLIFIER CIRCUITRY

The amplifier circuit is conventional but a few practical details are of interest. Band change is effected by a two wafer, two pole, five way ceramic rotary switch, S1. All p a. antenna loading capacitors are Suflex, polystyrene types rated at 500 volts d.c. working and have so far proved quite satisfactory. The table 2 gives the p.a. tank circuit parameters for each band. The fixed tuning capacitors must be high voltage mica or ceramic types.

Band MHz	C1 pF	C2 pF	L1 uH
3.5	310	1600	7.5
7.05	135	880	4.0
14.2	76	450	2.1
21.3	52	290	1.4
28.6	38	220	1.0

Table 2: P.A. Tank Circuit Parameters

N.B.: Subtract half the capacitance swing of the tuning and loading capacitors from C1 and C2 respectively.

The p.a. tank coil for the 7-28 MHz bands is wound on a 1¼ inch, grooved ceramic former and it was easy to solder on the required taps. The additional 3.5 uH for the 3.5 MHz band consists of a separate coil of thick enamelleo wire, soldered to the end of the grooved coil.

The power supply relay, RL1, which is operated from the FT-75 relay output socket, is a silver contact, heavy duty component from Pye equipment, by Magnetic Devices, whilst the antenna change-over, RL2, is a surplus, two pole device, with normal contacts, but ceramic insulation.

All controls are on the front panel with power supply and r.f. output sockets at the rear. The circuit diagrams of the amplifier and power supply are shown in figures 1 and 2 respectively and the physical layout in figure 3.

This amplifier has operated very satisfactorily on the parcel shelf of my Triumph "Dolomite" for several months, enabling me to compete with the FT-101 boys whilst retaining the compact saloon car I want. ●

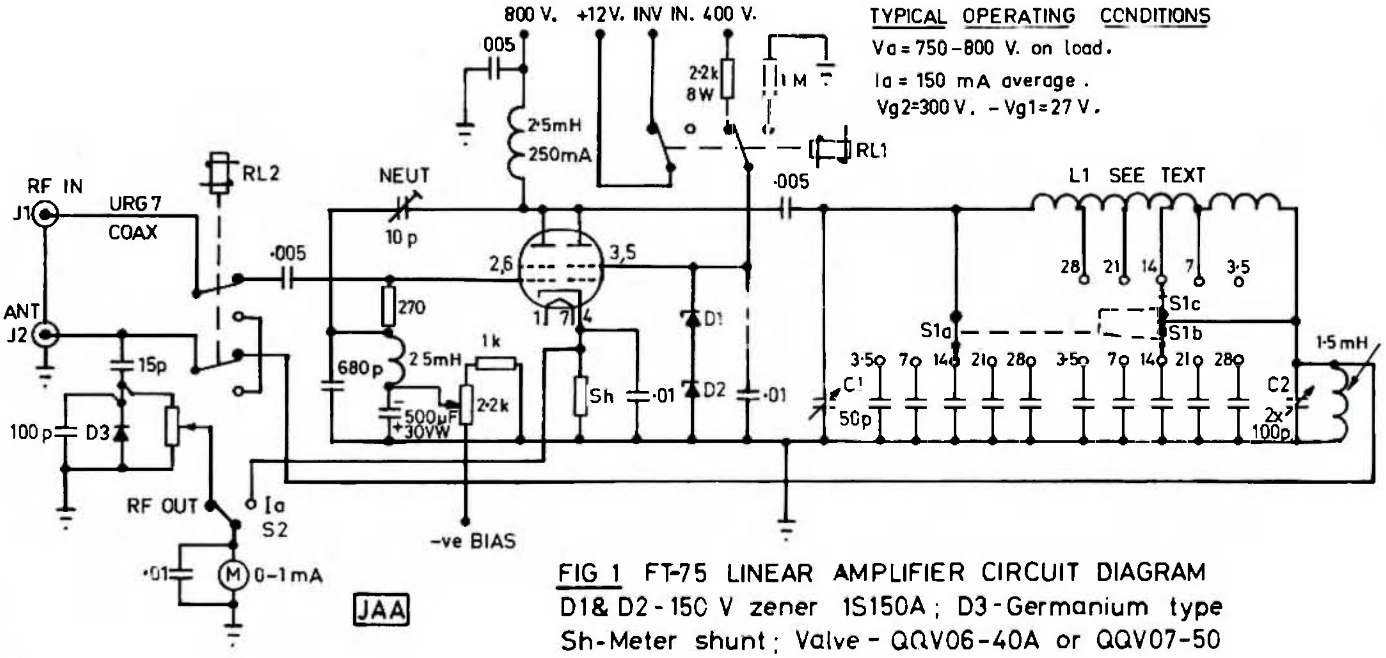


FIG 1 FT-75 LINEAR AMPLIFIER CIRCUIT DIAGRAM
D1& D2 - 150 V zener 1S150A; D3 - Germanium type
Sh - Meter shunt; Valve - QQV06-40A or QQV07-50

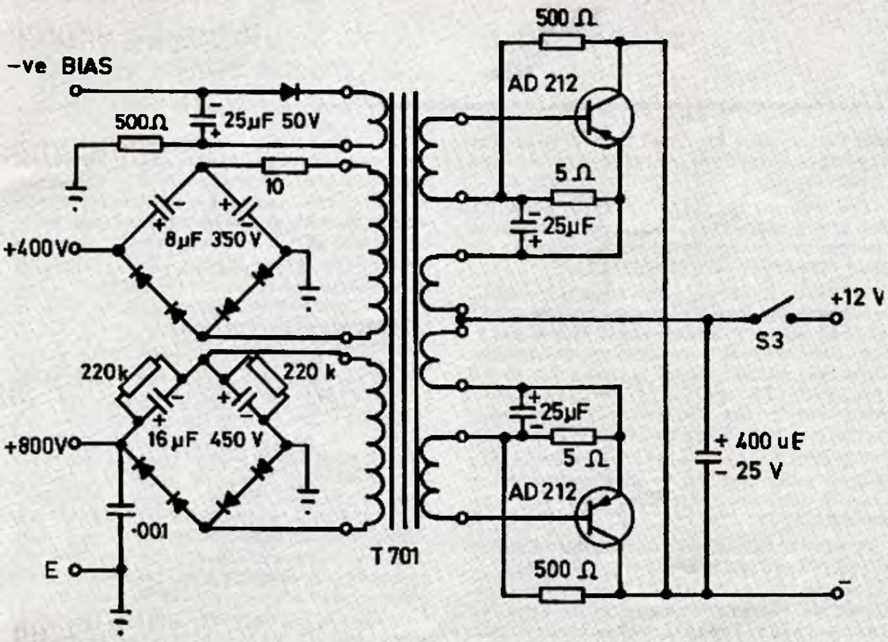


FIG 2 MODIFIED PYE POWER UNIT

NOTE. If T701 or complete unit cannot be obtained use design in "Radio Communication" Sept 1972 pp 576-7

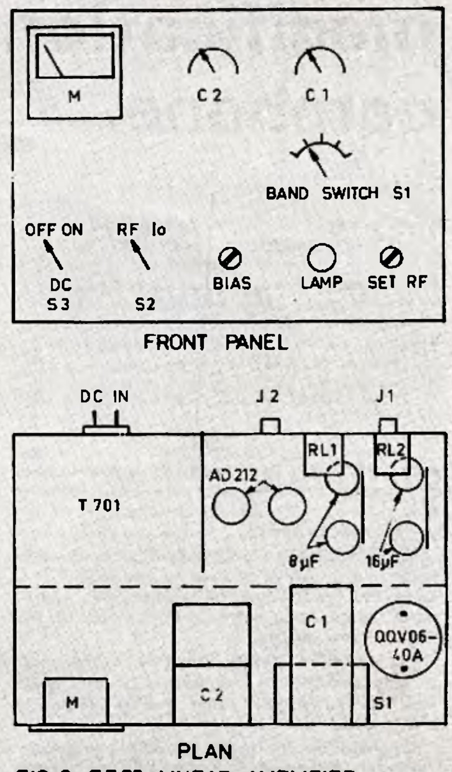


FIG 3 FT75 LINEAR AMPLIFIER

modifications to the MR6A carphone

Steve Gregory, VK3ZAZ
Bob Bennell, VK3ZAC
"Lynmere", Learmonth, 3352

It appears there has been a sudden influx of the multi-channel AWA Car Phones on to disposals markets over recent months. For those who have obtained one of these units here are some notes and information on improvements to existing circuitry, and modifications to upgrade the efficiency of the unit.

Bob, VK3ZAC, has spent 6 years in the commercial servicing field and once fostered over 100 of these mobile units as part of his service responsibilities.

The basic MR6A should realize 10 to 13 watts with 1 to 2 mA grid drive to the QQE03/12. Only the exceptional units with the "right" valve combination seem to be capable of the higher power output.

The first modification attempted to the transmitting section was the second doubler stage V20 which normally used a 6C4. This was changed to a 6AK6 pentode.

An important point to remember whenever any valve substitute is contemplated in these units is the filament configuration to enable the set to operate on either 6 or 12 volts, positive or negative earth.

The filament current of any substitute valve should match the one removed otherwise the balance will be upset, resulting in a deficiency of voltage on one rail and too much on the other.

The 6AK6 power output pentode draws .15 amps at 6.3 volts which is identical with the 6C4.

A quick consultation of the valve data book shows few modifications to valve connections are needed to make the change.

The grid lead from TR10 is shifted from Pin 6 to Pin 1. Grid 3 of the 6AK6 is connected to the cathode by bridging Pin 2 and Pin 7.

The centre post in these units is used as a HT busbar, so do not bridge to earth by accident, or deliberation!

The anode connection remains the same, as do the filaments; however Pin 6, vacated by the grid lead, is now by-passed by a .001 uf disc ceramic and fed from the HT busbar via a 4.7K ½ watt resistor.

The high voltage current is up by some 8.5 mA and a substantial increase in drive can be realized by connecting the anode circuit to the same 400 volt rail as the QQE03/12.

In this way the multiplier stage is keyed up along with the final. The anode coil may need 1 or 2 pF across it for resonance. This is due to the lower internal capacitance of the pentode. Drive will be somewhere between 2.4 to 3.8 mA, with 2.6 mA being the figure when connected to the 200 volt rail only. Power output should be around 15 watts.

The second stage of modification would be a distinct advantage for mobile operations or country repeater operation, and will cost around $10.00.

It involves replacement of the final tube with a YL1240, and the driver with a 12BY7A.

The first question raised was current consumption. Would the power supply carry the increased drain from the higher power tubes? From tests on the final product we have seen that no ratings are exceeded and there is no appreciable difference between the running rail voltages in either the modified or unmodified condition.

The YL1240 is a bigger brother of the QQE03/12 and for similar drive input will give up to 30 watts output.

The large 9 pin socket is available locally and 10 minutes work will see the 9 pin ceramic socket evicted, the hole enlarged, and the new socket soldered or screwed into place. Pin 5 of the new socket points toward the first tank enclosure.

All the components and leads removed from the 3/12 socket are reconnected to the appropriate pins on the YL1240 socket. The connections are identical except that the socket is longer. A trial was given to a modified grid input circuit. Normally a 10K resistor is connected to each grid. The coil TR13 was centre tapped and fed from bias through a 1.3 µH RFC and a 6.8K ohm resistor. Bias was identical when retuned.

Next step is the removal of all components and leads from the 6C4 socket, its eviction, and enlargement of the hole to take the old 3/12 socket (if in good condition), or a new ceramic 9 pin socket.

The choosing of a tube to drive the final is open for discussion at this point. The 6AK6 could possibly drive the new final to full output without modification, but we found that it loaded the circuit too much, resulting in inadequate drive.

The 12BY7A is a sensitive pentode and gives good output when used as a doubler in this circuit. Current consumption is in the order of 25 mA plate, and 6 mA screen.

The 5763 draws 50mA plate and 6mA screen. The 7551 draws 80mA plate and 5.1mA screen when used in similar conditions.

Another point is that the facility of 12 volt filaments in the 12BY7 allows use of the 12 volt rail for a supply source. However, when the 6C4 is removed from the upper rail, 150mA drain is removed, thereby causing unbalance. V15 (a 6BH6) is elevated to the upper line adding 150mA consumption; LP1 (the pilot lamp) is connected to the lower rail and replaced by a 12 volt 1.5 watt version drawing 100 mA.

The additive currents for both rails now equal at .60 Amp each. The 12BY7 draws .30 Amp uo across the 12 volt rail and the YL1240 draws .38Amp.

With filaments now in balance, components for the second doubler stage are selected for best performance.

TR10 (the 2nd tripler stage output) would not tune due to increased capacity, so a new approach was chosen where the transformer was modified to a single wound coil, and capacitive resistive coupling was applied to the 12BY7.

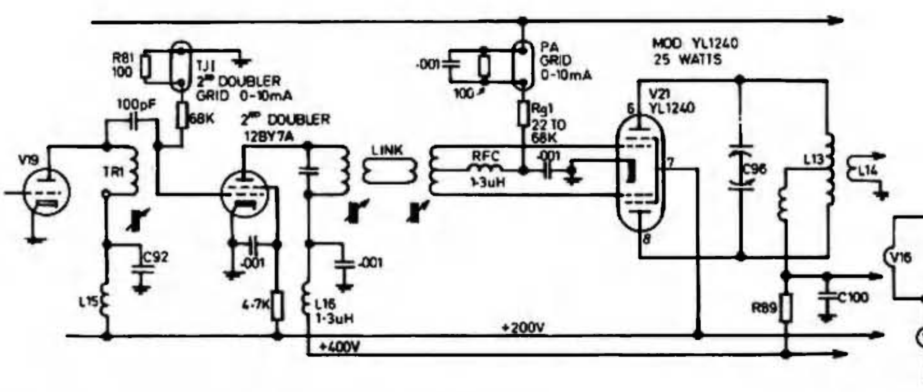
A 100K grid leak was found to be too high and a 68K realized optimum drive. As with the previous modification when a 6AK6 was substituted, the screen grid is taken from the keyed HT rail via a 4.7K and .001 decoupler.

The anode circuit is fed from the HT rail via RFC and .001 decoupler.

The rewound coil on the TR10 former was 8 turns of 18 gauge enamelled copper with a 5pF ceramic across the former; the coil resonates at 73MHz with the tuning slug.

HT feed through TR10 to the 6C4 is via a 1.3 µH RFC amd .001 decoupler. To resonate the output stage of the 12BY7, a 3.9 pF was placed across the TR11 coil. By experiment the optimum output against drive was found to be when 6.8K ohm was used and 3.3mA of grid drive obtained. The previous standing bias is retained to all the stages in the driver section and no modification was needed to the final tank circuit.

The PA draws 100mA and, under bench conditions at 13.5 volts, delivers 25 watts output.



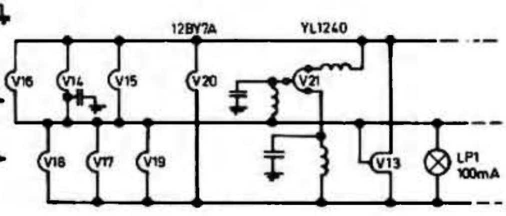


FIG. 1 MODIFICATIONS TO MR6A CARPHONE.

TABLE

Second Tripler:	Second Doubler:	P.A.
6C4	6C4	3/12
drive 0.5 mA	drive 0.75 mA	drive 2.0 mA Power output 12 watts
6C4	12BY7	YL1240
drive 0.5 mA	drive 0.82 mA	drive 3.3 mA Power output 26 watts
6AK6	12BY7A	YL1240
drive 0.65 mA	drive 1.5 mA	drive 4.0 mA Power output 31 watts

The figures above show the increased performance obtained and includes figures for the optional 6C4 VS. 6AK6 as the 2nd tripler, which we have not reported on, but which gives the last little bit of performance available from the system. The modification is not essential and is only listed for reference. On the second tripler socket, as with the stage 1 doubler modification, Pin 6 is changed to Pin 1 which is the grid connection; Pin 2 is connected to Pin 7 and earth; Pin 6 is fed from the keyed 200 volt rail via a 4.7K ohm and .001 decoupler.

After retuning the PA coil and grid input the extra drive conditions will be realized.

Modification to Microphone.
There are two ways to achieve rocking armature operation. One is the direct substitute of the transistor pre-amp unit designed by the manufacturers as a replacement for the carbon insert. The other is the replacement of the 12AU7 with a 12AT7 and removal of the Input Transformer. Then connect the rocking armature in place of the transformer secondary.

Modifications to the Muting Circuit.
These were made to improve the time constant and audio frequency response. Instead of referring to substitution, we print the new circuitry (Fig.2) and leave the techniques of placement of the new components and replacement of the old to the discretion of the constructor.

Modification to the Front End.
This simply involves the replacement of V2, the second Mixer, with a type 6CY5. The noise figure of this tetrode is substantially lower than the pentode it replaces. Retuning is necessary and, although the book states an increase in filament current, 175A to 200A, the unbalance benefits the transmitter line, and volts are 6.1 against 6.4 for a 13.5 volt rail instead of a 6.25 balance. Inclusion of a small resistor on the lower rail will rebalance the lines.

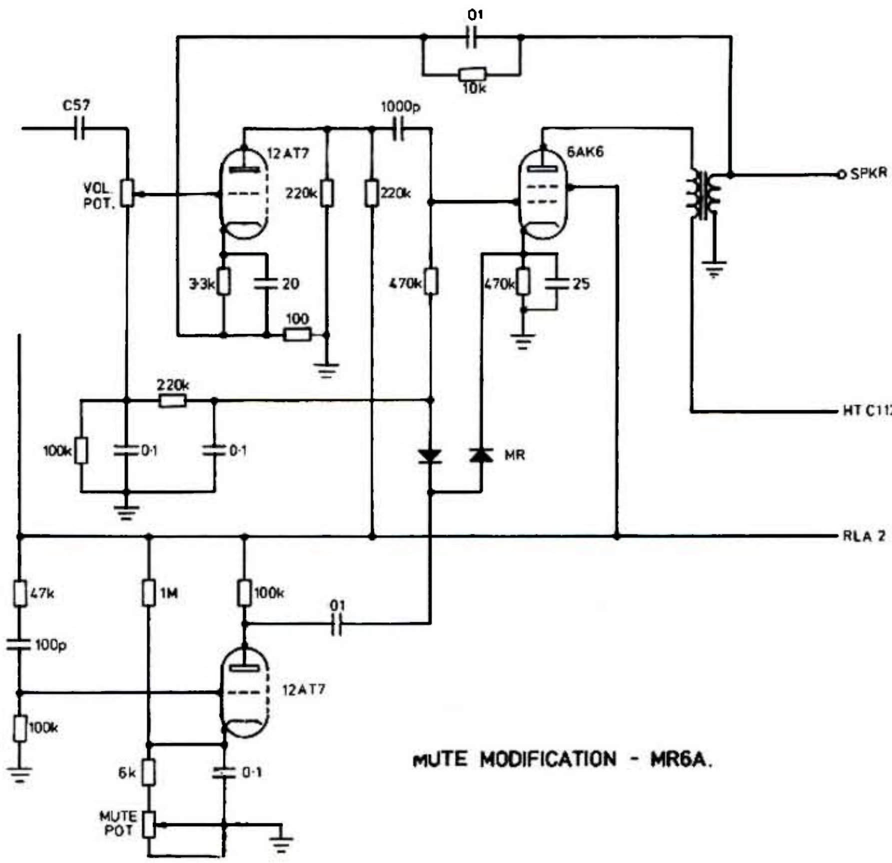
Modification to the Power Supply.
To reduce the rise time of the switching transistors, and consequently the dissipation, the 2 feedback resistors R103 and R104 are increased from 330 Ohm to 560 Ohm, 1 watt, and across R98 and R101 are connected two back-to-back electrolytics. The values are 20 microfarad and the positives or negatives are connected together, creating a miniature 10 microfarad non polar capacitor.

In the voltage tripler section, C112 is supplemented by an additional 24 microfarad electrolytic 450 VDCW, 600VDCS.

In our rig we also changed the two doubler electrolytics, substituting 33 microfarad 450VDCW for the existing 24 microfarad values of C108 and C109.

Conclusions
This is definitely a project for those with time on their hands; but results in an improved nice-to-listen-to rig, well behaved, and with that little extra "oomph" for the marginal contact or armchair copy across town.

Those who have heard the rig used by VK3 ZAZ mobile in country areas will probably verify that it is easy to copy and as good as any others heard. No claims to fame are made other than this, and we hope to hear some results from those who desire that little extra, without going "you know what."



MUTE MODIFICATION - MR6A.

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Thinking of going to Europe on holiday or maybe on business-cum-pleasure? David Verity of Whitehouse Public Relations, 67 Christie St., St. Leonards, N.S.W., 2065, ph. (02) 439 2611, sends along some details of holidays in Europe with DX at your fingertips. Perhaps not so many people will know about the pleasures of pottering around Europe in a caravan or motor caravan, tent or what have you. Beware however of going on a tour in summertime, especially June to September, without advance reservations. This applies also to camping sites which get very very crowded at that time of the year. Remember also there is not too much outback in Europe for ad hoc camping or overnight caravan halts.

The Club Radio Stations listed in this article most certainly are located in the very heart of Europe. More than sufficient historical places close by and such scenery as can only be described as beautiful — so long as the WX does not intervene. Literally thousands of VK's and ZL's can be found ambling round Europe. Many take advantage of the 'off-season' period March to May — the spring — when the weather can be temperamental particularly in the more northern parts of Europe, but how beautiful it can be when the sun shines. Apart from the places mentioned, do not forget to include a visit to 4U1ITU in Geneva if you can. The DX-tour might perhaps be more fun for a full licensee as opposed to the limited operator.

EUROPEAN HOLIDAYS FOR AMATEURS

A group of active Radio Amateurs from four different countries recently launched a new venture called TOPTOUR HAM CLUB.

The club plans to offer all licensed amateurs the opportunity to enjoy their hobby during their holidays.

Many countries already have reciprocal agreements which permit foreign amateurs to obtain vacation licenses in the host country. The Club is in a position to secure such vacation licenses or assist in procuring such documents.

In order to assist the amateurs in their amateur activities the Club has established facilities in a number of holiday centres in Europe. All club Stations have been placed in first class hotels.

At this time there are Club stations operating in SWITZERLAND, GERMANY, LIECHTENSTEIN, PORTUGAL and AUSTRIA.

Moreover, the club can make available VW-Campers with mobile amateur station built-in.

Any licensed amateur from Australia is eligible for guest membership.

Toptour Ham Club has close relations with SWISSAIR and several well-known Travel Agencies. As a result it can provide the vacationing amateurs "tailor made" holidays at the lowest prices.

TOURIST PROGRAMS

The travel program can be arranged according to the needs of the vacationing amateur and his family. Rates are based on a minimum stay of 7 days at each Club Centre (minimum in Portugal, 14 days). It is also possible to provide for interruption in the program to allow the amateur to use part of the time for business purposes. Places other than the listed Ham Club Centres may also be visited and included in the program.

ACCOMMODATION & MEALS

All rates quoted are based on rooms with double occupancy, with or without bath, in selected hotels or in a Club House. The rates at most destinations include 2 meals (continental breakfast, plus either lunch or dinner), and Toptour Ham Club will undertake to secure the vacation amateurs licenses and assist in making the necessary application. The vacationing amateur will get his own licenses and call letters for each country to be visited. Any fees for these are included in the overall prices quoted.

However, it is understood that due to the considerable time needed to obtain licenses and call signs for the vacationing amateurs, a complete questionnaire, and photostat or Xerox copy of the home license (for Portugal the original, which will be returned) need to be completed and sent at the time of booking but not less than 2 months in advance of departure (for Portugal 3 months).

THE VW — CAMPER

A comfortable vacation home on wheels, the camper provides room for 3 grown-ups and 1 child. Radio equipment consists of an FT 101 (Sommerkamp 277) for 5 bands, CW and SSB with 240 Watt PEP input, a Drake W-4 HF-Wattmeter, an electronic key (ETM2). A dynamic mike is also provided. There are two loudspeakers: One in the living area, the other above the driver's seat, built into the roof.

The antenna is a roof-mounted HUSTLER mobile antenna. The station can be switched to AC current for stationary operation on camp grounds.

All the station gear is conveniently arranged on a modern desk. The YAESU FT DX 400 is mounted on top of a speaker console. The entire 5-bank 80- 10m rig, operates on CW, SSB and AM with a full 500 Watts PEP input. A DRAKE W-4 WATT-METER allows the continuous checking of the HF output, as well as the Monitoring of the SWR. There is also a high-level output DYNAMIC DESK STAND MIKE with touch control bar for easy PTT operation, and for the CW man a modern ELECTRONIC KEYER ETM-3 also permitting squeeze-keying.

Overlooking Bregenz, Austria, the new Top Tour QTH for this area is the Berghof Fluh perched on a mountainside overlooking Lake Constance.

Additional conveniences afforded are: A DIGITAL CLOCK, a HIGH INTENSITY READING LAMP and a set of HIGH QUALITY EARPHONES. The small SWITCH PANEL BUILT INTO THE DECK, HOUSES THE MAIN SWITCH for the station with a SAFETY LOCK AND KEY, as well as a CO-AX SWITCH for the antennas and the 50 Ohm DUMMY LOAD.

Depending upon the location of the individual Club Stations one or two of the following antennas are used: — FB 53 JUMBO BEAM with 5 elements on 10-15m and 3 elements on 20m, driven by a HAM-M ROTOR and activated through its well known control box.

— FD 4 WINDOM ANTENNA with a coax-feeding for 4 bands, generally used for 40-80m.

The entire station is laid out with comfort and convenience in mind.

Sub-tropical is the only way to describe the Swiss city of Lugano, the southernmost city in the country. Located south of the Alps, dipping deep into Italy this Top Tour location offers the best of Swiss and Italian hospitality.

THE STATIONS

HB9: Bad Ragaz — (Club Radio Station No. 1)

BAD RAGAZ is world famous for its mineral springs. It is a health spa of the first order with Thermal baths and the best medical facilities. The town has numerous attractive parks, endless possibilities for vacationers who like sports of any kind. Golf (18 holes) mini-golf, horse-back riding, swimming, fishing, flying and soaring, skiing and mountain climbing.

HOTEL CRISTAL CH — 7310 BAD RAGAZ

This is a new Hotel with its own enclosed swimming pool, sauna (Swedish steam bath), large restaurant, large lobby, bar and reserved Club Room with Radio Station.

Other world famous tourist centres can be reached by train or car in a relatively short time. St. Moritz, Pontresina, Davos, Klosters and Arosa.

HB9 QTH: ZWEISIMMEN

Surrounded by Pre-Alpine meadows, forests and mountains, this is an ideal spot for recreation, rest and summer and winter sports. There is a new heated swimming pool, tennis courts and mini-golf courses, beautiful fishing streams, and an enclosed gondola-type chair lift to the top of famous Rinderberg

(6,200 ft.), trains and a ski school.

QTH — HOTEL KRONE CH-3770 ZWEISIMMEN

The Hotel is modern, centrally located, yet quiet. Sunny meeting rooms, bar, banquet room, beautiful garden open to guests, garages, orchestra and reserved Club Room with Radio Station.

HB9: QTH: LUGANO

In the southernmost part of Switzerland, Lugano is near the Italian border, with mild climate. It is one of the loveliest spots in Europe and offers the tourist every facility.

QTH — KINGS HOTEL CH-6900 LUGANO

This is a modern "skyscraper" with large restaurant, meeting rooms, bar, garage in the basement and reserved Club Room with Radio Station.

Excursions — By car or train to Locarno, Ascona and the Italian cities of Milano, Como and Varesse. Sight-seeing trips by boat to a number of quaint and interesting places along the shores of the lake.

HBO — QTH: GAMPRIN, LIECHTENSTEIN

Tiny Liechtenstein is a separate and independent country, which is ruled by Duke Franz Josef II. It is situated in the Rhine Valley between Switzerland and Austria and is only about 17 miles long and 5 miles wide.

Gamprin is a small village on a hill in the middle of the Rhine Valley, about 7 miles from the Capital, VADUZ. This is an ideal spot for DX men.

QTH — FORSTHAUS VALEPR — SPITZINGSEE, GERMANY

A historic Inn, surrounded by woods in the Bavarian Mountains, close to the border of the Tyrol. It features a rustic atmosphere, large, friendly rooms with pine-panelled walls.

The Radio Shack here features a COLLINS 75 S-3 plus LINEAR with 3KW input, a Beam and Vertical Antenna.

OE9 — QTH: BREGENZ, AUSTRIA

The picturesque town of BREGENZ is situated at the east end of Lake Constance, where the Rhine River flows into the Lake at the point where the three countries Austria, Germany and Switzerland meet.

A variety of entertainment is available to the tourist, mini-golf, boating and water-skiing, sailing and fishing.

QTH — HOTEL BERGHOF — BREGENZ, AUSTRIA

This modern Motor Inn is located on a hill overlooking the town of Bregenz. Its view of the Austrian, German and Swiss mountains is truly unique and awe-inspiring. It is a new Inn with an excellent restaurant, a huge terrace, Tap Room, Bar-In-The-Rocks. Reserved Club Room with Radio Station. Rooms, modern with bath, phone and balcony.

The Radio Shack features Beam and Rotor; also a separate antenna for the lower bands.

CTI — QTH: ARMACAO DE PERA, PORTUGAL

Armacao de Pera is situated on the southern coast of Portugal in the Province of Algarve, about 30 miles west of the airport of FARO.

QTH — TOPTOUR CLUB HOUSE, PORTUGAL

The Club House is located on the beach and contains 4 double rooms and 1 single room. The large radio shack is enclosed and has a 5 element Beam and Ground Plane Antenna. ●

audio rectification hints

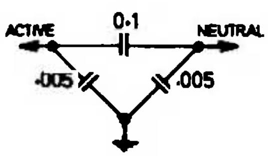
R. S. Gurr, VK5RG

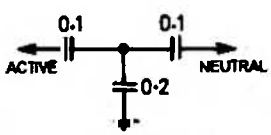
Reprinted from VK5 Journal, January, 1972

Just like Channel O interference, when amateurs get into audio frequency amplifiers, nothing can be done at the amateur rig to cure the problem. A passing taxi or a nearby two-way service could cause the same problem, but it is usually the amateur that gets the neighbors' wrath. If affairs are friendly, and you haven't been abused, and you feel you would like to help the guy, perhaps only for the technical exercise, here are a few hints on possible cures.

POWER LEADS

Once believed to be the main source of R.F. input to audio-stereo systems. With valves, it was, but in this day of solid state, very likely no problem. An Aegis MF2A line filter can resolve some cases and will reduce audio plops and clicks — a simple backyard line filter can be improvised by twining the excess cord through a circular ferrite, perhaps an old TV deflection yoke core. A 10' length of 3 x 23/.0076 flex thus entwined with loose plugs and sockets can be used for the chokes of an experimental line filter. To accompany these, some "jumbo" type double adaptors with the following condenser combinations should be made.



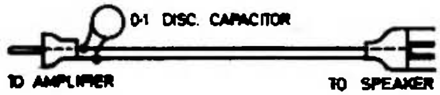


An experimental lash-up should give you a lead to the best type of filter. In extreme cases the above capacitor combinations wired direct to the power transformer may be necessary. Often a direct earth from the radio chassis to the ground is all that is required — this could apply especially to some imported equipment where the manufacturer has ceased to include electrostatic shields in power transformers.

OUTPUT LEADS

Although we would be led to believe that the speaker leads on modern hi-fi combinations are shielded wire, a survey reveals this is only so in a few cases. Long open speaker leads are good aerials, and will conduct RF back into the sensitive preamplifier circuits, where it is rectified and amplified.

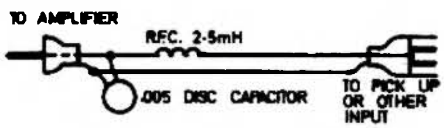
Most commercial units use either screw-on or RCA type connectors — some have been found using 3.5 mm plugs and standard headphones type plugs for this purpose. With screw-on connectors, a 0.1uF polyester or ceramic capacitor direct across all speaker output terminals, at the connector strip, will stop speaker lead pickup in most cases. A useful item to help try this same cure on sets using RCA or other jacks is to have a couple of adapters already made up, so that they may be plugged in series with the loudspeaker leads. NEVER do this switch-over with the set switched on — open circuits on output stages are still disastrous!



INPUT LEADS

With the use of transistors, the need for intimate shielding of all circuits is reduced, providing the hum field of the power transformer is made insignificant. As a consequence it is not unusual to find input leads from pickups that are not shielded. A 0.005 or so disc ceramic on a plug adaptor is useful if the input connections are removable. If they are not, it will be necessary to start bypassing at the first available point nearest the amplified input. The number of input combinations to be met are many. However, it will be necessary to bypass at least the input terminals on the PCB, if this cannot be done at the chassis input terminals on the PCB.

In extreme cases, changing the pickup leads to double screened wire will help, and may also give reduced hum from the motor field. Use a series RFC to the input elements, and 0.005 bypass capacitors are often used.



OVERALL EFFECTS

With input, output and power circuit pickup reduced to a minimum, the remaining RF pickup, if it still exists, is by direct receiver wiring and board pickup. You really are in for fun if you need to go to the extent of lifting components from a PCB to install series filters. If may be necessary, but try every means of shunt bypassing before you attempt this, as it is so easy to upset the bias conditions and so hard to fit the parts back in — even ferrite beads become difficult to fit sometimes.

Direct-pickup by wiring is best tested back in the freedom of your own home shack/ workshop. Most of the previous tests can be conducted in the owner's lounge room. A 27 MHz handphone, or a signal generator with a probe, or even a GDO with 50 Hz modulation, may be of assistance. The portable source as described above, should be moved about over the pre-amplifier section of the wiring and the areas where intensity of interference is great should be noted. This will be near unscreened volume control leads, and either bypassing of the next input element (0.001uF) or screening the leads, or both, will be necessary.

If it is proved that RF close to the board is being rectified, but it is hard to pick the exact element, cover the section with paper held down with masking tape and then screen the lot temporarily with "Alfoil". At your leisure you can then peel the metal away in parts and see which area is the most sensitive to its removal.

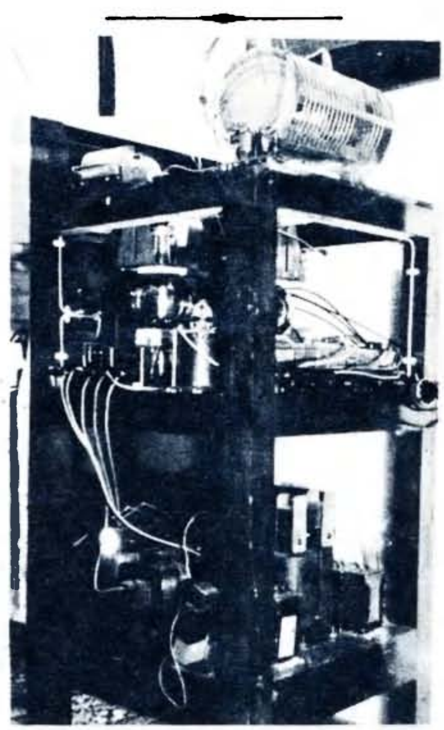
CONCLUSION

The above brief notes may be of assistance to anyone about to attempt the de-lousing of an audio TV-stereo-radiogram system, although they are necessarily incomplete. It is difficult to discuss the aspect of receiver-audio design with servicemen, manufacturers' representatives, and the manufacturers themselves. Apparently due to lack of legislation on receiver design standards, this aspect is continuously overlooked. Remember, however, the same trouble can be caused by any other AM or SSB transmitter that may be set up close to the amplifier in question, consequently the burden of cure should not necessarily be the amateurs.

If you have TV or audio appliances in your home that suffer no interference, your invitation to an irate neighbor and his uncomprehending technical advisor to visit and observe for themselves is a good way to start to improve relations. There is a "no man's land" existing in this area, and since usually the amateur is the only one involved who understands RF, perhaps if he got off his tail and offered his assistance early in the piece, rather than procrastinating on legal points, he would improve his public image.

REQUEST

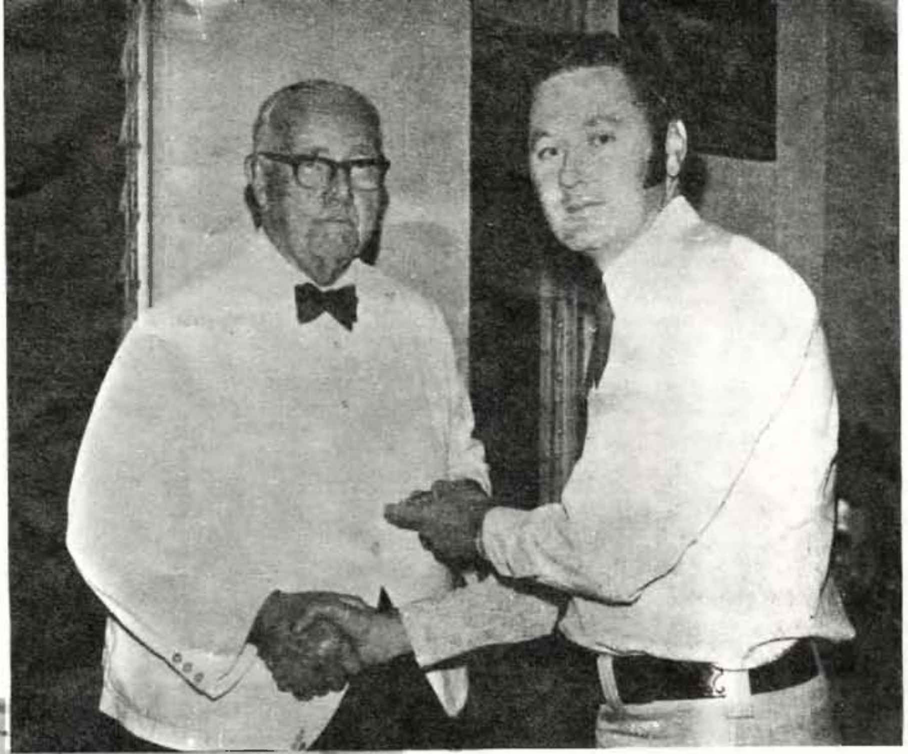
The writer would welcome details of case histories, mainly technical, on methods of cure. I do not require any further information on the legal aspects, or how nasty some neighbors can be! ●



Station 2WI—the official station of the N.S.W. Section of the Wireless Institute of Australia in 1923. Many components for both amateur and commercial experimental stations were 'home-built' in these days and this illustration is typical of an experimental station of the time. It was built by a member of the Institute named James and installed at the residence of Mr. H. A. Stowe, 2CX, until 1925 when it was transferred to Mr. Basil Cook's residence. Basil Cook operated as XADW.

North Queensland Convention
21st-22nd July, 1973

The Saturday evening dinner dance was attended by 130 people. Highlight of the evening was the after dinner talk by Newton VK4QW. Peter, VK4QD, President of the Townsville Amateur Radio Club is shown presenting honorary membership of the Club to Newton with a suitable momento of the occasion.



Left—
The commercial display of SSB equipment by courtesy of Fred VK3YS, was well received and many amateurs stood gazing at it with that far-away look in their eyes.

Below—
Ron VK4ZLC broadcasting the Queensland Divisional news on Sunday, 22nd July, from the North Queensland Convention. On the left is Peter VK4QD, T.A.R.C. President. Behind is Newton VK4QW waiting to take the call-back on 14MHz.

Left—
Evie, VK4EQ, hostess for the Saturday evening dinner dance, cutting the VK4TC cake

a review of the BARLOW WADLEY XCR-30 MARK 2 receiver

A review by the AR technical staff.

The Barlow Wadley Receiver has already been the subject of two technical reviews; firstly in the RSGB magazine "Radio Communication" for January 1973, and also in Electronics Australia for May 1973. In this review it is proposed to give a picture of the receiver in operation at a typical amateur station by comparing it with some of the better known pieces of amateur gear.

The "Barlow" is a general coverage receiver with a frequency range of 500kHz to 30 MHz effectively in 30 bands each of 1000 kHz. It does not employ any form of bandswitching, the appropriate range being selected by a MHz dial calibrated from 0 to 30 MHz. The kHz dial is calibrated at 10 kHz intervals, the actual divisions being spaced approximately 2 mm. apart. The receiver is complete in itself, the cabinet measuring 292mm.wide x 190mm.high x 98mm. deep (11½" x 7½" x 3 7/8"), and the weight including batteries is 4.14Kg. or 9 lbs. 2 ozs. Reference to the photos shows that the set has the appearance of a typical large Japanese portable receiver, but it is, in fact, manufactured in the Republic of South Africa.

Front panel controls, apart from the MHz and kHz dials, include an antenna trimmer which actually tunes the front end throughout the entire range from 500kHz. to 30MHz; an SSB clarifier control giving a 'band spread' tuning over about 6kHz; a mode switch to select either upper or lower sideband, or AM reception, and a combined off/on volume control. There is also a calibration re-set control, and a small tuning meter.

The "Barlow" operates on the Wadley Loop principle which is also used in the well known Racal receiver and also in the locally designed Delta-het receiver. In order to cover the 30 MHz range, the front end oscillator is tunable from 45.5 to 74.5 MHz. This is then mixed with the harmonics from a one MHz. crystal in a complex system to produce output into a tuneable IF range of 2 to 3 MHz. A 455 kHz IF section follows, which includes two ceramic filters, one giving 3kHz selectivity for SSB, the other 6kHz selectivity for standard AM reception. Both diode and product detectors are provided, the appropriate one being selected by the mode switch. The audio stages are quite conventional and provide in excess of .5 watt output into the built-in speaker or to a 3.5mm output socket for external headphones or speaker.

Before proceeding to "on air" impressions, here is a run down on the more important specifications.

Frequency Scale Accurary:- Within 5kHz. at all frequencies.

Resetting Accurary:-Within 1kHz. at all frequencies.

Selectivity:-6kHz. overall on AM. 3kHz. overall on SSB.

Frequency Stability:- Will hold an AM transmission in tune indefinitely, and an SSB transmission on pitch for long periods of time.

Sensitivity:-Antenna circuit thermal noise audible at all frequencies.

Image Rejection:- 50db on all movable image channels. 60db and better on immovable images.

Current Consumption:- 20mA. quiescent from 6 internal "D" type cells.

THE BARLOW ON AIR.

Initial operation is simplicity itself. To set the receiver to any given frequency it is only necessary to move the MHz. dial to roughly indicate the whole number MHz. range, then move the kHz. dial to the required frequency. The exact frequency is then determined by simply adding the two readings together. It might be thought that the setting of the MHz. dial is a critical process, perhaps in the style of the old band set, band-spread, receivers of bygone years; however this is not the case at all. The action is more related to a switch than to a continuously variable control and when a signal is located, it is only necessary to move the MHz. dial slightly back and forth to peak the signal. The frequency does not vary in any way at all.

For the purpose of our tests, the Barlow was operated on its inbuilt telescopic whip antenna with no external connections at all. The comparison receiver used was a Collins 75S3 connected to a tuned, long wire antenna. One of the first things noted was the difficulty in tuning SSB using the kHz. dial alone. The drive ratio of this is only two to one and, although a large edge type control is provided, it was more good luck than good management if a signal was resolved immediately.

However, it is not intended that SSB signals should be resolved on this dial. The clarifier control provides smooth and easy resolution once the signal has been located. When the process has been mastered, tuning becomes very easy and SSB signals could be located almost as easily as on the Collins. The overall sensitivity of the Barlow on its own whip antenna is quite incredible. On the 20 metre band any signal over 'S'3 on the Collins was readable on the "Barlow." The addition of an external antenna to the "Barlow" made only a small improvement, possibly due to the difficulty in obtaining an impedance match into the external antenna connection of the receiver.

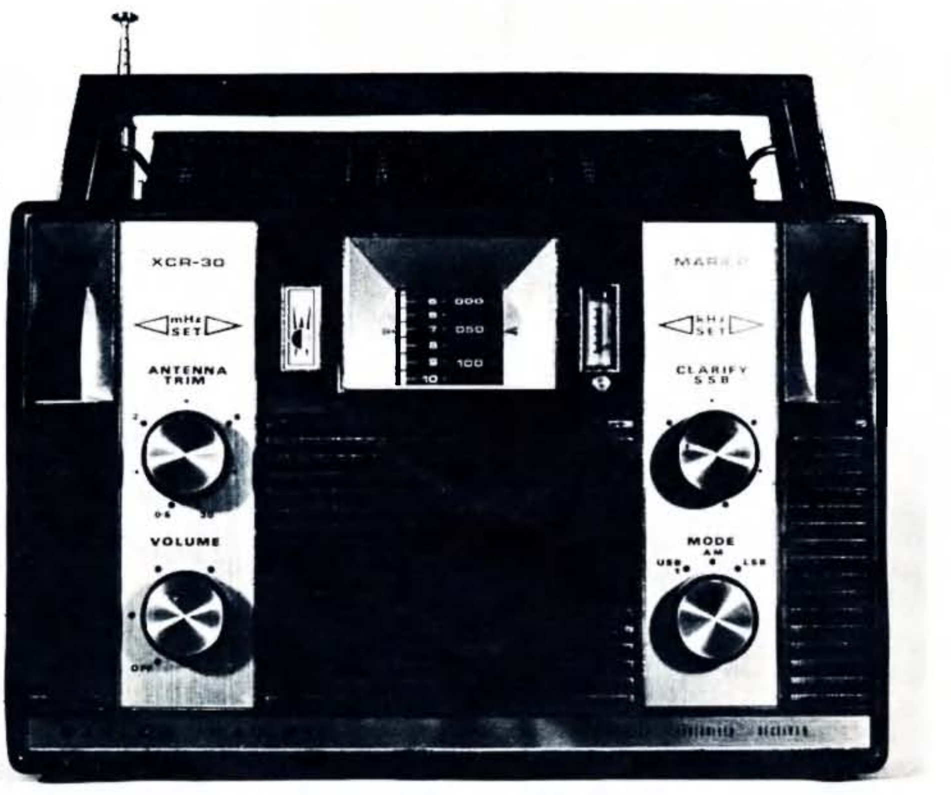
At 7 MHz and lower the Collins pulled away in sensitivity from the "Barlow" and it was found that either an earth or external antenna was needed to restore full sensitivity. Stability of the receiver was also most impressive. In the SSB position, drift did not exceed 400Hz., from a cold start, over a period of several hours operation. Most of this drift occurred during the first half minute due to shift in the BFO, the actual drift in the front end oscillators being so low that it was difficult to measure.

One surprising discovery was that the set caused quite a bit of TVI on both Channel 0 and 2 when tuned around the one to two MHz. range. This occurred when the "Barlow" was used within a twenty-foot radius of the TV receiver. If you live in a low signal area this could be a problem. Also it seems that strong signals from Channel 0 and 2 can cause birdies on the "Barlow" when tuning around the one to two MHz. region. However when used in average locations these effects should not present too much of a problem.

To sum up then, the "Barlow" receiver appears to outperform all other general coverage receivers in the price bracket around $200. It would be hard to imagine a better receiver for the short wave listener.

However, to use the "Barlow" as an amateur station receiver presents a few problems. Firstly, some means of muting would have to be devised, preferably a system that left the BFO operative in order to eliminate the initial switch-on drift. Secondly, and it is perhaps only a minor point, the appearance does not fit in with normal amateur gear.

The Barlow Wadley XCR-30 Mark 2 receiver is currently available from at least one of the advertisers in AR.

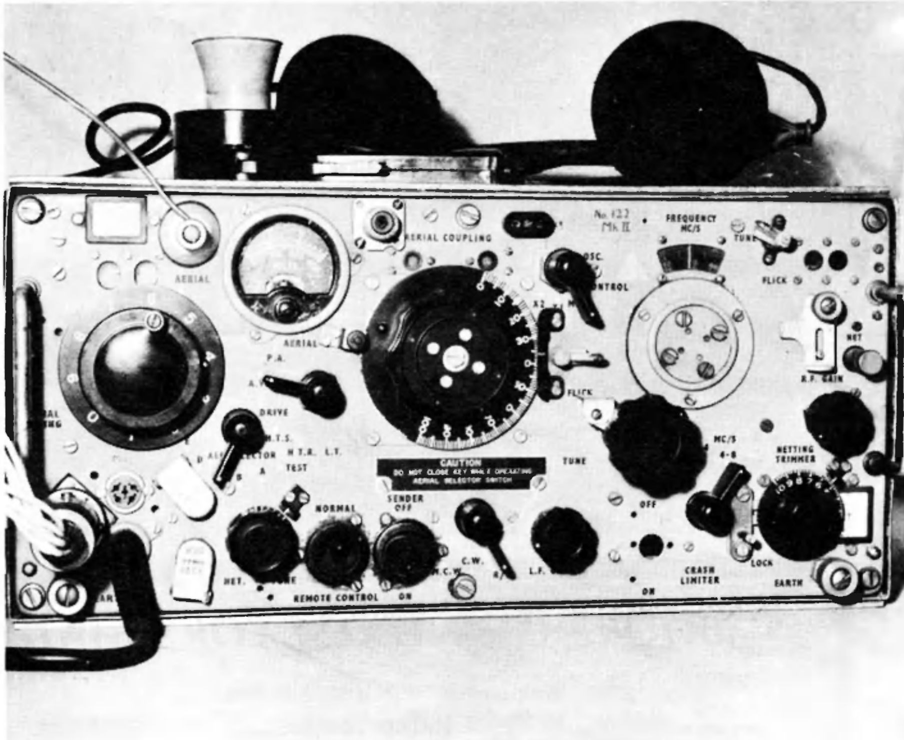


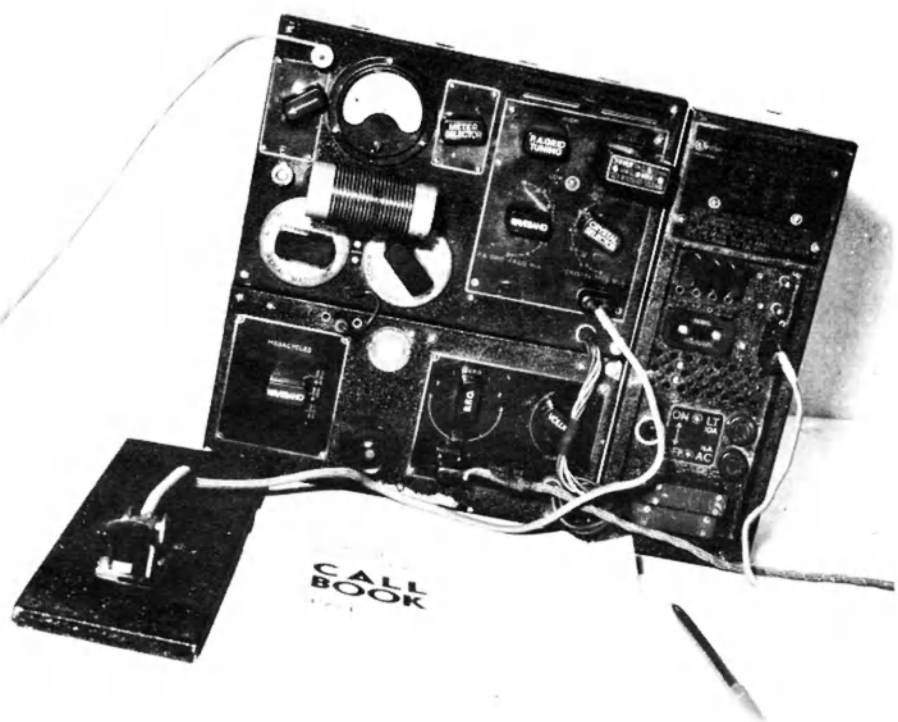
transceivers used by amateurs post-war

Rodney Champness VK3UG
44 Rathmullen Rd., Boronia, Vic., 3155

122 TRANSCEIVER

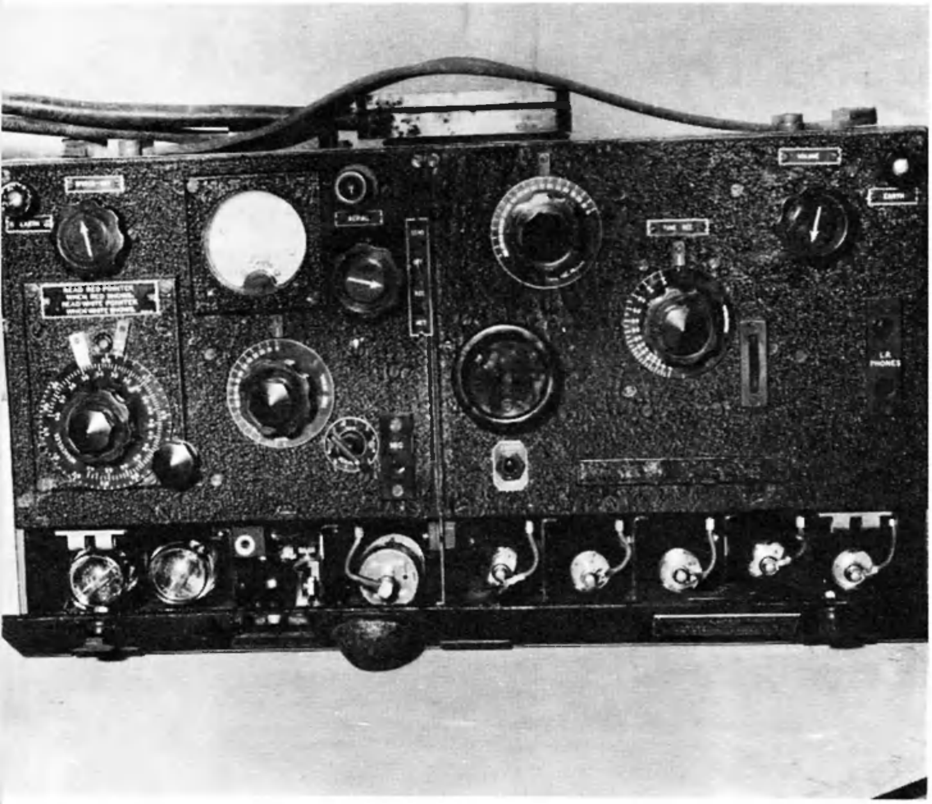
The 122 transceiver was possibly the most used of the WW 2 ex-army transceivers. It covered 2 to 8 MHz in two bands, which meant it covered 80 and 40 metres with no modification. On CW it had an output of 12 to 14 watts and on AM, 7 to 8 watts. The 122 was one of the few sets which had plate and screen modulation; in fact a 6N7 was used in Class B to modulate the 807 output valve. It nominally operated from a 12 volt battery and featured, for its time, one of the lowest current drains on receive of any similar transceiver. These sets were VFO and crystal controlled.





TYPE 3 MK2 TRANSCEIVER

The Type 3 MK2 was designed as a "spy" set for use in occupied territories. These sets used a very versatile power supply and were capable of operating from 6 volt DC and from 110 to 240 volts AC. Their frequency range is from approximately 3Mhz to 15Mhz so covering 80-40-20 metres. This is purely a CW unit and an output of 14 to 15 watts could be expected from the 6L6 in the final. Many of these were modified to fit a plate and screen modulator so making them more useful for the average amateur. This set was crystal locked on transmit and fully tuneable on receive.



FS6 TRANSCEIVER

The FS6 is one of the few transceivers that appear to have a wholly Australian history. It covers, in its original form, 4.2MHz to 6.8Mhz. They were easy to pull onto 40 metres and some chaps got them going on both 80 and 40 metres. They worked off a 6 volt battery and used a combination of battery style 2 volt valves and one 6 volt valve namely a 807. This is a AM/CW transceiver although it does use grid modulation in the AM mode. The output power on AM was 4 watts and on CW 8 watts. The transmitter and receiver were both fully tuneable.

These three sets were probably the most popular of the transceivers which came onto the market after WW2. The sets no doubt were used in many a Remembrance Day contest. These particular sets were photographed in VK3UG's museum by Cyril Maude VK3ZCK.

Newcomers Notebook

with Rodney Champness VK3UG

44 Rathmullen Rd., Boronia, Vic., 3155

As stated last month I intended to build up a signal injector. Strangely enough I did build it, and it took all of half an hour to complete.

YRCS TRANSISTORISED SIGNAL INJECTOR

Bob Callander and his helpers in the projects section of the Youth Radio Club Scheme have been at it again with another winner of a project. The first project was a BFO kit which sold for $2 plus 30c postage. Bob informs me that they have sold 100 of these kits. The signal injector that I built is their second project. I timed my construction time as noted above. I believe that depending on your skill in wiring construction it should take between 15 minutes and an hour.

A lot of thought goes into the design of these projects, so as to present a simple, cheap, and effective piece of equipment. Once again they have succeeded. The signal injector is constructed on a small piece of matrix board, and the whole thing fits in a small plastic tube. Used, large hypodermic syringes are ideal for this job, as they have a rubber bung at one end and a small tube leading out the other to act as the probe outlet sleeve. Everything is in the kit to complete the job with the exception of a few inches of hookup wire and a couple of inches of solder. There are two NPN silicon transistors, 4 resistors, 3 capacitors, matrix board, a penlite cell and the plastic case — plus comprehensive construction information. Bob (VK3AQ) indicates that future kits will have hook up wire and solder.

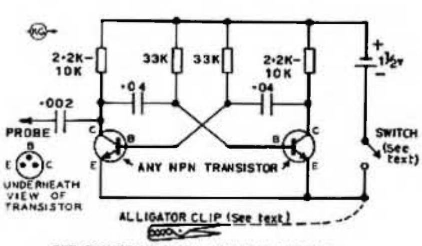
I found that the injector did not draw all that much current, in fact my unit drew about 0.2 ma. I decided to experiment a little with the collector resistor values which are 10k ohm as supplied, and gradually reduced them to the region of 2.2k ohm. This did in fact increase the output of the unit to a more useable level for some types of circuits. Mine finished up drawing about 0.6ma.

The on-off switch for the injector is formed by twisting and untwisting the lead to the negative terminal of the battery. Crude maybe, but it must be remembered that the signal injector will not be used every day by the average experimenter, so it will last a long time and is cheap.

Another advantage having the negative lead come outside the unit is that it can be used as an earth. I used a small lead with an alligator clip on both ends; one end clipped to the negative terminal of the battery and the other to the earth of the equipment under test. This brings up the effective output for some types of circuits where sensitivity is low or the impedance is low. Now one caution when the earth lead is used during the tests. **NEVER** use the earth when testing high voltage equipment. Why you might ask? If the earth lead is connected and then the probe is placed on a component operating at say 200 volts above or below earth, a very high damaging spike of current and voltage will appear across the probe capacitor and the transistor. These share the voltage in inverse proportion to their capacity. The probe capacitor has a value of 0.002uf and the transistor has a value across its junctions of maybe 10pf. The transistor may have to stand momentarily 190 of the 200 volts. The type of transistor used in such a project as this will not normally have a rating above 40 volts Collecter to Emitter. If you do not observe this warning you will ultimately find the injector just does not work. One or both transistors will have expired. I know, I had to find out the hard way. You do not have to! If you do use it on valve equipment, use it without the earth or, alternatively, only put the probe on parts of the circuit where the potential to earth is no more than about 20 volts. For instance the grids of most valves will be a safe place.

I have only two small criticisms of the injector, or more precisely the information supplied. The circuit drawing is hand drawn, and the pin connections of the average transistor are not included. Other than that I can do nothing other than recommend this kit for any newcomers or, for that matter, some not-so-newcomers like myself. The YRCS are selling the injector kits for $2 plus 20c postage. They are available from Bob Callander of 383 Warrigal Road, Burwood, 3125.

There is one possible fault you may strike with the injector. Sometimes it will not work, and not for the reason mentioned previously. The leakproof batteries in vogue at the moment have a double bottom and sometimes these two layers of metal don't make contact — therefore no voltage. These batteries are designed to be used under slight compression. Some of the Japanese batteries appear not to be double bottomed and it may well be preferable to use them as replacements when the time comes. Figure 1 shows the circuit of the injector and the base diagrams of the transistors. As can be seen the circuit is simple and can form the basis of many other simple projects.



FOR PNP TRANSISTORS REVERSE BATTERY.

FIGURE 1.

USING THE INJECTOR AND HOW IT WORKS

Next month I hope to show you how a signal injector works, and how it can be used to fault-find the audio and RF sections of equipment. It can even be used as a tone source for a morse code practice oscillator or for the modulation on an A2 type transmission. Do you know how a device which is oscillating at say 1kHz can be used on RF circuits? Wait for next month s instalment.

ODDS AND ENDS

The RF probe in the June **Newcomer's Notebook** can have one extra component added to prevent destruction of the OA91 diode. When this probe is used on circuits with high DC voltages to earth much the same problem as I warned you about regarding the signal injector and high voltage can occur. To overcome this problem, I drew the circuit such that the high voltage pulse from the plate circuit of a valve transmitter stage will cause the diode to conduct — not be reverse biased. To be doubly sure an **NE2** neon indicator worth about 25c can be placed across the OA91 diode. The striking voltage of the neon is lower than the Peak Inverse Voltage rating of the diode. The diode should then last for ever, theoretically, as long as you do not put too much **RF** through it.

If you are an amateur how do you monitor your signal? You are required to do so according to regulations! There are many ways of doing this, but can your monitor tell you anything about your signal other than it sounds alright? Can you tell, for instance, how much modulation you have on your AM set, or are you flat topping on SSB? Can you be certain how much deviation you have on your FM set? I will be very interested to hear what you use, because I believe that there is a dirth of good station monitors that are simple and effective. ●

"The Ham from Snowy River." by Alan Shawsmith VK4SS.

(With apologes to Australia's Immortal Bard – A.B. 'Banjo' Paterson. Author of 'The Man from Snowy River' and 'Waltzing Matilda'.)

There was movement on the Ham bands, for the word had passed around
that a contest big and rich was under way,
And from official sources, it was worth a thousand pound.
So all the cracks had gathered to the fray.
All the tried and rare DX'ers from stations near and far
Had mustered on the Ham bands overnight.
For contestors love hard fighting where'ere the raries are,
And put their rigs to hattle with delight.

There was Harrison who made it when he won the CQ cup.
An old man now with hair as white as snow;
But few could stay beside him when his blood was fairly up·
He'd go where'ere DX and rig could go.
And Clancy of the Overflow came on to try his hand,
No better code man ever held a key:
For not one op. could throw him while the heated rig would stand –
The Overland had taught him well, you see.

And one called in, a Novice with a small and weedy rig;
Something like a ORP'er undersized
But built to stand the climate and thrice tested for it's sig;
Gear that's by mountain DX'ers prized.
But still so small and tiny, one would doubt it's power to stay
And the old man said, "That rig'll never do
For a long and tiring contest lad. You'd better give away;
A two day test is far too much for you."

So he waited, sad and wistful – only Clancy stood his friend,
"I think we ought to let him in," he said.
I'll warrant he'll be pitchin' with us right until the end;
His rig's homebrew but he is mountain bred."

· · · ·

They found the DX raries in the first big pile up clump
And called hard from the mountain brow.
The old man gave the orders. "Boys, go at 'em from the jump;
No use to try for fancy working now."

So Clancy tried to work 'em – he was breaking on the wing,
Where the best and boldest DX'ers take their place.
He turned his beam toward them and he made the ranges ring
With his keyer as he met them face to face.
But the QRN was awful and the gorges deep and black,
Resounded to the thunder of its cries,
And the CQs' woke the echoes and were fiercely answered back
From the Ionosphere pulsating in the skies.

When they reached the half way mark, even Clancy took a pull.
The pace would make the bravest, stay, relent.
The QRM lay thickly but still the bands were full
Of maddened ops urged on by victory's scent,
And the old man muttered fiercely, "We may bid the mob good-day.
No man can hold them now from here."
But the Ham from Snowy River wouldn't give the game away.
He swung his beam around and gave a cheer.

He was still among the callers as the sun began to rest.
– And other mountain Hams now sitting mute,
Heard him ply the keyer faster; he was right amidst the best
As he raced across the bands in hot pursuit.
Then they lost him for a moment where two S9 signals met
And widely spread – but a final glimpse reveals
On far and higher frequencies, the rare ones calling yet,
With the Snowy River Novice on their heels.

And he logged them – now he logged them. Till he'd made the QSO
He followed like a bloodhound all the way
With a pace that never slackened – and as the records show;
He alone and unassisted, won the day.
But his hardy mountain rig now could scarcely raise a watt.
The PA tube was red from hip to cap,
But it struggled on undaunted with a courage fiery hot,
Until the Novice sent his final tap.

And down by Kosciusko, where the pine clad ridges raise
Their torn and rugged battlements on high,
Where the air is clear as crystal and the white stars fairly blaze
At midnight in a cold and frosty sky,
And where around the Overflow, the reed beds sweep and sway
To breezes and the rolling scrub is thin.
The Ham from Snowy River is a household word to day,
And the others tell the story of his win.

a saga of the bug

Ken Gillespie, VK3GK

P.O. Box 5, Clayton, 3168.

The word "Bug", whilst being a trade mark, is known in radio circles as the generic name for any mechanical semi-automatic code key. These days the name has even been incorporated in a purely electronic device known as an E1-bug. However it is interesting to follow advertisements for the genuine article over the years.

The earliest such advertisement I came across appeared in a December 1911 magazine and is shown in the facsimile. Notice that it is the Horace G. Martin Vibroplex for $10 and J.E. Allbright is the sole selling agent at 253 Broadway, New York.

In 1921 it becomes Martin's New Improved Vibroplex Bug and is sold by the Vibroplex Co. Inc. (established 1890) now situated at 825 Broadway and the price is $17.

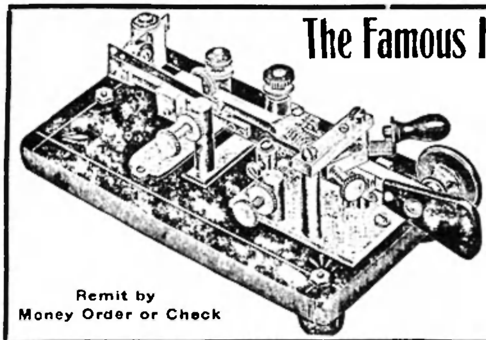
By 1931, the Genuine Martin Vibroplex bug is still $17 but a special radio model is introduced at $25. The Vibroplex Co. Inc. has a J.E. Allbright as president. A 1942 advertisement shows Allbright still president but the Martin has been deleted and is no longer even printed on the key. Price has dropped to $15.95 and the firm is now at 833 Broadway.

The key is an expensive $24.95 in 1968 from the company at the same address. For the first time, Mr. Allbright's name does not get a mention.

I notice that the company still advertises, but not so much of recent times. The original unit can still be bought, but more emphasis is placed on a mechanical device for people making electronic keyers. It seems a little sad to see the old keyer being superseded by the self completing dots and dashes of solid state. ●

Advertisement from "Modern Electrics" December 1911

The Famous Horace G. Martin Vibroplex



THIS TELEGRAPH SENDER S ESPECIALLY ADAPTED FOR WIRELESS. EVERY MAN INTERESTED IN WIRELESS SHOULD HAVE ONE OF THESE MACHINES.

PRICE, $10.00

J. E. ALBRIGHT
SOLE SELLING AGENT
DEPT. A, 253 BROADWAY
NEW YORK

Remit by
Money Order or Check

W.I.A. WESTERN ZONE CONVENTION

Will be held at **Stawell** on **Saturday** and **Sunday, October 6th & 7th, 1973**

Saturday—Electronics Display
Dinner, Evening Entertainment

Sunday—Carphone checks,

Barbeque at Hall's Gap and visit to the beautiful Hall's Gap Wild Flower Exhibition Details, Bookings.

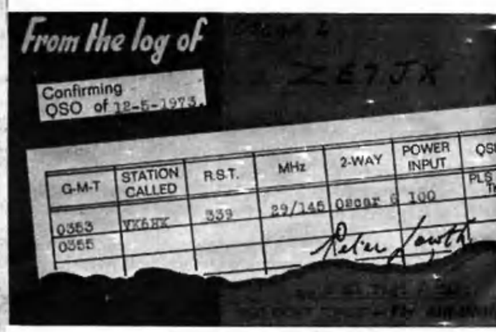
Max Grimble,
Wartook Wayside,
Horsham, 3400

Albert Cash, L3289. Victorian Intruder Watch Coordinator, shows an Intruder teletype printout being received on the 14MHz band.

PROJECT AUSTRALIS

with David Hull VK3ZDH, Chairman, Project Australis.

Don VK6HK has had the thrill of making one of the more exotic satellite contacts through Oscar 6. The QSO with ZE7JX was well beyond the normal range of the satellite and Don has the QSL card to prove the contact.



Commercial Kinks

with Ron Fisher VK3OM
3 Fairview Ave., Glen Waverley, 3150

This month I am going to continue with the FT101 modifications published originally in the English "Mobile News", the journal of the Amateur Radio Mobile Society.

From the October 1972 issue here is some data on front end improvements for early models of the FT101.

"Simply because there must be thousands of FT101's in use throughout the world, in fixed and mobile installations, and because you cannot please all of the people all of the time, we receive a steady stream of suggestions for 'improving' the performance of this ingenious transceiver.

Sometimes the situation gets rather confused since some users complain of faults which are absent in the other owner's sets. What has transpired is that, whilst all are called FT101, there appear to be subtle differences between the components used in the earliest and later models. This is encouraging in a way, since it shows that the makers are constantly striving to improve overall performance in the light of customers' experiences.

The latest contribution is taken from notes sent to Sandy Duncan GM3DZB/m, by 9M2CP from Penang Malaysia, whose permission we have to publish them."

Phil's opening remarks are important and confirm what we have suggested.

. . . I must warn that not everyone's problem is the same. This is due to location, strength and frequency of interfering signal (s) etc. as well as model numbers being differently designed. I have also found, when comparing notes on results of modifications, that trouble has also been caused by differences in transistor parameters used in different sets. So with the above preamble I'll get on with the details. Bear in mind they are mostly gleaned from my own personal views, and experience. The problem as I see it can be broken down as follows:-

1. Intermodulation caused by several strong out-of-band signals.

2. Spurious unmodulated in-set responses from either the various oscillators or harmonics of them, or those induced by the various diodes.

3. Blocking.

A. The front end diode, DD13, provides some spurii and unwanted signal. It can be removed (I have shorted it out so it can be put back if needed). Then if this is done lift off R49, 1K ohms, or remove it. The 30 pf C122 can be left in circuit, or removed.

B. The latest FT101 has a 14 volt pilot lamp placed in series with this line, I believe as an RF overload protection for the coil windings.

C. If the above is done it is advisable to replace the RF amplifier with a dual gate, diode protected MOSFET. The RCA 40673 is one of the best. I would suggest this change in any case. Any suitable substitute will do.

D. Board PB 1077B. There are two main causes of trouble on this board. (a) The first mixer. (b) The local oscillator. After considerable experimentation I found that replacing the first receiver mixer with a BF 173 and the local oscillator with a BC 109 (not 107 or 108) gave excellent improvement to cleanliness of unwanted, out of band signals and 'jingle-bells'. The oscillator certainly needed cleaning up. The latest model FT101 uses a buffer transistor between the L.O. and mixer. I tried with some success but could not get both the transmitter and receiver mixers fed with the proper signal levels.

E. My set is now satisfactory. I have one more modification to make and that is to use a double balanced modulator. VK5PX and VK5XV swear by this one. I have tried so many mods in the mixer stages that have not improved matters that I am very sceptical about anything now. I am also not even certain now in which mixer the trouble really is. I was inclined to think in the first, then the second, and now I think the trouble is in both.

F. The diodes in the noise blanker are another story and this also needs looking into."

Well there you are, go to it and let us know your results.

Before closing for this month, some information on the Fox-Tango Club. It is an association made up mostly of owners of Yaesu transceivers for their mutual benefit. Although originally organised for owners of the FT101, extension to other models is now being considered.

An interesting news letter is published at regular intervals. Milton Lowens WA2AOQ; 3977-F Sedgwick Ave. Bronx, New York. 10463 USA, is the man to contact for details of subscriptions, etc.

My thanks to VK4NS for bringing my attention to this very worthwhile club. ●

Jamboree on the air

Everv year many pleasant, successful visits are made by scouts to friendly amateurs, and interesting contacts are completed. But sometimes we hear:

— VK2XYZ this is VK3XYZ. I'll get Mike to say hello.
— Hello.
— VK3XYZ this is VK2XYZ. I'll get Fred to say hello.
— Hello.
— VK2XYZ this is VK3XYZ. Well thanks for the contact; we'll look around and see if there's anyone else to talk to. VK2XYZ this is VK3XYZ.

Or maybe after calling CQ for a quarter hour you get this: "— VK2XYZ this is VK2XYY. We're just a few blocks down the street from you. Name here is Brian! That's B-R-I-A-N. Brian. Boston Radio India America Norway. Brian. Heard you calling and thought you might just give me a report on a new cubical quad I've installed. The SWR is about 1 to 1 and front to back ratio is over 40 db. I'll call you long path first, HI. Just keep watching the old S-meter now. We're pouring out 500 watts PEP from a XX-5367Q in grounded grid driven by a couple of XXX-5366R in push-pull. Microphone's a cardioid ceramic 10-Z What's this jamboree you were calling? Some sort of new prefix or something? Watching the S-meter? Now I'll swing it round then swap to the old Yagi; used to get a bit of TVI with it but . . . Blah blah . . . ." Suggestion? Give him 20 seconds then QSY.

For ghat they are worth, here are some more suggestions for Jamboree Day, meant for the 10 to 11 year olds.

1. Ask the scout leader to only bring children interested in radio.
2. Remove anything that can be knocked over.
3. Put a large mat over any wires on the floor.
4. Put away anything that can be picked up and dropped.
5. Have a list of suitable comments and questions clearly written on card; have a visitor read this through before starting.
6. Have printed signs in position, e.g. "Transmitter", "Receiver", "Antenna", "Power Supply", "Main Switch" etc.
7. Have rig tuned to 20 or 40 meters before visitors arrive; never keep them waiting while you twiddle every knob in sight.
8. Have only two or three in shack at a time; ask scout leader to mind surplus in back yard. They will need shuttlecock, football, dart board or something.
9. Before a QSO briefly point out features of interest, license, awards, transmitter, receiver, etc.
10. Explain prefixes — VK, ZL, W, K, JA.
11. Tune in a good signal and ask if they can understand it (SSB often takes getting used to).
12. Never bore everyone with weak signals.
13. Talk English. Absolutely banned — QRMary, Handle, Hi, 73, DX, Phonetics, QRX etc.
14. Avoid all technical jargon.
15. Give call-sign every five minutes — not every break. It is most important not to turn contacts into mumbo-jumbo.
16. Use question-answer technique; never talk for five minutes, or even two minutes.
17. Advise visitors to ask questions twice, and to repeat anything important, such as names.
18. Have a few lollies and soft drinks ready outside for a good finish.
19. Offer your QSL card and a few spare DX ones as souvenirs.
20. Mention W I A services.

Lee Kinsella, VK2AXK.

Awards Column
with Geoff Wilson VK3AMK

In 1973 the City of Bamberg, Germany, celebrates its 1,000th anniversary. Non-European stations contacting three amateurs in the Bamberg area during the period 1.1.73 to 30.6.74 will be eligible for a special award to commemorate the event. There are no band or mode restrictions. Every station can be worked once on each band. To receive this award send your QSL cards for the Bamberg stations, together with a fee of DM 5, $2. US., or 10 IRCs, to the Award Manager, DL8NG, Wolfg. Graf, D86 Bamberg, Michaelsberg 4, Germany.

VHF UHF
an expanding world

with Eric Jamieson VK5LP

Forreston, S.A., 5233

Times: GMT

AMATEUR BEACONS	BAND	
VKO	52.160	VKOWI, Macquarie Island.
VKO	53.100	VKOMA, Mawson.
VKO	53.200	VKOGR, Casey.*
VK2	52.450	VK2WI, Dural.
VK3	144.700	VK3RTG, Vermont.
VK4	52.600	VK4WI/2, Townsville.
VK4	144.400	VK4WI/1, Mt. Mowbullan.
VK5	53.000	VK5VF, Mt. Lofty.
VK5	144.800	VK5VF, Mt. Lofty.
VK6	52.006	VK6VF (VK6RTV), Bickley.
VK6	52.900	VK6RTT, Carnarvon.
VK6	144.500	VK6RTW, Albany.
VK6	145.000	VK6VF (VK6RTV), Bickley.
VK7	144.900	VK7RTX, Devonport.
VK8	52.200	VK8VF, Darwin.
ZL1	145.100	ZL1VHF, Auckland.
ZL2	145.200	ZL2VHF, Wellington
ZL2	145.250	ZL2VHP, Palmerston North.
ZL3	145.300	ZL3VHF, Christchurch.
ZL4	145.400	ZL4VHF, Dunedin.
JA	52.500	IA1IGY Japan
HL	50.100 52.010	HL9WI, South Korea.
KX6	50.110	KX6HK, Marshall Islands.

NEW W.I.A. DIVISION

This page takes the opportunity on behalf of the VHF fraternity in wishing the newly formed A.C.T. Division of the Wireless Institute of Australia every success in the future, the formation of which was instigated by the Canberra Radio Society, an organisation of some 22 years standing. The first meeting of the new Division was held on 23rd July, 1973, the President being John Lauten VK1JL, and Secretary Andrew Davis VK1DA. The A.C.T. Division Federal Councillor is the well known VHF operator (and HF of course) Eddie Penikis VK1VP. New members and visitors will be welcome at meetings and other activities, and information may be obtained by writing to the Institute at P.O. Box 1173, Canberra City, A.C.T. 2601.

BY-LAW ENTRY OF EQUIPMENT

The Editorial by Roger VK2ZTB in the July issue of "6 UP" on the above subject makes sensible reading, and food for thought and as there is room this month in the column I think the comments should be digested by wider group of people. I therefore quote:-

The recent announcement that amateur equipment may be brought into Australia under by-law entry will be welcome news to many. It will probably stimulate activity to a certain extent, but I note from the information received that VHF equipment appears to be excluded. Now, one does not really know whether to look upon this as a blessing or a curse. If VHF equipment is included then the increase in "appliance operators" is likely to be considerable. Now this is not necessarily detrimental as it can be argued that, after all, appliance operators do populate the bands thus saving it for the experimenters/frontiersmen from the clutches of commercial encroachment.

But then appliance operators are notorious for being confused by more than three knobs or switches and thus will tend to buy either the simpler FM equipment or the fully automatic variety. Consequently, they will congregate on the FM nets which is not necessarily a bad thing either. Less QRM and confused operating on the other end.

Then again, more people should be encouraged to operate tuneable, and the relatively sophisticated equipment that comes within reach of the pockets of more people allows (and indeed encourages) them to indulge in such activities as meteor scatter, troposcatter etc. which is all to the good. It also allows contact with those experimenting with UHF or sophisticated communications methods or circuits, which can only be a good thing in the long run.

In one sense, if by-law entry of VHF equipment is possible, then it could prove detrimental to the hobby by encouraging "the curse" of toy radio, but the possible advantages to be gained from the availability of more sophisticated equipment may outweigh the disadvantages thus introduced. Think about it." Unquote.

Since that editorial was prepared there has been the further decision of a general reduction of 25 per cent in tariffs which may also have a bearing on the matter. One certainty is that as SSB operation is increasing rapidly on VHF, a logical starting point for a good signal is one of the proven SSB transceivers in conjunction with a transverter.

CONFIRMATION OF RECORD.

The Australian record for 2300 MHZ set up on 19th May, 1973 between VK2ZAC/2 and VK2BDN/2 operating between Priest's Ridge near Kulnura to Mt. Gibralter near Mittagong is confirmed. The distance is 159.931 Km (99.376 miles).

To be sure there are many problems to be overcome in the transverter, but a good transceiver halves the problems straight away. Anything which allows better equipment to come into the hands of those prepared to use it intelligently for improving and updating the state of the art in many more shacks, can only be good, particularly as we do not have a large enough amateur population in Australia to adequately support industry along similar lines.

BENDIGO REPEATER

John, VK3AAA, has written with some more information on the Bendigo Channel 4 Repeater. He advises that the repeater is at present operating on low power from Flora Hill. Although Departmental approval has been obtained to relocate to Mt. Alexander (2432 feet a.s.l.) it was the original intention to delay, as a matter of convenience, both this and the increase in power until the question of repeater frequencies was satisfactorily resolved.

It is now felt that, as both of the other existing Ch. 4 systems in Victoria at Geelong and Gippsland have been moved to higher sites, the full extent of co-channel problems should be thoroughly investigated before any changes are made. Consequently the Bendigo Group has resolved to bring forward the date of relocation so that the extent of the common coverage areas between all three repeaters can be fully assessed before any frequency changes are made.

GENERAL

I have been somewhat out of touch with things this month due to exams, a week suffering with the wog, and sundry other things like stocktaking, income tax etc., plus many things you would not really care to hear about. Thus news is a bit scarce, but nothing unusual for this time of the year. I note that most of the other publications I have received for the month have been very light on for general VHF news. Obviously too cold for people to write to me. Anyway, we will not waste the Editor's paper, so will close at this point with the thought for the month: "A good woman is like a good book — entertaining, inspiring and instructive, sometimes a bit too wordy, but when properly bound and decorated, irresistible. I wish I could afford a library."

The Voice in the Hills.

TASMANIA DIVISION GOLDEN JUBILEE AWARD

Following is a list of applicants who have successfully claimed and have been awarded Certificates.

Cert. No.	Call		
1	ZM3RK	18	ZL2IK
2	ZL3VJ	19	ZL3UF
3	VK3VR	20	VK3EW
4	ZL4CA	21	ZL3JN
5	ZL4JP	22	ZM3PW
6	VE6EO	23	VK2ARZ
7	ZL2OA	24	ZL2AGR
8	VE5SM	25	ZL3KO
9	ZL2AH	26	ZL1AGO
10	ZM2ANA	27	VK7AL
11	V[illegible]2CX	28	W7KSA
12	ZM3ACZ	29	ZL3ACS
13	ZM3SX	30	VK[illegible]APL
14	[illegible]3ZD	31	VK[illegible]BZV
15	[illegible]BI[illegible]	32	VK[illegible]APU
16	VK7BR	33	ZL3AZ
17	VE6MP		

20 Years Ago

with Ron Fisher VK3OM

September 1953

The VFO at VK3WI, by Jack Duncan, VK3VZ, headed the technical articles in the September issue of AR. As well as being technical editor of Amateur Radio, Jack was closely associated with the design and construction of the transmitting equipment at VK3WI when this station was located in Queen Street in the heart of Melbourne.

Jack's VFO was based on the then easily obtainable Command transmitter. Stability of the completed unit averaged better than 5Hz in a one minute period, which would be considered good even with today's sideband gear. If you are considering using a Command transmitter as a VFO, reference to this article would be very worth while.

Part three of "Amateur Television" by E. Cornelius, VK6EC, described a synchronising signal generator. This was an article with lots of good information, including data on trigger multi-vibrators, step counters, clippers and limiters.

VK7RK's DX notes reported the first amateur contact between Australia and Easter Island which was chalked up by VK7KB who worked CEOAA on 40 meter CW. Other DX at the time was just so so. VK's working all the DX over this period included VK2AOU, VK2AMB, VK3AHH, and VK9YY.

Commercial interference in the 7MHz band is certainly not a new problem. Federal Notes report that representations have been made to Mr R. G. Casey, Minister for External Affairs, and the Post Master General, Mr H. L. Anthony, regarding transmissions from Radio Pakistan. Both these gentlemen promised to take action on the matter.

Y.R.C.S.

with Bob Guthberlet

Methodist Manse, Kadina, S.A., 5554

NEW VK6 SUPERVISOR

We welcome Mr N. H. Hyde of the Hamilton Senior High School, who has taken over from Laurie Jessop, to whom we express our thanks for services rendered in the West. Ironically, it would seem that communication is a major problem in Y.R.C.S. Kev Watson in N.S.W. is tackling the problem with a News-sheet to clubs. The new supervisor in W.A. wrote to a supervisor in another state and after several months came to the conclusion that the said person was either deceased or suffering from rigor mortis! S.A. supervisor, Allen Dunn, commenced a recent letter as follows: "Just so that it cannot be said that the S.A. Supervisor is slow in keeping the Federal Co-ordinator informed, here is the latest on the YRCS situation in VK5." Welcome to Noel Kohler, the new S.A. State Secretary. June annual meeting of the S.A. area discussed the proposed new syllabus and favoured provision being made up to AOCP level.

Congratulations to the Maitland Radio Club in having been awarded, for the fourth time, the pennant from the Institute of Radio and Electronics Engineers of Australia. This club is busy in promoting a new building scheme which, when completed, should prove an outstanding contribution to the advancement of YRCS in that state. It is noted that Maitland has the backing of civic and district organizations, an area which other clubs could consider. The YRCS has nothing to hide and much to publicize! We congratulate the Marist Bros. High School Radio Club in gaining the pennant for a non-school radio club; also its leader, Bro. Cyril, who received his AOCP through instruction in the Maitland club.

On the Federal level, I have requested State Supervisors who form the Council, for permission to have the constitution amended as follows: Article (5) sub section (f) "To exercise such authority as may be necessary in the development of, and in the interest of, Y.R.C.S." This added clause will enable the Federal Co-ordinator to make such decisions as may be required between triennial meetings.

We are hoping that the Syllabus Committee will be able to furnish a complete and adequate decision on our teaching notes when the Novice Licence details are available. In the meantime, we have the task of promoting the scheme with publicity and achievement.

As communication is one of our objectives, will supervisors please keep me informed of any major movements in their respective states.

Contests

with Peter Brown VK4PJ

Federal Contests Manager, G.P.O. Box, 638
Brisbane, Qld., 4001.

CONTEST CALENDAR.

September 1 - 2: Gold Coast Amateur Radio Club Field Day.
September 8 - 9: Worked All Europe DX 'phone Contest.
September 15 - 16: The 15th Scandinavian Activity Contest, CW.
September 22 - 23: The 15th Scandinavian Activity Contest, 'phone.
October 6 - 7: VK-ZL Oceania. 'phone. Do your bit with the mike.
October 13 - 14: VK-ZL Oceania. C W. More VK CW operators needed.
October 13 - 14: RSGB 21-28 Mhz. 'phone.
October 20 - 21: RSGB 7 Mhz CW.
October 27 - 28: CQ—WW—DX 'phone.
November 3 - 4: RSGB 7 Mhz 'phone.
November 11: Czechoslovakian contest.
November 24 - 25: CQ—WW—DX CW contest.
December 8 to January 20: Ross Hull Memorial VHF-UHF Contest. Rules in next month's **Amateur Radio**.
February 9 and 10: John Movie Memorial National Field Day.
February 24: Central Coast Amateur Radio Club Field Day, VK2.
When is your Club or Division holding a contest?

WHAT AGAIN???

Yes, again I mention the VK-ZL Oceania, on October 6 - 7 and 13 - 14, and the importance of "flying Australia's flag" in the International field. Put in a good attempt for your country and build up your state's representation. There is every chance that you could work DXCC on that weekend. Get on the air and the bands will not be "dead". You will note that the RSGB 21-28 MHz 'phone contest is on one of the weekends so you may be able to squeeze a few CW contacts out of those bands.
Also in October and November are the popular CQ—WW—DX 'phone and CW contests. Keep the dates clear for a few hours at least.

Unofficial CW Contest.

Thanks to the operators who wrote to me of the above contest, and told me that few know what the contest is about, and that all seem to be experienced operators.
The best log for May was VK3QK — 17 contacts.
June VK3XB — 27 contacts.
July to come.
I guest that if we do not try we certainly shall not succeed in developing CW. VK3 lead easily . . . no VK4s or 5s?
Frank VK4II has yet to get his tower up at a new QTH or he would be on. Let us carry on to November and see if the CW contest is worthwhile.
Here are the simple rules . . .
Third Sunday. 15 Sept., 20 Oct., 17 Nov., 0800-1400GMT. (6 pm - 12 pm EAST) Bands 80, 40, 20. CW-CW only. VKs only. One point per contact, one contact per station per band. No logs. Your Callsign and score only. No sheepstations either. You will note that there are CW contests on Sept. and Oct. dates.

1972 CQ—WW—DX Contest results, Australia.

	Band	Points	Contacts	Zones	Countries
VK2BJL	14MHz	29580	128	26	59
VK3JF	A11	61608	168	47	89
VK3SM	21 MHz	15660	124	20	25
VK3ARY	14 MHz	35208	163	25	47
VK4FH	A11	129168	402	43	65
VK4AK	A11	46618	122	53	90
VK4PJ	28 MHz	5088	56	12	20
VK4DO	14 MHz	34224	136	32	61
VK5MF	A11	46325	186	36	49
VK6NE	A11	5412	83	10	12
VK6HD	14 MHz	706251	1483	37	132

Congratulations VK6HD on a fine effort.

EX-G CONTEST. The week end of 10th-11th November (first week-end after 5th Nov.) from oo,ooZ on Saturday to 23.59Z on Sunday any mode any licensed frequency. Objects of the contest are to publicise reciprocal operating privileges Worldwide and to promote links between the Ex-G Club, Overseas British residents and amateurs In the U.K. Only 24 hours total operating time may be counted in the contest period.
Ask your G contacts or a member of the Ex-G Club for further details if you are interested in this contest. ●

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With Syd Clark, VK3ASC

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SHORT WAVE MAGAZINE. May 1973.
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Letters to the Editor

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

The Editor, A.R.
Dear Sir,

In view of the amount of publicity recently in regard to Churchill Island, I feel it could be of interest that amateur radio has been associated with the Island since it was purchased in 1939 by Harry Jenkins, who was a Collins Street Dentist.

His son, Ted, suffered paralysis at the age of 16 and studied and obtained his A.O.P.C. at the same time as the Writer.

He operated from Churchill Island under the call sign VK3QK, from the end of the war when licences were restored, until his death, originally using a home built rig, operated off a vibrator power supply, but later when they installed a 32 volt power plant, he used a disposal G09 transmitter from down there.

The original antenna was a long wire strung from the top of a pine tree near the house extended about 300 yards to another pine tree, but later the Writer and Arthur Tinkler, VK3ZV, with some otherr assistance, put up a rotary beam on top of a pine tree which was used quite successfully.

Ted was active from both Churchill Island and his home address in St. Kilda Street, Brighton, and during these years quite a number of amateurs will remember working Ted Jenkins on 10, 20 and 40 metres.

Perhaps it is unfortunate that the advent of S.E.C. power to the Island, which would have made things far easier than hey were in the early stages, occured when Ted was not well and he did not get a great deal of benefit from having 230 volts on tap.

Conditions at Churchill Island were really exceptional for radio and even in the early days on an extremely low power of about 15 watts, there was no problem in working DX all over the World on 10 metres.

The lack of any real interference electrical, mechanical, or anything in that way did make an enormous difference to both transmission and receiving generally. Included in the regular visitors to the Island, apart from myself, were Arthur Tinkler, VK3ZV, George Benwell, VK3KQ, Max Cumming, ex VK3XN, and the late Bill Mitchell, VK3UM.

Yours faithfully,
Arthur Evans, VK3VQ

The Editor, A.R.
Dear Sir,

For what I would believe to be obvious reasons, I have tried to refrain from making any comments about Amateur Radio. However, I feel that the letter from Mr. V. H. Leonard in June issue, should not go unchallenged. I have seen all issues of "AR" produced (including the war-time reneoed issues) and consider that the production has reached an all-time low.

Perhaps I have been unfortunate enough to receive exceptionally poor copies since April, with the May issue being if possible, the worst of all.

Please Mr. Editor, may we have a clean and clear readable print before we all go blind and need the Braille issue which apparently Mr. Leonard receives.

I would imagine that you are already aware that there are a couple of errors in the captions to the pictures, but you may not be aware that "Ohm's Law Simplified" which you credit to VK2II has appeared in "AR" on two previos occassions, and if memory serves me correctly, was also issued as a full page supplement in "AR" by courtesy of one of your advertisers.

Yours faithfully,
K. E. Pincott, VK3AFJ
(Immediate Past Editor, A.R.)

(Apologies have previously been extended lo Neil Penfold and Russell Kelly for transposing the captions below their photos on page 12 of June A.R. — Ed.)

Dear Sir,

In reply to Fred Stirk, VK2ABC, regarding firsts for QSO to KH6 and VK9 on 50 mcs, I supply the following details.

On 26th August 1947 I QSO'D W7ACS/KH6 on 50 mcs breaking the then World Record for distance and being the FIRST VK to QSO outside of Australia. (See QST, October 1947) Later on Eugene was issued the callsign KH6PP and this is the same person that Fred made a QSO with in May 1950.

I do not have available my QSL card from VK9XK, but my log shows that I did QSO him on 29th December 1951, just 9 days before Fred. No doubt other VK stations contacted VK9XK during this period. I do not claim a first for this QSO.

It is interesting to set the records straight.

Yours sincerely
C.H. CASTLE
VK5KL

Dear Sir,

Referring to a letter from Fred Stirk, VK2ABC (Page 4 June A.R.), I think a few other Hams may still be alive who had earlier contacts with D.X. stations on the V.H.F. bands.

I worked KH6PP at 20.20 hrs., on 20/10/49 with Sigs. S5 and again on November 27th. 1949 at 12.30 E.A.S.T. with Sigs. again S5.

I also worked VK9XK on June 6th 1952

KL7AD was heard S7 on 28/11/49 for a short time.

JA2AZ was heard S7 on 28/11/49 on CW. This was subsequently found to be an automatic keyer and JA2AZ was not listening. He was also heard on 30/11/49.

A number of W6 stations were heard around this time, but no contacts were made.

Equipment in use at the time was an SCR 522 Tx, and a modified Service receiver.

As Fred Stirk VK2ABC, John Peel VK2WJ, and myself all lived within a quarter of a mile of each other at Maroubra, we usually heard the D.X. signals first as the band appeared to open from the East for overseas D.X.

I have Q.S.L.s and Logs to confirm the above facts.

Yours faithfully,
Vaughan Wilson.
VK2VW.

Dear Sir,

With the decline in the Sunspot Cycle conditions are certainly down but I cannot understand why the vast majority of VK stations just stick to 20m and moan no DX. Certainly 15m is open during daylight hours. Whilst I hear few stations from VK, those I do hear have excellent signals and include all VK districts. With 10m the position is even worse. During last week, mid June, I asked VK stations in the 2,3,4,5 Districts to try 10m and we ALL got through, though often the signals were weak. The trouble with 10m is everyone listens and no one calls. In this connection the beacon service is invaluable for knowing when the Band is open yet I find few Australian Stations are aware of this service. Active 24 hour beacons on CW, with identification every minute, are:–

28.175	VE3TEN	(a)	Reports on Beacons (a) to (d)
28.180	ZC4CY	(b)	please send to G3DME and will
28.185	GB3SX	(c)	be greatly appreciated by
28.190	388MS	(d)	R.S.G.B. Scientific Studies Committee.
29.195 & 28.200	DLIGI		Switches to 28.200 between 15-20 and 45-50 minutes past each hour.

It is important to extend these Beacons to other areas. I have tried in Malaysia but at present Telecomms here are not willing to permit Beacons or Repeaters. I am sure it would be invaluable if the W.I.A. could set up a Beacon in Australia especially in the Central or Northern Regions. Excessive power and expense is not required. GB3SX is only 25 watts to a ½ w dipole and I understand the R.S.G.B. has provided assistance with the keyers for the overseas beacons.

I could hear GB3SX every week and month of 1972 and usually at least a few days every month in 1973. One often hears it S3 on an apparent dead band, than calls CQ on 28.600 and back come the calls.

73,
James C. Pershouse 9M2DQ

Dear Sir,

I feel that the question of MCW is quite an important one as raised in the key section of the July 1973 issue of A.R.

A group of us here in Sydney have been running AM on 40 metres from our Yaesu (carrier with inserted sideband) transmitters and transceivers to allow those fellows who may be tuning across the short wave dial, perhaps for the first time, to discover the world of amateur radio. However, we would very much like to use MCW as well as AM so as to demonstrate the fascination of CW communications and thus create an interest in this mode.

160 metres MCW is an excellent idea as pointed out, especially for those with only a broadcast receiver. However, for those with a two band short-medium wave portable receiver, the tuning range only covers 6 to 12 MHz in many cases and thus 40m is the only band on which listeners have a chance of gaining an interest in amateur activities.

Thus if we were able to use MCW with our present AM transmissions we would be very keen to do so. We have been transmitting slow CW on 40 metres during school holidays, but most of our young short wave listeners cannot satisfactorally resolve this mode.

This weekend we will have commenced MCW practice on 52.525MHz hopefully.

Please persist in your efforts concerning the use of MCW on the H.F. bands. We are keen to use it on 160 and 40 metres and also very importantly on 11 metres which looks like becoming the major Novice band due to the large frequency allocation and the availability of AM equipment.

Yours faithfully,
S. Voron VK2BVS
J. Pages VK2BYY

Dear Sir,

After having thoroughly read through the July copy of AR I have decided to write concerning the special item which appeared on page 19, concerning the history of Australian Amateur Radio.

There has been for some time a growing band of collectors who are collecting and restoring early radio and associated equipment. I also am a collector of these items. To this data these collectors have not banded together to any extent to really know how many there might be, but all appear to have the same object in mind.

My own collection which has been gathered over a period of years covers from the early phonograph to present day standards. I have a fairly good collection of early radio, mostly being between the period 1925 to 1930 and consisting of commercially made receivers. I have found during my travels in search of early sets that the amateur made gear as referred to in the article is practically non-existent and have yet to acquire any sets of the early years. Most of this period have simply been thrown away or just plain lost during the passing of time. There are the odd items which have survived, for example morse keys of which I now have a few of or the odd meter.

One of my earliest finds is a framed introductory letter as issued to a Staff Sgt. W. Endacott, R.A.M.C. from the Wireless Institute, Victoria and is addressed to:- President or Secretary, Wireless Institutes, Throughout the World. — and requesting all privileges to be shown to the bearer. Also attached is the current membership card which gives the member's address as, 15 Spring St., Melbourne. Attached also is the membership badge. The date of issue I have omitted to say earlier is the 19.9.1914 for the letter and the card is dated 1.9.1914. Incidently the letter was signed by a Vernon Cole.

I also have other items of the earlier period, too numerous to list here but do not have enough to make up a definite complete item of the earlier period. Whilst my collection of this period is small other collectors may have been fortunate to have complete items. I feel safe in saying that the early days are being looked after but until collectors can get together in some way it will not be known to what extent these items are being preserved.

To digress slightly I mention another society "The Phonograph Society of Australia" of which I have been the Federal Secretary of since formation some six and a half years ago, and up till this month have produced the bi-monthly magazine "The Phonogram". We started off with from memory, six members and now have over 130 scattered throughout Australia. There is also a State Branch been formed in Victoria to give closer contact between members in this state. Due to the formation of the Society it is amazing to learn of the items that members have found that have survived the period of time.

Not that I am suggesting here that we form a Society for the Preservation of early radio but I feel that this may be the only way in which the amount of survival may be gauged. Most collectors are usually only too pleased to show what items they have and usually are well restored to working order. I also feel that most collectors would not hand over items which are considered precious to their owner, to a Federal Body but see no reason why they could not be catalogued in some way.

To give myself a further pat on the back I am rebuilding part of a house which I had shifted to here in which my collection is to be on permanent display. I hope to be able to show from the early days of the phonograph, through the radio or I should say the early days of radio and a collection of wartime (1939-45 era) sets plus various other mechanical objects of the early days, but the main theme is on sound reproduction. If the powers to be at the various government departments give approval it is hoped that the set-up will be registered as a "Museum."

Should yourself or any interested member be passing this way please drop in and have a look. I have had help from various amateurs, especially my good mate John Woodburn, of Dunkeld, all have been very helpful in the cause.

Yours faithfully,
Colin Gracie.

CLUB/ZONE/DIVISION NEWS

● The Publications Committee wishes to advise that the call on AR for space to print material is so great it is not possible to include a section devoted to Divisional, Zone or Club news.

● Arrangements were made with all Divisions that such news would appear in Divisional Bulletins if so required, and accepted by Divisional Bulletin Editors. Bulletins, when submitted, are carried as inserts in AR mailed to members of the Division concerned.

● It has been agreed however that AR should include an Events Diary to contain **very brief details** of forthcoming events. Items for this Diary **MUST** reach the Editor not later than the 1st of the month prior to publication.

Ionospheric Predictions

with Bruce Bathols, VK3ASE

September 1973

This month's predictions from information supplied by the Ionospheric Prediction Service Division indicate point to point band openings for at least 50% of the month.
Times are G.M.T.

28 MHZ

VK2	to	KH6		2200-0100
"	"	VK9		2400
"	"	W6		2200-2400
"	"	JA		2400-0500
VK3	"	VK9		2300-0100
VK4	"	W6		2300-0100
"	"	JA		0100-0700 2200-2300
VK5	"	VK9		2300-0100
"	"	JA		0100-0500
VK6	"	JA		0200-0800
VK7	"	VK9		2300-0200
VK8	"	SU		0800-1200
"	"	KH6		2300-0600
"	"	JA		0500-0900
"	"	9G1		0700-0800

21 MHZ

VK3	"	SU		0400-0900
"	"	ZS		0500-0800
"	"	G	S.P.	0800-0900
"	"	UA		0400-0900
"	"	W6		2100-0400
VK4	"	SU		0400-0900
"	"	ZS		0400-1400
"	"	G	S.P.	1000
"	"	G	L.P.	2100
"	"	UA		0400-1000
"	"	W6		2000-0400
VK6	"	SU		0400-1100
"	"	ZS		0500-1100
"	"	G	S.P.	0700-1000
"	"	UA		0400-1000
"	"	W6		2300-0400

14 MHZ

VK2	"	SU		1100-1700, 2100-2400
"	"	ZS		0400-1200
"	"	G	S.P.	0700-1700, 2100
"	"	G	L.P.	0700-1100, 2000-2400
"	"	UA		0800-1700
"	"	W6		0300-1000, 1500, 1900
VK3	"	ZL		2000-1100
"	"	SU		1100-1400, 2200-2400
"	"	KH6		0300-1400, 1900-2000
"	"	ZS		0400-1200
"	"	G	S.P.	0900-1700, 2100-2200
"	"	G	L.P.	0700-1000, 2000-2300
"	"	VKO		2100-0900
"	"	VE3	S.P.	0300, 1200-1600
"	"	VE3	L.P.	2200-0100
"	"	UA		0800-1700
"	"	W1		0300-0400, 1200-1500
"	"	VK9		2000-1700
"	"	PY		2100-1100
"	"	W6		0300-0800, 1500-1600
"	"	JA		0500-1700, 2100-2400
"	"	9G1	S.P.	2200-0800
"	"	9G1	L.P.	0300-1100, 1900-2000
VK4	"	SU		1100-1700, 2100-2400
"	"	ZS		0400-1400
"	"	G	S.P.	0600-1600, 2100
"	"	G	L.P.	0700-1100, 2000-2400
"	"	UA		0700-1600
"	"	W6		0300-1000, 1500, 1900
VK5	"	SU		1100-1800, 2200-2400
"	"	ZS		0400-1200
"	"	G	S.P.	0900-1700, 2200
"	"	G	L.P.	0700-1100, 2100-2300
"	"	UA		0800-1700
"	"	W6		0400-1000, 1500-1600
"	"	PY		2100-1200
VK6		SU		1200-1900, 2300-2400
"	"	ZS		0400-0800, 1000-1400
"	"		S.P.	1000-1900
"	"		L.P.	0800-1200, 2200-2300
"	"	L		0900-1800
"	"	W		0500-0800, 1500-1700
"	"	PY		2300-1300

7 MHZ

VK2	"	SU		1500-2100
"	"	ZS		500-2100
"	"	G	S.P.	[illegible]0-2100
"	"	G	L.P.	0700
"	"	UA		1400-2100
"	"	W6		0700-1500
VK6	"	SU		1500-2300
"	"	ZS		1500-2400
"	"	G	S.P.	1700-2300
"	"	UA		1400-2300
"	"	W6		0900-1500

Smoothed monthly sunspot numbers predictions, September 34, October 32, November 30, December 28.
Swiss Federal Observatory, Zurich.

Hamads

* Eight lines free to all W.I.A. members. $6 per 3 cms. for other amateurs and S.W.L's.
* Copy should be in block letters or typescript, signed and forwarded to The Editor, P.O. Box 150, Toorak, Vic., 3142.
* Excludes commercial advertising.
* Closing date for Hamads is the 3rd day of the month preceding publication.
* QTHR means the advertiser's name and address are correct in the current Australian Callbook.

FOR SALE

Electronic Organ, Selmer Minster Oxford. Out of order. Suitable re-building. Appearance as new. Over 100 valves mainly 12AX7. Amplifier pair EL34's. 12 inch speaker. Complete with manual. VK2UJ QTHR.

Collins Receivers. Unique opportunity to obtain the "best". 75S1 as new $375. 75S3A amateur & general cov. $550. 75S3B late model $550. 75S3C very late model $600. Contact Bill Watson, 7 Lambert Grove, East St.Kilda, Vic. Phone 52 1059.

Communication RX. Trio 9R59D. Technical parameters as new. Give price. VK2BQQ, G.P.O. Box 3209, Sydney, 2001.

General Coverage RX. Realistic DX-150A. Six months old. FET circuit, excellent selectivity. $209 ono. P.O. Box 30, Mildura, or Ph. (050) 24-5493 evenings.

Geloso N4/116 Pi-Coupler, tuning and loading conds. As new. $16 posted. VK4CY QTHR.

Hy-gain 3 element beams 10m $35, 15m $40. both with BN-86 baluns; as new condition, never erected in coastal area. Ian McCoskor, 34 The Promenade, Isle of Capri, Surfers Paradise.

STC MTR 25/131 Multi-channel Mobile c/w Chan B xtals, microphone, leads and instruction manual. Top performance and condition $120 or offer. VK4AO QTHR.

CW TX AT20 150W complete working order 80/40/20 MO/CO, isolator, buffer stages all 807s,final single 813, PSU 866s, cooling fans. Full protection O/load contactor, interlock, gate switches.. Instruction manual. One ham modification for remote control. VK3VG. Ph. (03) 850-1894, 7 p.m.

2m—FM Tranceiver, STC MTR25—121, transistorised PS, 6 or 12V, complete with mobile cradle and xtls for 4 channels. 8m—AM Mobile Transceiver, Pye Reporter Mk III, with xtls for 53.032 MHz net. VK3ZIM. Ph. (03) 848-6151 AH.

QQEO 3/20 1 used, 2 new $15; QQEO 2/5 2 new $10; QQEO 3/12 3 new $10; FM 2 Mx Pye Premier Carphone, solid state, final includes boards for 50W plus xtls for ABC, 1 plus 4 Rx OK but TX needs attention $85: VK3EW QTHR.

Moving Interstate, cleaning shack. Selling 5Mhz American CRO, 6 & 2 meter folded groundplanes on boom, capacitors, valves, transformers, aluminium tubing, lots of other goodies. VK3AQV, QTHR, (03) 874-5942.

Audio amp., chokes, valves, no charge. Power supply, $10. Transceiver Type 3 $20, No. 62 $10. Ph. (03) 347-7491, VK3NI QTHR.

Heath HR10 Amateur Rx 80 to 10. 'S' meter, NL B.F.O. Complete with manual and transformer, $120. Johnson Matchbox aerial impedance matching unit with instructions, $85. Astatic D104 microphone as new, $15. VK3DS QTHR.

Galaxy V MKII Transceiver with power supply. VK3KR QTHR. Ph. (051) 44-1414 AH.

Swan 350 transceiver c/w heavy duty power supply, service manual, and spare set finals, still in immac. cond. $350. ONO. VK2BTL QTHR Ph. 20223 ext. 263.

Digital Frequency Counter, 5 digit, 7 segment display. O.I. kHz—220MHz, 8 digit readout capability. As new $250. VK3ZX. 5 Tucker Court, Traralgon, 3844. Ph. (051) 74 1114, A.H.

Yaesu FL 200B TX, good order, $200: AWA Car Phone Junior Channel A, $25: VK3AR, Wartook Wayside, Horsham, 3400.

Drake 2A Rx, xtal cal, Q mult, NL, match spk., 6 HF bands $200 ONO; Yaesu FL100B Tx 120w PEP only $165; Lafayette KT340 0.5-30 Mhz, 4b., cal bs. Qmult $85. QTHR Ph. (03) 57 8600.

Viceroy Mk1 and **Drake 2B** complete SSB station all 5 bands. Excellent condition with handbooks etc. $320, Allen Crewther VK3SM. QTHR Ph. (03) 36 4406 or 9-4 (03) 62 9510.

MR10A 2M FM Carphone, Channels B & 4; Nuvistor front end; good order; AC & DC supplies $35. VK3UG (03) 231-2028, QTHR.

Pye Overland SS 25w 2 Mx FM Ch A,,B,1, $185. Kyritsu VTVM $45; Vinten MTR B Ch A.B.C.D. 1, 4 $120, all above ONO. Super HI PWR QI (100w) driving lamps Hella $60; Magn cartridge ADC 25 as new $75; CRO BWD 905-15 Mhz bandwidth with probes etc, $350; Vinten MTR 16 G.A.M. $70. VK3YAV QTHR Ph. (03) 391 6856 A.H.

Silent Keys

BOB GLOVER VK6RG.

To most people June the 6th, has no particular significance. However it was on June 6th, that Bob Glover VK6RG celebrated his 73rd birthday.

A little more than two weeks later he had passed away. Bob had lived alone for many years and it could be truthfully said that amateur radio was his life. It would be a most unusual day if Bob was not on the air on either 20 metres or 80 metres. These were the only bands his home brew transmitter would cover and he extracted the maximum from them.

Although not a "D.X. hound", never-the-less he had worked more than his share of the exotic calls. However he was just as happy ragchewing on 80, and what more pleasant way to spend an evening?

Bob started in ham radio as a Z - call, but after gaining his full call, the lure of the H.F. bands claimed his full attention.

It is hard to recall many operators who came up on the bands so consistently, day after day, year after year, as did Bob Glover.

Amateur radio will be much the poorer with his passing. 73 old timer.

Ross Greenaway, VK6DA.

K. A. THOMAS VK6TA

We are sorry to report the passing of K. A. (Ken) Thomas (VK6TA). Ken had not been too active in recent times, but on his recent transfer to Perth from Geraldton had been busy picking up the reins again. His early passing is much regretted by his many friends.

Ron Vaughan, VK6RV.

Enthusiast requires early Radio Sets, valves, parts, speakers and books prior to 1930. Good prices paid. Details to Edgar Road, San Remo, 3925. Phone 107. M. O'Brien, Experimental VK30.

WANTED

Collins 62S-1 must be clean and in good condition. Price, etc. to VK3ZX, 5 Tucker Crt. Traralgon, 3844.

2M F.M. RX 240V at a reasonable price. Also L5/6 first 42/319 IF for Philips radioplayer, mod 3041 or any other parts for above model. B. Boyce, 146 Abbott St., Sandringham, 3191.

C.R.O. Servicescope 832 or similar 3" Scope with DC to 5Mhz amp, high sensitivity and slow sweep. VK2ASI QTHR.

Rebecca Indicators and Receivers, likewise Eureka and Racoon gear, or any pulsed Radar or Loran equipment and handbooks, A.P.S.4 scanner or cutler feed section for same. RAAF type 1082RX 1083 TX, MN26H radio compass controller. VK3AQB Ph. (03) 337 4902, AH.

Collins Receiver 51J, 51J2, 51J3 or 51J4 in clean condition with table cabinet. Pay reasonable market value. VK3IB, QTHR.

RSGB Amateur Radio Circuit book, one copy required. VK3LP QTHR or P.O. Box 20, Castlemaine, 3450.

Collins 30L1 Linear. Particulars to VK2AS, 7A Melbourne Rd., East Lindfield, 2070. Ph. (02) 467 1784.

Pal Colour TV Receiver, condition not important. Full P.A.L. only. Details to VK2ZGB, 80 Murray Park Rd., Figtree, 2525. Ph. (042) 26 9101 A.H.

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Brand new Valves and Semiconductors.

2N 3055	**$2.00**
OA91	**15c**
807 Valve	**$2.00**
IT4	**75c**
IR5	**75c**
6BA6	**$2.00**
2E26	**$3.00**

Coil Formers 1¼ Inch diameter. Octal base **45c**

AVO Model 7 & 8 Multimeters. As new condition from **$35.00**

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No. 19 & No. 62 Transceivers. Plenty of part wrecked units any reasonable offer will buy.

Headphones, ex Army. Brand new. Low Impedence in sealed boxes **$2.00 pair**

Transformers, A & R 240 V - 12Volt new **$2.50**

LARGE QUANTITIES of hard to get valves, transformers, semi-conductors & components, dural tubing, cables multicore & coaxial, connecting leads Cannon type plugs multipin, relays PMG types & miniature, telephone parts, teleprinter units, all types of panel meters new & used, test equipment, multimeters, signal generators, oscilloscopes, power supplies, standard racks and thousands of component parts, potentiometers, capacitors oil filled & electrolytic, high & low wattage resistors, transistor circuit boards, crystals.

TRANSCEIVER PYE No. 62

1.6MHz - 10MHz in 2 continuous bands. 12 Volt 5 Amp DC supply air tested and complete with all cables and Mic. **$27.50**

A.W.A. RC Audio Oscillator, 20Hz to 200kHz in 4 bands. HI Z & 600 ohm 240 Volt AC **$65.00**

Army Transceivers—We have just received a shipment of the most modern we have ever been able to offer. All are air tested and complete with 24 Volt DC power supply, Leads and Ear Phones. All are continuous coverage. Manufactured by Plessey.

C13 1.00MHz - 12MHz FM/AM $65
In 12 bands each of 1MHz.

C42 36MHz - 60MHz FM $65

B47 38MHz - 56MHz FM $45

C11 TRANSMITTER 2MHz - 4MHz 4MHz - 8MHz, 8MHz - 16MHz. Continuous coverage with built-in Calibrator. Complete with 24 Volt Power Supply **$65.00**

FREQUENCY METER Manufactured by American Disco-Wyne Model AM/URM 32A. 125kHz 1000MHz. AC Power Supply Head Phones and Calibration Charts **$130**

Bendix BC227 Frequency Meters from **$35.00**

COAX CABLE 58 ohm Ascand 15 Pl/24. Brand new 1/8" outside diameter. 12c per yard, $10 per 100 yard reel.

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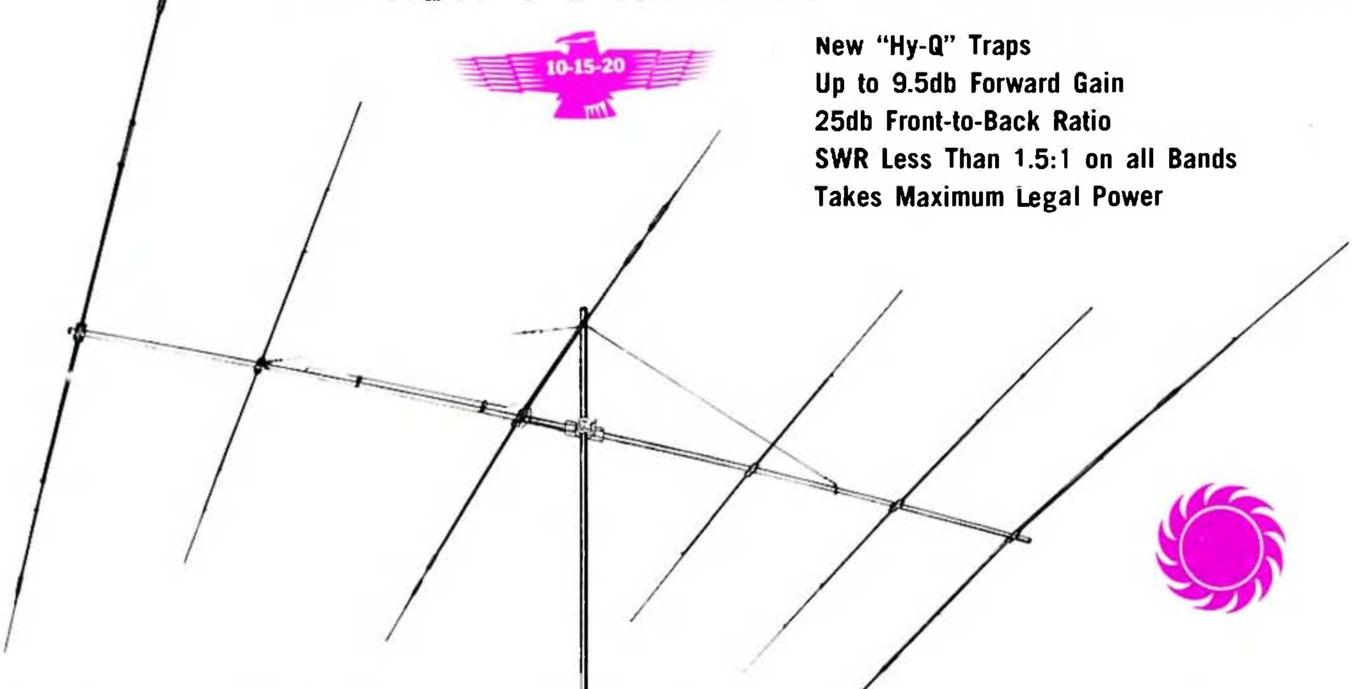
HAM

RADIO DISPOSALS

104 HIGHETT STREET, RICHMOND, VIC., 3121
(Near Lennox Street) Phone 42-8136

hy-gain NEW SUPER THUNDERBIRD TRIBANDER BEAMS for 10 15 and 20 METRES

ALL NEW 6-Element SUPER THUNDERBIRD DX



New "Hy-Q" Traps
Up to 9.5db Forward Gain
25db Front-to-Back Ratio
SWR Less Than 1.5:1 on all Bands
Takes Maximum Legal Power

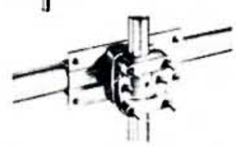
The New Super Thunderbird TH6DXX offers the ultimate in tribander performance and mechanical reliability for 10, 15 and 20 meters...is superb on DX and other long haul contacts. Separate Hy-Q traps, featuring large diameter coils that develop an exceptionally favorable L/C ratio and very high Q, provide peak performance on each band whether working phone or CW. Exclusive Hy-Gain Beta Match, factory pre-tuned, insures maximum gain and F/B ratio without compromise. Feeds with 52 ohm coaxial cable...SWR less than 1.5:1 on all bands. Mechanically superior construction features taper swaged, slotted tubing—allows easy adjustment and readjustment. Taper swaged tubing permits larger diameter where it counts! And, less wind loading. Full circumference compression clamps are mechanically and electrically superior to self-tapping sheet metal screws. Large diameter, heavy gauge aluminum boom...heavy cast aluminum boom to mast clamp and heavy gauge machine formed element to boom brackets. A totally new dimension in Tri-Bander performance.

AVAILABLE NOW EX STOCK

BAIL ELECTRONIC SERVICES

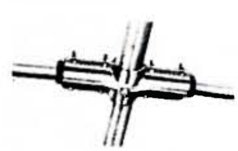
60 Shannon St., Box Hill North, Vic., 3129.

Ph. 89-2213



Tilt-bend, universal boom-to-mast bracket — all new, cast aluminum bracket accommodates masts from 1¼" x 2½". Allows easy tilting for installation, maintenance and tuning, provides mast feed thru for beam stacking

Taper swaged, slotted tubing — new tubing on all elements allows easy adjustment and re-adjustment. Taper swaged to permit larger diameter tubing where it counts! And, less wind loading. Full circumference compression clamps are mech and elec superior to self tapping sheet metal screws



Extra heavy gauge, machine formed element-to-boom brackets, with plastic sleeves used only for insulation. Bracket design allows full mechanical support

ELECTRICAL SPECIFICATIONS

Frequency Range	20, 15 and 10 Meters
Gain	8.7db (average)
Front-to-Back Ratio	25db
Maximum Power Input	1 kw AM; 2 kw P.E.P.
VSWR (at resonance)	1.5:1
Impedance	50 ohms

MECHANICAL SPECIFICATIONS

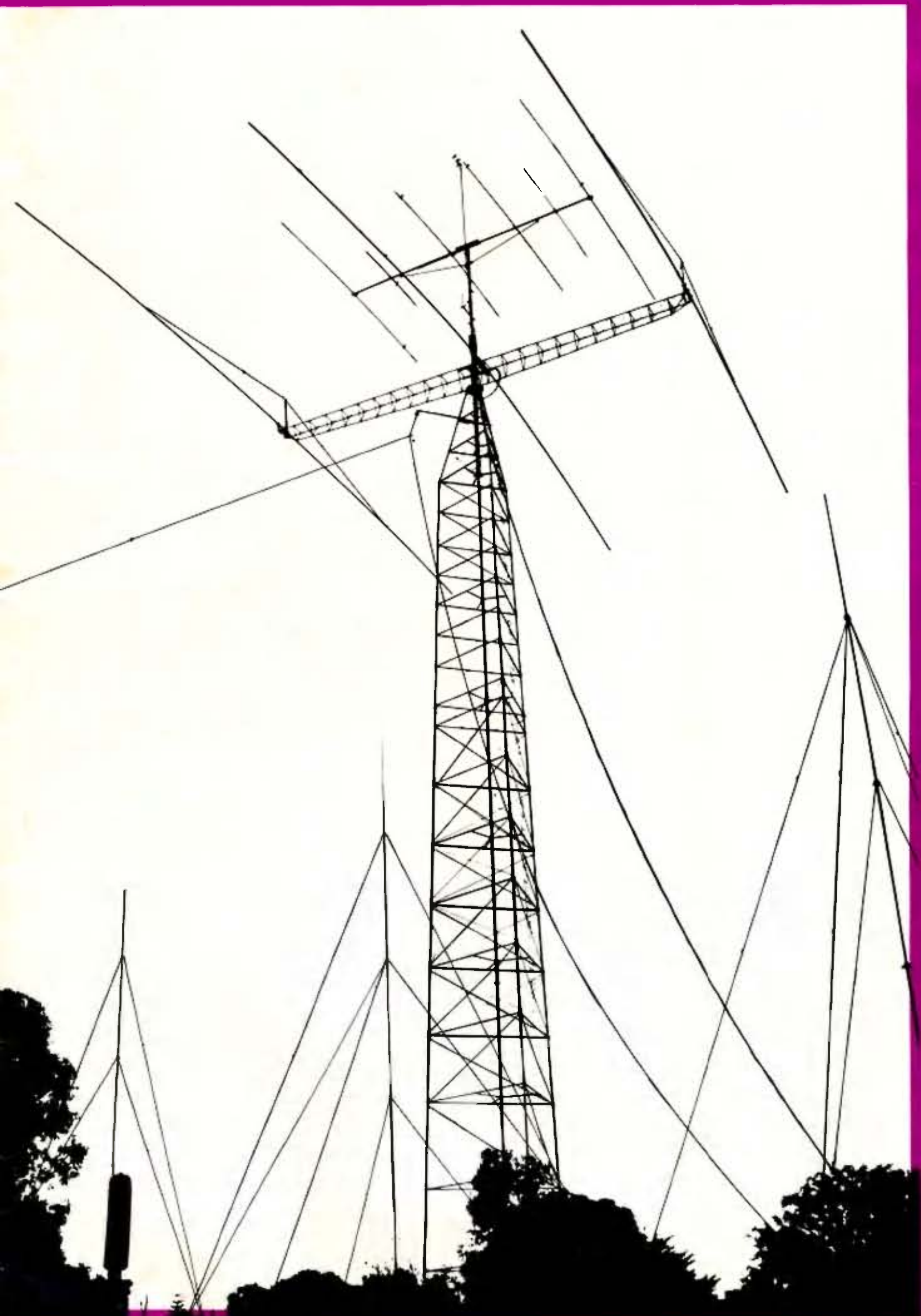
Longest Element	31.1 ft.
Boom Length	24 ft.
Turning Radius	20
Wind Load at 80 MPH	156 lbs.
Maximum Wind Survival	100 MPH
Net Weight	61.5 lbs.
Mast Diameter	1¼" to 2½"
Boom Diameter	2"
Surface Area	6.1 sq. ft.

Hy-Gain Beta Match — Advanced design from company that invented the Beta Match. Tapered impedance provides most efficient 3 band matching. Provides DC ground to eliminate precipitation static.

Qld. Rep.: MITCHELL RADIO CO., 59 Albion Road, Albion, 4010, Telophone 57-6830
N.S.W. Rep.: STEPHEN KUHL, P.O. Box 56, Mascot, N.S.W., 2020 Telephone Day 667-1650 (AH 371-5445)
South Aust. Rep.: FARMERS RADIO PTY. LTD., 257 Angas St., Adelaide, S.A., 5000 Telephone 23-1268
Western Aust. Rep.: H. R. PRIDE, 26 Lockhart Street, Como, W.A., 6152. Telephone 60-4379

amateur radio

OCTOBER, 1973



INSIDE

- FEEDING 40M YAGI
- CW NET FOR VK
- 5-5.5 MHz VFO
- REPEATER BAND PLAN
- ROSS HULL CONTEST RULES
- INTRUDER LISTING

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

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6SJ7GT	**$1.50**

Coil Formers 1¼ Inch diameter. Octal base **45c**

AVO Model 7 & 8 Multimeters. As new condition from **$35.00**

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LARGE QUANTITIES of hard to get valves, transformers, semi-conductors & components, dural tubing, cables multicore & coaxial, connecting leads Cannon type plugs multipln, relays PMG types & miniature, telephone parts, teleprinter units, all types of panel meters new & used, test equipment, multimeters, signal generators, oscilloscopes, power supplies, standard racks and thousands of component parts, potentiometers, capacitors oil filled & electrolytic, high & low wattage resistors, transistor circuit boards, crystals.

AMERICA TUNING UNITS

1.6 to 3 M/C variable. 115PH HV condenser, ceramic formers. Good for wrecking. **$12.00**

A.W.A. RC Audio Oscillator, 20Hz to 200kHz in 4 bands. HI Z & 600 ohm 240 Volt AC **$65.00**

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amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA, FOUNDED 1910

OCTOBER, 1973

Vol. 41, No. 10

Price, 40 cents

Registered at the G.P.O. Melbourne for transmission by Post as a Periodical—Category "B"

Published monthly as the official journal by the Wireless Institute of Australia.
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Above 474 Toorak Road, Toorak, Vic., 3142

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Copy is required by the **third of each month.** Acknowledgment **may** not be made unless specially requested. All important items should be sent by certified mail.
The Editor reserves the right to edit all material, including Letters to the Editor and Hamads, and reserves the right to refuse acceptance of any material, without specifying any reason.

Advertising:
Advertising material should be sent direct to **P.O. Box 150, Toorak, Vic., 3142,** by **the 25th of the second month preceding publication.**

Hamads should be sent direct to **P.O. Box 150, Toorak, Vic., 3142,** by the **3rd of the month preceding publication.**

Printers:
Chas E. Tully Pty. Ltd.
40 Hume Street, Huntingdale, 3166.
Phone: 543 1242.

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40 Metre YAGI at VK3BM
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QSP

BAND-PLANNING—THE FINAL WORD

For some years now the vexed question of 2 metre band-planning—centred around the frequencies to be used by satellites and repeaters— has been thoroughly thrashed.

Clearly, there is an international problem, directly related to the increasing use of both satellites and repeaters.

Australian Amateurs cannot bury their heads in the sand and "go-it-alone" on what we might prefer to see as maintaining the status quo or saving a few dollars on crystals.

Surely, we as Amateurs must recognize the fact that in the IARU community, although we are entitled to an opinion as Australians, we cannot be so cavalier in our expression of opinion as to ignore an international problem of interference which WOULD be to the detriment of amateurs here and elsewhere in the world in their enjoyment of the facilities which Amateur Satellites make available.

While recognising this aspect, there is, of course, a need to be fair to those users of the 2 metre band whose interests may be other than satellites.

What then are we doing or have we done about solving the problem?

Basically, there have been three major conferences. These were: Wodonga (1968), Albury (1972) and the Easter 1973 Convention.

All were aimed at 2 metre Band-Planning, and they all failed to produce a continuously acceptable plan.

What is a band-plan?

More important; what is an acceptable band-plan?

Presumably, a band-plan is a scheme for maximuum utilization of a slice of the frequency spectrum giving the maximum benefit to all users, no matter what mode is employed, with absolute minimum interference between modes or users.

A plan, by definition, is some orderly arrangement of facts, or figures, or other detail—each item positioned relative to the others—and since a plan is something which is projected into the future, it should be as far-sighted as possible; allowing for future expansion or alteration.

This then would appear to be an acceptable band-plan.

The Wodonga Plan seems to meet some of the requirements but does not have an orderly progression about it.

The Albury Plan, although undoubtedly not the only solution to the problem, is favoured by most Divisions and, as a long-term band-plan has more attractions.

Looking at the sorry mess of dissention which followed the Easter 1973 Convention, it is not surprising that the South Australin Division's Federal Councillor, in a requisition dated 7th August, 1973, sought an Extraordinary Convention to consider and vote on the 2 metre band-plan.

All necessary provisions of the Companies Act of Victoria having been satisfied, this Extraordinary Convention was held at the lecture room of the WIA, Victorian Division, Melbourne, on the afternoon of Saturday, September 15, and continuing the following morning.

All six Federal Councillors and the Executive were present as well as several observers and visitors.

A communique was issued in time for the Sunday morning VK3 broadcast and the contents were conveyed to Sydney for inclusion in the VK2 broadcast. The following policy was established in respect to the 2 metre band-plan, to be known as "The WIA 2 metre band-plan", which, subject to PMG Dept. approval being obtained, set out the repeater input channel frequencies at 50kHz spacing starting at 146.100MHz, ending at 146.400MHz with output frequencies 600kHz above the respective input frequencies.

Simplex channels were set out at 50kHz spacing beginning at 146.450MHz and ending at 146.650MHz, with 146.500MHz to be developed as the national simplex channel and 146.600MHz as the RTTY channel.

Also implemented was a channel numbering system starting with 144.000MHz as Channel O rising by 1 at each 50kHz step.

It was agreed that Channel 4 be changed as soon as possible and that the other existing channels be changed at an appropriate time.

All this, then, is the WIA 2 metre band-plan ready for implementation.

John McL. Bennett, VK3ZA.

VK ZL OCEANIA DX CONTEST

phone oct 6 & 7 cw oct 13 & 14

OUR ONLY INTERNATIONAL CONTEST—JOIN IN THE FUN

USING THE AX PREFIX

Sunshine State Convention

6th and 7th October in the Amateur Wrestling Club Hall, 54 Phillip St., Leichhardt, Ipswich. Queensland open from 08.30 hours on the Saturday with the official opening at 14.00 hours. Further details obtainable from the Honorary Secretary, W.I.A. Queensland Division, GPO Box 638, Brisbane, Qld. 4001.

Contest Awards

The IARU Calendar for June-July 1973 finds it necessary to issue a reminder that international regulations define a radio amateur as a " . . . . person interested in radio technique solely with a personal aim and without pecuniary interest". Contests whose main prizes are rewards in the form of expensive pre-paid trips violate this principle, and may cause difficulties for the amateur service at future international conferences.

BOX 88 MOSCOW

At the Club Headquarters a full-time staff of 8 is employed in a building of 1800 m (about 19000 sq.ft) on two or three levels. Apart from administrative offices, the building houses a library of 48,000 reference books (this figure not including magazines), and about 12,000 technical articles, a reading room, a lecture theatre about the size of a small cinema, a small lecture room, a laboratory and workshop and, of course, a QSL bureau — with a full time staff of four women who handle annually about 2.5 million cards. There are 46,000 licensed amateur operators in the Soviet Union and 4,600 clubs with over 17,000 members. ZL1HL writing in Break-In of July 1973 on a visit to "Box 88, Moscow".

Amateur Radio under fire

Where are we heading? Radio Communications of July 1973 carries a leader about 'good housekeeping' and comments "At one time it was accepted that the courtesy of the amateur operator was unquestioned, nowadays the manners heard often leave much to be desired. It seems that the standards have declined with the improvement in equipment". The leader not only mentions bad language, the defiance of both the law and reasonable standards of conduct and the activities of pirates but also comments "unless an improvement is effected (it all leads) to the loss of frequencies at the next ITU conference". Reading between the lines this seems to be more or less an international disease which can only lead to a hardening of officialdom towards amateur radio — please pass this on to the ratbags.

tuning and feeding a 40 metre yagi

BRUCE R. MANN VK3BM
P.O. Box 724, Swan Hill, 3585.

Most visitors to Swan Hill will be impressed by VK3BM's 40 metre beam which is a prominent feature of the skyline. DX stations are equally impressed by his 40 metre signal. Here's how it was done!

When contemplating the construction of a full sized 3 element 40 metre Yagi I did much searching of books and magazines and much questioning of the "experts" on the DX 40 metre band.

Apart from structural worries there appeared to be 3 major design problems:-

1. The lengths of the elements
2. Coupling the feedline to the antenna
3. The feedline itself

PROBLEM 1.

I came across various references to change of resonant frequency of a Yagi if tuned near the ground then elevated to the top of a tower. Seemingly it should be tuned at least a half-wave above ground if the resonant frequency is to stay put when elevated.

Thus one can readily adjust 2, 6 or 10 metre yagis from a step-ladder — and even 15 metre and 20 metre yagi's well enough — but what-ho a 40 metre beam! That would be a mammoth task even with the aid of the Fire Brigade's motorised ladder!

Then why not cut elements to length by formula? From various sources I found that the usual stepped or tapered elements do not conform to the formula. For instance W3MWC designed his beam with elements stepped from 1¾ inch down to ½ inch and element lengths cut to formula for 7020 kHz, but when elevated to 100 feet the performance was atrocious! He found that the antenna resonated at 7400 to 7500 kHz, and that an addition of approximately 4 feet was needed to each element to attain proper operation.,

So I decided to use un-tapered elements of 2 inch diameter throughout and cut them by formula. Actually aluminium scaffolding tubing was used at the centre of each element and light gauge aluminium tubing of the same outside diameter at the element ends. Joints were made by forcing the tubes until they butted together over a machined section of aluminium alloy rod, then electric welding around the joint. This eliminated the resistance losses common in clamped aluminium joints. The elements were cut to formula for 7100 kHz namely:-

Spacing	20 ft.
Reflector	70 ft. 3 in.
Driven Element	66 ft. 7½ in.
Director	61 ft. 5 in.

To cater for the heavier than normal material and greater wind loading of these elements the 40 foot boom was of triangular lattice steel construction.

PROBLEM 2.

The Co-ax feeder is usually matched to the driven element by the gamma match method but this necessitates a gamma rod with an adjustable clamp at least 6 feet from the boom, plus a variable capacitor in weather proof housing. I couldn't imagine myself adjusting this setup 86 feet up in the air! In any case, users of this method had reported very lopsided field strength patterns. A Tee match was reported to be more symmetrical when used with a balun , but is quite complicated and hard to adjust.

Then over the air came a suggestion which I finally adopted. The driven element was cut in the centre, insulated, and each half attached to the centre conductor of one of a pair of 50 ohm co-ax feeders, the outer braided conductors being joined.

The support and insulation of the two halves of the driven element was achieved by slipping short lengths of polythene tubing over the inner ends and clamping to three feet of impregnated hardwood beam.

PROBLEM 3

The feedline then is a side-by-side pair of 50 ohm co-ax cables with shields connected together, and at the shack end connected to the transmitter through a Johnson Matchbox. Obviously the feed is symmetrical and shielded, giving maximum directivity to the antenna, minimum feedline radiation and lowest noise pickup when receiving and of course a perfect match at the transmitter.

But what of the match at the antenna? The two cables add up to 100 ohms feeding into about 35 ohms — but who's afraid of a 3:1 mismatch at 7 MHz? Not me! The particular co-ax used had a rated loss at 7 MHz of 0.4 dB per 100 feet; and this loss doubles at an SWR of 4:1.

The text book says that most of the loss in co-ax is in the braid, because RF currents tend to go in straight lines rather than follow the convolutions of the individual wires of the shield.

In the double co-ax feeder set-up under consideration the braids are merely shields, not conductors of power so that losses are greatly reduced.

Anyway, what's one dB off an S9 signal!

So this homebrew antenna was cut by tape measure, assembled to the homebrew self-supporting tower with feedlines and homebrew rotator connected, and the whole winched up without any antenna tune-up procedure whatever.

IT WORKS!

At 1125 GMT April 4th, 1971 I called a group of five W's who gave me S meter readings from 9 + 20 dB to 9 + 50 dB. The symmetry, sharpness and front-to-back ratios are in keeping with the performance, and the Collins O-200 watt power meter permanently in the TX output seldom hits the top pin.

I am sure you will agree, that with this design the problems are all structural — the usual problems of adjustments and tune-up have disappeared. I wish to acknowledge helpful information, ideas and encouragement in this project from VK2AVA and VK3HW.

ZEPHYR PRODUCTS PTY. LTD., 70 BATESFORD ROAD, CHADSTONE, VIC., 3148. Phone 56-7231

C.G.S

TYPE C MINIATURE VITREOUS ENAMELLED POWER WIREWOUND RESISTORS

Approved to BS 9114 – N002 style 2E–56

SPECIFICATIONS

The 'C' Series of miniature wirewound, vitreous enamelled resistors has been designed to meet the requirements of Specification BS 9114 - N002, and full Qualification Approval has been granted. A Test Report Summary is available on request; this report shows that many of the performance levels are in fact much higher than the specification acceptance levels.

The use of specially selected materials, combined with the application of exacting quality control throughout all stages of production ensures the consistent achievement of a very high standard of reliability.

ELECTRICAL SPECIFICATION

Tolerance: ±5% is standard on values of 1Ω and above and ±10% between 0.1Ω and 1.0Ω. For non standard values and tolerances please consult the factory.

Resistance values: C Series resistors are available with the preferred ohmic values of the E24 Series within the ranges shown in Table 1.

Temperature coefficient: Typically less than 100 ppm/°C and never exceeding 200 ppm/°C over the category temperature range −55°C to +200°C

MATERIALS

Core: High purity steatite ceramic. Chemically inert, capable of withstanding severe thermal shock and impervious to moisture. Ground to close tolerance finish to give maximum contact with wire element for rapid heat transfer.

Resistance Element: High quality nickel-chrome or nickel-copper alloy depending on resistance value; wound at minimum tension.

End Caps: Formed to close tolerances from a special nickel-iron alloy chosen for its consistent welding properties and glass sealing characteristics.

Leads: Solder coated nickel A.

Uncoated leads can be supplied for welding.

Specify – 'weldable leads'.

Preformed and cropped leads can also be supplied on request.

Coating: Humidity proof vitreous enamel with carefully controlled expansion matched to the materials of the resistor.

TABLE 1

C.G.S.				BS 9114 - N002							STYLE CROSS REFERENCE		
Style	Maximum wattage rating @ 20°C	Resistance Range Ω min.	Resistance Range Ω max.	BS 9114 - N002 Style	Maximum wattage rating @ 70°C	Approved Resistance Range Ω min.	Approved Resistance Range Ω max.	Critical Resistance Ω	Limiting Element Voltage. Volts Normal	Limiting Element Voltage. Volts Low Air Pressure	DEF. 5111-1 Style	DEF 5115-2 Style	G.P.O. Style
C3A	3	0.1	10K	2E-56-2.5	2.5	1	4.7K	3.9K	100	70	RWV3J	RFH3-2.5	P.O.35
C7	7	0.1	27K	2E-56-6	6	1	15K	6.8K	200	140	RWV4J	RFH3-6	P.O.40
C10	10	0.1	68K	2E-56-9	9	1	68K	27K	500	350	RWV4K	RFH3-9	P.O.36
C14	14	0.2	120K	2E-56-12	12	1	100K	47K	750	530	RWV4L	RFH3-12	–

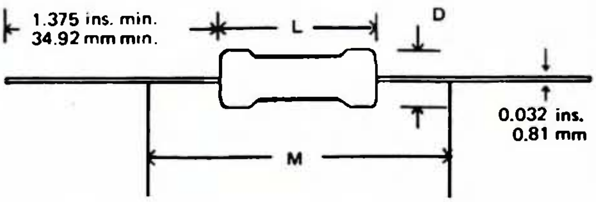

TABLE 2

Style	Length L max. in.	Length L max. mm.	Diam. D max. in.	Diam. D max. mm.	Measuring Distance M ±0.062 in.	Measuring Distance M ±1.59 mm.	Approx. Weight grammes
C3A	.499	12.7	0 220	5.6	1.250	31.8	1.0
C7	.874	22.2	0.315	8.0	1.625	41.3	2.0
C10	1.499	38.1	0.315	8.0	2.250	57.2	3.5
C14	2.106	53.5	0.315	8.0	2.875	73.0	5.0

Note: M = resistance measuring points distance – below 10Ω only.

amateurs assist in air race

Andy Andrews

Secretary, Dubbo Amateur Radio Club, VK2BMA

The recent Sydney to Dubbo Air Race has been hailed as a great success and I would like to tell you of a few Amateurs who contributed their time and energy to this object.

About two months before the race the State Emergency Service Signals Section, Macquarie Division, of which I am a member, was asked to provide radio communication facilities for the air race.

Basically what was required in our area was a radio link between Mudgee Airport and the Headquarters at Dubbo and also a radio link between the marker area which non-stopping planes flew over and identified to Mudgee Airport a distance of about four miles.

The main link between Mudgee and Dubbo was to be with the State Emergency Service SSB sets on their frequency of 3743 kHz. whilst the local link was to be with "Pony" transceivers on 27.230MHz.

Some doubt was expressed on the reliability of the HF communications link due to the normal daytime conditions on the 80 metre band and it was decided to invite the Amateurs in the area to participate in setting up a secondary channel on 2 metres through the Orange Amateur Radio Club's repeater on Mt Canobolis, VK2AOA-RI (FRED). The Amateurs showed great interest and many points were discussed on the 7.30pm rag chew on following evenings.

On the Sunday preceding the race the SES contingent for Mudgee went to the Airport for a dummy run on their equipment and to erect a 60ft mast to take the 80 metre inverted V. Robert Alford, VK2ZRJ and Alan Wright, VK2BVL made the trip from Orange

Meanwhile, at Dubbo, Ces Kearines, VK2AKC had constructed a 2 metre beam from 8 gauge fence wire with an SWR of 1-1.5, (we will have to check his SWR meter) and this had been fixed to the roof of the SES Headquarters at Dubbo, and no difficulty was experienced in triggering "FRED" at Orange.

Robert and Alan at Mudgee experienced difficulty in getting through to the repeater using a ground plane and it was obvious that further thought had to be given to the matter. The SES HF system to Dubbo worked perfectly but the important link between the marker area and Mudgee was poor.

During the next week an offer by Tom Stroud, VK2AMR for the loan of his beam and a mast was quickly accepted. It was dismantled and taken to Mudgee and a quick test with the little KEN 2 Watt transceiver showed that the 2 metre link to Dubbo via FRED was established.

Dawned the race day and Robert arrived at Mudgee from Orange at the early hour of 7.00 am complete with beam and ground planes attached to the roof of his car. After erecting a ground plane at the Airport he joined the frozen band of stalwarts in a frost covered paddock four miles away. A fire that had been started to provide some warmth had to be extinguished as the smoke was concealing the marker from being seen from the air. Robert erected a beam on a pole in the middle of the paddock and established a Channel B 2 metre link back to the base, and for the rest of the day he was kept very busy transmitting the marker changes and the identification numbers of the planes that passed overhead. Bill Baylis, VK2BVW and Ken North, VK2-ZAN travelled up from Bathurst to assist.

Due to the exceptional conditions on 80 metres the Secondary 2 metre link to Dubbo was not used. However, after the race was over the Controller of the Macquarie Region SES was able to talk to his Mitchell Region counterpart in Bathurst (Bill Bayliss) over the 2 metre Fred link and was impressed what can be done with VHF and a Repeater. ●

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You and DX

COUNTRY CRITERIA. What constitutes a 'country' for the purposes of the IARU awards (WAC, WAZ)? IARU Region I News of Aug. '73 lists 4 criteria summarised below.

Firstly a Government-Administration 'country' is an area by reason of Government or a distinctively separate administration constituting a separate entity. (Comment by an ignorant DX-er — how come, then, that GM and GW are separate 'countries' but not VKI and VK3, etc, or are the latter States considered to be in the same category as the States of the USA?).

Secondly in two bites are islands and groups of islands. An off-shore island is a separate 'country' if it is not less than 225 miles of open water distant from the mainland provided the island is not part of or located adjacent to an island group. An island group must be at least 500 miles of open water away from anything administered by the same government or administration.

Thirdly two pieces of a country listed 'firstly' above which are completely separated by a foreign country must be at least 75 miles of land apart.

Fourthly any unadministered area is ineligible for consideration as a separate entity.

It is always interesting to consider the variations and implications of separate 'countries' status for different awards and purposes. It is also interesting to observe how the rules of various awards in relation to country status can be applied to uninhabited pieces of rock or sand scattered over the face of the globe. Remote places such as Rockall and a few reefs await activation one day but others once thought nearly impregnable such as Bouvet have succumbed. What price the DX activation of space vehicles? Would each be a separate country perhaps?

Verona. The Netherlands Antilles amateur radio society celebrates its 25th anniversary with a special activities month during December 1973 when the PJ2 stations will be using the PJ1 prefix. The Secretary of VERONA also advises that the beautiful Curacao Certificate will be issued free for working three PJ1 stations during December 1973. Applications by air mail, with details, before 1st February 1974 to P.O. Box 383, Curacao.

City of Joao Belo Award. The Mozambique Society advises that a special award will be issued to anyone working CR7CJB plus at least one other of CR7ER, CR7LZ or CR7RA in the period 1st to 31st October 1973 on the DX bands 40 to 10 metres. Send QSL cards to Camara Municipal de Gaza, P.O. Box 14, Joao Belo. Mozambique. ●

the CW net

a first for Australia

F. J. Miller, VK4II

95 Stanley Terrace, Taringa, Qld., 4068

An activity has recently started up on 40 metres which might well be the first of its kind ever. A group of CW ragchewers discovered that if they organised their round-tables along rudimentary traffic net lines, a degree of freedom was achieved which the good-natured chaos of random break-in could not offer.

VK2RY
I. L. (Ivan) Brown

VK2AHR
R. (Dick) Ellis

VK2AV
A. W. (Art) Thurstan

This group of east coast VK stations, which had been meeting informally over a period of time before the idea of a net was hit upon, recognised the possibilities of an improved ragchew session which maintained order by the simple expedient of setting up a control station whose function it would be to assemble all the parties together and then pair them off for short QSO's. The concept of course was basically different from the round-table format it began from, but it had the advantage of enabling people to come and go as they pleased and it offered each person the chance to do more operating himself.

It was felt by many that the round-table seemed somehow to get monopolised by the most talkative ones and it was difficult to remember all the calls in order, and all the names, not to mention the problem of copying the weak fellow who seemed to invariably get clobbered by a break-in station . . . what a mess it became at times, and how hard it was to politely escape from.

Thus began an exciting activity which has been running successfully and in earnest for over 20 weeks, with a typical weekly attendance of 14 stations. On the low end of 40 metres each Sunday morning, a lone station calls CQ CWN* and with that invites all interested CW stations to call in and relax while he proceeds to pair one station off with another and suggests a frequency to shift to. When each station has acknowledged that he has his information, he is on his own. After a pleasant QSO and a chance to get in some real operating (not always possible in a round-table) one returns to the net frequency, reports in, and awaits another assignment. Code speed is not a problem because if you are slow, the net control station (NCS) will oblige by finding someone who prefers to go slow too. If it is speed you are after, there is always someone who will take you on. Best of all, if you want to bow out for whatever reason, just tell the NCS . . . no messy apologies needed. The CW Net concept is simple: drop in for the fun and leave when you choose. No need to wait interminably for a chance to break in or to leave.

The current net procedures have evolved from early attempts at efficiency through rigorous use of the QN code (the ARRL traffic net Q-code) to the present neat but casual

VK2ADV
C. M. (Mac) Hicks

procedures involving mainly the signal QNI ("I report in") and one or two others such as QNX ("I request to be excused for a while") and QNO ("I'm off, cheers"). The NCS uses such QN codes as QND ("Net is underway") and QNF ("Net is finished for today"). Several ARRL publications list the QN code, but even if one did not at first know a single Q signal the NCS would understand and pair you off anyway.

If you wanted to get in touch with someone in particular whom you were not sure was on the air, a check call to the NCS would sort the problem out without formality other than a quick report in and out. Formality is purposely kept to a minimum because experience to date has shown that rigidity creates its own problems not the least of which is early waning interest. To keep order, however, demands competence on the part of the net control station which might appear to require a superman, but this has not proved to be at all necessary. Those stations who have volunteered to be NCS have among themselves evolved a simple logging system which works well and is easy to learn. (The logging and control technique is available from the author.)

Thus far the NCS role has proved very popular and there has been no reluctance by operators to give it a go. There are always a sufficiently large percentage of NCS oriented people to fill this role and so far no-one has felt pressured to have to offer his services.

To date the net has been limited in its operation to a two hour period on Sunday mornings** and for an average attendance each station enjoys up to 5 QSO's. Due to skip conditions on 40 metres the activity has been centred on NSW and Victoria, but stations from VK5, VK4, and ZL are heard regularly.

What is needed now is decentralisation, both as to operating bands and geographical regions. Currently an 80 metre CW Net is in the embryo stage. Judging by the genuine and continuing interest shown in the net so far, it seems likely that the ragchew net concept could attract interest overseas as well. Perhaps the real strength of the net lies in the fact that it does not discriminate. All CW operators are encouraged to join in, although speeds of under 15 wpm do make

** CQ CW Net
** 7025 KHz 0930-1130 Eastern Time

(Continued on page 15)

a VFO for 5–5·5 MHz

Drew Diamond, VK3ANU
55 Winbirra Parade, Ashwood, 3147

Here is a modern solid-state VFO designed for easy construction using locally-available parts. This, allied with its excellent performance, may well make it the VK amateur's standard VFO.

Many transceivers today use some form of frequency synthesis or mixing process to derive a desired output frequency.

The mixing method is a very good one for several reasons, one of which is excellent frequency stability. For example, if an output frequency range of 28.0 to 28.5 MHz is required, it could be obtained by mixing 5 to 5.5 MHz and 23 MHz, the latter being furnished by a crystal oscillator. Using this method, the stability of the output frequency will be similar to that of the 5 MHz component, any drift which may occur in the crystal frequency being relatively small.

To derive a stable output frequency it only remains therefore, to provide a source of 5 to 5.5 MHz signal which, when set to the required frequency, will continue to maintain that frequency, and not be affected by the changing environmental conditions the oscillators may undergo during a communication period.

Using this method of frequency production, the VFO can be allowed to run continuously, preferably 24 hrs per day.

The VFO to be described here will provide such a variable source. Frequency range is 5.0 to 5.530 MHz. Stability is in the order of 2 parts per million per hour after warm up. The frequency curve can be linearized using the split segments of the capacitor shown. Output voltage is 3 volts peak to peak sine wave into 1000 ohms. Supply requirement is 12.6 volts at 25 mA. A supply voltage change of plus or minus 1 volt will result in a frequency change of about 1 Hz.

A FET is used as the maintaining device rather than a bi-polar transistor in the interest of improved stability with changes in temperature.

The components of the oscillator and buffer amplifiers are laid out on an etched fibre-glass board measuring 7 x 9 cm. Good mechanical stability can be secured using the form of construction shown, a U shaped box and cover measuring 15 cm long, 6.5 cm high and 8.5 cm in width.

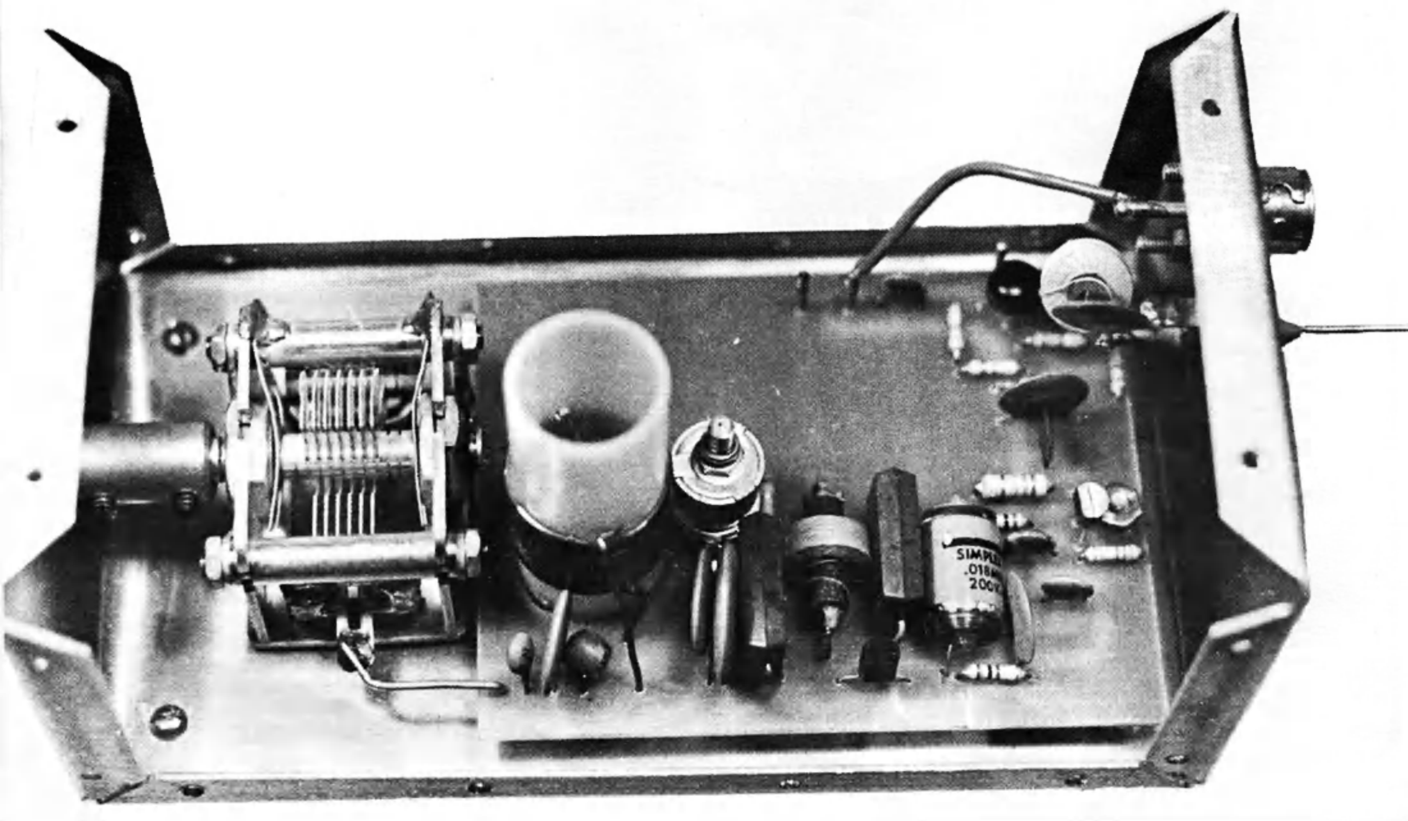
An ordinary ¼ inch solid coupler is used on the capacitor shaft inside the VFO box and a plastic rod should be used to connect the capacitor with the drive mechanism. A number 3 knitting needle is exactly ¼ inch in diameter.

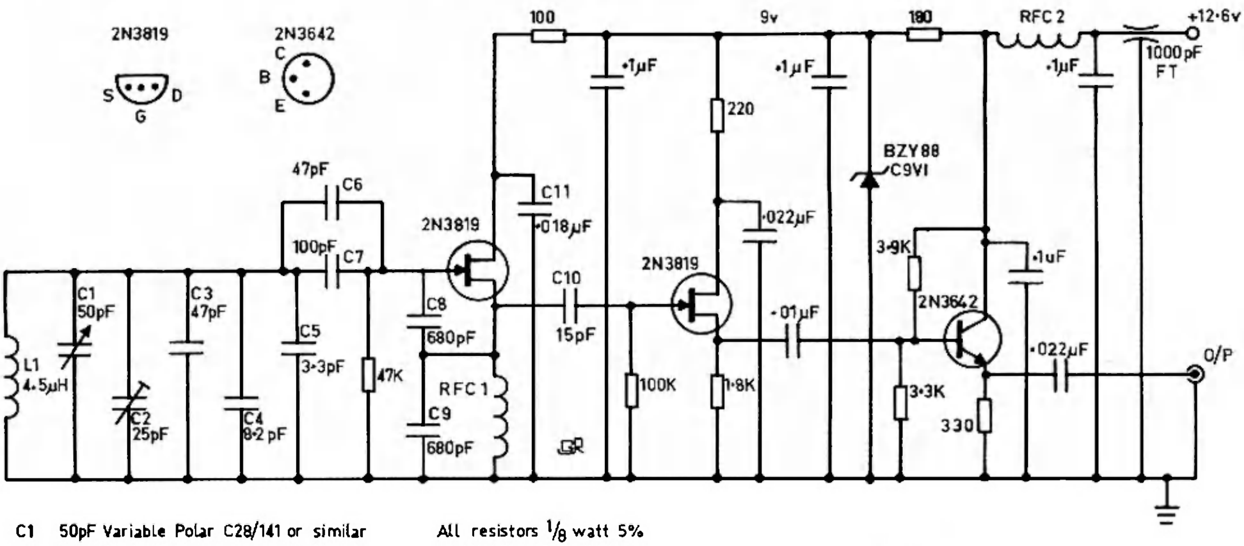
The entire box is mounted on four ⅛ Whit. screws which are secured to the main exciter chassis through four rubber grommets which provide some mechanical, electrical and thermal insulation. A considerable improvement in stability can be obtained by enclosing the VFO box in one inch thick polyfoam insulation. The coax from the VFO output socket provides the earth return for the supply.

The capacitors used at C4 and C5 are ceramic N750 type for frequency drift compensation. The values shown were arrived at after some experimentation with temperature versus frequency. It will probably be necessary to find the exact amount of capacitance by similar experiment. If the frequency increases with temperature, there is too much negative capacitance, if the frequency decreases with increasing temperature, there is too little. Use C2 to restore the correct frequency range. Remember to give the components time to reach room temperature after soldering before taking frequency measurements. If a very stable VFO is required, you must be prepared to spend some time in determining the exact amount of capacitance required

The author spent considerable time experimenting with various types of coil formers and fixed capacitors in the tuned circuit. A good quality ceramic coil former is ideal of course, but here in Melbourne there appears to be no ready supply. The former finally used was a WYNNE ¾ inch available at Magrath's.

An output waveform which is distorted may be traced to a FET which has too much gain. As 2N3819's have considerable parameter spread, it may be necessary to try a few FET's in order to obtain a clean output waveform. ●





C1	50pF	Variable Polar C28/141 or similar	
C2	25pF	Trimmer	C005 BA/25E
C3	47pF	Ceramic	NPO
C4	8·2pF	"	N750
C5	3·3pF	"	"
C6	47pF	"	NPO
C7	100pF	"	"
C8	680pF	Silver Mica	
C9	680pF	"	"
C10	15pF	Ceramic	NPO
C11	·018uF	Styroseal	

All other capacitors as shown.

All resistors 1/8 watt 5%

L1 4·5uH : 17 turns 18swg enamelled copper on 3/4" Wynne former. Start and finish held in place with a small amount of Araldite.

RFC 1 2·5µH Single pie (Aegis)
RFC 2 2·5µH " " "

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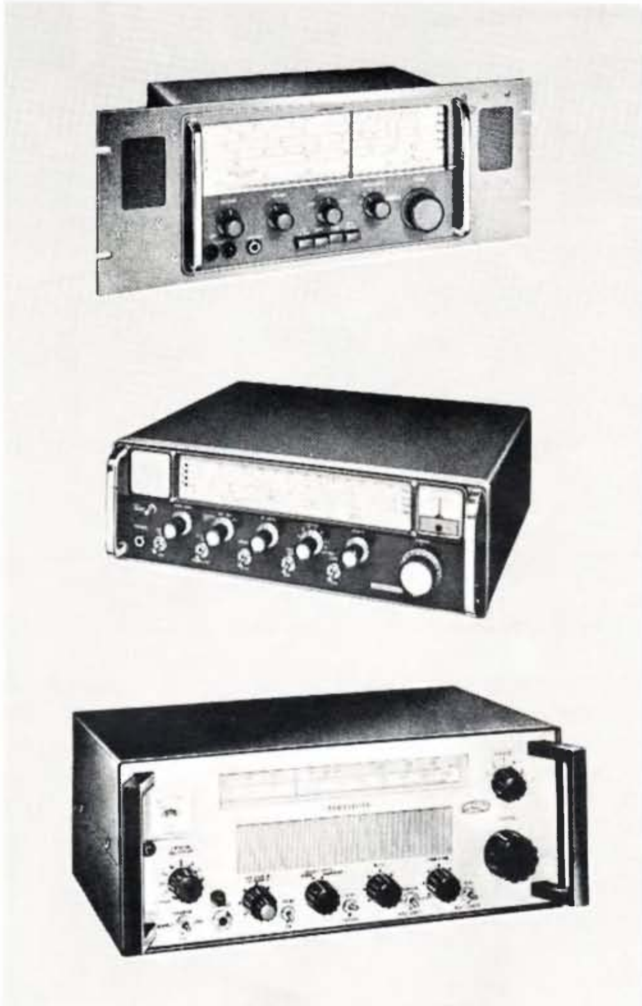

Newcomers Notebook

with Rodney Champness VK3UG

44 Rathmullen Rd., Boronia, Vic., 3155

The Transistorised Signal Injector:- How it works.

Last month I said that an audio oscillator, like the YRCS one described last month, also produces RF signals. If you are new to electronics you could be excused for thinking I'm talking through my hat. Not all audio oscillators produce RF signals, thank goodness. The conversation this time will concentrate on the multivibrator type of oscillator, such as the unit shown in Fig 1 of September 73 "Newcomer's Notebook".

Consider that transistor TR1 has a Beta of 100 and TR2 a beta of 80. Beta can be very roughly equated to gain, meaning that 1mA of base current in one transistor will cause 100mA to flow through the collector junction. There are other factors which come into this but for the purpose of this explanation I will keep it fairly simple. When the multivibrator has supply voltage first applied, TR1 draws slightly more current than TR2 because of its higher beta. This means that the voltage at the collector of TR1 will be lower than TR2. This also means that the voltage across C3 is more negative going than across C2. Negative going doesn't mean negative, it means going in a negative direction with its positive potential decreasing or if already negative, the negative potential is increasing further. The negative going voltage across C3 causes TR2 to be biased off. In other words the voltage applied via C3 to the base of TR2 nullifies the voltage applied across R3. As TR2 is being cut off the voltage at the collector is positive going and is applied via C2 to cause TR1 to turn on harder to the point of saturation.

With TR1 turned on hard and TR2 cut off a temporary state of quiescence is reached. C2 is initially uncharged when TR2 is cut off and as such has no voltage across it. Therefore the base of TR1 can be considered to be at full + potential. As the capacitor C2 charges via R2 the base forward bias decreases. C3 is gradually discharging at this time and the base of TR2 is gradually coming away from deeply inside cutoff. When the base of TR2 reaches conduction point at about 0.6 volts a small amount of collector current is drawn. This will mean that the voltage at the collector will be slightly less positive and a negative going pulse will be transmitted across C2 which will pull TR1 just slightly away from saturation. Therefore the collector voltage will rise going slightly positive. This positive pulse is transmitted across C3 causing TR2 to draw more current so lowering its collector voltage. This causes an increase to the size of the negative going pulse applied via C2 to TR1 which is progressively cutting off TR1. This regenerative action continues very quickly until TR1 is cut off and TR2 is conducting into saturation. Changing over from conduction to cutoff can be accomplished in a microsecond or so. The length of the quiescent state, though, is controlled by the time constants of the resistors and capacitors used in the device.

In essence the multivibrator just discussed is a square wave generator. Square waves in fact can be mathematically shown to contain all frequencies which are harmonically related to the fundamental oscillation frequency. Therein lies the clue of how an audio oscillator can produce an RF signal. The waveform of the multivibrator isn't quite a square wave so its output does diminish as the frequency rises. A typical output waveform is shown in Fig 1 of this issue. The unit under discussion will give output to at least 2MHz. The higher in frequency you go the less the output there is from the unit.

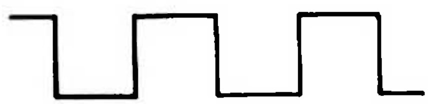

FIG. 1

How to Use the Signal Injector.

The signal via the probe can be injected into any audio signal circuit by placing the probe onto any part of the signal path through the amplifier. If placed on the speaker don't expect to hear a loud noise, in fact you will barely be able to hear it at all. The base or grid of the last audio stage will produce higher volume, and the base or grid of the preceding stage considerably more. Once you get to the diode detector the volume may be slightly down on what you obtained at the input of the following stage. If you now start to work your way towards the front end of the set you will find the level of the output from the speaker increases. At the collector or plate of the last IF stage you will find that the output is quite low after having been high in the first stage of the audio section. The reason for this is that the probe has a much lower output at RF frequencies than at audio. As you once again progress towards the front of the set the level of signal should once again increase.

To get the hang of the multivibrator signal injector, it is desirable to try it on several sets both valve and transistorised. You will get an idea of the level of signal that can be expected in various stages by doing this. One point I wish to bring to your attention again is the one I mentioned last month, namely **NEVER** use the earth lead when you are putting the probe onto a point of high potential above earth.

The multivibrator signal injector is a very handy instrument for the amateur and for the professional radio man. I consider that this is one of the handiest "dynamic" testing instruments for the amateur shack. This particular article wasn't written on test instruments as such, but has ended up being a write up of a particular instrument. Other instruments will be written up soon. One method of increasing the output from the signal injector is to increase the supply voltage. Subminiature batteries giving up to about 6 volts could be used, and considering the current drain should last a long time. At 6 volts the current drain would be in the order of 4 mA.

Another method of obtaining output at higher RF frequencies would be to replace the transistors used with transistors known to be good at HF and possibly VHF. The switching time from cut-off to saturation and vice-versa is likely to be shorter with the HF or VHF transistors. This means the front and back slopes of the "square" wave output are steeper so causing more of the higher harmonics to be produced. It is possible to do quite a few experiments with these multivibrators until you get the results you want. The multivibrator that has been discussed is called an "a-stable multivibrator", there are two other types "bi-stable" and "mono-stable". The latter two are used extensively in digital electronics.

Notes

Next month I hope to describe some accessories for converted domestic mantel receivers. I promised it about a year ago, so it is about time. The planned low power 160 or 80 metres transmitter hasn't as yet got off the drawing board. It will, but regrettably will be delayed a few months. ●

Commercial Kinks

with Ron Fisher VK3OM
3 Fairview Ave., Glen Waverley, 3150

After looking at the FT 101 over the last two months, we are now going to step back a few years to the 101's predecessor, the FT 100. Many of these rigs are still giving excellent service and can often be obtained on the second hand market at quite reasonable prices.

The service data that follows is again due to the generosity of Mr Fred Bail of Bail Electronic Services.

SYMPTOM. Low kick-up on speech. Meter kicks normally on whistle or high pitched sounds.
Probable cause. Earth point of emitter bypass on TR 308 (first mic amp) not earthed (C322).
Cure. Resolder the condenser leads.

SYMPTOM. Cross modulation.
Probable cause. Protection diodes D106-D107 incorrectly positioned in circuit.
Cure. Check that the diodes are on the receiver side of trap L608 as shown on the circuit. If they are on the antenna side, B C break-through will then result.

SYMPTOM. Oscillation in the IF stage.
Probable cause. Coupling between IF transformers 1, 2 and 3. Coupling can occur between the tuning slugs.
Cure. Screw slug through to bottom side of one coil only, instead of top side for resonance as is normal.

SYMPTOM. Receiver very weak.
Probable cause. Dry joint at band switch to cIII.
Cure. Resolder condenser. Also check RF transistor TR 101 and alignment.

SYMPTOM. Intermittent operation for all but CW-Tune position.
Probable cause. Stress on chassis could cause short with coax braid and mode switch lug.
Cure. Adjust stress on chassis. Check that no leads or wires are jammed under control fixing nuts etc.

SYMPTOM. Delay too short in VOX operation.
Probable cause. Lack of capacity in timing circuit or resistance too low.
Cure. Check value of timing resistor. If low, replace, or if OK, add extra capacity to delay circuit.

SYMPTOM. AM modulation downwards.
Probable cause. Poor SWR.
Cure. If unable to reduce the SWR try adjusting the IC on AM for best upward modulation.

SYMPTOM. Pulling or FM-ing of VFO on voice peaks.
Probable cause. Defect in voltage regulator causing slight variation in regulated voltage to VFO.
Cure. Check VR components. Check that VR circuit has correct input voltage. If fault exists only when operating on 12 volt DC power supply, check that battery voltage is normal. Excessive Mic Gain with resultant high peak current on speech can result in VFO FM-ing.

SYMPTOM. VFO OK on receive, but drifts on transmit.
Probable cause. Faulty conductivity in RFA circuit, probably via relay contacts in RL 301.
Cure. To check this, try interchanging the plug-in relays RL 301 and RL 302. Clean the relay contacts and retension the springs.

SYMPTOM. "S" Meter reads high on SSB with no signal input.
Probable cause. Oscillation in IF stages or carrier leakage in IF.
Cure. Check IF alignment. Check carrier oscillator (BFO on receive) and adjust to correct frequency. Also check transmitter carrier null.

SYMPTOM. No drive on transmit. Receive OK.
Probable cause and cure. Diode D304 open circuit. replace.

SYMPTOM. Little or no "S" meter reading. Meter reads OK in transmit mode.
Probable cause. Meter circuitry defective.
Cure. Check relay RL301 contacts that change over the meter functions. Clean and retension. Also check "S" meter transistor TR205.

SYMPTOM. Advancing RF gain beyond half scale causes volume to decrease and "S" meter to rise. (Voltage on AGC line rising).
Probable cause. Zener diodes at RF amplifier emitter reversed or open circuit, or not properly soldered in.
Cure. Check diodes and resolder.

SYMPTOM. Receiver audio output distorted.
Probable cause and cure. Output stage transistors faulty. Replace both 2SB200 output transistors.

SYMPTOM. No output or very low output on transmit. Preselector tuning broadly and incorrectly.
Probable cause and cure. Fault in driver stage. Replace RFC L119 plate feed to 12BY7. This choke can overheat and become distorted although not actually burnt out. Turns can apparently become short circuited. Aegis type CA is a suitable replacement.

SYMPTOM. Oscillation in the receiver RF amp.
Probable cause and cure. Excessive gain in the RF section. Try connecting a 22K ohm resistor across the RF coil. ●

Y.R.C.S.

with Bob Guthberlet
Methodist Manse, Kadina, S.A., 5554

A few weeks ago I received a letter from N. H. Hyde, (VK6NHI informing me of his appointment as the Supervisor of YRCS in WA. In offering our congratulations, we respond to his SOS for assistance in terms of which I quote: *I have recently taken over the Co-ordination of the Youth Radio Scheme in WA, and would be grateful if you could make this known in Amateur Radio. As my records are somewhat incomplete, I am anxious to hear from any individual or organisation involved with the Youth Radio Scheme in WA. I can be contacted — Hamilton Senior High School, Purvis St, Hamilton Hill, WA, 6163 (Tel. 37 1740, and, 67 Hennessy Avenue, Orelia, WA. 6167.* (Please help if you are able).

Another important item is that referred to in a letter from Rex Black, VK2YA. Rex emphasises the importance of club members being given guidance when appearing for interviews for jobs. Suggestion is that the potential employee should take a suitcase with his best electronic project, and demonstrate and discuss it from the technical point of view. Will club leaders consider this idea?

Have received a copy of the YRCS News Release Sheet published by the VK2 boys under the guidance of Kev Watson. This is something which could be profitable in all States and enable supervisors to keep in touch with the clubs under their control.

It is now over ten years since the formation of YRCS and with many of our teething problems overcome, I believe the time has come when we should accept some responsibility for helping ourselves financially. The present situation is that we are dependent on local WIA Divisions and Fed. WIA for support which has been given willingly. On the Federal level, YRCS has to rely on help to cover the cost of postage, stationery telephone, etc. etc. If the 200 clubs in Australia contributed the small sum of $1 per year, we could establish a fund which would enable us to function more efficiently. Will State Supervisors think about this suggestion, and act accordingly? ●

AARTG

with Ken Kelly VK4MJ
285 Monaco Street, Surfers Paradise, Qld., 4217

During August, meetings have been held in Brisbane and Perth, resulting in the formation of the WIA — Australian Amateur Radio Teleprinters Group. Although the constitution has yet to be ratified by the W.I.A. it seems that the new group is now off the ground.

The first meeting was held in VK6 early in August, and there are already 15 members. The secretary is Alan Gibbs, VK6PG, 12 Munyard Way, Morley, W.A., 6062, and interested persons in that area should get in touch with him. The members to date are VK 6 — VW, WA, PG, NT, NE, KR, IX, IQ, HK, CW, LF, VK, NK, QJ, AND JR. The state chairman is VK6NT.

Late in August a meeting was held in VK4, and was attended by 12 hams. It was decided to form the VK4 Divisional Group, and a provisional constitution was agreed upon. This will be considered by the VK6 group and when agreed upon by both groups, will be forwarded to Federal Executive of WIA for approval.

It has been noted that there is now some activity in VK5, and we hope that it may be possible to form a group there also in the near future. In VK3 and VK2 those active on RTTY appear to rather favour joining a new RTTY group being formed by the Eastern & Mountain District Radio Club of Victoria. While we are disappointed that there is some fragmentation of the RTTY interest in this way, we are pleased that there will be an active group operating, and hope that the two bodies will be able to co-operate to the advantage of both.

We have reason to hope that a large number of page printers may become available shortly, and that many who are interested in this mode will be able to join the ranks. In the meantime, we will try to populate the RTTY frequencies in use, and be able to find more stations to work within Australia than has been possible up to the present time. Frequencies most likely to be active at the present time are: 3590, VK6 net on Mondays at 0001Z. 3540, 7005, 7040, 14085 to 14095. A general net is at present held at 0600Z, Sundays on 14085kHz.

Anyone who is interested may receive further information by writing to the address given at the head of this column, and all enquiries will be welcome. Those who wish to join, and who reside in a State in which a group has not yet been formed may be attached to the group of another State for the time being. ●

The CW Net — (Continued from page 9)

the going rough at present. The simplicity of the concept offers to any group the opportunity to form a net to suit themselves.

There are still a fair number of CW operators active today, but it seems that their numbers are not growing. Possibly the convenience of SSB has wooed many away, or perhaps it is just another facet of the trend today to give in when the going gets tough, and CW is tougher to master than phone operation. What the CW Net philosophy offers is an opportunity for those radio amateurs who would like the chance to have on-the-air practice to get some without fuss. It encourages proficiency which is an end in itself and helps alleviate the bandwidth problem which, despite the improvement brought about by SSB, offers a further four-fold improvement. For the casual QSO where speed of communication is generally irrelevant, CW says it as well and offers the added satisfaction which comes to those who can do something which apparently others cannot.

It has been suggested that if the world population growth rate were applied to the radio amateur population, within 20 years there would not be space available for voice communication in the medium frequency bands. Will that day sound the death knell for the hobby? I think not. It is more likely that the CW operator will continue as he always has enjoying the fruits of his efforts and the pleasure of his hobby.

It is the aim of the CW Net activity to offer the opportunity for more CW activity on the bands now. The author would welcome comments on this article and extends to all operators the invitation to listen in to the CW Net and judge it for themselves. ●

Contests

with Peter Brown VK4PJ

Federal Contests Manager, G.P.O. Box, 638 Brisbane, Qld., 4001.

CONTEST CALENDAR.

October 6, 7. VK-ZL Oceania 'phone Contest. Our International Contest.
October 13, 14. VK-ZL Oceania 'phone Contest. Do your bit.
October 13, 14. RSGB 21-28 MHz contest. 'phone.
October 21, 21. RSGB 7 MHz CW.
October 27, 28. CQ WW DX 'phone contest. One of the best.
November 3, 4. RSGB 7 MHz 'phone.
November 11. Czechoslovak Central Radio Club Contest. Rules next month.
November 24, 25. CQ WW DX CW Contest. Plenty of practice here.
December 22, 23. Hungarian Contest.
October is one of the best contest months of the year. If one works hard I am sure they would achieve DXCC.

C Q World Wide DX Contest.

Phone October 27, 28. CW November 24, 25.
Starts 0000 GMT Saturday. Finishes 2400 GMT Sunday.
All Bands, 1.8 through 28 MHz.
Exchange. RS-RST plus your CQ Zone.
QSO point value.
3 points between stations on different continents. 1 point between stations on the same continent but in different countries.

Contacts between stations in the same country are permitted for Zone and-or country multiplier, but have no QSO point value.

Final Score.

(a) Single band. Zoning plus countries by QSO points.
(b) All band. Sum of Zones plus sum of countries from each band by total QSO points.

Three Divisions.

Single Operator, single or all band.
Multi-operator, single transmitter.
Multi-operator, multi transmitter.
Use a separate log sheet for each band. 40 contacts per page.

Indicate Zone and Country only the first time each is worked on each band. Logs to CQ World Wide Contest, 14 Vanderventer Ave., Port Washington, LI, NY, USA. 11050. Usually Dec. 1st and Jan. 15th deadlines. Times GMT. Summary sheet giving all details.

Going metric?

Herewith is the Ross Hull scoring table with two metric conversions.One column wich we will call "A" converts fairly closely but is not rounded off as well as "B".

Perhaps you have some better ideas which I will be pleased to hear. When you return your contest log put in an "A" or a "B" to indicate your preference, but please do not consider just yourself. Consider what is best for the majority . . . and give an opinion.

Distance	Miles.	Kilometres "A"	"B"
Up to	25	40	50
	50	80	100
	100	160	200
	200	320	400
	300	480	600
	500	800	1000
	1000	1600	2000
	1500	2400	3000
	2500	4000	5000
	3500	5600	7000
	5000	8000	10000

Remembrance Day Contest.

How did you find the Remembrance Day Contest this year? The opening address was received OK tnis year at this QTH without any QRM.

I thought that it was a pretty slow start; my first 4 contacts were ZLs, but it soon developed into the same great contest . . . must be the world's best? I only made locals on 10 metres and I don't think 15 was so good. VK5s were going great guns; VK8XK Doug. having a ball, VK4VU and VK4EQ working well; VK7KJ, Greg was among the leaders I heard. Did not hear much from VK3 but I guess that VKs 2, 3, 6 & 9 will show up well in the final returns.

I received over 100 logs in the first week from Carnarvon to New Guinea.

Ross Hull VHF UHF memorial contest 1973/4 rules

The Wireless Institute of Australia invites Amateurs and Short Wave Listeners to join in this annual contest which is held to perpetuate the memory of Ross Hull who did so much to further VHF-UHF.

A Perpetual Trophy is awarded annually for competition between members of the Wireless Institute of Australia and is inscribed with some details of the man the contest honours.

The name of the winning member of the Wireless Institute of Australia for each year is inscribed upon the trophy and that member also receives a suitably inscribed certificate.

Objects. Amateurs from Australia and Territories will endeavour to contact as many other Amateurs as possible under the following conditions.

Date of Contest. 7th December, 1973 1401 GMT, to 20th Jan. 1974, 1400 GMT. (0001 Hours E.A.S.T. 8th December 1973 to 2400 Hours E.A.S.T. 20th Jan. 1974.)

Duration. Any seven calendar days within the dates mentioned above which need not be consecutive. These periods are at the operators convenience. A calendar day is from 1401 hrs GMT to 1400 hrs GMT.

RULES.

1. There are two Divisions, one of 48 hours duration and the other of seven days duration. In the seven day division there are four sections:
(a) Transmitting, open.
(b) Transmitting, 'phone.
(c) Transmitting, C W.
(d) Receiving, open.

In the 48 hours division the best score over any consecutive 48 hour period is the winner.

In the seven day division the best score over any seven days of the Contest is the winner.

2. Any Amateur operating fixed, mobile, or portable within the terms of his licence may participate.
3. All Amateur VHF-UHF bands may be used but cross band contacts are not acceptable. At any one time, single frequency operating only is permitted. Cross mode contacts are permitted.
4. Amateurs may enter for any one of the sections and either or both divisions. The seven day division winner is not eligible for the 48 hour division award.
5. Two contacts per band per day, irrespective of mode, are permitted provided that two hours elapse from the previous contact with that station on that band.
6. Logs from a multi-operator station are not acceptable. One operator only may operate a station at any one time and must submit a log for his own operation.
7. Entrants must operate within the terms of their licence.
8. The exchange of RS or RST reports with serial numbers beginning with 001 shall be proof of contact.
9. Entries should be set out on quarto sheets, using one side of the paper only, and must be forwarded to reach the Wireless Institute of Australia, Federal Contest Manager, GPO Box 638, Brisbane 4001, in time for the last opening of logs on Friday 22nd February 1974. Envelopes should be clearly marked "Ross Hull Contest". Early logs are appreciated.
10. Scoring will be based on the attached table and the table of distances published in the Contests column of this issue of AR. Approximate distances are to be shown in the log. Operation via repeaters or translators is not permitted.
11. Logs should be set out as in the example and must carry a front sheet with the following information :

Name ....
Address ....
....

Section ....
Callsign ....
Claimed 7 day score ....

Operating dates ....
Highest 48 hour score ....
Operating period ....
I hereby certify that I have operated in accordance with the rules and spirit of the contest ....

Comments ....

12. All times are to be logged in GMT only.
13. Certificates will be awarded to the winners of each section of each call area. Certificates will be awarded to contestants who break any Australian VHF-UHF distance records.

The VK Contestant who returns the highest score in the transmitting section and who is a member of the WIA will have his name inscribed on the trophy which will be held by his Division for the prescribed period.
A certificate will be awarded to the operator with the highest 48 hour score.

RECEIVING SECTION.

1. Short wave listeners only may enter for this section.
2. Contest times and logging of stations will be the same as for the transmitting section except that there will not be a 48 hour Division.
3. Logs must show the callsign of the calling station, the serial number given, and only the call sign of the other station. Scoring will be as for transmitting stations.
4. Any scoring contacts may be logged. There is no limit to the number of times that a station may be logged provided serial numbers are given.
5. The logs for any 7 days (calendar) may be submitted and the winner of the section will be the highest scorer.
6. Certificates will be awarded to the highest scorer in the contest and if sufficient interest is shown, to State winners.
7. A certificate will be awarded to the club station with the highest 7 day score.

General

It is preferable that complete logs be submitted as an aid to checking but contestants must clearly show their best 7 days or 48 hours. Enjoy yourself in another Friendly Contest. Try and exchange names with each contact.

SCORING TABLE

Distance		52 MHz.	144 MHz.	420 MHz.	576 MHz.	Higher
Up to 25	miles	1	1	2	5	10
26 to 50	..	1	1	5	10	25
51 to 100	..	5	5	15	30	50
101 to 200	..	10	10	25	50	100
201 to 300	..	25	15	50	150	250
301 to 500	..	20	25	100	250	300
501 to 1000	..	10	35	200	300	350
1001 to 1500	..	15	100	250	350	400
1501 to 2500	..	25	125	300	450	500
2501 to 3500	..	35	200	400	500	600
3501 to 5000	..	50	300	450	550	650
5001 to over		100	400	500	600	700

(When we change over to metric, these distances will be changed so you won't always be just in or just out of a range.)

EXAMPLE OF VK4 TRANSMITTING LOG

Date/ Time GMT	Band MHz.	Emission	Call Sign	RST Sent	RST Recd.	Dist. Miles	Pts.
Dec. 24							
1402	52	A3(a)	VK7ZAB	56001	57022	1234	15
1424	52	A3(a)	VK4OP	57002	54004	330	20
1534	144	A3	VK5ZDL	58003	56043	980	35
1655	144	A3	VK3ZHD	45004	57089	175	10

EXAMPLE OF VK6 S.W.L. RECEIVING LOG

Date/ Time GMT	Band MHz.	Call Heard	RST Sent	Station Called	Dist. Miles	Pts.
Jan. 2						
1207	52	VK5ZXG	56087	VK8OK	1330	15
1400	52	VK2ZDD	56244	VK6DB	2450	25
1815	432	VK6JX	57061	VK6TG	60	15
2309	144	VK5RF	47004	VK6ZDQ	1330	100

DISTANCE TABLE FOR ROSS HULL MEMORIAL V.H.F. CONTEST

Computer Great Circle distances with first order corrections for non-spherical earth shape. Accuracy ±2 miles.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	0	1172	828	2019	1001	596	1905	1636	1827	394	722	644	408	236	768	1328	1075	720	1198	2003	698
2	1172	0	1235	3141	2133	1760	2939	1756	2817	1486	1665	1642	1515	1286	1940	239	2116	1891	2074	3071	1867
3	828	1235	0	2586	1219	1217	2589	809	2550	1179	1534	1445	1175	1061	1260	1241	1057	1262	888	2647	1264
4	2019	3141	2586	0	1434	1434	472	3207	658	1659	1508	1509	1634	1860	1331	3328	1719	1344	2088	302	1352
5	1001	2133	1219	1434	0	599	1571	1773	1770	901	1126	1032	864	1018	395	2248	313	471	684	1569	508
6	596	1760	1217	1434	599	0	1375	1959	1333	327	535	437	290	496	223	1924	830	150	1122	1447	116
7	1905	2939	2589	472	1571	1375	0	3292	192	1515	1274	1307	1500	1707	1347	3147	1880	1332	2254	190	1326
8	1636	1756	809	3207	1773	1959	3292	0	3280	1973	2332	2239	1965	1866	1946	1654	1506	1968	1168	3321	1981
9	1827	2817	2550	658	1770	1333	192	3280	0	1434	1161	1205	1422	1617	1337	3031	1916	1312	2285	383	1300
10	394	1486	1179	1659	901	327	1515	1973	1434	0	360	266	39	200	549	1669	1085	478	1319	1621	443
11	722	1665	1534	1508	1126	535	1274	2332	1161	360	0	103	374	490	732	1873	1364	656	1639	1409	617
12	644	1642	1445	1509	1032	437	1307	2239	1205	266	103	0	275	418	641	1843	1264	564	1536	1431	526
13	408	1515	1175	1634	864	290	1500	1965	1422	39	374	275	0	229	512	1695	1051	440	1287	1602	405
14	236	1286	1061	1860	1018	496	1707	1868	1617	200	490	418	229	0	707	1469	1156	642	1339	1817	611
15	768	1940	1260	1331	395	223	1347	1946	1337	549	732	641	512	707	0	2090	665	77	996	1506	116
16	1328	239	1241	3328	2248	1924	3147	1654	3031	1669	1873	1843	1695	1469	2090	0	2198	2047	2114	3273	2026
17	1075	2116	1057	1719	313	830	1880	1506	1916	1085	1364	1264	1051	1156	665	2198	0	731	375	1871	765
18	720	1891	1262	1344	471	150	1332	1968	1312	478	656	564	440	642	77	2047	731	0	1052	1385	39
19	1198	2074	886	2088	684	1122	2254	1168	2285	1319	1639	1536	1287	1339	996	2114	375	1052	0	2245	1081
20	2003	3071	2647	302	1569	1447	190	3321	383	1621	1409	1431	1602	1817	1506	3273	1871	1385	2245	0	1385
21	698	1867	1264	1352	508	116	1326	1981	1300	443	617	526	405	611	116	2026	765	39	1081	1385	0

1—Adelaide
2—Albany
3—Alice Springs
4—Auckland
5—Brisbane
6—Canberra
7—Christchurch
8—Darwin
9—Dunedin
10—Geelong
11—Hobart
12—Launceston
13—Melbourne
14—Mt. Gambier
15—Newcastle
16—Perth
17—Rockhampton
18—Sydney
19—Townsville
20—Wellington
21—Wollongong

Awards Column

with BRIAN AUSTIN VK5CA
P.O. Box 7A, Crafers, SA, 5152.

The following Awards are offered by JARL to any HAM or SWL in the world in his-her amateur life. The applicant must submit QSLs fulfilling the conditions of the Award applied for, and a list showing the date and time (GMT) of QSOs, type of emission and frequency used, signal report, and location of the stations contacted.

All claims for these Awards should be made by the submission of the QSLs, together with the list as mentioned above, and ten IRCs for each certificate except HAC which requires five. If the list has been certified by the Awards Manager of an IARU member society, confirmations (QSL cards) are not required to be sent. Address for the application: JARL Awards Manager, P.O. Box 377, Tokyo Central, Japan.

All contacts between HAMs or reported by SWLs must have been made on and after 30th July 1952. Any authorised amateur band and type of emission may be used, but no crossband contacts will be allowed. The applicant must have worked under their local regulations. All contacts must be with "land station". Contacts with ships, anchored or otherwise, and aircraft do not count. All stations must be contacted from the same call area, where such areas exist or from the same country in cases where there are no call areas.

REQUIREMENTS

ALL JAPAN DISTRICTS: QSO with all JA-JH-JR-JE call areas, 1 through 0. SWL-AJD for SWLs.

WORKED ALL JAPAN PREFECTURES: QSO with JA-JH-JR-JE station in All (47) Japanese Prefectures shown in the attached list. HAJA for SWLs.

JAPAN CENTURY CITIES: QSO with over 100 JA-JH-JR-JE stations in different cities in Japan. JCC-200, -300, -400, -500, -600 are also issued as separate Awards. A list of cities is available on your request (3 IRCs needed). SWL-JCC for SWLs.

HEARD ALL CONTINENTS: This Award is issued to any SWL who gets confirmation of amateur stations in six different continents, for his-her reception reports.

ASIAN DX AWARD: This Award has been instituted to encourage co-operation and friendship of radio amateurs between Asia and other continents of the world. The ADXA for confirmed contacts with 30 different Asian countries including JA-JH-JR-JE (except KA) is available to licensed amateurs everywhere in the world. SWL-ADXA for SWLs.

WORKED ALL CITIES AWARD: QSO with JA-JH-JR-JE stations in all Japanese cities. HACA for SWLs. Obsolete cities are not included.

Country list of ADXA.

AC3
AC4
A51 (Bhutan)
AP (East)
AP (West)
BV-C3
BY-C
•C9
•CR8 (Damao, Diu)
CR9
•CR8 (Goa)
EP-EQ
•F18 (French Indo China)
•FN8
HM-HL
HS
HZ-7Z
JA-JH-JR-JE
JD-KG61 (Ogasawara Is.)
JT
JY
•KR6, 8
MP4B
MP4Q
MP4M-VS90
MP4T
OD5
TA
UA9, 0
UD6
UF6-4L7
UG6-4J7
UH8
UI8
UJ8
UL7
UM8
•VS1-9M4-9V1 (Singapore)
VS1-9M2, 4 (West Malaysia)
VS2-9M2 (Malaysia)
VS6
VS9
VS9K
•VS9H
VS9M-8QA
VU
VU (And'n & Nic'r IS)
VU (Laccadive)
XU
XV-3W8
XW8
XZ2
YA
YI
YK
•ZC6-4X1
1S9 (Spratly Is.)
4S7
4W1
4X4-4Z
5B4-ZC4
8Z4
9K2
9K3-8Z5
9N1

• Effective contact only.

List of WAJA-HAJA

Districts	Prefectures
JA1	Tokyo, Kanagawa, Chiba, Saitama, Ibaraki, Tochigi, Gumma, Yamanashi
JA2	Shizuoka, Gifu, Aichi, Mie.
JA3	Kyoto, Shiga, Nara, Osaka, Wakayama, Hyogo.
JA4	Okayama, Shimane, Yamaguchi, Tottori, Hiroshima.
JA5	Kagawa, Tokushima, Ehime, Kochi.
JA6	Fukuoka, Saga, Nagasaki, Kumamoto, Oita, Miyazaki, Kagoshima, Okinawa (JR6).
JA7	Aomori, Iwate, Akita, Yamagata, Miyagi, Fukushima.
JA8	Hokkaido
JA9	Toyama, Fukiao, Ishikawa.
JA9	Niigata, Nagano.

Jamboree on the air

10TH AUSTRALIAN SCOUT JAMBOREE WOODHOUSE, SOUTH AUSTRALIA. 28TH DECEMBER 1973 — 6TH JANUARY, 1974.

Friday, December 28th, 1973, will be a memorable day for South Australia.

On that day, 10,000 Scouts from all States of Australia and a number of overseas countries, will assemble for the start of the 10th Australian Scout Jamboree.

For 10 days, the South Australian Branch Training Centre, at 'Woodhousa', in the Adelaide Hills, will become South Australia's fifth largest 'city'.

During this time, the South Australian Scout Amateur Station "VK5BP" will be operating from the Jamboree site.

The station will commence transmission at 0230 GMT on Sunday, December 30th and will operate 24 hours a day until 1030 GMT on Saturday, 5th January, 1974.

The station will be equipped with three SSB Transmitters covering all bands, two transmitters will be operating simultaneously on separate bands while the third will be in a 'filaments on' condition in case of failure of either of the operating equipments. Each transmitter will operate for 16 hours on air, and 8 hours on standby to give equal usage of all equipment.

The basic operating frequencies will be:-

160 metres	1.819 MHZ
80 metres	3.625 MHZ
40 metres	7.050 MHZ
20 metres	14.190 MHZ
15 metres	21.190 MHZ
10 metres	28.190 MHZ

Dependent on frequency being clear of use.

Propagation Conditions from day to day will determine the two bands in operation.

Three Aerial Systems will be In use:-
1) A Rotatable Quad for 20, 15, 10 metres.
2) Dipoles at 90 degrees for 80, 40, 20 metres.
3) Long wire for 160 through 10 metres.

It is hoped that many stations around the world will take part, thus ensuring that the operation of the JAMBOREE Station will be a success.

STOP PRESS

Les Marmo, Victorian Branch Organiser of JOTA passed along an interesting letter by Alan Reid, VK3AHR which was unfortunately received too late for inclusion in this issue. Alan recommends quick short overs, SSB style, with pre-arranged skeds and only 'loud and clear' copy—no technical jargon.

CLUB/ZONE/DIVISION NEWS

● The Publications Committee wishes to advise that the call on AR for space to print material is so great it is not possible to include a section devoted to Divisional, Zona or Club news.

● Arrangements were made with all Divisions that such news would appear in Divisional Bulletins if so required, and accepted by Divisional Bulletin Editors. Bulletins, when submitted, are carried as inserts in AR mailed to members of the Division concerned.

● It has been agreed however that AR should include an Events Diary to contain **very brief details** of forthcoming events. Items for this Diary **MUST** reach the Editor not later than the 1st of the month prior to publication.

VHF UHF
an expanding world
with Eric Jamieson VK5LP

Forreston, S.A., 5233
Times: GMT

AMATEUR BAND BEACONS

VKO	52.160	VKOWI Macquarie Island
VKO	53.100	VKOMA Mawson
VKO	53.200	VKOGR Casey.
VK2	52.450	VK2WI Dural.
VK3	144.700	VK3RTG Vermont.
VK4	52.600	VK4WI-2 Townsville
VK4	144.400	VK4WI-1 Mt. Mowbullan.
VK5	53.000	VK5VF Mt. Lofty.
VK5	144.800	VK5VF Mt. Lofty.
VK6	52.006	VK6VF (VK6RTV) Bickley.
VK6	52.900	VK6RTT Carnarvon.
VK6	144.50	VK6RTW Albany.
VK6	145.000	VK6VF (VK6RTV) Bicklay.
VK7	144.900	VK7RTX Devonport.
VK8	52.200	VK8VF Darwin.
ZL1	145.100	ZL1VHF Auckland.
ZL2	145.200	ZL2VHF Wellington.
ZL2	145.250	ZL2VHP Palmerston North.
ZL3	145.300	ZL3VHF Christchurch.
ZL4	145.400	ZL4VHF Dunedin.
JA	52.500	JA1IGY Japan.
HL	50.100	HL9WI South Korea.
HL	52.010	HL9WI South Korea.
KX6	50.110	KX6HK Marshall Islands.

The VK6 VHF Group News Bulletin refers briefly to the new solid state beacon VK6RTV to take the place of VK6VF, it has been on test at VK6PD running 8 watts to a ground plane. FSK has been used to minimise keying problems so that a simplified power supply could be used. So far the safety devices have not been completed, but work is in progress on these and the 2 metre unit.

George VK3ASV writes that the Eastern Zone beacon being constructed by Norm VK3ZQC has now been completed and tested on dummy load, and the new keyer and command receiver are being constructed. The beacon will not be installed until the licence is received and the equipment installed at the QTH of Graham VK3QZ at Traralgon which is 100 miles (160 Km) from Melbourne. Thanks for the advice George.

SIX METRES.

Ron, VK4ZLC of Townsville writes with information of doings in the North Queensland area. He reports a very successful Convention during July, and mentions much discussion between the Mackay and Townsville boys regarding the possibility of a repeater to cover between the two areas, about 260 miles.

Ross VK4RO at Ayr will be ready for the next DX season, having assembled his Heathkit panoramic adaptor and attaching same to his 6 metre receiver. This will allow Ross to work anyone who pops up on the first 500 kHz of the band, and will be able to radiate both SSB and FM.

Ron also mentions there is quite a lot of interest in forming a VHF Club in Townsville, and preliminary discussions will be held soon. This may well increase VHF activity in the area so hope the Club does eventuate. Would like to see some good transmitters in that area capable of operating on 2 metres tuneable, some contacts with southern stations might result during the summer period of the next year or two. Thank you Ron for your letter.

While still on 6 metres I was pleased to receive a letter from Bill VK2HZ of Springwood with some notes on winter 52 MHz Es. Bill is 50 miles west of Sydney in the Blue Mountains in a fair VHF location, and runs 200 watts PEP to a pair of 6146B's on SSB, with a Heathkit SB300 receiver and SB400 transmitter providing the main essentials.

The week July 8 to 14 provided one of the best periods of Es propogation experienced by Bill. It compared favourably with any normal summer season DX period other than there being few stations active. I quote: "A letter from Max ZL3ANN confirmed the number of times VK TV was audible in Ashburton, N.Z., as was ZL TV here in Springwood, often up to periods of 4 hours. July 10 was the day that saw the best viewing both ways across the Tasman. At 1800 Sydney TV was 40dB over S9 and the VK2WI beacon S7, the loudest ever recorded by ZL3ANN. Max wrote that Sydney and Melbourne TV was peaking at 1800 from Monday to Thursday, and Brisbane TV on Friday and Saturday.

"The band opened from VK2 to VK7 from 1730 to 1845 on July 7 and again on 12th from 1050 to 1600. On the same day VKOWI from Macquarie Island appeared at 1715 peeked to S7 and faded out at 1810. On 13th the VK7's were again contacted between 1330 and 1540. Ian VK7ZIF was also working into other States during the week. Main activity was on 52.525 FM and plenty of VK7 and VK2 mobiles on their way home from work made good contacts."

Max provides the following offset frequencies for New Zealand Channel 1 TV stations: "Hedgehope near Dunedin 50.750 MHz, Horizontal; Kaukau near Wellington 50.750 MHz, Horizontal; Te Aroha near Auckland 50.740 MHz, Vertical; and Whakapurake near Gisborne, 50.760 MHz, Horizontal. All stations run 100 Kw. ERP."

Many thanks Bill for going to the trouble of writing. News like that is what is needed, it makes good reading even when it is somewhat dated by the time it is eventually published, would like to hear from you again some time.

Whilst still on 6 metres, August "6 UP" has a paragraph of interest regarding Ionospheric-meteor scatter operation during the latter part of July.

In VK2 alone, VK2s ZQJ, AM, AOG (ex-ZQG), ZVD, ZXL, ZYP, ZAY, BHO and ZTB have worked one or more interstate stations via m.s. in the past few weeks. All stations use SSB, except of course the editor of 6 UP who takes pride in running (almost) the only AM station left in Sydney . . . The predicted enhanced meteor activity peaked around July 29 to August 1 when signals were virtually ever-present with long S9 bursts being very frequent. On July 30, VK3AMK and VK3ANP heard good backscatter returns from VK2AQG, which demonstrates the possibility of working stations inside the forward scatter minimum range via the meteor route. The writer has often heard VK2ZAY and VK2BHO on meteor backscatter.

MOONBOUNCE

The Illawarra Branch of the WIA on the South Coast of N.S.W. sent along their Newsletter which gives some information on their recent moonbounce activities. It was reported that the usual monthly test with W6FZJ was not as successful as previously, but signals were heard for about 2 minutes. Not helping is a problem which has developed in the receiving system which results in excessive noise output immediately after switchover to receive, requiring about one minute to return to normal. Much time has been spent in trying to rectify the trouble without result so far.

A check was also made of the circularity of polarisation of the radiated signal following comments from W6FZJ and a previous check at Dapto which indicated that it may be excessively eliptical rather than circular. It was found however, that the maximum variation was 1.2 dB in the field pattern over 360 degrees of rotation, which was considered satisfactory.

Preparations for the use of RTTY are continuing. K2UYH reports that his 28 foot dish is now up and he hopes to have it operational shortly; he is interested in trying RTTY as well . . . Thanks Lyle VK2ALU.

News ends abruptly at this point. Concluding with the thought for the month: "The trouble with an income-tax reduction is that is stimulates business just enough to put everybody in a higher tax bracket." 73.

The Voice in the Hills.

Magazine Index
With Syd Clark, VK3ASC

BREAK-IN June 1973.

Single Sideband Ratings: 33 Mile 3 Centimetre Contact, 1972; Those Crystal Calibrators Again; Solid State SSB Transceiver; Wire Antennas.

BREAK-IN July 1973.

A Broadband 80 Metre Antenna; Construction of Enclosed Racks for Amateur Use; A Peep inside Box 88 Moscow; Sniffer of the Month; The "NZART".

RADIO COMMUNICATION July 1972.

Quartz Crystal Oscillator Circuits; The Zygi Beam Aerial for 20M; Reception of GB3SX (28MHz) in Malawi; Plus usual features.

RADIO ZS May 1973.

Project Netset; Damping Meter Movement; The End Fed Long Wire; 70 CM Mosfet Converter; Hamnet; Use of Radio Amateurs in Times of Emergency; Aligning Tucker Tin Mk2.

RADIO ZS August 1972.

Guglielmo Marconi and the Sixtieth Anniversary of Trans-Atlantic Wireless Communication; Power In AC Circuits; A VTO for 80 Through 10 Metres; Don Murceen, VS6AM, gets inside the "FT-200"; Design of Pi-Tank Circuits.

CQ MAGAZINE May 1973.

The SS Mark 4; 1973 Armed Forces Day Communication Tests; Oscar 6 News and Orbital Predictions; Converting the Western Union Telefax Machine for use in the Amateur Service; A Kilowatt Plate Transformer for $25; Tuning in on Touch Tone Pads; A Tilt-Over Tower for $50; CQ Reviews: the Hallicrafters FPM-300 "Safari" SSB Transceiver.

CQ MAGAZINE July 1973.

SSTV: Toy or Tool?; The National FB7 Single Signal Superheterodyne; Improved C.W. Break-In with The Heath SB-Series Equipment; Converting the WU Telefax Machine (2); A TTL-DTL Test Probe for $2.00; Improved AGC for the Allied Radio Shack 190 Receivers; Some Ideas for Monitoring A.C. Power Lines.

Ham Radio May 1973.

Low Cost RX Impedance Bridge; 40 Metre Log-Periodic Antennas (Also 40,20, 15M.); Quad-Yagi Arrays for 432 and 1296 MHz; Antenna and Feedline Facts and Fallacies; 80-Metre Antenna for a small lot; Simple Antennas for Two-Metre FM; How to Tailor Your Antenna for Optimum Performance; Four-Element Collinear Antenna for 440 MHz; How to Design Gamma-Matching Networks; Grounded Vertical-Tower Antenna System; Suitcase Antenna; Plus usual features.

QST June 1973.

A Simple Az-El Antenna System for Oscar; A QRP Man's RF Power Meter; A Kilowatt Amplifier for 6 and 2 metres. Another Look at Reflections; A Modified 20-Metre Delta-Loop Beam; Automating the TR-44 Antenna Rotator; A Practical Approach to Two-Metre Frequency Synthesis; A Medium Power HF SSB-CW Transmitter, Pt.2; Putting up Wire Antennas the Easy Way.

QST July 1973.

An FM Adapter for 2-Metre AM Transmitters; Where Can I Buy the Parts; An 80-metre Pebble Pulverizer; A Simple Computing SWR Meter; A Practical approach to Two-Metre Frequency Synthesis, Pt. 2; 1296 Revisited; Additional Notes on the Amateur Station Counter; Mini-Powerhouse on Wheels; Review: Henry (Trio) TS-900; The QRP Challenge Barbados Style; The Sixth Amateur Satellite — A Technical Report; Is Prose Listening?; The Origin of Amateur Radio.

VHF COMMUNICATIONS. Published Quarterly and available from Mag Pubs. Feb. 73.

A Modular ATV Transmitter; Recommended Modifications to the Calibration Spectrum Generator; VHF Transequatorial Propagation; A Shortwave Receiver Module for use with VHF Converters or for Direct Reception; A Modular Six-Channel FM Receiver; Automatic 10-Channel Scanner for FM Stations; An Integrated Receiver System for AM, FM, SSB and CW, Part II; The SSB IF-Portion; An ATV Pulse Centre.

May 1973.

A Modular ATV Transmitter, Pt. II; A 144 MHz Linear Amplifier with 25 Watt Output at 12 to 14 V; A Dual-Input Pre-amplifier with 2:1 pre-scaler for Frequency Counters from 1Hz to Minimum 100 MHz; A Six Digit Frequency Counter for Frequencies between 1Hz and 100 MHz; Circular Polarization on 2 Metres; Theory, Advantages and Types of Antennas for Circular Polarization at UHF; Temperature Compensated Oscillator with Varactor Tuning; A Miniature AM-CW-FM Transmitter for 144 MHz.

73 MAGAZINE May 1973.

Mobile Burglar Alarm System; The Burst Box; Power Inverter w-Sine Wave Output; 450 MHz Preamp; Roof Mounted VHF Whips; LED Readout Crystal Switch; Voltage Limit Sensor; Build A Digital Clock with 19 inexpensive IC's; Portable Use for the HR-2A; Fixed and Mobile 2m Antennas; Two Metre FM Transmitter; Mini-Repeater Control System Pt. 2; Audio Boost for Mobile Transceivers; 6m 5W Amplifier; Hand Transceiver Madness; QRP on 180 kHz; Solid State Automobile Burglar Alarm.

Letters to the Editor

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

Dear Sir,

Re "JOTA 16"

I have a suggestion concerning Scouter participation in "JOTA", and would appreciate any publicity you may care to arrange.

I have the approval of our Branch Organiser, Mr Ray Lawrence, and am writing you on his authority.

The idea is to have three, one hour segments, on each of the three nights, Friday 19th, Saturday 20th and Sunday 21st October, 73, from 0900 hrs to 1000 hrs G.M.T.

During these segments, the Adult Leaders — 'Scouters" — could feel free to talk to other Scouters, swapping ideas, comparing campsites etc., and at the same time gaining valuable experience — which should have immediate value to the "Boys" . . .

Another point is that I feel there may be some Radio Amateurs who, for one reason or another, have not had, or, cannot have a number of Boys, in their "shack" — but who may be delighted to take some part in JOTA. At least, say, a couple of Scouters for one hour?

The Scout Association certainly appreciates the Services provided by Radio Amateurs, and I hope my suggestion will be accepted in the spirit that it was made, to the benefit of all concerned.

We will have Scouters available here at the suggested times, seeking other Scouter contacts, and already have an 80 metre sked with a blind operator near Sydney.

Need I mention that Wauchope Scouts will be on the air throughout the JOTA weekend, and some of our QSO's could again be while mobile.

Yours faithfully,
Jim Griffiths VK2BGG.
Group Leader —
2nd Wauchope Group.

The Editor.
Dear Sir,

Concerning an item entitled "Unusual Problems" in QSP Page 9 of July 1973, I can help you with an explanation of the construction methods used on the Bellenden Ker T.V. Transmitter project as I was employed as a foreman with the contractors.

The answer to your query is that it was primarily a helicopter-engineering construction project; in other words, helicopters were used as flying cranes and trucks.

All materials for the ropeway towers and the transmitter building were flown to altitudes of 5000 feet up the mountain side, the steel towers were rigged by helicopter and a lot of the concrete for foundations was premixed at base camp and poured by helicopters hovering over the formwork.

The power line towers were fabricated in three sections, flown in and rigged by air. Aerials for the power line and light haul ropes of nylon for the heavier track and haul cables of the ropeway were strung by helicopter.

Operational control of ground and flying operations was by HF & VHF radio telephone and army telephones.

A very interesting colour film by the Commonwealth Works Department is available for conventions and was shown at the recent North Queensland Convention at Townsville.

73
Ted Gabriel
VK4YG.

Dear Sir,
Ref. Mobile Whips AR March 1973

Due to the volume of mail regarding the above.

1. **Errata Tabulation 1.** Could you repeat the tabulation correctly as the feedback has not been noticed; **Giving Col. 3 the heading — Diameter Mils Instead of Radius.**
2. The foregoing dimensions are artist readings from micrometer and rule.
3. The wire sizes are overall sizes including insulation thickness so check the wire overall when looking for a suitable gauge; there possibly will be 2 to 8 mils variation in the "standard" gauges available.
4. The criteria as always is wire length so measure off the necessary amount plus and wind that on.
5. Have heard that Estapol may be a good clean dielectric to use for the coating of whips if you do not wish to shrink sleeve it.

73,
Doug Pannell, VK6EP-VK6SP

Editor.
Dear Sir,

On reading Max Hull's history in a recent "AR" I am reminded of a piece of radio history that is probably only known to a few Members.

In 1927 there was a break-away group of Amateurs from the WIA led by Queensland's Leo Feenaughty. I don't remember his call sign, but he called the break-away "The Australian Radio Transmitters League" (ARTL). In Victoria the VRTL was formed as a branch under the leadership of the late Jack Kling VK3AJQ (then OA3JQ). I was Communications Manager, and under the call sign OA3WH I won an 80 metre communications contest inaugurated by the ARTL in 1928 It was a great occasion when as a lad of 22 I was presented with a pennant commemorating the occasion by Leo at the QTH of the then WIA Secretary, Bruce Hardie. It was here that Bruce persuaded Leo to amalgamate with the WIA, and this was done in 1929. Regrettably this pennant along with my other radio equipment was destroyed at Beaumaris in the bushfires of 1944.

Hoping that this is of some interest,
Yours Fraternally,
Alf Chandler, VK3LC.

The Editor,
Dear Sir,

Reference your mention of the availability of slow morse tapes on page 4 of the August issue of Amateur Radio. The following information may be of interest. Source of **Information:** — Page 24 of the March 1973 issue of the N.Z.A.R.T. publication "Break-in"

Details: Morse Course — ZL1HV, 1970. In two sections. — (1) eight ¼ hour lessons for teaching morse code. (2) 1½ hours of practice morse from 6 w.p.m. up to 16 w.p.m., plus some off-air morse at high speed. The courses are accompanied with a written decode. There will be more information next month. The lecture service is available to branches of N.Z.A.R.T., Radio Clubs and to Individuals where special circumstances apply. The normal time is one month except for section 1 of the morse course which is available for 4 months. No charge is made for the service, except the return postage. When ordering, please include the following information — Name of Branch, Address, Name of responsible person. (This person is charged with returning the tape by the due date), Tape lectures required, Recording required (i.e. tape or cassette). One week should be allowed for processing.

Source of Information — Page 67 of April 1973 "Break-in"

Details: Morse Code — As mentioned at conference in 1972, this scheme has obtained tapes for teaching morse code. The course produced by Arthur Godfrey ZL1HV, is grouped into lessons of about 15 minutes, each lesson dealing with a certain group of letters. The whole course is very similar to that presented by Dr A. W. Lewis, ZL3RT in April 1972, Breakin and differing only in the grouping of some letters. The course is designed to teach morse code, and only a knowledge of basic morse code characters is required.

Each lesson consists of the characters under study being sent, followed by groups of letters. As each lesson progresses, the letters from the previous page are included in the groups so that knowledge proficiency is built up as each lesson progresses. to aid recognition of characters at speed, the tapes are made by recording the morse characters at a speed of 15 w.p.m. but the spacing is twice normal, thus giving the effect of fast characters but with "thinking" time in between.

The morse course is divided into two parts for convenience. Part 1. Basic morse course of 8, 15 minute lessons for teaching morse code. Part 2. Practice exercises, from 6 w.p.m. up to 16 w.p.m. plus some high speed off-air morse.

Each part has an accompanying written decode (except for high speed off-air morse) for checking and correcting copy.

The morse course is available through the Tape Lecture Service. Note that to keep costs down only one copy of the decode is available with each tape, all extra copies are 25 cents each. Copies of the morse course are available to any interested person at the following prices. Part 1. 2 hour cassette or 7" tape $6.00. Part 2. 1½ hours cassette or 5" tape, $4.00.

The information was extracted from The Novice Radio Training Scheme Column compiled by H. Wiggins ZL2BFR, P.O. Box 1718, Palmerston North, New Zealand.

73,

Lionel L. Sharps, VK4NS.

intruder watch

With Alf Chandler VK3LC

WIRELESS INSTITUTE OF AUSTRALIA

Intruder Watch Summary for six months—January to June 1973

Frequency kHz	Mode	Average Time GMT	Ident.	Traffic & Remarks.	Reported by
28080	F1	0830	AXD	Teletype read-out	ZL1BAD
21022	A1	0630	4CWA	8IYJ de 4CWA QSV K.	VK4KX
21022	A1	0700	8IYJ	.. de 8IYJ QSA nil.	4KX
21033	A1	0300	—	vvv code groups.	4PB
21053	F1	1000	CUA49	vvv CUA49	4KX
21110	A1	0800	XSO	vvv de XSO QSV.	4KX
14000	A2	2030	Jammer		4KX
14003	A1	2130	DKI	vvv DKI.	4KX
14006	F1	0100	—	Teletype.	2ZO
14008	A1	0115	05BM	LX4J de 05BM QRK?.	2ZO
14010	F1	0800	—	Teletype.	4BO
14008-15	A1	0630	3DN	Weather reports.	(2ZO 4PB
				Spurious from 13095.	(2QL 4KX
14018	A1	1200	4CIJ	YJFX de 4CIJ.	4KX
14022-26	A1	0930	NAP	vvv NAP	(4BG 4KX
14024-31	A2	1200	Jammer.	Musical note.	4KX (4PV
14030	A1	0530	MIL	vv MIL.	4GQ
14036-40	A1	1200	PBJ	vvv PBJ.	4BG 4KX 8HA
14037	A1	0730	UKCH	UTO CAW UKO SEA	
				OOE de URCH QTH Komsomol	4PB
14039	A1	0015	JANB	GBV de JANB.	2ZO
14040	A1	0800	YVK	.. YVK QSY 195000 OSV.	4KX
14041	F1	1000	87Q6	BZ12 de 87Q6.	8HA
14046-59	A1	0700 1200	7BD2	7AJ de 7BD2.	4BG 4KK
14057	A1	0800	AOXE	8FZ6 de AOXE.	8HA
14061	A1	2030	CLA30	4CIJ de CLA30 14064 QSV	4KX
14060	F1	1900	—	Teletype.	4BG
14062	A1	0030	KVOL	UHGF de KVQL hj.	4KX
14064-68	A1	0900	7BD4	7WR we 7BD4.	3LC 4KX 8HA
14066	A1	1030	RJF	ULY4 de RJF.	4PB
14066	A1	1040	ULY4	RJF de ULY4.	4PB
14070	A1	1130	BW2J	SWR de BW2J.	6ZZ
14071	F1	0700	UMG72	ULM84 de UMG72 QSV	4KX
14081	A1	0900	OUW	.. de OUW figure gps.	8HA
14082	A1	1300	7A1	7BC de 7A1.	8HA
14085	A1	1100	JKEL	vvv JKEL K.	4KX
14086	F1	1000	K9KK	4TLZ de K9KK	4KX
14092	A1	2030	DAN	CQ de DAN.	4BG
14098	F1	0730	FHU	SSTF c FHU.	4PB
14125	F1	2100	—	Teletype.	4BG
14100	F1	0630 1200	TCX	Teletype read-outs.	4VU
14110	A1	0630	NJL8	4 letter code.	4BG
14111	A	0700	5UO3	.. 5UO3.	4BG
14112	F	2200	OMSEN	vvv OMSEN.	4BG
14129	A1	2200	JJQW	—	4BG
14130	F1	1000	—	Teletype	2ZO
14136	F4	0600 0700	—	Facsimile.	4BG
14138	F4	0800	—	"	4BG 4KX
14142-6	A1	0930	V3AU	V3FT de V3AU.	4LZ
14144	A1	0830	BCX24	CQ de BCX24 Taipei.	4BG 4KX
14147	A1	2300	RMS4	TBO de RMS4 db, coded traffic.	4KX
14148-9	F1	0630	—	Teletype.	4BG
14150	A1	1030	—	4 letter code.	6ZZ
14151-4	A1	0800	YFY6	UK4R do WFW6.	(5LG
14152	A1	2000		4 letter code.	(4KZ 4LZ
14152	A1	0630	ULY4	vvv ULY4.	4BG
14153	A1	0830	RJP	vvv RJP.	4BG
14160	A1	0030	BCX24	vvv BCX24 Taipei.	4BG
14162	A1	0900	8AP	vvv de 8AP.	3LC
14098	F1	0100	55AH	17BR de 55AH.	4BG
52001	F3	0600	AXM32	Teletype read-out.	4VU
14162	A1	1100	D31	Ref. road blocks & accidents	5LG
14165	A1	0700	KYB2	RMS4 de KTD2.	8HA
14165	A1	2200	UOT40	Q signals.	4BG
14166	A1	2200	UR83	4 letter code.	4BG
14183	A1	0800	OLW	P/P other stn audible.	4BG
14200	F1	1130	8FZ6	QLP2 de 8FZ8.	8HA
14205	F1	1000	—	Teletype.	8HA
14206	A1	0700	—	Teletype.	4BG
14208	A1	0100	SCH	UNA de SCH.	4BG
14216	A1	1130	5DX	8TB de 5DX k.	4KX
14217	A1	1030	HDX	chirpy note.	8HA
14220	A1	1100	OQ7	VW5 de AQ7.	3LC
14221	A1	1130	7GV	—	6ZZ
14222	A1	130	CST	..CST.	4BG
14223	A1	1130	UGF	.. de UGF.	4BG
14239	A1	0900	SZDH	GYY1 da SZGH.	8HA
14250	F1	-	KBOO	vvv KBOO.	4BG
14258	A1	1630	—	Teletype.	Cash
14270	A1	1200	KDN	.. KDN QSY 10070.	4KX
14275	A1	1200	NPN	vvv de NPN gm.	4LZ
14291	A1	1100	CXT	.. CXT QRY1 14660.	4BG
14306	F1	0700	KTNK	GHGI de KHNK.	4BG
14310	F1	1130	—	Teletype.	4BG
14336	F1	0800	—	Teletype.	4BG
14345	A1	1100	—	Teletype.	4BG
7000-40	A2	2000	FAL	vvv FAL.	4BG
7003	A1	1130	Jammer	Jamming B/casts.	4KX
7004-6	A1	1100 2300	U8ZV	vvv de U8ZV.	4KX
7005	F1	2300	OFZ3	MN17 de OFZ3.	4PB 8HA
7006	F1	2330	—	Teletype.	4KX
7010	A3	2000	—	Teletype.	4KX
7001	A1	2100	Radio Peking	B/C Chinese.	2ZO 8HA
7019	A1	1030	XSMV	4MZC de XSMV QSV.	4KX
7020-30	A1	1400	OFZ3	MN17 de OFZ3.	4KX
7025	A3	1200 2330	TXBX	VZ5DZ de TXBX.	3AED 8HA 4KX
7035	A3	2100	R Peking	Chinese B/C.	2XO 8HA
7037	A1	1200	Voice of Vietnam.	B/C.	2ZO 8HA
7039-40	A3	1000	MRL	ALO de MRL.	8HA
7040-42	A1	1100 1200	Voice of Vietnam.	B/C.	4KX 8HA
			TXBX	05DZ de TXBX.	(2QL
				4 letter code.	(3AED
7042	A1	2330	9RDH	.. 9RDH	8HA
7046	A1	1200	YG4R	TE9N de YG4R.	4KX
7050	A3	2100	Radio Cairo	B/C In Arabic.	2ZO 8HA
7056	A3	2100	—	Foreign B/C.	2ZO 8HA
7060	A3	1200 2330	R Peking	Chinese B/C.	8HA
7064	A3	0830	Radio Tirana	Albanian B/C.	3LC 8HA
7065	A3	2100	—	Foreign B/C.	2ZO 8HA
7072	A1	1100	DMAY	LAT6 de DMAY.	6ZZ
7072	A1	1600	WW5T	ZHGU de WW5T QSV.	4KX
7075	A3	2100	—	Foreign B/C.	2ZO 8HA
7080	A1	2000	QTEJ	TBO de QTEJ hj.	4KX
7081	A1	2000	JXZ4	UUCD de JXZ4.	4KX
7085	A3	2100	Radio Peking	B/C in poor Italian	2ZO
7090	A3	2000	—	Chinese B/C.	3ASV
7091	A1	2000	FDGM	1BXT de FDGM.	2AAB
7094	A3	1200 2330	R Pakistan	B/C.	8HA
7095	A3	2100	Radio Peking	B/C.	2ZO 8HA
7095	A3	1000	Radio Saigon	B/C.	3ASV 3ZUN
7096	A3	2100	—	B/C in Spanish.	2ZO
7020	A1	2300	1RHX	2NLW de 1HHX.	8HA
3506-8	A1	1300	3MA22	CAP de 3MA22 Taipei.	4CA 4KX 4VO
3510	A1	1830	J3Y9	XZ2B de J3Y9.	4KX
3537	A3	1200	—	Foreign B/C.	4PV
3541	A1	1900	URD	CQ de URD QSX 4180	4KX
3665	A3	0930	—	B/C from Dilli Timor.	Cash
3667	A3	0930	—	Foreign B/C.	4PV
3669	A3	1100	—	Foreign B/C.	4PV

Firstly, I would like to correct an anomaly with the VK4 monthly net as revealed to me here. It seems to be understood that the time is 8 p.m. whereas it is 7.30 p.m. on the first Monday of each month on 3580kHz.

I have been to the North Eastern Convention at Townsville inaugurated by the Townsville Amateur Radio Club, report of which was included in September issue of "AR". As reported it was a huge success. My identification tape was played to an eager audience as well as a short talk, and I am sure that I have enlisted some new observers from VK4. I have submitted for publication in this issue a summary of recurring Intruders as extracted from my various summaries, and they are as hereunder; also an explanation of some of the positive identifications known to me.

Remarks concerning Summary

3DN is a Fijion station located at Nadi airport emitting a spurious from 13095 kHz. Traffic varies, but mostly weather reports for Tonga, New Hebrides, Niue, Western Samoa, Gilbert & Ocean Islands. Calls 5WB who cannot be heard on the frequency.

7BD2; 7BD4; 7BQ2 are Indonesian stations (Military) working point to point with 7AJ and 7WR who are not heard no the band. Send mostly plain language messages in the Indonesian languuage.

TCX is a Diplomatic station located in Ankara, Turkey working with Tehran, Cyprus and other countries in Asia.

Recurring Intruders reported before are:—

14008-15	3DN Fiji.
14021	NAP.
14036-39	PBJ.
14046-68	7BD2; 7BD4; 7BQ2 Indonesian.
14092	DAN.
14100	TCX Turkey.
14157	WFW6.
14152	ULY4.

7010 7025 7035 7050 7065 7075 7095 Radio Peking

Address by Mr Myles F.E. Wright, Chairman, Australian Broadcasting Control Board, to open the 26th Remembrance Day Contest, August, 1973.

I am very pleased to have been invited to open the 26th Remembrance Day Contest of the Wireless Institute — not least because I notice that it involves amateur operators in Australia and New Zealand. As a New Zealander by birth I am pleased to make a special reference to the operators from Maori land and particularly to any listening in my own home town of Wellington.

Having been involved for about half of my working life in the "professional" side of radio — in front of the microphone as well as behind a desk — I can understand the attraction which radio holds for "amateur" operators. I have heard it said that radio hams could more conveniently (and frequently less expensively) conduct their "natter sessions" using the modern telephone system. I can fully understand their retort that it is not the same thing to talk over the telephone to a single captive listener. The thrill of broadcasting a message to an unseen and unknown audience far transcends the mere telephone call. And — in addition — with the true radio "ham" — there is the technical challenge.

I trust that this challenge to investigate and invent new techniques is not completely lost now that such elaborate professional amateur radio stations (if you will excuse the paradox) can be purchased off the shelf as it were. I do sincerely hope that there are still amateurs who are not only building their own equipment but building it in new ways to operate on the newer wave bands.

It was this technical inventiveness and the thorough technical knowledge which it developed that fitted "hams" so well for the duty so many undertook during War years — too many of them now names on the Remembrance Day trophy.

In my present position as Chairman of the Australian Broadcasting Control Board it would be remiss of me if I failed to use this opportunity to say a few words on the interaction between amateur radio operations and the broadcasting services of Australia and New Zealand.

You are all aware of the dreaded initials "T.V.I."!

With colour television services beginning in New Zealand in only a few weeks and in Australia in about eighteen months, interference from amateur transmissions to television programmes is under careful scrutiny.

The Board's engineers tell me that there is very ready co-operation from "hams" in minimizing interference to television. However, viewers will be investing large sums in their new colour television sets, so we can expect an increase in their reaction to any marring of quality in their reception.

(Continued next page)

Ionospheric Predictions

with Bruce Bathols, VK3ASE October 73

This month's predictions from information supplied by the Ionospheric Prediction Service Division indicate point to point band openings for at least 50% of the month.
Times are G.M.T.

28 MHZ

VK3	to	G	S.P.	0800 - 0900	(possible 40%)
"	"	VE3		2000 - 2300	(possible 40%)
"	"	UA		0400 - 0900	(possible 40%)
"	"	VK9		2400 - 0400	
"	"	W6		2000 - 0300	(possible 40%)
"	"	JA		0100 - 0500	
VK4	"	SU		0400	
"	"	KH6		2000 - 0800	
"	"	VE3	S.P.	1900 - 2300	(possible 40%)
"	"	UA		0500 - 0800	(possible 40%)
"	"	W6		2100 - 0200	
"	"	JA		2200 - 0800	
VK6	"	SU		0600	
"	"	KH6		2200 - 0600	(possible 40%)
"	"	ZS		0600 - 0700	(possible 40%)
"	"	G	S.P.	0700 - 1200	(possible 40%)

21 MHZ

VK3	"	SU		0400 - 1000
"	"	ZS		0400 - 0900
"	"	G	S.P.	0700 - 1000
"	"	UA		0400 - 1000
"	"	W6		2000 - 0300
VK4	"	SU		0400 - 1000
"	"	ZS		0400 - 0900
"	"	G	S.P.	0800 - 1400
"	"	"	L.P.	0800 - 0900
"	"	UA		0400 - 1300
"	"	W6		1900 - 0300
VK6	"	SU		0400 - 1200
"	"	ZS		0400 - 1200
"	"	G	S.P.	0600 - 1200
"	"	"	L.P.	1000
"	"	UA		0400 - 1200
"	"	W6		2200 - 0300

14 MHZ

* VK2, 3, 4, 7, to:

		ZL		1900 - 1300
"	"	SU		1100 - 0100
"	"	KH6		0400 - 2100
"	"	ZS		0400 - 0700, 1100 - 1300
"	"	G	S.P.	0700 - 1900
"	"	G	L.P.	0800 - 1200, 2000 - 2400
"	"	VKO		2000 - 1200
"	"	VE3	S.P.	1300 - 2000
"	"	VE3	L.P.	2000 - 0100
"	"	UA		0700 - 1800
"	"	W1		0700, 1300 - 1900
"	"	VK9		2400 - 2400
"	"	PY		2000 - 1200
"	"	W6		0400 - 0800, 1400 - 2000
"	"	JA		0500 - 1700, 2100 - 2400
"	"	9G1	S.P.	1500 - 1700, 2000 - 0200
"	"	"	L.P.	0400 - 1100, 1500 - 2000

* Average over whole of east coast.
Times are approximate only.

VK5	to	SU		1100 - 1800, 2100 - 0100
"	"	ZS		0300, 0600, 1100 - 1300
"	"	G	S.P.	0700 - 1800
"	"	"	L.P.	0800 - 1300, 2100 - 2200
"	"	UA		0800 - 1700
"	"	W6		0400 - 0500, 1500 - 2000
VK6	"	SU		1100 - 1900, 2100 - 0100
"	"	ZS		0300, 1100 - 1500
"	"	G	S.P.	0900 - 1900
"	"	"	L.P.	0800 - 1300
"	"	UA		0200, 0900 - 1900
"	"	W6		1600 - 1800, 2100

7 MHZ

VK2	"	SU		1500 - 2100
"	"	ZS		1600 - 2000
"	"	G	S.P.	1500 - 2000
"	"	"	L.P.	0800
"	"	UA		1300 - 2000
"	"	W6		0700 - 1500
"	"	PY		0800 - 0900
VK6	"	SU		1500 - 2300
"	"	ZS		1500 - 2300
"	"	G	S.P.	1600 - 2300
"	"	UA		1400 - 2300
"	"	W6		1000 - 1600
"	"	PY		2100 - 2200

Sunspot Numbers Predictions: — September 30, October 28, November 26, December 24, January 22.
— mean for July, 1973 — 20.4.

Hamads

* Eight lines free to all W.I.A. members.
  $6 per 3 cms. for other amateurs and S.W.L's.
* Copy should be in block letters or typescript, signed and forwarded to The Editor, P.O. Box 150, Toorak, Vic., 3142.
* Excludes commercial advertising.
* Closing date for Hamads is the 3rd day of the month preceding publication.
* QTHR means the advertiser's name and address are correct in the current Australian Callbook.

WANTED TO SELL

Eddystone 750 with "S" meter and speaker $110. G Stern, 96 Stuart Street, Blakehurst, 2221. Ph.: (02) 546 4114 (after 4 p.m. Mon.-Fri.).

Geloso G4/225, 200W SSB Tx brand new in original carton, $300. O.N.O. VK3AXK. Ph.: 233 1261 after 6 p.m.

Drake 2B Receiver, Matching Qxer SPKR Unit, 160-10 metres, perfect condition, $200. VK3ARZ. QTHR. (03) 232-9492.

SSB Transceiver Yaesu FTDX400, including manual and accessories. $395. Excellent condition. VK2BMM. QTHR.

Oscilliscope, 3 inch Astor 1, with probes. Good condition. $35. Ph. (03) 85-4952. VK3BFW. QTHR.

Hewlett Packard Variable Attenuator Model 894A 1000 to 200MHz, 6 to 120 DB $30.00, also Eig. Gen. Model 614 AR, 800 to 2100 MHz. $200; VK6PK, Box 346, Carnarvon, 6701.

General Coverage RX 150kHz - 20MHz, AR8 Front End, Double Conv., AM.SSB CW., good working order. Extn. Spkr., Circuit. $65. O.N.O. T.Hambling, 88 Bayview Street, Williamstown. Vic., 3016. Ph.: (03) 397-6773.

AMR 300 RX, 1.5-24 MHz, excellent condition, $70, O.N.O. Valves, all new, 77, 6C8, A310, A615, 24A, 5625. H. Leupold, 9 Hyland Avenue, Darlington, S.A., 5047. Ph.: (082) 96-4250.

VHF (30 to 200MHz) Signal Generator with calibrated output attenuator to one microvolt or less. (Eric Gray—VK3ZSB—QTHR—Bus: (03) 630-5656 A.H. (03) 25-3249.

FT200 with power supply and microphone, as new condition. Can be heard on air, $325. O.N.O. VK3TG QTHR. Ph.: (056) 62-1636.

FT401, TH3 & rotator $640. C1-16 dual beam CRO $245. HA-600A Rx. D. Bridge., 10 Farnham Street, Bentley, W.A. Ph.: (092) 68-7113.

WANTED

Slow Scan Television Monitor wanted. Details to ZL2AAV, P.O. Box 22, Waiouru, New Zealand.

AR7 Coil Boxes To make up set. Important C.D.E.: VK3ZNZ. QTHR.

Collins 75A2 or 75A3, R105 or 51H3 Collins or AR88D. CV253/ALR Convertor or R508/ARC RX; coil boxes A,C,D,E, for R20 AWA C55164 Exoca 5FP7. Schematic or handbook for No. 62, 22, TR 1934 or TR 1935. State condition and price to H. Leupold, 9 Hyland Avenue, Darlington, S.A., 5047. Ph.: (082) 96-4250.

Instruction Manual, RCA AR88D Receiver (72kHz-30MHz). To buy or borrow, for copying. J. Hams, 1/150 Queen Victoria Street, Bexley, 2207.

Silent Keys

A. H. Tilse—VK4WO
R. H. Vickary, VK4VX

W. J. Zech, VK2ACP
Bill passed away on August 9th at Blue Mountains Hospital after a short illness. He was one of the oldest licensed amateurs in Australia, having held a ticket for 61 years.
D. A. Clift, VK2DC

20 Years Ago

with Ron Fisher VK3OM

October 1953.

Tucked away in one of the back pages of the October 1953 issue of Amateur Radio is an epoch making notice. The Limited AOCP was named as such by the PMG's Department. They stated that where application was made, a Limited certificate would be granted to those candidates who passed the technical and regulations sections of AOCP examinations held since the 1st of January 1953.

Back in the 1950's when plenty of high power transmitting components were available from disposals sources, many amateurs constructed transmitters capable of running well over the 100 watt limit of that time. The 150 watt limit came later. Many of these amateurs, although complying with the law, ran into trouble with PMG Radio Inspectors who would not approve operation of the gear. After Federal representation to the Radio Branch, the following was published. "It is confirmed that the Department will not object to the use of such combined components so long as the final stages of the transmitter is so operated that the licensed input power of 100 watts cannot be exceeded without a major change to the equipment providing the d.c. operating voltages and aerial loading facilities".

The Editorial page for October 1953 was concerned with the 'Status' of the amateur operator in the eyes of the general public.

It was pointed out that most other hobbyists were well known and perhaps understood to some extent by the average citizen, where-as amateur radio operators were looked on as 'radio cranks'. Perhaps even after twenty years we still have a way to go yet to correct this impression.

Technical articles for October included, 'Multi-Band Tuning Unit' by Joe Rogers VK3JO. The system used two tuned circuits, one covering 80 and 40 metres the other tuning 20, 15 and 10. Although the L-C ratio was something of a compromise, the whole thing could be made to work fairly well.

The "Gamma" Match was described by E. Gabriel VK2AVG and a Simple Low Level Audio Peak Clipper by J. C. Watson VK6JW.

Series Connection of Rectifier Power Transformers by V. J. McMillan VK2AWN showed how to use disposals transformers with 110 volt input in series for 230 volt operation.

DX Activity page was taken over by Hans VK3AHH for the first time. Fairly good conditions were reported on all except the 15 and 10 metre bands. ●

My Board is anxious to ensure that viewers derive the greatest benefits possible from the purchase of their expensive colour television sets and the technical staffs of the Board and of the Post Office will be ready to help both the public and the amateur radio operators (either individually or collectively through the Wireless Institute) in solving the T.V.I. problems which will rise when colour services begin.

The one important advantage which this natural resource possesses, compared with many of the other resources, is that the radio spectrum is not irrecoverably consumed. It may be mis-used but with wise management and co-operation between users the position can be recovered.

Now, in the case of the spectrum, I believe that the broadcasting users and the amateur radio users have a common complaint that they do not have sufficient channels. At the same time we both must keep our own houses in order to ensure that we use the channels which we do have to the very greatest advantage and that we do not cause trouble to our neighbours. We must develop good housekeeping methods, reduce the amount of pollution or rubbish which we produce and, above all, we must attempt to keep our pollution within our own backyards!

As many of you will know, this simple housekeeping in the radio spectrum sense is now being promoted as a specialized topic within the field of radio engineering with the elaborate title of Electromagnetic Compatibility.

No doubt we shall all be hearing a great deal more about it in the future.

In conclusion, let me, on behalf of the broadcasting fraternity in this, our Golden Jubilee year, acknowledge the role which the radio amateurs individually and as a group have played in the development of radio services generally in Australia and in New Zealand. In particular let us recall the important roles your members played, and the sacrifices they made, during the War years.

And now I have great pleasure in declaring open the Remembrance Day Contest. I hope it is a very great success. ●

OCTOBER, 1973
Vol. 41, No. 10

AN EFFICIENT COUPLING UNIT for use from 80 to 10 metres over a wide impedance range. For use with balanced or coaxial feed lines at up to IKW PEP.

AN ALL IN ONE UNIT Combines an E-Z match, Antenna switch, Dummy Load and SWR/PWR meter for balanced or coaxial feeds. Wide impedance matching range at up to IKW PEP.

coming soon

THE KW MONITORSCOPE and POWER METER

* Q-Craft SWFS-2 single meter type, combined SWR and FS meter. Includes FS pick-up whip.

* Q-Craft SWR-2 dual meter type offers simultaneous readings of forward and reflected power at 50 ohms.

* Osker SWR-200, large dual meters, is switchable for 50 or 75 ohms, also has calibration chart for direct power readings to 2 kw.

* Katsumi MC22 Microphone Compressor, completely self contained with battery and level meter.

* Katsumi EK26 Electronic Keyer, offers every feature you could want, relay and transistor switching as well as built in monitor oscillator.

* Yaesu YD-844 Desk microphone. This elegantly designed microphone not only performs excellently on many transceivers but also compares favourably with broadcast microphones. (See AR June '73, page 8)

* Connectors.
* Cable.
* Rotators.
* Morse Keys.
* Switches.
* Code Practice Oscillators.
* Low-pass filters.
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* Multi-band antenna traps.
* Digital Clocks, both AC and battery operated.
* Coaxial lighting arrestors.
* and the COMPLETE RANGE of Hy-Gain aerials, HF UHF and VHF.

The items on this page are but a few from our large and still growing range of accessories. If the accessory you require is not shown on this page then call us or our agents, we're sure to have it.

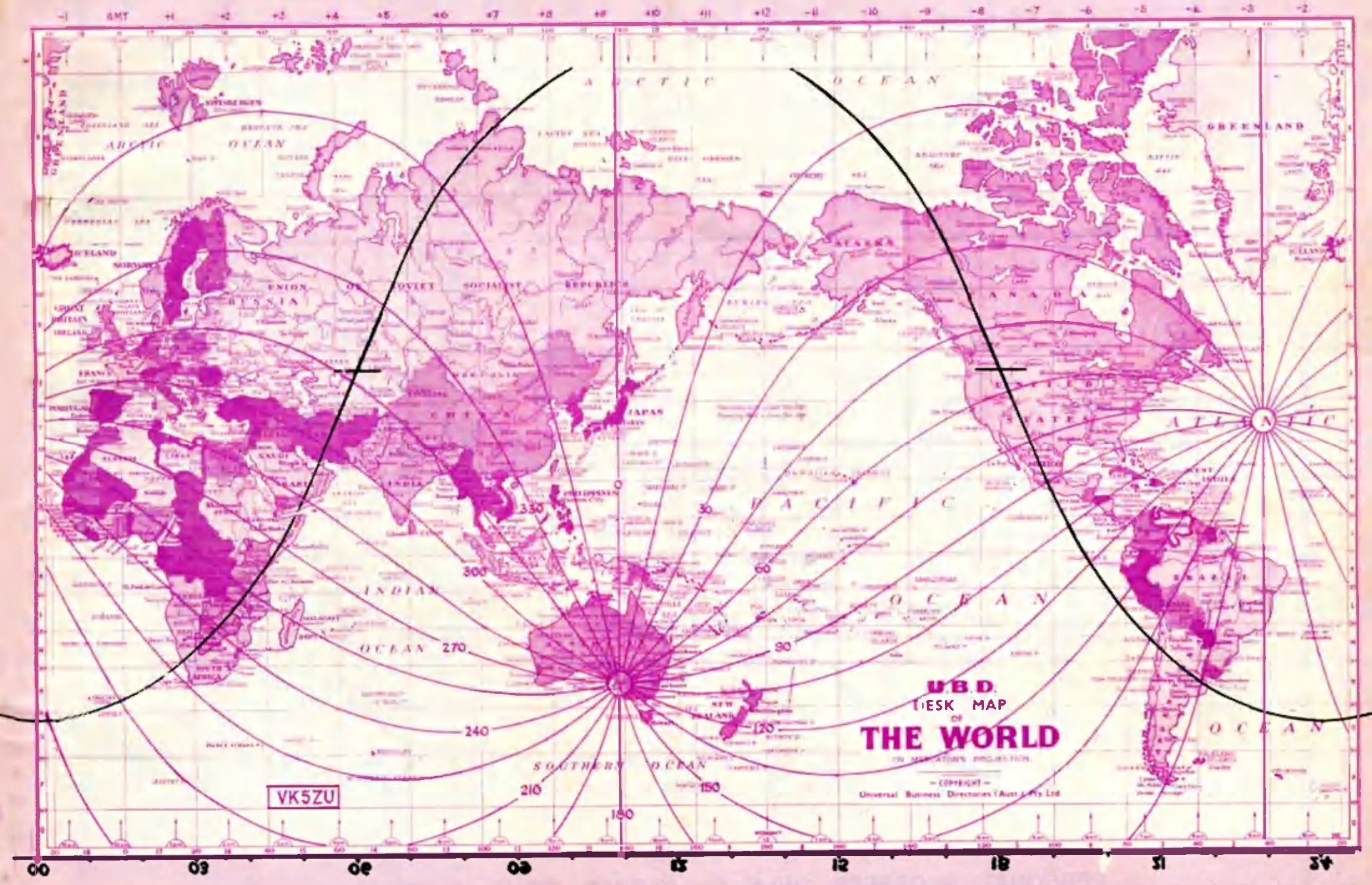
BAIL ELECTRONIC SERVICES

60 Shannon St., Box Hill North,
Vic., 3129. Ph. 89-2213

Qld. Rep.: MITCHELL RADIO CO., 59 Albion Road, Albion, 4010, Telephone 57-6830
N.S.W. Rep.: STEPHEN KUHL, P.O. Box 56, Mascot, N.S.W., 2020 Telephone Day 667 1650 (AH 371-5445)
South Aust. Rep.: FARMERS RADIO PTY. LTD., 257 Angas St., Adelaide, S.A., 5000. Telephone 23-1268
Western Aust. Rep.: H. R. PRIDE, 26 Lockhart Street, Como, W.A., 6152. Telephone 60-4379

amateur radio

NOVEMBER, 1973



VK5 SPECIAL ISSUE

- A WIDE-BAND PRE-AMP FOR THE FTDX401 AND FT200
- AN ANTENNA FOR 160 METRES
- MOBILE ANTENNA FOR 40
- "S" METERS FOR AMATEUR RECEIVERS
- THE THEBARTON PROJECT
- RD CONTEST RESULTS

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA, FOUNDED 1910

NOVEMBER, 1973
Vol. 41, No. 11
Price, 40 cents

Registered at the G.P.O. Melbourne for transmission by Post as a Periodical— Category "B"

CONTENTS

Published monthly as the official journal by the Wireless Institute of Australia.
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Copy is required by the **third of each month.** Acknowledgment may not be made unless specially requested. All important items should be sent by certified mail. The Editor reserves the right to edit all material, including Letters to the Editor and Hamads, and reserves the right to refuse acceptance of any material, without specifying any reason.

Advertising:
Advertising material should be sent direct to **P.O. Box 150, Toorak, Vic., 3142,** by the **25th of the second month preceding publication.**

Hamads should be sent direct to **P.O. Box 150, Toorak, Vic., 3142,** by the **3rd of the month preceding publication.**

Printers:
Chas E. Tully Pty. Ltd.
40 Hume Street, Huntingdale, 3166.
Phone: 543 1242.

TECHNICAL —

GENERAL —

DEPARTMENTS —

CONTESTS & AWARDS

FRONT COVER:

Mercator map of the world marked with great-circles based on Adelaide with bearing increments of 15 degrees. Black curves show solar terminator at 22nd July.
(See article on page 14).

QSP

BEWARE — NOW

The Executive has heard rumours and misinformed comments about the 2m and 70cm bands. A member of the Executive saw senior officials at a joint meeting on 10th October to establish facts.

The re-opening of the FM Broadcasting enquiry by the Minister for the Media, has led to speculation about our vhf-uhf bands. This is because "x" number of MHz in the spectrum is required for this new service. Internationally the FM broadcasting band runs from 88 to 108MHz but the ABCB Report on the subject could not recommend this in Australia because of TV channels 4 and 5. Instead 470-510MHz was preferred with 500-540MHz as the next best. The band width of 40MHz was suggested as desirable.

A fresh Enquiry on the subject is expected to be announced soon for a Report to be made to the Minister in the New Year. The Executive will of course make submissions because once again all the VHF and UHF frequencies will come under scrutiny — ALL the frequencies and not solely the amateur bands. Everything points to the continued exclusive use of our entire 2m band but nevertheless, because it is in the vhf area, it will be looked at.

The technical administrators clearly state there are no intentions against our 2m band and none could be supported. One or two isolated MHz are of little use in the context referred to above.

The status of the 70cm band however is different. Amateurs have 420-450MHz on a secondary basis and here are 30MHz not too far away from 470MHz. The primary user in this part of the spectrum is probably too deeply entrenched to be molested in any way. The Executive however has set up a Committee to look at this band. We have no exclusive use of any frequencies between 148MHz and 24GHz but this seems to be of little concern to anybody else because of the severe pressures on the available spectrum. The last Space Conference showed all too clearly how the amateur service needed support.

The public in Australia do not hold 'Hams' in much favour either, The adverse and often ignorant press and other publicity has seen to this. Commercial interests also could wield a powerful lobby.

The Federal Council and the Executive are able and willing to engage in battle. Are you ready to assist in every way you can? To always operate and behave responsibly, reasonably and intelligently and encourage others to do the same MUST CONTINUE TO BE THE WATCHWORD. Improve our image in the eyes of the public. Use our frequencies to the full.

Unfortunately there is a minority refusing to conform. Their unconformity could be our undoing under the pressures building up around us.

John McL. Bennett, VK3ZA.

Most of the articles in this edition of "Amateur Radio" have been supplied by the South Australian Division. This was not done to bolster our ego (after all, we know we are the Division with the mostest), but to prompt other Divisions into supplying a similar batch of material for subsequent issues.

"Amateur Radio" is our only printed link. We claim to be competent communicators, but how many people in other Divisions know of activities such as our headquarters project.

At this year's Federal Convention it was suggested that perhaps VK2 could supply copy for February, VK3 March, VK4 April, and so on, finishing with VK9 for September. While this would be an ideal situation for the magazine committee, it is probably an impossible dream.

Or is it?

Perhaps you could give the suggestion further thought while reading through our efforts. We hope you enjoy them.

The VK5 Division.

SPEED OF LIGHT.

QST for June 1973 quotes from Optical Spectra that NBSL scientists have concluded that light travels at a velocity of 299792.4562 Km per second + 1.1 metres. This is equivalent to 186282.3960 miles per second ± 3.6 feet. This is almost the time taken for bad news to travel around Australia.

Historical.

"The article *'50 Golden years of Broadcasting'* (Aug. '73 AR) was of particular interest to me, being one of the original staff of 6WF in 1924 when the station operated on 1250 metres and 104.5 metres. Wally Coxon, VK6AG and Bill Phipps VK6WP were the engineers."

(Note from VK6MY of Atkins Carlyle Ltd. of Perth).

Interference

"The APO at the request and expense of the Board, investigates causes of interference to the reception of broadcasting and television programmes and furnishes advice and assistance to listeners and viewers as to how these troubles might be minimised. During the year ended 31 May, 1973 16,422 complaints (4032 bci and 12390 TVI) complaints were lodged. The cost of investigating complaints to 30 June, 1973 was $233,868". Australian Broadcasting Control Board 25th Annual Report for year ended 30 June, 1973.

THE AMATEURS.

"What good are amateurs?" — "What do they do?" — "Can they serve any useful purpose?" The quick answer is, of course, that the mere fact of there being nearly 500,000 in the world of the West as a whole, is by itself a good enough reply to these questions. If no benefits flowed or advantages accrued from the pursuit of Amateur Radio, it could not possibly exist on such a scale — and continue to expand at the rate it does. Editorial Short Wave Mag. July '73.

RADIO STATION STATISTICS.

At 30th June 1973 there were 6563 licensed amateurs showing an increase of 41 in the 6 month period to that date. Licensed mobile stations however increased by 17,771 to 156,110. Of the 6470 continental VK stations 4419 were full calls and 2051 restricted licences; 2045 (1450 full and 595 limited) were in NSW, 2012 (1295—717) were in Victoria, 758 (525—233) in Queensland, 748 (500—248) in S. Australia, 516 (373—143) in W. Australia, 224 (148—76) in Tasmania and 117 (88—29) in ACT with 50 (40—10) in the NT. 93 (80—13) amateurs were listed as being in the territories of whom 81 (68—13) were in TPNG.

The Thebarton Project

VK5 Division of the Wireless Institute of Australia

Rarely is the Wireless Institute associated with world famous architects. Such a momentous event is taking place in VK5, where the Division is in the process of converting a building designed by Walter Burley Griffin into the Divisional headquarters. The following article describes the trials and tribulations of firstly, obtaining a building, and secondly, converting it.

For some fifteen years the VK5 Division has been putting the profits from disposals and equipment sales into a Building Fund. Like many such funds, the growth of the fund has been far slower than the rise in building prices and it looked as if we were doomed to meet in rented halls for ever, as well as relying on members good graces to store equipment in their homes. In 1969 two or three members started private investigations into possible sites for headquarters buildings. After several different proposals had been followed up, the matter was put to the general membership, and at a Special General Meeting in mid-1971 a committee was appointed to determine our requirements and find a suitable home for us.

This committee, commonly known as the Headquarters Committee, was chaired by Rob Wilson 5WA. To this day Rob is not sure how he was landed with the job, but the committee worked magnificently and the results are a credit to its members. Heaven only knows how many properties they looked at, from private houses, through bakeries, to disused churches. Bear in mind that the Building Fund stood at less than $3000, which limited their bargaining powers somewhat. One rather attractive offer of a block of land 66ft x 460 ft fell through when we found that we were expected to erect a $20000 building with no guarantee of continued tenancy.

After six months of hard work, the committee hit the jackpot — the Thebarton Council indicated that they were prepared to offer us their municipal rubbish destructor building. When the raucous laughter died down we found that we were being offered an architectural masterpiece designed by Walter Burley Griffin, the man responsible for the initial planning and design of Canberra. While in Australia to work on the Canberra project, Burley Griffin also carried out other architectural and town planning jobs, including several municipal rubbish destructor buildings.

The building we were offered consists of three floors (see sketch) and an attached room. Although it does not have a room suitable for general meetings (the largest area will take about 800 at a squeeze), it was considered that the rented hall in the Adelaide city area was satisfactory for these, while the building could be used for VHF, YRCS, SWL and WICEN meetings. The separate attached room was ideal for 5WI, while the top floor was earmarked for a YRCS lecture room. One of the most attractive features was a 50ft. high chimney on which to mount the beams and terminate long wires.

BELOW — The chimney at Thebarton, shortly due to be topped with beams for 20 metres and higher.

BELOW — Burley Griffin believed, amongst other things, in making his buildings solid. That hole represents two hours work with the jack hammer.

ABOVE — Secretary Ross VK5KF signs the lease for the new HQ building under the eagle eyes of Rob VK5WA chairman of the Building Committee, and Geoff VK5TY, Divisional President. Barry VK5-ZAU ensures the occasion is suitably recorded in the minutes.

Negotiations were commenced with the Council, and after 15 months, largely due to delays in the preparation of lease documents, we were the proud possessors of a BUILDING, on a ten year renewable lease, annual rental $15!! And what a building.

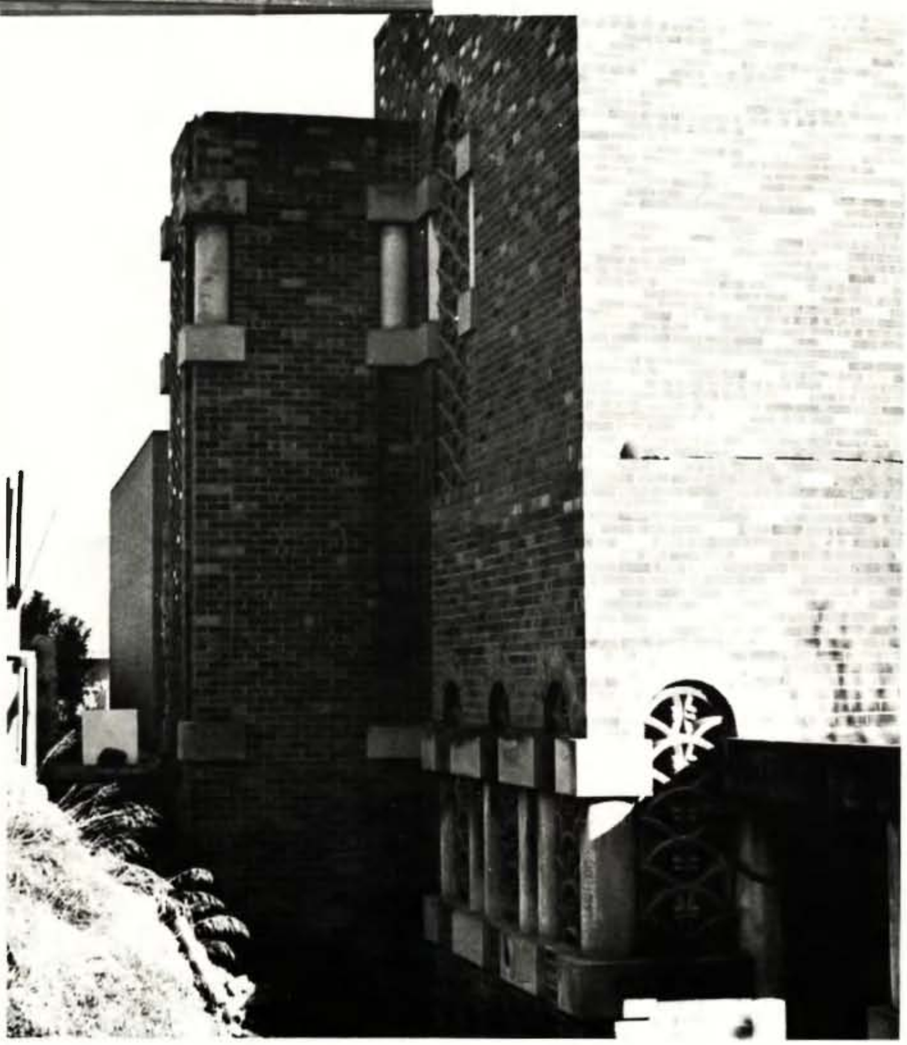
Work started on the Sunday after Easter 1973; the first jobs being to throw out all the movable junk and remove the soil which had been dumped against the building since it was last used in 1957. Having tossed out all the smaller items (nothing over 300 lbs in weight) into the conveniently located pug-hole outside the back door, we tackled big headache number one — the furnace.

Sitting sullenly in the middle of the basement floor, this consisted of a steel box 16ft by 12ft by 8ft high, filled, or so it seemed, with firebricks. All the edges and corners were reinforced with 3" x 3" angle, the sides braced with back to back 6" x 3" channel, and the whole lot bolted together with ⅝" nuts and bolts with the bolt heads concealed on the inside. One Saturday afternoon with an oxy-cutter and the nuts were removed from the end nearest the pug-hole. Four weeks later the pug-hole was full of firebricks, the steel plate was cut into manageable sections and stacked ready for removal, and we could see the length of the basement.

The chimney, future support for massive beams and long wires, presented a totally different problem. We could not find a way into it! Several nights work with torches and hand lanterns peering through odd holes in the brickwork and climbing round inside the furnace flues, and the problem was solved. To get into the chimney, go down, young man, through the basement floor. One flue channel below the floor led directly into the chimney. Granted, the opening was only about three feet wide and two feet high, but it was big enough for a man to get through and stand up inside the chimney.

Although the chimney is square on the outside, this is only a disguise for the actual, round, chimney inside. Brickwork was cheap in 1937, and the round chimney did not fit the design of the building. The internal diameter of the chimney is about 4ft, and a ladder will be built, from 5ft sections, inside it so we can erect the aerials; (five feet sections are the largest it is possible to fit through the flue opening). We will assemble it inside the chimney and fasten it to the wall as it goes up. Two of our older members have offered to pre-fab the sections at home and to deliver

BELOW — Burley Griffin believed in making even the most mundane building beautiful.



them ready to be erected in the chimney by some of the younger, more agile members. Conveniently, there is a small flue that feeds into the chimney just below the floor of the 5WI room, so the coax cables will not have to disappear into the basement first.

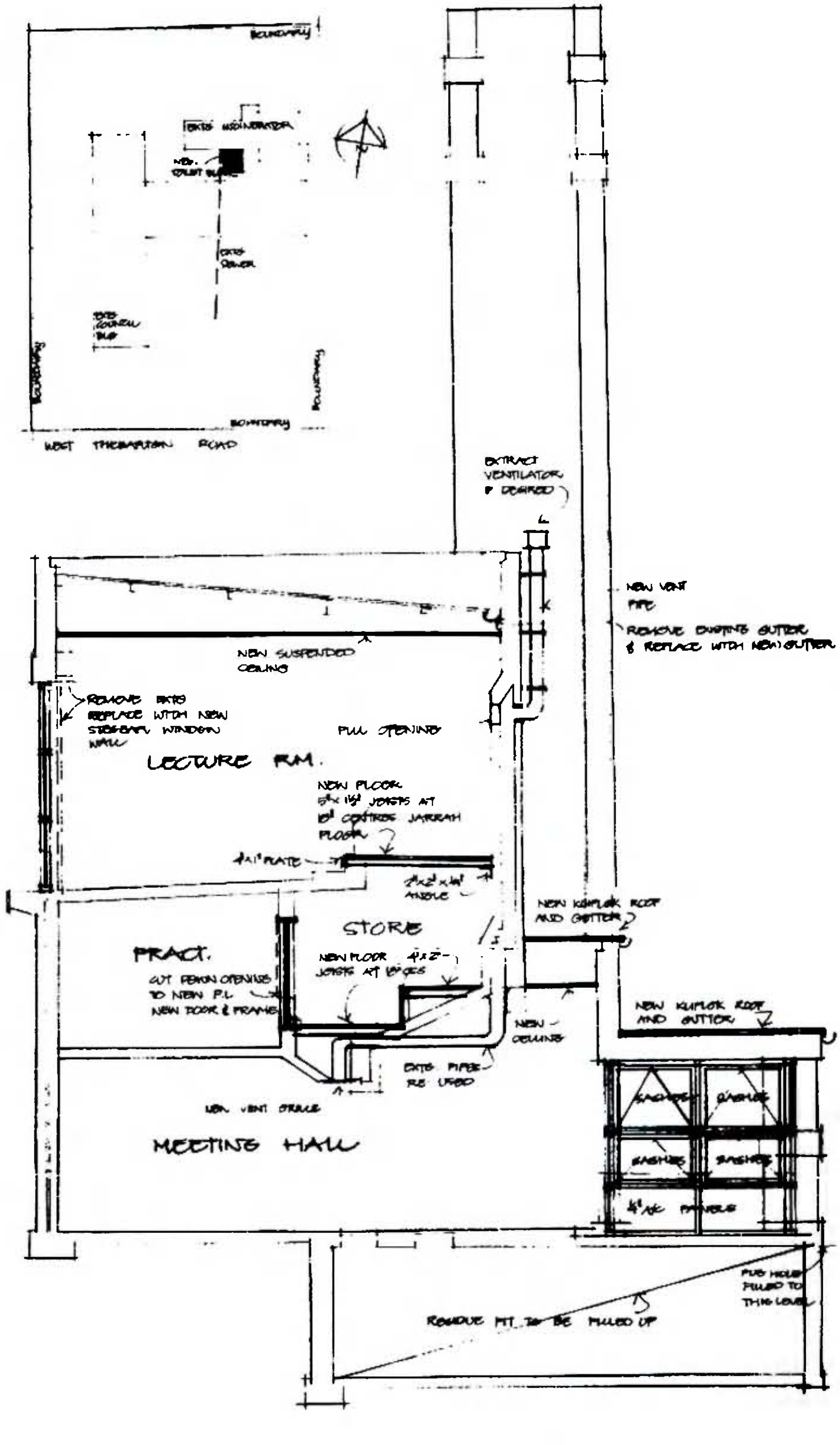
To guide our work we had a set of plans drawn up by Bruce Bussenschutt, VK5OR of Turner, Bussenschutt and Associates who spent considerable time deciphering prints of the original drawings and turning them into a form suitable for interpretation by radio amateurs. The only errors we have found so far have been due to incorrect information on the original drawings; minor things such as showing the internals of the furnace to be mirror images of the final product. Bruce just smiled, made the necessary adjustments, and left the bill at zero.

All jobs have their ups and downs. Who would have thought that the 9 ft high brick retaining wall was actually a brick-faced, 9" thick, reinforced concrete structure, and was located just where the toilet block had to go. That caused a certain amount of blood, sweat and pure Australian language, but eventually it succumbed. The ceiling of the basement was jet black with soot and bituminous residue from the furnace. Burning off with blow lamps was only partially successful, but one Sunday the workers borrowed the Council's fire hose to clean the floors and found that the ceiling muck washed off if hit hard enough with a jet of water. In about an hour we had a clean ceiling, and so far nothing has reappeared from within the concrete. The same technique is working marvels elsewhere in the building, and the time saved cannot be estimated.

On-the-spot supervision and coordination of the effort has been the responsibility of Barry Williams 5ZBQ, and Geoff Taylor 5TY. Supervision in this sense is interpreted as; "If there's no-one else available, do it yourself, mug". So far about 50 members have assisted on the job, ranging from junior associates to Roy Cook 5AC, who held a licence before World War I, and makes an admirable gatekeeper to keep out undesirables and let in the workers. Till now all the work has been voluntary, but we are in the process of sub-contracting out the erection of the toilet block as this requires certain specialized trades and will be built much quicker by weekday labour.

The Thebarton Council has been more than cooperative. Not everyone would allow a team of radio amateurs unrestricted access to their property at all hours of the night and day, and more important make equipment such as concrete mixers, tractors, air compressors and wheel barrows available without charge. Without their assistance the job would have been harder and more expensive. With only weekends available we must work just that little bit harder and one Council worker commented "The way your mob get stuck into it, we wouldn't be surprised if one Monday morning we found the whole building turned round to face the road". The building would look better that way, so . . . .

We hope to have the basement room ready for meetings by mid-November, and to complete all essential work on the rest of the building by late January. After that, of course, come the finer details, like the establishment of a garden in the old pug-hole. While the work will probably never be finished in the 5WI room (another transmitter, better audio gear, etc.) we will at least be in our own home and working for ourselves. ●



Building plan of the floor layout

IMPORTANT NOTICE

As announced in "Amateur Radio" individuals may apply to the Department of Customs and Excise for By-Law on a H.F. Transceiver.

We will be glad to assist with your transceiver requirement from the Yaesu range. All we need is your By-Law Certificate and a written authority to use it for By-Law admission of the transceiver of your choice from our bulk imports, either when a shipment arrives or from bond storage. Immediate delivery cannot always be guaranteed, but perhaps this is a small price to pay considering the Duty concession.

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FP-501	90
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Subject to the model of transceiver desired, we will be pleased to provide forms for a By-Law application together with the required information, on receipt of your order with deposit (20% of concession prices shown).

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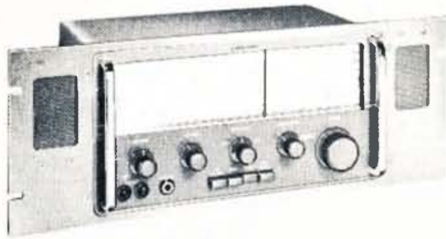
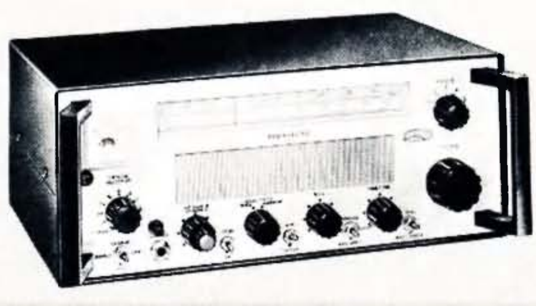




communication in the VK5 division

Geoff Taylor, VK5TY, Federal Councillor.

"In any division there is always the problem of passing information on to the members. As radio amateurs we are expected to be experts in communication, but radio is not necessarily the best way of passing on information. In VK5 a two-pronged attack is made using radio, via the Divisional broadcasts and the printed word in the *Divisional Journal*. Both have their problems but these are not insoluble to keen amateurs."

No Division can function without some form of communication among the members. Most members seem content with what they hear from other operators on the air, but there is always a need for some form of formal communication. The Divisional broadcast is one form of communication, but not everyone is in a position to hear it because of other commitments. To ensure that information is available to all members, some form of printed sheet is necessary.

In VK5 we make maximum use of both outlets. As we have no headquarters building as yet, all the work is carried out in members' homes. This involves considerable liaison and crosstown travelling.

The Divisional broadcast is prepared by Ian 5ZKT and Adrian 5AW. They arrange the program, edit taped submissions, arrange interviews, and tape the entire session ready for playback on the Sunday morning. The tape is complete with cue-ing and tune-up signals for the relay stations, and identification pauses. It is delivered to Bart 5GZ who is the official 5WI operator. The program originates from Bart's home on 1.8 MHz AM using a Viking transmitter purchased by the Division some time ago.

The 1.8 MHz signal is received and relayed by various members on the other bands. Due to the geographic layout of the VK5 Division, from Mount Gambier in the South to Darwin in the North, Renmark in the East to Ceduna in the West, no one frequency can hope to supply an adequate cover. The relays are on 3.5MHz AM by Murray 5ZQ; 7.0MHz AM by Ross 5KF; 14MHz SSB by Geoff 5TY; 52MHz AM by Bob 5MM; 144MHz by John 5AWI; and FM Channel 4 by Jim 5NB.

Additionally there are relays on 2 metres in Darwin by Colin 8CM and Mount Gambier by Colin 5DK. Each relay station takes a callback after the broadcast with the exception of the FM Channel 4 transmission. We also have a number of stations that stand-by to substitute for the regular operators at holiday time and during other absences.

For the written word we have the SA Divisional Journal. This is a duplicated, foolscap sized magazine issued at least six times a year to all members of the VK5 Division. Minimum size for several years has been 8 sheets (16 pages) and lately it has been running something like 12 sheets per issue. The Journal contains technical articles (some of which are reprinted in this copy of "Amateur Radio"), Oscar predictions, VHF and SWL notes, Federal notes, official communications from Council, general Divisional information, members advertisements, and last but not least, details of items available from the Equipment Supply Committee. We also include paid advertisements from local trade organizations.

Again, as with 5WI all the work associated with the Journal is done in private homes. Editing and printing is carried out by Tom 5QP on the Institute's duplicator set up in the kitchen. Bob 5MM as Technical editor rewrites articles and draws circuit diagrams to his own high standards. Address plates are looked after by Ross 5KF, and the addressing is done by Junior Associate, Marian, under the eye of Geoff 5TY.

Journal assembly is organised by Wally 5TW who gathers a group of "volunteers" at his home, wearing out his carpet while tramping round the table picking up sheets, and then eating (and drinking) him out of house and home. The Journals are then bulk posted to members.

We are fortunate that John 5UL was successful in obtaining a Class A postal permit for the Journal as this reduces the postage to a reasonable sum. As it is, by the time the extra amount is paid for airmail delivery to VK8 members, the bill for 600 copies is about $13.

The Journal is now in its fourteenth year. Over this period it has had several editors and printers, the most outstanding service being by Brian 5CA and his wife Marlene who, for eight years, typed, edited, printed and collated the Journals at their home, as well as printing the wrappers. Marlene's greatest worry always being that she might not have enough supper for the collaters — an entirely unjustified fear.

With the possibility of a headquarters in the near future we hope to extend and enlarge the coverage of both 5WI broadcasts and the Journal. It is the efforts of volunteers in these activities which has made the VK5 Division what it is today — the best informed and most active Division in Australia! ●

ABOVE — Colin VK8CM at Darwin takes the 20 metre relay of VK5WI and retransmits it on 2 metres for the Darwin group. Reception is by a TH3 beam to a FTDX100 receiver. The audio is then fed to a TCA1675 and from there to a beam.

a wide-band pre-amp for the FTDX 401 and FT 200

Kerry Adams, VK5SU
Lambell Street, Ceduna, 5690

This wide band amplifier is suitable for many modern transceivers including the Yaesu F series. No originality is claimed; it is a combination of circuits and ideas drawn from many sources.

Using 9 volt positive regulated supply from the FTDX401, the gain is slightly below unity at 3.5MHz, while rising to 10dB at 15MHz (12dB is obtainable with a 15 volt supply). The gain falls slowly to unity at 54MHz. I find that the FTDX401 is quite satisfactory up to 21 MHz requiring only 30-35 microvolts RF CW in to produce an S9 signal. At the other end of the scale, 28MHz requires between 60 and 80 microvolts to achieve the S9.

My preamplifier was built on a small bit of vero board, 8 holes by 11 holes and laid out like the circuit. The only adjustment is to the midget trimmer capacitor C1. Tune up the transmitter on about 28.6 MHZ, and do not touch the pre-selector tuning control after tuning up the unit. Then peak C1 for maximum RF noise on a signal generator or antenna. This capacitor compensates for the lower input capacitance of the TIS88 compared to the 6ZB6.

The 100pF capacitor from the RF amplifier switch to the 6BZ6 grid is lifted off the grid and run to the preamplifier. The 1000PF output from the OC170 then goes to the 6BZ6 grid.

No cross modulation has been observed to date even from an FT200, yards away, or an FTDX560 200 yards away in the same street. All of us can operate to within about 20KHZ on any of the HF bands with only slight desensitisation with Yaesu gear.

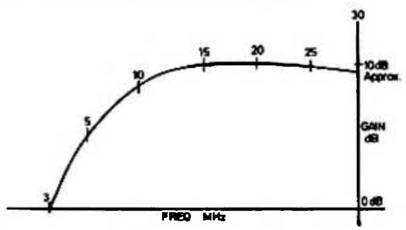
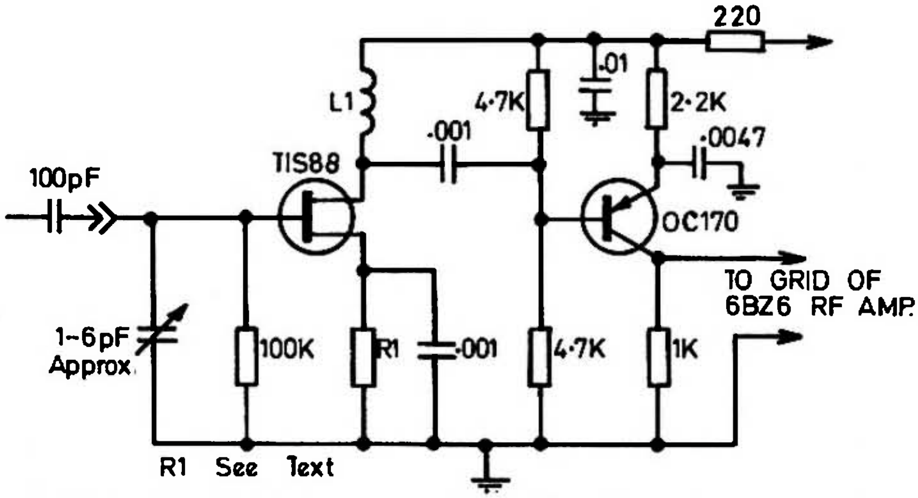


FIG. 2 – RESPONSE OBTAINED USING SWEEP GENERATOR

Many FT401 owners have noticed that the 2MHz spread of 28MHz does not track too well. I fixed mine by the addition of a 3-30 midget trimmer between the RF amplifier switch position D, and earth (4 switch positions are in parallel). Approximately all the capacitance is required. Check across the range while retuning the capacitor and aerial coil. The transmitter and receiver pre-selector tuning is now identical, even if the gain on 28MHz has dropped a little in the process of acquiring proper tracking. This makes the pre-amplifier even more desirable. ●



WIDE BAND PRE AMP FOR THE FTDX401 – FIG 1

R1 220 ohms nominal, values increased via a spare wafer on band change switch in FTDX401 so that gain of pre-amplifier is altered to suit band in use, i.e. more resistance gives less gain.

L1 8 turns of bell wire round a pencil.

extraordinary convention

Tony Mulcahy VK2ACV, Don Millar VK2GN (Alternate FC), Ian Mackenzie VK2ZIM (observer), Russell Kelly's nose VK3NT, Peter Williams VK3IZ (observer), Peter Zinden VK3BX (observer), Ian Binnie VK2ZIU (observing), Lawrie Blagbrough VK4ZGL.

The Extraordinary Convention held in Melbourne on 15th and 16th September dealt mainly with 2M repeater frequencies as briefly reported in QSP of last month's AR. The opportunity of holding discussions with all Federal Councillors was too good to be missed and was used to maximum advantage.

One outstanding question was the constitutional position arising out of the formation of the A.C.T. Division and that Division's application to join the Federal body. The thinking on this crystallised during a debate on such Constitutional Matters as the absence of proportional voting provisions about which additional work was commissioned. Many problems affecting AR were discussed at length including the impending increases in postage rates and the continuing improvements in organisation which are going on all the time as well as those which have been noted for implementation within the most stringent financial limitations imposed upon the Executive.

Another matter which has been, and still is, the subject of great thought is the vexed question of Convention costs and how to keep these at the lowest possible level consistent with the essential function of meeting together to transact business.

Among the other matters discussed was the use of our EDP system to greatest advantage. This affects members in relation to such areas as subscriptions processing, AR addressing labels and membership cards. EDP also bears heavily on the small Executive office engaged in a multitude of other functions necessary to the administration of the central organisation. ●

Left to right: Ted Cruise VK7EJ (with glasses and cigarette), Kev Connelly VK3ARD ●, John Bennett VK3ZA ●, the WIA PR expert, Peter Dodd VK3CIF, Michael Owen VK3KI ●, David Wardlaw VK3ADW o, Federal President, Jack Martin VK3TY ● Vice-President.

Tony Mulcahy, 2 visitors in the background, Geoff Taylor VK5TY, Ian Champion VK5WB (observing), Neil Penfold VK6NE, Phil Fitzherbert VK3ff (observing), Peter Frith VK7PF (observer) and Ted Cruise.

an antenna for 160 metres

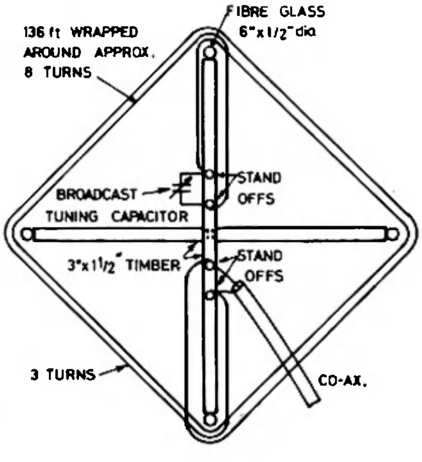
Reprinted from South Australian Wireless Institute Journal October 1972.

The antenna to be described has shown improved results over the various dipoles and long wires that had been used in the past. Compared with the other antennae, this one shows a couple of "S" points more.

I have been able to copy K4SGU at 559, and VK5DV's signal, which was not so strong here at Balaklava, is now up another couple of "S" points.

The antenna is basically a one element yagi with a tuned winding and a low impedance link.

To construct the antenna you will need 2 pieces of timber 6' x 3" x 1½" to form the cross, 136 ft. of 20-22 s.w.g. enamel wire to form the main tuned winding, and enough 20-22 s.w.g. enamel wire to wind on three turns to form the link. Four pieces of glass fibre rod, about ½" diameter and 6" long from an old fishing rod, four small stand off insulators to terminate the ends of the wire and a single gang broadcast type capacitor (mounted as close as possible to the stand off insulators) are also needed.



160 METRE ANTENNA

The construction of the antenna is as follows. Screw the two pieces of timber together to form a cross, and across the ends of the timber screw the four pieces of fibre glass rod. Attach one end of the 136 ft. length of wire to an insulator, these insulators having first been mounted in pairs as shown in the diagram. Wind on all the wire and attach the end to the adjacent insulator. This will be about eight turns. Now wind on the three turns, attaching the ends to the other set of insulators.

Mount the single gang condenser to the boom as close as possible to the stand-offs that are connected to the 136 ft. length of wire, and connect to the ends. Attach 70 or 50 ohm co-ax to the ends of the three turn link and the antenna is ready.

The final step is to peak the capacitor for maximum signal strength and the antenna is then complete. ●

mobile antenna for 40

Les Diener, VK5NJ/M

Reprinted from South Australian Wireless Institute Journal May 1973.

Mobile antenna systems certainly present a never ending field for experiment, and whether used on the V.H.F. or Low Frequency bands, each will have some merit and de-merit.

The conventional centre loaded type is without question as good as any, both from a "short-haul" and DX standpoint. However, this type of mobile antenna (particularly on the low frequency bands) has the following dis-advantages.

1. Critical construction and adjustment including attachment to the vehicle, and a means of stowing in the vehicle when not in use.
2. Deflection, particularly when travelling at high speed or in a strong head wind. This causes the resonant frequency to change slightly as the top section is pulled away from the metal of the vehicle. This effect is most severe when using a metal caravan.
3. Sharp tuning and narrow band width, usually ± . . . 15 kHz "f" resonance.
4. Height above the vehicle.

With some reservations, the well known "helical" overcomes most of these problems quite well, and, if accurately tuned and matched to the transmission line, performs comparably to the centre loaded type.

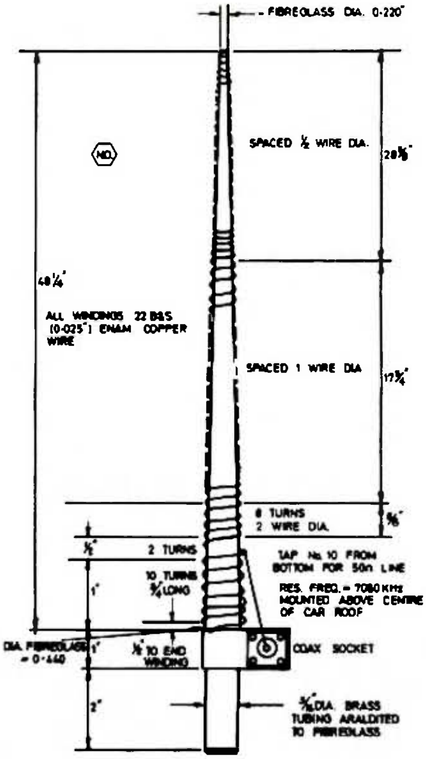
Over recent years, my efforts with helicals have not, until now, been comparable with results using a centre loaded system. However, when noting the excellent signals from various other mobileers using helical whips one cannot but agree with their possibilities.

At this point, I pay tribute to Hughie, VK5BC, who has done a great deal of experimenting with L.F. mobile antenna systems, and has given me many useful hints and tips which have largely accounted for my success with the helical described in this article. Vern, VK5VB, has also done a great deal of experimental work with helicals for portable operation where total height is of no importance, and with very satisfactory results. But this antenna is primarily intended for mobile operation, total height above the vehicle being only 4 feet.

For the interest of "home-brew" types like myself who want to go mobile on 7 MHz details are given of the actual construction used, but variables, such as diameter of the fibreglass rod, rate of taper, etc., will determine the changes necessary in final tuning. However, provided the resonant frequency and matching are accurately adjusted, performance should be the same. Being strictly a monoband antenna, separate antennas of this type will be needed for each band chosen, but the 40 metre version may be used as a guide.

PERFORMANCE

1. Operation up to 40 kHz either side of the resonant frequency is quite feasible without encountering high v.s.w.r. problems. (This is not possible with centre loaded types.)



2. A contact with JA5AFU/MM, 900 miles south of Adelaide at RS57 was made (other contacts within the normal 40 metre range appear about equal to those made in the past using a centre loaded antenna of 8ft. length).
3. The helical antenna may be left mounted on a bar over the vehicle roof, and raised or folded down as required.
4. The total height above ground is 8 feet 9 inches.
5. S.W.R. when correctly matched is 1.1 to 1.

Finally salutations go to Phil, VK5NN, for his R.F. noise bridge data (ref. A.R. July and October 1971), for matching to 50 ohms was possible to the "enth" degree using the bridge I have constructed to Phil's amended detail using a pair of 2N3693's.

CLUB/ZONE/DIVISION NEWS

- The Publications Committee wishes to advise that the call on AR for space to print material is so great it is not possible to include a section devoted to Divisional, Zone or Club news.
- Arrangements were made with all Divisions that such news would appear in Divisional Bulletins if so required, and accepted by Divisional Bulletin Editors. Bulletins, when submitted, are carried as inserts in AR mailed to members ot the Division concerned.
- It has been agreed however that AR should include an Events Diary to contain **very brief details** of forthcoming events. Items for this Diary **MUST** reach the Editor not later than the 1st of the month prior to publication.

making the most of Mercator

A. M. Phillips, VK5ZU
27 Prospect Terrace, Prospect. 5082

Having recently joined the ranks of those who operate rotatable beams on the HF bands, the writer took a critical look at the generally accepted methods of direction-finding and decided to explore the feasibility of using the well known Mercator projection. This article develops a simple graphical method of plotting great-circles for any point on the earth's surface, having specified the latitude of the point and the great-circle bearing. The technique is then further developed to determine the position of the solar terminator at any time.

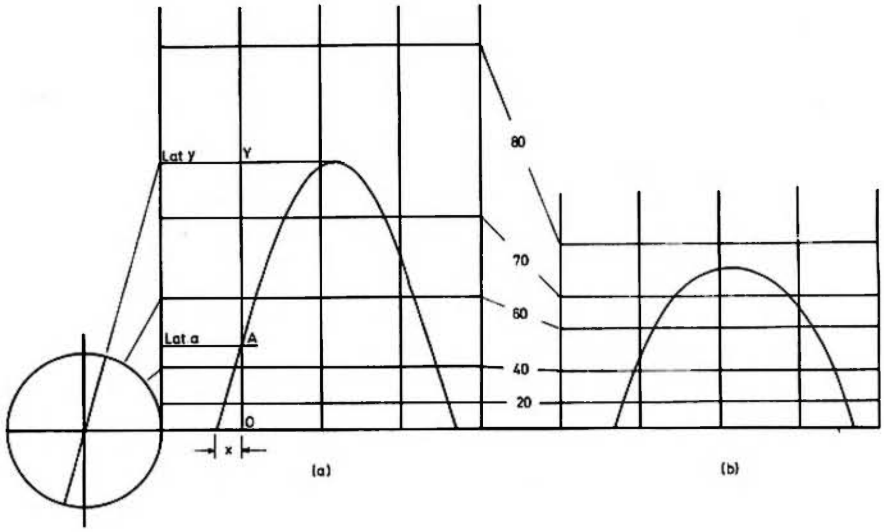


Fig. 1b— Mercator's projection. Horizontal scale varies as sec latitude. Vertical scale varies as sec latitude. Therefore bearings are correct at all points.

Fig. 1a— Simple cylindrical projection. Horizontal scale varies as sec. latitude. Vertical scale varies as sec² latitude

A line having bearing "b" will have slope cot b on Mercator's projection and (cot b . sec latitude) on the simple cylindrical projection.

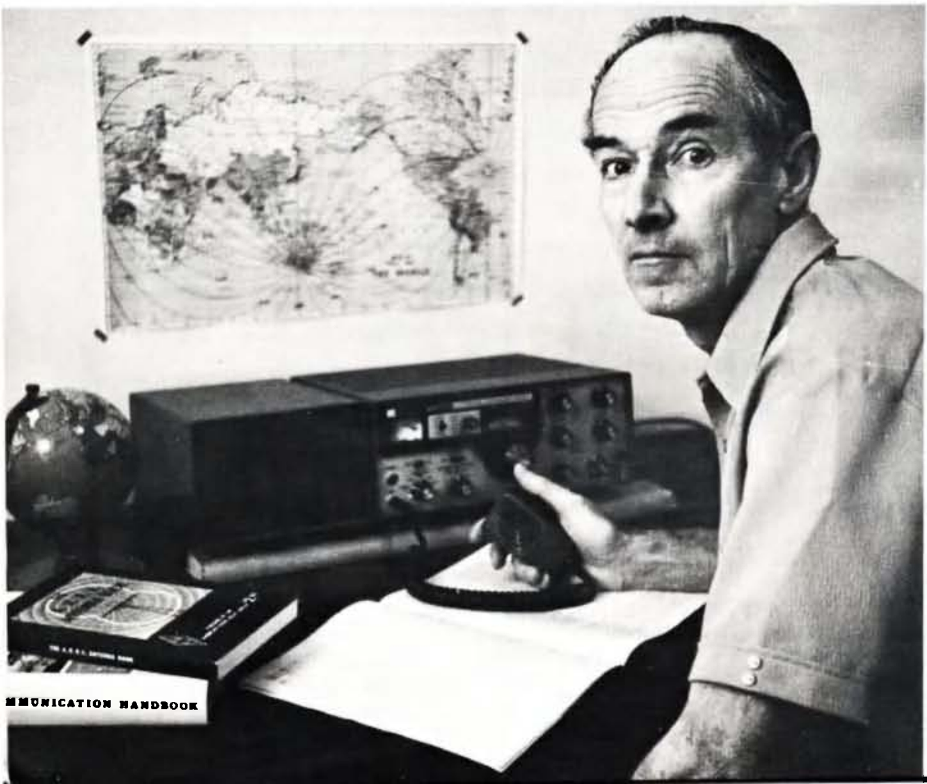
GREAT-CIRCLE BEARINGS

The generally accepted method of determining great-circle bearings appears to be by using the equidistant azimuthal chart 1,2. However, this has several distinct disadvantages, namely:

1. Available charts are centred on selected points only, and these are generally few and far between.
2. Distortion around the perimeter makes pin-pointing difficult.
3. Fine map detail is lacking.

The use of a globe overcomes the first two difficulties but fine detail is expensive to obtain and considerable manipulation is required to obtain readings.

Consideration was therefore given to what could be done with the widely used wall-type map based on Mercator's projection Fig, 1.



In the simple projection – Fig. 1a – the horizontal scale varies as the secant of the latitude while the vertical scale varies as (secant)^2 of the latitude. In the Mercator projection – Fig 1b – the horizontal and vertical scales both vary as the secant of the latitude so that bearings are correct at all points on the map; hence its wide use in navigation.

The simple projection, however, has the characteristic that any great-circle projects as a sine curve symmetrical about the equator. This provides the basis for a fairly simple calculation to define a particular great-circle, having given its bearing at a particular latitude. (See Appendix).

Given point A whose latitude is "a" and the great-circle whose bearing at point A is "b", then the values of "y" (the maximum latitude of the great-circle) and "x" (its equatorial intercept with respect to A) are found to be

$$y = \text{arc tan} \sqrt{(s^2 + \tan^2 a)}$$

$$x = \text{arc cos } (s \cdot \cot y)$$

$$s = \cot b \cdot \sec a$$

Values for "x" and "y" were first calculated as in the appendix, but this method is tedious unless one has access to a desk calculator. With a little more thought and the help of Pythagorus, the relationship shown in Fig. 2 was discovered.

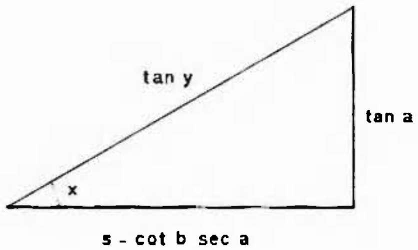


FIG. 2

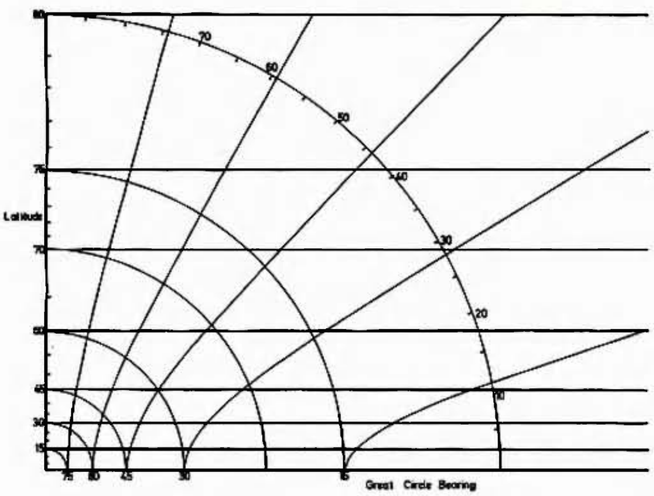


Fig. 3—Universal Great-Circle Calculator

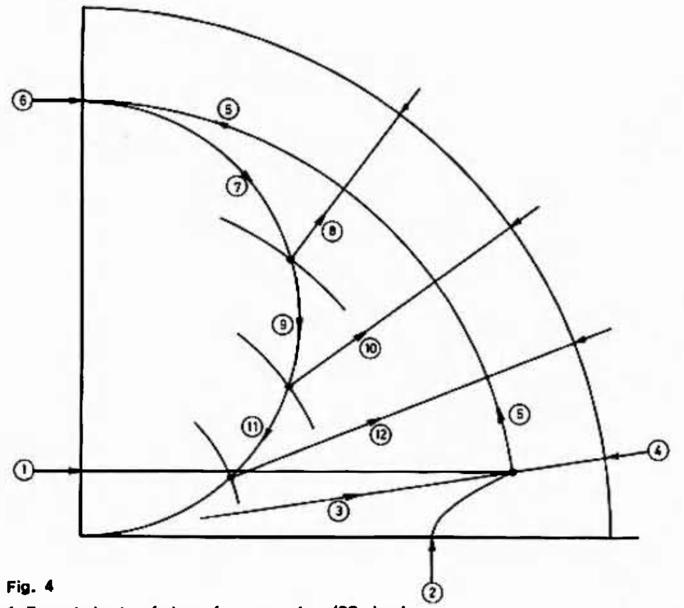


Fig. 4

1 Enter latitude of the reference point. (35 deg.)
2 Enter bearing of the desired great-circle. (15 deg.)
3 Project from origin through intersection of 1 and 2.
4 Read off angular value of x. (8.5 deg.)
5 Describe a circular arc from intersection of 1 and 2 to the vertical axis.
6 Read off latitude value y. (77.5 deg.)
7 Construct a semicircle on the vertical axis and note point of intersection with next significant latitude circle. (Lat. 75 deg.)
8 Read off angular value of x' for Lat. 75 (54 deg.)
9
10 Read off angular value of x' for Lat. 70 (36.5 deg.)
11
12 Read off angular value of x' for Lat. 60 (22 deg.)

TABLE 1

Degrees longitude from 0600 or 1800 hours to Solar Terminator at latitude shown.

Latitude	Days from equinox					
	15	30	45	60	75	90
20	2.3	4.4	6.4	7.9	8.8	9.1
30	3.7	7.2	10.2	12.5	14.0	14.5
40	5.6	10.5	14.9	18.4	20.6	21.4
50	7.7	15.0	21.4	26.6	29.9	31.1
60	11.2	22.1	32.1	40.6	46.5	48.7
65	13.8	27.7	41.1	53.6	63.9	68.5
66.4	-	-	-	-	-	90
67.3	-	-	-	-	90	
69.4	-	-	-	90		
70	17.9	36.6	57.4			
73.0	-	-	90			
75	24.7	54.0				
77.8	-	90				
80	39.5					
83.6	90					

EXAMPLE:

For a point at Latitude 35 degrees, compute great-circles with bearing increments of 15 degrees.

$a = 35$ deg. $\tan a = 0.7002$ $\tan^2 a = 0.4903$

b	15	30	45	60	75	90
cot b	3.732	1.732	1.000	0.577	0.268	0.000
sec a			1.221			
$s = \cot b \cdot \sec a$	4.556	2.114	1.221	0.705	0.327	0.000
s^2	20.757	4.471	1.490	0.497	0.107	0.000
$s^2 + \tan^2 a$	21.247	4.961	1.981	0.987	0.597	0.490
$\tan y = \sqrt{(s^2 + \tan^2 a)}$	4.609	2.227	1.407	0.994	0.773	0.700
y	77.7	65.8	54.6	44.8	37.7	35.0
$\mathrm{cox}\ x = \frac{s}{\tan y}$	0.988	0.949	0.867	0.709	0.423	0.000
x	8.7	18.3	29.8	44.8	65.0	90.0

Intermediate points on each of the above curves can then be calculated by using the relationship $\tan a' = \tan y \cdot \sin x'$
e.g. For great-circle bearing 015 deg.

a'	20	40	60	65	70	75
tan a'	0.364	0.839	1.732	2.145	2.747	3.732
tan y			4.609			
$\sin x' = \frac{\tan a'}{\tan y}$	0.079	0.182	0.376	0.465	0.596	0.810
x'	4.5	10.5	22.1	27.7	36.6	54.0

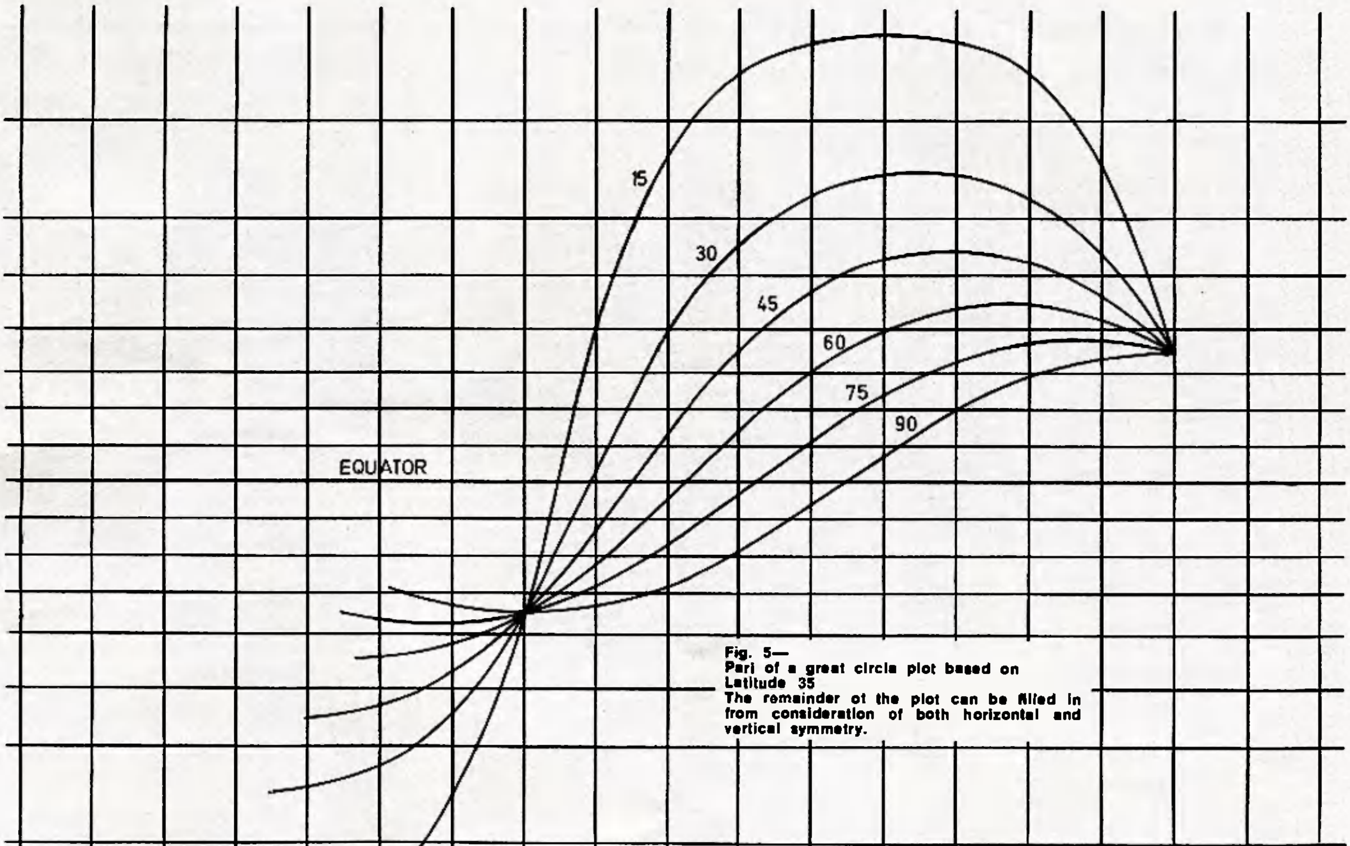


Fig. 5—
Part of a great circle plot based on Latitude 35
The remainder of the plot can be filled in from consideration of both horizontal and vertical symmetry.

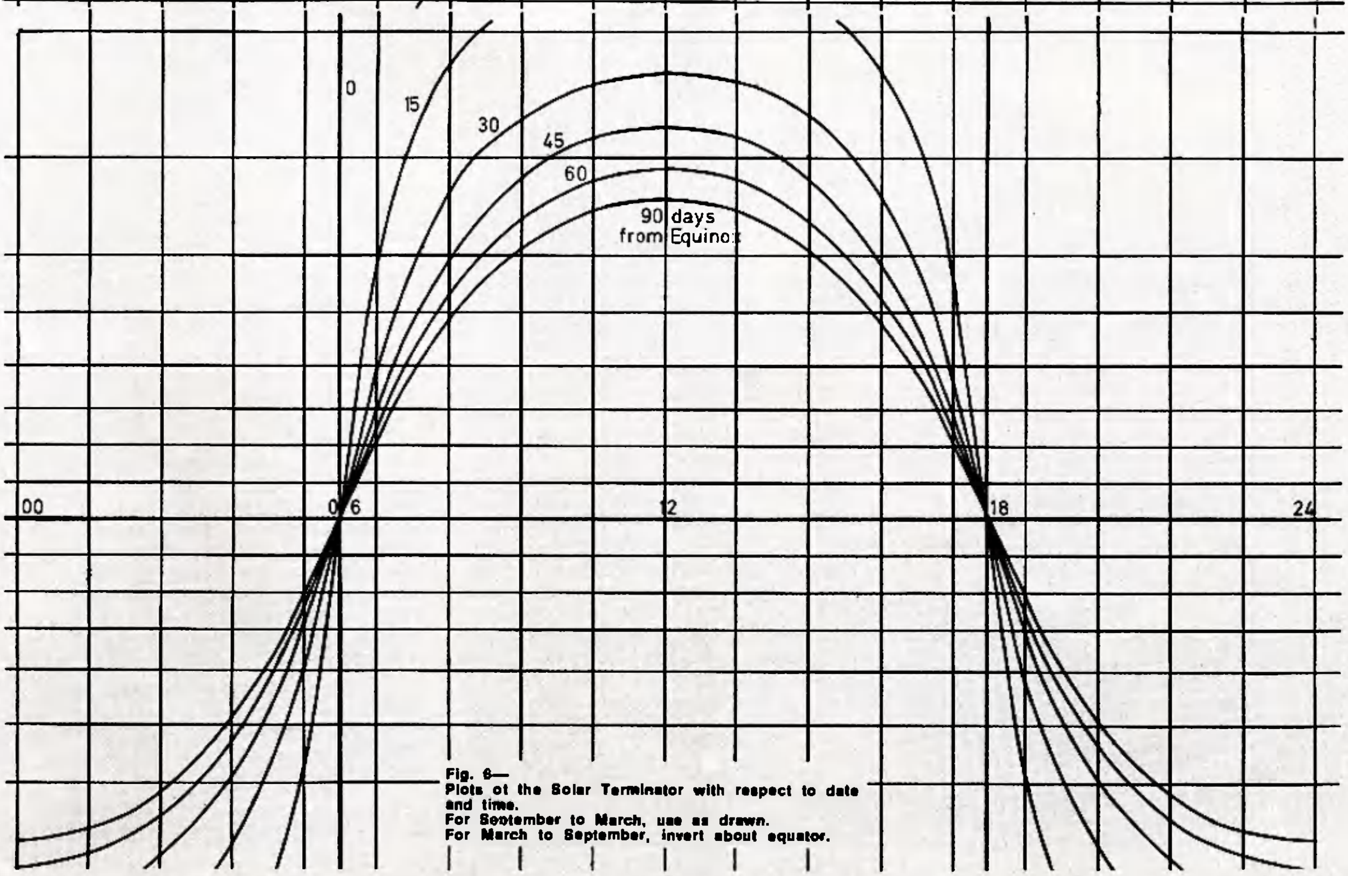


Fig. 6—
Plots of the Solar Terminator with respect to date and time.
For September to March, use as drawn.
For March to September, invert about equator.

The complete plotting data can be summarised as follows:

Latitude a'	Longitude from equatorial intercept – x' b = 15	30	45	60	75	90
10	-	-	-	10.2	13.2	14.6
20	4.5	9.4	15.0	21.5	28.1	31.3
30	-	-	-	35.5	48.3	55.5
35	8.7	18.3	29.8	44.8	65.0	90
37.7	-	-	-	-	90	
40	10.5	22.1	36.6	57.6		
44.8	-	-	-	90		
50	-	32.3	57.9			
54.6	-	-	90			
60	22.1	51.0				
65	27.7	-				
65.8	-	90				
70	36.6					
75	54.0					
77.7	90					

APPENDIX

In Fig.1 let the earth radius be the unit of length and assume the earth to be a perfect sphere.

Then $OY = \tan y$

$$OA = \tan a = \tan y \cdot \sin x \qquad \text{---------------(1)}$$

Let s = slope at A

$$s = d/dx \tan y \cdot \sin x$$

$$= \tan y \cdot \cos x \qquad \text{---------------(2)}$$

$$s^2 = \tan^2 y \cdot \cos^2 x$$

$$= \tan^2 y - \tan^2 y \cdot \sin^2 x$$

and from (1) above

$$s^2 = \tan^2 y - \tan^2 a$$

hence $\tan^2 y = s^2 + \tan^2 a$

and $$y = \text{arc} \tan \sqrt{(s^2 + \tan^2 a)} \qquad \text{-----------(3)}$$

and from (2) above

$$x = \text{arc} \cos \frac{s}{\tan y} \qquad \text{-----------(4)}$$

For a line having a true bearing b at point A

$$s = \cot b \cdot \sec a \qquad \text{---------------(5)}$$

This forms the basis for a universal graphical calculator – Fig. 3.

Both axes are set out as tangent scales, the vertical being calibrated to show latitude and the horizontal to show great-circle bearings. Additional curves are then plotted to give the appropriate value of "cot b sec a" at each value of latitude "a".

The calculator is used as shown in Fig. 4.

Tabulated data for latitude 35 deg. obtained by calculation is shown in the appendix and very close agreement is obtainable by the graphical method.

Fig. 5 shows a part-plot of these values on a Mercator chart.

Note: In plotting, first locate the equatorial intercept with respect to the reference point. Then measure all longitude values from the equatorial intercept, NOT FROM THE REFERENCE POINT.

Because bearings are correct at all points on a Mercator chart, back-bearings from the remote end of a great-circle path can also be determined. This can be useful if the other party to a contact is not sure of his correct beam heading.

THE SOLAR TERMINATOR.

Since ionospheric propagation is dependent on solar activity, it is useful to know the extent of the solar illumination of the earth at any time. The perimeter of the illuminated area, the terminator, is also a great-circle, the location of which can be determined by the same general methods outlined above.

As the sun moves along the ecliptic, its declination and the extreme latitude of its terminator vary as follows :

Days from equinox.	Declination.	Extreme latitude of terminator.
0	0	90
15	6.4	83.6
30	12.2	77.8
45	17.0	73.0
60	20.6	69.4
75	22.7	67.3
90	23.4	66.2

Using the values in Column 3 and the methods outlined above, the data in Table 1 has been calculated. From this the family of curves shown in Fig. 6 has been plotted, together with the appropriate time lines. If this data is plotted on a transparency, it can be superimposed on the Mercator map with freedom to move in the East-West direction and used to indicate the daylight and dark regions of the earth's surface and also the local time at any place.

Note: Easier readability is obtained if a master-plot is made and the appropriate curve is traced on to the transparency as required.

The above is based on mean solar time which can differ from apparent solar time by as much as 16 minutes. However, correction for the "equation of time" can easily be made in the tracing process if required.

REFERENCES

1 Radio Communication Handbook; RSGB Fourth Edition, pages 12.22 - 12.24
2 The ARRL Antenna Book Twelfth Edition, Chapter 13

Newcomers Notebook

with Rodney Champness VK3UG

44 Rathmullen Rd., Boronia, Vic., 3155

"S"-meters for Amateur Receivers

In February's column I discussed the value of an "S"-meter in a receiver. I suggest that you read that before getting busy on your receiver with holecutters, etc.

In its simplest form an "S"-meter consists purely of a low value milliameter connected in the cathode or emitter circuit of one of the AGC controlled stages. With no signal input, the valve or transistor draws a certain current which diminishes in the case of a valve and can either increase or decrease in the case of a transistor. The amount of variation depends on the signal strength, although not necessarily linearly.

I will assume that you have a multimeter of at least 1,000 ohms per volt rating, as discussed in test instruments a few months ago. Fig 1 shows perhaps the simplest "S"-meter that you can install in either your home-made, bought or converted BC mantel receiver. This is an external meter, in fact your multimeter, which will not be in use otherwise when you are doing any operating. R1-C1 are the already fitted cathode or emitter bias components. Some sets do not have these components and have the cathode or emitter going to ground or common. Disregarding these, it can be seen that a multimeter set to a low voltage range and connected between points A and B will register a reading with no input to the receiver.

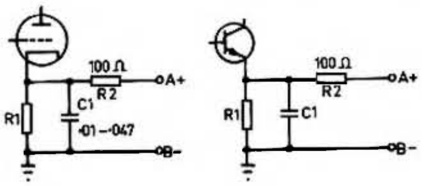


FIG 1

When a signal is received this AGC operated stage will alter its operating conditions and the current drawn will decrease with the valve circuit and a lower voltage will be registered on your multimeter. In the transistor circuit depending on whether the stage is forward or reverse biased will depend whether the current will increase or decrease, and so cause an increase or decrease in the voltage registered across R1. R2 is purely to act as an RF choke so that RF does not get radiated from the multimeter leads. An additional capacitor may be needed across A and B of about 0.47 uF. The value of R1 depends very much on the circuit of the set in use and the actual valve type in use and could, in the case of a valve, be anywhere from 40 ohms to about 1,000 ohms. Transistor values will tend to be lower.

This is normally a backwards reading "S"-meter and has no zeroing facility. It is a cheap system and gives good relative results. One resistor and two spring terminals would be all that would be needed, besides solder and wire.

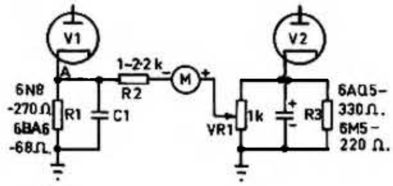


FIG 2

Fig 2 shows a slightly more elegant "S"-meter which is forward reading, has a zero adjust and can be designed so that S9 just comes to the end of the scale. For such a simple circuit this is very good. V1 is the Automatic Gain Controlled stage and V2 is the Audio Output stage. This particular circuit works on what is called the balanced bridge configuration. When there is no incoming signal the slider of VR1 is adjusted until no reading is evident on the 1 mA meter M. At this time point A and B are at the same potential so that in fact there is no voltage across R2 and the meter. Now, if a signal is received, the current drawn by V1 will reduce so that point A will drop in voltage say to one volt. There is now a voltage potential across R2 and the meter. Current will flow and cause the meter to read up the scale. How far it does read up the scale, depends on the value of R2. The value of R2 can be approximately calculated by finding out the minimum voltage present across R1 with the strongest signal you can possibly get. This may in the case of a 6N8 be perhaps ½ a volt. In this case then the variation in voltage across R1 is 1½ volts. The 1 mA meter must read full scale then with a voltage difference of 1½ volts between point A and B.

Calculation is as follows, using R = E divided by I. E = 1.5 I = 0.001 R = 1.5 over 0.001 = 1.5k ohm. Therefore R2 is approximately 1.5k ohm. It could of course be made variable temporarily until the correct value is ascertained. You will of course have to calibrate this meter in some way. Probably the easiest is to divide the scale into ten segments, which it may already be, and use the normal 1 to 10 scale and call ten, S9 plus. Simple, and perhaps not considered accurate, but very few amateur "S"-meters are anywhere near accurate. At least this will be able to tell you if one station is stronger than another. It will tell you if alterations to your aerial make any difference to the reading on a known station.

To suit a 6BA6, R1 will be about 68 ohms and R2 will be about 1k ohm. Other valves will require different values again. The power output valve may not be a 6AQ5, and may commonly be a 6M5. The 6M5 has a different bias point nominally 7 volts compared to the 6AQ5 with its 12.5 volts. The position of the slider on VR1 will be different in these two cases. With a little fiddling with the values you will get the meter to read very satisfactorily.

Another simple "S"-meter is shown in Fig 3. This appears to be a circuit that suits transistorised receivers more so than valved receivers. The circuit remains the same for both valves and transistors except that the capacitors C1, C2 and resistors R1 and R2 will be different in value. The load resistors R1 and R2 for valves will be in total about ½ megohm. Cut off bias for most valves designed for AGC operation is in the range from 20 to 50 volts. This means that the current through R1 + R2 will vary from 40uA to 100uA maximum depending on the valves used and their AGC characteristics.

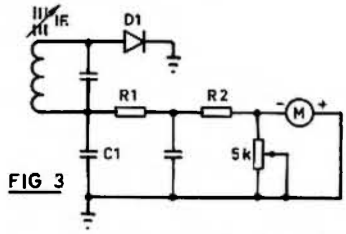


FIG 3

The disadvantage of this circuit is that in the case of valves a sensitive meter movement is needed. a 20,000 ohm per volt multi-meter on its lowest current range can be used here. The detector diode load resistors in the case of transistorised receivers are much lower and may be in the order of 10,000 ohms total. A 1 mA FSD meter may suit in these sets. The rheostat wired in parallel with the meter is used to set full scale deflection with the strongest signal you can receive. There is no zero set as with no signal there is no voltage developed across the resistors and hence no deflection. This is a forward reading "S"-meter. The value of the rheostat for valve circuits will be about 5k ohm and for transistors considerably lower. The active value of the rheostat can be measured with an ohm-meter and it can be replaced with the next lowest value fixed resister.

SUMMARY

The preceeding three circuits are simple but effective "S"-meters. If you want more of these I can oblige. Some circuits are much more complex than these, with no real advantage for simple receivers.

ODDS AND ENDS

Next month I hope to be able to give you a list of non-radio items which can be used for amateur radio construction projects. If anyone has ideas on items that can be used please write to me.

Mr Skeeny of Kew has kindly donated an old B-C receiver for conversion into a simple 160 or 80 metre phone transmitter. Ron Fisher VK3OM constructed a transmitter out of an old B'C set a few years ago, and has volunteered to build another. So in a few months an article describing this conversion can be expected, all being well. ●

SEA NET.

"A very highly informal but extremely effective net" is the description for the South East Asia net which meets on or near to 14.320 MHz at 12.00Z usually with Paddy, 457PB as net control. There were two previous annual conventions of SEA net regulars and interested participants, one in Penang and the second in Bangkok. This year the SEA Net Convention takes place in Singapore on 8th, 9th and 10th November with SARTS as hosts. If you want more details why not write to 9V1QF, Ed Gribl, C-o SARTS, GPO Box 2728, Singapore.

Try This

with Ron Cooke VK3AFW
and Bill Rice VK3ABP

One of the most deservedly popular features in the ARRL magazine QST has for many years been the Hints & Kinks page. Some years ago AR also featured a column of hints and kinks but it faded out in 1966. We have now decided to reintroduce it, but in a rather different, expanded form.

We would like to receive from anyone not only constructional clues, brief circuit descriptions and so on, as in QST, but also ideas, whether tried or not. Someone else may be better able than you to tell if your untried idea is practicable, or have more time to find out.

Send all contributions direct to the Technical Editors.

Everything we receive will be considered for publication.

How long we can keep this feature running depends on how much response we get from you, the reader with a bright idea! Until the ideas start coming in we will in the meantime publish a selection of hints and kinks from other publications.

Precise Zero Beat Device Using LED's

Robert W. Stankus, WIGEY, Director of Engineering Services for Totel Systems (Letot Inc.) has come up with a little gadget to precisely align crystals to an exact frequency. It enables exact visual alignment of 100 kHz crystals to WWV simply and inexpensively.

See Fig 1. Two light-emitting diodes connected in parallel, but with opposing polarities make an inexpensive display for indicating zero-beat frequency.

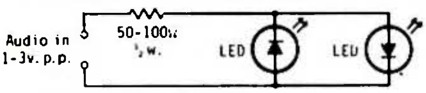


Fig. 1—Device for detecting zero beat to very close tolerances. Depending on the audio response of the receiver beats down to 5 Hz or less can be detected. LED's may be Monsanto MV-5094 or Fairchild FLV-100, or equivalent.

The display can be driven by an a.f. voltage from the receiver's low impedance speaker terminals (usually 8 ohms). A current-limiting resistor is included in the circuit and its value is not critical.

When the input frequency is more than 1 kHz away from the zero beat frequency, both LED's appear to be on all the time. Each one is correctly biased for half a cycle of the input and shut off for the other half. As the input frequency comes within about 20 Hz of zero beat, the LED's will flicker until exact zero beat is reached. Both LED's then go out and will remain out over the width of the zero beat frequency notch which usually is a + or −5 Hz. While the display is being used, the LED intensity will vary depending on the low frequency response of the receiver being used. (From Page 12, CQ, October 1973.)

NEON-BULB LAMP DRIVER

The circuit shown in Fig 2 permits operation of a neon bulb from a 12-volt supply at a current drain of approximately 6 mA.

Transistors Q1 and Q2 form a complementary astable multivibrator. The output of this multivibrator is used to drive switching transistor Q3. When Q1 turns on, Q3 also turns on. During the time that Q3 is on, current flows in L1. When Q3 is turned off, a large voltage spike appears across L1 and fires the bulb.

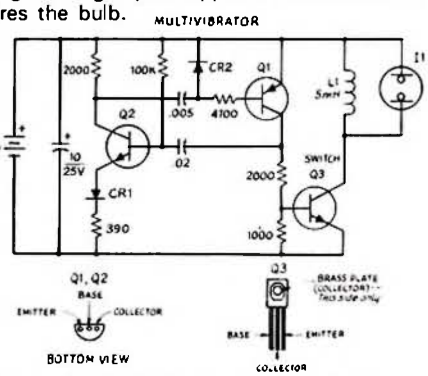


Fig. 2 – Schematic diagram of the neon-bulb lamp driver. Capacitances are in uF. Capacitor marked with a polarity is electrolytic; other capacitors are disk ceramic or paper. Resistances are in ohms; k = 1000. Resistors are ¼-watt composition.

CR1, CR2 – High-speed silicon switching diode (1N914).

I1 – NE-51H neon bulb.

L1 – See text.

Q1 – Pnp silicon, hFE 300-600 (Motorola MPS 6523).

Q2 – Npn silicon, hFE 300-600 (Motorola MPS 6521).

Q3 – Npn silicon, VCEO 300 V (Motorola MJE 340).

In a complementary multivibrator both transistors are off during one part of the cycle, and both transistors are on during the other part of the cycle. A complementary multivibrator, rather than the conventional variety, is used in the neon-bulb lamp driver, because it is off during most of the cycle. This results in less current drain. The circuit will operate satisfactorily at supply voltages of 8 to 16 volts, although the brightness is decreased at the lower operating voltages.

Transistors Q1 and Q2 were selected for their high beta, while Q3 was picked because it has a high breakdown voltage. A ferritecore rf choke was used for L1. – *Joe H. Duncan, K4ZL1-2.*

(From page 56, QST May 1970).

EQUIPMENT FINISH

When new equipment is purchased it is a good idea to give it a coat of automobile wax. This preserves the finish and makes dusting easy. – *Louis Berman, K6BW.*

(From page 47, QST February 1969.)

SIMPLIFIED METER SWITCHING

The writer recently built a simple 6146 CW power amplifier to follow a small transistor transmitter. A 6AQ5 clamper tube was used to protect the amplifier, and a 0-1 milliammeter and suitable shunt and multiplier resistors were employed to indicate either grid or cathode current. However, as shown in Fig 2, a SPST toggle switch, S1, was used to do the meter switching, rather than the usual multiple pole switch. When S1 is closed, M1 and R1 serve as a voltmeter to

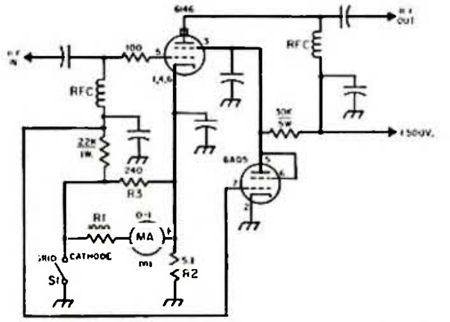


Fig. 2—Only a s.p.s.t. toggle switch is necessary to do the meter switching in this amplifier. Resistances are in ohms; K = 1000; resistors are ½ watt unless indicated otherwise.

M1—0-1 milliammeter.

R1, R2, R3—For text reference.

S1—S.p.s.t. toggle switch.

indicate the potential drop across the 5.1-ohm cathode resistor, R2. When S2 is opened, the voltmeter indicates the potential drop across the 240-ohm grid resistor, R3. The full scale cathode and grid current readings are approximately 200 mA and 5 mA respectively. – *Wes Hayward, W7Z01*

(From page 43, QST July 1968).

"Made in Australia"

A well understood phrase. But how soon might we see "Made in Space". As the "country" of origin so greatly affects trade through Customs Tariff preferences and import/export restrictions will the "made in space" (or "made on Mars") article be classified as the origin of the country owning the Spacelab? How about a joint Spacelab venture by several countries? Or will it be necessary to check the passports of the workmen? Or would something be labelled "Made in Ruritania" because the Spacelab happened to be over that country at completion time of the article!

Commercial Kinks

with Ron Fisher VK3OM

3 Fairview Ave., Glen Waverley, 3150

This month back to our old friend the FT 200 with some notes on improving the carrier suppression.

Before this however, I have had a letter from Phil 9M2CP regarding the FT101 modifications published in this column two months ago. Phil tells me that in the time since the original publication of these notes, he has made considerable improvements to the front end performance of his 101 and that an article describing this has been forwarded for publication in *'Amateur Radio'*.

I have also heard on the grape vine that there is a new model FT101 on the way which is reputed to have a vastly improved front end performance. I believe it will be known as the FT101B. (see insert October 73 AR. Ed).

The August issue of the ZL FT200 Club carried an excellent article on 'Better Carrier Suppression with the 7360', by Brian Pickett ZL2BDU.

..''When first put on the air, my FT200 had one or two problems, one of which was solved by checking into the Club Net one night. The other was not quite so simple, excessive carrier made it possible to tune and load the finals without tone. The Manual was consulted and the carrier balanced out as per the instructions. Local QSO's showed a carrier strength of S7 and on-the-air adjustment achieved no less than S5. To obtain this level was a nervewracking task, just breathing on the alignment tool upset everything. Long term stability was also very poor. Obviously the carrier balance control had insufficient resolution and stability, so a Cermet 15 turn professional potentiometer was temporarily substituted and with this, 50 dB suppression was possible.

..Fine, I had exceeded the original specification by 10 dB however the theoretical maximum with the 7360 tube and crystal filter is about 80 dB and I thought I could do better than I had.

R. F. Balancing

*Examination of the circuit shows that the carrier balance control is in reality a carrier amplitude control, relying on **exact** phasing of the RF across L105 to achieve balance with VR106. The action of VR106 is to equalise the RF voltages at the anodes of the 7360 which, if exactly in phase, should then cancel or balance out. Just how critical the phasing of the RF voltages across L105 are, can be seen from the fact that one degree of phase error will result in a reduction of carrier suppression by about 20 dB. The circuit at present has no manual adjustment for phase errors and this has lead me to the obvious conclusions that L105 is factory 'tweaked for the correct phase relationship. Actually L105 is somewhat crude for a circuit requiring component symmetry. It consists of a single winding tuned by a matched pair of 150Pf mica capacitors. The output link is taken from the top end of the coil.*

..The ideal output tank would probably consist of a bifilar anode winding with the output link taken from the centre. This was considered too drastic a modification, it had to be simple.

The simplest form of RF phase balance uses a trimpot across the output tank, so this was tried. Suppression was excellent — better than 65 dB but the 'Q' of L105 was reduced, and the receiver sensitivity degraded. This method is quite OK for frequencies generally below 2MHz.

Temporary installation of a 30pf differential trimming capacitor across L105 showed promising results, and the coil could be re-peaked with its slug to compensate for the added capacitance. Permanent installation consisted of an 'L' shaped bracket mounted with two 6BA screws on the shield partition between the main print board and the rest of the chassis. The differential capacitor was fitted onto this bracket, directly over the input terminals of L105, and a small brass shield about 1 by 3cm fitted between pins 6 and 7 of the 7360, and the input pins of L105. The shield was earthed solidly at the 7360 and L105. Permanent mounting of the 15 turn trimpot was achieved with the aid of Araldite.

Fitting the case back onto the rig and drilling a hole immediately above the differential capacitor to allow the use of an alignment tool completed the operation. The DC balance trimpot could be reached by a slim trim tool through the ventilation slots.

Alignment.

*If you propose to do this modification, you will need to realign the balanced modulator and L105, and will need suitable alignment tools. Metal of any kind is strictly taboo, although metal tipped tools are OK. A VTVM with RF probe or a VOM with a 'sniffer' and a 68 ohm 1 watt carbon resistor as a dummy load. Initially set the phasing capacitance to half and warm up the rig for 15 to 20 minutes, with the antenna connected. Tune the transmitter for maximum RF output in the normal manner, switch to standby and after disconnecting the antenna, fit the 68 ohm dummy load and RF probe. Switch function to SSB, move lever switch to OPER, and turn the MIC gain fully off. Repeak all transmitter controls for maximum output as indicated on the VTVM. Typically 30 to 100 volts initially. **DO THIS QUICKLY**. Using a metal tipped tuning tool (the differential capacitors are hard to turn), repeak L105, adjust the phasing capacitor for minimum RF and then the DC amplitude control for minimum, and so on. It may be found that it is necessary to unbalance with the phasing control and rebalance with the DC control VR106. Care and patience is necessary. Eventually a point will be reached where minimum carrier is obtained, the final adjustment is quite critical, requiring only small changes of the phasing control to achieve balance. When completed typically less than 25mV of carrier should be obtained and in my case slightly better than 73dB of suppression was obtained. Long term temperature stability appears to be excellent.*

Points to note.

The alignment must be completed with the cover on, and L105 repeaked. The replacement of VR106 with a 15 turn Cermet trimpot can effect a very worthwhile improvement on its own. Cermet is the name given to the type of resistance element in the trimpot, and is not a brand name. Don't remove L105; placement of components within the can is critical. The capacitor is a Jackson Bros, type 701''. ●

YRS

with Bob Guthberlet

Methodist Manse, Kadina, S.A., 5554

Club Leaders should be aware of the value of publicity for the WIA Youth Radio Club Scheme, and where possible organise a Publicity Officer to make news available to their local press; (a personal interview with the editor of any country Newspaper will be rewarding to clubs that are willing to help themselves). TV and Radio will also give time in their Community Service programmes.

A news cutting sent to me shows the value of liaison between clubs and the community.

> *The Maitland (N.S.W.) club's theatrette was again packed to capacity for the presentation of the 1972 I R E E Pennant, Y R C S certificates and prizes won by members.*
>
> *Guests included: Mayor of Maitland Ald. Noel Unicomb, and Mrs Unicomb, representative of Radio and Electronics Engineers, Mr C. Cowan, District Radio Inspector Mr F. Hinks, Member for Paterson, Mr F. O'Keefe, president of the Hunter branch of the Wireless Institute, Mr G. Sutherland representative of NBN Channel 3, Mr R. Prout, secretary of West Lakes Radio, Mr E. Brockband and Mrs Brockband, Miss Rhonda Eddy (Miss Newcastle and Hunter Valley 1970) and club leader of the Gosford YRCS Radio Club, Mr G. Proctor, and the Officer-in-charge Maitland Police Sub-District, Inspector N. Bowden who addressed the gathering.*

The reader of this may say, ''Well, that's fine for Maitland, but how can it help my club?'' My answer is, ''Have you tried to get publicity? If you haven't, you don't know!''

Those who have travelled in the Holy Land will recall the River Jordan with its tributary in the hills of Syria and travelling south reaches the Sea of Galilee, which in turn passes it further south until the river reaches the Dead Sea, and here it stops. The Sea of Galilee receives and gives, and is alive with vegetation and fish; the Dead Sea receives and keeps, and because of this it is dead. To my mind, that is a fair description of some club members . . . they receive but give little or nothing. Y R C S is a movement of youth and for its future to be assured there must be a vital giving of time and talents, on the part of all concerned. To say, ''that's all the time I can spare'' is not good enough.

From the aspect of publicity, which I receive very sparingly from most of the States, it would seem that little movement is taking place, and that points to stagnation! It has been suggested to me in some quarters that to publicize Y R C S is to invite difficulties in that we couldn't find the necessary instructors for an increased club membership; my reply is that by increasing membership we shall create a demand for help, and without that situation the scheme can hardly go ahead. In the business world it is necessary to see the d[illegible] and then supply the product. Y R C S has the product and it's a good one. In a recent daily newspaper I read that the 1970's would see greater use of electronic devices and other forms of technology in schools. To this area of activity we must address ourselves and this is the time to be up and doing something about it. Within a few weeks I shall be asking State Supervisors to report Club statistics . . . there is still time for upgrading the 1973 figures.

YRS OF VICTORIA

Frank Whittom, VK3BAN reports that he has taken over the work of State Supervisor YRS of Victoria with effect from 1st October, 1973.

Frank requests that correspondence and enquiries concerning WIA YRCS of Victoria should be addressed to him at 204 Churchill Avenue, Braybrook, Vic. 3019, telephone number 311-0619, Monday to Friday 0900 - 1700 hours.

All Victorian school and other YRCS radio clubs should write to him forthwith to initiate various formalities and to confirm both their registrations and their requirements of notes, certificates, etc. ●

Contests

with Peter Brown VK4PJ

Federal Contests Manager, G.P.O. Box, 638
Brisbane, Qld., 4001.

1973 REMEMBRANCE DAY CONTEST RESULTS.

VK5 tightens its hold on the Remembrance Day trophy.

Yes VK6, with some help from VK8, very successfully carried out their plan to retain the RD trophy for 1973.

Tasmania tried hard but the massive score from VK5 was too much to overcome.

VK7 led in highest average of top six Logs and also in participation. Now get out your pencil and paper and do some figuring as to what is required next year. Whatever you decide is necessary to win the trophy will have to include some detailed planning and organisation. This is the year that the VHF fraternity showed their ability with some effect. Note the number of VHF scorers; generally the point score is close to the number of contacts, in VK5, 6 and 7. Apparent to me was the number of HF operators who also scored many single points on VHF, realising that every VHF contact was two points to their state.

Congratulations to VK5 on a job very well done.

Did we make 700 Logs???

Yes we made the grade with a total of 709 Logs, including SWL's logs. Thanks to those who participated and helped us on the upward path.

You must be pleased that you helped achieve the goal.

There were many missing this year who will have the opportunity to help us achieve next year's goal.

BUT Most Important!!!!!!

I received a record number of comments and a record number commented on the friendly atmosphere of the contest.

The simplest comment, on a scrap of paper, seemed to me the most heartfelt and I give it to you.

"A very lovely contest. God bless you all"

We can be very proud of our contest . . . help with it next year. Many Logs had the other contacts name written in. If you have time to exchange names it makes a more friendly contest.

Look out here are some brickbats.

Over 700 Logs (yes I asked for them) about 3000 sheets of paper, a September deadline to get results in November Amateur Radio, and I get

1. A high percentage of Logs without a front page.
2. A high percentage of Logs without any details anyhow.
3. About seven Logs without any scoring.

My heartfelt thanks to the VK5 gentleman who prepared so many front sheets and made my job so much easier.

If you expected me to correct 1, 2, 3 . . . you were right . . . I was determined that we make a success of the contest.

Again my compliments to so many, generally high scorers, who typed and printed copy book logs.

DETAILS OF DIVISIONAL SCORES AND PLACINGS.

Division	Logs	Licences	Participation per centage	Top 6 average	Points	Score
VK5 & 8	154	798	19.3	1471	47096	10559
VK7 & 0	67	227	29.5	1615	21582	7985
VK4 & 9	127	839	15.1	1301	35994	6749
VK1 & 2	145	2162	6.7	1416	42867	4289
VK6	86	516	16.6	972	19764	4266
VK3	92	2012	4.5	870	22617	1904

In detailed scores the first figures are the points score and the second contacts made.

Divisional sectional leaders logs are subject to further checks.

Logs from VK5UF. 30 points and 6 contacts. and VK9ZC. 1323 points and 431 contacts were not included in the Divisional results but do not affect them markedly.

STATE SCORES

VK1

Phone

MP	1218	567	JL	285	127	RH	56	34
GR	1068	425	RA	206	114	ZGC	30	30
MS	667	259	LF	129	52	ML	11	11
JC	544	201	ACA	118	71	ZAR	8	8
YR	288	157	MF	60	25	VK	6	6

CW

VP	262	72
LO	148	74
DC	116	55

Open

AOP	1074	434
DA	903	404

VK2

Phone

BNS	1700	581	BML	216	83	IJ	72	21
ASD	1579	621	BHD	193	58	AIM	69	19
XT	1448	505	BKG	193	60	ZCT	69	69
DM	1185	418	VU	173	52	ZSG	65	65
DWF	1139	407	AJH	169	42	AYL	63	20
AGF	845	274	CM	166	41	BJK	60	21
BKM	807	279	MR	167	41	OH	58	14
BBN	738	299	WD	160	52	CW	58	15
ACZ	712	267	AGS	160	65	DC	57	26
BDN	674	286	NV	145	50	CI	56	35
AJY	637	235	AYN	145	51	AWX	49	17
ZA	567	190	FC	136	32	AHH	48	21
APQ	551	172	BYY	128	69	AKQ	44	17
AWN	437	157	SG	120	23	ZDR	42	42
EJ	403	160	WT	118	38	XD	38	12
VG	398	102	RU	114	23	AEC	37	18
BDB	372	160	SW	114	27	AHA	36	11
JX	352	127	PF	113	23	ZIL	36	36
BLB	345	131	BUC	108	35	BGG	35	9
AJL	321	103	ASJ	103	33	ZVN	35	35
AXU	275	89	GV	101	29	ZVY	27	27
ANO	275	75	AGZ	99	30	CAL	25	21
ML	274	118	KQ	99	35	BVS	23	20
BMX	271	101	BXG	97	25	AVR	17	17
ACD	255	88	AFA	94	26	ZMO	15	15
BBI	246	80	AKY	91	22	CF	10	6
CS	221	62	BHS	80	19	ZWL	7	6
LW	219	54	GT	77	30	AQ	6	6
AXJ	216	96	CU	76	22			

Open

BO	1357	488	BZX	443	164	RJ	243	72
CAX	1070	340	PN	368	115	BPR	212	72
BTS	791	293	HQ	322	123	AYF	169	70
BJL	692	250	PU	284	93	HZ	108	25
BMM	682	238	AAC	260	100	AJQ	101	31
AHM	609	203						

CW

CX	556	211	AV	218	92	SI	58	20
GR	511	197	ZO	202	34	LH	58	53
BF	437	173	JY	145	63	ZC	52	20
QL	423	143	BBB	136	61	IV	51	24
HW	334	118	BQQ	97	37	AWI	43	18
VN	291	103	JM	93	47	AXK	39	12
BNA	285	105	XQ	88	40	AND	16	6
BHO	263	104	VM	79	27			

Receiving

J. Varrnela	1016	227	R. Sulcs	656
J. Hilliard		697	S. Dwight	610

VK3

Phone

AYF	881	409	ZD	240	108	AFW	121	51
VK	805	326	HT	240	117	AKZ	102	19
ADW	746	309	KR	238	120	WQ	85	26
DF	736	335	HZ	220	100	AJP	83	35
BDL	728	364	LV	218	76	UJ	76	16
ZY	641	290	BJB	206	66	YBS	67	67
APS	551	220	AKC	184	116	NZ	62	32
AXV	550	252	AUQ	178	107	JK	56	39
RV	476	222	ZJ	174	54	LY	54	54
EF	475	210	ASE	171	69	AFI	50	44
YQ	475	175	DH	168	55	GS	48	27
DS	429	148	QZ	150	62	YF	47	22
KK	370	145	YAP	146	146	ZBB	44	44
SM	338	151	WM	143	53	ZRG	39	40
BCT	330	155	AGJ	140	118	ZGY	25	25
ALK	324	181	DY	132	54	KS	22	7
ANP	314	120	ASV	130	57	YFL	16	16
HE	288	120	AAM	128	72	RN	12	7
BFN	260	122	EG	125	37	2QC-3	12	10
						ZTA	7	7

CW

OP	533	247	CM	184	85	NK	85	47
XB	527	234	ZO	142	72	ZM	80	24
JI	279	122	KX	132	61	AXQ	63	20
YK	242	110	RJ	122	58	BRC	58	24
DG	230	117	ABR	117	50	XV	32	17
ACV	200	106	ARV	91	40	OF	7	5
ARK	197	101						

OPEN

BCF	1265	562	BGR	289	130	PY	103	37
WW	793	359	ASD	195	106	BCZ	41	25
AYL	633	316	YO	143	80	TJ	32	20
OP	606	264	AER	130	55	ARA	13	6
VF	320	152	ZZU	113	113			

Receiving

S. Gillespie		557	204
E. Trebilcock	337	162	All CW
A. Cash		180	32

VK4

Phone

VU	1604	611	PJ	196	63	FE	51	15
RH	1406	420	AK	178	50	ZAY	47	48
EQ	1305	499	EF	173	50	XN	43	10
NU	965	351	FN	152	72	IQ	44	44
OW	928	320	NO	164	52	QW	42	12
PX	896	319	NV	124	52	CR	42	44
IC	778	306	ZP	114	32	HW	41	26
DO	681	229	YA	114	35	ZTK	41	42
IE	678	292	AF	111	39	NG	36	12
QE	673	211	PU	106	30	BG	35	12
FU	577	202	JI	103	47	LE	30	12
KV	550	190	ZAP	102	104	ZML	29	29
PS	549	201	UJ	101	101	GT	29	22
TK	509	169	LB	93	39	ZNH	28	28
JS	465	118	RL	93	36	HZ	27	11
RJ	417	150	NP	92	39	NS	22	9
NQ	403	121	VS	90	36	EH	22	11
GD	388	125	OF	83	23	ZHK	21	21
ZB	384	127	DJ	81	31	ZFA	18	18
IZ	347	106	AT	79	28	SF	18	8
VV	343	120	RC	72	31	YQ	18	6
UP	313	119	QC	66	25	ZEA	16	6
DZ	299	101	ZZ	66	20	BQ	16	6
OA	267	86	OD	65	36	ZTL	15	15
FX	257	75	AQ	65	32	CW	14	6
LN	258	84	ZEZ	57	57	QT	13	6
XG	256	97	HJ	55	25	ZDG	9	9
GI	245	79	RO	55	29	IO	9	9
CZ	214	66	OR	54	14	LU	8	8
OX	226	66	DV	50	22	QS	6	6

CW

XW	703	133	SO	150	60	XJ	47	[illegible]
KX	426	160	RE	106	47	WL	32	[illegible]
PB	330	66	HH	65	30	CN	32	8
MY	238	95	FB	56	21	GH	15	8

Open

RF	1275	453	UA	663	210	BZ	53	18
HE	1118	331	PM	342	101	CA	50	25
UX	1099	341	RT	273	102	VH	47	18
FH	1096	433	LC	269	70	NB	43	19
LT	905	315	PV	206	63	FJ	16	13
XY	680	194	GS	139	53			

Receiving

W. Whiteway	1245	V. Lenehan	505-192
H. Grau	771	K. Cunningham	436-167
A. Downey	506-186	A. Macpherson	189-69

VK5

Phone

QX	1700	650	AX	276	104	JB	68	20
BI	1595	550	CE	265	109	WB	67	30
NC	1363	503	MF	262	75	ZBU	67	67
FT	1131	404	RR	254	95	LQ	65	17
WV	1070	390	WN	254	100	BF	65	23
AF	1038	360	GZ	233	105	MA	65	20
NN	975	330	TY	209	78	QO	63	16
PH	949	370	ZCP	207	207	ZQ	55	27
KM	878	317	FQ	200	92	GV	50	15
ZI	836	355	ZGZ	191	191	ZR	49	37
FD	835	296	HM	181	66	ZMF	48	48
BQ	827	315	TW	163	90	ON	48	15
QV	758	267	CH	162	49	ZAP	47	47
UJ	731	246	ZAC	150	150	ZCV	45	4
LM	724	250	ZNJ	150	150	KS	43	[illegible]
DV	706	300	AW	147	136	ZS	43	43
QH	688	290	ZEG	121	121	AC	42	16
DK	686	269	CY	112	30	DJ	36	30
NY	662	236	ZJV	112	112	ZBM	36	36
WI	621	217	FL	111	29	EW	35	35
LP	615	210	RI	111	48	GF	34	10
HS	597	218	SR	104	30	DO	32	10
VB	592	113	ZKT	104	104	MC	30	12
NJ	576	200	ZJH	101	101	ZKJ	30	30
ST	491	172	ZAW	100	100	ZN	30	30
GM	483	177	ZFJ	100	100	ZPW	28	28
UC	480	150	CL	95	62	ZAG	26	26
VT	469	202	ZBC	93	94	ZJF	26	26
UM	447	168	ZNN	91	91	CIL	21	21
EF	428	150	YS	91	50	ZUR	21	21
CD	427	152	KU	89	30	ML	19	12
PX	406	158	TU	86	54	AZ	18	5
ZK	391	145	BX	73	25	ZIM	18	18
HI	379	151	LC	71	27	MK	15	15
EK	367	127	QG	71	20	ZKK	14	14
HN	349	151	CA	70	35	LL	13	7
LN	337	102	ZWW	69	69	LZ	11	11
ZU	330	100	DE	68	20	ZJG	10	10
TV	303	303						

CW

MY	345	133	UY	99	40	RX	53	16
OR	329	116	HR	73	30	KY	44	12
XK	282	115	KL	61	26	LD	34	17
AU	213	69	TL	60	30	YA	19	5
BO	112	39	FY	55	23	JG	13	8
HO	101	57						

Open

EN	1144	422	QP	412	151	RK	157	58
MM	772	327	OT	367	110	KJ	138	60
RG	543	207	IF	318	126	QR	75	37
FH	508	164	ZF	196	62	RC	124	62
FM	506	202						

Receiving

R. Whitford	1664	627	D. Minchen	73	170
M. Dibden	640	213	R. Edmeades	62	131
C. Collins	367	151	T. Hannaford	10	10
C. Fordham	198	84			

VK6
Phone

KG	1364	546	AN	209	82	TP	66	49
DA	918	415	ZHR	209	209	GR	64	29
AB	876	350	MO	204	64	VF	63	63
KY	766	335	DZ	178	84	WH	63	63
VP	724	283	ZJD	174	174	BO	61	21
ZZ	664	127	ZGZ	166	167	NA	57	19
JK	598	227	AO	161	61	MB	57	26
VW	411	155	HE	160	51	RD	40	34
RL	395	153	ZKO	128	128	JA	34	16
NM	328	124	ZIW	128	128	LF	33	33
RV	310	116	DC	121	55	CD	31	13
BY	308	162	VK	107	38	PD	31	31
HU	273	192	KC	106	33	ZFF	31	31
ZDG	264	264	ZHJ	103	106	CH	30	9
OR	260	106	EW	99	42	HC	25	12
WL	258	101	ZKW	93	93	WD	24	19
NE	257	168	WI	89	89	PX	20	13
DD	256	124	AWI	88	88	KU	16	7
WY	251	94	XY	86	44	LT	12	7
WU	242	55	XX	81	27	ZKY	9	9
SH	233	172	XV	76	35	ZK	7	6
ZHA	233	233	ML	75	25	FN	5	5
ZDA	230	232	SR	73	39			
TU	223	89	FP	67	31			

CW

WT	498	194	RS	285	177	GA	22	10
CT	492	193	CF	90	36			
BO	488	190	WA	33	15			

Open

MA	1185	517	QJ	325	160	DW	42	14
RU	621	274	HK	242	101	LE	21	10
EB	556	222	CR	96	40			
ZE	370	164	DW	96	40			

Receiving

T. McGrath	1107	403	G. Allen	171	
R. Edwards	540	335	D. Hides	138	47
C. White	456	97			

VK7
Phone

AZ	1521	631	ZIE	232	232	ZLH	71	71
JV	1404	626	EM	222	105	ZWX	59	59
MS	976	426	ZBY	205	205	AB	48	30
MX	730	316	ZSF	201	202	RX	46	10
NR	693	408	SR	201	107	HE	45	45
LH	552	339	EB	195	84	CT	43	20
BR	475	284	ZGG	172	172	AX	25	25
KH	441	157	ZGJ	154	154	TT	23	23
ZIF	400	402	PF	163	143	AI	20	8
OH	381	217	JU	143	69	ZJG	18	18
GW	372	106	ZAQ	143	143	JO	14	14
KK	320	181	ZLD	139	139	JD	10	10
PS	280	240	ZMF	138	139	ZL	10	10
FB	279	177	BK	102	47	ZBE	9	9
MJ	258	125	AW	119	104	NZ	9	9
WH	253	149	ZFR	117	117	ZX	8	8
LS	253	150	MK	79	79			
BM	236	107	ZJR	75	75			

CW			Open			Receiving	
CH	408	181	KJ	1533	691	R. J. Everett	975
GV	226	100	SS	1223	612		
RY	205	119	AL	723	214		
BJ	110	41	RH	544	308		
CIC	60	25	LP	216	120		
JB	25	15	LZ	143	54		
YL	25	19	KS	27	27		

VK8

Phone						Open		
CM	1085	410	JS	155	72	KK	1895	738
ZB	608	235	AZ	87	30	ZZ	519	210
DI	527	207				OU	440	146
KP	388	157	CW					
			HA	219	83			

VK9

Phone						Open		
GA	943	308	FV	411	131	EJ	656	233
RY	903	284	GR	212	83			
FD	674	223	KA	141	43			
EM	655	196						

VKO
Open

WW	3032	534

New Zealand

Phone			CW		
ZL2AH	768	300	ZL4CP	697	157
ZL3ABC	692	198			
ZH2AUP	593	305			
ZL4OP	512	112			
ZL1AGO	439	223			
ZL2HE	257	123			
ZL4CA	203	30			

Open

ZL2ACP	590	152
ZL1AMM	223	108
ZL1OB	204	107
ZL1SV	175	101

ROSS HULL MEMORIAL VHF-UHF CONTEST 1973-1974

Now that you VHF chaps have shown that you can really get into a contest what about making the Ross Hull a smashing success??? All you do is get on the air, make a few contacts and send in a Log. Your participation will make the contest a success.

The target for the coming contest is 200 Logs . . . the number you gave numbers last year, but only 40 sent in Logs.

You could exceed 200 Logs with the greatest of ease by just trying. Come on VKs 2, 3, 4: get going.

JOHN MOYLE MEMORIAL NATIONAL FIELD DAY.

Now is the time to obtain and-or try out your "putt putt" for the second week-end in February.

CONTEST CALENDAR

November 3rd and 4th R S G B 7 MHz phone.
November 11th Czechoslovakian Contest.
November 24, 25th CQ WW DX CW contest.
December 7th Ross Hull Memorial VHF-UHF Contest.
December 22nd, 23rd Hungarian Contest.
February 9th, 19th John Moyle Memorial National Field Day.
February 24th Central Coast Amateur Radio Club Field Day.

Some CQ Contest results

VK2BKM	946368	1300	90	158
VK2GW	277344	667	61	83
VK3KX	653020	1078	79	127
VK3XB	54416	246	38	38
VK3JI	78660	308	30	60
VK3APH	126996	559	25	51
VK3RJ	576	20	9	7
VK4AK	1247	17	14	15
VK6AJ	36984	189	28	41
VK6CT	9956	94	16	22
VK6HD	54	4	3	3

Multi single operation

VK4VU	621712	1094	72	124

CZECHOSLOVAKIAN CONTEST

November 11th 0000 GMT Sunday to 2400 GMT Sunday 11th.

Participating stations work stations of other countries. Contacts of same country multiplier only . . . no points.

All bands. No cross bands or mode.

Exchange Phone: 4 numbers, RS report plus ITU zone number.
CW : 5 numbers, RST plus ITU zone number

Scoring One contact per band per station. One point per complete contact. 3 points per Czech station contact.

Multipliers The sum of ITU Zones from all bands.

Categories
A. Single op all bands.
B. Single op one band.
C. Multi op all bands.
Any assistance makes the station a multi op.

Separate Log for each band.
A Column for points and also ITU zone (first station only).
Usual front page with details, including declaration.
An award for 100 "IK" station contacts.
Logs to The Central Radio Club,
Post Office Box 69, Prague 1, Czechoslovakia.

Afterthoughts

The VK-ZL-Oceania DX Contest 1972 Results printed on page 20 of August 1973 A R accidentally omitted the following two scores under VK-Phone —

Call	80	40	20	15	10	Total
2ABC	—	—	5235	—	—	5235
2ASI	—	—	—	4295	—	4295

Apologies to the participants concerned.

Ionospheric Predictions

with Bruce Bathols, VK3ASE

The Predictions listed below are obtained from information supplied by the Ionospheric Prediction Service Division of the Commonwealth Bureau of Meteorology.

Times stated are G.M.T.

28MHz

VK3 to (possible 40 per cent)

Cut out

	0700-1300
G (L.P.)	1000-1100
UA	0600-0700
W6	2200-0200

14MHz

East Coast to

ZL	2400-2400
SU	0900-2400
KH6	0400-2100
ZS	1200-1700
G (S.P.)	0700-1600
G (L.P.)	0800-1300
VKO	1900-1400
VE3 (S.P.)	1200-2100
VE3 (L.P.)	1400-1600
UA	0700-1500
W1	1300-2000
VK9	2400-2400
PY	0400-1200
W6	0400-0500
JA	0600-1800
9G1 (S.P.)	1400-1600
9G1 (L.P.)	0400-2000

VK5 to

SU	1000-2400
ZS	1200-1600
G (S.P.)	0800-1700
G (L.P.)	0800-1400
UA	0700-1500
W6	1600-2100

VK6 to

SU	1000-2400
ZS	0300, 1200-1800
G (S.P.)	0900-1800
G (L.P.)	0900-1600
UA	0800-1600
W6	1600-2200

7MHz

VK2 to

SU	1400-2000
ZS	1600-2000
G (S.P.)	1400-2000
G (L.P.)	0800
UA	1200-2000
W6	0800-1600

Sunspot Numbers Predictions —
October 28, November 26, December 24, January 22, February 20.
— Mean for August 1973 — 25.6
— Swiss Federal Observatory, Zurich.

VHF UHF
an expanding world

with Eric Jamieson VK5LP
Forreston, S.A., 5233
Times: GMT

AMATEUR BAND BEACONS

VK0	52.160	VK0WI Macquarie Island
VK0	53.100	VK0MA Mawson
VK0	53.200	VK0GR Casey.
VK2	52.450	VK2WI Dural.
VK3	144.700	VK3RTG Vermont.
VK4	52.600	VK4WI-2 Townsville
VK4	144.400	VK4WI-1 Mt. Mowbullan.
VK5	53.000	VK5VF Mt. Lofty.
VK5	144.800	VK5VF Mt. Lofty.
VK6	52.006	VK6VF (VK6RTV) Bickley.
VK6	52.900	VK6RTT Carnarvon.
VK6	144.50	VK6RTW Albany.
VK6	145.000	VK6VF (VK6RTV) Bickley.
VK7	144.900	VK7RTX Devonport.
VK8	52.200	VK8VF Darwin.
ZL1	145.100	ZL1VHF Auckland.
ZL2	145.200	ZL2VHF Wellington.
ZL2	145.250	ZL2VHP Palmerston North.
ZL3	145.300	ZL3VHF Christchurch.
ZL4	145.400	ZL4VHF Dunedin.
JA	52.500	JA1IGY Japan.
HL	50.100	HL9WI South Korea.
HL	52.010	
KX6	50.110	KX6HK Marshall Islands.

• denotes an added listing this month.

In addition to the above beacons, for those new to the bands during DX seasons, the various television stations provide high level signals from time to time. Those of greatest interest are as follows:

50.750 Channel 1 from New Zealand
51.740 Channel 0 from Wagga
51.750 Channel 0 from Brisbane
51.760 Channel 0 from Melbourne
143.750 Channel 5A from Wollongong.

It should be noted however, that the power of these stations is 100 Kw ERP and need to be heard very strongly as a rule before amateur station signals are workable. The 10kHz separation between the Australian stations allows for identification of the particular transmitter. Separation frequencies for New Zealand TV Stations were published last month.

ROSS HULL MEMORIAL CONTEST

The Federal Contest Manager Peter VK4PJ writes seeking help with the promotion of this year's Ross Hull Memorial Contest. Peter mentions that records indicate that more than 200 V H F operators took part in last year's contest, yet less than 40 submitted Logs! Well, that is not a very good indicator for the overall success of the Contest is it? Is it really worth running a contest on a national basis for less than 100 entrants? Isn't is possible for the V H F fraternity to give a similar display of support to that shown in the Remembrance Day Contest? Perhaps most of us are too tired after the hot weather of the summer to be bothered with writing up a Log. Is the daylight saving worrying you, with mother on your back to get on with the gardening during all those long hours after you finish work at 5 p.m.? Yes, I know I did not submit a Log myself last year, the first time for a long time that I had not, but then it is a bit difficult to send in a Log if you did not work any stations at all due to a changeover to SSB which was not completed in time. That is my excuse. What was yours?

OK. That was last year. What about this year? Can we try and get 200 Logs submitted, even 100 would be a vast improvement but let us try for 200. The best way to get your Log done is to start on it as soon as the contest is over; do not put everything aside for a week or more just to have a well earned rest, otherwise most go on resting and the log is never submitted. Anyway, all joking aside, let us be serious about it, and see what we can all do to make the Ross Hull Memorial Contest one which perhaps for several reasons need only be second to the R D Contest in VK.

A final point on D X in general. This year again will see a further increase in the number of S S B operators on 6 and 2 metres, and if you are able to run fairly high power you will no doubt find the bands open to you more than previously; certainly S S B stations are workable longer than AM stations. However, there is a place for AM on the bands, 6 metres in particular, but with many of the usual operators now set up for S S B it rests now with the AM operator to make sure he has a clean stable signal, preferably VFO controlled. If you have a drifting signal with FM on it, your days of being received by the S S B boys are very severely limited. Due to their narrow pass-band receivers, one or two attempts is all you will get, after that, on your own! Finally, for the S S B boys, watch how you shout into the mike; if you are running 400W PEP on a poorly set-up transverter, you can finish up being 20 to 30 kHz wide, and cause considerably more interference than you did when having similar signals (noise-wise!) on AM.

EME SIGNALS

Word arrives via Lyle VK2ALU from the Illawarra Branch of the W I A in NSW, that an EME test was made on 2-9-73 with K2UYH and W6FZJ. The signals received from K2UYH were much better than ever before and reflect the additional gain obtained by Al from his 28 foot dish over that from his previous 20 foot diameter dish. Here I take up Lyle's story:

We copied solid signals for several of his transmissions, peaking up to 7dB or more above noise. For the first time we were receiving signals possibly louder than our own echoes, due to his transmitted power being much greater than ours. However, he was not copying us as well as we were getting him, probably due to our lower power. The signals from W6FZJ were detected but not good enough copy to make them readable.

A.C.T. DIVISION OF W I A.

A copy of Volume 1 No 1, of *Forward Bias* has been received from Canberra from that newly created division, and is full of news. I hope in time it will feature a VHF column as surely there must be some VHF operators still left in Canberra! I noted with interest the mention of two new amateurs to the ranks in Canberra, Peter VK1LO and Chris Davis VK1DC. Both were members of the YMCA Radio Club. Chris passed his exams at 14½ and was able to get on the air on his 15th birthday. He operates mainly CW on HF. The note at the bottom is the interesting part: *VK1RD, VK1DA and VK1DC are brothers.* That's quite an effort for one family; wonder if there are any others around Australia?

FROM GEELONG

The Geelong Amateur Radio and TV Club Newsletter for September duly arrived and I was rather taken with a cleverly written piece of nonsense contained therein. This column does not often divert from the straight and narrow path of VHF but I think the Editor will grant me space this time. I quote:-

WANTED. *A reward is offered for information leading to the arrest of Eddy Current, charged with the induction of an 18-year-old coil named Milli Henry, found induced, half choked and robbed of valuable joules.*

This unrectified criminal armed with a ferrite rod, escaped from Western Primary Cell, where he had been clapped in ions since Faraday.

With an erg to be free, his escape was carefully planned in three phases. First, he fused the electrolytes, then climbed through the grid despite the impedance of the warders who reactance was too slow. Finally, he went to earth in a magnetic field.

What seems most likely is that he stole an a c motor. This is of low capacity and he is expected to try to change it for a megacycle, and return by a short circuit to ohm. He may offer resistance and is a potential killer. A. C. Maynes-Humm. Sheriff.

ATV COLOUR FIRST

Two South Australian Amateurs on 17th September established what is believed to be an Australian first with the successful completion of a two-way duplex contact using colour ATV. Maitland VK5AO operated on 576MHz and Ray VK5ZEF used 441MHz, with signal strength on 576MHz being 5 by 8 and better than S9 on 441MHz. The differences are mainly contributed to the rather poor path over which the experiment was conducted, and the higher proportionate losses to be expected at 576, e.g. equipment inefficiencies rise, higher feedline losses etc. Both stations use a QQE06-40 in the final, grid modulated. Ray used a log periodic antenna, and Maitland a 16 element collinear. Corner reflectors are being constructed by Ian VK5ZJS for future experiments.

The equipment is all home brew and built to commercial standards, except Ray's camera which is made by Sony. First experiments towards the final end contact were made about 7th September, and ten days later the contact was made, and has since been followed by several other similar contacts. Considerable duplex contacts using black and white had been completed prior to this.

I am sure we all join in congratulating these two boys for their efforts with colour ATV and hope that news of their success may stimulate interest in other people to try it as well.

SIX METRES OX

A letter has just come to hand from Bruce VK8AZ in Darwin stating that the 6 metre band opened to JA and KG6 on the evening of 27th September. Bruce managed to work KG6RA, JA2, JA3, JA4 and JA6 during the period from 2055 to 2230 EST. Barry VK8DI was also on and copying their signals even better. Bruce also mentions he had been listening on and off since February with no success until the 27th. Colin VK8CM has organised a 6 metre net on Thursday nights from 2000 onwards to try and encourage some 6 metre activity. The JA's commented on the fact that the Darwin beacon VK8VF is heard regularly at good strength. Bruce uses an FTDX400, FTV650 and a 4 element beam. Thanks for the letter, and would be pleased to hear from the Darwin area again soon.

GENERAL NOTES

Garry VK5ZK advises of a message from Bob VK6BE that the Mt. Adelaide (W.A.) beacon on 135.5 MHz is operational again, being a little earlier than usual. This beacon is a useful indicator of band conditions between VK6 and VK5 in particular on 144 MHz.

A report to hand of the possibility of a 144 MHz beacon in Darwin this season. Maybe some further news from that area may trickle through to me eventually with information on this and the proposed alterations and additions to the existing 6 metre beacon in Darwin.

That seems to be all the news for this month, so for the time being think about this: "The trouble with today's wage-price spiral is that everybody is trying to climb aboard and nobody wants to get off." Until next month. The Voice in the Hills. ●

PROJECT AUSTRALIS

with David Hull VK3ZDH, Chairman, Project Australis.

In early September the first sign of trouble with the battery on Oscar 6 showed in several very low battery counts on Channel 3A of the telemetry. The lowest recorded reading was 330 and operation at this level for any length of time would have seriously endangered the package. Whilst even this low level of battery caused no significant loss of efficiency, due to the level of voltage still being above the voltage regulators, the satellite was held off until the battery recovered. The fault was thought to be a faulty battery cell failing to hold its charge.

In order to extend the life of Oscar 6 to the maximum obtainable it was decided to restrict the operation of the package to night orbits only. This means in future the satellite will only be turned on Monday, Thursday and Saturday nights. Operation on this schedule has already improved the battery situation and we have confidence that the present operations of the package will continue at least for the designed life of AO6. It could be pointed out that each orbit over Australia at night comes out of the daylight and thus the battery is at a charged state when used by VK amateurs. Thus we can expect that if commenced capability can be maintained, AO6 operation over this continent will be maintained to the last.

The present estimated date for the launch of Oscar 7 is April 1, 1974. We hope the date is not significant.

The Australis contribution to Oscar 7, the R T T Y telemetry encoder, left Melbourne in early August and all things being well should fly in AO7.

A new and welcome country noted through Oscar has been the fine signal of 9M2AA in Kuala Lumpur noted on CW. Reports also of HS4AGN Thailand and other Asian mainlanders have been noted. A complete rundown on Oscar 7 and its capabilities will be published in AR early in the new year in time for construction and preparation of equipment for this satellite. ●

around the trade

Dick Smith Electronics Pty. Ltd. has arranged to circulate their 64 page manual, catalogue and directory of the Electronics Industry as part of the October issue of Electronics Australia. This was included in their advertisement in A.R. for October.

Sungravure Pty. Ltd. has issued a press release about this circulation which numbers 45,000. A further 10,000 copies of the catalogue will be distributed they state. This is the first time such an ambitious insert has ever been presented in Electronics publishing and Mr Selwyn Sayers, the Advertising Manager of Sungravure's 'Electronics Australia' comments "While it is obviously an astute piece of marketing by Mr Smith, I believe this catalogue will prove to be of enormous value and interest to all readers." ●

20 Years Ago

with Ron Fisher VK3OM

November 1953

Twenty years ago this month, the Wireless Institute was successful in negotiating with the Post Office for the copyrights to publish the Australian Call Sign Book. The initial copyright was for a period of five years and it was expected that the first edition would be on sale during March of the following year. The Call Book has been a regular publication of the Institute ever since. Before this, a list of Amateur Stations was published in the Radio and Hobbies produced *'Short Wave Handbook'*, and prior to this the PMG produced their own amateur call sign book.

November 1953 AR presented an interesting array of technical articles. As mentioned last month multi-band tuners were very much to the fore about this time. The Multi-Band Antenna Coupler was the subject of an article reprinted from *QST*. Working on the principle of the multi-band tuner, all bands from 80 to 10 could be covered with two coils and no switching.

C. J. Cook VK4CC showed us how to make a 'Standing Wave Indicator for 2 shillings (inc tax)'. He used two dial lamps coupled to either 300 ohm feeder or to coax cable. With some experience this system worked well, and even today could well be used in an emergency.

E. Cornelius VK6EC continued his 'Amateur Television' series giving circuitry and details of the video mixer and video receiver.

Western Australia Again'. What else but the Remembrance Day contest. Top scorers in each State were: VK6FL VK7KB VK3ATN VK2ZC VK5MS and VK4RT, and of those VK5MS made the top Australian score of 790 points. Although not counted in any of the State scores VK1AF turned in a sizzling 1086 points.

On the equipment front, R. H. Cunningham Pty. Ltd. announced the arrival of the new Eddystone 840 Communications Receiver. A seven tube job with one RF stage and one IF stage at 455kHz. The price £103-6-2d. It covered from 620 metres to 30.6 MHz in four bands, with the usual smooth running Eddystone dial.

Awards Column

with BRIAN AUSTIN VK5CA
P.O. Box 7A, Crafers, SA, 5152.

The following additional stations have qualified for Awards, and certificates have been issued —

W A V K C A Award

Certificate	Callsign		Callsign
571	UA4HC	577	JA2DNA
572	UK0QAE	578	ZL2IK
573	UL7NW	579	G2DF
574	UW0IF	580	JA1DQT
575	9H4G	581	JA3KWJ
576	JA4FUQ	582	G3TLV

W I A 52 MHz W A S Award

Certificate No.

108 VK1JB
109 VK4GM ex 4ZGA Add countries 3

D X C C

New member:

Call VK8KP Certificate No. 141 107-107

VICTORIAN DIVISION W.I.A.

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For further details—WIA Broadcasts or Zone Secretary Bill Clark, VK3FY, High Street, Kangaroo Flat, 3556

Letters to the Editor

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

The Editor A.R.
Dear Sir,

I have just got around to reading Bill Currie's amusing article in the July issue of AR entitled "How to Succeed in Electronics". There is much in this I soberly agree with for I too have had many failures with "modern" solid state devices — much more than I ever had over my 40 years with valves. I am learning the sorrowful lessons, and now "tuning in" as many fuses and protective devices as I can muster before switching on the power to a newly constituted solid state device.

A transister fan, Cyril Buckingham, VK3QV keeps telling me that "transistors are beautiful". Yea, like having a ravishing blonde for a girl friend. You have to tie her up hand and foot to stop her from being knocked off.

I quote the case of Lew Rearding, VK3LX, who in the late 30's would be found in his Footscray shack, pounding away with ". . . a thousand or so volts on the anode . . . of his 210 final. If his sending was slow enough you could read his code by watching the length of the glow on the 210 anode, yet this valve lasted years (with an occasional "cooking" of the filament). No, they don't make them as rugged these days!

Yours etc.,
W. Russell, VK3ZUP

The Editor, AR,

Dear Sir,

I wish to draw your attention to the extraordinary article I found in this week's Camberwell "Free Press" (26-9-73), which I have enclosed.

(The Press Cutting referred to the usual "pestilences that beset many residents". The neighbours had of course objected and there is the usual heart-throb about an 86 year-old mum and her comforting TV. — Ed.)

Although the Camberwell Council is apparently trying to be fair, by enquiring among neighbours as to whether there may be any objections to the erection of a tower, one is left with the feeling that equal representation is not allowed — is the person erecting the tower able to seek proof of the complaints?

Taking the objections one by one; on what grounds are towers unsuitable in small suburban blocks? Why should adjoining properties be devalued? Because the tower is unsightly? Show me a television antenna which is aesthetically pleasing. Because the tower is unsafe? Hardly; the tower is replacing an existing one which does not meet Council specifications. To state that a tower of this sort will interfere with television reception is ridiculous. Claims like this only serve to underline the claimant's ignorance of what they are talking about. According to one claimant, the area has poor television reception. But how is the tower going to interfere with television reception? Ghosting is an explanation I find hard to believe; maybe it will act as a VHF signal-sucker. Or must the Amateur Radio fraternity continue to be the scapegoat because television receivers have an aversion to strong signals in the immediate (frequency) vicinity? Or even not immediate? Or even not harmonically related? Fooey.

The daughter of the 86 year old lady has presented a claim which defies logic to unravel it. What does she mean?

Let's look at some of the arguments against the non-erection of a tower:

1 The amateur concerned — I don't know who he is; all I know is that he and I have a common interest — is just as entitled to pursue his hobby as is the 86 year old lady.

2 If the amateur already has a tower up, how can the claims against the erection of a new tower possibly be justified? On the assumption that there must already have been a Council permit obtained, were the neighbours queried as to objections at the time the permit was sought? No mention is made of this. I am led to wonder how he was able to erect his tower in the face of such opposition.

3 Is the tower to be in use 24 hours a day?

I am also upset at the biassed opinion expressed by the reporter: ". . . there is little control over the number of pestilences . . ." Amateur Radio is a "fatal epidemic disease" (Oxford Pocket Dictionary)? Even the heading is a downright untruth. (**'Ham Towers Mar TV Reception**).

Finally, I am very glad I don't have the above complainants as neighbours. What a sad lot of people they must be.

Yours faithfully,
John Lilley (VK3AZJ).

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LATEST PRICES (still under review until exchange rates stabilise)

- "QST" $8.20
- "RADIO COMM."* $8.80
- "BREAK-IN" $3.00
- "CQ" $5.70
  ($13.50 for 3 years)
- "73" $6.50
  ($11 for 2 years, $15 for 3 years)
- "HAM RADIO" $5.50
  (11.50 for 3 years)
- "VHF COMM.":
  Surface Mail $4.00
  Air Mail $6.00
- "CQ-TV"* $2.50

* Please ask for membership form

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P.O. Box 150, Toorak, Vic., 3142

Magazine Index

With Syd Clark, VK3ASC

BREAK-IN August 1973

Marconi, The Inventor of Radio Communication; The "Climie" Repeater.

RADIO ZS June 1973

Technical Description of the NETSET.

CQ August 1973

A General Coverage Solid State Communications Receiver with Direct Digital Frequency Readout; A De-Luxe Screen Modulator for Beginners; Further notes on the SS Mk4 SSTV Monitor; An Electronic Timer for Less than $5.00; Using the Surplus R-390 Receiver for SSB; FM Repeaters — A Paradox of Problems.

CQ September 1973

An Integrated Circuit Morse Code Keyboard; OSCAR-Mobiling; CQ Reviews: The Miida Model 6354 Mini-Multimeter; A VFO Keying Switch for QRP Operation; 1972 CQ W-W. D. X. Contest Results

HAM RADIO June 1973

Digital RTTY Autostart; A Complete Audio Module; FM Repeater Installation; Regulated a c Power Supply for Mobile Equipment; Micropower Communications Receiver; High Performance Broadband IC Amplifiers; Using the Heath SB-650 Frequency Display with Other Receivers; Logic Oscillator for Multi-Channel Crystal Control on VHF FM.

73 Magazine July 1973

Tunable Reception for 2 Metre FM; A Basic Amateur TV System; Maximum Performance for small Yagis; An Accurate Frequency Standard; A Digital Identification Unit; Mobile — and DXing too; 450 MHz Power Divider; An Experimental Comparison of CW Audio Filters; "Concerning a System to Achieve 85 dB Gain on a 2M Antenna"; Compromise Multiband Antennas; Spinoffs from NASA to the Radio Amateur; Grid Dip Tuning the Quad; FCC Rules and Regulations Part 97 (II).

For some time now I have hoped that space would become available to carry reviews of some of the 'lesser known' magazines which come to the WIA without digressing into the 'foreign' publications which require translation.

This month, as material is somewhat less than usual I propose to say a word or two about *Mobile News* published by the Amateur Radio Mobile Society, three issues of which are to hand, namely September and October 1972 and June 1973. This journal publishes technical articles and tips of interest to 'Mobileers' HF or V H F, A M or F M. The subscription rate is low and information may be obtained from R. E. Snell, VK3-BGG, QTHR. The other journal is an old friend of ours from VK7, *The Australian EEB*. The last issue I have to hand is dated December 1972 and since Leo VK7RG did not publish his very interesting magazine for some months I am not surprised that he has a back log to catch up. Enquiries should be made by SAE to P.O. Box 177, Sandy Bay, Tasmania, 7005, Australia.

Ardent experimenters will find much to interest them in both of these publications. ●

Hamads

- Eight lines free to all W.I.A. members. $6 per 3 cms. for other amateurs and S.W.L's.
- Copy should be in block letters or typescript, signed and forwarded to The Editor, P.O. Box 150, Toorak, Vic., 3142.
- Excludes commercial advertising.
- Closing date for Hamads is the 3rd day of the month preceding publication.
- QTHR means the advertiser's name and address are correct in the current Australian Callbook.

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TCA 1674 Loband F.M. Mobile Transceiver. 3/20 final. Clean condition. Recently in service, unconverted. I will pack; you pay freight. $13.00. VK4ZTK. QTHR.

Philips FM806 mobile transceiver, 2mx Fm. 5 chs. Chs. A, B, C, inc. 28 W output, latest fully solid state TX from Philips, wide band filter, tone calling, reflectometer protected final, handbook and mobile mount provided; excellent unit. $175, ONO. VK4ZML. QTHR. Ph.: (072) 56-3607.

Sideband TX. E A Jan-Mar 1967. mech. filter type, solid state, all band $60. **Linear**—2 x 6146's $30.

BC-348 RX $40. Back issues EA '61-66 free. VK2BAK. QTHR. (1973 call book). Ph.: (02) 48-6241.

50' Self Support Two Section Mast. Good cond. Base included $90. Ph.: AH (03) 53-1357.

Swan 120 Transceiver and power supply, excellent condition. What offers? VK2ABC. QTHR. Ph.: (02) 451-1313.

Australian EEB: Bound volumes for sale, 1971, 1972, $2 each. A few 1970 at $2.50. VK7RG. QTHR.

2m FM Carphone, solid state, (ex AR Mar/April, 1971). 5 channels A, B, C, 1 and 4. TX 12w output. RX extremely high sensitivity. Completely aligned. Perfect condition. Includes Belling Lee 146MHz loaded 5/8 whip. $195. VK3ATV, QTHR. Ph.: (03) 232-6062 AH.

Video Tape Recorder Ampex Type VR650, 2 inch Helical, approx. 20 K feet of tape. $600 O.N.O. **Teletype** model 14FRxD Typing reperf and TX $35. **Vidicon** 1 inch new $20. **Television** sideband response analyser and sweep generator type-BW5 $150.00. VK2ZPM. QTHR. Ph.: (02) 476-2304.

Heath VFO, model VF-1, 10-160 plus 11 metres $8. R. J. Flanagan, VK3CR. QTHR. Ph.: (03) 772-4039.

Eddystone RX "888A" Amateur bands only. Excellent condition, 160-10 metres with circuit and service manual. $120.00 O N O. D. Johnston, c/- Prince Henry Hospital, Little Bay, N.S.W. Phone Sydney 661-0111 Ext. 239.

A W A MR6A Carphone, Channels A, B, 4. $50.00. **Vinten** BTR 10 50 Watt Base Station, Channels A, B, 4, switching for four channels $75.00. **A W A MR20** Carphone on 52.525 FM-6146 final, 35 watts—includes crystals, $35.00. Alan Bradley, VK3LW, C/O Box 520, Geelong, or Ph.: Melb. 341-2452 BH.

WANTED

Morse Keys, Clipsal. Simplex auto, PMG and others. Any condition, write VK4SS. 35 Whynot Street, West End, Brisbane, 4101.

You and DX

Many readers turn first to this page and are disappointed to see very little in this column even though the sunspot cycle is getting so low that 20M has become a day-time band, 15M and 10M are open spasmodically around lunch-time and any DX is to be found on 40, 80 or 160 at night. This leaves aside any DX through OSCAR-6 and successors.

What is the news of impending DX-peditions, QSL addresses and the other chap's prowess in hooking a new one? Or has everyone been reduced to rag-chewing with set stations on pre-arranged skeds to the exclusion of DX which is probably not there anyway?

To run a DX column requires a bit of effort, intimate contact with conditions and an 'ear to the ground!' It also requires the possession of some ink wherewith to write.

If there is no **VOLUNTEER** to write a regular column for AR could you, yes **YOU** the reader of this, put pen to paper when you feel an itch in your writing fingers? This is the kind of thing to send in so that many such paragraphs from different sources could be added together (after edit) to make up a pot-pourri column —

> *VK9ZZ worked Fred, XX7XX on Sept. 28th on 14230 SSTV at 13.30 hours K and exchanged pictures of rare quality. Fred showed one picture of a world record cashew nut grown in his garden but VK9ZZ capped this with his picture of the world's smallest paw-paw plucked from his very own tree. Band conditions to Africa were otherwise poor but Steve (yes, YK9ZZ no less) did hear 5T9ITU working 5T5ITU on 14105 giving QSL address as 4U6ITU.*

Note the third-person usage and brevity. Write it out legibly on any old piece of paper, even a $10 note would do, but do not forget in this case to ask for a refund of the 7 cent stamp you used.

Ten itchy-fingered paragraphs from ten DX-chasers would make a DX column provided each did not write about the same choice morsel. So how about it?

The DM-QSL-Bureau has sent out a circular stating that several DM-stations will be using the special prefix DT from May to December 1973 to mark the 20th anniversary of amateur radio Sport in the German Democratic Republic. ●

Intruder Watch

with Alf Chandler VK3LC

1536 High Street, Glen Iris, 3146

Reference the summary published in last month's Magazine I now have both the RSGB and the ARRL doing similar summaries, but they have opted to do their summaries monthly and include any Intruders reported by VK, so it looks as though I shall have to compile my summaries more often.

An indication of how useful they are to Members would be appreciated, and also any suggestions as to layout and information supplied would be useful to me.

From the IARU Monitoring System Region 1 co-ordinator GB2IW the following comments are appropriate, and I quote —

> *In view of the success of the Intruder Watch monthly summaries and the resultant increased distribution, the previously issued six monthly summary of Intruders has been discontinued. More information has been included where possible including reports received from sources within IARU-ITU Regions 2 and 3. Every effort has been made to reject reports arising from receiver images, IF breakthrough, cross modulation etc, and where possible are checked on independent receivers and antenna. With reference to the VK reports more information is required on the following items — 14018 4CIJ; 14022 NAP; 14061 4CIJ de CLA30; 14071 UMG72; 14082 7A1; 14144 BCX24 (also 14153); 14345 FAL. Beam headings would also be appreciated.*

If Members hear any of these stations, and can get a fix on them please notify your co-ordinator and supply reports. The co-operation between Societies is to be commended and encouraged. By reports received it would seem that we have enticed the engineers concerned to cure the spurious emanation from the Fiji station 3DN. This station is controlled from New Zealand, and is situated at Nadi airport. ●

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C.G.S

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ELECTRICAL SPECIFICATION

Tolerance: ±5% is standard on values of 1Ω and above and ±10% between 0.1Ω and 1.0Ω. For non standard values and tolerances please consult the factory.

Resistance values: C Series resistors are available with the preferred ohmic values of the E24 Series within the ranges shown in Table 1.

Temperature coefficient: Typically less than 100 ppm/°C and never exceeding 200 ppm/°C over the category temperature range −55°C to +200°C

MATERIALS

Core: High purity steatite ceramic. Chemically inert, capable of withstanding severe thermal shock and impervious to moisture. Ground to close tolerance finish to give maximum contact with wire element for rapid heat transfer.

Resistance Element: High quality nickel-chrome or nickel-copper alloy depending on resistance value; wound at minimum tension.

End Caps: Formed to close tolerances from a special nickel-iron alloy chosen for its consistent welding properties and glass sealing characteristics.

Leads: Solder coated nickel A.

Uncoated leads can be supplied for welding.

Specify – 'weldable leads'.

Preformed and cropped leads can also be supplied on request.

Coating: Humidity proof vitreous enamel with carefully controlled expansion matched to the materials of the resistor.

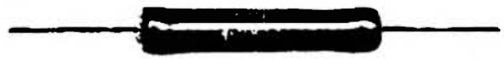
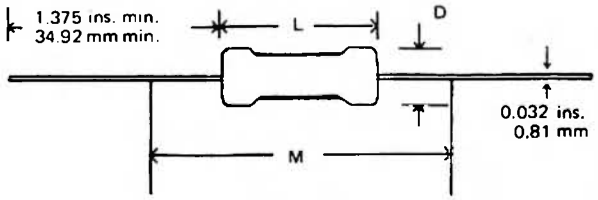


TABLE 1

C.G.S.				BS 9114 - N002							STYLE CROSS REFERENCE		
Style	Maximum wattage rating @ 20°C	Resistance Range Ω		BS 9114 - N002 Style	Maximum wattage rating @ 70°C	Approved Resistance Range Ω		Critical Resistance Ω	Limiting Element Voltage. Volts		DEF. 5111-1 Style	DEF 5115-2 Style	G.P.O. Style
		min.	max.			min.	max.		Normal	Low Air Pressure			
C3A	3	0.1	10K	2E-56-2.5	2.5	1	4.7K	3.9K	100	70	RWV3J	RFH3-2.5	P.O.35
C7	7	0.1	27K	2E-56-6	6	1	15K	6.8K	200	140	RWV4J	RFH3-6	P.O.40
C10	10	0.1	68K	2E-56-9	9	1	68K	27K	500	350	RWV4K	RFH3-9	P.O.36
C14	14	0.2	120K	2E-56-12	12	1	100K	47K	750	530	RWV4L	RFH3-12	–



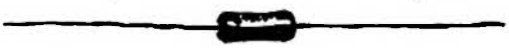


TABLE 2

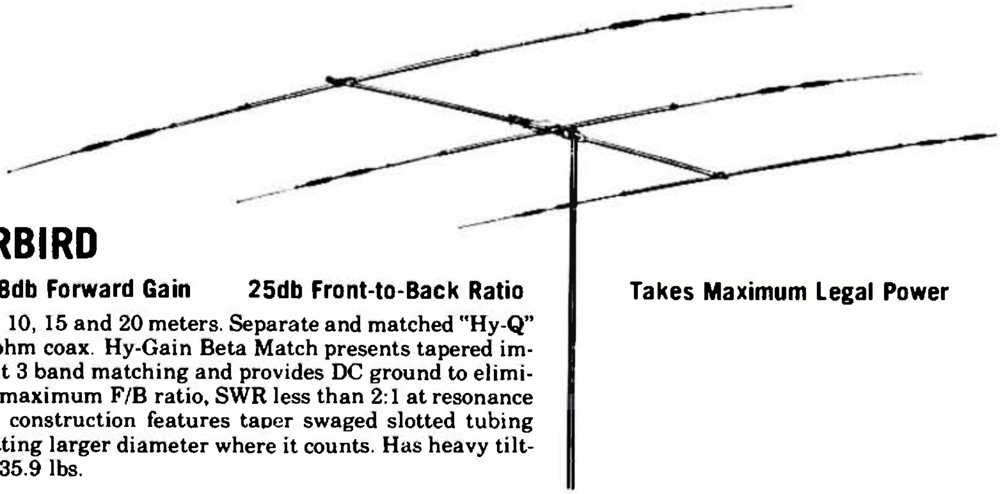
Style	Length L		Diam. D		Measuring Distance M		Approx. Weight
	max. in.	max. mm.	max. in.	max. mm.	±0.062 in.	±1.59 mm.	grammes
C3A	.499	12.7	0.220	5.6	1.250	31.8	1.0
C7	.874	22.2	0.315	8.0	1.625	41.3	2.0
C10	1.499	38.1	0.315	8.0	2.250	57.2	3.5
C14	2.106	53.5	0.315	8.0	2.875	73.0	5.0

Note: M = resistance measuring points distance – below 10Ω only.

NOVEMBER, 1973

Vol. 41, No. 11

hy-gain NEW SUPER THUNDERBIRD TRIBANDER BEAMS from BAIL ELECTRONICS



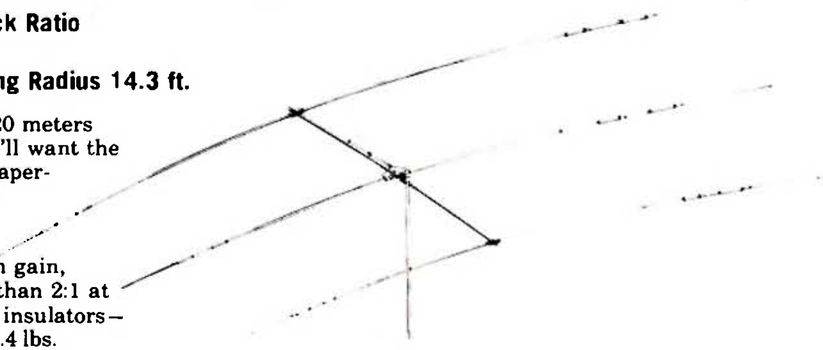
NEW, IMPROVED SUPER 3-Element THUNDERBIRD

- New "Hy-Q" Traps
- Up to 8db Forward Gain
- 25db Front-to-Back Ratio
- Takes Maximum Legal Power

Delivers outstanding performance on 10, 15 and 20 meters. Separate and matched "Hy-Q" Traps for each band. Feeds with 52 ohm coax. Hy-Gain Beta Match presents tapered impedance which provides most efficient 3 band matching and provides DC ground to eliminate precipitation static resulting in maximum F/B ratio, SWR less than 2:1 at resonance on all bands. Mechanically superior construction features taper swaged slotted tubing allowing easy adjustment and permitting larger diameter where it counts. Has heavy tiltable boom to mast clamp. Shpg. Wt. 35.9 lbs.

FABULOUS THUNDERBIRD JUNIOR

- Up to 8db Forward Gain
- 25db Front-to-Back Ratio
- Takes up to 300 Watts AM; 600 Watts P.E.P.
- Rotates with Heavy Duty TV Rotator
- Turning Radius 14.3 ft.



If you're looking for top performance on 10, 15 and 20 meters but are hampered with severe space limitations, you'll want the Model TH3JR. Constructed of durable, lightweight taper-swaged aluminum tubing, the Model TH3JR is ideal for rooftop or lightweight tower installations. Separate and matched "Hy-Q" traps for each band. Feeds with 52 ohm coax—Beta Matched for optimum gain, maximum F/B ratio without compromise. SWR less than 2:1 at resonance on all bands. Molded high impact cycolac insulators—all hardware iridite treated to MIL specs. Shpg. Wt. 20.4 lbs.

SPECIFICATIONS

ELECTRICAL	Model TH3Mk3	Model TH3JR
Gain	8db	8db
Front-to-Back Ratio	25db	25db
Maximum Power Input	1 KW, AM	300 Watts AM; 600 Watts PEP
VSWR (at resonance)	Less than 2:1	Less than 2:1
Impedance	52 ohms	52 ohms
MECHANICAL		
Longest Element	27 ft.	24.2 ft.
Boom Length	14 ft.	12 ft.
Turning Radius	15.7 ft.	14.3 ft.
Wind Load At 80 MPH	103.7 lbs.	87.0 lbs.
Maximum Wind Survival	100 MPH	80 MPH
Net Weight	36 lbs.	21 lbs.
Mast Diameter	1¼" to 2½"	1¼ to 1⅝"
Surface Area	4.03 sq. ft.	3.4 sq. ft.

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amateur radio

DECEMBER, 1973

- TWO METRE TRANSVERTER
- VERTICAL AERIAL — NO GROUNDPLANE
- DIPLEXER FOR THE DISCONE
- DISCONE ANTENNA MEASUREMENTS
- LAS BALSAS
- NATIONAL FIELD DAY RULES

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA

amateur radio

JOURNAL OF THE WIRELESS INSTITUTE OF AUSTRALIA, FOUNDED 1910

DECEMBER, 1973
VOL. 41, No. 12
Price, 40 cents

Registered at the G.P.O. Melbourne for transmission by Post as a Periodical— Category "B"

Enquiries and material to:
The Editor,
P.O. Box 2611W, Melbourne, 3001.

Copy is required by the **third of each month.** Acknowledgment may not be made unless specially requested. All important items should be sent by certified mail. The Editor reserves the right to edit all material, including Letters to the Editor and Hamads, and reserves the right to refuse acceptance of any material, without specifying any reason.

Advertising:
Advertising material should be sent direct to **P.O. Box 150, Toorak, Vic., 3142,** by the **25th of the second month preceding publication. Phone: 24-8652.**

Hamads should be sent direct to **P.O. Box 150, Toorak, Vic., 3142,** by the **3rd of the month preceding publication.**

Printers:
Chas E. Tully Pty. Ltd.
40 Hume Street, Huntingdale, 3166.
Phone: 543 1242.

Published monthly as the official journal by the Wireless Institute of Australia.

Reg. Office:
Above 474 Toorak Road, Toorak, Vic., 3142.
P.O. Box 150, Toorak, Vic., 3142

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FRONT COVER :
H.R.H Prince Phillip operates the Townsville Amateur Radio Club's Station VK4TC and talks to the crew of the Las Balsas raft expedition. On the Duke's right is the Mayor of Townsville, Alderman Max Hooper.

QSP

Amateur Satellite Service

IARU Headquarters in a circular to all member societies advises that the FCC in the U.S.A. has issued a Notice of Inquiry seeking comments and suggestions from interested parties **in the U.S.A.** as to what rules should apply to the Amateur Satellite Service **IN SO FAR AS THE U.S.A. IS CONCERNED.**

It appears that hitherto the regulation of communications functions has been on an ad hoc basis. Now that longer life Oscars are in operation or are being planned, the FCC believes the time is ripe to regularise operations through satellites **IN SO FAR AS U.S.A. USERS ARE CONCERNED.**

The ARRL will be formally sending submissions to the FCC as the proper channel of communications between the amateur service and the FCC **IN SO FAR AS U.S.A. REGULATIONS ARE CONCERNED.**

The FCC have called for submissions to be made by **7th January next.** IARU Headquarters believes that comments from member societies will be useful because of the international aspects of the Amateur Satellite Service. The Executive of the WIA are in process of co-ordinating any views. Views which it is hoped will be sent in by VK amateurs. Views and comments which have already been requested from the relative technical Committees including Project Australis.

Why is the Executive taking this action?

Firstly to give IARU the benefit of Australian views on the subject. Secondly to crystallise our own thinking on the subject if the PMG's Department decide to draft Australian rules. Thirdly to determine what rules and regulations are desirable assuming that any are indeed required at all.

We have authority for Limited Licensees to use the Oscar satellite under their own call signs when the downlink is in the 10 metre band.

No separate licence is required to operate through a Satellite.

There are no planned uplinks on 10 metres to Satellites so our future 'Novices' could not operate through a Satellite even if the WIA pressures to allow Novices a segment on 10 metres proves successful.

Command stations, which are under the control of the Project Australis Group do not require separate licences and are authorised for higher power for command purposes.

The Group's business may be conducted over the air with Amsat stations as a special privilege relating to Oscar Satellites.

A special 2m to 70cm experimental repeater was licensed for user familiarisation but is no longer required.

Our own authorities have also acted on an ad hoc basis. Whether or not any special rules or regulations will be deemed necessary remains to be seen.

Because the IARU needs assistance in this field it will be given. The information now collected could be useful for ourselves at a future date but the Executive hopes it will not be required because the amateur service and, ipso facto, the Amateur Satellite Service, should be largely self-regulatory.

If any member does have any views on the subject he should submit them through his Division or through one of the three Executive Committees concerned with the usage of the higher frequencies.

David A. Wardlaw
VK3ADW
President.

Mellish Reef Dx-pedition

Recognition of VK9JW for the ARRL DXCC Award was suspended by the ARRL following certain disputes.

The WIA supplied on 29th June 1973 the information sought of it by the ARRL.

The recognition of VK9JW for its DXCC is a matter for ARRL not the WIA. It is believed that the ARRL has referred the question to its DX Advisory Committee and is still to determine the question.

a two metre transverter

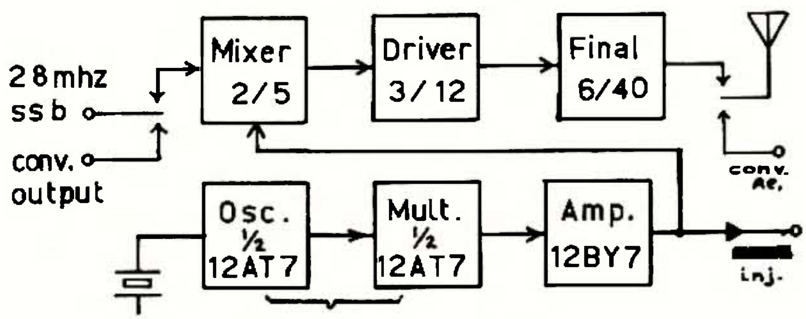
MIKE TRICKETT, VK3ASQ
8 Matlock Street, Herne Hill, Geelong, 3220.

Having seen the light, and turned to SSB operation on six metres several years ago, I decided to make the shift to SSB on the 144 MHz band as well. The resulting transverter was designed to operate in conjunction with an FT200 transceiver; however there should be no difficulty in adapting it to operate with another transceiver or transmitter. The FT200 lends itself nicely to transverter operation, the accessory socket on the back making available all supply voltages required plus relay terminals. It also has provision for removing the final stage heater supply, while still giving a low level output (about 1W PEP) from the driver stage to a phono type socket on the back. With these facilities available this transverter resulted.

The 28 MHz band was used as the IF because it has two main things in its favour. 28 to 30 MHz coverage giving 2 MHz tuning range, and the problem of images is minimised as the image frequency is 56 MHz away. Not much of a consideration at 6 or 2 metres, but a forthcoming project is a 432 MHz transverter and for convenience it was decided to use 28 MHz for all transverter IF's.

OPERATION

From the block diagram, it can be seen the transverter consists of 3 main sections; a crystal oscillator and multiplier chain producing RF at 116 MHz at about 1 watt, the transmitter section, and the receiver section. The oscillator section is straight forward, consisting of a crystal oscillator at 29 MHz, followed by two doubler stages producing 116 MHz output. The output tuned circuit of the oscillator chain couples to two points; the transmitting mixer, and the receiving mixer in the converter. The mixer V1 is the heart of the unit, and the section where the most experimentation was done. Several configurations and tube types were tried, but the QQEO2-5 in the configuration shown here was considered to produce the best results, consistent with gain, linearity and rejection of unwanted frequencies. It will be seen that the 28MHz SSB signal is applied to the grids in push-pull and the 116MHz is applied to the center tap on the 28MHz coil, that is in parallel to each grid. The plate circuit is tuned to 144MHz and is in push-pull. This configuration produces cancellation of the 116 MHz component in the plate circuit.



BLOCK DIAGRAM OF TRANSVERTER

V2 is simply an amplifying stage which brings the level up to that sufficient to drive the final.

V3, a QQEO6-40 PA, is operated in AB2 with metering in the cathode. These components are not labelled as any suitable meter will do the job with the appropriate shunt.

The bias arrangement utilises a voltage divider circuit for each stage; the bottom of each stage leg goes to a common point and is connected to earth via a contact on the TX-RX relay. In the receive position the full bias voltage of -100 is applied to the three stages cutting them off. The final has a zener diode in its bias supply to stabilise the bias at this point. In an earlier design, trouble was experienced with the negative voltage increasing at this point as the drive was increased, thus causing a flattening off of the plate current at about 120 mA. Then, no matter how much the drive was increased, no more plate current would result. This was traced to the final grid drawing current and developing additional negative voltage, thereby producing an undesirable ALC effect.

Mike VK3ASQ displaying the completed 6 and 2 met[illegible]sverter at a recent VK3 VHF Group meeting.

CONSTRUCTION

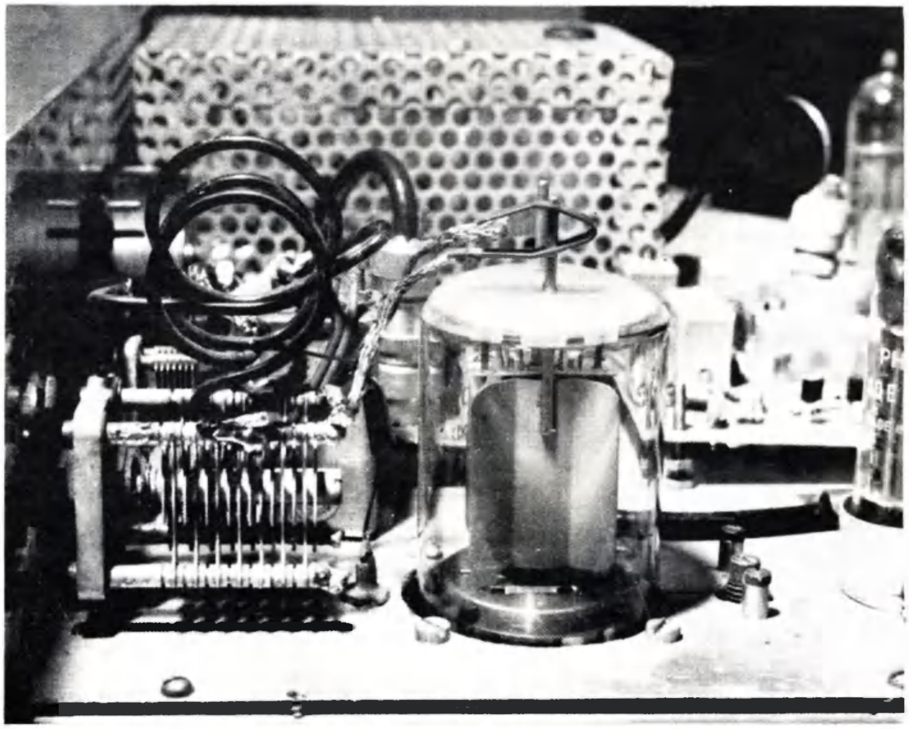
The unit was constructed on an aluminium chassis 12"x11½"x2½" using the layout as shown. On the vacant left hand side a 6 metre unit was constructed thereby providing 6 & 2 metre facilities. (the 6 metre unit will be the subject of a later article). The heaters were wired for 12 volts as the FT200 has a 12 volt heater line, usual VHF construction practices were followed, and a tin plate shield was soldered across the socket of V2 to shield input and output.

ALIGNMENT

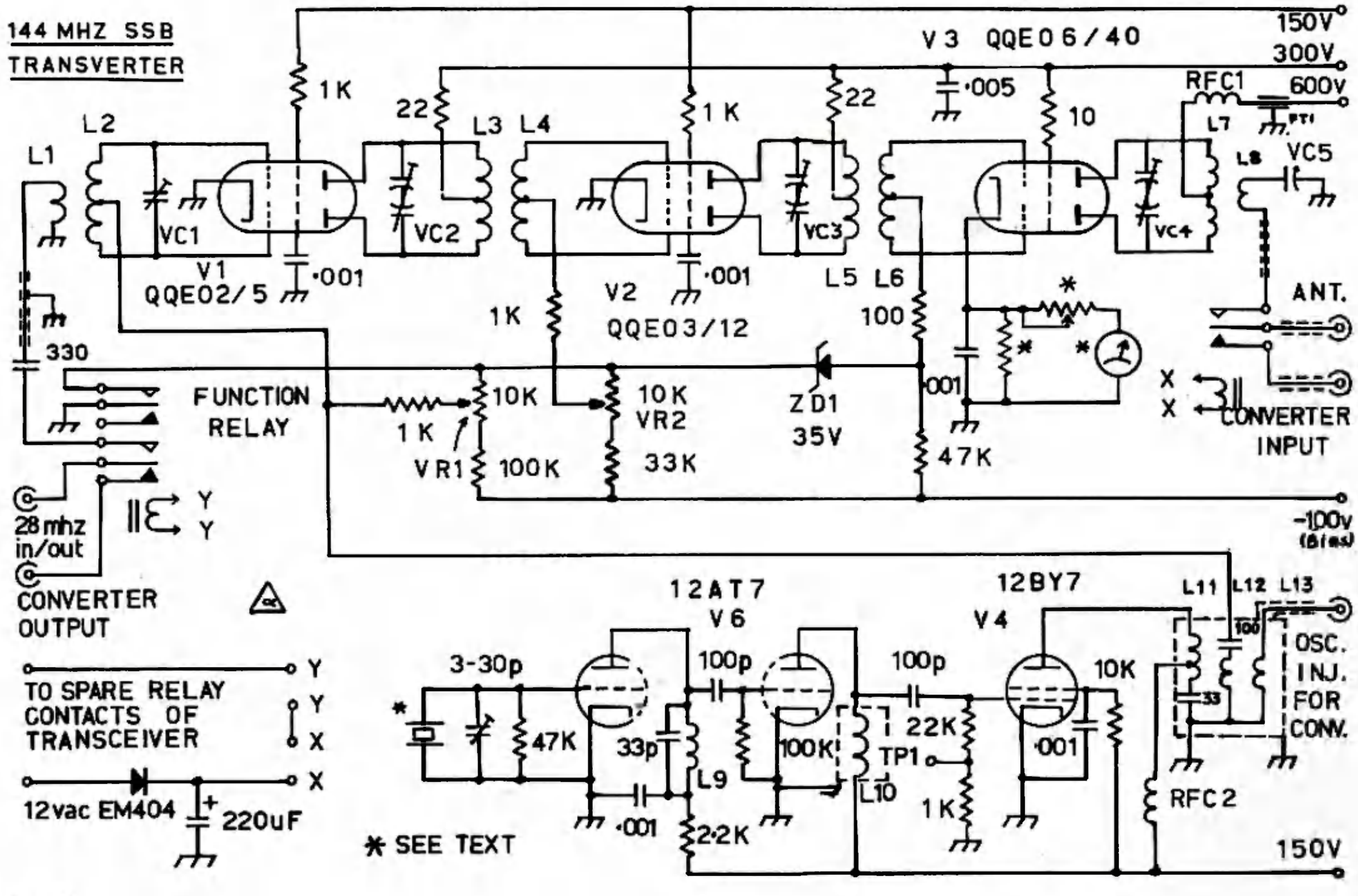
The oscillator section is first checked out. Plug in the 12AT7 and 12BY7 with a multimeter on the cold end of L9 and adjust L9 slug for an increase in voltage. A point will be reached where oscillation ceases and the voltage falls sharply; the slug should be set to a point just before this happens. The crystal should be pulled in and out a few times to ensure stable and reliable oscillation. L10 is tuned for maximum negative voltage at TP1, about 1 volt. A diode probe is connected to the center of the co-ax. going to the receive converter and L11 is adjusted for maximum.

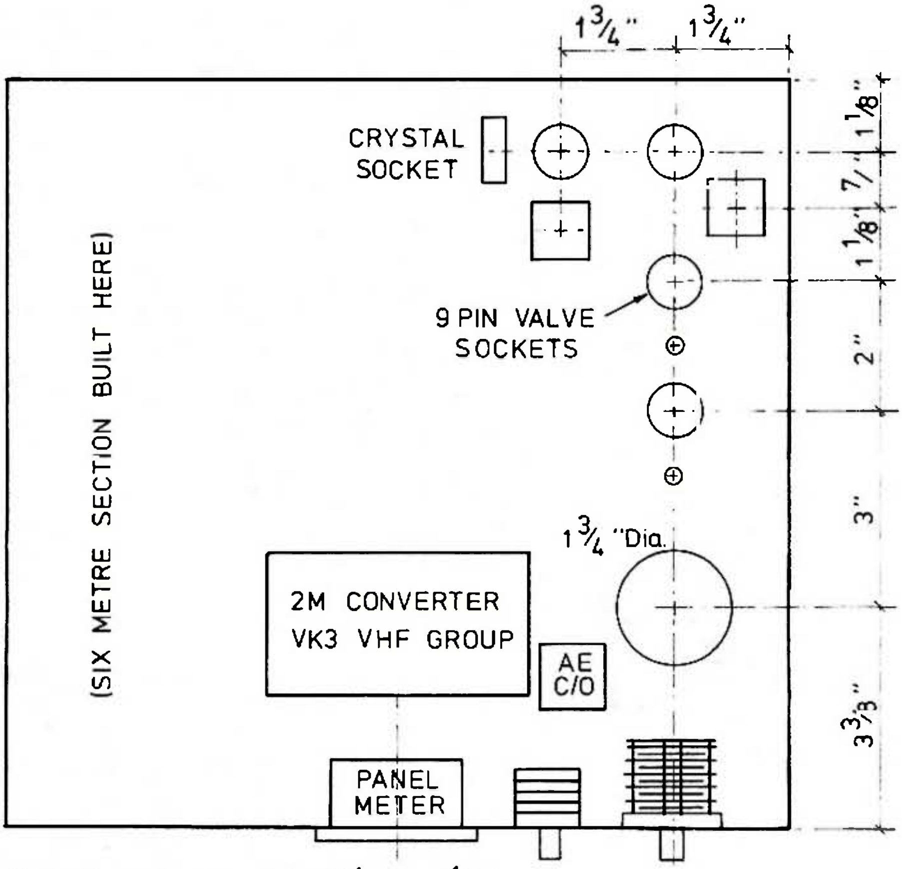
V1, 2, and 3 are now plugged in and the transceiver switched to transmit. The PA should be drawing about 60 mA and its bias should measure -35 volts. VR1 and VR2 are set for -4 and -20 volts on the taps, respectively.

With the transceiver in tune position, it should be adjusted for maximum output at 28 MHz. Now with an absorption wavemeter near L2 adjust VC2 for maximum reading at 28 MHz; with the wavemeter at 144 and near L3, VC2 is adjusted for maximum; with the wavemeter near L5, VC3 is adjusted for maximum. With a wattmeter connected to the output of VC4, VC5 and the coupling and spacing of L7 and L8 should be adjusted for maximum RF output. Re-peak all adjustments for maximum power output at 144 MHz. With full carrier or tone the output should exceed 50 watts RMS. PA cathode current should peak at between 250 and 300 mA on speech peaks.



A close-up of the final tube and tank circuit of the VK3ASQ two metre SSB transverter.





Note. Chassis size 12" x 11 1/2" x 2 1/2"

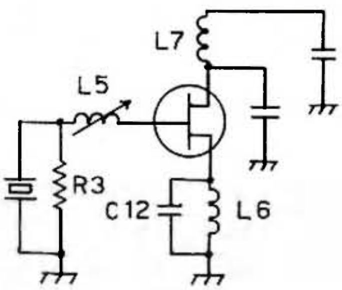


FIGURE 1 - ORIGINAL

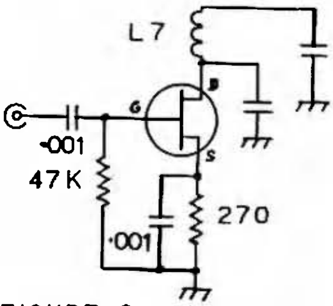
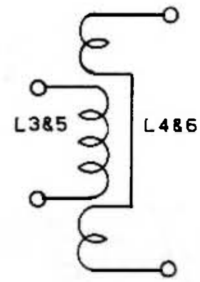
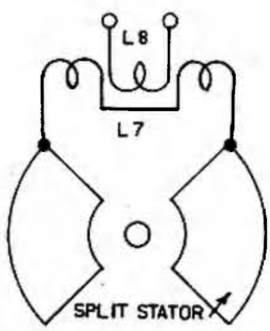


FIGURE 2 - MODIFIED



L3 & L5 Each 4t 20 SWG 1/2" d. spaced by 1 wire d.
L4 & L6 Each 2 x 2 t 20 SWG 1/2" diam.



COIL DETAILS

RECEIVING SECTION

The receiving section uses a WIA VK3 VHF group 2 metre converter, modified for external oscillator injection.

While this is not strictly necessary, it is most desirable as it ensures that the transverter actually transmits and receives on the same frequency. It also saves the cost of one crystal, and gives the converter a little more oscillator injection, producing a slight improvement in performance. Fig 1 gives the original circuit, while Fig 2 shows the simple modification required.

The L6 coil form is replaced with a 270 ohm resistor in parallel with a 1000 pF ceramic capacitor, utilising the holes in the p-c board where the coil would go. The gate is added in place of L5, again using holes in the board. The co-ax, which comes from L11 comes through the side of the L11 can, across the chassis, and is soldered to the bottom of the converter, which is mounted on stand-offs above the main chassis.

The trimmer across the crystal should be adjusted to bring the transverter onto frequency. If a counter is not available, this can be done by firstly calibrating the transceiver at 28 MHz, then with the transceiver in the receive mode locate the 100 KHz calibrator harmonic at 144 MHz. It may be quite weak and it may be necessary to hang a wire near the 100 KHz oscillator with the other end in the converter input. Adjust the trimmer until the 28 MHz harmonic and the 144 MHz harmonic produce a zero beat (RX in AM position).

A possible improvement to the unit can be had by using a 38.666 MHz crystal in the oscillator and multiplying by 3 to produce 116 MHz. This will do away with a small problem encountered in the unit, that is 29 MHz x 4=116 MHz,but 29 MHz x 5 = 145 MHz. Very little of this fifth harmonic content actually gets to the antenna, mainly due to the cancellation in the mixer, but never-the-less it's a problem which can be eliminated before it starts by utilising a different crystal.

If a separate transmitter-receiver combination is to be used, the 28 MHz in and out relay can be omitted and two cables used, one for in and one for out. This can also be done with the FT200 if required, by feeding the low level output into the transmitting mixer, and the receiver mixer output into the normal antenna socket, thereby utilising the internal antenna change-over relay in the FT200. ●

USA Repeaters

It appears that repeaters in the 2m band are a big issue in the USA arising out of FCC Docket 18803 — briefly mentioned in QSP, Jan '73 A.R. — as reported by Wayne Green in '73' Magazine for July '73 and elsewhere. As if the "apparently asinine" FCC Regulations were insufficient to spark off vociferous complaints according to one report, yet another report mentioned the chief of the FCC division responsible for amateur operations as saying that in his view amateur radio was no longer justifying itself — appliance operators seemed to be in the overwhelming majority. One might be forgiven,in asking if these are straws in the wind for the 1978 ITU WRA Conference.

a Diplexer for the Discone

Tom Moffat VK3AQV
63 Doncaster East Road, Mitcham, 3132.

This article is a follow-up to the one on the DISCONE broad-band VHF antenna, published in *AR of April 1973*. The antenna can be used on all VHF bands from 52 to 432 MHz, but its biggest problem, as stated in the earlier article, was that "you can't listen on six while talking on two". After several months of frustration on changing co-ax connectors over every few minutes to try to keep an ear on both bands, it was decided to make a concentrated effort to use the Discone on both 6 and 2 metres at the same time.

It was found that it would receive well on both bands by feeding the six and two metre receivers from the one lead-in with a 'T' connector. But accidently keying one transmitter surely would have caused embarrassment in the front end of the other receiver.

The first step was to design some kind of filtering system that would pass all the 6 metre energy to the Discone, and block it from the 2 metre receiver.

All that was hoped for at that stage was to prevent the blowing up of front ends when a transmitter was keyed.

As for cross-band duplex operation (talking on two while listening on six), everyone who heard of the idea said, "It'll never work, 6 metre signals will block the 2 metre receiver, and vice versa".

But you can never be sure of these things until you try them. That is what amateur radio is all about.

DEVELOPMENT:

The Diplexer, Model One, consisted of a series of pass and reject filters made of RG58 co-ax, and arranged in the configuration shown in the block diagram, Fig 1.

Each was a shorted stub, a quarter wavelength long, to present a very high impedence at the design frequency.

The 'pass' filters were connected across the line, to short everything but the resonant frequency to earth, while the 'reject' filters were connected in series with the line to present an open circuit at their resonant frequency (the unwanted frequency) and pass everything else with little attenuation.

In other words, a 6 metre signal fed into the 6 metre port would pass the 6 metre parallel stub as if it was not there, go through the 2 metre series stub (resonant at 2 metres only), and on to the Discone and the 6 metre series stub. The 6 metre signal hitting the 6 metre series stub would see it as an open circuit, so all the energy would have to go to the Discone.

If any did manage to sneak through the 6 metre series stub, it would be shorted to earth when it hit the 2 metre parallel stub, before it could damage the 2 metre receiver.

The first part of this scheme worked quite well. Fifteen watts fed into the 6 metre port resulted in about 14½ watts at the Discone port, with only 100 milliwatts or so appearing at the 2 metre port and the rest probably dissipated in the dialectric of the stubs. At this stage it was possible to listen to a fairly strong 2 metre signal while the 6 metre transmitter was keyed, although commercial services came through the 2 metre receiver if no other signal was present.

Things were not so encouraging in the other direction. Fifteen watts of 2 metre energy into the 2 metre port resulted in about 3 watts at the Discone port, about 30 milliwatts at the 6 metre port, and an SWR at the 2 metre port of about 5 to 1. The reason for this became obvious after some concentrated thinking. A 6 metre shorted ¼ wave stub is very close to a ¾ wave stub on 2 metres, so 2 metre energy was also seeing a near open circuit.

So much for that idea.

Diplexer Model 2 was made up in a similar way but with RG8 cable instead of RG58.

It was hoped that the lower loss cable would provide higher Q stubs.

Since three times the 6 metre frequency, 52.525MHz, is 11.5MHz away from the 2 metre design frequency of 146MHz it was hoped the higher Q would provide some discrimination against the three-quarter wavelength effect.

But it was not much better, and the tuned stub idea was abandoned. In Diplexer Model 3 it was decided to try coils and capacitors in the same configuration as the stubs.

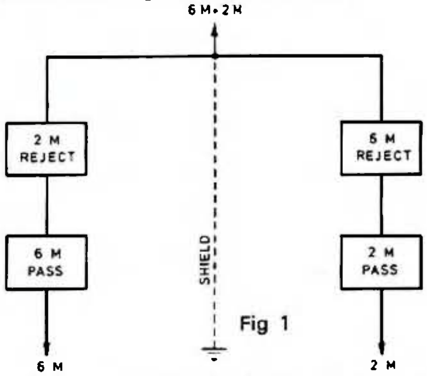


Fig 1

First tests on this circuit showed that the series rejection filters were good and sharp, and did their job well. And there was no more 2 metre reaction to 6 metre tuned circuits.

As for the parallel pass filters, they were not much good. Tuning them had little effect, and they showed a high SWR back to their sources. Obviously their Q was way too low.

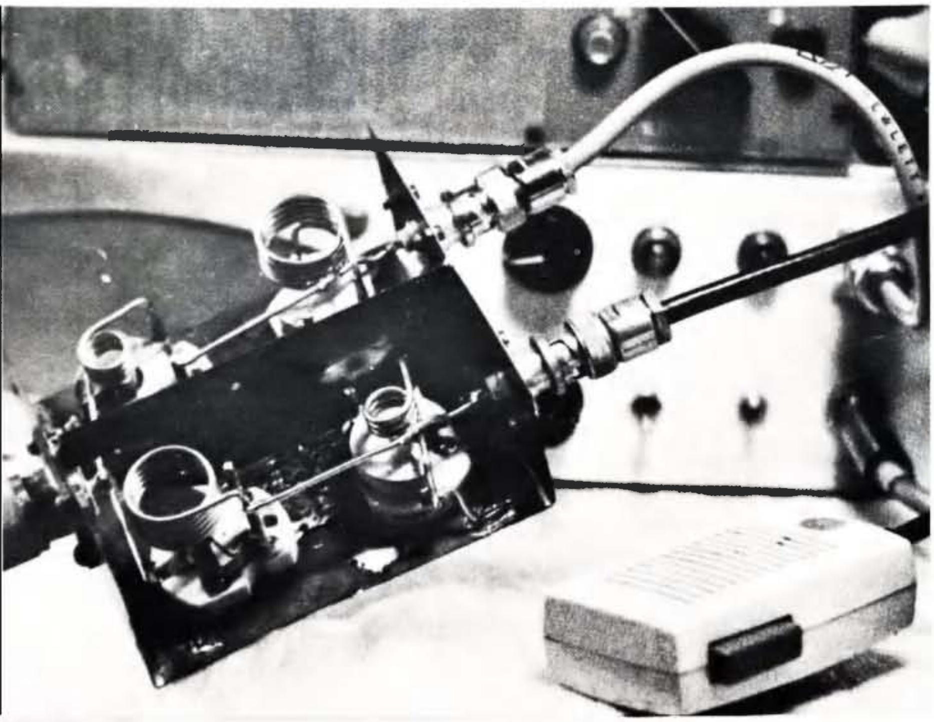
But when they were tapped down from the hot end, the tuning became much sharper, and the input SWR fell dramatically.

Model 3 was obviously going to be a winner.

After a bit of adjustment of the taps, the SWR dropped to 1 to 1 at the 2 metre port and 1.1 to 1 at the 6 metre port, and the power through to the Discone was pretty much the same as what went in.

As far as 6 metre energy at the 2 metre port, and 2 metre energy at the 6 metre port, both of these were too low to see even on a sensitive power meter.

And on the air, it was impossible to tell the Diplexer was in circuit. Both rigs worked as if they had separate antennas, well spaced apart.



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5 BANDS 150-400 kHz, 550-1600 kHz (Broadcast band), 1.6-4.8 MHz, 4.8-14.6 MHz, 10.5-30 MHz
Operates from 12 Volts DC (negative ground) or 220-240 Volts 50 Hz.

- Field Effect Transistors in RF Mixer and Oscillator Stages.
- Two Mechanical Filters for exceptional selectivity.
- Voltage Regulated with Zener Diodes.
- Product Detector for SSB/CW.
- Edge illuminated Slide Rule Dial with "S" Meter.
- Continuous Electrical Bandspread Calibrated 80-100M Amateur Bands.
- Variable BFO, Automatic Noise Limiter.
- Speaker Impedance: 4 to 16 ohms.

Price $215.00
P & P $2.00

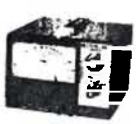
Also available — HA800B Amateur Band. 6 Bands 3.5MHz to 29.7MHz and 50-54MHz as above features with 100kHz calibration facility: $210.00. 100kHz Xtal Extra $10.75. P & P $2.00

A-10/P

Price $55.00

Giant 6½" Meter
Inbuilt signal Injector.
Overload Protected.
AC/V: 2.5V, 10V, 50V, 250V, 500V, 1000V, (10,000 ohm/V)
DC/V: 0.5V, 2.5V, 10V 50V, 250V, 500V, 1000V at 30,000 ohm/V, 5000V, (0,000 ohm/V)
DC/A. 50uA, 1mA, 50mA, 250mA, 1A, 10A
AC/A. 1A, 10A
OHMS: 10k ohm, 100k ohm, 1M ohm, 100M ohm
db: —20 to + 62db
Signal Injector: Blocking oscillator circuit with a 2SA102 transistor
Approx. size: 6 2/5" x 7 1/5"x x 3 3/5"

SOLID STATE SINE SQUARE WAVE AUDIO SIGNAL GENERATOR



The AG-202 is a Wien bridge CR-type, sine & square wave audio signal generator which is invaluable for high fidelity analyses in the lab, on service benches and in electronic educational classrooms. All solid state in construction, it produces excellent sine waves instantly with a minimum of distortion and square waves with fast rise time that are ideal for hi-fi tests. Input for synchronisation with external signal sources has been provided to further enhance the versatility of this fine instrument.

SPECIAL FEATURES

1. Near-perfect sine waves, excellent square waves.
2. Instant signals, superior stability due to all solid state circuitry. No warm-up waiting time needed.
3. 10 V r.m.s. high level output at low impedance. Simple, sure attenuation control.
4. Easy-to-read, single dial wit hfrequency readings accurately calibrated in four ranges: smooth dial mechanism.
5. Input provided for external signal sources, synchronisation which produces signals of the highest accuracy.
6. Frequency and output level of signals are practically unaffected by line voltage fluctuations.
7. Ideal for high fidelity analyses and test work. Also educational purposes.

Price:

AS-100D/P

Price $34.50

High 100,000 ohm volt sensitivity on DC,
Mirror scale Protected movement
AC/V: 6V, 30V, 120V, 300V, 600V, 1200V, (10,000 ohm/V)
DC/V: 3V, 12V, 60V, 120V, 300V, 600V, 1200V
DC/A: 12uA, 6mA, 60mA, (100,000 ohm/V) 300mA, 12A
OHM: 2k ohm, 200k ohm, 20M ohm, 200M ohm
db: —20 to +63db
Audio Output: 6V, 30V, 120V, 300V, 600V, 1200V, AC
Battery: Internal
Approx. size: 7½" x 5½" x 2¾"

LAFAYETTE "GUARDIAN" 6600" 6-BAND RECEIVER

- Operates on 4 "C" Batteries for Portable use.
- Operates from 220-240 Volts AC with Built-in Transformer Supply for Home Use.
- 20 Transistors, 17 Diodes and 2 Thermistors.
- Slide-Rule Dial Calibrated for each Band plus Logging Scale for Reference Purposes.

6 BANDS
(1) LONG WAVE — 160kHz to 390kHz
(2) BROADCAST — 550kHz to 1600kHz
(3)) MARINE — 1.6MHz to 4.6MHz
(4) VHF FM — 88MHz to 108MHz
(5) VHF AIRCRAFT — 108MHz to 136MHz
(6) VHF FM — 147MHz to 174MHz

Price $175.00

TEST EQUIPMENT
MODEL C3023 TRANSISTOR CHECKER

This sensitive, low cost Transistor checker has facilities for measuring ALPHA, BETA and ICO factors, and for checking germanium and silicon diodes.

SPECIFICATIONS
Transistor Test
Alpha 0.7—0.9967
Beta 0 —300
ICO 0 —50A; 0.5mA
Diode Test: Forward and reverse internal resistance
Resistance: 0 to 1M ohm.
Dimensions: 7" x 4½" x 2½"
178 x 114 x 63 mm

SKYWATCH VHF AIRCRAFT BAND MONITOR 8 TRANSISTOR

Freq. Range: 108-136 MHz
Circuit: Superhetrodyne
Antenna: Telescopic Monopole
Sensitivity: 10mV (Microvolt)
S/N Ratio: 36db
I.F. Freq.: 10.7MHz
Power Output: 280mW Pocket size 4½" x 2 7/8" x1¼"
Complete with Earphone and Wrist Strap.

Price $34.95. Post Free

GENERAL COVERAGE & AMATEUR COMMUNICATIONS RECEIVERS
TRIO 9R-59DS

- 4 Bands covering 540 Kcs to 30 Mcs.
- Two Mechanical Filters ensure maximum selectivity.
- Product detector for S.S.B. reception.
- Automatic noise limiter.
- Large tuning and bandspread dials for accurate tuning.
- Calibrated electrical bandspread.
- "S" Meter and B.F.O.
- 2 Microvolt sensitivity for 10 db S/N ratio.

Price $185.00
P & P $2.00

MODEL OL-64D/P MULTIMETER

20,000 ohms per volt, DC volts: 0.025, 1, 10, 50, 250, 500, 1000 (at 20K o.p.v.), 5000 (at 10K o.p.v.). AC volts: 0-10, 50, 250, 1000 (at 8K o.p.v.). DC current: 50uA, 1mA, 50mA 500mA, 10 amps. Resistance: 0.4K, 400K, 4M, 40 megohms. DB scale—20 to plus 36 db. Capacitance: 250pF to 0.02uF. Inductance: 0-5000H. Size: 5¾ x 4 1/6 x 1¾ in.

Price $19.75
Postage 30c

Brand new Valves and Semiconductors.

2N 3055	$2.00
OA91	15c
807 Valve	$2.00
IT4—6C8	75c
IR5	75c
6BA6—6AK5—6V6G	$1.00
2E26	$3.00
6SJ7GT	$1.50
Coil Formers 1¼ inch diameter. Octal base	45c

AVO Model 7 & 8 Multimeters. As new condition from **$35.00**

VHF Transceiver TR 1935 (Suitable for 2 metres AM) 24 Volt **$28.00**

Army Transceivers—We have just received a shipment of the most modern we have ever been able to offer. Complete with 24 Volt DC power supply, Leads and Ear Phones. All are continuous coverage. Manufactured by Plessey.

C13 1.00MHz - 12MHz FM/AM $65
In 12 bands each of 1MHz.

C42 36MHz - 60MHz FM $65

B47 38MHz - 56MHz FM $45

C11 TRANSMITTER 2MHz - 4MHz 4MHz - 8MHz, 8MHz - 16MHz. Continuous coverage with built-in Calibrator. Complete with 24 Volt Power Supply **$65.00**

FREQUENCY METER Manufactured by American Disco-Wyne Model AM/URM 32A. 125kHz 1000MHz. AC Power Supply Head Phones and Calibration Charts **$130**

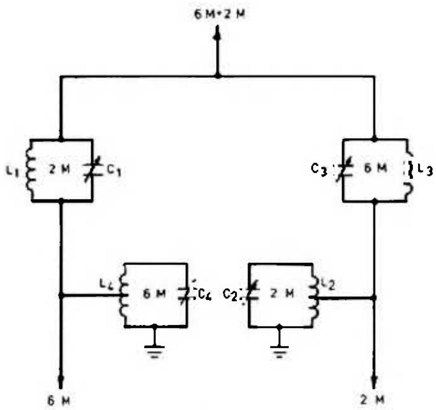
HAM RADIO
(DISPOSAL BRANCH)
104 Highett St., Richmond, Vic., 3121
Phone 52-8136

CONSTRUCTION:

The final version of the Diplexer was built in a home-made brass box, with a brass shield separating the 6 and 2 metre sections.

Layout is exactly as shown in the block diagram, with the four tuning capacitors spaced evenly around the box. The coils are mounted directly above the capacitors, and the appropriate co-ax connectors are mounted in the ends. The box in use measures about 3 by 4 inches, but this was found to be a bit small. With the cover on the coils are too close to the sides, and their Q suffers.

The only way it will work properly is with the cover removed, and that is the way it is used to this day.



L_1 - 3 turns 16B&S, 7/16" I D
L_2 - same as L_1, tap 1 turn from earth end
L_3 - 5½ turns 16B&S, 7/8" I D
L_4 - same as L_3, tap 1½ turns from earth end
C_1, C_2, C_3, C_4 - Approx 5-50pF air trimmer

The tuning capacitors are not critical . . . we used some that happened to be on hand.

Anything should work as long as they will resonate with the coils as specified, but make sure they have good ceramic insulation.

Remember, high Q is the secret to success in this circuit.

ADJUSTMENT:

Tuning the Diplexer is fairly simple. The first step is to terminate the Discone port in 50 ohms. Then feed a 2 metre signal into the 2 metre port and adjust C2 for minimum SWR with the detector connected between the transmitter and the 2 metre port. Next do the same with a 6 metre transmitter and the 6 metre port, adjusting C4.

Now feed 6 metres into the 6 metre port, leave the Discone port terminated, and connect a sensitive power meter to the 2 metre port. Adjust C3 for minimum indication.

Finally feed 2 metres into the 2 metre port, connect the power meter to the 6 metre port, and again go for minimum power, this time adjusting C1.

As the adjustments interact to a slight degree, they should all now be repeated, but this time with the Discone connected to the Discone port through the cable length normally used with it.

After the second run through you should not be able to measure any power from the 6 to 2 port, or the 2 to 6 port, and the input SWR for both should be very close to 1 to 1. If it's not, a slight adjustment of the tap on the offending L2 or L4 should put things right.

As a "final-final" adjustment, for greatest 6 to 2 and 2 to 6 loss, terminate the Discone port in 50 ohms once again, and connect the Discone itself to the 2 metre port.

Now connect the 2 metre receiver to the 6 metre port and listen for a strong signal.

It will not sound strong going through the Diplexer in this way as it will probably be attenuated by at least 60dB. Once you hear something adjust C1 for minimum signal. You will probably be able to null it out completely by careful adjustment of C1.

This adjustment should be done sitting down, with both elbows on the table and both hands on the screwdriver. It is a very touchy one and the smallest rotation of the screw will take the test signal from full quieting to virtual absence.

Let it be stressed that a **STRONG** signal will be required for this test, as the loss when properly adjusted will be very high. Once the 2 metre reject filter has had this final touch up, you can switch things around and do the same on the 6 metre reject filter.

Once these adjustments are made, check and touch up if necessary the SWR readings into the 6 and 2 metre ports, with the Discone connected to the Discone port. They should require only a minor adjustment if any, and will not affect the tricky return loss adjustments just made.

PERFORMANCE:

Now you should be able to connect the Diplexer into the system permanently.

If it is working as it should, keying one transmitter should have no effect on the other receiver. If it does, connect the transmitter to the Discone direct, and terminate the other receiver in 50 Ohms. Chances are any noises you hear will occur just the same, without the Diplexer even being in circuit, due to some small spurious coming out of the transmitter.

A COUPLE OF FINAL POINTS:

You may find your 6 metre rig works better with the Diplexer than without it.

This is because the 50MHz Discone shows some reactance at the low end of its frequency range, causing an SWR of about 2½ to 1 with a 52.525 signal.

The Diplexer seems to work as a sort of antenna tuner, improving the match between the transmitter and antenna at this frequency. The Discone article also stated that a band pass or low pass filter should be used between the transmitter and antenna, to prevent the radiation of harmonics.

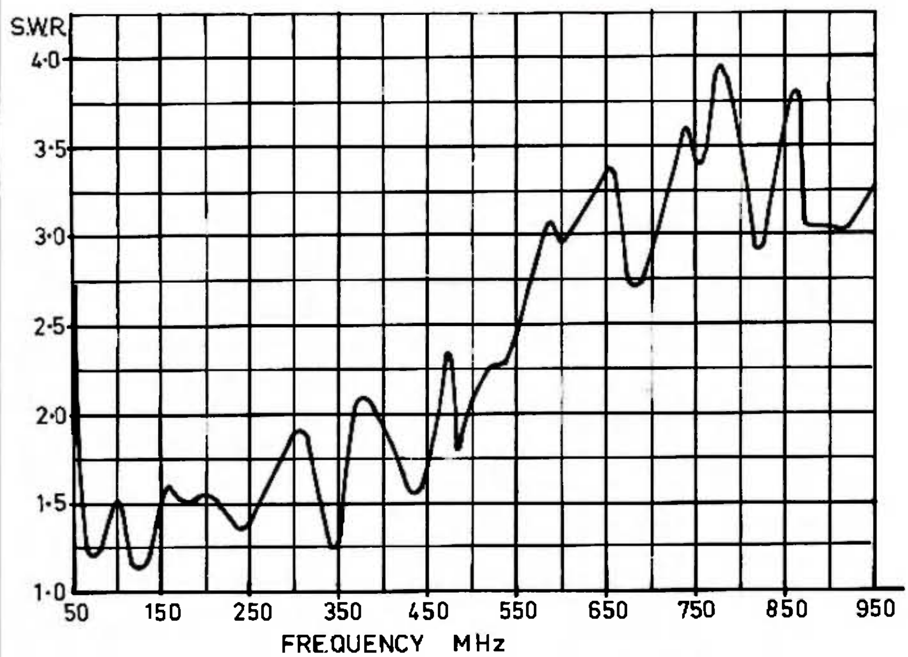
The Diplexer serves very nicely as a band pass filter for both 2 and 6, as the parallel filters tend to block anything other than the desired frequency.

It seems likely that this design could be expanded to take in 432MHz, by adding the appropriate pass and reject tuned circuits. This would bring the total to nine, but it should work after a bit of development time.

How about someone trying it? ●

discone antenna measurements

Ross Dannecker VK4ZFD/T
Kings College, University of Queensland, 4067.



ABOVE—A graph showing the comprehensive SWR measurements performed on a DISCONE antenna constructed from the article in April, 1973, AR. ●

vertical aerial needs no groundplane

BRIAN RICHARDSON VK4CCR
20 Peacock Street, Leichhardt, Q. 4305.

Mobile operation does not necessitate drilling the roof of the car to mount the usual quarter-or ⅝-wave whip. Here's how to avoid the problem and still get better than quarter-wave performance.

Of the various types of vertical antennas, so popular among VHF mobile operators, nearly all suffer from one big disadvantage; they require a good earth or counterpoise to decouple the RF current from the outer conductor of the coax feeder. Achieving this end involves drilling a disfiguring hole in the roof of the car, or carrying a bulky counterpoise with the portable station. There is, however, another version of the vertical, by no means a new idea, but one that is largely neglected today. This is the half-wave vertical, and it will provide 2dB of gain over the quarter-wave whip, without the need for a ground-plane. The end fed half-wave is fed at the point of minimum RF current, and so for practical purposes eliminates the need to decouple the coax outer conductor. It does however require a suitable matching network to match the low impedance coax to the high impedance antenna, and this is achieved by using a parallel tuned circuit to feed the antenna, and tapping the coax into the inductor. The inductor is a large diameter single turn, used to minimise coupling between the antenna and itself, the resonating capacitor is a ceramic variable. See Fig 1.

CONSTRUCTION

The antenna I constructed was a two-metre version of the half-wave, and is shown in the accompanying diagrams. It used a 41 inch length of thin fibreglass fishing rod stock. A piece of coax braid was slid over the top of the rod for a length of 38¼ inches. The 2¼ inch diameter inductor was made up as in Fig 1, from ¼ inch wide copper strap, and soldered to the bottom of the braid. There is no reason why heavy copper wire such as 10 gauge should not be used here. The tuning capacitor, a tubular ceramic variable in my case, was soldered in parallel with the coil, and the outer conductor of the 50 ohm coax soldered to the bottom end of the coil. Determining the correct point for attaching the centre conductor is best done by the trial and error method, varying the tapping point on the coil for best SWR.

ADJUSTMENT

After the antenna is constructed attach the coax centre conductor initially about two inches from the earthy end of the coil, connect a SWR bridge into the feeder and feed a small amount of power into the antenna. Adjust the variable capacitor for best SWR, then move the position of the tapping point on the coil and re-measure the SWR after trimming the capacitor again. You will find very little interaction between these two adjustments and a good SWR can be obtained with a few minutes work. The antenna should be mounted several feet away from any large metal objects while carrying out these adjustments.

INSTALLATION

Once properly adjusted the antenna may be mounted on a wooden pole, clipped to the guttering of a car, or nearly anywhere, and the SWR will show only the slightest change. If a significant change in SWR occurs when a good earth is connected, then this indicates that there is coupling between the coax outer conductor and the antenna field. This is best remedied by running the feeder away at right angles to the antenna, or by looping the coax through a ferrite toroid about nine inches away from the antenna. See Fig 2. A suitable toroid would be the Q2 toroid advertised by the WIA disposals committee.

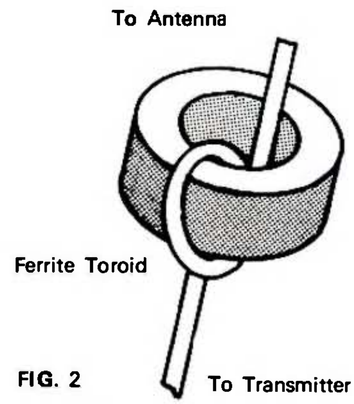


FIG. 2

PERFORMANCE

I have made tests, comparing the quarter-wave whip mounted in the centre of the car roof, and the half-wave attached to a gutter mount. In all situations the half-wave gave considerably better performance than the quarter-wave, sometimes providing a solid signal where the short whip only picked up a weak fluttery signal. Tests made over about 10 miles between two hills, and using the receiver limiter current as an indication, gave results which indicated that the half-wave had slightly more than 2dB gain over the quarter-wave vertical.

The details given have only covered a 2-metre whip, but the same principles apply to any frequency. For example on 20 metres the coil would be about 25 inches diameter, of ¼ inch diameter tubing, tuning with a capacitor of 70 to 100pF. ●

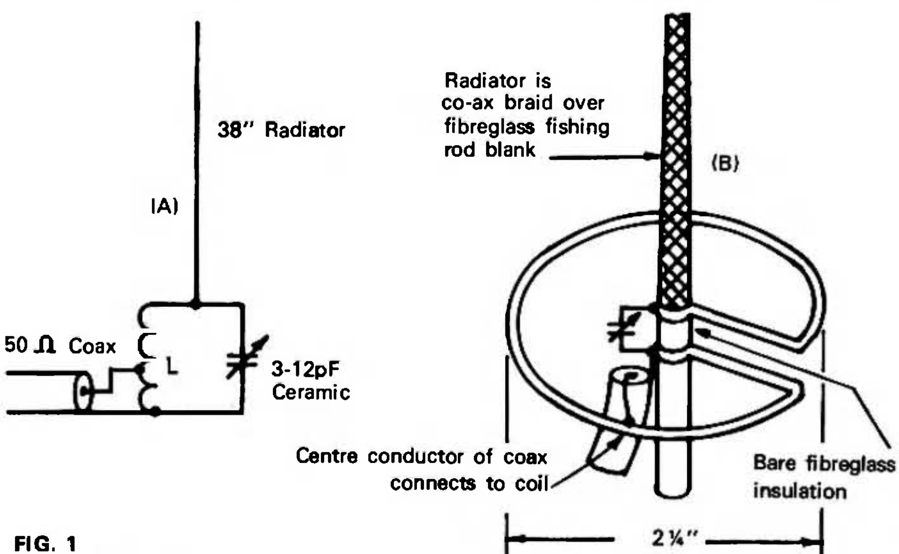


FIG. 1
2 meter half wave vertical

looking back....

Fred M. Maddison

41 Knowles Street, Amellia Heights. Balcatta. 6021

Looking back to 40 years ago the usual forms of entertainment for most young boys were the occasional slide-show at the local Church Hall and visits to a museum. Schooling consisted of the Three R's plus the practical subjects of woodwork and science.

To me, those science lessons were the only joy of my schooldays and, by a strange coincidence, those days on which science lessons occurred were the only days on which I did not develop a 'mysterious illness' or played truant. Fortunately, the science master had a greater interest in electrical other than chemical experimentation.

In common with most other children I caught the usual childhood ailments of chickenpox, measles etc. and then, at the tender age of seven, I contracted the dreaded 'Cat's Whisker' disease which has remained with me to this day.

In its mildest form this disease does not interfere with the normal smooth running of a household; however, in its more virulent form it tends to disrupt the harmony of the house. My collection of radio receivers and components — obtained through schoolboy 'swapping' sessions — was hoarded away in my small bedroom which I shared with two brothers. It was not long before it became somewhat difficult to open the door, let alone get into bed.

When one and two valve receivers first made their appearance on the market, mass unemployment caused them to be beyond the means of most people. Consequently the crystal receiver remained very much in vogue — although they too were quite expensive, being sold in beautifully polished cabinets resembling deed or trinket boxes.

With the upsurge of public interest in radio a great deal of home construction took place and occasionally the national newspapers printed circuit and construction details.

Circuits of early receivers were very basic and mostly consisted of an untapped coil tuned by a variable capacitor plus a crystal detector and a pair of high resistance headphones. Long aerials and good earths were the order of the day and even though Q factors were unheard of, this and selectivity were of no concern because there were, from memory, only two broadcast stations in England.

In a very short time the theory and design of inductances improved dramatically. The most popular design was that in which taps from the inductance were brought out to brass studs which were, in turn, wiped with a knob-controlled arm. The detector, which used a germanium crystal, was contained in a dustproof glass tube.

The crystal was held in a little brass cup by three screws and this, in turn, was contacted by a small piece of wire attached to a movable arm attached to the other end of the glass tube — hence the term 'cat's whisker'. The preference was for a gold wire cat's whisker which, incidentally, was in the shape of a small spring.

Considerable time could be spent in probing the surface of the crystal for the 'loudest' spot and even the vibrations of someone entering the room could break the long sought after 'loud spot' although it proved to be that the coiled shape of the cat's whisker was slightly effective in reducing the vibratory loss of contact. Sophistication came with the construction of two crystal detectors placed side by side — at least one was guaranteed not to lose reception!

Needless to say, broadcast stations were springing up all over the world and for those fortunate enough to be able to afford a valved receiver it was comparatively easy to receive stations such as Radio Paris. However, crystal receiver circuits were still being improved upon and I was fortunate enough to come across one which the designer boasted would receive Radio Paris.

Basically the inductance was a wire-wound tube approximately four inches in diameter inside which revolved a tennis ball which was also wound with wire. This was known, I believe, as a variometer. Imagine my delight when, on hooking it up, Radio Paris came through; in fact it was so loud that when I coupled it to a 2000 ohm Ormond horn speaker the volume was amazing. When my father brought in the next-door-neighbours to hear a French-speaking horn-amplified crystal receiver my face was like that of a Cheshire cat.

I clearly remember persuading my mother to buy toilet rolls in order that I had ready-made coil formers. The progression from newspaper to toilet rolls was appreciated by the anatomy and, coupled with the advancement of experimental radio, was no mean achievement.

However, not all of my ideas were beneficial to the household and encouraging pats on the back alternated with discouraging smacks on the behind. For example, having read that warming batteries rejuvenated spent cells, I once placed a large 120v HT battery in a warm oven and returned to experiments which I felt would benefit mankind. Some considerable time later acrid fumes pervaded the house and a quick visit to the oven revealed a mass of molten wax, pitch and carbon rods bubbling away in their now empty cells.

On another occasion, having constructed my first mains operated receiver (transformerless), I discovered that excellent results could be obtained by using the frame and springs of the bed as an aerial, not realizing that the whole frame was very much alive — a fact which my mother quickly discovered when she attempted to make the bed!

To this day I am still plagued with the 'cat's whisker malady' and, in the hope that I may be of some assistance to other radio enthusiasts who may be as yet unaware that they too are sufferers, I submit below my current (no pun intended) medical report.

Reference Patient R5-S9

General, Pysical and Mental Fitness:
Has a Split Stator personality. Has ability to climb ladders, masts and clamber about roofs but suffers severe headaches and giddiness when painting or cleaning windows while standing on even the smallest stepladder.

Manual Dexterity:

Has a watchmaker's skill when winding small coils or working on printed circuits but is all thumbs when washing up and drying crockery.

Prescribed Treatment:

Many years of massive doses of QRN and electric shock treatment have elicited little response and it is felt that the introduction to FT 101 may be the only cure. ●

BELOW
Diode detectors have progressed a long way from the "cats whisker" detector.

how safe is your aerial

Chris de Combe VK5NQ
Flat 83 Blk G. Carriwan Street, Woomera. 5720.

As the last crash of thunder sent me leaping at least 6" out of bed and sent the cat dashing for cover I was suddenly struck by the thought *'How Safe is My Aerial'.*

A good aerial represents a large surface of metal which is positioned clear of any other objects. As such it is a potential lightning hazard.

There are several methods of protecting an aerial system all of which depend upon DC earthing of the aerial. For this protection to work and also more important to be safe, the earth used must be good and on no account should *mains* earth be used. A 5 foot metal rod sunk into the ground represents a reasonable earth system.

The most simple way to earth an aerial is to install a switch at the point where the feeders enter the shack. When the aerial is not in use it is switched to earth. For coax feeders an earthed socket can be provided to terminate the aerial.

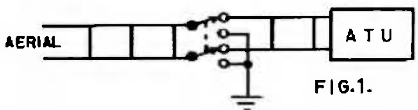
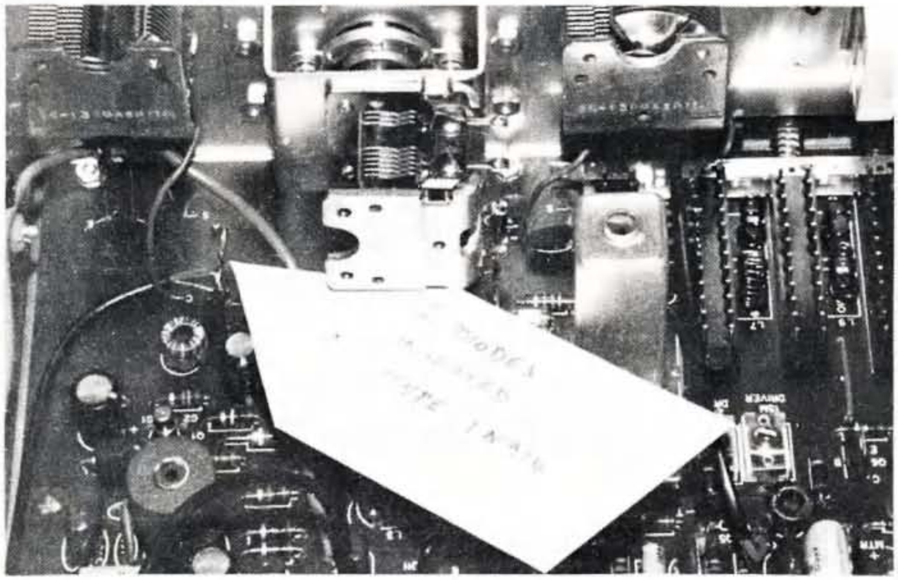


FIG.1.

The aerial switch Fig 1 works very well provided the switch is a high quality knife type but it has the great drawback that it can be forgotten. In one case the shack is not protected and in the other the station transmitter can be fed into an open circuit with nasty results.

A better method is to use automatic protection, using RF chokes to earth the aerial to DC but not to RF.

Suitable chokes should have a low DC resistance, that is wound with heavy gauge wire, and a reactance at least 5 times the line impedance.



ABOVE
Showing where the protective diodes were added to a Heathkit HW7.

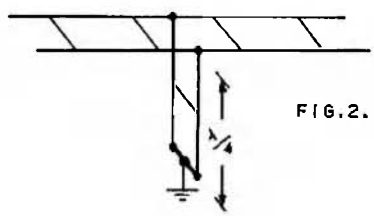


FIG.2.

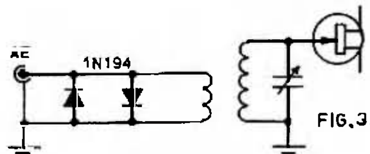


FIG.3.

BELOW
Chris VK5NQ operating his own rig at the Woomera Radio Club VK5WC.

Stations using a single band can use ¼ wave stubs with good results, Fig 2. A ¼ wave length of line connected between the feeder and earth will provide a low resistance DC path and yet a very high impedance to the RF.

When using coax cable the velocity factor of the cable should be taken into account. The length of the line being $\frac{\lambda}{4} \times VF$ where VF is typically 0.6.

Lightning protection not only applies to aerials but also to towers and masts which should all be well earthed.

Care should be taken to ensure that a good connection is made to the tower and that the joint is weather proofed.

Lightning protection also gives protection against static build up which can be very high on dry days due to cloud movement.

It is not often appreciated that this static build up can be large enough to cause arcing and certain damage to transistor and FET receiver inputs if they are not properly protected.

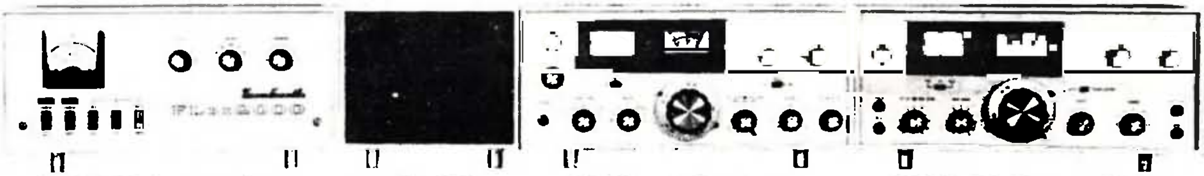
The protection methods so far mentioned will protect the receiver but an additional protection in the shape of two IN914 diodes connected across the receiver aerial terminals is worthwhile, Fig 3.

These diodes have a low capacity of about 4pF, so there is no effect to the receiver's performance but they have the effect of limiting the voltage across the aerial terminals to ½ a volt.

The diodes will also help protect the receiver from any RF leakage across the aerial change over switch when transmitting.

Having just carried out several of these ideas I can now sleep easily through any storm knowing that my shack is safe and my receiver protected. I hope you can do the same. ●

For Best Value in SSB—Choose Yaesu
from BAIL ELECTRONIC SERVICES



FL-2000B Linear Amp.
80 - 10 mx, G.G.

SP-400
Speaker

FRDX-400 Receiver
160-10 mx, WWV, C.B.

FLDX-400 Transmitter
80 - 10 mx, peak in. 300w.

FTDX-401 TRANSCEIVER: 80/10 mx, PA two x 6KD6, 560w. peak input SSB, choice of manual, PTT or VOX operation. Full coverage on 10 mx, offset tuning, calibrator. Includes fan, CW filter, noise blanker, **$550.**

FV-401 EXTERNAL VFO: For FTDX-401, **S115.**

FT-101B TRANSCEIVER: 160/10mx, SSB, AM, CW, PA two x 6JS6A, 300w. peak input SSB. Built-in dual AC/DC power supply. Low current drain transistorised except for transmitter driver and PA. Plug-in modules, I.F. noise blanker, FET receiver RF, clarifier, built-in speaker. Ideal for portable/mobile from 12v. DC, or in the shack on AC, **$579**

FV-101 EXTERNAL VFO: Matching auxiliary VFO for the FT-101, **$115.**

FT-200 TRANSCEIVER: 80/10 mx, PA two x 6JS6A, 300w. peak input SSB. Manual, PTT or VOX control, offset tuning, calibrator. Operates from a separate power supply, **$331**

FP-200: Yaesu AC Power Supply for FT-200, in matching cabinet with in-built speaker, **$90.**

DC-200: Yaesu 12v. DC Power Supply for FT-200, complete with special plug and cable, **$135.**

FT-75 TRANSCEIVER: SSB and CW. VXO, noise blanker, squelch. Very small size, transistorised, a superb little rig (see review "A.R." Sept. '72). Microphone and four crystals included, **$237.**

FP-75 AC POWER SUPPLY: 230v., for FT-75. Built-in speaker, power cable and plug, **$49.90.**

DC-75 DC POWER SUPPLY: 12v., for FT-75. Includes built-in speaker, mobile mount, power cable and plug, **$49.90.**

FV-50C VFO: for FT-75, **$45.**

FLDX-400 TRANSMITTER: 80/10 mx, PA two x 6JS6A, 300w. peak input SSB. Manual, PTT or VOX control, SSB, AM, CW. Adaptable to FSK for RTTY. Mechanical filter, **$436.**

FRDX-400 RECEIVER: 160/10 mx. Mechanical filter, I.F. "T" notch rejection tuning, calibrator. Provision for installation of FET VHF converters, FM, and 600 Hz. mechanical filter for CW. Can be coupled with the FLDX-400 for transceiving, **$428.**

FT-501 DIGITAL READ-OUT TRANSCEIVER: 80-10mx, SSB CW. 500w peak input, includes 2-speed cooling fan, noise blanker, clarifier, VOX and etc., **$760.**

FP-501: Yaesu AC Power Supply for FT-501, in matching cabinet with built-in speaker, **$90.**

FL-2000B LINEAR AMPLIFIER: 80-10 mx. Tubes, two x 572B triodes in G.G., twin fan cooled. **$398.**

FL-2100 LINEAR AMPLIFIER: Similar to FL-2000B but styled to match FT-101, **$398.**

FL-2500 LINEAR AMPLIFIER: 160/10 mx, four x 6KD6 tubes, standard cabinet, **$315.**

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hy-gain

KW

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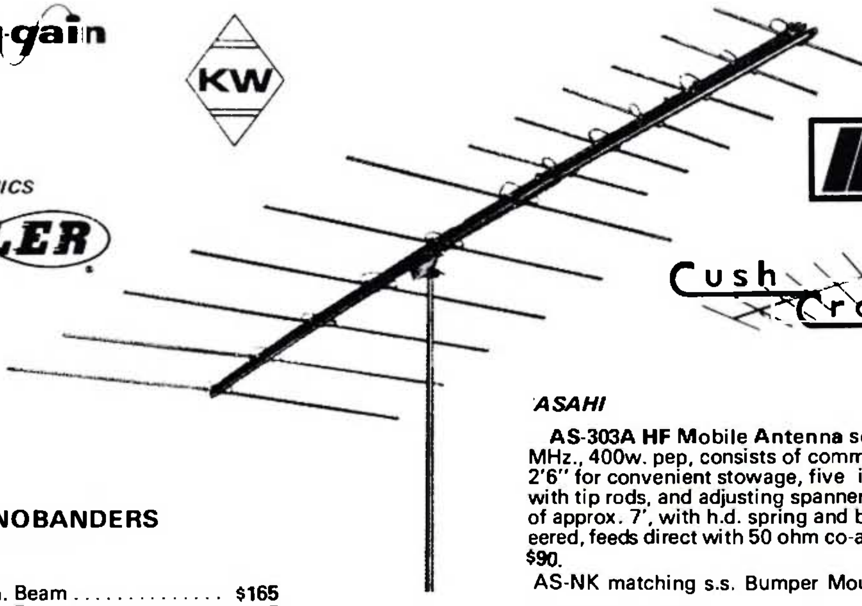
Cush Craft



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204BA, 4 element 20m. Beam $165
203BA, 3 element 20m. Beam $153
402BA 2-element 40m Beam $188

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DB-24B 4-element 20-40m Beam $210

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TH3Mk3, 3 element trap Beam $165
TH3Jr, 3 element trap Beam $110
HY-QUAD 2-element Quad beam .$153

H.F. VERTICALS

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4BTV 40-10m. Trap Vertical.............. $59.50
RM80 Adapter for 4BTV Converts the 4BTV to 80-10m. Vertical $20

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14AVQ, 10m. thru 40m. trap Vertical $57
18AVT, 10m. thru 80m. trap Vertical $79
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MC-40, 40m $22
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MC-15, 15m......$16.00
MC-11, 11m......$15.00
MC-10, 10m......$15.00

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RS Series Gutter Mount HF Centre Loaded Mobile Antenas, consisting of gutter mounting base attachment and mast with 11'6" co-ax. and plug PL-259 attached (base mast doubles as a ¼ wave vertical on 2 mx) and interchangeable coils with adjustable tip rods for 40 mx to 10 mx. 150 watt **PEP**, 4'6" total length. Slim and neat, brushed chrome finish, a typical **Yaesu** quality product. RS base and mast, $19.50. Coils RSL-7 $19.50, RSL-14 $18.50, RSL-21 $15.50, RSL-28 $14.00.

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HW-40, 40m $23.50
HW-20, 20m $21.50
HW-15, 15m $20.00
HW-11, 11m $20.00
HW-10, 10m $20.00

FITTINGS: (Suit all makes).
BPR, bumper mount $12.50
BDYF, heavy duty adjustable body mount $12.50
HWM-1, fixed body mount $12.50
SPG, heavy duty spring $10
SPGM, light duty miniature soring $6.00
JMS "Jiffy" body mount $9
Asahi AS-KRB, flat roof mounting adapter for vertical trap antennas $15.

V.H.F. ANTENNAS

HY GAIN

23, 3 element 2m. Beam $15
28, 8 element 2m. Beam $29.50
SGP-2, 2m. ground-plane $14.50
GPG-2, 2m. ⅝ wave ground-plane $25
GP-50, 25 thru 54 MHz. ground-plane 25

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AR-2, 2m. half-wave gamma loop matched vertical $25
A144-7, 7 element 2m. Beam $21
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Also available, 27, 52 and 430 MHz Beams and Verticals

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MAG-150, magnetic mount ¼-wave whip (108 thru 450 MHz.) includes 18 ft. of RG58U and connector.................. $22
W-102, 102" S.S. whip suitable 27-100 MHz $13.50
764, duo-band 6-2m. whip $38
HH2BA, 2m. centre mount halo......................... $12
HMBA, telescoping mast for halo, and etc..............$12.50

ASAHI

AS-2HR, ⅝-wave S.S. 2m. gutter mount, inc. co-ax. $28

NEWTRONICS

UHG-1, ¼-wave 2m. gutter mount, inc. co-ax $16.50

las balsas

S. E. Molen VK2SG

The Australian Communications Co-ordinator
13 Pendle Way. Pendle Hill. 2145.

By the time you read this, you will have heard of Las Balsas, and of their epic trip across the Pacific Ocean. Three rafts and twelve persons braving the elements for long periods and landing at their destined point on the Australian coast. Of course you have also heard of the part that AMATEUR RADIO played during the trip. Amateurs all over the Pacific, the Americas and Australia combined to assist with the communications.

Just how does one become involved in something like this? What must one give to people who do this kind of thing? The only way that I can explain is to cast my mind back to 1970, when Vital Alsar made his first trip to Australia. At that time he used Amateur Radio as his communications. If one remembers, he did have difficulties with his transmitter, mainly that seawater seeped onto the audio board and ate the copper away, thereby preventing the audio getting to his transmitter. All that could be heard was the transient clicks as the press to talk button was pressed. It was about this time that I was asked to assist the Mexican stations with the communications. This proved successful and with the assistance of several other stations (who are again assisting) we finally managed to get the rafts ashore successfully at Mooloolaba in Queensland, despite certain doubts raised by some people in official positions.

On Vital's return to his home we had kept up an intermittent correspondence (I am a lousy letter writer) until October 1972 when I received the following letter, I quote in part:-

"We are planning another expedition, with three rafts this time. They will be called ***"Guayaquil"****,* ***"Aztlan"*** *and* ***"Mooloolaba"*** *in honor of Ecuador, Mexico and Australia. The name of the expedition itself is "****Los Huancavilcas****", an Ecuadorian tribe which are thought to have been navigators who sailed in rafts across the ocean.*

We will leave the first week of June (first Sunday) 1973 from Guayaquil. We will be in Ecuador the first week of April building the rafts and hope to reach Mooloolaba again. We will be sailing together and I hope we will all reach Mooloolaba at the same time.

This time we will take a different route thereby definitely proving that the raft could have been a means of transportation in Precolombian times. This does not mean to say that I think people went from Ecuador to Australia. We will be twelve men with nine different nationalities, four men on each raft. The principal object of the voyage is to study how one can survive at sea, and the human element. We will also be conducting other marine experiments.

Syd, I wish that you could have the same network as you did on the previous voyage, and for you to be the "bossman" as you were before. I will leave that to you to plan as I know you will. If you will contact XE1EB (Admiral Samuel Fernendez), XE1NF (Roberto (BOB) Romero) and XE1CI (Nelly and Marcos Lazard) and let them know the time and the frequency and the day, whenever you say they will be ready to listen. I do hope that it will be soon so that we can be in contact before the expedition starts.

Thank you very much for your trouble," etc . . . . .

When one receives that kind of letter, what can one do? Well as you guessed I replied, and we set up skeds with Nelly XE1CI on a fairly regular basis through January, February and March. Of course there was a lot of correspondence as well, for I wanted things like radar reflectors fitted and also some emergency radio equipment as carried in lifeboats, in addition to other gear that was felt necessary for safety of life at sea.

In the final consumation we agreed on some things, and disagreed on others, but in the main we compromised on what we felt would be best and most conveniently carried by the rafts, which you must realise would have to carry a fairly heavy load of food, water, equipment and personnel.

In April, Vital and the crew moved to Ecuador to start the building of the rafts, which were built of female balsa logs cut at the right time of the month, so that the logs are in their least absorbent condition. Strange to say the male logs are very hydroscopic and do not last any time in water. So female trees are used and these have proved very durable. The construction of the rafts, provisioning, and preparing took them well into May. The date for sailing was then set for the 27th May 1973, as the tides, current and winds appeared that they would all be favourable at that time.

During the time that Vital and the crews were constructing the rafts, Nelly XE1CI, Samuel and myself set about organising the necessary networks. In the Americas and under control of XE1CI were the following stations:-

XE1CI, XE1EB, XE1NF, XE1TX, XE1FFC, HC2OM, W6FQ and VE2BBS.

As for myself, my mind went back to 1970 and to the stations who had been the main standby's namely VK4LZ and ZL1RO. Both of these stations had given unlimited assistance previously and it was felt that they would again be able to provide qualified assistance due to their previous experience with this type of operation. There were other stations with whom I had had considerable contact over the years and who I had met personally on several occasions. I felt they would fall into the operation with ease; they were VK4GD and 9VIRA. There was also a station in the Cook Islands who was approached and who had signified his willingness to assist but, due to occupation commitments, was not able to assist at the appointed time. Luckily his place was ably taken by another station from the Cook Islands who did an excellent job. But more of that later as we approach the Cook Islands on the actual trip.

Basically that was the setup as the rafts left Guayaquil in Ecuador on the 27th May, 1973 at 1700 GMT. The rafts were towed to sea by an Ecuadorian Naval tug with the intention of injecting them into the Humboldt Current but due to the tow rope breaking just as they were entering the northward flow, they experienced some difficulty in remaining in the current. With the winds blowing from the south west they found themselves being blown back to the coast and finished up behind one of the coastal islands named Santa Glada. After some days struggling against adverse winds and currents, the Ecuadorian Navy sent another tug to tow them well out into the Humboldt Current and turn them loose.

During this time, the communications between the rafts, Mexico and Ecuador were excellent (with some QRM) but with Australia it was, to say the least, very difficult. However Nelly XE1CI who was the control station was passing all the information to me and the stations who were listening in Australia, so at all times we knew just where the 'boys' were and how they were faring.

From where they were finally turned loose in the Humboldt Current until they neared the Galapagos Islands, the trip was fairly uneventful, with winds never above force 5 and the waves never reaching more than 6 metres high. As the rafts passed the Galapagos Islands on the 11th June, it was hoped that they could receive some fresh fruit and vegetables and have a celebration, because this was their first big hurdle owing to the current flow around the islands, which could have taken them onto the islands and wrecked the whole trip. Unfortunately, the yacht that was to have met them had a faulty compass and could not find them and even had difficulty finding the islands on its return trip, so contact was not made and the rafts drifted on their lonely way.

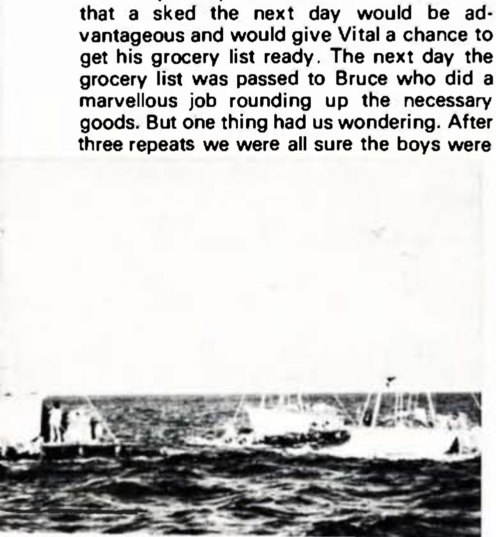
It was not until the 6th July that they made physical contact with the outside world. The M.V. TEKOA appeared out of the predawn murk and almost passed them by, until the rafts attracted their attention by firing rockets. To quote the captain of the TEKOA as reported in the Auckland Star on the 24th August, I quote

> *"He had the very odd experience of meeting three Kontiki type rafts in mid ocean, and their leader buying three cwt of groceries and wanting to pay for them in cash. He also said that to his mind such expeditions were crazy, but the leader of the expedition said "nothing to it".*
>
> *Anyway, the skipper of the TEKOA gave them a present of 24 cans of beer before he went on his amazed way."*

From this point longitude 104 degrees 25 minutes west 00 degrees 51 minutes south onto the Marquessa Islands they had a fairly smooth though slow trip. With, of course, the occasional storms which apparently were up to the usual Pacific standards of waves up to 10 metres high and winds up to force 7. It was during this period of travel that the two parrots they had on board decided that they could make better time on their own, so early one morning they took off and headed west. This was not the best direction for them to go, as the rafts at that time were about 1200 miles east of the Marquessa Islands, the nearest land in the direction the parrots were last seen heading. As it would take sustained flying and good navigation for these birds to reach the islands, it was generally felt that the birds would not make it.

When the rafts were about six days away from the Marquessa Islands I had a contact with the yacht "SEEKER" HP9XGB-MM, who enquired as to the position of the rafts. Bruce had been trying to follow the rafts, but radio conditions had not been good and he had missed hearing some of the skeds. The interesting thing is that he had passed within three degrees of the rafts as he sailed from the Galapagos Islands to the Marquessa Islands, and he was now at anchor in the Marquessa Islands. As the sked with the rafts was the next day, I invited him to be on frequency at sked time. The next day, the sked went as usual and, after the formal information had been passed, I called Vital and asked him if there was anything that he needed from the Marquessa Islands? Vital suggested that he would appreciate certain fresh fruit. At this point, I called HP9XGB-MM and introduced Vital to Bruce.

After primary discussion it was decided that a sked the next day would be advantageous and would give Vital a chance to get his grocery list ready. The next day the grocery list was passed to Bruce who did a marvellous job rounding up the necessary goods. But one thing had us wondering. After three repeats we were all sure the boys were beginning to feel the strain of the trip. Vital had asked for **24 teaspoons!**



It turned out that they had been teaching the monkey they had on the raft to eat with a spoon and he had responded marvellously. Unfortunately he was also lazy and did not like washing up. After he had finished his meal he would hurl the spoon into the sea and the rafts were now running very short of spoons.

Vital had also asked for a pair of dental pliers, for apparently one of the crew had tooth ache. It turned out that Bruce on the "SEEKER" had a doctor on board and he would be coming with them to meet the rafts. Contact with the rafts was made on the 20th August and the groceries were transferred in a most efficient manner. Bruce had three dingies on board, each one loaded with the stores for one raft. As he sailed past the raft he let the dingy go so that the raft could unload it without too much trouble. While this was going on the doctor was having a look at the condition of the crews and removing the offending tooth.

The crew of the rafts were very grateful to Bruce and his crew on the yacht for his effort. It will remain in their memories as one of the highlights of the trip. After several hours of enjoyable meeting the rafts sailed on and the yacht "SEEKER" returned to the islands. I believe the people on the yacht were pleased to reach an anchorage because Bruce said it was very, very rough out there.

The course of the rafts took them north of the Society Islands and north of Bora Bora Island. It was between the Marquessa Islands and the Society Islands that they ran into a fairly heavy storm. Heavy enough to make the monkeys leave the deck and head up the mast to get out of the sea water that was flowing over the rafts. Apparently the rafts were pitching hard enough to shake both the monkeys off their grip on the mast and unfortunately both monkeys were lost during that night.

By this time several yachts had been alerted that the rafts were passing north of Bora Bora and from the indication we received it looked like the traffic in the area would be very heavy and could almost develop into a traffic jam. Unfortunately, the seas did not abate to any extent and it was only the larger vessels such as the "MAGIC DRAGON" VEOMCG-MM with Dan as the skipper, and the official vessel of the Governor of the Society Islands (with the Governor on board) who managed to meet the rafts. The Governor had sailed up from Tahiti to meet the people on the rafts. The meeting went off very well, and I believe a good time was had by all. The alerting of the Governor as to the position of the rafts and their impending arrival near Bora Bora was ably handled by FO8AU who spent many tiring hours on frequency assisting the rafts.

After leaving the Society Islands the seas became a little rougher and lifted to 10 to 11 metres. It was during a storm in this area that the Mooloolaba suffered a little damage to its sail which was repaired but caused trouble at a later date.

The intended track of the rafts took them through the Cook Islands and ZK1AA who had been on frequency for about the past week found the rafts almost passing his doorstep. He also was able to assist with the communications and in turn alerted the Premier of the Cook Islands as to the raft's position. The Premier in turn offered to assist in any way possible, but unfortunately an aircraft sent out to sight the rafts could not find them. No contact was made but the Premier did send the following message to the rafts.

> *"To the leader of the expedition Las Balsas. The Premier, Government and people of the Cook Islands convey their best wishes for the success of your journey. And the protection of Tangaroa as you all pass over our Pacific waters".* (Tangaroa is the god of the sea in the Cook Islands).

After leaving the Cook Islands and heading for Tonga in what is purported to be deep water, according to all marine maps, the leading raft came to a grinding halt on a coral reef. Luckily it was only a small reef as the other two rafts who were within 1000 metres of this raft did not touch it. As it was unmarked on any marine maps we have called it Las Balsas reef. The name has not been ratified as yet nor has the position been checked, but when it has and if the name is accepted, we will at least have a reef to remind us of this trip.

Later, during a storm that lasted for five days, the sail on the Mooloolaba, which had previously given trouble, came undone from its lashings and the raft fell behind the other two during the night. The raft was not sighted again for six days. Unfortunately the transmitter on the Mooloolaba was not operating so it was not possible to contact them and find out just how far astern they had fallen. But, we did know that Marc Modena the skipper of the raft had a shortwave radio on board and usually listened to the news services from Radio Australia. I approached Radio Australia and asked them to broadcast the position of the other rafts so that he may know in which direction they were travelling, and try to catch up with them. Six days later there was another storm (these storms seem to be a feature of the Pacific Ocean) and to repeat Vitals words *"winds gusty to heavy force 7 to 9, seas moderate to rough, waves 10 to 12 metres high"* when over the horizon came Marc, with repaired sail fully set and charging along, like an express train.

Again the rafts were together. It may seem strange that after having travelled in excess of 6000 miles across the ocean this was the first time that one of the rafts had been out of sight of the other two. However if one considers that they were all in the same current and in the same wind areas, and that the rafts do not have rudders to steer with, it is not hard to understand their togetherness.

From Tonga to south Fiji the seas remained rough and the yacht FREJA who had hoped to cross their path on its trip from Fiji to Auckland had to turn back because of the rough seas. I believe this is a well founded vessel with a very experienced crew, but on that day Vital said that the seas were moderate and the winds had dropped considerably and they were only force 5. I suppose it is a matter of relativity as to how one assesses rough seas.

The course from south of Fiji to south of New Caledonia, was maintained in an almost due westerly direction, and as the winds dropped to a steady 15 to 20 knots and the seas abated to about 3 to 5 metres high, the speed of progress decreased slightly to about 150 miles every four days. On the sked of the 18th October the stations from Mexico were very weak, and I had to handle all the traffic to and from the rafts and pass it all back to Mexico.

It was during this sked that Len VK4GD broke in to ask a question. As Vital was hearing both Len and myself, I told Len to ask his question. It appeared that His Highness the Duke of Edinburgh (Prince Philip) would be in Townsville for the Youth Award presentations and had indicated his willingness to talk over the Townsville radio club station VK4TC. As Len is one of the officials of the Townsville Radio club, it was on his suggestion that the rafts be approached for the purpose. Vital was very excited at the suggestion and a sked was made for Tuesday 23rd October at 0600 GMT when His Highness would be there. Unfortunately the conditions were not the best on Tuesday. That, together with the number of stations that were jamming on the frequency, prevented a good contact between the rafts and the Townsville Radio Club. This was regretted but Vital on the raft felt that he had achieved something for the Radio Club, as he did talk to some of the members of the club while awaiting the arrival of His Highness.

Also when one considers that the weather out at sea, where the rafts were, was not really perfect, with heavy rain and 15 to 18 knot winds, it can be realised that Vital considered it an honour to have the opportunity to talk to His Highness the Duke of Edinburgh. ●

Letters to the Editor

Any opinion expressed under this heading is the individual opinion of the writer and does not necessarily coincide with that of the Publishers.

Dear Sir,

I refer to the Sunday morning broadcast from VK3WI on the 21st October, 1973 wherein listeners were invited to comment on your comprehensive report relating to Amateur Band Planning.

References were made to the forthcoming Colour Television transmissions with their obvious interference problems and we were also reminded of the ever-present threat of incursions into the amateur band allocations by commercial interests.

Almost every Sunday the Band reports for SWL's state that "nothing was heard on 10 metres". What kind of advertisement is that? One Decimal Seven megahertz and just because the Band is not 'open' nobody is interested. How do you know any Band is 'open' unless operators use it? Gentlemen, perhaps someone is very interested in some of that 1.7MHz.

I cannot understand why the WIA did not persist with their 10 metre campaign for novices following the last Easter conference.

The writer considers that a fresh submission should be made to the Post Office proposing that part of 10 metres be made available to the novice operators in lieu of the 11 metre segment stressing that this transposition is designed to minimise interference to the aeromodellers and radio paging systems used by the Industrial, Medical and Scientific services.

Of course there are several other reasons why the WIA should consider this proposal, the first being that at long last the 10 metre band would be in continual use (and we would have that band report), secondly the low cost CB gear would easily convert and thirdly some good DX could be worked with the American amateurs who no longer have the 11 metre band.

As the Novice Licensing System is reviewable after 5 years it would be well worth the effort to avert any possible cause for criticism from the commercial operators and the relevant authorities. The writer is of the opinion that the most likely area for concern regarding the Novice License will be the 11 metre allocation.

Yours faithfully,
M. R. Morris.

20 Years Ago

with Ron Fisher VK3OM

DECEMBER 1953.

Amateur activities were obviously slowing down during December 1953. The Editorial page was devoted to a review of the year's achievements which included the Limited AOCP and the privilege of sixteen year olds to sit for the amateur examination. On the Federal front, progress was reported on the preparation of the new Call-Book with advertising copy rolling in. It was suggested that amateurs with a flair for design should submit ideas for the front cover.

DX highlights for December were that ZC3AA was operating from Christmas Island on phone and CW. ZL3JA was planning a DXpedition to Tokelau Island using the prefix ZM7. G2RO was intending to operate from Sarawak and Borneo and George VK3ADZ was on his way to Heard Island complete with 100 watt rig for 7 and 14MHz.

The list of Institute office bearers published at the head of the Federal and Divisional notes section makes interesting reading, the various presidents and secretaries were as follows: Federal; G. Glover VK3AG and G. M. Hull VK3ZS. New South Wales; Jim Corbin VK2YC and D. H. Duff VK2EO. Victoria; Gordon Dennis VK3TF and Col Gibson VK3FO. Queensland; J. A. Weddell VK4FT and V. P. Green VK4VS. South Australia; W. W. Parsons VK5PS and R. G. Harris VK5RR. Western Australia; G. A. Moss VK6GM and J. Mead VK6LJ. Tasmania; L. E. Edwards VK7LE and F. J. Evans VK7FJ.

Technically the December issue started off with the S-N 6 Cascode 2 Metre Pre-Amplifier. Reprinted from *Ham News* it described the development of a high performance 2 metre front-end using a 6BK7 cascode to a 6AK5. A noise figure of 5 to 6 dB was claimed which makes an interesting comparison with modern solid state RF amplifiers.

Part five of Amateur Television by E. Cornelius VK6EC. A summary of troubles experienced in certain sections was discussed plus a circuit of the Video Mixer Monitor. ●

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With Syd Clark, VK3ASC

HAM RADIO July 1973.

Slow Scan TV Test Generator: Operational-Amplifier Relay for Motorola Receivers: Low-voltage Super-Regenerative Receiver for VHF: Importance of Standing-Wave Ratios: Frequency Synthesiser for Two-Metre FM: Transistor Curve Tracer: Designing Impedance Matching Systems: How to Compare the Efficiency of Linear Power Amplifiers: Ham Sweepstakes Winners.

QST August 1973.

The Micromountaineer: Recycling Obsolete Gear: How to Solder (VK3AOH): The WB4VVF Accu-Keyer: Bearing and Distance Calculations by Sleight of Hand: The Rochester VHF Converters: Quality Recipe for a Portable Package: Another Look at Reflections: Charging Nicad Walkie-Talkie Batteries: Reviews: Heath HA-202, Hallicrafters FPM-300, MT-5 Morse-TT Translator, Heath GR-110: How to Achieve an Impressive DX Score: The Sixth Amateur Satellite: Planning for the Future.

QST September 1973.

A Bite Size Beam: A High-Performance Balanced Mixer for 1296MHz: An HF-Band Solid State Amplifier: A DSB and CW QRP Transmitter: MOSFET Preamplifiers for 10, 6, or 2 Metres: A Medium Power HF SSB CW Transmitter, Pt 3: A Packaged Keyer and T-R Switch: Reviews; Heath HM-2103, E. F. Johnston 550 & 557.

RADIO COMMUNICATION. August 1973.

The Pipsqueak: Tilting with the Stolle Rotator: Intense Radio Aurora: An Integrated Circuit Speech Compressor.

RADIO COMMUNICATION. September 1973.

Phase Locked VFO for 2M Transmitters: Equipment Review; The Trio Model TS515 SSB Transceiver.

73 Magazine. August 1973.

Mono-Band Log-Periodic Antennas, Pt 1: An Acoustically Coupled Digital Keyed Squeaker for Tone Burst Entry: Theory and Design of VHF & UHF Amplifiers Utilizing RF Power Transistors: The Amateurs Intercom: Novel 160M Antenna: A Basic Solid-State Slow Scan Television Monitor: Low Cost Frequency Counter: VOM Design: Simple QRP Transmitter: The Numbers Game: Distribution of DXCC Holders: Solid State Exciter for 450MHz: Talk Power and FM.

BREAK-IN. September 1973.

Antenna Balun on the Cheap: Yaesu Musen FT101 on 5680kHz: A Versatile in-line Reflectometer Wattmeter: Adventure into Solid-State Direct Conversion: Electronic Loo Lock. **Mobile News July-August 1973** contains details of an "Automatic 80 Metre Mobile Antenna Tuning Unit".

Sundry other small Journals such as "EEB"; "Collector & Emitter" & "Amateur Radio News Service Bulletin" come to hand quite regularly and although not reviewed, sometimes provide interesting reading. ●

Awards Column

with BRIAN AUSTIN VK5CA
P.O. Box 7A, Crafers, SA, 5152.

Alterations to Listings of DXCC

Phone:		C.W.:	
VK4VX	303-304	VK3AHQ	311-331
VK4FJ	290-314	VK4FJ	293-322
VK3JW	286-290	VK4VX	266-268
VK4RF	252-254	VK4KX	237-239
VK4CZ	241-242	VK4RF	228-246
VK3SM	206-210	VK4XJ	150-157
VK4XJ	195-200		
VK5WV	180-182		
VK4KX	5-5		

Open:

VK2VN	314-336
VK4VX	309-312
VK4FJ	303-238
VK4RF	274-288
VK4KX	241-243
VK4XJ	226-234

New Member:

VK8ZZ	100-100

Would all applicants for awards please note that the postal registration fee is now 75c in addition to postage. An alternative to registration is to use certified mail, which costs 25c plus postage.

When forwarding cards for checking, please enclose sufficient stamps, postal orders etc. to cover their return by registered, certified or ordinery (air or surface) mail, whichever you prefer. ●

IGNITION INTERFERENCE

In the U.K., the Wireless Telegraphy Regs. require that combustion engines do not radiate electro-magnetic energy exceeding specified limits between the frequencies 40 to 70MHz. This has been recently extended from 40 to 250MHz according to Sept. '73 *Radio Communications*.

Callsign Identification.

Radio Communication quotes the G licensing conditions about identification by callsigns as "The callsign . . . . shall be sent for identification purposes at the beginning and at the end of each period of sending, and whenever the frequency is changed. When the period of use exceeds 15 minutes, the callsign shall be repeated (in the same manner) at the commencement of each succeeding period of 15 minutes".

Newcomers Notebook

with Rodney Champness VK3UG

44 Rathmullen Rd., Boronia, Vic., 3155

Radio Construction Bits from Hardware Stores, etc.

Hardware stores and the like can be a ready supply of items adaptable for use in radio construction.

Jon VK6TU and Rex VK2YA have both been of considerable help this month in bringing to your notice items that can be used for other than their intended use.

I quote from Rex's letter —

"About your idea of using NON-RADIO bits and pieces for radio purposes. What about plastic pill bottles as coil formers — easily drilled and mounted on panels, bases, etc. Can be tied up to valve bases to make plug in coils, using some sort of strong adhesive. Also, can use as insulators for aerials by drilling the right holes and attaching the necessary wires.

The coloured tops of various kitchen-type containers have a wide range of applications. Some make "beaut" panel light bezels — reds, blues, whites, greens, etc. Also they can be persuaded to act as knobs and dials for tuning purposes. A bit of ingenuity can overcome the disadvantages of a three-eights shaft and a plastic container-top with a half inch hole. Pad up the shaft diameter with insulating tape or Bandaids, or something similar, and use the strong adhesive to keep the cheap, home-made knob in place. There may be problems if you want to remove these but, as they cost nothing, nobody will be greatly upset if they have to be broken in the process. The tops of toothpaste holders — the large economy size — can be cut off to make a flanged type of control knob. You can even engrave or otherwise mark the flange to show numbers or whatever you want.

The plastic containers for Vitamin pills are good for storing nuts and bolts, solder lugs, small items. Simple projects involving small wooden boxes can be improved by sticking on a cover of cooking foil — look for all the world like "metal boxes". Cunning. Dressing up projects with "DYMO" labels is an old gag and the old-timers will need no advice on this. Radio clubs could buy "Dymo" machines from club funds and charge at least enough to show a profit when selling desired labels to Club members.

Front panels of various equipments dress up nicely with handles from the hardware store. Vents for metal boxes with heat-generating valves inside can be obtained in a wide range of sizes and shapes from the local hardware man.

Small rubber "feet" may be used to advantage with all boxed gear to prevent scratching the polished top of the dining room table. Looks a finished job, too. Chrome plated handles can be fixed to the topsides of metal or wooden boxes to facilitate the operation of moving gear from Point A to Point B.

Does anyone ever use "stand-off" insulators? Easy to make. Plastic pill container with screw-on lid. Drill hole in the dead centre of the bottom of the container and fit a terminal of suitable design. Screw or bolt the lid upside down in the desired location and then screw the terminal-bearing body of the container into the normal threads of the lid and lo, a stand-by terminal — for almost no pence.

Supermarkets and chain stores offer a wide range of aluminium cake pans — some (the not-too-flimsy types) being okay as chassis for a wide range of projects. Small transistor projects can be built in small rectangular plastic containers.

The good thing to do is to develop a specialised sense which can — with due experience — lead the newcomer to look at almost everything with the mental query:- "How can I use that for some construction project?" I must admit to looking at small items like Kombi Vans as potential mobile radio centres with all sorts of aerials stuck hither and about."

Thank you Rex for all this information, I am sure that it will be of help to more than just our newcomers. Now to a couple of hints from Jon VK6TU.

"My transceiver required several extension shafts and I used lengths of brass welding rod, about ¼" diameter. This may have some kind of gauge number, but I do not remember now as I bought it many years ago. Universal joints were used at the inner end and the panel end passed through rubber grommets mounted on the aluminium panel. The rods were bought in lengths of about 1 yard. Been going for years now."

Thank you Jon for your tips.

Have you ever thought of using plastic drink straws for spaghetti. A more suitable item is the plastic tubing which is available in many colours from craft shops. The diameter of the tube available varies from about 1mm to 6 or 7mm. Laminex sheet makes a reasonable board for transistor projects, although not as neat as printed board. Does anyone else have ideas on what can be used for radio projects along the lines of the above? That's all for this month.

Try This

with Ron Cook VK3AFW and Bill Rice VK3ABP

TUBE ADAPTER

To improve the performance of older receivers, it's often necessary to replace an octal tube with a 7-pin miniature. As shown in Fig. 1, an easy way to do this is to make an adapter from a 7-pin socket and a male multiwire connector.

Begin making the adapter by removing the grommet from the connector cap. Then determine if the miniature socket will fit flush with the top of the cap. In case it won't, increase the size of the hole with a small file. Next solder a 3-inch length of hookup wire to each pin of the miniature socket. Leave sufficient insulation on the wires so that crossing leads will not short. Insert the wires in the appropriate pins of the octal plug, and pull the wires taut. To complete the

Fig. 1—A miniature-tube adapter for an octal socket.

adapter, solder the wires to the connector pins, and plug in the miniature tube. — *Hank Van Hooser, W4DIJ*

Reprinted from QST, February 1969

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TOOTHPASTE-TUBE CAP INSULATORS

Toothpaste-tube caps are an excellent source of material for constructing feedthrough and standoff insulators as illustrated in Fig. 2. The feedthrough in example *A* is made by mouting a toothpaste cap on each side of a metal plate and passing a threaded rod through both caps. A spacer of insulating material is mounted at the center of the rod to prevent accidental contact between the rod and the metal plate. The nylon wheel of a curtain runner is ideal for this purpose. In example *B*, the necessary hardware is bolted to the cap and the cap in turn glued to the plate.

A non-insulated standoff is constructed by directly bolting the toothpaste cap to the plate as illustrated in example *C*. An insulated version is made by cementing a machine screw to the concave recess in the top of the cap and gluing

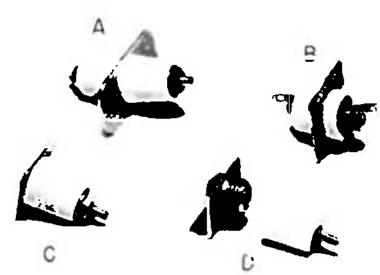


Fig. 2—Toothpaste cap feedthroughs and standoffs.

the cap to the plate. The cap can also be bolted to the plate as shown in example *D*.

Fig. 3—Feedthrough insulator made from the nylon wheels of a curtain runner.

Fig. 3 shows yet another method of constructing a feedthrough insulator. A small insulated washer, placed at the center of the assembly, prevents a short circuit between the rod and metal plate. — *D. P. Taylor, ex-G8OD*

Reprinted from QST, May, 1966

Commercial Kinks

with Ron Fisher VK3OM
3 Fairview Ave., Glen Waverley, 3150

Over the period that I have been writing Commercial Kinks, several pieces of gear have stood out as top favourites by the number of enquiries received. Those that have so far been covered include several units from the Yaesu range, the Trio 9R59, plus several other popular transceivers. Apart from these, the war time AR7 receiver rates very high on the enquiry list. Thousands of these receivers must have been released through disposals sources over the last twenty five years and it seems to be a surprising thing that many of these are still in original condition. As an aid to those who are lucky enough to own one of these, over the next few months I will present a run down on the set and then a few of the more popular modifications that have been proven over the years. Because of space limitations it will not be possible to publish the full circuit diagram but these will be available from **Commercial Kinks** in the usual way.

THE AR7 PART ONE
— description and specification.

Sensitivity. The absolute sensitivity is such that a radio frequency input of one microvolt modulated to a depth of 30 per cent at 400Hz applied through a standard dummy antenna gives an output greater than 50 milliwatts in the 600 ohm line with a signal to noise ratio of 1:1 in milliwatts or better. The specifications demand a minimum sensitivity of one microvolt absolute to give an output of six milliwatts under such conditions. Actually the output is as high as two hundred milliwatts on some bands. These readings are taken with the volume control adjusted to give a signal to noise ratio of 1:1 in watts.
Power Output. With the same input as above (1 microvolt) from a signal generator or antenna, and with the volume control advanced beyond the noise ratio of 1:1, maximum undistorted output to the speaker is nearly two watts. Output to the headphone jack is about 40dB below output level depending on the type of headphones used.
Image Ratio. Two stages of radio frequency amplification are used and these provide the following image attentuation. 8MHz. 50dB. 12MHz. 40dB. 13MHz. 54dB. 19MHz. 35dB. 24MHz. 26dB.

IF Selectivity. (1) Crystal in — Attenuation at 5kHz off resonance to be better than 50dB.
At 1kHz off resonance to be better than 2dB. Selectivity control at maximum. (2) Crystal out — Attenuation of at least 6dB at 3kHz off resonance.

ANTENNA INPUT. The input to the antenna coil is designed for double or single wire input and has an average input impedance of 400 ohms. If a single wire is used it should be connected to terminal A1, a jumper wire being connected from earth to terminal A2.

COILS. The frequency range of the receiver is covered in five bands. The plug-in coil units are lettered from A to E and cover as follows.

Band A	140 to 405kHz.
Band B	490 to 1430kHz.
Band C	1420kHz to 4.3MHz.
Band D	4.25MHz to 12.5MHz.
Band E	12.5MHz to 25MHz.

The electrical contacts on the coil acceptor unit are constructed of phosphor bronze silver plated and are self cleaning by friction.
Parallel trimming condensers are employed on bands A B C and D, and series capacity tuning on band E.
The main tuning of the receiver is accomplished by means of a four gang capacitor each section of which has a capacity of 11 to 240pF. The whole assembly is mounted on a ⅛ inch plate to ensure rigidity.
The oscillator coil is tuned 455kHz higher than the signal frequency and this is maintained over each band by correct adjustment of the inductance slug and padder capacitor mounted inside the coil shield. Band E has no padder or variable inductance. Correct tracking on this range is maintained by spacing the turns of the secondary winding during manufacture and adjusting C8 at the low frequency end of the band.
Crystal Filter. Continuously variable selectivity is possible by means of the front mounted control while the phasing control allows the rejection of any portion of either of the two sidebands. The rejection remains constant at any position of the selectivity control. The crystal is a special AT cut having a high Q and low drift. The resonant frequency of the crystal is 455kHz plus or minus 100Hz. The phasing capacitor is a different type, that is two capacitors in parallel with the variable plates common to both arranged in such a way that when the capacity of one section is increased, the other is decreased. This means that the total capacity remains constant and thus the resonant frequency of the associated IF transformer remains constant.
Next month full alignment procedure will be described and the following month details on how to modify the BFO to give reactance tube control for increased stability and also a Squelch circuit for use on net frequencies.

PROJECT AUSTRALIS

with David Hull VK3ZDH, Chairman, Project Australis.

SUMMARY OF AMSAT-OSCAR-B SPACECRAFT SYSTEM.

1. AMSAT Deutschland Repeater (designed by Karl Meinzer, DJ4ZC)
   Input freq. passband between 432.125 and 432.175MHz.
   Output frequency passband between 145.975 and 145.925MHz.
   Power output (high power mode) is 14W PEP.
   Downlink passband is inverted from uplink passband.
   Repeater is 45 per cent efficient using envelope elimination and restoration technique.
   Linear Operation — SSB and CW are preferred modes.
   Repeater is commandable to either 3.75 or 14W PEP output.
   Telemetry beacon at 145.980MHz (200mW).
2. AMSAT Two-to-Ten Meter Repeater (designed by Perry Klein K3JTE)
   Input freq. passband between 145.85 and 145.95MHz.
   Output freq. passband between 29.40 and 29.50 MHz.
   Power output is 2W PEP.
   Downlink passband is not inverted from uplink passband.
   Linear Operation — SSB and CW are preferred modes.
   Telemetry beacon at 29.50MHz (not same as OSCAR 6).
3. Morse Code Telemetry Encoder (designed by John Goode, W5CAY)
   24 analog input channels.
   Converts each analog value into a two-digit Morse code number or "word".
   A third digit precedes the telemetry value and gives the line number in which the word is located.
   Format is arranged 4 words per line, six lines per telemetry frame.
   Morse code rate is commandable to 10 w.p.m. or 20 w.p.m.
4. Teletype Telemetry Encoder (developed by Peter Hammer, VK3ZPI and Edwin Schoell, VK3BDS).
   60 analog input channels.
   Converts each analog channel to a three-digit number transmitted in Baudot code.
   Each three-digit value is preceded by its channel number, making a five-digit telemetry word.
   The data is arranged 10 words per line by six lines oer telemetry frame.
   Two lines of status information follow the analog matrix and give the spacecraft time (i.e., time in "counts" from launch, 1 count = 96 minutes).
   Output keys 435.1MHz beacon in FSK: 850-Hz shift; 45.5 Baud: (reversed from U.S. standard). Also keys 145.98 and 29.50MHz beacons as AFSK, on command.
5. 435.1MHz Beacon Transmitter (developed by Larry Kayser, VE3QB and Bob Pepper, VE2AO)
   Beacon output freq. is 435.10MHz.
   Power output is 0.4W at an efficiency of 45 per cent.
   Beacon is FSK modulated 850-Hz shift.
6. 2304MHz Small Beacon Transmitter (developed by San Bernardino Microwave Society)
   0.1W at 2304MHz
   Turned on by command only for 30-min. periods.
   CW keyed — HI followed by 30-sec. carrier. Also keyed with Morse code telemetry on command.
7. Codestore — Message store-and-forward system (built by John Goode, W5CAY)
   896 bit memory capacity using COS-MOS shift register memory.
   Loaded via command link.
   Output code speed is 13 w.p.m.
8. Experiment Control Logic (designed by Jan King, W3GEY)
   Selects the spacecraft operating modes.
   Protects satellite against excessive battery drain by reducing repeater output power or by shutting it off completely.
9. Input Solar Power-Battery Charge Regulator (developed by Karl Meinzer, DJ4ZC and Werner Haas, DJ5KQ)
   Converts 6.4V at arrays to 14V to charge battery or to supply the spacecraft experiments.
   Senses overcharge of battery and reduces charging current.
   Senses failure of either of the two redundant regulators and switches to the opposite regulator automatically.

AMSAT-OSCAR-B SPACECRAFT

A-O-B (to be known as OSCAR 7 after launch) is an international effort now involving four nations. The A-O-B systems developed in each country are as follows:

Germany:	AMSAT Deutschland Repeater, Spacecraft Structure, Battery Charge Regulator, 28V Power Regulator, Antenna System — DJ4ZC, DJ5KQ.
Australia:	Two Redundant Command Decoders, Teletype Telemetry Encoder — VK3ZPI.
Canada:	435.1MHz Beacon Transmitter — VE3QB and VE2AO.
United States:	2M-10M Repeater, Morse Code Telemetry Encoder, Experiment Control Logic, Instrumentation Switching Regulator, Solar Panels, Battery — K3JTE, W3GEY, WA4DGU, W3DTN, Marie Marr.
	Codestore — W5CAY.
	S-Band Beacon Transmitter — K6HIJ.

Dry batteries.

"Amateur Radio operators, especially those on 2-metre Fm, are using more and more dry batteries than ever before. Zinc-carbon batteries rate very high on the list because they are relatively inexpensive and easy to find, although some Amateurs use the more expensive but higher powered Alkaline-Manganese cell, and a few swear by rechargeable Nicads. A new dry battery, which will be on the market in the near future, just might revolutionise the whole field of portable dc power. (This is) the Lithium Organic cell which has been receiving enthusiastic reviews from the military . . . Lithium batteries are lighter, have greater power output, can operate over wide temperature ranges and have a remarkably long shelf life — up to 20 years."

('A second look' by Jim Fisk in Ham Radio, July '73).

Use or lose.

"What is the justification for allowing a group of individuals known as Radio Amateurs the exclusive use of large chunks of valuable radio spectrum space?

The FCC in the Basis and Purpose Section of the Amateur rules mentions six things. They are —

The communication service that amateurs provide for the public (especially emergency communications);
Their advancement of the radio art;
Advancing of technical skills;
Expansion of the reservoir of trained personnel;
The enhancement of international good will;
The advancing of communication skills.

Of the six, the most neglected by (amateurs) is the advancement of skills for communicating."

(Guest editorial in CQ, July '73.)

Can any other Division equal or better this?

VK6 Division now boasts two new callsigns:-

VK6ZHA and VK6ZDA — A father and son combination who both gained their calls at the same examination.

The long arm of coincidence stretches even further — both have the same "handle" — Adrian.

Just to keep the record straight, Adrian senior previously held a PA call.

Well, what about it you other Divisions?

Ross VK6DA.

IARU Region II

The 4th triennial Region II conference was held in Santiago, Chile from 9th to 13th April this year at which 9 countries were directly represented, 5 by proxy, 2 others were included in committee members without vote and also attending was Bob Denniston, WODX the IARU President. A wide range of topics were discussed including IARUMS, better band usage and a number of recommendations resulting from the Managua earthquake.

MEMBERSHIP — ARRL

Interest in Life Membership continues at a brisk pace. We are only a few away from having 2500 elected Life Members of the League, with about another 2500 paying on a quarterly basis. Handsome ceramic wall plaques will be mailed about mid-June to those fifty or so members who have been members of the League for 50 years or more and who have already received the 50-year pin.

QST June '73.

(The 1973 WIA Easter Convention directed that the question be examined of suitable recognition to members of the WIA for 50 years and over — Ed.)

COLOUR TV.

Break-In for July '73 quotes a resolution passed at this years NZART Conference as reading "That Council seeks from the NZ Post Office and NZ Standards Association an assurance that colour television sets, either manufactured locally or imported, shall conform in all respects to the standards laid down by the CCIR."

Reciprocal licensing

"G3BID informs us that in future, foreign amateurs operating temporarily in Switzerland will use their home call/HB9. Amateurs wishing to operate in HB0, Liechtenstein, should advise the Swiss Authorities at least five days in advance of their intention to operate in the Principality. They are insistent upon this since Liechtenstein is not part of Switzerland — the Swiss only deal with radio licensing for administrative convenience."

ARMS Mobile News May '73.

Mobile DX

"Ted M. Marks, WA2FOG receives our congratulations this month on getting his "140" sticker for his Mobile Century Award. His latest additions were mostly on 15m SSB." ARMS Mobile News May '73. This award is similar to DXCC but involves mobile operation contacts. By-the-way a DXCC, mobile-to-mobile, would appear to be possible although exceedingly difficult.

PRINCE PHILLIP VISITS TOWNSVILLE

Ross Melton VK4ZLC

On October 23rd H.R.H. Prince Philip visited Townsville to present the Duke of Edinburgh Awards.

The awards were presented to the recipients at Anzac Park on Townsville's Beautiful Strand. The Townsville Amateur Radio Club display shown in the photos was only one of many displays featured during the afternoon. The display included AR magazine covers, QSL cards and posters, and working models on amateur frequencies.

Using the FT101 Prince Philip was able to talk with the crew of the rafts of the Las Balsas expedition. The rafts were located at 170 degrees 59 minutes East, 24 degrees South when contacted. The antenna used was a TH3 JR erected on a 30 foot self supporting mast amongst the coconut palms at Anzac Park. About half a dozen Townsville amateurs spent many hours beforehand setting up the various pieces of equipment.

The display achieved its purpose in allowing Prince Philip to talk to Las Balsas as well as being a very interesting showpoint among the general public.

"He sounds like he's six feet under water", said the Duke of Edinburgh as he talked with Captain Alsar. He went on to say, *"Wish them the best of luck. Tell them I'm sorry I won't be here when they arrive."*

Power was generated on site, and provision for a standby link on 7MHz was established with Les VK4LZ at Airlie Beach. Fortunately 14MHz proved satisfactory with signals being R5 S8 during most of the afternoon.

"BERU" (1973) Results.

World-wide:
1st VE3HUM 4114 points
2nd VE2NV 3972 points
3rd 5Y4XKL 3608 points
4th G3FXB 3579 points

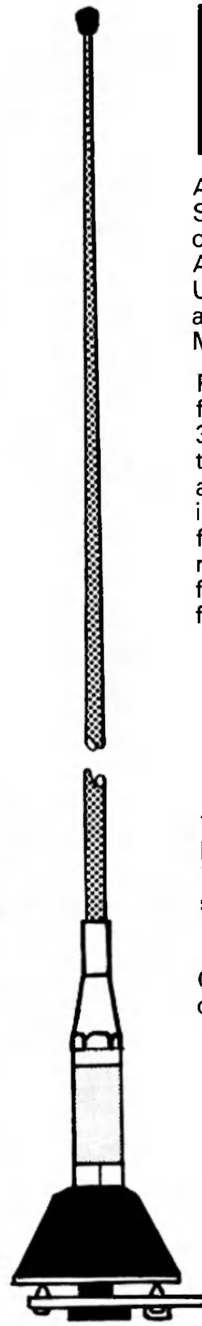
Australia:
13th VK3XB 2930 points
18th VK2BPN 2768 points
21st VK5BV 2586 points
31st VK3ZC 1592 points
39th VK6RV 1302 points
40th VK3KX 1295 points
41st VK2GW 1281 points
43rd VK3MR 1230 points
68th VK3RJ 380 points
72nd VK2VN 235 points

(Congratulations are offered to Ivor Stafford VK3XB on winning the "VK" silver medal, and to Ron Vaughan VK6RV on winning the bronze medal.)

ABOVE—
Len VK4GD tells the rafts that Prince Phillip has arrived to inspect the TARC display.

ABOVE—
Prince Phillip asks Las Balsas "How's the weather out there?"

Ross Inglis operating VK4QD's FT101. Ross handled the Las Balsas contact in the presence of Prince Phillip.



VHF UHF

an expanding world

with Eric Jamieson VK5LP

Forreston, S.A., 5233
Times: GMT

VK0	52.160	VK0WI Macquarie Island
	53.100	VK0MA Mawson
	53.200	VK0GR Casey
VK2	52.450	VK2WI Dural
VK3	144.700	VK3RTG Vermont
VK4	52.600	VK4WI-2 Townsville
	144.400	VK4WI-1 Mt Mowbullan
VK5	53.000	VK5VF Mt Lofty
	144.800	VK5VF Mt Lofty
VK6	52.006	VK6VF (VK6RTV) Bickley
	52.900	VK6RTT Carnarvon
	144.500	VK6RTW Albany
	145.000	VK6VF (VK6RTV) Bickley
VK7	144.900	VK7RTX Devonport
VK8	52.200	VK8VF Darwin
ZL1	145.100	ZL1VHF Auckland
ZL2	145.200	ZL2VHF Wellington
	145.250	ZL2VHP Palmerston North
ZL3	145.300	ZL3VHF Christchurch
ZL4	145.400	ZL4VHF Dunedin
JA	52.500	JA1IGY Japan
	50.100)	HL9WI South Korea
HL	52.010)	
KX6	50.110	KX6HK Marshall Islands
KH6	50.104	KH6EQI Hawaii

Various other beacons and television VHF frequencies were listed last month, and these should be referred to for a complete list. From very scanty information available it appears some of the Australian beacons are not operational at the time of preparation of these notes, but are included as it would be reasonable to expect that most areas would have their beacons on the air for the VHF DX season. VK7RTX is off the air whilst a new site is found. VK4WI-2 at Townsville has also been off for some time but hopes to be back before long. The VK2WI beacon has been off for a couple of months, and unless something is resolved pretty soon in VK2 regarding the installation of the new 6 and 2 metre beacons prepared by Roger VK2ZRH, little will be heard from there. Things are a bit up in the air in VK6 as well; it appears the 2 metre beacon in Perth has not been operational for some time. I just wonder how all these various problems are to be solved and whether they can be by the time you read this. Anyway, I'll never be told direct, such news only comes on the grape-vine, months afterwards!

ROSS HULL CONTEST

Once again a reminder that the Ross Hull Memorial Contest will be with us again from 7th December to 20th January 1974. As always there will be plenty of participation, and it is to be hoped all have a very pleasant time. But do remember the poor Federal Contest Manager who wants you to send in your logs please. The contest for some time has had a very poor return of logs. Can we do better this year?

NEWS FROM NEW ZEALAND

Stan, ZL4MB, in Dunedin, has written to fill VK in on the present state of the art in ZL4. Stan is hoping for a better DX season this year. Commenting on last year, he mentions conditions were dead over Christmas and New Year. Best day was 11th February when he worked VK1JC-VK1ZPB at mid-day, VK5ZWW at 1320 and VK3ZGP at 1643.

Hugh, ZL2AID has improved his gear for this season; now VFO control and 150W PEP SSB as well as a unit for his car. Paul, ZL1QI is up to 30 watts PEP. Brian ZL1AVZ, Bill ZL3QK, Max ZL3AAN are all expected to be operational.

Stan advises he will be home for lunch practically every day and will be listening 1215 to 1250 EOST each week day from 1st December, with either 100 watts AM or 100 watts DSB available. He has built new converters, tuneable IF strip with Collins mechanical filter. Stan will also be resuming his Sunday morning calls from 1-12-73, calling on the hour from 0800 to 1300 EDST, mostly operating on 52.000 MHz.

For those with 80 metre facilities, Stan mentions the continuing Thursday night sked with Geoff VK3AMK on 3643kHz at 2000, and fairly regular visitors have been David VK3ANP and Mike VK2AM.

STATE OF THE ART CONTEST

The VHF contest arranged by 6UP Magazine in Sydney, under the auspices of Rod VK2ZQJ as Contest Manager, resulted in a win for our stalwart VK5 kiwi, Wally VK5ZWW, who scored 31095 points from 46 contacts, all on 52 MHz, being meteor and other type scatter contacts, all from around 0530 EST, and embracing 20 such mornings of activity. The only mornings Wally did not appear in the log were 25th July and the 2nd August. That's a pretty good effort Wally, and the VHF fraternity offers their congratulations to you. Second place to Allan VK3TV with 23738 points and 90 contacts.

The best distances covered by this mid-winter contest were: 52MHz: Wally VK5ZWW to Barry VK2ZAY 763 miles; 144MHz: David VK3ANP to Mike VK3ASQ 190 miles; Geoff VK3AMK to VK3BEH 188 miles; Allan VK3TV-Stephan VK3ZAZ to Chris VK5MC 185 miles. 432MHz: Byron VK3YFL to Les VK3ZBJ 80 miles. 1296MHz: David VK3AUU to Les VK3ZBJ 30 miles. David used 0.2 watts on 1296.

Thanks to 6UP magazine for the above information, and for advice that there will be a similar such contest in 1974, dates to be decided when the 1974 IGY calendar is available for M-S data.

1296MHz.

Thanks to the Victorian VHFer for the following, headed **500 Watts DC Input.**

Perfectly legitimate ... but, you must have a special permit to make use of all these electrons.

This is the factual situation at the QTH of Ron, VK3AKC, in Geelong who has already done a mountain of experimenting on 1296MHz, and much valuable work on all the VHF bands.

The recently acquired high power permit by Ron must be renewed every 12 months and can only be used for EME experiments under the supervision of the PMG Department . . . the dish reflector must be no less than 10 degrees of elevation and this calls for a very high standard of workmanship to maintain the mechanical stability necessary under all types of weather conditions . . . the 20 foot diameter dish was entirely constructed by Ron in conjunction with commendable aid from his wife on computations for the project.

Besides numerous verifications via EME Ron's recent endeavours procured for him confirmation from NRL (Naval Research Laboratory, USA) — in the form of a tape, and QSL card, of his contact during their 50th Anniversary Contest, also a very nice Certificate for his efforts.

Getting your feet wet at 1296MHz tropospheric-wise is not so difficult these days with the abundance of solid state devices available, but inter-continental contacts via Moonbounce can only be described as an undaunted dedicated effort . . . to those engaged in this field of amateur activities must go the rich rewards in human satisfaction.

Good work Ron.

VK5ZWW to OSCAR 6.

Wally, VK5ZWW, has taken time off from working M-S to write me a short note, and I need only quote:

With my transmissions through Oscar 6, so far I have worked ZL's 2, 3 and 4, VK's 2, 3, 5, 6 and 7. The transmitter has a 3-12 in the final with a measured output of 3 watts PEP into a ¼ wave whip mounted on the shack roof. On the receiving side I use an unmodified Drake 2B and a half wave dipole.

Have heard many other signals including the exotic ones from the equator but am afraid the QRP is not good enough. Because of this QRP the satellite is only available for a period of about 5 minutes at the centre of a 20 minute pass.

Hope to be running RTTY through Oscar and also RTTY is available on 52MHz already.

Thanks for the news Wally, please write again.

2m In G-Land

It seems to us that the 2m band is becoming far too mode conscious, with SSB operators who only ever work SSB stations, FM-ers who only ever listen on their own channel and AM and FM stations who cannot receive SSB anyway. (G3FPK in Mobile News Sep. '73 editorial).

It bothers me that the two metre band seems to be degenerating into just a few fixed channels, i.e. SSB, FM talk box channels and now repeaters. It seems that if we are not careful the 2MHz wide band which we now have will be taken from us and we will be allowed only certain fixed channels. (G8CZM-M writing in the same issue).

French Transponders

"Anjou" and "Mirabel" 70cm uplink 2m downlink transpanders are part of balloon experiments being carried out in France. The packages are built for 60,000 to 80,000 feet, stay there about 2 hours and fall under parachute. During recent flights contacts through the transponders were made by G to OE and F to OH. The *Mobile News* (Sep. '73) article ended "After all it's like using a repeater on a 15 mile high tower."

GENERAL NEWS

. . . A new beacon in Kalgoorlie, with the call sign VK6RTU, is awaiting a licence from the PMG, and plans to run about 40 watts FSK . . . Ray VK3ATN now using 56 elements on 144MHz with successful contacts to VK2SW in Wagga . . . On a Sunday morning recently a rare sight was witnessed when a 35 foot steel tower was transported from Port Sorell to East Devonport on top of a Holden Station Sedan! Not content with that the tower was lifted over the top of the house and now rests in the back yard of Graham VK7ZAQ. (From QRM, Launceston.) . . . VK4TC, the Townsville Amateur Radio Club station should have a 6 metre base station soon — a transceiver donated by Rod VK4ZRC is being converted by Bob VK4ZRG (Backscatter, Townsville.) . . . VK9CZ on Willis Island will be carrying out ATV skeds before long on 432MHz . . . During a recent visit to VK6 Rod Graham VK2ZQJ visited Don VK6HK, who is one of the three southern hemisphere control stations for Oscar 6. Rod reports the teleprinter for Oscar 7 was already installed. The antenna system at 6HK is steerable from the shack in azimuth and elevation. The 144MHz aerial was 2 bays of 10 element crossed yagis and it was possible to shack select in real time vertical, horizontal, RH circular or LH circular polarization. The 432 array (for the now defunct 435.1MHz beacon) had many elements but was so high up it was not possible to count them. Assorted antennaes for 29.5MHz and other HF bands, and something like 16 coaxial cables coming into the shack from the antenna installation. The transmitter ran a pair of 4CX350's (6 UP, October).

That will have to do for this time. Hope to see or hear all my friends on VHF this DX session: I will be running SSB on both 6 and 2 metres. **AND PLEASE SEND IN YOUR ROSS HULL LOG THIS YEAR!** Closing with the thought for the month: "Most families do not worry about the wolf at the door any more. They just feed him on instalments."

The Voice in the Hills.

Key Section

with Deane Blackman VK3TX

Box 382, Clayton, Vic., 3168

My apologies to regular readers of this column for its absence over the past few months. It is much easier to write when I get on the air and "talk" to people, but I am sure some beside me find that work keeps getting in the way of Amateur Radio.

Tom Clarkson, ZL2AZ, drew my attention to an article he wrote in April 73 *"Break In"* discussing the refusal of CW to lie down and die in the face of phone activity. As you might expect from the man who represented you at the recent ITU Conference it has a good deal of sound stuff in it.

The President's Cup has come back from the jewellers looking very fine and shiny. The winner will be known when the results of the VK-ZL become available; the formula was published in *AR* in August 1972. The formula includes a strong contribution from the results of the Ross Hull VHF contest, which begins this month. The Key Section had the CW part of this contest restored; can I again encourage you to support the Ross Hull? You thereby support CW, and the field, in 1972-3 anyway, was pretty small.

This month also brings the festive season, and the thoughts of summer holidays. Let me wish you the compliments appropriate for the 25th, and remind you not to forget to pack your key when you go away.

Contests

with Peter Brown VK4PJ

Federal Contests Manager, G.P.O. Box, 638
Brisbane, Qld., 4001.

Notes on the John Moyle Memorial National Field Day rules.

There is a separate section this year for VHF operators, brought about by the interest in last year's RD Contest.

Entrants in sections (a), (b), (c), and (d), of course can operate VHF but obviously cannot enter section (e).

You will note that Portable Field Stations may make a second contact with another Portable Field Station after a lapse of 4 hours while the now accepted rule for VHF operators, of repeat contacts after 2 hours, stands.

If there are sufficient entries in section (d), multiple operation, I will separate entries into phone and open, and there will probably be sufficient entries. The rules could have contained this I suppose but don't you think they are complicated enough??

Similarly for section (e) with Portable Field Stations and Mobiles. We did not do so well with the ZLs last year and I do not know their Field Day dates this year. I have airmailed Jock ZL2GX, NZART Contest Manager, and hope to advise you next month. If there are good openings we will help each other a lot.

Note that CW-CW contacts count double.

Fixed Home Stations. What about giving the blokes out in the field something to talk about? Make them feel that their effort getting out in the field is worthwhile. When you come home on Saturday night after the show (or a party?) get on the air and look for a field station or two . . . before breakfast will do . . . or before lunch.

CONTEST CALENDAR.

December 7th and 9th ARRL 160 CW Contest.
December 15th & 16th ARRL New 10 metre Contest.
December 22nd & 23rd Hungarian Contest.

Ross Hull Memorial VHF-UHF Contest is on NOW! Rules in October *"AR"*.

John Moyle Memorial National Field Day, February 9th and 10th, 1974.

Central Coast Amateur Radio Club Field Day, February 24th, 1974.

ARRL International DX competition.
Phone, 1st full weekends in February and March.
CW, 3rd full weekends in February and March.

ARRL New 10 Metre Contest.

From 1200 GMT Dec 15th 1973 to 2359 GMT Dec 16th 1973. No limitation. Single transmitter only. Single or Multiop.

USA & Canada transmit signal report and state or province.

Others transmit signal report and serial number beginning with 001.

One contact on phone — phone and one contact CW-CW. Anywhere.

Oscar 6 contacts count. Cross mode does not count. CW on 28.0-28.5MHz. 2 points for 2 way exchange. 4 points for W or K novice contact. Multiplier consists of the number of different states, Canadian call areas, VE1-8, VO, ITU regions and countries as ARRL list. Final score - QSO points X multiplier.

Entries to be postmarked no later than Jan 21st 1974.

REMEMBRANCE DAY CONTEST.

As well as the entrants listed last month, quite a few others also helped make the contest such a success, namely VKs 7MR, 3IC, 3AZQ, 3BMD, 3ARS, 3ANE, 9DJ, 3AH, and Aquinas Radio Club.

VK9DJ made a great effort with 2139 points and 677 contacts.

VK3AH prepared VK9ZC's Willis Island log.

You will be interested to know that Doug VK7AZ who scored 1521 points with 631 contacts is a blind op, looked after for the contest by Andrew VK7AW.

Evie VK4EQ seems to be the most successful of quite a few YL and XYL ops we are pleased to have with us.

I have a few more interesting items on the RD for next month.

Book yourself in for next year's RD and help make it a most successfull FRIENDLY contest.

ROSS HULL MEMORIAL VHF-UHF CONTEST.

How many contacts have you made so far????

Do not put off getting into the contest because time flies. AND get a log returned, be it ever so small. 200 entrants last year, and we should get a percentage increase this year, what about 200 logs???

IT'S TRUE. If you enter the contest it will be a success.

THE NEW 10 METRE CONTEST.

A few years ago 10 metres was my favourite band but apart from JAs it is not so good these days. However there is a contest in December. What about a few calls at optimum times, refer Bruce's prediction column, to find who is about??? Just listening is not enough. Who knows, you may become part of a contest.

VK-ZL CONTEST

I spent most of the time I had available in the phone section on 10 and 15 metres, and although I did not hear many VK-ZLs directly there seemed to be quite some activity. VK9s were having a ball on 15 metre with one op logging over 500 contacts.

From reports CW section went OK.

Reports tip a very successful contest. I wonder which state will do best VK4's annual convention was held that weekend. Don't forget that logs go to Perth this year.

CQ WW DX Contest.

As usual there was plenty of activity over this week end. 15 and 20 metres seemed to be open most of the time. Contestants were at it hammer and tongs when I tried for a few minutes before going to work on Monday morning.

There seemed to be plenty of VK-ZL activity.

This must be about the most popular contest of all.

If we could work up to about 400 participants from VK-ZL then our international contest may start to rival the CQ contest.

3.5MHz YU-DX Contest 1974. CW only.

2100 GMT Saturday, 12th Jan to Sunday 13th (2100 GMT.) Send SAE for details.

VHF-UHF Contests.

To my knowledge nothing developed from the suggestion that we have contests early in December. However Brisbane VHF Group have organised a contest for the 2nd December. By the time you read this it will be history but think about VHF contests in all states at the same time, say 1st week in December. ●

John Moyle memorial national field day contest 1974

Amateur Operators and Short Wave Listeners are invited to help make this contest, held in memory of the late John Moyle, a huge success.

Contestants may participate either as individuals or as part of a group. There are two Divisions (parts) in this contest. 1—24 hour continuous operation Division and 2—6 hour continuous operation Division, to be carried out within the 26 hours available.

Dates and Times.

From 0600 GMT, February 9, 1974 to 0800 GMT, February 10, 1974.

Objects.

The operators of Portable Field stations or Mobile stations within VK call areas will endeavour to contact other Portable, Mobile or Fixed stations in VK, ZL and foreign call areas, on all bands.

Rules.

1 — In each Division, 24 hour or 6 hour, the operating period must be continuous.

2 — In each Division there are 7 sections.
(a) Portable Field station, transmitting, phone.
(b) Portable Field station, transmitting, CW.
(c) Portable Field station, transmitting, open.
(d) Portable Field station, transmitting, open, multiple operation.
(e) VHF Portable Field station or Mobile station, transmitting.
(f) "Home" transmitting stations.
(g) Receiving portable and mobile stations.

3 — Contestants must operate within the terms of their licence.

4 — A Portable Field station must operate from a power supply which is independent of a vehicle or permanent installation.

5 - No apparatus may be set up on site within 24 hours of the contest.

6 - All amateur bands may be used but cross band operation is not permitted.

7 - Cross mode is permitted.

8 — All operators of a multi-operator station must be located within an approximate half mile diameter circle (800 metres).

9 - Each multi-op transmitter should maintain a separate log.

10 - All multi-op stations logs should be submitted under the one call-sign.

11 - One only multi-op transmitter may operate on a band at a time.

12 - RS or RST reports should be followed by serial numbers beginning 001 etc.

13 — Scoring. For Portable Field stations and mobiles.
Portable Field Stations and mobiles, outside entrants call area . . . 15 points.
Portable Field stations and mobiles inside entrants call area . . . 10 points.
"Home" stations outside the entrants call area . . . 5 points.
"Home" stations within the entrants call area . . . 2 points.

For "HOME" stations
Portable Field stations outside entrants call area . . 15 points.
Portable Field stations within entrants call area . . . 10 points.

14 — Portable Field stations may contact any other Portable Field station twice on each band during the period of the contest provided that four hours elapse after the previous contact with that station on that band.

15 — VHF Portable-mobile Field stations may contact any other VHF Portable-mobile Field station repeatedly provided that two hours elapse after the previous contact on that band.

16 — Operation via active repeaters or translators is not acceptable for scoring.

17 — All logs shall be set out under headings of Date-time, in GMT, Band, Emission, Callsign, RS-T sent, RS-T received, Points claimed.

List contacts in correct sequence. There MUST be a front sheet to show . . . Name, Address, Division, Section, Callsign. Callsigns of other operators . . . Location, Points Claimed. Equipment used, Power supply. I herewith certify that I have operated in accordance with the rules and spirit of the contest . . .

18 — Certificates will be awarded to the highest score of each section of the 6 hour and 24 hour Divisions. The 6 hour certificate cannot be won by a 24 hour entrant.
Additional certificates will be awarded for excellent performance.

19 — Entrants in sections (a), (b), (c), (d), and (e) must state how power for transmitting is derived.

20 — All CW-CW contacts count double.

21 — Entries must be forwarded in time to be opened on 22nd March, 1974. Clearly mark your envelope that it is a John Moyle Memorial National Field Day entry and address to Federal Contest Manager WIA, Box 638, GPO Brisbane, 4001.

I like to hear that you enjoyed the contest and your suggestions may add weight to like suggestions from others.

Please read my notes on the rules, that follow.

RECEIVING SECTION.

This section is open to all Short Wave Listeners in VK Call areas. Rules, as applicable, are as the transmitting station rules but logs do not have to show report and serial number of the second station or station called.

Logs must show the call sign of the portable or mobile station heard, and report the serial number sent by that station, and the call sign of the station called.

Scoring will be as transmitting stations score. A station calling CQ does not count. Portable-Mobile stations, which must be listed in the left hand call-sign column, alone count for scoring. Stations in the right hand column may be any station contacted.

A certificate will be awarded to the highest scorer of each of the 6 hour and 24 hour Divisions, individual multiple operator entries. Certificates will be awarded for excellent performance. Note rule 21. ●

MAKE A NEW YEAR RESOLUTION

Resolve to buy a ticket in the VK6 Division Raffle
or a
FT dx 401 + Accessories
LOOK AT THE PRIZE LIST

1st Prize:
QANTAS EXCURSION TO LONDON **$654**
or
14 Days Holiday motel accommodation by Ansett **$650**
or
Any holiday of choice to value of **$650**
YAESU FT dx 401 + Accessories **$650**

2nd Prize:
Five year subscription to W.I.A. **$60**

3rd Prize:
Portable typewriter **$50**

4th Prize:
Five L.P. Records of choice **$30**

5th Prize:
Bedroom Rug **$25**

6th Prize:
Hamper of Groceries **$25**

7th Prize:
50 Gallons of Petrol **$24**

8th Prize:
Steam or Dry Iron **$20**

9th Prize:
Surf Board & Bathers **$15**

10th Prize:
Perfume **$15**

Closing Date
JANUARY 8th, 1974
HURRY! HURRY! HURRY
Send your remittance to—
The Treasurer, W.I.A.,
W.A. Division
Box N1002, G.P.O. Perth, W.A.
6001

Full book of tickets at $4.00
Half book of tickets at $2.00
5 tickets for $1.00

Postmaster-General's Department
AMATEUR OPERATORS' CERTIFICATES OF PROFICIENCY
Examination, Section M (Theory), August, 1973.

(Time allowed — 2½ hours)

NOTE: — **SEVEN questions only to be attempted.** Credit will not be given for more than **SEVEN answers. All questions carry equal marks.**

1. In relation to the final class C radio-frequency power-amplifier stage of a transmitter:
   (i) explain why the anode current varies as the tank circuit is brought into resonance; and
   (ii) state whether the anode current will vary when a resonant aerial is coupled to the tank circuit. Explain.

2. Assisted by a circuit diagram, describe the operation of a mains operated power supply which uses silicon diodes. The power supply is required to provide a regulated output of 6 volts to supply a crystal oscillator and an unregulated output of 9 volts for the buffer stage of a transistor type transmitter.

3. With reference to single-sideband suppressed-carrier transmission and reception discuss the functions of the following:
   (i) the balanced modulator;
   (ii) the product detector; and
   (iii) the final class B linear R.F. amplifier.

4. (a) Describe the process by which high-frequency radio waves may be propogated over long distances and explain why frequency changes may be necessary to maintain continuous service over a long distance communication path, e.g. — Australia to England.
   (b) Discuss the effects of the eleven year sunspot cycle on the use of frequency bands allocated to the amateur service.

5. With the assistance of a circuit diagram, describe the operation of a device suitable for measuring the ratio of forward to reverse power present in a transmission line feeding radio-frequency to an antenna.

6. (a) Aided by a sketch,describe the construction and principle of operation of a moving-coil (dynamic) type of microphone.
   (b) Discuss the relative merits and demerits of a moving-coil and carbon type of microphone as regards fidelity and sensitivity.

7. (a) Define the terms:
   (i) parasitic oscillation;
   (ii) harmonic radiation; and
   (iii) self oscillation.

   (b) Indicate, two possible causes of parasitic oscillation in a transmitter.
   (c) Describe how you would locate and suppress such a condition.

8. With the assistance of a sketch showing approximate dimensions and component values, explain the theory of operation of an antenna which uses "traps" to enable it to be used for multiband operation within the amateur bands.

9. (a) Explain the meaning of the term "resonance";
   (b) Indicate how the impedance of a series resonant circuit changes as the applied A.C. voltage is varied in frequency;
   (c) Calculate the resonant frequency of an inductor of 30 microhenries and a capacitor of 120 picofarads.

Ionospheric Predictions

with Bruce Bathols, VK3ASE December 1973.

This information is obtained from data supplied by the Ionospheric Prediction Service Division of the Bureau of Meteorology.
Times stated as G.M.T.

28MHz — (Propagation predicted possible for approx. 40 per cent of the month).

East Coast to	
SU	0500-0900
KH6	2000-0800
G (S.P.)	0800-1000
VE3 (S.P.)	2100-2200
UA	0500-1000
W1	2100-2200
VK9	2100-1000
W6	2100-0100
JA	2200-0800
VK6 to	
SU	0400-1300
KH6	0300-0700
G (S.P.)	0800-1300
UA	0500-0700
JA	0100-0700

21MHz

VK2 to	
SU	0500-1100
ZS	0700-1100
G (S.P.)	0800-1100
VE3 (S.P.)	1500, 2000-2300
UA	0500-1100
W6	2000-0200
VK6 to	
SU	0500-1400
ZS	0600-1300
G (S.P.)	0800-1400
VE3 (S.P.)	1600
UA	0500-1200
W6	2300-0200

14MHz

East Coast to	
ZL	2400-2400
SU	0900-2400
KH6	0400-1300, 1800-2100
ZS	1200-1600, 2000-2200
G (S.P.)	0700-1600
G (L.P.)	0900-1400
VK0	1900-1400
VE3 (S.P.)	1400-2100
VE3 (L.P.)	1400-1700, 2000-2200
UA	0600-1400
W1	1300-2000
VK9	2400-2400
PY	2400-0400, 1000
W6	1600-2100
JA	0500-1200, 2100-2300
9G1 (S.P.)	1400-2400
9G1 (L.P.)	0400, 0700-2100
VK6 to	
SU	1000-2400
ZS	0200-0300, 1200-2300
G (S.P.)	0900-1700
G (L.P.)	0900-1600
VE3 (S.P.)	1400-2400
VE3 (L.P.)	1100, 2200-2400
UA	0800-1500
W6	1600-2200

7MHz

VK2 to	
SU	1400-2000
ZS	1700-1900
G (S.P.)	1300-2000
G (L.P.)	0900
VE3 (S.P.)	0800-1400
UA	1100-2000
W6	0800-1600
VK6 to	
SU	1400-2200
ZS	1600-2200
G (S.P.)	1400-2200
VE3 (S.P.)	1000-1500
UA	1200-2200
W6	1000-1600

Sunspot Numbers Predictions —
December 29, January 28, February 27, March 26.
— Mean for September '73 — 60.8
— Smoothed mean for March '73 — 43.6
— Swiss Federal Observatory, Zurich.

Hamads

WANTED TO SELL

MR3A Carphone, ex. cond. spare set valves incl. 2 finals ch. A.B.C., $40. 3" Oscilloscope July 63, EA. $20. 52MHz conv., Mar. 63 EA. $2.00. Tony. VK2ZKA Ph. (02) 663-7336.

National HRO RX 800kHz-30MHz general coverage full set band spread coils, amateur bands. Fitted modern valves. Product detector, Mechanical Filter, manual, etc. $110.00
VK6LK. QTHR. (092) 57-2202.

Wide Band Oscilloscope. Home brew, all transistorised. Working in breadboard condition. Complete with circuit diagrams and two new double beam cathode ray tubes. $58.00
VK3AOH. QTHR.

AT20 Base Station TX made by STC for RAAF. 2 units mounted vert. 6 ft. or horiz. 4 stages on slide-out racks, modified for amateur use and passed by PMG. Freqs 80/40/20. Complete working order, instruction manual. $30.00
VK3VG. QTHR. Ph. (03) 850-1894.

Tower Galv. Crank-up, Tilt-over installed in pleasant garden setting, together with radio amateur's comfortable B.V. Home, corner site, good DX. Both items available early next year, must sell together. Enquire VK3VG. QTHR. Ph. (03) 850-1894.

Swan 120 Transceiver and power supply, excellent condition, $120.
ONO. VK2ABC. OTHR. Ph.: (02) 451-1313.

Transceiver SSB and AM, 5 bands, upper and lower sideband, CW. Vox, incremental tuning 500 Watts PEP, well looked after. JA manufacture model FE1200 GT, 3 years old, nearly all solid state. Price $350. 240V supply built in, Final Blower.
R. Richardson, VK2ALR, 12 Boulden Street, North Parramatta, N.S.W., 2151.

TACAN Base Stations. One partially scrapped, the other converted to VHF FM. Good quality subchassis containing receivers, drivers, transmitters and high voltage/high current stabilised power supplies. 2 prop pitch motors and selysyns. Offers wanted. VK1CR. QTHR.

Vinten MTR20 Carphone operating on 2mFM, 6 channel switching. With Xtals for Ch. 1, Ch. 4, ChB and Ch. 4 reverse. 3/20 final 25w. Good go-er complete $100.00. ONO. VK3ASQ. QTHR

Realistic DX150A Solid State Communications RX, perfect condition, selectivity & sensitivity excellent, perfect for the SWL. $180.00 ONO.
R. Milne, P.O. Box, Mildura, 3500. Ph.: (050) 24-5493.

FRDX400 RX 2m and FM options with Xtals both spare 29 MHz channels installed. Complete spare set 22 proper Jap transistors. Very little used. $350 ONO. Birch. VK3ASO. Ph.: (054) 43 1877 Bus.

WANTED TO BUY

Transverter, FTV 650. Ph.: (060) 71-6211.
AH (060)) 71-7244.

Signal Generator VHF 30 to 200MHz with calibrated output attenuator to one microvolt or less. Eric Gray VK3ZSB. QTHR. Bus.: (03) 630-5656.
AH (03) 25-3249.

Cathode Ray Tube type; 4EP1, 4EP31, DH10-94 or DN10-78 or any other equivalent of these.
D. Perry, 47 Trigg Street, Blair Athol, S.A., 5089.
Ph.: (08) 62-5305.

Receiver 6-9MHz command or similar RX for use as tunable IF. Need not be complete—Basics will do. VK3ZDG. QTHR. Ph.: (03) 877-3523.

Silent Keys

H. Pearson—VK2BPR

It is with deep regret that we record the passing of Harry Pearson, VK2BPR.

Although Harry only had his licence for just on twelve months, he enjoyed immensely participating in the Amateur Service, particularly on CW, and was an active Operator on the regular N.S.W. South West Zone Monday night net. In the short time he was on the air he often took part in the Sunday CW net, achieved a *"Hunter's Club Certificate"* from the I.R.S., became a member of the *"Key Club"* (Certificate No. 49), was participating in the *"Commonwealth Electorates Award"*, planned to take part in the *"Jamboree on the Air"*, a first ever for Khancoban based Boy Scouts, and recently attended the South West Zone Convention at Illabo, N.S.W.

Although Harry was known to many only as an active Amateur, few were aware that he also held the onerous position of Regional Engineer in charge of the Operations and Maintenance of the giant 1,500 Megawatt Snowy-Murray complex of the Snowy Mountains Hydro-Electric Scheme.

Harry passed away suddenly after a heart attack at his QTH on Monday, October 8 1973, and to his wife and family we extend our deepest sympathy. He will be missed by many Amateurs, both far and near.

John G. O'Brien.

W. J. Zech VK2ACP

It is with deep sorrow that we record the passing of one of our older hams William J. Zech. VK2ACP.

Bill passed away on the 8th of August 1973 at Katoomba after a short illness, aged 80.

Bill was first licensed in 1912 with the call XABQ. He moved to Victoria for some time and was issued with VK3WZ, after having VK2WZ when the VK calls were started. He later moved back to VK2 and held VK2ACP until his death.

Bill's early activities are a little vague, but it was known that he was a marine operator for some years. He was secretary of the Leichhardt and District Radio Club in 1924. Although quite active throughout his life he became almost blind in later years and found it almost impossible to use his AT21 transmitter. He moved to a nursing home and a Heathkit on 20 Mtrs until his death.

Bill had many friends with whom he corresponded, on and off the air. He was known to many Harmonics as "Uncle Bill", never failing to send a card for a Birthday or Christmas. He will be sadly missed by many who owe their start in amateur radio to him

With much regret we say 73 Bill.

Dan Clift VK2DC.

DECEMBER, 1973
VOL. 41, No. 12

ZEPHYR PRODUCTS PTY. LTD., 70 BATESFORD ROAD, CHADSTONE, VIC., 3148. Phone 56-7231

C.G.S

TYPE C MINIATURE VITREOUS ENAMELLED POWER WIREWOUND RESISTORS

Approved to BS 9114 – N002 style 2E–56

SPECIFICATIONS

The 'C' Series of miniature wirewound, vitreous enamelled resistors has been designed to meet the requirements of Specification BS 9114 - N002, and full Qualification Approval has been granted. A Test Report Summary is available on request; this report shows that many of the performance levels are in fact much higher than the specification acceptance levels.

The use of specially selected materials, combined with the application of exacting quality control throughout all stages of production ensures the consistent achievement of a very high standard of reliability.

ELECTRICAL SPECIFICATION

Tolerance: ±5% is standard on values of 1Ω and above and ±10% between 0.1Ω and 1.0Ω. For non standard values and tolerances please consult the factory.

Resistance values: C Series resistors are available with the preferred ohmic values of the E24 Series within the ranges shown in Table 1.

Temperature coefficient: Typically less than 100 ppm/°C and never exceeding 200 ppm/°C over the category temperature range −55°C to +200°C

MATERIALS

Core: High purity steatite ceramic. Chemically inert, capable of withstanding severe thermal shock and impervious to moisture. Ground to close tolerance finish to give maximum contact with wire element for rapid heat transfer.

Resistance Element: High quality nickel-chrome or nickel-copper alloy depending on resistance value; wound at minimum tension.

End Caps: Formed to close tolerances from a special nickel-iron alloy chosen for its consistent welding properties and glass sealing characteristics.

Leads: Solder coated nickel A.

Uncoated leads can be supplied for welding.

Specify – weldable leads'.

Preformed and cropped leads can also be supplied on request.

Coating: Humidity proof vitreous enamel with carefully controlled expansion matched to the materials of the resistor.

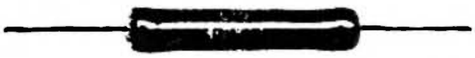


TABLE 1

C.G.S.				BS 9114 - N002							STYLE CROSS REFERENCE		
Style	Maximum wattage rating @ 20°C	Resistance Range Ω		BS 9114 - N002 Style	Maximum wattage rating @ 70°C	Approved Resistance Range Ω		Critical Resistance Ω	Limiting Element Voltage. Volts		DEF. 5111·1 Style	DEF 5115·2 Style	G.P.O. Style
		min.	max.			min.	max.		Normal	Low Air Pressure			
C3A	3	0.1	10K	2E-56-2.5	2.5	1	4.7K	3.9K	100	70	RWV3J	RFH3·2.5	P.O.35
C7	7	0.1	27K	2E-56-6	6	1	15K	6.8K	200	140	RWV4J	RFH3·6	P.O.40
C10	10	0.1	68K	2E-56-9	9	1	68K	27K	500	350	RWV4K	RFH3·9	P.O.36
C14	14	0.2	120K	2E-56-12	12	1	100K	47K	750	530	RWV4L	RFH3·12	–

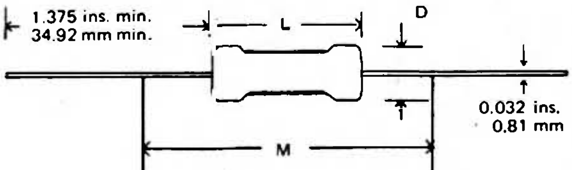


TABLE 2

Style	Length L		Diam. D		Measuring Distance M		Approx. Weight
	max. in.	max. mm.	max. in.	max. mm.	±0.062 in.	±1.59 mm.	grammes
C3A	499	12.7	0.220	5.6	1.250	31.8	1.0
C7	.874	22.2	0.315	8.0	1.625	41.3	2.0
C10	1.499	38.1	0.315	8.0	2.250	57.2	3.5
C14	2.106	53.5	0.315	8.0	2.875	73.0	5.0

Note: M = resistance measuring points distance – below 10Ω only.