

The SHORT WAVE Magazine

VOL. XXXVI

DECEMBER 1978

NUMBER 10

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TR2300 2 METRE SYNTHESISER PORTABLE

Trio once again lead the field with the introduction of the new TR2300 2 metre FM portable. Following the established TR2200 line, the all new 2300 combines all the virtues of small size, ease of use and rugged go-anywhere construction but introduces for the first time full band coverage in 25 kHz steps from the same advanced synthesiser used in the TR7500. The synthesiser provides 80 FM channels from 144-146 MHz together with 600 kHz repeater shift, and a single auxiliary channel which can be crystal controlled to your favourite net frequency.

Automatic tone burst is provided for repeater operation and all in all, the TR2300 looks like being the new definitive 2 metre FM portable.

Although not so obvious from the photo, the TR2300 is actually smaller than the existing TR2200 and is a totally new design with an improved specification. The high sensitivity receiver section uses a combination of effective RF filters providing optimum cross modulation rejection across the entire band. An extra low-profile speaker uses a samarium cobalt magnet to reduce equipment size whilst improving speaker efficiency and clarity of reproduction.

Switchable dial illumination is provided so as to ease dial readout in dimly lit situations.

Needless to say, in line with Trio advance planning, the TR2300 will allow for incorporation of the new IARU region 1 adoption of 12½ kHz FM channels as this is gradually introduced.

Once again, Trio sensible design, attention to detail and care in providing equipment designed specifically for the user, rather than hand-me-down Japanese designs, is reflected in the TR2300—why settle for anything less! Price: £210 including VAT.



TR7500 THE SENSIBLE 2 METRE RIG

When comparing other rigs with the TR7500, you may become dazzled by the thoughts of 800 5 kHz channels at your fingertip—forget it—think commonsense and remember that FM in Europe is organised on 25 kHz channels so why tune five times as many frequencies as you really need. The TR7500 is the only imported FM box to be designed for the British user, the others are simply hand-me-downs from the Japanese home market.

With the TR7500, you can enjoy mobile 2 metre operation at its best. Need S20? turn the dial until display reads 20. Move to S17? turn to 17, it's simplicity itself. Repeater operation is equally easy requiring only the touch of a switch to select either 600 kHz normal receiver up shift or reserve repeater operation as desired. Dial readout? you guessed, it's simply 7 for R7, 4 for R4 and so on.

Full band coverage 144-146 MHz is standard on the TR7500 and as a final point to muse upon, consider when happens if we adopt 12½ kHz channels in Europe. With your 5 kHz step rig you are up ye creek without ye paddle but with Trio foresight, you are covered since the TR7500 is basically a 12½ kHz channel rig and 12½ kHz channels are available.

TR7500, the sensible choice. Price £235 inc. VAT. Matching PS-6 mains PSU, £63 inc. VAT.

ANNOUNCEMENT

Some firms in the U.K. are not officially authorised Trio dealers and Trio equipment purchased from these companies is not backed by the Trio service and spares organisation in the U.K.

SEE THE SEPARATE STATEMENT BY TRIO

**FOR FULL CATALOGUE AND ANTENNA BOOK,
SEND 45p IN STAMPS TO MATLOCK**

LOWE ELECTRONICS LTD



TS120

MULTUM IN PARVO

We introduce yet another exciting innovation from Trio in the new TS120V HF transceiver. Equally at home in mobile or home station situations, the TS120V packs more features into a small package than any other comparable model.

Measuring only $9\frac{1}{4}'' \times 3\frac{3}{8}'' \times 9\frac{1}{4}''$ —which is about the size of a packet of cornflakes, the TS120V can best be described as a miniature TS820. The rig covers all bands 80–10 metres—and all of 10 metres 28–30 MHz so it's ideal for transverter driving, has digital readout built in, vox, break-in CW, RIT, noise blanker and the unique Trio passband tuning system used in the 820. The power output is 10W, and a matching linear will be along shortly.

The TS120V is clearly a winner for mobile operation but is equally attractive at home and is perfect for the VHF/UHF enthusiast who requires a high performance I.F. system for his transverters.

The transceiver is based on an advanced PLL system and the digital readout gives you the correct operating frequency at all times unlike many other rigs. Remember my previous comments about Trio attention to detail!

For ease of operation, the TS120V is unsurpassed; simply select the band required, tune the VFO to the frequency you want and there you are: no preselector or PA tuning to worry about, and a distinct safety feature for the mobile operator.

We at Matlock, have all fallen in love with the TS120V and we feel sure that you will too. At it's price of £435 including VAT (and including digital readout, vox, etc) we have no doubt that this transceiver will be another winner from Trio. See it soon.



SB2M

MIZUHO 2 METRE SSB

The SB-2M portable SSB/CW transceiver makes a welcome change from the procession of FM boxes and offers the user real DX performance in a small, easily carried package. Power output is around 1W, pep (2.5W, input) and sideband generation is by 76514 double balanced modulator and high quality 9 MHz crystal filter thus ensuring very good carrier and unwanted sideband suppression. A further 76514 is used in the heterodyne mixer to guarantee not only a clean transmission but also a receiver free from unwanted spurious responses.

Frequency control is by a wide range VXO giving 50 kHz coverage from one crystal. As supplied, the SB-2M is fitted with four crystals giving a total tuning range of 200 kHz which is adequate for most operators' needs. Alternative crystals can be fitted by the user at any time without the necessity for realignment.

The receiver performance is really outstanding and we can normally hear the Wrotham beacon in Matlock using only the telescopic whip on the rig. As a mode comparison, we can seldom if ever, hear the London repeater GB3LO even using a 10XY at 40 feet and the most sensitive FM rig available. Real DX is yours with the SB-2M and SSB.

Current consumption is low enough to make operation from dry batteries perfectly feasible. However, a Nicad battery pack and charger are also available at modest cost. The SB-2M comes complete with manual, microphone, carrying strap, etc., and is fitted with crystals to cover 144.1–144.3 MHz. Other crystals will be available shortly. Why not try sideband, you'll really enjoy it after a dose of FM repeater operation. After all, where does everyone on 2 metres vanish to when there's a lift? You guessed; they're working the real DX around 144.3 and you can join in with the SB-2M.

SB-2M £155 inc. VAT

HEAD OFFICE : 119 CAVENDISH ROAD, MATLOCK, DERBYSHIRE. Tuesday-Saturday 9 a.m.–5.30 p.m.
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FT202R. 2m. Hand Portable

TR7500. Synthesised 2m. Mobile

CPU2500RK. CPU Controlled 25W. 2m. Mobile

FRG-7000. Digital Continuous-Coverage Receiver

TS520S. HF Transceiver

TR2300. Synthesised 2m. Portable

FT-7. HF (10-80m.) Mobile

FT225RD. 2m. All-Mode Transceiver

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THE WHOLE LENGTH of the DX-5V is active on all bands except 15 metres due to its unique design. On 15 metres the DX-5V is a full physical quarter-wave.

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Frequency bands 80-10 metres inclusive

Bandwidth (for VSWR 2 : 1 or less):
Entire 40, 20, 15 or 10m. bands
60-100 kHz on 80m. band

Power rating: 1200W. p.e.p.

VSWR at Resonance: 1.5 : 1 or less on all bands

Feed impedance: 50 ohms (matching line included)

Connector: SO-239 on end of matching line

Height: 7.8m. (26ft.)

Shipping weight: 6kg (13½ lbs.)

Merry Christmas to all
our customers

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IC-215 By far the best 2m. FM portable on the market—with more power (3W) than most and batteries some 4 times as big thus giving a reasonable period of operating use. Add to this the superb, clear modulation for which ICOM are so famous and a good receiver, plus a solid, reliable construction and you have really good value for money.

Total channel capacity = 15
Channels fitted = 12 (520, 522 RO-9 inc.)
Available ex-stock at £179 inc. VAT and delivery.

IC-215E

£179 inc. VAT and delivery



IC-240

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IC-240 Think of the features you would instal in a mobile to provide a combination of optimum usefulness AND SAFETY. You will probably come up with the following requirements

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- 3 Instant reverse repeat at the flick of a switch without any re-tuning or memory programming.
- 4 A very sensitive receiver with a spurious reponse performance far better than the average and a very clean transmitter with excellent clear, crisp modulation. (We measured a sensitivity of 0.1µv pd for 10dB sinad).
- 5 A reasonable price—but (more important) a quick, reliable after sales service.

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Giving you FM/CW/USB/LSB, all produced from the amazing ICOM synthesizer and patent LSI chip. Frequency read out is to the nearest 100Hz and it is amazingly stable and accurate. You can use the two frequency stores as separate VFOs or for any repeater shift required. The tone burst is automatic, of course, and reverse repeat is available at the flick of a switch. Add a keypad (we will give you the circuit to make your own or you will be able to buy one shortly) and find a new facility which is quite impossible with old-fashioned rigs. The original waiting list has now been dealt with and you can now have one from stock.



IC-245E ▲

£414 inc. VAT

This truly amazing little box gets you mobile on FM, USB or (if you really think it a good idea) CW! The synthesizer is the same as the IC-211E and can be tuned to the nearest 100Hz, again with amazing accuracy. Of course such a versatile little box will often be used as a base station and facilities such as keypad operation can be added. They are now ex-stock

IC-701 £999 inn. VAT ▼ COMPLETE WITH PSU



◀ **The popular "SLIM JIM" SJ2**

144-146 MHz — High efficiency metre omni-directional vertical. An omni-directional 2 metre aerial developed by T & T from a design by F. C. Judd (G2BCX). Derived from the "J" the SJ2 is a free space aerial with better than 50% greater efficiency than conventional ground plane types due to the very low angle radiation field. The aerial is slim and compact (58 inches long) and as there are no radials it is unobtrusive and has low wind resistance. Supplied complete with mast clamp. £15.50 inc. VAT (carriage £1.00).

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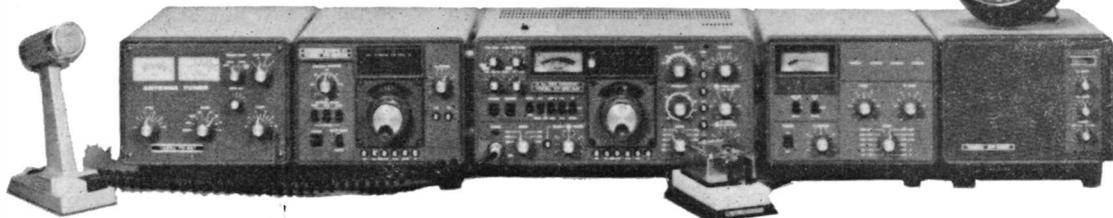
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FT227RX

- OPTICAL COUPLED TUNING
- MEMORY CHANNEL (S OR R)
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braid c/w 75' feeder, etc.	£27-00

VHF ANTENNAS FIXED OR MOBILE

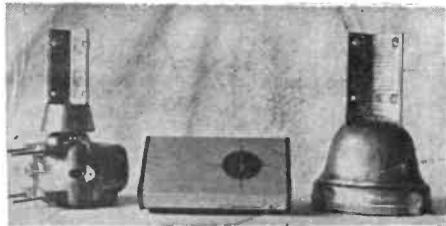
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440 144 MHz 1/4 Standard 1/4 base tapered whip	£7-15
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10XY/2m. 10 ele. crossed	£26-50
5Y/2m. 5 element yagi	£16-00
8Y/2m. 8 element yagi	£20-00
10Y/2m. 10 ele. long yagi	£26-50
14Y/2m. 14 ele. long yagi	£27-50
Q4/2m. 4 ele. yagi	£16-60
Q6/2m. 6 ele. quad	£22-00
PBM10/2m. 10 ele. para	£26-00
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UGF/2m. ground plane	£7-10
C5/2m. Vertical	£31-00
D8/70 8 over 8 slot feed	£15-50
PBM18/70 18 ele. Para	£18-70
MBM48/70 46 ele. Multi	£21-80
MBM88/70 88 ele. Multi	£29-00
12XY/70 12 ele. crossed	£29-80
C8/70 Vertical colinear	£33-50
15/23 15 over 15	£23-40
4Y/4m. element yagi	£13-00
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PMH2/C Circ. Phasing	£5-20
PMH2/2m 2 way harness	£7-85

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L7606 Log Periodic	£73-95
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CSS Gutter clip	£2-25
25 Trunk mount	£2-95

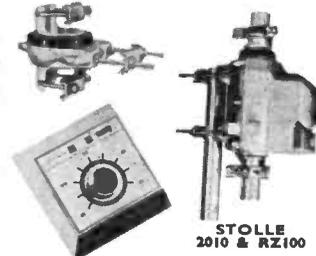
BANTEX VHF WHIPS (Carriage 90p) VAT 12 1/2%	
70 1/2" 1/4 4m. fibreglass	£4-50
144 1/2" 1/4 2m. fibreglass	£4-30
BS 1/4 2m. whip	£7-75
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Stan'd b. Unwanted deduct 50p	£9-10
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UCL 70cm. base load	£8-00
UGC 70cm. base/mid load	£13-50
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AR20/30 VAT-Rotator 12 1/2% AR30/40 Cables and delivery 8% AR22/40/33 Cables and delivery 8%

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AR40 VHF Light HF	£47-50
AR33 Deluxe control '40	£59-00
B7I Medium duty	£79-50
CD44 Medium duty	£95-00
HAM III Heavy duty	£139-00
2010/220 Automatic	£43-50
2030 Memomatic	£48-00
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MOUNTING KIT	
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50' £47-00 or £81-90 c/w rigging	Base grillage (3' 6") ... £37-00	79" mast £224-50 (RK £49)	Heavy Duty P40 ... £357-30
	Cap fitting ... £19-00	101" mast £303-50 (RK £76)	Heavy Duty P60 ... £405-60

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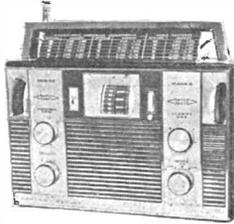
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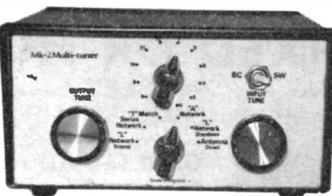
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£189.00 inc. VAT
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The Mk. 2 Multituner was designed by us to many requests who found our Mk. 1 the finest they had ever used but required a wider frequency range. This covers 550 kHz to 30 MHz. The circuitry gives 50 switchable, tunable positions to match any antenna over 5 metres in length to practically all communication receivers. Our "Multituners" are designed and manufactured by ourselves and have been exported to over 50 Countries. Many operators use them for QRP Transmitting also. See the February edition 1977 of the "Short Wave Magazine" or send SAE for details.

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VFO820	£131.00
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TS700S 2m. All mode digital transceiver	£637.00
SP700 Speaker	£22.00
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Most Drake models available to order.	

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8XY/2m. 8 element crossed yagi	£19.91
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Twin Meter Model 500 3-500 MHz 50 or 75 ohm	£45.00
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Nye King 003 Morse Keys	£10.00
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MK1024 Keyer with 1024 bit memory	£140.00
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FS301 Through Line Wattmeter 3-5 to 30 MHz	£37.50
FBB-9A Balun 50 ohm 1-1 to 40 MHz	£12.00
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DL 120 120 Watt Dummy Load 50 ohm 0-500 MHz	£20.00
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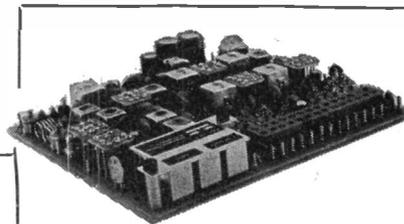
ALL OUR PRICES INCLUDE VAT

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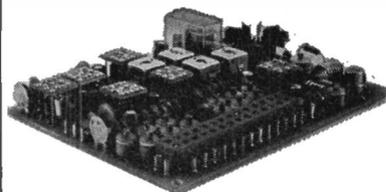
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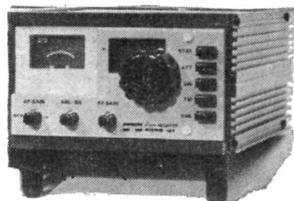
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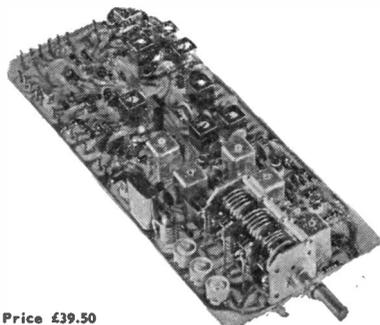
AR20. 12 channel FM receiver 144-146 MHz. Input impedance 50-75 ohm. AM-FM modes. Sensitivity 0-2uV AF output 3 watts. 12v. DC operation. Price £45-00



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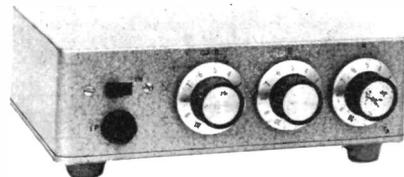
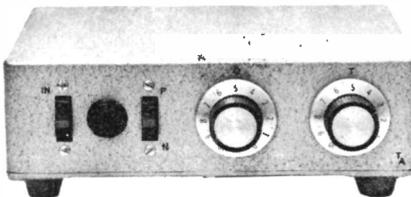


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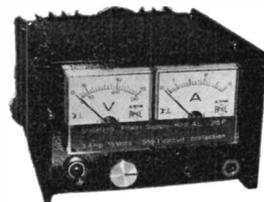
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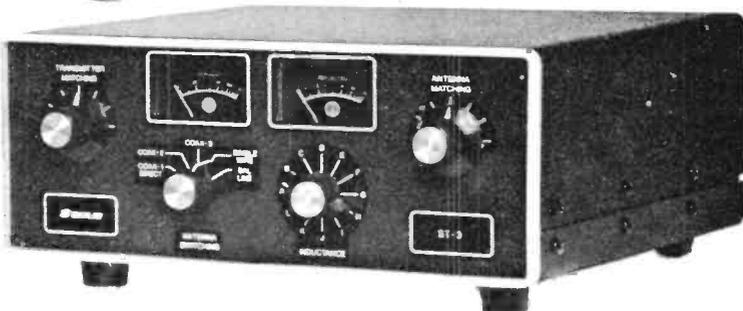
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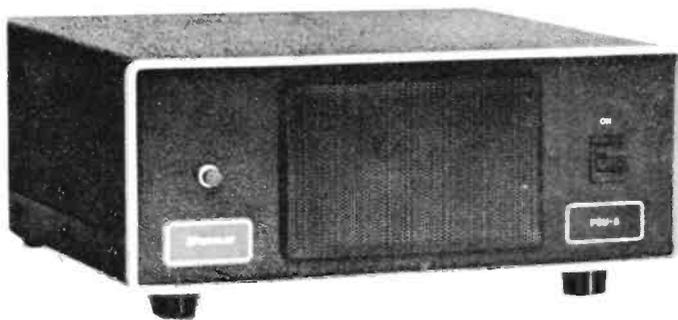


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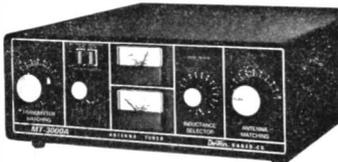
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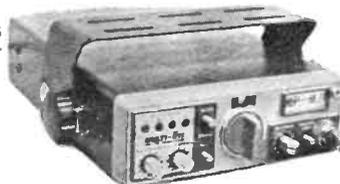
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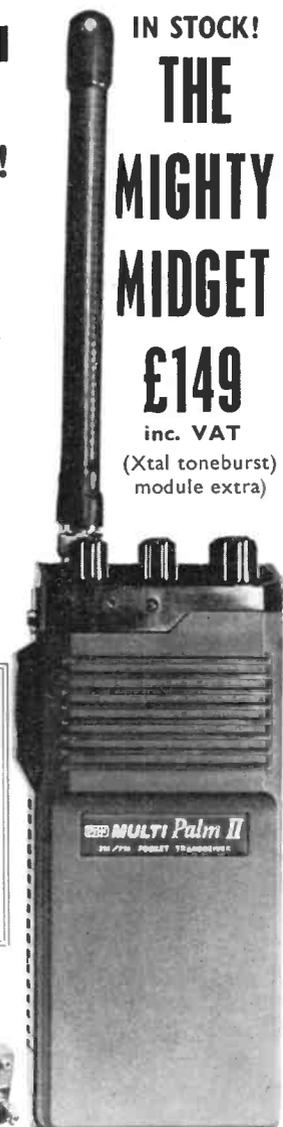
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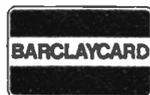
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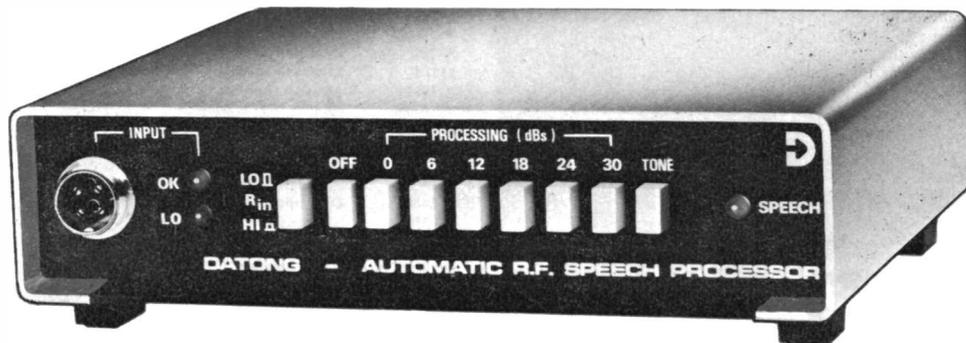
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- ★ Unique "TONE" button simplifies transmitter adjustment
- ★ LO/HI microphone impedance matching

PUSH-BUTTON CONTROL

Model ASP sets remarkable new standards of performance and ease of operation for speech processing equipment. As well as providing the genuine 6 to 10 dBs of talk power improvement without harmonic distortion which has made our Universal R.F. Speech Clipper world famous, Model ASP adds the ultimate convenience of instant push-button selection of the degree of R.F. processing. This ranges all the way from 0 to 30 dBs in 6 dBs steps.

Input level adjustments or meter watching are completely eliminated and the automatic control system ensures that you always get exactly the amount of processing that you want despite changes in voice level, or even despite changes in microphone.

With Model ASP you simply select the processing to suit conditions: 0 to 6 dBs for semi-local work; 12 or 18 dBs for DX work; and 24 or even 30 dBs for when the going is really rough.

UNIQUE SET-UP ADJ.

Having eliminated input setting controls, Model ASP goes even further and simplifies the setting of the transmitter microphone gain. Simply press the "TONE" button and the unit generates a sine wave with the same peak-to-peak amplitude as the processed speech output. Once your transmitter mic. gain for the preset output level control on the back of Model ASP is set to give the desired peak P.A. current using this tone, it will be virtually impossible to overdrive the transmitter or to radiate a bad signal.

The result is that you can always rest assured that your signal is exactly as you want it, without the need to watch meters or to carefully control your voice level.

TWO PROCESSORS IN ONE

Model ASP really consists of two processors in one case. The first is an audio processor and the second is a true R.F. clipper.

The audio processor is not intended to give any speech compression or talk-power enhancement; its job is instead that of an intelligent and unobtrusive yet thorough automatic peak level adjuster which ensures that the subsequent R.F. processor always has an accurately defined peak-to-peak input level. It is exclusively the job of the R.F. processor to boost the talk-power.

PROVEN R.F. CLIPPING TECHNIQUE

The main processor uses the well proven R.F. clipping technique which has been so successful in our Models RFC and RFC/M. A high quality SSB signal is generated at 60 kHz using the phasing technique because of its smooth frequency response and its long term reliability. This SSB is then clipped, filtered, and demodulated back to audio. The result is an increase in the average to peak voltage ratio of the speech waveform yet without harmonic distortion.

Unlike some A.F. or R.F. compression systems which make you sound louder without improving your readability, true R.F. clipping actually increases the intelligibility of speech in noise. This effect acts in addition to the simultaneous increase in your average power level.

- ★ Connects between microphone and transmitter
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- ★ Eight ICs, eleven transistors, three LEDs
- ★ Elegant appearance complements any rig

ADVANCED AUDIO PROCESSOR

The audio processor has the demanding job of maintaining a constant peak-to-peak speech amplitude despite wide variations in input level and yet without introducing any audible side effects. The circuit has been especially developed for this specialised purpose and is highly sophisticated. It involves detection of both positive and negative speech peaks to allow for the marked asymmetry of many speech waveforms, and five second "hang" time after speech ceases so that the background noise remains constant during speech pauses. So that the circuit is not fooled into a long term gain reduction by loud transients (such as from dropping the microphone) dual time constants are used in the control loop together with special logic circuitry to discriminate against non-speech sounds.

ACCURATE CONTROL

As well as being highly convenient to use, Model ASP gives a far more accurate control of the degree of R.F. processing than processors which rely on the operator controlling his voice level to "talk-up" a meter to a desired reading. Moreover, the self-control needed for the latter method all too often evaporates in the excitement of DX operating. With Model ASP on the other hand, you can afford to get excited; the automatic control continues to look after your signal while you concentrate on the operating.

FULL MONITORING

Even a control system with the wide range of Model ASP has its limits and three light emitting diodes are provided so that you can confirm at a glance that your input is within bounds. If your voice level is too low, the "LO" lamp will stay on. If your voice level is within the correct range the "OK" lamp comes on instead, and after a few seconds of speech (during which the processor will "learn" your voice level) it will stay on for about five seconds after you stop talking. This represents the "hang" time of the pre-processor. If both "LO" and "OK" lamps go off together your input is too large.

As a further refinement, the "SPEECH" lamp should stay on only while speech sounds are present. If it stays on between words there is too much background noise at the microphone for good intelligibility, and you should talk closer to it.

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SHORT WAVE MAGAZINE

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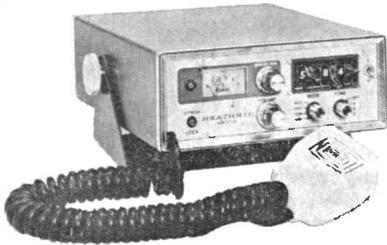
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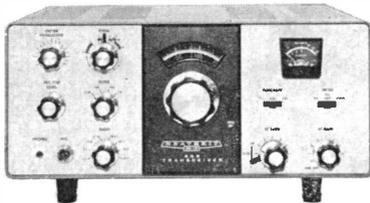


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The
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EDITORIAL

HICCUP

Everyone has them sometimes: following the production difficulties of Autumn, Professor Murphy (of the infamous Law) surpassed himself by laying low, at the same time, almost all of us here at *Short Wave Magazine* with illness. (Perhaps we've just poked fun at him once too often!). The result is that the December issue is, to put it mildly, late and for this our sincere apologies to all our readers and advertisers. Rest assured that we are taking steps to ensure that Murphy can not get us again *this* particular way!

In order to re-establish schedules, the next issue will be a bumper joint January/February issue, same price as usual, appearing in the middle of February; the March issue (which incidentally marks the start of Volume 37) will appear during the first week of March. The April issue, containing the Index to Volume 36, should be published on time.

May we now express the hope that *all* our customers had a Happy Christmas, and that they will have a Peaceful and Prosperous New Year.

Billings
W3KFE.

VHF BANDS

NORMAN FITCH, G3FPK

Radio Sputniks Launched

ON October 26 the first Russian amateur radio satellites were launched at 1930 UT from the Plesetsk site. It appears that two were launched. *RS-1* is the working one with *RS-2* as a back-up in case of problems with *RS-1*. The vital statistics of *RS-1* are being quoted as:—Period 120.29461 minutes; Longitude increment 30.07365° West per revolution; inclination to the Equator 82.55857°. The apogee of the orbit is 1724 kms. and the perigee is 1688 kms. The uplink band is 145.88 to 145.92 MHz with a downlink on 29.36 to 29.40 MHz. The telemetry beacon is on 29.40 MHz and there is a *codestore* facility on 29.38 MHz.

The inclination is such that the track of the satellite on a polar projection map is nearly a straight line, passing the opposite side of the poles to the AMSAT *Oscars*. A maximum ground range of 8,500 kms. seems possible as the altitude is higher than *O-7*.

The transponder's 2m. Rx is very sensitive and *ten watts e.r.p.* is the most power that need be used. Circuitry has been incorporated which cuts off the Tx if too big a signal is received, so habitual QRO satellite abusers will never have a QSO. It is hoped that the message will get home eventually. From G3FPK, it was found that with 10 watts output to a 10 dB aerial system, the Tx could be cut off at about 2,000 kms. range.

The operating schedule is alleged to be in transpond mode on Sunday, Tuesday, Thursday, Friday and Saturday, with Monday and Wednesday as "off" days. The telemetry is more complicated than *O-7* and *O-8* in that each frame consists of either seven or fifteen character groups of the form, P01K, C01K, etc. Lacking

any confirmation from the Russians to date, it appears that the first letter identifies the parameter being metered, and the two figures represent the measurement. The final letter seems to indicate a condition with a D, K, S or U indicating transponder off, but a O or W indicating it is on. In the former case, the "D" channel will read "01" but in the latter it will indicate the power output which is 1½ watts maximum.

As with *O-8* in the earlier stages, there have been several sets of predictions based upon AOS and LOS observations. However, the Russians did give a reference orbit for Nov. 13—no. 221—at 1945 hrs. 54.82 secs. at 169.48° West.

RS-1 is opposite to *O-7* and *O-8* in that the morning orbits are the ascending ones and the evening passes the descending ones. An orbit crossing the Equator going north at 0832 at 6° west would pass over the U.K. some 16-20 minutes later depending upon one's latitude. An evening pass crossing the Equator at 159° west at about 1844 would be over northern Scotland some 40 minutes later and over London three minutes afterwards. On overhead passes, *RS-1* should be in range for about 25 minutes. Orbits crossing the Equator in ascending node between 226° and 300° west are out of range of the southern U.K. in normal conditions.

Project Cameo

Confirmation came through from NASA on Nov. 5 that the *CAMEO* man-made *aurora* experiment would be triggered off at 0933 UT on Nov. 6 at 60°N and 17°E, over IU QTH square. Careful monitoring for the following quarter hour at G3FPK on 2m. revealed nothing unusual. Other observers reported similar non-results: all rather disappointing from the radio propagation point of view.

VHFCC Award

Geoff Brown, GJ8ORH, from St. Saviour in Jersey receives 2m. VHFCC certificate no. 348 for QSO's between Feb. 10 and mid-September this year. His station comprises a *Trio* TS-700 with a two times 4CX250B amplifier. The aerial is a 14-ele. *Parabeam* 20ft. above ground with a masthead pre-amp. Geoff is also very active on 70 cm. whereon he used the *TS-700* to

drive a transverter feeding a single 4CX250B amplifier. A masthead pre-amp to an 18-ele. *Parabeam* comprises the aerial system at his sea level QTH.

Contests

Results:—The Fixed Station section of the 144 MHz Open Contest of Sept. 2/3 was won by G3UNU, the Nottingham University RS's station, with 5115 points from 531 QSO's. In second spot with 5082 points from 543 contacts was the Surrey Hills Contest Group in Weybridge, G4DGA, while G8IQL came third with 4919 pts. from 469 QSO's. The Portable half was won convincingly by G3PMH/P, the March & District ARS, who chalked up 9147 pts. from their 731 exchanges. G6UW/P, the Cambridge University Wireless Society, had 694 QSO's worth 8670 pts. and in third place came G3CW1/P with 7550 pts. from 746 contacts.

In the RSGB Region 1 VHF Contest on Sept. 10, the Liverpool & Dist. ARS topped the Multi-operator section, winning the G2CIP Shield. Arthur Breese, GD2HDZ, walked off with the G3SMM Shield by winning the Single-Op. section on 23 cm., 70 cm. and 4m. The 2m. certificate went to Bob Mackean, G4HAO, while the best performance outside Region 1 was achieved by G8LKR.

Coming attractions:—The 144 MHz Fixed Contest is scheduled for Dec. 3 from 0900-1700 GMT. There are three sections. "A" for single operator, all mode, "B" for multi-operator, all mode and "C" for FM only between 144.500 and 144.900 MHz with the specific proviso that RTTY, Raynet and beacon frequencies are avoided, not forgetting 144.54 MHz, of course. General Rule No. 15 for RSGB VHF contests requires contestants to comply with RSGB/IARU Band Plans. This infers that operators using FM in the 144.15-144.50 MHz exclusive SSB section risk disqualification.

The Repeater Scene

In the September feature, reference was made to 15 more VHF repeaters. These have now been licensed by the Home Office and, as this is being edited, the RSGB is mailing the appropriate documents to the groups responsible for GB3AR, GB3FR, GB3NI, GB3PR, GB3SC, GB3SR,

GB3TR, GB3WH and GB3WT. There are some technical matters to sort out concerning the remaining six repeaters before the licences are released.

In the 70 cm. band, GB3BN on RB0, serving the Bracknell area of Berkshire, was put into service on Oct. 25. Further information from G8JWD. On Oct. 29, GB3FC (YN15c) on RB2 and serving the Fylde Coast was due to be commissioned. Details on this one from G8HED.

Oscar News

AMSAT has confirmed that certain batteries on O-7 are failing, so the demise of this very successful satellite would seem to be nigh. Therefore, it may be used for communication in whatever mode it happens to be on. However, the use of the minimum possible power should prolong its life.

The main news this month is that AMSAT-UK is to build a scientific satellite which it is hoped to launch in December 1980 or February 1981. It will be almost wholly constructed by the University of Surrey AMSAT team with practical assistance from other interested radio amateurs professionally qualified in the space technology field. AMSAT-USA is putting its expertise and experience at our disposal. Such enterprises do not come cheaply. Funding will come from AMSAT-UK, company and private donations. This will *not* be a communications satellite but a research one incorporating a number of important programmes. Introductory details are in the latest *Oscar News* which AMSAT members will have received recently. An *s.a.e.* to Ron Broadbent, G3AAJ, at 94 Herongate Road, London, E12 5EQ will bring details of AMSAT-UK.

The O-8 schedule is basically Mode "A" for Monday, Tuesday, Thursday and Friday, and Mode "J" on Saturday and Sunday. However, occasionally it is switched purposely into the unscheduled mode for experimental purposes and may be used normally in such cases.

As the GB2RS News Bulletin Service no longer carries satellite orbit predictions, those wanting them should listen either to the Sunday morning AMSAT net on 3780

kHz from 1015 local (G3RWL *et al*), or on 144-280 MHz from 1930 local on Sundays (G8CSI/G3FPK, etc.) in the London area.

Four Metres

High-light in October for Jack Kay, G3CO (Essex) was a QSO with G3LDR/P on the 15th for a first 4m. QSO with Co. Cleveland. The Fixed Contest on Oct. 22 enabled Ray Elliott, G4ERX (Essex) to increase his 1978 score in spite of flat conditions. Using his, "ancient *Pye Vanguard*," David Thorpe, G4FKI (Essex) made 20 AM and 7 CW QSO's in the contest adding six new 1978 counties.

Two Metres

A long silence from Whitehaven has been broken by a welcome letter from Bill Hodgson, G3BW, who has now acquired a *Trio RS-700S*. With MS operation the goal, Bill has built a 4CX250B amplifier and memory keyer. During the *Orionids* shower, a sked with I1DMP (DF79j) almost came off with just the final "R's" missing. From Devon, Roger Thorn, G3CHN, stole a march on us by working VJ square thanks to SM6EUH/MM operating on a vessel called "Snow-storm" while heading for the Azores on October 22.

Clive Morton, G4CMV (Leeds), reckons conditions have not been as good as one would expect for this time of the year. Even so, on Oct. 5 some convenient ducting into southern Germany produced DL0FM/P in FH33c, followed by DF1CF (FH23g) on SSB and CW respectively, between 2305 and 2325 GMT. On the 12th, the tally included F1CYB (BH20), HB9AMH/P (DH66c) and F1EZQ (CH15d). On the 26th a short *aurora* was caught at 2250 when GM8FFX was worked at QTF 30°.

Bob Mackean, G4HAO (Liverpool), reckons he is the youngest consistently active SSB station on 2m., although this lead has been narrowed to 2½ weeks by GD4HOZ. He would be interested to hear from any under-18's as part of a survey of young amateur radio operators. His QTH is, Lowood, Lyndhurst Road, Mossley Hill, Liverpool, L18 8AU. No great DX was worked in October apart from a couple of GI's on the 20th, and GM4DTH (Lothians) on the 27th.

John Woodham, G8BKR (Bristol), was one of the operators of GB3NBH, a special event station, during mid-October in the two days, 104 stations were worked, best DX being ON4VN on CW and GJ8AAZ on SSB. The transceiver was John's *TS-700* to an 8-ele. *yagi* at 110ft. Ken Osborne's, G8KSS (Bristol), latest note arrived after last month's deadline. He mentions the *aurora* of Sept. 29 during which he worked mainly Dutch and German stations in CL, CM, DL and DM squares with best DX, DD3BA (EN65h) and DB9YJ (EM73a).

During the tropo. lift on Oct. 6, Steven Ruff, G18EWM (Co. Antrim), worked 14 PA's, 5 DL's and 2 ON's between 1957 and 2200 GMT. Alister Simpson, GM8NCM (Fife), sent along a complete typed log extract covering the big Sept. 29 *Ar* event during which he had 58 QSO's between 1222 and 1721. His best DX were DF4DL (EL43e), F2YT (BK55h), DB5YD (EL02e), LX1FX (CJ40e), F1CBX (BJ62f) and F1DRR (BI01d). The QTF's for most contacts were 50° but for the more southerly QSO's in the later stages the azimuth was 65° for best reception.

The weekend Nov. 4/5 brought the Marconi Memorial Contest. From London conditions at the beginning were quite good to the east through south-east. Quite a few British stations were QRV for this affair in which our own five hour contest was buried. Chris Tran, GM3WOJ, operated portable from the Mull of Galloway (XO26e) but found conditions mediocre till the last half hour, so no great DX was worked. For Clive Penna, G3POI (Downe, Kent) the best DX was DM2CSB/P in FN square, worth 31 pts. He made about 70 contacts in the British event. Your scribe's brief appearance brought HB9AMO/P (DG13b) from the worst direction, plus assorted ON, PA and DL stations from the east.

As this is being written, the persistent anticyclone which has brought such mild and dry weather to much of England recently, is nicely poised over Germany with a high of 1038 millibars. During the late afternoon of Nov. 6, Walter Zach, OE2CAL/2, was a good signal from GH16c on CW. He mentioned running 400

THREE BAND ANNUAL VHF TABLE
January to December 1978

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	
G3SPJ	58	7	66	16	41	9	197
GD2HDZ	45	5	61	11	40	8	170
G3CO	50	7	54	15	28	8	162
G2AXI	43	7	54	14	30	7	155
G4ERX	33	3	57	15	36	10	154
G4CMV	—	—	62	25	40	11	138
G8LEF	—	—	60	17	45	16	138
G8BKR	—	—	72	16	38	6	132
G8GML	—	—	59	13	46	11	129
G4BWG	23	4	58	17	19	7	128
G8HHI	—	—	62	19	33	6	120
G8GXP	—	—	55	12	40	7	114
G8LHT	—	—	57	14	28	11	110
G3BW	—	—	55	13	30	5	103
G18EWM	—	—	65	13	19	6	103
G3FPK	—	—	78	24	—	—	102
G4DEZ	—	—	75	26	—	—	101
G8MFJ	—	—	61	14	22	2	99
GJ8KNV	—	—	51	17	21	9	98
G4AEZ	23	4	36	10	19	5	97
G3FUJ	31	3	40	6	14	2	96
G4BYP	9	3	44	9	25	6	96
G4GEE	—	—	54	8	29	3	94
G8KSS	—	—	70	18	—	—	88
G4FRE	—	—	48	7	24	3	82
G8ITS	—	—	46	9	23	3	81
G4HAO	—	—	68	12	—	—	80
G8APZ	—	—	57	16	4	1	78
G8KGF	—	—	60	16	—	—	76
GJ8ORH	—	—	42	16	7	6	71
G8OGD	—	—	42	9	9	5	65
G4FKI	12	1	31	6	10	1	61
G8JJR	—	—	51	10	—	—	61
GM4CXP	—	—	44	14	1	1	60
G8BIJ	—	—	50	9	—	—	59
G3KPU	—	—	51	8	—	—	59
G4GXT	—	—	51	8	—	—	59
G8GRT	—	—	35	4	15	3	57
G8MKW	—	—	47	9	—	—	56
G8NYS	—	—	44	8	—	—	52
G4GET	—	—	42	9	—	—	51
GJ8AAZ	—	—	31	6	7	5	49
G8JGK	—	—	29	9	—	—	38

watts to an 11-ele. *yagi*. About 1700 GMT a station was heard calling HG6KVB/P. G4CMV worked some 50 continentals on the 6th, many in EL, FL and FM squares, plus HB9MY (EH), LX1DB, OE2CAL/2 and DM2DTN (GK). The OE was Pete Connors's, G8LEF (W. Yorks.), 17th country of the year and gave him the 100th square on the band. Mike Allmark (Leeds) reports receiving many East European UHF TV stations in the period plus one 300 watts relay. Most all signals were "snow free," such was the received field strength.

Seventy Centimetres

G3BW still finds it hard going from Cumbria on 70 cms. Bill thinks the perennial moisture problems with his *Multibeam* in his coastal environment may need investigating. The rare Co. Durham is now represented by G3ZJY according to G8LEF. Pete also added GW4GKF in Mid Glamorgan to his 1978 total on Nov. 5, and that is a rare catch, even on 2m.

G4CMV confirms the good conditions during the UHF Contest on the Oct. 7/8 weekend during which he worked 2 F's, 8 PA's, an ON, plus G, GM and GW. On the 11th, 70 cm. conditions were good again and Clive contacted DB1BP (DN36b), DM2CPA (GO61f) and DT2BHA (GO71h). However, 2m. conditions were not very much up. The following night the situation was reversed.

G4ERX went to Devon with the HADRABS Contest Group for the UHF event. They used the group's call, G8PUB/P on 70 cm. Their best DX was OZ3TZ/A (EP01c) at 989 kms, other goodies being OZ2JE/P (EP73c), DC8JO/P (EK01b) and DC9EM (EN64g). G4FKI has been on FM up to now but hopes to have SSB *via* a transverter by January. G8BKR is very pleased with the October activity when he achieved his QSO no. 1000 on the band from the home QTH. During the contest, John worked F1ANH/P, F1EFS (AH10e), F1ELL/P and F6CJL/P. A Dutch station was heard but could not be raised. On Oct. 18, GU8FBO was the first Channel Is. contact. In Oct. 29 leg of the *Cumulatives*, John worked G2AMV, G3DY (Cams.), G8ART (Northants.) and G8GNE.

Graham Taylor, G8HVV (Dorset),

mentions SM1BSA (JR22e) as his best DX on Oct. 7. He reports listening to a big pile-up of Europeans working OH0NC/M at 2200 on the 12th. The Finn was quite a good signal but it was impossible to break through the hordes calling him. G3POI passed along the snippet that OZ1OF (EQ78b) worked UA3LBO

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G3JXN	26	66	88	180
G8GML	11	63	106	180
G8HVY	—	62	118	180
G3COJ	17	61	75	153
G8LEF	20	59	100	179
G2AXI	1	48	82	131
G8EOP	8	36	38	82
G4BAH	—	32	92	124
GD2HDZ	10	32	66	108
G3OHC	4	31	98	133
G4CMV	—	30	138	168
G8BKR	1	30	107	138
G8HHI	—	30	101	131
G8IWA	—	30	82	112
G4DKX	5	30	68	103
G4BWG	—	29	118	147
G8ATK	—	29	88	117
G8HUY	—	28	56	84
G8LHT	2	27	77	106
G3FIJ	—	27	62	89
GJ8KNV	—	26	76	102
G4ERX	1	26	67	94
I4EAT	—	25	217	242
GM4CXP	—	25	129	154
GJ8AAZ	1	24	67	92
G4GEE	—	24	50	74
G4FCD	—	22	89	111
GJ8ORH	—	22	82	104
G8GII	—	22	63	85
G4AEZ	2	22	57	81
G3XCS	—	21	111	132
G3BW	1	21	47	69
G8IFT	7	18	49	74
G18EWM	—	17	57	74
9H1CD	—	13	127	140
G8ITS	—	13	57	70
G3KPU	—	12	81	93

GM8NCM	—	12	78	90
GM4COK	—	9	106	115
G8MFJ	—	9	48	57
GD3YEO	—	8	59	67
G8KUC	—	7	60	67
G4FBK	—	5	82	87
G8KSP	—	2	72	74
G8LGL	—	1	73	74
G8KLN	—	1	62	63
G4GSA	—	1	48	49
G8JAH	—	1	35	36
G3POI	—	—	258	258
G3SEK	—	—	179	179
G3CHN	—	—	161	161
G3FPK	—	—	154	154
G4DEZ	—	—	142	142
9H1BT	—	—	138	138
G4AWU	—	—	90	90
G6UW	—	—	85	85
9H1C	—	—	83	83
G8JHX	—	—	80	80
G8JJR	—	—	79	79
G8KGF	—	—	76	76
G8KPL	—	—	74	74
G8KSS	—	—	74	74
G8JAG	—	—	72	72
G4GET	—	—	70	70
G4CIK	—	—	62	62
G4GCQ	—	—	61	61
G8JEF	—	—	58	58
GW4FJK	—	—	57	57
OZ9IY	—	—	53	53
G4EYL	—	—	41	41
G8JGK	—	—	37	37
G8JAJ	—	—	24	24
G8JKA	—	—	21	21
G8PRG	—	—	15	15

Starting Date January 1, 1975. No satellite or repeater QSO's. "Band of the Month" 70 cm.

(QO21h) on the 7th.

For GD2HDZ, the first three legs of the *Cumulatives* produced 43, 32 and 52 stations respectively, which was rather better than Arthur had expected from outlying GD. The Martlesham and Ipswich clubs also report excellent conditions for the UHF contest, their best DX on 70 cm. being DM2BYE at 901 kms.

Gigahertz Bands

In the 23 cm. section of the UHF Contest, the aforementioned HADRABS Contest Group, operated from XK30c, using the call sign G4ERX/P and their best DX was PA0HLM/P at 625 kms. PA0MAR/P and many south eastern G's were also worked. The Martlesham/Ipswich folk were among those who worked into Czechoslovakia in the contest and their best efforts was OK1AIY/P at 1002 kms. On 13 cms, they managed PA0NYM/P at 322 kms. On 23 cm. G8LEF worked another six squares in two days—Nov. 5 and 6—to bring his total to a very respectable 20. Pete's efforts have resulted in his getting signals across the difficult Pennines path into the Manchester area. He reports growing activity on 1296 MHz in the north of England, even to the extent of QRM during the UHF contest.

Overseas News

An item from a recent GB2RS broadcast mentioned that BBC Channel 1 TV sound on 41.5 MHz was received at S9 in Texas on Oct. 16. Those interested in crossband 6/10m. QSO's should monitor 50-40 MHz and transmit on 28.7 MHz.

Edgar Brockmann, DJ1SB, advises of the German New Year CW Contest on Jan. 1 from 1600-1900 GMT on 2m. CW. As in the June 24 event, there are three classes; A below 3.5 watts; B below 25 watts and C over 25 watts. Full details from Edmund Ramm, DK3UZ, Postfach 38, D-2358 Kaltenkirchen, German Federal Republic. This short contest is sponsored by the AGCW-DL. Edgar's report mentions DF2ZC's QSO's in the Sept. 29 *Ar* event when he worked G3FDW (ZN56h), G4CJG (ZO22g) and G13TLT (XO22e), plus a couple of SP's.

Deadlines

That's it for another month. Deadline for the January/February column, which will carry the final Three Band Annual placings, is February 1st; and your contributions for the March issue to arrive *a.s.a.p.* thereafter. Everything to:—"VHF Bands," SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. 73 de G3FPK.

AMATEUR RADIO— COMMUNICATION OR TECHNOLOGY, OR BOTH? PART VII

N. H. SEDGWICK, G8WV

SO far we have concentrated on the circuit and general Electronics' aspects of designing and making amateur radio equipment. Undoubtedly, though, the mechanical design and construction plays a big part in home-brew activity, and can deter good radio technologists from building their own gear through lack of interest in the craftsmanship required, or lack of knowledge of it; or quite often because the sight of the mechanical workshops with their machines at their place of work has persuaded them that sheet metalwork just is not possible without such aids.

Every sheet-metal part of the transmitter discussed in *Part VI* of this series was cut, bent, drilled and painted in the shack, and the only power tool used was a *Black & Decker* pistol drill with a chuck capable of taking up to a $\frac{3}{8}$ in. drill. The writer has a liking for the standard die-cast aluminium boxes to serve as chassis for electronic modules, because of their rigidity and the completeness of their screening when the base plates are fitted, but they are expensive and the home-constructor may prefer to buy ready-made aluminium chassis, which are available in a good variety of useful sizes. The writer has also tended to use thick aluminium front panels— $\frac{3}{8}$ in. or $\frac{1}{2}$ in. thick to provide mechanical rigidity to the assemblies—but 16 or 18 s.w.g. sheet aluminium can be made adequately rigid for front-panel service for most equipment by the bracing provided by the screening cover or box which finally contains the assemblies, and which is fixed to the front panel.

Cutting Sheet Metal

In workshop practice sheet metal is cut by a guillotine. In the amateur workshop thin tin-plate or aluminium can be cut with tinman's snips, but they always bend at the cut edge and this needs to be flattened. With thin aluminium the flattening process generally dimples or stretches the metal a little so that the finished job always looks rough. The alternative is to saw the metal with a hack-saw and file the sawn edge smooth. For cutting thin metal this way it is necessary to support it, and a couple of lengths of mild steel angle clamped either side of the metal about $\frac{1}{4}$ in. from the cutting mark in a vice will give adequate support (Fig. 1). The metal can again be held between the strips and dropped down to the cutting mark for filing, so that the filing is right down to the faces of the strips, ensuring that it is completely straight and that the measured dimension is maintained; the angle strips are also used for bending sheet metal in the shack, and can conveniently be about one foot long and 1in. or 1½in. across the flats. (Metal stockists who will sell small pieces of metal like this are frustratingly rare these days, however). Purchase of a light steel angle fencing stake at a garden centre will provide enough angle metal to make up a selection of cutting and bending

clamps. Although sheet metal of $\frac{1}{8}$ in. and more thickness does not need support when cutting with a hack-saw it is a good idea to use the angle metal clamps, as they make it much easier to cut and file accurately.

Drilling Small Holes

This can be done with a pistol drill capable of taking up to a $\frac{3}{8}$ in. drill in its chuck. Aluminium tends to "pick up" on twist drills and this may cause the hole to wander, so check that swarf is not clogging the drill tip. Hole positions should always be centre-punched and then initially drilled with a smaller diameter drill than the final size; de-burring of the hole edges may be done with a much larger drill twisted by hand with its tip engaged in the hole. Twist drills have been available hitherto from retail stockists in vulgar-fraction sizes, or number or letter drill sizes, though they are now being sold increasingly in millimetre sizes. The table in Fig. 2 shows comparable sizes for various small BA screw clearances and tappings; BA screws are also being superseded by metric threads and sizes, but most home-brewers obtain many BA screws from stripped-down surplus equipment, and will be using them for years to come. Common sizes are 0, 2, 4, 6 and 8 BA. (The Post Office telephone service seems to go in for the odd sizes!). Commonly used self-tapping screws are 4, 6, and 8 sizes, and these numbers have the same meaning as those describing wood screws, in respect of shank diameter before threading.

NOTE: We regret that owing to production difficulties, Figs. 1 and Figs. 3 to 6 (all photographs) cannot be shown until the next issue.

Larger Holes

Round holes for valveholders, small meters etc., can generally be punched in aluminium sheet and tinplate using *Q-Max* punches. These come in standard sizes, $\frac{1}{8}$ in. diameter for B7G valveholders, $\frac{1}{4}$ in. for B9A valveholders, and so on in small steps up to 1½in. diameter. The technique is to drill a hole in the metal to just clear the screw of the punch ($\frac{1}{8}$ in. for smaller punches and $\frac{1}{4}$ in. for larger ones) and then to force the punch through the metal into the die by tightening the screw joining them with a hexagonal socket wrench. Fig. 3 shows this being done using a 1in. diameter punch on 18 s.w.g. aluminium sheet. The punches are safe enough on 16 s.w.g. aluminium sheet, but the process becomes rather brute-forceful on thicker material.

To cut other round holes for which a punch is not available, or in metal too thick to take punching, some sort of circle cutter is required. A tank cutter in a carpenter's brace is the crudest method, and Fig. 4 shows a home-made cutter which uses a piece of $\frac{1}{4}$ in. square tool steel for the cutter and is powered by a pistol drill with a speed reducer attachment. This sort of thing will easily cut through a $\frac{1}{4}$ in. thick panel, but needs to be held truly perpendicular to the panel so that it cuts evenly round the whole circle. It is best to cut half the depth from each side of the panel.

For holes other than round ones, or for round holes too large for the cutter, use may be made of an *Abrafile* fitted with clips in a hack-saw frame. It will cut in any

direction the operator guides it, and the technique is to pass it through an $\frac{1}{8}$ in. hole drilled in the metal before clipping it into the frame: once taut in the frame it may be used to cut out any shape previously marked out on the panel. It is difficult to cut very accurately with an *Abrafile*, and the idea is to cut slightly small to allow filing to the line to take out the wiggles; Fig. 5 shows an *Abrafile* being used on a die-cast box lid. When buying clips for *Abrafiles*, try to get them with retaining springs, as those without are difficult to fit when one has the *Abrafile* through a small hole in a panel, and one seems to need three hands to do it.

Bending Sheet Metal

Fig. 6 shows a piece of sheet aluminium being bent between two pieces of mild-steel angle clamped in a bench vice and screwed together at the ends. A piece of $\frac{1}{2}$ in. thick steel is being used to push the panel over for a 90° bend, and afterwards the bend will be tapped flat and sharp with a light hammer.

Marking out sheet metal for bending it into a box of some kind, or a lid, requires patience. The marking on the panel should be made with a scribe to the inside measurements required and due allowance made for the fact that the thickness of the metal bent over will add to the overall dimension. If the bend is not sharp and has a distinct radius this will further increase the dimension beyond the mark, but shorten the length of the piece bent over; hammering the bend to sharpen it can beat the metal thinner and cause erratic inaccuracy along the length of the bend. The writer prefers not to mark out all bends on one piece of metal at the same time, but to do them one at a time so that each measurement is accurate from the actual bend rather than from where it ought to have been.

Sheet metal workers in industry using presses generally fine their adjustments by making trial bends on pieces of metal which go into the scrap box until the setting-up is just right. Amateurs cannot afford to waste metal like that for one-off production, and have to accept that they are unable to work more closely than to around $\frac{1}{32}$ in. accuracy, or possibly worse, according to their skill and patience; however, these small inaccuracies can be accepted with some fiddling and filing. It is best not to put more than two parallel bends on one length of sheet metal as errors will multiply; a piece of half-inch aluminium angle can be used to join two pieces of sheet metal at 90°, and can be adjusted to take out the errors in the overall dimension by the positioning of the screws. Screw holes can be slotted to allow adjustment by filing with a round Swiss file. The heavy piece of steel plate shown in use for bending (Fig. 6) is not the sort of thing that can be readily obtained, but a length of steel or aluminium angle with at least a 2 in. side, or a block of hardwood, will do the job.

Neutralising Tetrodes

Back to electronics . . .

When power type tetrodes (screen-grid valves) and

Screw size	CLEARANCE			TAPPING		
	Fractional	No	Metric	Fractional	No.	Metric
0 BA	1/4	B	6.0	-	11	4.9
2 BA	3/16	12	4.8	5/32	22	4.0
4 BA	5/32	26	3.7	-	33	2.85
6 BA	1/8	32	3.0	-	44	2.2
8 BA	3/32	42	2.35	-	51	1.7
Self tap						
8	11/64	17	4.4	9/64	29	3.5
6	9/64	26	3.7	-	32	3.0
4	1/8	32	3.0	3/32	42	2.35

Fig. 2 Table showing approx. size for holes to accommodate commonly used sizes of BA and s/tap screws.

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pentodes were first introduced there was joy because of the assumption that their very low anode-to-grid capacities compared with triodes would make neutralising unnecessary in RF service. This has been true enough in receiving applications where typical anode/grid capacities for receiving pentodes are:—EF93 = 0.0035 pF, 6AU6 = 0.0035 pF, 8D3 = 0.005 pF, EF89 = 0.002 pF.

However, the power tetrodes used for transmitting have the anode/grid capacities commensurate with their larger sizes, and typically:—5763 = 0.3 pF, 807 = 0.2 pF, 6146 = 0.24 pF, 829B = 0.12 pF (per section).

Thus, if one uses two 6146 valves in parallel for the PA, the feed-back path from anodes to grids is almost half a picofarad, and at 21 MHz has a capacitive reactance of only 15K, which is probably quite comparable with the dynamic resistance of the tuned grids circuit. Clearly, taking into account the high power amplification of such a stage, neutralisation will be necessary, but the difficulty is to adjust such a small capacity as is needed.

The method of tuning the anode circuit through resonance with anode voltage disconnected but grid drive applied, and watching the grid current meter whilst adjusting the neutralising capacitor until that meter shows minimum variation as the anode circuit passes through resonance (which is so successful with triode stages), is far too insensitive for tetrode stages with their much greater gain. The best way is to operate the stage with reduced anode and screen voltages and tune the anode circuit back and forth through resonance; the grid current will be seen to vary greatly with neither maximum or minimum coincident with the anode circuit resonance dip in current. The object is to get the grid current relatively steady as the anode circuit passes through resonance, and to ensure that what small variation remains (either peak or trough) coincides with anode circuit resonance. It is necessary to load the anode circuit with a resistive load (not the aerial!) whilst

carrying out the process, and to keep the anode and screen voltages low enough to prevent the stage from going into actual oscillation. As the anode tuning is swung through resonance in a given direction of capacitor rotation, it will be seen that the grid current moves either up or down: if the direction of grid current variation reverses after an adjustment of the neutralising, it means the adjustment has been taken too far and the stage has changed from under to over neutralisation, or *vice-versa*. Quite coarse adjustments can therefore be made initially, and more delicate ones as the variations of grid current become less violent.

The neutralising is generally carried out by adjusting the length and bending of a stout wire passing from the end of the grid coil (remote from the grid) *via* an insulator through the chassis and close to the valve anode; care must be taken to ensure that all the RF voltage picked up by the neutralising wire comes from the anode. If it is so placed that it also picks up RF from the other end of the tank coil this will be in anti-phase and confuse the adjustment of the neutralising. Neutralisation should hold good for all bands, and if the required setting changes from band to band it is often an indication of RF pick-up on the neutralising probe from elsewhere in the circuit than the valve anode.

Failure of the circuit to respond to the adjustment procedure and erratic and sudden changes of grid current, together with a 'dirty' note, is an indication of parasitic oscillation at VHF resulting from wiring inductance and stray capacity, to set up false resonance and probably oscillating in tuned-plate-tuned-grid mode. Low value stopper resistors in the grid leads as near the grid connection as possible should stop this by reducing the Q of the unwanted VHF tuned grid circuit, since the valve input capacity will provide the major C, and the resistors will be between the C and the L of the LC circuit. ($Q = 2\pi fL/R$, so the increase of R by, say, 33 ohms should have quite a dramatic effect on Q).

Tracking of Ganged Tuned Circuits

In a transmitting amplifier/exciter, ganging and tracking the low-level tuned stages should be quite straightforward since all the circuits tune the same frequency ranges, and if the inductances for each range are made identical it is only necessary to provide minimum capacity adjustment for each circuit to ensure correct tracking over the ranges. Hopefully, the stray capacity contributed by the wiring, coil self-capacity, and switch contacts will not vary much at all from one range to another, so the trimming capacitors can be across the ganged tuning capacitor sections and cover all ranges with the single trimmer per section. In fact, an adjustable capacitor may be tacked into the circuit and replaced by a fixed capacitor once the required value of capacity has been found; it is not essential to have adjusting cores in the coils if they have been carefully wound to be identical for each range. The method of setting the minimum capacity is as follows:

(a) Connect a signal source to the input of the exciter. In the case of the transmitter described in *Part VI*, this connection should be made to the EXTERNAL DRIVE socket, or to the signal grid of the pentagrid mixer, and the VFO should be unplugged. The exciter should be switched to EXTERNAL DRIVE to switch

off the HT to the internal crystal oscillator.

(b) An RF voltmeter should be connected to the amplifier output and the signal source level adjusted to give a discernible indication when the source is set to the highest frequency intended for the range under adjustment and the main gang is set to its minimum capacity.

(c) Each trimming capacitor should then be adjusted in turn for maximum signal output indication on the RF voltmeter.

(d) A check should be made that, with the gang set at maximum capacity and the signal source suitably adjusted in frequency, the trimmers are still at peak setting; if they are not it could be due to capacity variations between the gang sections or inductance variations between the coils.

If the coils do have adjusting cores proceed as follows:

(e) Adjust the cores to give peak output at the low frequency end of the range. The trimmer capacities should then be reset at the high frequency end of the range, and again the cores should be re-peaked at the low frequency end. The adjustments alternating between trimmer capacities at the high frequency end, and core settings at the low frequency end, should be repeated until both ends are found to be peaked and needing no further adjustment. Once the adjustment is correctly carried out on one range, the other ranges should only require the cores peaking at the low frequency ends, as the trimmer capacities settings should be common to all ranges.

It is preferable to make these adjustments with a separate signal source, rather than use the pentagrid as a mixer with the VFO involved, because of the probability of selecting the wrong frequency at the anode of the pentagrid. If only one frequency is available one cannot go wrong!

The Commonsense Approach to Amateur Radio

Many of the articles by gifted young graduates which are published in the name of Amateur Radio must leave mature professionals perplexed and if they are also of the amateur fraternity, worried about the impression such essays make upon their colleagues in the Radio Regulatory Departments of the Home Office and the rest of the world: Nature has limited the HF communications spectrum and man cannot extend it, so we must be disciplined in our use of it. Amateurs cannot expect the adjudicators of the frequency allocations to regard their claims or tenures with enthusiasm, or even with sympathy, if they are demonstrably not using their existing allocations for anything else than indulging personal vanity.

In April this year the official journal of the RSGB published an article entitled "A CMOS RTTY Modulator for New Tones," which gave encouraging reference to data transmission by amateurs at 600 and 1200 bauds. Now a teleprinter running at 50 bauds can pass messages at the rate of 66 average words per minute, which is faster than any of us can type on its keyboard: in terms of the teleprinter Murray code 600 bauds equates to 792 words per minute, and 1200 bauds to 1584 words per minute. Which amateur is ever going to find enough traffic to warrant equipping his station to handle such speeds, and more to the point, which amateur is going to equip his station to receive such a pile of waste paper from another amateur? At 1200 bauds transmission

speed an operator would get one hour of transmission time for every 52.8 hours of preparatory work at 30 words per minute. If we want to invent equipment capable of working at such speeds (which already exists commercially) why do we need a VHF radio circuit over which to test it when a pair of wires will do just as well? The data equipment is terminal apparatus to send and receive high speed telegraphy over a bearer circuit; but whether that bearer be wire, VHF radio, a carrier telephony channel, or what-have-you, is of no importance to the terminal equipment, provided its bandwidth parameter is suited.

Yet it is our own fraternity which is making us look silly by negotiating such facilities and rejoicing in the granting of them, when it is absolutely certain that only the tiniest fraction of licence holders will ever dream of using them, and those who do will be 'way-out' types too naïve to see the futility of it before becoming involved.

In the days of the 58 MHz (5 metres) band a real old-timer once came up in frequency shift Morse with about 5 kHz shift and no filtering, and wrecked the band for everyone else for some days without scoring any QSO's before his unpopularity got through to him. He explained that F1 was much more efficient than A1, not understanding that this is only true when related to machine read-out, and is completely wrong when an operator is reading the received signals, for he has to filter out the 'space' tone before he can read the Morse, and so effectively changes it back to A1.

An old radio-engineer colleague had a notice over his desk for his juniors to see. It read: "Make sure brain is engaged before operating mouth." What we say on the air can be heard by anybody who cares to listen, and we really should be careful not to show our ignorance of subjects we do not understand, for if amateur radio is to continue, its credibility as a worthy and useful hobby must be maintained.

Our hobby is our choice of recreation. Some people play games like chess, others go hunting, some go sailing, others like walking in the countryside. The common aspect of all such recreations is that the participants' skill and capabilities are pitted against obstacles to be overcome as they arise: the man who plays chess does not use a computer to decide his next move, the fox hunter does not open all gates in the likely path of the chase before starting, the sailing enthusiast does not install an engine in his boat, the countryside walker does not stay on the main roads. In our hobby we know jolly well that modern technology has made it easy to communicate long distances *via* repeaters or satellites, but is that the objective of the exercise? The messages we amateurs exchange with distant strangers over the air are pretty banal, considered in the cold light of social intercourse, and all that is achieved by such devices (which do the difficult bits for us) is to spread our banalities much further afield using skill little more significant than their actual utterance!

We have stopped making our own rigs and so eschewed our technological abilities; now we are removing the obstacles that we used to overcome by our operating skills. What is left of the hobby that fulfills the common requirement of all recreations by giving us individually something to achieve? Unlike most recreations, we exercise our's at the expense of commercial,

military, and professional needs for there is but one HF frequency spectrum and we have exclusive use of chunks of it. The pressure to take those chunks away from us has been on for years, and our case for their retention gets thinner all the time we posture as professionals and demand traffic capability for traffic we have not got. It is an old and very true saying in commercial telecommunications that "traffic is self-proliferating to fill all available channels," but this cannot apply to amateur telecommunications, for restriction on our traffic is by the terms of our licences.

In this series an attempt has been made to restore interest in making one's own rig—not by giving detailed instructions and blue-prints, but by explaining how to approach the decision-making necessary to achieve the best utilisation of what one already has available (or can readily and cheaply obtain), with the addition of some notes on how to carry out the necessary crafts within the limitations of the shack.

May the following precepts remain in your thoughts:

1. Don't be put off because you cannot make it look professional. The colour of the paint will not affect its functioning in any way!
2. Keep your feet firmly on the ground and don't get involved with gadgets or systems that have no practical application to amateur operation.
3. It makes good social sense to worry about your transmitter selectivity as well as that of your receiver: never use more bandwidth to your transmission than is strictly necessary to its intelligibility.
4. The true art of amateur radio communication is to use the modulation and demodulation systems best suited to interface with the operator's brain. Leave the machine print-out to the professionals, who have to do it because of the volume of their traffic: for an amateur it is sheer sacrifice of efficiency and money.
5. If you earn your living in any form of telecommunications work, remember that amateur radio is recreation, not work!

Concluded

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THE MONTH WITH THE CLUBS

By "Club Secretary"

FIRST MCC: because of the production delay with the October issue in which the notice of MCC should have appeared, it was decided that the contest would have to be dropped for this year. We also felt that, in any case, this may not be such an unpopular move as the interest in Top Band has dwindled considerably over the years. However, we may well be mistaken on this point as we have received many letters and phone calls from clubs and individuals all insisting that, come what may, MCC must go on and *remain on Top Band* at that.

The strength of the feeling was such that we would ask all Hon. Sec./club-scribes to let us know their point of view, so that we may have a better idea of how to set about a contest to please as many people/clubs as we can. But please don't ask us to miss a clash with this-or-that major contest—there just isn't any free weekend in the calendar. However, we'll do our best to avoid a clash with any major event.

The Letters

Our first note is a pleasure to read, in that it tells of the rebirth of a club, that appeared to have almost died, into vigorous new life. This one is at *Axe Vale*, where the revival can be observed at first hand on the second Thursday of each month at the St. John Ambulance Hall, Seaton, Devon; and we understand they also have an informal on the fourth Thursdays at a venue not specified. In addition there is a club net at noon each Sunday on 3685 kHz (give or take a bit for the QRM). Visitors or potential new members are more than welcome.

We turn now to *Milton Keynes*, who have December 11 booked at Loyal Hall, Newport Pagnell, for a lecture and demonstration on "Micro-Computers" by which terminology the members are put in suspense until the due date wondering whether that means the mini-computer as such or the more recent microprocessor. Either way, it should be an interesting and instructive evening.

At *Hereford*, we read that the Hon. Sec. has been chasing RSGB about the late arrival of "RadCom"—like every other user of the postal service, the RSGB can but dump all the copies into the post on the specified day and sit back and pray for enough patience to deal with all the enquiries about "lost" copies which will eventually turn up. It is fairly safe to say that pretty well any post that goes through London will not arrive as claimed in Post Office advertising. Our sympathies go to G3OUF trying to pacify the irate member who telephones Hq. because he knows other locals have got theirs, and the postal people outside the metropolitan areas who get a lot of 'stick' for things which happen in London. However, we digress; the gang have their Hq. at the Civil Defence Headquarters in Gaol Street, Hereford, on the first and third Friday of each month.

It seems an age since last we heard from *Horndean*, but a new Hon. Sec. brings us back into the picture.

They are to be found at Merchiston Hall Community Centre, London Road, Horndean on the second Thursday in each month; for December it is to be a Social Evening, with YL's and XYL's running the buffet and bar facilities. Sounds good!

On to *Chichester* who have December 5 and 31st; the first date is the club Project evening, and the second is set aside for the presentation of the Marcuse Trophy, which will occur sometime during the Christmas Party they are setting up for this evening. Room 34A in the Lancastrian Wing of the Chichester High School for Boys.

Reigate next, and the formal evening on December 19 is set aside for the Constructional Contest; this is the third Thursday in the month, and the informal date is the first Thursday—the latter in the Marquis of Granby in Redhill. For the venue of the main meeting we must refer you to the Hon. Sec.—see Panel.

Deadlines for "Clubs" for the next three months—

For January/February issue—February 1st

For March issue—February 13th

For April issue—February 23rd

Please be sure to note these dates!

We notice in the current issue of *WAMRAC Newsletter* that they have spread their wings somewhat; the group was originally formed to unite those of the Methodist persuasion, and retains the word Methodist in its full title as a mark of respect to its late founder; but now it welcomes any person, licensed or SWL, who is of any of the Christian denominations. Details from the Hon. Sec. at the address set out in the Panel. Incidentally, the group have a Conference Weekend most years, at which they have an AGM, and look to the future, as well as all the social activities—this attracted W5OP to attend from far-away Texas; a long walk and a long swim!

On to *Melton Mowbray* which, like most good clubs, have the odd evening set aside for something completely out of the ordinary. Theirs is on December 15, when G3WKM will be talking and showing slides of St. Kilda and the Outer Hebrides. The venue, as for so many years, is the St. John Ambulance Hall, Asfordby Hill, Melton Mowbray. St. Kilda, it may be recalled, is the most westerly bit of the U.K. some 25 miles west of the Outer Hebrides, and 90 miles or more further west than the Isles of Scilly.

Sutton & Cheam next; they have a place at Ray's Social Club in North Cheam and another at Sutton College of Liberal Arts, the general idea being to alternate them. However, we don't have to December details so we would refer you to the Hon. Sec.—see Panel—rather than risk getting any possible visitor or new member to the right place on the wrong evening (or t'other way about).

Our next stop is with the *Royal Navy*, and reading their *Newsletter* it is quite surprising how much personal contact there can be, apart from the RF ones. Membership is open to RN and ex-RN types, and an associate grade covers all sorts of others—they must have a WAC in members!

Cheltenham seem to travel on their merry way, with twice-monthly dates at the Old Bakery, Chester Walk, behind the Public Library, on the first Thursday and the Friday 15 days later. Unfortunately, the copy of the *Newsletter* we have here doesn't carry through as far as December, so we can't tell you what they'll be up to! If you really need to know, you can either contact the Hon. Sec.—see Panel—or go along and find out: we are game to bet a welcome.

The main event discussed in the current issue of **IRTS Region 1's** *Newsletter* is the EI/GI Convention at Ballymascanlon—the first one for many years. They have their more normal sessions at the Irish Wheelchair Association, Blackheath Avenue, Clontarf, and all the details can be obtained from the Hon. Sec.—see Panel.

Should you be acquainted with anyone who is either an invalid or blind, and interested in amateur radio, you should point them at the Hon. Sec. of **RAIBC** at the address in the Panel—and, while you are about it, you could do a lot worse than join as a supporter or representative!

A change of date and venue for **Verulam**: they are now based on the ex-Civil Defence Hall in the Chequers Street car park, St. Albans, where they will be on *December 21* for the AGM followed by Christmas festivities. For the record, the change is being made because the Market Hall has been closed for redevelopment, but is only a temporary one until a final venue has been settled. The informals are still at the R.A.F.A. Hq. on the second Thursday in each month—this is in Victoria Street.

One of the best *Newsletters* to come our way is that of the **G-QRP Club** albeit we think that there are so many overseas members that the 'G' should be dropped! The latest issue of their newsletter *Sprat* is entitled "Small Circuits Issue" with a picture showing W6PQZ who is now at 215 countries worked on QRP, with 200 confirmed; his station is all solar-powered, and with the power panels rotated he gets enough energy to drive the Ten-Tec Argonaut 509 from around 0630 to 1830 local time on the longer summer days. More details from G3RJV, at the address in the Secretaries Panel.

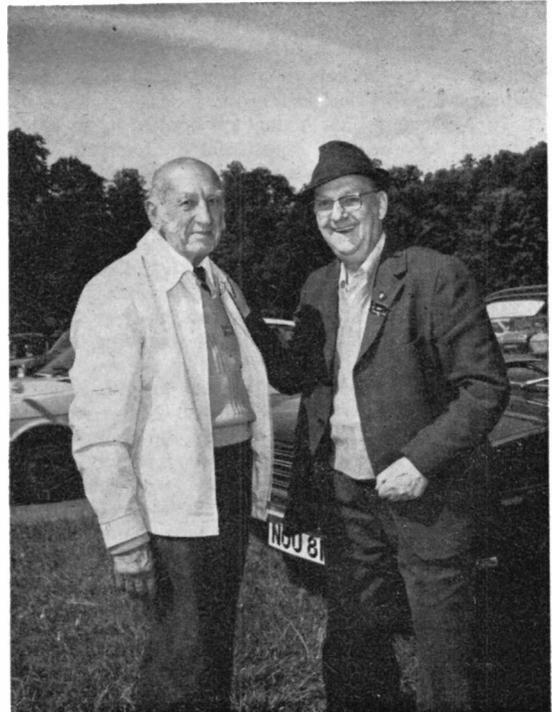
Peterborough nearly missed their mention, as it came connected with their report for *CDYN*. However, old 'KFE' does read his mail once in a while and as a result it came to hand; the place is the Scout Hut, Occupation Road, the time 7.30 on December 15, and the activity a Christmas Party.

Our next port of call is **Spalding**, where they seem to have been having changes in the committee. The usual routine seems to be to foregather at the Teachers Centre, Pinchbeck, on the first Friday in the month, but there are variations, and so we must refer you to the Hon. Sec. Incidentally, we were sad to hear that the new Hon. Treasurer elected in January died recently; he had only had the pleasure of his licence since March, and will be much missed.

BARTG caters for the enthusiast RTTY operator or "listener" and one would say membership is pretty well essential if one wants to get operational in this mode. Details from the Hon. Sec.—see Panel. We might add that other clubs wishing to have a talk on RTTY could do worse than to contact him also; if at all possible he



A hark back to summer: two of the many reunions at the Longleat Rally were, above (l. to r.), Sir Evan Nepean, G5YN, and Phil Revill, G3ZZR, who are both regulars on the RAFARS net on 80m.; shown below are (l. to r.) Leo Worboys, G3AFD, and Charlie Overton, G8IUF.



Names and Addresses of Club Secretaries reporting in this issue:

- ACTON, BRENTFORD & CHISWICK: W. G. Dyer, 188 Gunnersbury Avenue, Acton, London W3 8LB.
 A.R.M.S.: N. A. S. Fitch, G3FPK, 40 Eskdale Gardens, Purley, Surrey CR2 1EZ.
 AXE VALE: C. Jones, G4HHU, Wayside Studios, Chardstock, Axminster, Devon EX13 7BN. (*South Chard 376.*)
 B.A.R.T.G.: John P. G. Jones, GW31GG, Heywood, 40 Lower Quay Road, Hook, Haverfordwest, Dyfed.
 BOURNEMOUTH (Wessex): G. D. Cole, G4EMN, 3A Cavendish Road, Bournemouth (20027) BH1 1QX.
 BSC PORT TALBOT: R. Thomas, GW4BCD, 13 Northways, Porthcawl, Mid-Glam.
 CHELTENHAM: G. Gearing, G3JJG, 158 Leckhampton Road, Cheltenham (34287).
 CHICHESTER: T. M. Allen, G4ETU, 2 Hillside, West Stoke, Chichester PO18 9BL, West Sussex. (*West Ashling 463.*)
 CHILTERN: N. C. Ambridge, G4FRL, 53 The Avenue, Chinnor, Oxon. OX9 4PE.
 CRAWLEY: A. V. H. Davis, G3MGL, 41 Gainsborough Road, Crawley (20986), West Sussex RH10 5LD.
 CRAY VALLEY: P. J. Clark, G4FUG, 42 Shooters Hill Road, London SE3. (*01-838 3703.*)
 G-QRP CLUB: Rev. G. C. Dobbs, G3RJV, Willowdene, Central Avenue, Stapleford, Nottingham. (*Sandiacre 394790.*)
 HEREFORD: S. Jesson, G4CNY, 181 Kings Acre Road, Hereford (3237).
 HORNDEAN: V. C. Lear, G3TKN, 18 Alten Road, Waterlooville.
 IRTS (Region 1): J. Ryan, EI6DG, 23 Dollymount Grove, Clontarf, Dublin 3.
 MAIDSTONE YMCA: G. A. Hastie, 79 Rochester Crescent, Hoo, Rochester, Kent ME3 9JJ. (*Medway 251387.*)
 MELTON MOWBRAY: R. Winters, G3NVK, 32 Redwood Avenue, Melton Mowbray (3369), Leics. LE13 1TZ.
 MID-SUSSEX: R. Kingstone, G4HHB, 2 Tindal Close, Burgess Hill, Sussex RH15 0LB. (*044-46 45182.*)
 MILTON KEYNES: W. Backhouse, G8POU, 46 Tattenhoe Lane, Belchley, Milton Keynes (77479), Bucks.
 NORTHERN HEIGHTS: L. Cobb, G3UI, 27 Moorlands Crescent, Cousin Lane, Halifax (60574), West Yorks.
 NOTTINGHAM: M. C. Shaw, G4EKW, 50 White Road, Nottingham HG5 1JR.
 PETERBOROUGH: L. Critchley, G3EEL, 36 Waterloo Road, Peterborough.
 R.A.I.B.C.: Mrs. F. Woolley, G3LWY, 9 Rannoch Court, Adelaide Road, Surbiton KT6 4TE.
 REIGATE: F. H. Mundy, G3XSZ, Westview, rear of Manor Farm, off Reigate Road, Hookwood, Surrey. (*Horley 73878.*)
 ROYAL NAVY: FCRS M. Matthews, G3JFF, 127 Drift Road, Clanfield, Portsmouth, Hants. PO8 0LD.
 SOUTHDOWN: B. Chuter, G8CVV, 15 Coopers Hill, Willingdon, Eastbourne, East Sussex BN20 9JG.
 SPALDING: W. Martin, G3UWD, 46 Mill Drove, Bourne (2498), Lincs.
 SURREY: R. Howells, G4FFY, 7 Betchworth Close, Sutton, Surrey SM1 4NR. (*01-642 9871.*)
 SUTTON & CHEAM: J. Korndorffer, G2DMR, 19 Park Road, Banstead, Surrey. (*01-255 8729.*)
 THAMES VALLEY: R. J. Blasdell, G3ZNV, 92 Bridge Road, Chessington, Surrey KT9 2ET.
 VERULAM: B. Pickford, G4DUS, Netherwood, 130 The Drive, Rickmansworth (77616), Herts.
 WAMRAC: L. Colley, G3AGX, Micasa, 13 Ferry Road, Wawne, Hull, Yorks. HU7 5XU.
 WEST KENT: B. P. Castle, G4DYF, 6 Pinewood Avenue, Sevenoaks, Kent TN14 5AF. (*0732 36708.*)
 YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

will get one of the lads to come along to give a 'spiel' and maybe even a demonstration.

At Maidstone YMCA they are booked in on Friday evenings at the 'Y' Sportscentre, Melrose Close, Maidstone. However, we note that they have a Ladies Night on 8th, and a Pub Night on 22nd, so clearly it would be a good idea to contact the Hon. Sec. for the venue for these two evenings. Of the others, December 1 and 15 are for Beginners, and on 29th there is an Open Evening. And, we dare say, those "beginner" evenings can open the eyes of more advanced types too—the writer took an R.A.E. class for ten years and learned a bit more himself with each year!

A change of venue for Northern Heights who now meet every Tuesday at the British Sub-Aqua Club, Bradford branch, where they have the room to leave some gear, and to house their new repeater GB3WY. The existing programme is retained, with the weeks in between used for informal natter sessions.

On to Nottingham, where it is every Thursday at the Sherwood Community Centre. December 7 is a Forum, while 21st and 28th are both Activity Nights. This leaves December 14 for a debate when G3YUT will propose the motion "Two metres is a dilettante's band" and G8FRB will oppose the motion. We only hope no heads are broken!

An interesting title appears in the Acton, Brentford & Chiswick programme, when G4FVE will be talking about Electrical Phenomena in the Oil Industry. As usual, the place is Chiswick Trades and Social Club, 66 High Road, Chiswick, and the date December 19.

Its AGM for Southdown on December 4, at the

Chaseley Home, South Cliff, Eastbourne. Visitors or prospective members are always welcome.

B.S.C. Port Talbot Sports & Social Club is the club for anyone resident in that area, and they can be found at the Club at Margam every Thursday evening. We feel sure the Hon. Sec. would be pleased to give you any more details, and he assured us all are welcome.

An important subject comes up for a talk on December 5 at Thames Valley where G3KQR will talk about Individual Liberty and the Police. Giggs Hill Library is the place, and the Hon. Sec. tells us they are in that part of Thames Ditton on every first Tuesday of the month.

One of the most engaging letter writers to this column is the scribe for York, who obviously thoroughly enjoys all the activities they have, both at Hq. and elsewhere—at the latter they are dab hands and seem to have as many outside events as home ones. They can be found at the United Services Club, 61 Micklegate, York, on Fridays *except the third* in each month.

Back down South again, to West Kent, at their place in the Adult Education Centre, Monson Road, Tunbridge Wells. On December 8, they have a round of five-minute talks on various subjects by members; on December 12 they go over to the Drill Hall in Victoria Road, for the informal. Looking forward to January 5, there is a talk on Home Computers and Programming by a couple of PET owners.

It looks like the third Thursday for Mid-Sussex, and the venue, as ever, is Marle Place, Leylands Road, Burgess Hill.

On to the Cray Valley outfit, and their excellent *QUA*

newsletter. This time we notice ourselves being shot down by G6HD for our comments about SSB in the August "Month with The Clubs": some crossed-lines here in that Lyell was referring to the *publication* of their use of SSB by the Post Office, while we were thinking of some original experimental work at VLF, as reported in G. G. Blake's *History of Telegraphy* dated 1927—a work which has a very good description of the early amateur transatlantic effort by someone who was directly involved. However, we digress; the 'home' for this club is at Christchurch Centre, High Street, Eltham, S.E.9, and the first Thursday of each month is the date to reserve.

Bournemouth (Wessex) Hon. Sec. has a fair old load, with membership up to the 130 mark and still rising—but he hopes it stabilises there for the very good reason that any more would cause severe overcrowding of their excellent clubroom at the Dolphin Hotel, Holdenhurst Road, Bournemouth. In December there is *no meeting on December 1*, but on 7th they have an Auction and Equipment Sale, and by 15th they are back on programme with a Question and Answer Evening. If you have questions to put, please pass them to the Hon. Sec., at the new address shown in the Panel.

Next we find a couple of newsletters both printed in the same size and colour of paper—so alike that we almost failed to notice they came from different clubs! Taking them alphabetically, the first one is Chiltern,

and we note a change of Hq. venue to the canteen of John Hawkins' furniture factory in Victoria Street, off Oxford Road (A40), High Wycombe. The date given is December 27.

The other one came from Crawley where December 13 is the date to note, at Trinity United Reformed Church Hall, Ifield, for a 'Member's Evening'—which we guess means an informal Christmas natter session.

Surrey have a Christmas Party set down for December 6, to which all the family are invited—a free evening but if you can help by supplying something in the eatables line you will be doubly welcome!

The front page of the A.R.M.S. *Newsletter* carries a list of the recommended international mobile operating frequencies—as good a way as any of telling you the society caters for the interests of the amateur who is interested in mobile operation, whether at HF or VHF. Details from the Hon. Sec.—see Panel.

Finale

That's it for another year; and as good a point as any to wish all readers of this piece, and particularly those who go to the trouble of sending the reports, very best wishes for Christmas and the New Year. As for the deadline, look in the 'box' in the piece for the dates, and address it to "Club Secretary," *SHORT WAVE MAGAZINE*, 34 High Street, Welwyn, Herts. AL6 9EQ.



The new Model RF-2800 portable receiver from National Panasonic is "designed specifically for the radio amateur or DX enthusiast." Covering FM/MW/LW and SW from 3.9 MHz, the RF-2800 features an LED 5-digit readout, 2-speed tuning knob with band-spread dial, wide/narrow band selector switch, RF input gain control, variable BFO, external aerial connectors and mains/battery operation. Further information is obtainable from National Panasonic (UK) Ltd., Whitley Road, Slough, Berks.

AUDIO SPEECH AMPLIFIER AND CLIPPER

I. D. POOLE B.Sc (Eng.), G3YWX

WHEN the author decided to rebuild the speech amplifier of his transmitter into a diecast box, it was decided to incorporate several improvements into the original design which had been in use for some time. Owing to the fact that the aerial was very poor and there was little chance of improving it, the maximum use had to be made of the available power; obviously this had to be accomplished by the use of clipping and careful use of frequency response tailoring, both before and after clipping. Not, of course, that this would lead to maximum naturalness, but maximum intelligibility.

Design Parameters

It is generally accepted that RF clipping is superior to AF clipping but requires more sophisticated circuitry, as a single-sideband signal has to be generated with good carrier and unwanted sideband suppression before clipping takes place; this will inevitably make an RF clipper more expensive than an AF one. Anyhow, AF clipping can be made to give very acceptable results provided that attention is paid to the filtering to remove out of band distortion products. Also, if the bandwidth before clipping is limited so that only the required frequencies are clipped, then the distortion can be minimised.

The accepted bandwidth for communications purposes is taken to be 300 Hz to 3 kHz. In fact the lower frequencies contribute very little to the intelligibility of the signal, tending only to add to the naturalness; accordingly it was decided to raise this somewhat, though staggering the breakpoints of the several RC networks used to control the low frequency response. This would mean that the fall off would not be so steep above 300 Hz as below it. The high frequencies were filtered before clipping in order to reduce any intermodulation distortion they may introduce, and to generally limit the overall high frequency response.

As the actual process of clipping introduces both harmonic and intermodulation distortion, the products which lie outside the permitted audio bandwidth have to be removed; this is done by using a low pass filter with a cut-off frequency of less than 3 kHz.

Owing to the fact that 2-metre repeater operation was envisaged, provision for a tone burst circuit was added. The tone was mixed with the speech after the clipper, because no advantage was gained by clipping it. Accordingly it was decided to make the post-clipping amplifier into a virtual earth mixer for this purpose; the feedback around this stage would also be used to contribute to the removal of the unwanted high frequencies.

Circuit Description

As the speech amplifier was likely to be used from a non-stabilised supply, ZD1 and R18 are used to stabilise the supply to 14 volts. (In actual fact ZD1 consists of two 400mW diodes, one 10v. and the other 3.9v.: however any combination giving around this voltage is quite acceptable).

The input stage consisting of TR1 and TR2 was chosen because it gave a reasonable and defined amount of gain, whilst maintaining a fairly high input impedance. The actual value of the mid-band gain is ten, and this is

Table of Values

Fig. 1

C1 = 0.047 μ F	R1 = 33K
C2 = 1 nF	R2 = 82K
C3, C5,	R3, R4 = 4K7
C6, C9,	R5 = 470 ohm
C10, C12,	R6 = 8K2
C14 = 10 μ F	R7,
C4 = 0.01 μ F	R8 = 47K
C7 = 0.22 μ F	R9, R14,
C8 = 330 pF	R15 = 100K
C11 = 0.047 μ F	R10 = 150K
C13 = 3 nF	R11, R17 = 1K
D1, D2 = 1N914, or equiv.	R12, R13 = 1K2
IC1,	R16 = 15K
IC2 = 741	R18 = 150 ohm
TR1,	R19 = 5K <i>see text</i>
TR3 = BC107	VR1 = 5K
TR2 = BC177	ZD1 = 14v.

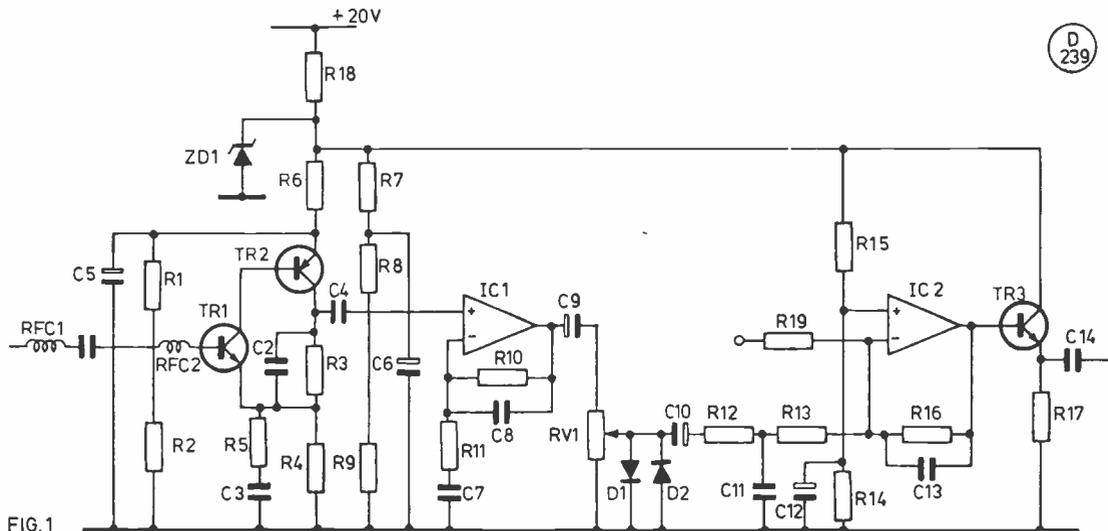


FIG. 1

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caused to roll-off at low frequencies by C3, and at high frequencies by C2. The RF chokes have been included to prevent any RF feedback that may occur, especially if the aerial is fairly near the microphone; they consist of three turns of enamelled wire on a ferrite bead. The supply for this stage is well smoothed by R6 and C5 because any ripple on the supply line at this stage will be amplified through the whole system and be quite significant at the output.

C4 couples the input stage to the following one, which is a 741 operational amplifier in a non-inverting configuration. The input is set at half the supply voltage by the resistors R7, R8, R9 with C6 serving to decouple the input from any hum which may have appeared there from the supply. The gain of this stage is set by R10 and R11, with C8 giving high frequency roll-off and C2 low frequency roll-off.

The amount of pre-clipping gain is adjusted by VR1, and it is most likely that this will have to be used to reduce the gain to avoid excessive clipping; D1 and D2 provide the clipping. Having been clipped, the signal is immediately filtered by the network consisting of R12, R13 and C11 to remove out-of-band harmonics. The output from this filter is then fed into the inverting input of IC2 (which is in the inverting configuration); this means that the inverting input is virtually at earth potential for the audio, and accordingly makes an ideal mixer. Therefore, if a tone burst is required it should be connected to this terminal, remembering that the gain of this stage is R_f/R_i , where R_f is the feedback resistor (in this case 15K Ω), and R_i is the input resistor which will have to be added to reduce the gain for the tone burst; C13 provides high frequency attenuation to still further remove out-of-band distortion products from the clipper, and any from the tone burst.

Owing to the fact that the feedback in an inverting

amplifier, such as the one used here, tends to increase output impedance, an emitter follower is included to overcome this. This will enable the amplifier to drive into lower impedances. The output from this stage is around 12 volts peak-to-peak but this could, of course, be reduced if necessary by using a potentiometer. In the author's case a valve reactance modulator was to be driven and the output was stepped up by a transformer.

Construction and Setting Up

The author's unit was constructed on 0.1 inch plain matrix board using pin and wire techniques, but more or less any method could be used. The layout is not critical as the circuit is only operating at audio frequencies. It is, however, wise to keep the output away from the input in view of the very high gain. The original unit was enclosed in a diecast box to give good screening from any RF which could be picked up and rectified, giving rise to instability.

It should also be noted that the microphone lead should be kept well away from any source of hum because clipping by raising the average signal level will make any hum more noticeable. Also care should be taken in construction to avoid any earth loops which could give rise to hum.

In view of the large amount of pre-clipping gain, care should be taken not to advance the gain too far. If reports of an unduly harsh signal are received, then the gain should be reduced using VR1 or by speaking further away from the microphone.

Conclusion

The circuit as shown here has been in use for several months and has given a very useful increase in talk power for a comparatively low cost. The clipper was designed to use cheap and easily available components and to avoid unnecessary frills which would be of little use; it is hoped that this has been achieved.

CW SAGA

OR THE REMORSELESS STRUGGLE

MICHAEL RHODES, G4FMS

FROM pre-amp to power supply, from tuning fork to telephone exchange, from digital clock to battery charger—a veritable pleasure of projects. But now, amateur radio suddenly offered more possibilities than everything else put together. Why hadn't I thought of it before? What was it all about?

Spurred on by a floundering effort to create a radio model control system, which had started out on the wrong foot by making the erroneous assumption that it would be reasonable, not to mention legal, to transmit 2 MHz pulses on a 27 MHz carrier, the search for knowledge was now on. A lightning decision, precipitated by an impending ruinous Budget, led to the securing of a general coverage receiver only days before the VAT exploded. The set was hastily installed at the bedside and I took to my bed and eavesdropped on the world.

After a brief flirtation with the short wave broadcast bands, I discovered "Rag-chewing" from Warrington and his friends on 80 metres early one Saturday morning. Here at last were real people on the air. But what were

those "bleeps" a bit further down? Were there real people behind them too? The "bleeps" became more fascinating—or was it irritating?—and it was about this time that my faithful "G3" friend was prevailed upon to copy out the Morse code for me, since, surprisingly enough, I could find no literature to hand which revealed the truth about the cypher.

Thus began the CW Saga. Immediately my two daughters latched on to the code and were sending secret messages in hand written Morse. It soon became obvious that a practice oscillator was required, so one was quickly lashed up using an old micro-switch, some salvaged transistors and a disused loudspeaker. Now, with this device connected to a cheap cassette recorder, I could spend happy hours encoding and decoding the works of Aristotle and Shakespeare at will. But, what were those "bleeps" on the band saying? At first the only thing I could decipher were the occasional "73's." My "G3" friend came to the rescue, pointing me towards the RSGB slow Morse practice timetable and with renewed enthusiasm tuned to the specified spot on the dial.

Up till now most of my listening had been on the general coverage receiver which, though excellent for listening to speech, was not ideal for CW since the bandwidth was such that usually around four different transmissions could be heard at the same time. This did present

some strain not only on the ear, but also on relationships with the XYL who was becoming increasingly aware of the strange hold that midnight Morse had taken on her spouse.

The rather premature opportunity to purchase a proprietary transceiver now presented itself and after due perusal of the pamphlets, the pin was pricked, an epistle posted and a parcel appeared. This superior piece of apparatus made possible more precise location of the spot on the dial. (It was some time later that I discovered one of the bands was not working which accounted for some of the spots being silently illusive). It still had the "quadraphonic" problem on CW so I was forced into fitting an optional extra CW filter which effected the cure. At last I could listen in comfort and decipher to distraction.

My "G8" friend now came into the picture. He had a set of Morse instruction tapes he was willing to loan. These were intended to work up reading speeds from about 5 to 20 words per minute and finished off with a simulated Post Office test at 12 w.p.m. They also had an endearing dead-pan comment of his near the end, introducing the top speed of 20 w.p.m. "... if you should wish to go that little bit faster." Armed with all these facilities and with remorseless intent to concentrate for at least half an hour a day, it could surely not take very long. After all, the ads. said a few weeks!

In the meantime of course one or two little diversions occurred. I had decided to go in for the R.A.E. (after all I had a half useless transceiver lying around) and a move of QTH was forced upon us. Imagine the difficulties involved in transferring the debris of umpteen finished and part-finished projects with all their associated impedimenta—too much to contemplate I thought. Morse was suspended, the QTH moved and the R.A.E. taken.

When the dust settled, out came the key again and the half hour every evening. But, when the R.A.E. pass certificate came, the strain became too much. I could just about read 8 words per minute if I'd slept well the night before and the wind was blowing in the right direction. Should I cut my losses, sell the HF transceiver, buy a 2-metre rig and settle for a "G8"? The decision was difficult. I opted to steer a middle course: stake my last dollar on a 2-metre transverter just in case I didn't make it and continue with the struggle. All other projects were temporarily abandoned and the lone path pursued.

The long summer passed, the 2-metre antenna lingered through a prolonged period of erection on the highest chimney like some visible symbol of impending failure. It was September. The CW rate was almost 12 words per minute. One final effort—it was now or never.

The local test centre didn't have sufficient applications to justify the tests being held there so, forgoing my familiar haunts, I was off to that "maritime metropolis" for the day. Having found the test-centre building I walked down to the docks and stared across the water to await the evil hour. With a few minutes to spare, I arrived back at the centre only to find that it wasn't the right place and that I should have been at another building a few hundred yards away. Now with only seconds to spare, I knocked at the door and was surprised to be greeted by name. I was welcomed into the office where

the only other candidate had already arrived.

There was a large desk with a well-established looking brass telegraph key mounted on a board at one side of it. The key was loosely connected to a large piece of ancient looking valve gear and thence to a pair of headphones lying at the centre of the desk. It gave the impression of having been connected up experimentally in the early days of wireless and of being there ever since. My fellow candidate and I were invited to a seat and presented with some printed forms—no, nothing to fill in—these were just left overs from some over-enthusiastic bureaucratic system and to be used to write down our decoded message! "Can you hear the tone on the headphones all right?" These were still on the desk since there was only the one pair for the two of us! "I will give you a trial and then we'll do the test itself. I'll start after CT. Are you ready?"

So far, so good; beautifully rhythmic Morse—he must have been doing this for years. But, after the trial, the test proper. Just 4½ minutes into which 12 months of harassing-half-hours had to be compressed. How could 200 hours work be successfully demonstrated in a few minutes?—"I'll start after CT."

The letters loosed; the pencil pulsed. Look out! I've missed one—and there goes another. Two errors in one word—skip to the next. Why is the pencil jumping uncontrollably? Can I aim it straight enough to write the next word? He stops sending. We're half way through. Now for the numbers—no problem there if you can count.

"We'll do the next part separately . . . if you would care to wait in the next room?" At last, this is my chance to sooth shattered nerves and steady my shaking hand before the sending test. Never had any problem with sending—but oh for a cup of tea! The minutes pass. The other candidate waves me in—he's done all right—seems absolutely confident. "All the best! See you on the band," he says and disappears down the corridor.

"Just try the key, get the feel of it, then when you're ready . . ." "Ready now." Off we go—plain words—OK so far. Whoops—missed that letter; repeat—whoops missed again. How many repeats am I allowed? Numbers now—they should be OK if I can stop my hand dithering and my teeth chattering! The mental effort is exhausting. Must be half way through now; oh dear—too many dots—try again. Oh! Wrong again! It's my last chance now—no more errors allowed. I pound away using a desperate amount of effort for each movement so that the key won't make a fatal bounce. How much longer? I must have done more than 1½ minutes by now. What if he never says stop? I am filled with a powerful hate and am confident I can continue till midnight when I shall finally collapse. On my grave stone they will carve the epitaph "He found the key to heaven."

"Right, you can stop now. Just wanted to make sure you'd recovered all right." It was two hours later before I had recovered all right even after a friendly nod that implied that I was expected to pass. It was nearly 12 months later that I managed to stagger through my first CW QSO and even then I still had the feeling I might have to go on pounding till the Pearly Gates opened. •

THE MAINS

A DISCUSSION ON THE FORGOTTEN FACTOR

ONE of the most neglected parts of our stations generally is the *public mains* supply; we are told it is 240 volts 50 Hz, and most of us go happily through life assuming it to be just that. However, in the practical case, all sorts of interesting things can and do happen, and if you have a pen recorder capable of responding to fairly quick changes, or alternatively have time to sit in front of an oscilloscope looking at the mains for a few hours, you will in most cases get quite a surprise.

Essentially, the disturbances may be divided up into three main classes, namely pick-up, momentary over-voltage transients, and interruptions of greater or lesser length; and to this collection we can add *regulation*, which we may define for all practical purposes as the stability of the mains voltage disregarding the three problems already mentioned.

Let us then firstly look at the problem of pick-up. This, as it's name implies, is the result of using the mains wiring as an aerial unintentionally; the power coming to the house may travel part of the way overhead in many districts; and in most cases there is a fair amount of rubbish generated in the house by way of the operation of electric drills, motors and what-have-you, which can be radiated by the mains acting as a transmitting aerial; and if we fit a suppressor to the plug-point, thus stopping the QRM from going further down the lead we will almost certainly be able to demonstrate that the mains wiring is just as capable of acting as a receiving aerial. It is an interesting thing to note about this type of mains-borne QRM that it is very often asymmetric—in other words it will be found to be going in the same direction on both legs of the mains, unlike the 50 Hz which one regards as coming in down one leg and back down the other. Sometimes this type of garbage on the mains is home-brewed, in which case the cure is either to use the conventional mains filter of Fig. 1, or to wind the mains lead a few turns round a ferrite ring, as is done with the TV set aerial. If the mains filter is used, the capacitors should be at least 1000-volt DC rating, or 250-volt AC rating; and the unit must be made with safety as the prime consideration in construction. If, however, the mains is picking up the garbage before it gets into the house (which is often the case), then you either have to trace it to source and ask the offender's owner to rectify it, or you have to live with it; once this sort of thing has got on to the mains you are in problems, so essentially it must be treated at source if it is local, or treated by a filter in the mains lead to the station if it is just RF picked up by the overhead-wire mains acting as a receiving aerial, and safely taken down to ground.

Our second case is that of the momentary over-volt transient. On a 'scope this may be seen to rise to 1000 volts or more on occasion, in the form of a "spike"—and if it happens to be one of the brief variety lasting a micro-second or less, then the *rate of change* is going to be megavolts per second; and that sort of rate of change has energy well up into the VHF range.

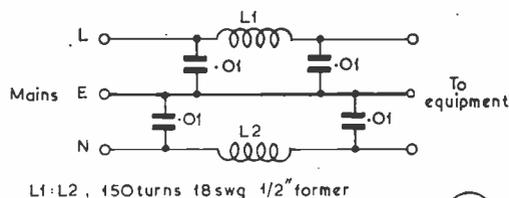


Fig. 1 Mains filter

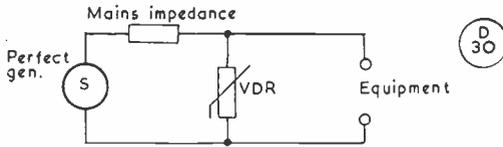
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This in its turn says that the normal sort of paper or foil capacitor which has a series resonance of less than 30 MHz will look to the spike like an inductance, and so the spike will pass merrily on its way without obliging by going down the capacitance to ground which we have so carefully provided in an earlier paragraph.

This sort of transient usually occurs when someone else switches a load on or off, or when the sub-station "does its thing" and it must be recalled that there will be umpteen different users on "your" mains—hospitals, factories, shops, do-it-yourself fiends, dishwashers, freezers, thermostat-controlled heating, and whatever. You just *can't* deal with all of these at source; there are too many of them. One possible avenue of attack is to use a voltage-dependent resistor (VDR) or a transient-suppressor diode. Silicon carbide, Titanium oxide, and Zinc oxide are all used in VDRs; and the relationship between the current and the voltage for an ideal VDR is given by:

$V = C I^B$ where B (beta) is the "non-linearity index" and C is the voltage across the VDR when it is passing a current of one ampere. Clearly for a linear resistor beta is 1; for silicon carbide it is around 0.2, for Titanium oxide 0.15, for zinc oxide 0.035, and for a transient suppressor diode about 0.01. Silicon carbide types can be used on voltages from 10 up to 25 kV and are mainly used in applications requiring continuous power dissipation; titanium oxide types are used on lower voltages for noise suppression and contact arc suppression. Transient suppressor diodes are essentially voltage regulator diodes designed for this particular application, and they must be connected back-to-back for AC mains applications; reference to the data sheet will give the "stand-off voltage" and if the devices are being used on the mains, there should be several in series so that the cumulative stand-off voltage is slightly higher than the nominal value of the *crest* of the supply voltage. Zinc oxide types are meant to be used in roles where they suffer intermittent dissipation, such as we are interested in, and they have voltage ratings very suitable for our purposes.

How do they work in the circuit? If you imagine the mains supply as a perfect generator in series with a source impedance, then when we connect, say, our power-pack to the mains, with a VDR between the mains terminals, as at Fig. 2, then we have a voltage divider comprising the source impedance and the VDR in series, with the load tapped across the lower leg of the divider. Normally the VDR is selected to draw a current of less than one milliamp, and so its effect on the circuit normally is all but non-existent. However, when a surge comes along, the resistance falls rapidly, and so the effective tapping point of the voltage divider also falls, which results in a reduction of the effective magnitude of the



VDR - Mullard Type 2322-594-13912 for 240v mains

Fig.2 The VDR

transient seen by the equipment. The only snag to all this is that the effect is a function of the course impedance of the mains supply, and this must be guessed at—indeed the difference between the figures given by CENELEC and ERA vary by a factor of about twenty! However, a 245 volt VDR will give a maximum of between 750 and 900 volts across the equipment when a mains spike of 2000 volts and 10 micro seconds duration comes down the mains supply, depending on whether the CENELEC or the ERA figure is taken, and assuming the disturbance is sourced some distance away. If, on the other hand, the disturbance is very close, then the source impedance will be negligible and so the total voltage across the equipment input terminals will probably stay below 700 volts even if the fuse blows.

The Origin of Transients

These can, broadly, be separated into those coming from elsewhere, and those generated in the equipment. Looking first at the "outside" ones, likely causes may be, for example, lightning strikes on power distribution lines, switching off inductive loads, or switching on capacitive loads. Voltages as high as 1 kV may be seen, superimposed on the mains voltage proper, and having widths of the odd micro-second up to some tens of micro-seconds. In a domestic case, blowing of a 20A fuse has been shown to be able to cause a transient of 30 micro-seconds at a voltage of over 1000 volts. Pulses of up to 200 volts may occur as often as 1000 times in 24 hours typically, with as many as 200 more in the range 200-300, 5 between 300 and 400, and less than one over 400 in the same 24 hour period; these figures cover the typical shack environment. As for the "inside" ones, we can look at things like the switching of relay coils, pumps, transformer primary windings blowers and whatever. Anything, in fact, that is in the house and its immediate surroundings. The prime thing to remember about these is that the amplitude can be very high indeed. A normal 48-volt relay would have a resistance of 1000 ohms, and (let us say) an inductance of 1 Henry. When the relay is made, the current in the coil is 48mA. There is energy stored in the magnetic field, and when we open the switch so the relay can drop out, the energy is transferred out of the inductor and into the capacitor. What capacitor you may well enquire—the stray capacity in the wiring and the coil we answer. Let us say it is 100 pF.

$$\text{Then: } \frac{I^2 L}{2} = \frac{C V^2}{2} \text{ from our R.A.E. class}$$

days, which we can then transpose to find the value of V:

$$V = I \sqrt{\frac{L}{C}}$$

Putting in our numbers, we get

$$V = 48 \times 10^{-3} \sqrt{(1/10^{-10})}$$

Whence $V = 4800$, to which we must add the original 48 volts, so our peak voltage when the relay drops out will be 4848 volts! On the other hand, it is not unreasonable to assume that we can deal with, at least, the items in the house and shack. Besides the devices so far mentioned, relays can be treated either by shunting with a diode, which will usually make the relay much happier, particularly when used with transistors, or the old-fashioned resistor and capacitor in series, all placed across the relay coil, and fiddled with until one reaches values for R and C which give no visible sparking at the switch contacts.

Drop-outs

These are not so common, but they still have their nasty tricks to play on the unwary. A constant-voltage transformer in the supply line will, if running within its ratings, not only handle a variation of plus-or-minus 15% in the mains about the nominal figure, but will also "swallow" a drop-out of up to one complete cycle—but before you reach for your cheque-books, remember that for a 240v. 50 Hz 5A one will set you back a couple of hundred pounds plus VAT! One should also realise that constant-voltage transformers are essentially an application of the resonant circuit just like our ATU—and like an ATU they work best when they are correctly tuned. In this case, it means that a 50Hz CVT will only work over a range of 1 Hz i.e. between 49 and 51 Hz—so if you are on a ship with a /MM ticket, you have to find out the frequency of the ship's supplies, and the frequency of the shore supplies at every port visited, or else you carry two CVT's, one for each frequency! This last is all the more annoying, as anyone will tell you who has ever lived aboard a ship for long, in that it is precisely when you are tacked to shore supplies that the mains voltage bounces about most. When you read, for instance, the Royal Navy advertisement which says that a modern ship has enough generating capacity aboard to cope with a town of 5000 inhabitants, it doesn't take much imagination to realise what happens when the ship is hanging on the end of a long, long cable and people start running-up all sorts of gear and changing the load from moment to moment.

Longer drop-outs than one cycle, or about 20 milliseconds, are not often given consideration, but they can have their own problems. Consider the chap with a valve rig using semiconductor rectifier diodes. The mains goes, for, say, a second or so. All the PSU capacitors discharge through the valves to ground, but the valve heaters are still hot and the valves can conduct even though there is no HT for them because of the thermal inertia of the heaters. When the mains comes back on, the PSU diodes are now trying to charge the smoothing capacitors and carry the load into the bargain; the diodes may give up under such treatment, and even if they don't it is highly unlikely that the voltage-regulator tube for the VFO will "strike" again, which means the VFO will wander all over the place.

Summary

Essentially, disturbance on the mains needs to be suppressed at source if it is possible; anything that can cause a spark will result in radiation of RF which needs to be "kept at home" by the use of mains filters as

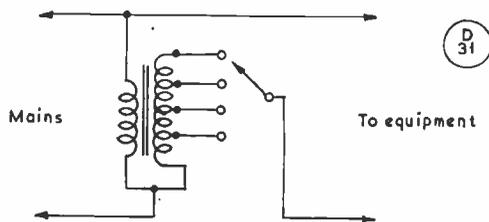
discussed in the Handbooks. In addition, disturbances on the mains may be in a form which can damage equipment, either by over-voltage or over-current. The preferred method of dealing with over-voltage situations is to use a voltage-dependent resistor across the primary of the input transformer of the shack equipment, to use CDR's similarly across relays which may have high voltage-generating ability when they drop out. Drop-outs in the mains voltage, if of short duration, can be dealt with in the home-station environment by use of a constant-voltage transformer, while longer drop-outs should be dealt with by arranging that the equipment is disconnected from the mains for long enough for everything to return to the cold condition (for valves this may take several minutes) before any attempt is made to activate the equipment.

Selection of a VDR

A VDR should be selected such that under normal conditions it is carrying only a tiny current; for example, a VDR connected across the primary of the station PSU would be selected so that it is carrying about one mA under normal conditions. To do this, allow for say 10% over-voltage as being not worth worrying about. This gives us 264 volts RMS, or a peak voltage of 373 volts. Select a VDR which is taking less than one mA at this voltage and is dissipating less than the limit specified by the maker under these conditions. It will then "catch" and absorb any over-voltage transients or over-current ones, to a degree which is dependent on the impedance of the particular mains supply but is always worth while.

Regulation

It may be that your household power mains supply tends to wander about rather more than it ought to, at predictable times, dropping away a bit at peak load times and maybe in the evening also. If this is the case, and you don't want to go to the bother of a CVT and its attendant expense, then you can either use a Variac,



Note: Secondary must be capable of carrying full mains current required by the equipment.

Fig. 3

which in effect is an autotransformer with an adjustable tapping point, so that from a 240 volt supply you can adjust the volts on the other side between 0 and 270 volts or so by cranking the handle. Obviously you need a metering arrangement of some sort as well.

A simpler "poor man's regulator" is shown at Fig. 3. In this one we use, in addition to the normal PSU transformers, an additional one, having a secondary tapped between, say, six and twenty volts. The two primaries (the load transformers and the regulator transformer) are effectively in parallel, but with the secondary of T2 also connected so that the output at the equipment terminals is greater than the mains input by the desired amount; by reversing the phase of the secondary, you can use the same arrangement to reduce a high mains voltage.

Conclusions

Even the best of mains supplies can be naughty at times; we have shown some of the reasons why and some of the possible solutions. The information was garnered as a result of an "investigation into what went wrong," and hence much is lifted almost directly from the data sheets of various manufacturers and various texts on the subject.

A STORY WITH A DIFFERENCE

DOUGLAS H. JOHNSON, G6DW

THIS is a true account of an event which occurred recently. Station G6DW commenced operation in 1923, so has been in existence for 55 years if we include the last war period. Contacts with Australia and New Zealand still occur almost daily and over the years most countries have been worked. A few weeks ago two contacts each day took place between G6DW and a friend GM4FPP/A who was staying at his holiday home in the island of Coll off the West coast of Scotland; one contact was at 6 p.m. and the other at 10 p.m. daily. Shortly before one of the 10 p.m. skeds the equipment was switched on and there was a wonderfully noisy and very spectacular display of fireworks inside the transmitter power supply, which was a separate unit in a perforated case on the floor at the end of a table in my shack.

Upon investigation it was found that the bowl con-

taining the sweet course of my evening meal had fallen off the end of the table and spilt its contents on to the power supply unit below. The sweet course consisted of a liberal helping of chocolate mousse which had, needless to say, penetrated the perforated cover of the power supply unit, which it had consequently entered.

Much time was then spent upon opening and cleaning out the power supply unit which was then dried and all eventually appeared to be satisfactory although one sked had been lost. The following day this story was of course recounted to GM4FPP/A to explain my absence the previous night. GM4FPP/A replied to my satisfaction that the signals were better than ever.

Moral: if a power supply unit does not appear to be working well as it should, try soaking it in chocolate mousse.

Although G6DW may have existed for 55 years, I can certainly assure readers that nothing like this has ever happened before and indeed this may be a record!

A MAINS INVERTER

240 VOLTS AC AT 50 HZ, FROM 12 VOLTS DC. IMPROVISED 'MAINS' SUPPLY FROM A CAR BATTERY — NO SPECIAL TRANSFORMER REQUIRED

At the time of writing, we are hearing noises about industrial action from quarters which may well have the effect of imposing power cuts upon us again. In view of this, some method by which 240 volts AC power could be generated would clearly be useful; not necessarily as the prime source, but to be at least available whenever a light-switch is put on, so one can find a way about—the prime lighting and heating, and indeed cookery, requirements already being amply covered by *Camping Gaz* appliances.

Many amateurs still have around them transformers which can be rescued from the junk-box which have several heater windings available; more up-to-date types will no doubt have some stabilised power supplies which can be stripped-out for the emergency. The prime requirement is that it must have a mains primary winding plus a goodly selection of secondaries which can be used or, at a pinch, stripped off and replaced by a different winding. Initially one requires to know how many volt-amps can be expected from the unit once built. If one takes the secondary windings and notes the watts available from each winding, then the total watts which can be drawn without saturating the core will be known; if you can't read the markings or there aren't any, then make an educated guess by weighing the thing—a 90 watt (or more correctly, volt-amp) transformer for 50 Hz weighs about 2.5Kg. and would be around the four-inch cube mark for size.

If the transformer seems to be a serious contender, the next move is to connect the station test-meter to each of the secondary lead-outs in turn to each other one, using the ohms range, so as to sort out which is which, noting them all down as you go. You may find that you have to do this to *all* the windings, including the mains primary if it has come from the depths of the junk-box, but if it is from a piece of equipment it should be easy enough to identify the mains windings; anyway, you need to end up with a note of all the windings, either by their colour coding or by masking-tape stuck to them, tying knots or whatever. Make a civilised sort of connection to the mains winding (this will most likely have several taps close together at one end and a higher resistance to the other end) and switch the mains on; you can now switch the meter to 'volts AC,' on the highest range, and measure the volts output from each of the secondary windings, noting them all down in their relevant places. It is well to remember if any doubt exists that almost invariably the mains primary is the winding nearest the centre.

Disconnect the mains supply and measure the wire gauge on each secondary—this is to give an idea of the current output that winding can give. 1mm. diameter is good for about three amps., as is 16 s.w.g., and 12 s.w.g. is OK for ten amperes. If you have some windings

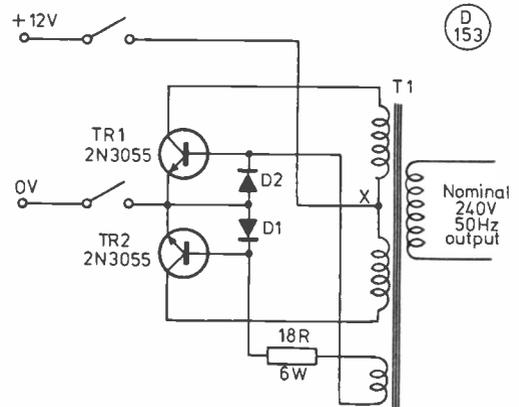


Fig. 1 CIRCUIT OF 240V 50Hz INVERTER

D1 and D2 came from the original PSU, but one-amp. 100v. PIV rating would serve e.g. 1N4001 or similar. Either leg of the 12v. supply could be earthed—the prototype has a wire link which can be altered as desired. Point 'X' is referred to in the text.

which look to be likely they will be giving you around 12 volts on the mains, and be pretty hefty: two such are wanted, plus a third one for the feedback which is maybe a bit lighter in gauge but around the same in terms of output volts when measured with mains on the primary.

Now turn to the circuit at Fig. 1; this was as basic as the writer could go in that it used nothing that wasn't in the original PSU—the box, the transformer, the tag-strips, the components—which had been saved from the 'skip' when a lab turn-out had occurred some two years before—having outlived its usefulness. (In fact it had had a fault in it, having blown one of the big transistors; some bright spark had fitted a new one—but somehow had forced the two pins to go through blank holes in the plug-in wiring base inside, so that the transistor now had emitter and base completely isolated from life around it!).

Because of the reason it had been junked, it didn't in fact work first time, nor did it do so when the fault had been found and the two legs reconnected to the rest of the circuit: we had organised the two windings

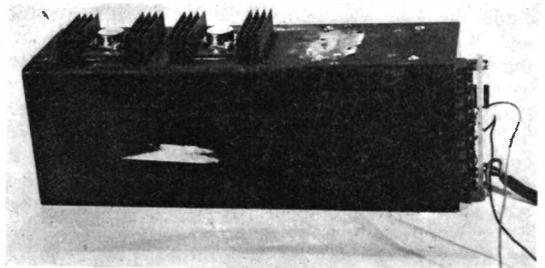


Fig. 2. This shows the original 'birds-nest' prototype, which has proved its reliability. It also shows how *not* to construct a piece of home-built gear!

going to the two collectors so that they were in series-aiding before wiring it up, *i.e.* two similar windings which gave the same voltage from the junction 'X' to each end, and double that across the lot. What we hadn't done was to connect the feedback winding so as to give positive feedback, so this was reversed and immediately things started to happen; the old mains input winding was now the mains output. A 'scope hung across the mains winding (mind it doesn't bite you!) showed we were getting something like the desired voltage output, and the frequency was in the right order; in fact our own model varied between 47 and 52 Hz from no-load to around maximum load. It is of course a square wave form, and looking at each collector on the 'scope with reference to the common winding showed an essentially square wave—indeed with a resistive (lamp) load it was a near-perfect square-wave. We could light a sixty-watt lamp quite nicely, although a 100-watt bulb was too much and stopped oscillation.

As to its behaviour on inductive loads, a TF144G signal generator was driven from it and the generator made no protest, neither did the inverter. A rather bigger one built at about the same time was tried on an electric drill; the drill would not start by itself, but if the chuck was spun over by hand the drill would pick up and run fairly normally, drilling holes in bits of scrap metal without protest. Likewise, the pump or fan-motor of a central-heating system would not start rotating unless 'persuaded'. Attempts to make the output more sinusoidal were a dismal failure; all that happened was that the no-load current rose dramatically and the transistors instead of trying to be switches tried to operate as amplifiers with positive feedback, so the load capacity dropped alarmingly and the transistors overheated. The attempt was abandoned.

Now, to the use of the beast. Clearly its prime purpose in life is to enable normal mains electric lights in the event of a power failure. To this end, anyone making a similar model should consider very seriously fitting a socket to the box, compatible with the mains plugs around the house—and it is comforting to have a small mains-type neon indicator by its side just to show that the 240 volts are in fact present. Likewise, a hefty double-pole double throw switch on the twelve-volt supply wouldn't come amiss—our own version had neither. The method of operation in practice would be to pull the mains switch to completely isolate the house wiring from the mains, and then to plug the inverter output into one or other of the ring main sockets, which means that electricity would be available in every room; the unit in such a case *must* be removed from the socket, and it's leads all coiled away *before* restoring the power switch after the cut. The advantage lies in that, with plenty of alternative light for activity in living-room and kitchen, the inverter supply results in bulbs lighting when a room switch is pulled (or a landing light required) —just so long as the person is prepared to switch one off before the next one comes on. Thus the risk of a fall in darkness over a slumbering dog or youngster's skateboard is avoided.

At full load the inverter was giving around the 80 per cent efficiency mark, which is not at all bad for something quite impromptu; it falls off at low load, drawing about one ampere with no load, most of which is dissipated in the series resistor in the feedback path.

Notes

The writer's transformer in fact showed two windings each of 14.3 volts AC when the primary was mains-energised and the station test-meter connected, and the feedback winding alone gave some 11 volts; 18 ohms needs six watts dissipation—it may be possible to adjust it a bit to reduce dissipation, so long as you don't try to poke too much drive into the transistor bases. As both transistors are 'hot' in voltage they should be mounted with the usual mica washer and insulator to a heat-sink. The unit ran cool at five amps of draw from the battery with the heatsinks shown in the picture; if you are going to beef more out of the transistors, then a bigger heatsink would be in order.

The unit could also be fitted with rectifiers and smoothing within the same case, and a double-throw switch, so that it could be used as a mains inverter or give DC HT from the car battery for a mobile rig. It would seem to be one of the more useful bodes the writer has made!



The Eagle EM-1200 multimeter, complete with leather carrying case.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

LOOKING at the mail this time, the theme is very definitely on the upswing of the 28 MHz band; indeed the thought which produced the first clause of this sentence prompted a quick lean over to flick on the rig and—lo!—Ws all looking for DX and putting out a big signal at that, as seen on an improvised dipole at about 15 feet or less.

Other letters have looked at Top Band, and indeed 14/21 MHz, but the loser seems to be 3.5 and 7 MHz, which is a shame when there can be no doubt that there are openings.

Vale

It is with deep personal sorrow that G3CED writes to tell us of the death of G4EVO, Frank Goodall who, after a career of some 46 years as a Marconi Wireless operator took up amateur radio late in life and operated QRP—he never ran more than five watts input. He wrote a number of books, including the *Ladybird Achievement* book, "The Story of Radio." He was 77 years old when he died on October 9. Readers will recall that for a long time his doings were recorded in this piece, his contributions only ceasing when he fell ill. He will be greatly missed.

Top Band

The fall-off in popularity of Top Band in recent years has even made itself felt among the transatlantic tests, notes W1BB in his first bulletin for the 78/79 season; on the other hand he mentions that some have looked at the last winter season as their personal best. In this country, there can be little doubt that much of the problem has been the syphoning-off of many operators to HF and VHF, by virtue of the readily-available commercial equipment, and the gradual decline of the 405-line TV population (which has made the HF bands far more useful at a time when one prefers to be in the shack). In addition of course the horrendous TV timebase noise doesn't help, not to mention the traditional "funny noises."

Coming back to W1BB, it is interesting to note that Stew manages to grab most of the DX there is, to the tune of between 60 and 70 countries in any given year. PY1RO's operation from St. Peter & St. Paul Rocks gave W1BB his 144th country on Top Band, and was followed by VK9ZR from Mellish. Many amateurs have wondered about the possibility of a transatlantic QSO from a mobile; W9ZVE did it while out /M in the W8 region, being heard by PA0HIP and worked by EI8H. LA's noted on Top Band could have been genuine, they having been allowed the use of the band for a special commemoration event, which they hope will be the "thin end of a wedge" for 1979 onwards. There have been many rumours that the Russian authorities might make Top Band available by 1979—and if G2HKU is anything to go by, the rumours are not without some foundation.

Which being said, we must now bring on G2HKU (Sheppey) who made SSB contacts with DJ9MH, YU1OCV, PA0PN, DJ8WL, PA0PAU/A, OH1NQ, GW3UCB, HB9H, GU3HFN, GM3WTA, PA0HWH, OH2BO, and OH3VV. A change to CW made the numbers up to GM3TMK, OE1HZA, DL8AN, GW3KOR, OH5NG, GM3PFQ, and UP2KUM operated by UP2NK in Vilnius (sending "UP2KUM—160m. test station" on each and every over).

G3PKS (Wells) has been using his rig and slightly modified pyramid aerial on Top Band; a few initial test QSO's on SSB gave good reports out to a fair way, and gave enough encouragement to ensure that in about a month from the date of his letter he would be on the band in earnest, on CW.

Eighty

First off we have the story of G2NJ (Peterborough) who seems to be alternating between 50 watts and the HW-8 which adorns the sideboard; and which ever route was chosen to the aerial the results

were quite good as compared with the flatness of the summer. Perhaps the loudest signal on October 6 was LA2NX/MM who was working LA6CL, also an ex-R/O; it is believed the /MM was in the Humber area. October 18 yielded OK4CNR/MM in the Adriatic, around 2230z, and on 21st OK2PEX hooked F6EBN/MM, but the latter just disappeared after his QSO with the OK, leaving a rather disappointed G2NJ. G2CAS has been out /P again, this time at Bridlington, but this time he managed to pick a very poor day for conditions. On the QRP front, G3JBA/P was operating an HW-8 on the roadside at Wareham around noon, and G3NIJ had an HW-8 to an invisible wire which was doing him quite nicely; G8IB in Abington was also on an HW-8, and OK1DKW was running just the one watt while G2NJ had two watts.

Another HW-8 was wielded by G2HKU, running three watts, to work ON4MA and PA0AUV. Ted mentions another "thing" appearing on our bands—around 3720 kHz, at S9-plus in ZL but still a good S8 in UK.

G4DMN now has a flat in Liverpool, and so his operating is confined to weekends when he can get home. It didn't however prevent SSB with HC1EE, HH2CQ, KZ0DX, EA6ET, FP8DX, FG0DWT/FS, PJ9JR, VP9DX, N1GL/VP9, LU4EV/VP9, ZL4AV, ZL3HI/C, ZL4QL/A and 9Y4VT.

Daylight conditions have been much better this time, says G3PKS, having heard stations at 1000 miles or more after lunch, and has also spent quite a bit of time nattering on SSB with "locals"—which means within UK.

Forty

Thanks to the shortage of time, and the attractions of the other bands, not to mention altering his 80-metre vertical beam so that it will also cope with 7 MHz, G4DMN hasn't done all that much operating on the band.

Again daylight conditions are the

topic for G3PKS, who heard a few DX. stations of the W/VK/ZL persuasion, but he felt they were a bit too far down and so didn't bother to call them. On the other hand the inter-G stuff was peaking to S9-plus-umpteén.

That about covers the writer's case too, come to think about it—there being no log entries on the band even though weak DX stations were heard towards late evening.

Here and There

G3PKS alludes in mild terms to the current U.S. prefix situation. We feel rather more strongly about it, and find it quite astounding that American amateurs should have let a situation arise where a particular prefix can be used on both sides of the Pacific, as for example KA4. It seems the next stage will be complete anarchy in which every station in the States will invent his own callsign and—maybe—register it with their authorities who in turn will issue a licence using this self-invented callsign. Or, perhaps, a reversal of their long battle for callsign licence plates on the car, to using the car registration number itself as a callsign. Wouldn't they have howled if, for instance, the Russians had adopted such methods of allocating callsigns!

Still with G3PKS, but this time with Jack's aerial (known as the P.P.P.—'PKS Peculiar Pyramid!). In essence it derived originally from the need for an aerial that would radiate well using only one high point. Initially, the two aeriels were both Windoms, so arranged that each 70-foot span was supported at centre by the mast, and the single-wire feeder of each Windom came down together to the shack, where they were attended-to by a Z-Match. This arrangement met the need for the central pole and the irregular site plus outdoor shack, and worked very well on 7-28 MHz, plus 3-5 and 1-8 MHz when the feeders were just strapped together. It then went through a string of variations, such as the VS1AA on each leg, an off-centre-fed version of a W3DZZ on each leg, not to mention wires trailing along garden fences, doubled back to absorb surplus; they all worked well, which led to the deduction that the basic idea of crossed inverted-V's simultaneously energised is a good one. The present

Call	TOP BAND COUNTRIES/COUNTRIES			LADDER Counties	Total
	AM	CW	SSB		
G3NKC	22	50	91	11	174
G3FJU	12	40	68	10	130
G4AEJ	30	14	21	4	69
G4GFN	—	—	—	3	54

Starting date January 1, 1978. Score one point for an SSB QSO, two for a CW, three for an AM QSO; no cross-mode contacts except on Phore, where AM/SSB is permissible and rates two points, scored in the column for the mode the station was using. Thus the AM station scores two in the AM column, and the SSB station two in the SSB one. Each county can be worked once on each mode.

version can be visualised as fitting roughly into a 40-foot square, of which the diagonals are more or less at the cardinal points: the sides therefore are *NW* and *SE*. On the *NE* side, there is a central feedpoint, which runs off 17 feet to the East and South corners; the wire at the South corner turns North for 75 feet and the other one turns West for about the same distance. Thus they cross at the approximate centre, which is the highest point. Near the North and West corners there is a 7 MHz trap, and then the wires bend back and both take a southeasterly course through another (3-5 MHz) trap and to their ends. It can be imagined as a square whose diagonals run *N-S* and *E-W*, fed in the centre of the *SE* side and lacking a *NW* side; the final result travels 93 feet to the 7 MHz trap, then 20 feet to the 3-5 MHz trap, with a final 20 feet to make each leg around—some 133 feet in each side of the feedpoint. It is fed with balanced open-wire feeders to the shack where the Z-Match copes easily. As he says, "Goodness only knows how it works—but it *does* work to both DX and locals!" As far as the LF bands are concerned, the intention is to try and make the high-current portion of the beast coincide with the high point of the Pyramid.

Turning from the means of working them to who you work with it, we look at the W1WY piece. Here we note that December 1 to December 3, 2200z to 1600z, is down for the ARRL Top Band CW Test. DX to appear in the usual "window" of 1825-1830, which it is hoped will be kept clear of by W's—and don't forget that the very top of the band, around 1995 kHz may well contain some DX. However, the contest is essentially W's versus the rest, and QSO's between two stations who are

both DX to the W's won't count for leaving. Logs to ARRL with postmark no later than December 29.

Still with Top Band, the same times January 26-28 are set aside for the CQ Top Band contest, the rules for which will be the same as for many years. While we are talking about it, we may mention the results of the 1978 contest: In the single-op. category there was just one G (G3YMC), although EI9J and GD4BEG were on; and the last-mentioned lifted the European trophy with 102753 points. In the multi-op. stakes G3WPF/A with some 63840 points led from G4BPO, GU3HFN, GM4GRC, and GM3IGW, the two GM's both being over the 40K mark.

With ten metres wide open so often, there is some considerable QRM to the users of the *Oscar 7* downlink frequency of 29-4 to 29-5 MHz: G6LX for instance mentions that he was working through *Oscar 7* and was called by a VE. After 0-7 was over the horizon, Ron did a QSY to Ten and called the VE, who didn't know this was the satellite piece of the band, and hadn't even heard of AMSAT! There will always be these chaps who don't read the amateur radio press and so never know "what gives," so it is a good idea if anyone hearing somebody in the 0-7 section of Ten, who obviously doesn't know about it, takes the trouble to explain just what the form is and asks them to keep a clear "window" for the downlink. Still with doodlebugs (sorry chaps, that one's for the over-50 types!), we hear that the Russian beast is about to be let loose, and G3FPK says it is understood that the downlink frequency will be 29-3 to 29-4 MHz. However, the uplink on 144 MHz won't please users of R8 and R9 repeater channels—or will it?—they

might accidentally work some DX! Whether or no, let's not QRM the downlink of anybody's *Oscar*, and let's make sure everyone knows it's there and if possible, when.

Awards now. The University of Cape Town was founded as long ago as 1829, and to commemorate this they will have ZS1UCT on the air from February 7 to March 4; on Sundays 0600 to 2000 GMT, and on weekdays 0700-1000z plus 1500 to 2000z. They will be found around 7050, 14210, 21200, 28500 or 28800 kHz with SSB, CW and RTTY. There is also a station on 145.5 MHz. To obtain the award, you just work ZS1UCT and a brace of other ZS1's. Certified log data, plus one dollar or 10 IRC's to the SARL Award Manager, ZS1MO, P.O. Box 5100, Cape Town 8000, Republic of South Africa. This one is open to SWL's too.

DX to come

Not surprisingly, the pot is bubbling quite well. LU3ZY on South Sandwich is showing right now, and for the CW faithful a look on 14020 kHz seems indicated.

Bouvet is due before Christmas, and probably about the time this leaves the printers will see the start of the game.

Desecheo came and went, with W0DX and KV4KV, which has nettled the KP4 chaps who have been beaten to the post; and there seems to be some question as to who writes out the permit to land—W0DX got theirs from Washington's Dept. of the Interior, but the Wildlife Service in Atlanta reckons they are the only ones to issue permits. Anyway the KP4's are still going, and to make sure their effort does no damage they propose to take a Wildlife man with them so he can see for himself what they are up to (they can then take a peek at the wildlife which is being conserved on Desecheo at the same time!).

Look out for Peter Island in the Bellingshausen Sea, with Willy de Roos, VK9XR, at the controls; he sailed there single-handed and the plan was to remain for some months.

Those who hunger for a QSO with Hong Kong should note that 350 hopefuls sat their "R.A.E." (350 more couldn't be accommodated for the exam.). That makes for an

awful lot of VS6 signals to be worked!

In Europe, ON4NC reckons he worked a BY2AR and felt the 21 MHz signals worth springing a QSL card on—so who knows what will happen and what the prefix will be?

Another of the African homelands, this one called Vendaland, goes independent on December 1. VE3FXT will be on the scene and the faithful patient ones will get a QSL card, but a long wait—till 1981!—before these homelands are ratified as independent countries and accepted for DXCC.

Talking about DXCC, there seems to be a strong undercurrent of opinion that the "distinctly separate administration" criterion for DXCC counters is a bit off. However, the word is "wait and see"—and meantime you can look out for XF1LM/MM; this will be from a group who are building a galleon which they propose to sail from Tampico to Spain, just like Columbus! Personally, your scribe would feel safer single-handed in his own 17-footer!

Twenty

Just five fleeting visits, says G3PKS, but each trip a QSO—WA2NPZ, VE3LX, 9H1DV, W3VG, and on the day of his letter a twenty-minute chat with ZL4DV, which leads him to the conclusion that the band needs looking at. As far as your scribe is concerned Twenty won't bear much looking at . . . some so-and-so has a new colour telly and its line timebase radiation is S9-plus on this band!

For G2HKU there have been the usual SSB contacts with ZL's on SSB, namely ZL1VN, ZL3SE, ZL3RS, and ZL3FV; and CW was used for UF6CX, HI3JEI, KV4AA, VK7RO, HB0BNP and HB0NL.

Talking of TV sets, they can QRM us and no one cares, but if we should upset the One-Eyed God, we are in trouble. This has hit G3NOF (Yeovil) which must be annoying with conditions outstanding even by G3NOF's reckoning; for three weeks he had been QRT at the time of writing, but before this he had rung the bell with P29JS, VK's, VP2LFZ, and ZL's, plus 4U1UN who QSL'ed by return airmail.

Your conductor looked at the band on the odd occasion, despite the

TV QRM, and liked what he saw, although the Sunday of the contest showed nothing much in the evening beyond Europeans, though there may have been something underneath the noise. However, like most, the rig has been on Ten or Fifteen much more often.

Fifteen

Yet again, much neglected in favour of Ten, by most readers. G3PKS noted it was often wide open, and he made CW noises to WA1VDP, W8FS, WD0ARX, JR1PNA, JA4LRX, JH7CMP, WA2WGS, PY4AKR, WA6AYQ/2 and, the evening before he wrote, an interesting QSO with W6OZ/MM in the Caribbean Sea for a solid QSO on a very definitely dying band.

A bit of flea-power was the prescription for G2HKU, and Ted offered his HW-8 to the band to raise W2AMS and WA3SKQ.

At G3NOF, contacts on SSB were made with EP2SL, JA9HKD, JH1JGX, K7R1, VE7KB, VP1RDT, W7QC (Idaho), WA7ZLC, WB5JJD, ZL2UV, ZL3PN, ZL4LZ, and ZD6BP. Then—QRT and TVI; what a life!

Ten Metres

Let G2BJY (Walsall) have the starting gun; Geoff has not been too happy with things of late, but has stuck to his last in the way of Ten, not to mention feeding the hedgehog daily until it went QRT for the winter hibernation after eight months of regular visits for food. Reverting to radio, 28 MHz CW showed with CF3BHZ, EA8IE, EP2WR, JH1BBT, RL7GCS, SV0WTT, UK8AAC, UA9's by the tinfal, some VE's, VK8DB, and all the W call areas including W7's in Utah, Wyoming and Washington.

G2ADZ (Chessington) reckons all the regulars on 20 and 15 have come down on Ten, and are all sitting on him. As for pile-ups, G2ADZ mentions his hearing of GD4BEG being jumped on by a pile of JA's and it was apparently quite like bedlam for GD4BEG. Bill himself mentions all W call areas with W6 and W7 very easy, VE1-8 but no KL7, JA's almost every day, XE1CF, XE3BL, KH6IBA, KH6JW, KH6HC, KH6AK, KH6JG, CT2QN,

ZL1HY, ZL2ACP, ZL3BK, ZL4AW, ZL2AU, ZL3IS, YS10, P29EJ, KA6NN, KA6DX, CO2QR, FG7AS, VP2VDH, CX1EK/W4, YV1BVJ, VU2LO, Y5T5CJ, UAO's right on to the BY border, UA9's, UL7's, UK9OAD/U8W and 4LØKR (both the latter knocking 'em off at a rate of knots). The UK9 one remains a mystery, but the 4L is Russian and in the Arctic, we understand. As for the Gotaways, we note KG4KG, AP2TN, who only worked W's, 8R1J (but he made that one good after sending his report to us), 4S7VZ, VR3AH, FP8HL, several ZL's and VK, an assortment of VK novices (28100 to 28130 kHz) all after Europe, FM7WH, OA4JR, CE3ZW, and loads of JA's. G2ADZ notes that he didn't make a try for ZS or the other S. Americans not previously mentioned; he often found he could hear 4-5 continents on the same frequency—the problem not being of getting out but rather of competing with the beams and linears!

G3NOF mentions that the band was in fine shape but, as already mentioned, he was QRT with TVI for most of the time. Nonetheless, he managed P29JS, VK's, VP2LFZ, and ZL's.

It was CW all the way for G2HKU, who keyed with W4QM, W4AM, W6OV, W9VW, and 9H1CH.

Now we have the enormous list from G4DMN: CE3XX, C5AAP, W4NT/C6A, EP2SL, FGOEUU/FS, HC1GB, HP1DX, HP2LT, HS1ABD, HH2CQ, H44DX, JA's, KG4KG, KG6JIH, KH6WF, KL7CD, KL7HR, KV4CF, OX3AK, OA4JR, P29TL, TGØFRACAP (the longest call sign in the world?), TR8AG, TI2JMT, VE1-8, VK's, VK9XW, VP2MBA, VP2SQ, VP8NO, all W call areas, XE1RM, XE1TE, XE1DDP, XE1VV, ZF2CB, ZL2RP, ZL4CN, YS1GMV, Y5T5KJ, 6F8J, 6Y5SMP, 7P8AC, 7X2BK,

8P6GG, 9JEBO, 9K2DR, 9L1CA, and 9Y4VT.

Now we return to G3PKS and his key. Once in a while the band was quiet but mainly wide open and good conditions. On several days Jack could hear GB3SX at Crowborough, 5B4CY, and the Florida beacon N4DR simultaneously, which indicates the co-existence of near, middle and DX skip. Stations worked included the following: N3AA, WA1ZXM, K2IJL, N2BJ, AE8O, Europeans, K6PWP, KB6EP, K6DC, K7GOX, N5VV, K6QC, VE3KYX, UA9QBT, WB4ENN, IT9ZMP, W3SQ, and EP2YA, not to mention KA4EIN who turned out to be in Florida, W9QKB, N5AKE, TF3CW, VE2FDY, KA4CWO, WB2TCP, KA2ABK/NY. Then there were YTØIARU and 4NØD—both presumably genuine because of the speed and ease of their CW. Jack was called by several VK's but none held up well enough for a QSO save VK2NSG (a VK novice) with whom a nice chat was enjoyed.

Table

More new entries and up-dates, please!

Late ones

GM4ELV (Arrochar) mentions his QRP and other contest results, and enclosed a list of QSO's to show that he is one of the relatively few stations who use 80-10m. on both SSB and CW. 3.5 MHz meant CW to YV1OB, plus SSB to EA9FE, 4X4YM, and VP2LLF. Forty seems to have been used quite a bit, with CW going out to FM7WU, PYØEOL, FGOEUU/FS, and VP1RX, while the phone QSO's included CT2-3, EA8, F0AFZ/FC, FG7BA, FP8DH, FG0DWT/FS, HI8RRD, YV1-3, VP8HX. Not so much on Twenty,

all Phone! SV1MT, KP4O, KL7JAR, UD6, UF6, and UG6. Turning to 21 MHz, we find EA0CR, FG7AN, PY0EG, PJ9JR, HI8XDJ, VE7, KP4 and YV3. That only leaves 28 MHz, and here it was U18, UH8, UD6, and UM8.

G4BHE (Basingstoke) spent lots of time on Ten; KH6 and KL7 completed the WAS, and in addition Barry notes A9XBJ, EP2TW, GU4EON, HH2CQ, HS1ABD, JA's, KG6JH, KG6RT, KH6WF, KL7FCH, OA4JR, N1GL/VP9, PJ8CO, STORK, TGØFRACAP, TR8RG, VE7BUL, VK2NDK, VU7AE, all W call areas, YN0S, ZF2BC, 5N2NAS, 6Y5HM, 7P8AC, 8R1J, 8R1Q, 9J2BO, 9K2DR, 9L1CA. Quite a crop—and what a difference from, say, 1976! As for 21 MHz, we look at A4XFE, FP8DX, HH2CQ, HM4HO, KH6BZF, KH6JHM, PJ8CO, ZL2BED, ZL1BOQ, and 7P8AC.

'CDXN' deadlines for the next three months—

Jan./Feb. issue—February 1st.

March issue—February 13th

April issue—March 1st

Please be sure to note these dates.

Finis

That's it for another month. The deadline is shown in the 'box' in the piece; and it only remains for the writer to say how much he enjoyed meeting up with friends and correspondents to this column at Leicester—and to offer his Christmas greetings to all who read *CDXN*. Everything, as usual, to: "CDXN," SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.



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CD562 CDE (up to 2" and 1 1/2")	£5.00
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IC 215E	£141.00
IC 202E	£150.00
IC 202S	£192.00
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IC 240 with scan	£244.00
IC 245E	£352.00
IC 211E	£488.00
Plus 12 1/2% VAT	



Multi UI 70cm. mobile ... £221.00
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Multi 2700 FM/SSB Tx/Rx + 12 1/2% VAT ... £435.00

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HERE'S THE PRODUCT THAT INCREASES THE VERSATILITY OF YOUR IC-240. ADDS A WHOLE NEW DIMENSION TO 2 METRE FM FOR IC-240 OWNERS.



- ★ Scans 40 channels in 25 kHz steps from 145-000 when scan mode is selected.
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- ★ Adjustable pause period.
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- ★ Display always shows frequency in use including transmit frequency when PTT is operated.
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- ★ +9v. available when repeater down mode is selected.
- ★ State of the art CMOS logic.
- ★ Dimensions approximately 6" w. by 1-1" h. by 5-5" d
- ★ Available NOW.
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CRYSTAL FREQUENCY RANGE USE (Tx or Rx) and HOLDER	OUTPUT FREQUENCY											
	4 MHz-TX-HC6/U	6 MHz-TX-HC25/U	8 MHz-TX-HC6/U	10 MHz-RX-HC6/U	11 MHz-RX-HC6/U	12 MHz-TX-HC25/U	14 MHz-RX-HC25/U	18 MHz-TX-HC6 & 25/U	44 MHz-RX-HC6/U	48 MHz-TX-HC6 & 25/U	52 MHz-RX-HC25/U	72 MHz-TX-HC25/U
144-030 ...	a	a	a	a	a	a	a	a	a	a	a	a
144-4 (433-2) ...	a	a	a	a	a	a	a	a	a	a	a	a
144-480 ...	a	a	a	a	a	a	a	a	a	a	a	a
144-800 ...	a	a	a	a	a	a	a	a	a	a	a	a
144-850 ...	a	a	a	a	a	a	a	a	a	a	a	a
145-000/ROT ...	a	a	a	a	a	a	a	a	a	a	a	a
145-025/RTI ...	a	a	a	a	a	a	a	a	a	a	a	a
145-050/RTI ...	a	a	a	a	a	a	a	a	a	a	a	a
145-075/R3T ...	a	a	a	a	a	a	a	a	a	a	a	a
145-100/R4T ...	a	a	a	a	a	a	a	a	a	a	a	a
145-125/R5T ...	a	a	a	a	a	a	a	a	a	a	a	a
145-150/R6T ...	a	a	a	a	a	a	a	a	a	a	a	a
145-175/R7T ...	a	a	a	a	a	a	a	a	a	a	a	a
145-200/R8T ...	a	a	a	a	a	a	a	a	a	a	a	a
145-300/S12 ...	a	a	a	a	a	a	a	a	a	a	a	a
145-350/S14 ...	a	a	a	a	a	a	a	a	a	a	a	a
145-400/S16 ...	a	a	a	a	a	a	a	a	a	a	a	a
145-425/S17 ...	a	a	a	a	a	a	a	a	a	a	a	a
145-450/S18 ...	a	a	a	a	a	a	a	a	a	a	a	a
145-475/S19 ...	a	a	a	a	a	a	a	a	a	a	a	a
145-500/S20 ...	a	a	a	a	a	a	a	a	a	a	a	a
145-525/S21 ...	a	a	a	a	a	a	a	a	a	a	a	a
145-550/S22 ...	a	a	a	a	a	a	a	a	a	a	a	a
145-575/S23 ...	a	a	a	a	a	a	a	a	a	a	a	a
145-600/ROR ...	a	a	a	a	a	a	a	a	a	a	a	a
145-625/R1R ...	a	a	a	a	a	a	a	a	a	a	a	a
145-650/R2R ...	a	a	a	a	a	a	a	a	a	a	a	a
145-675/R3R ...	a	a	a	a	a	a	a	a	a	a	a	a
145-700/R4R ...	a	a	a	a	a	a	a	a	a	a	a	a
145-725/R5R ...	a	a	a	a	a	a	a	a	a	a	a	a
145-750/R6R ...	a	a	a	a	a	a	a	a	a	a	a	a
145-775/R7R ...	a	a	a	a	a	a	a	a	a	a	a	a
145-800/R8R ...	a	a	a	a	a	a	a	a	a	a	a	a
145-950/S38 ...	a	a	a	a	a	a	a	a	a	a	a	a

PRICES : (a) £1.95 (£2.19); (b) £2.32 (£2.61); (c) £2.80 (£3.15) (d) and (e) £3.20 (£3.60).

AVAILABILITY : (a), (b), (c) and (d) stock items, normally available by return (we have over 5000 items in stock). (e) four weeks normally but it is quite possible we could be able to supply from stock.

N.B. Frequencies as listed above but in alternative holders and/or non stock loads are available as per code (e).

ORDERING. When ordering please quote (1) Channel; (2) Crystal frequency; (3) Holder; (4) Circuit conditions (load in pF). If you cannot give these, please give make and model of equipment and channel or output frequency required and we will advise if we have details.

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With the ever increasing popularity of Japanese equipments we have further expanded our range of stock crystals. We can now supply for YAESU (FT2F, FT2E, FT2 Auto, FT224), most of the ICOM range and the TRIO-KENWOOD range. We can also supply from stock crystals for the HEATHKIT HW202 and HW17A.

YAESU FT21 CRYSTALS NOW IN STOCK, ALL AT £2.80 (£3.15). All popular channels—For repeater use advise shift frequency required as earlier models have different shift xtals to later FT221R. We can also supply the crystal to give NORMAL "tune to RX" working (as FT221R). For 70cm. we can supply the 16 MHz shift xtal for direct use with a MICROWAVE MODULES MMT432/144 which we can supply for £169.88.

SPECIAL OFFER: If ordered with transverter 70 cm. shift crystal FREE

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5-500 MHz supplied with full details for only £95 (£6.43).

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We are stocking the following channels RB0 (434-60/432-00), RB2 (434-66/433-05), RB4 (434-70/433-10), RB6 (434-75/433-15), SU8 (433-20), RB10 (434-85/433-25), RB14 (434-95/433-35), SU18 (433-45) and SU20 (433-50)—TX and RX for use with: PYE UHF Westminster (W15U), UHF Cambridge (U10B), Pockefone (PFI) and STORNO CQL/CQM 62 all at £2.32 (£2.61). For the U450L Base Station we have the TX crystals for all the above channels. The RX crystals for the U450L Base Station, together with the TX and RX crystals for the remaining SU channels (SU12-433-30/RTTY, SU16-433-40, and SU22-433-55) for all the above equipments are available at £3.20 (£3.60) to Amateur Spec. or £4.20 (£4.72) to same spec. as stock items. Delivery approx. 4 weeks.

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TX 8-7825 MHz and RX 6-7466 MHz or 29-780 MHz £2.32 (£2.61).

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CRYSTAL SOCKETS—HC6/U, HC13/U and HC25/U (Low loss) 16p each (18p) + 10p P & P per order (P & P free if ordered with crystals).

CONVERTER/TRANSVERTER CRYSTALS—HC18/U

All at £3.00 (£3.37): 38-6666 MHz (144/28), 42 MHz (70/28), 58 MHz (144/28), 70 MHz (144/4), 71 MHz (144/2), 95 MHz (342/52), 96 MHz (1,296/432/144), 101 MHz (432/28), 101.50 MHz (434/28), 105-6666 MHz (1,296/28) and 116 MHz (144/28).

CRYSTALS MANUFACTURED TO YOUR SPECIFIC REQUIREMENTS

Prices shown are for one off to our amateur specs., closer tolerances are available, please send us details of your requirements.

A Low frequency fundamentals:

	Adj. tol. ± 50ppm	Temp. tol. ± 100ppm 0 to 70°C
6-0 to 19-999 kHz, £28.12 (£31.63)	80 to 99-999 kHz, £7.30 (£8.21)	
20 to 29-999 kHz, £17.75 (£19.97)	100 to 149-99 kHz, £6.68 (£7.51)	
30 to 59-999 kHz, £15.51 (£17.45)	150 to 499-99 kHz, £6.20 (£6.97)	
60 to 79-999 kHz, £12.41 (£13.96)	500 to 799-99 kHz, £7.30 (£8.21)	

B Mid frequencies:

	Adj. tol. ± 30ppm	Temp. tol. ± 30ppm 0 to 60°C
800 to 999.9 kHz Fundamental	£9.50 (£10.69)
1-0 to 1-4999 MHz Fundamental	£9.40 (£10.57)
*1.5 to 1-9999 MHz Fundamental	£3.95 (£4.44)
*2.0 to 20-9999 MHz Fundamental	£3.36 (£3.78)
21 to 24-999 MHz Fundamental	£6.48 (£7.29)
25 to 27-99 MHz Fundamental	£8.90 (£10.01)
28 to 30 MHz Fundamental	£9.68 (£10.89)
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*21 to 63 MHz 3rd Overtone	£3.36 (£3.78)
*40 to 62-999 MHz 5th Overtone	£3.95 (£4.44)
*63 to 105 MHz 5th Overtone	£3.36 (£3.78)

C High frequencies:

	Adj. tol. ± 20ppm	Temp. tol. ± 30 ppm —10 to 60°C
105 to 180 MHz, £6.48 (£7.29)	180 to 250 MHz, £10.54 (£11.86)	

Delivery: *normally 4/6 weeks—all other frequencies 6/8 weeks. **Holders:** All V. Low frequencies are in HC13/U or similar, otherwise supplied in HC6/U, HC18/U and HC25/U are available at frequencies above 4 MHz. HC17/U (same pins as FT243) available at 25p (28p) extra on above prices. (Same otherwise specified fundamental will be supplied to 30p circuit condition and overtones to series resonance).

TEST EQUIPMENT FREQUENCY STANDARD CRYSTALS 100 kHz in HC13/U and 455 kHz in HC6/U, £2.95 (£3.19), 1 MHz and 5 MHz in HC6/U and 10 MHz and 10.7 MHz in HC6/U and HC25/U, £2.80 (£3.02).

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We can supply crystals to most commercial and MIL specifications, with an express service for that urgent order. Please send S.A.E. for details or telephone between 4.30—7 p.m. and ask for Mr. Norcliffe.

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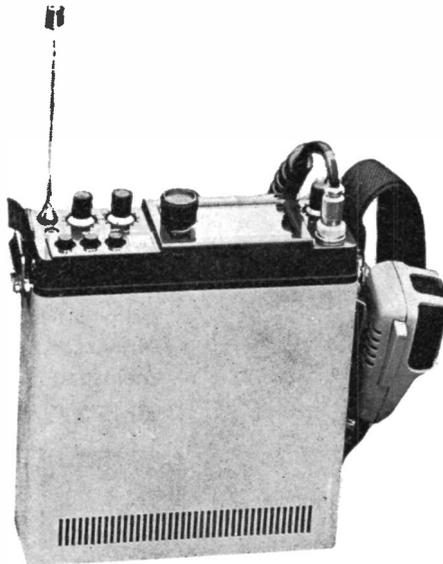
CQ—P2200E 2 METRE FM PORTABLE TRANSCEIVER

NEC

SPECIFICATION

General

Frequency range :
144.00 146.00 MHz.
Channels :
12 channels.
Microphone :
Dynamic type (10K Ω)
Speaker :
3W 8 Ω
Supply voltage :
Built in batt. DC 12v. HP11 x 8,
external power supply 13.5v.
Current consumption :
900mA at transmission.
110mA at reception.
Semiconductors in use :
29 transistors 3 FET's
16 diodes 2 IC's
1 LED.
Dimensions :
196(w) x 69(h x 219(d) mm.
Weight :
Approx. 2.6kg.
(including batteries).
Transmitter
Emission type :
F3
Transmitting power :
3W. (at HIGH, approx.
1W. (at LOW)



NEC

Antenna impedance :
50 Ω
Maximum frequency deviation :
 \pm 10 kHz
Modulation :
Crystal controlled variable
reactance modulation.
Multiplication :
12
Undesired radiation :
 $-$ 60 dB or less.
Repeater tone :
1750 Hz \pm 2 Hz.
Receiver
Receiving system :
Double superheterodyne.
Intermediate frequency :
First IF 10.7 MHz.
Second IF 455 kHz.
Sensitivity :
S/N 30 dB or more at 1 μ V input.
Squelch :
 $-$ 6 dB or less.
Pass band width :
 \pm 10 kHz or more (at $-$ 6 dB).
Filter :
Ceramic filter.
Low frequency output :
0.5W. (rated output)
Overall distortion :
10% or less at 1,000 Hz 0.5W.

This is a very well built piece of equipment with robust case and strong webbing carrying strap. All controls are on the top face making operation easy and comfortable. The built-in extending rod antenna can be used at $\frac{3}{8}$ or $\frac{1}{2}$ wave whip depending on the number of sections used. The battery compartment is recessed from the bottom of the unit and is held by one bolt giving easy access to compartment and the battery pack slides out without any connecting wires. External antenna socket is recessed into base. The microphone is particularly comfortable to hold and is the right shape and size.

The 1750 Hz repeater access tone operates on release of the P.T.T. switch thus giving a tone at end of transmission.

The transmitted output is switchable 3w. or 1w.

The meter serves as "S" meter on receive, and battery check on transmit.

An LED "ON AIR" Indicator is provided.

RIT is fitted.

FETS are used for RF stage and an IC for IF stage giving excellent sensitivity, cross mod. and limiting characteristics.

3 Channels £179 (VAT incl.)

9 Channels £197 (VAT incl.)

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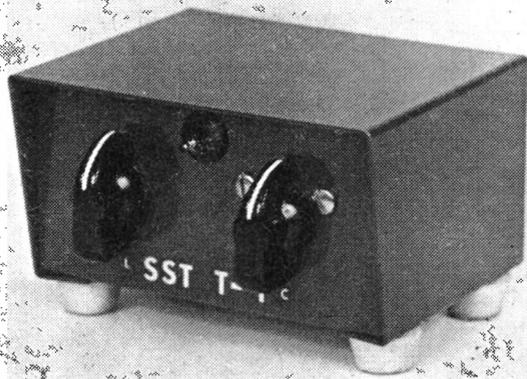
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All band operation (160-10 metres) with any random length of wire. 200 watt output power capability—will work with virtually any transceiver. Ideal for portable or home operation. Great for flats and hotel rooms—simply run a wire inside, out a window, or any place available. Toroid inductor for small size: $4\frac{1}{4}'' \times 2\frac{3}{8}'' \times 3''$. Built-in neon tune-up indicator. SO-239 connector. Attractive bronze finished enclosure.

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TUNING

MODES

SENSITIVITY FOR 10dB S + N/N

IMAGE REJECTION

BANDWIDTHS

DIMENSIONS AND WEIGHT

50 kHz to 29.7 MHz continuous. LED display.

5 kHz steps, digital readout, ± 5 kHz fine tune.

AM, USB, LSB, CW.

1 μ V typical.

70dB.

4 kHz-3dB, 10 kHz-60dB and 8 kHz-3dB, 14 kHz-60dB.

(WxDxH) 17.5 x 14.5 x 5.1in. Shpg. weight 19 lb.

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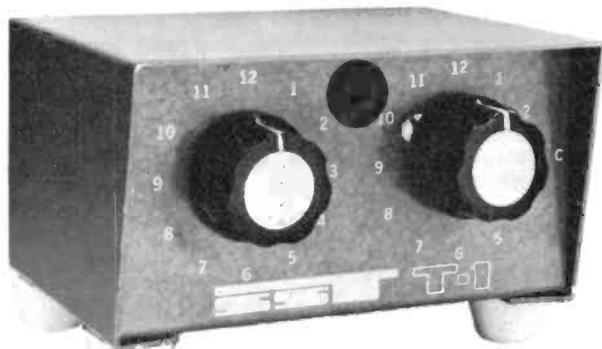
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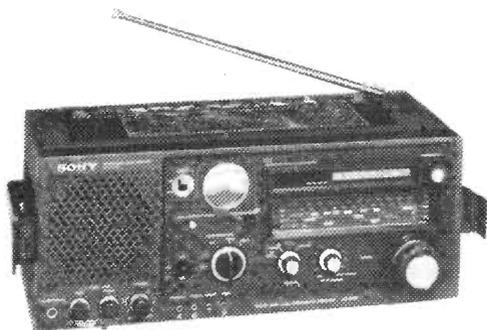
Tunes out SWR on any coax-fed antenna as well as random wires. Works great on all bands (80-10 metres) with any transceiver running up to 200 watts power output. Increases usable bandwidth of any antenna. Tunes out SWR on mobile whips from inside your car.

Uses efficient tapped inductor and specially made capacitors for small size: 5½ in. x 2½ in. x 2½ in. Rugged, yet compact. Negligible line loss. Attractive bronze finished enclosure. SO-239 coax connectors are used for transmitter input and coax-fed antennas. Convenient binding posts are provided for random wire and ground connections.



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ICF6700W



ICF6800W

SONY ICF 6800W. A new 31 Band receiver or the serious SWL Digital Readout. Dual conversion. Crystal Controlled Synthesizer. FET RF Amp/Preselector. Balanced Mixer to reduce Cross Mod. Covers VHF, MW and 1.6 - 30 MHz in 29 Bands. BFO for SSB/CW 2 Position Selectivity. Battery or Mains. Size 18" x 7½" x 9". R.R.P. £378.00. Our introductory Price £299.00 inc. VAT.

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HAMMARLUND HQ110 B.S. Receiver	£100.00 (£3.50)
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KW 201. B.S. Receiver	£130.00 (£4.00)
HEATHKIT SB301 B.S. Receiver	£100.00 (£4.00)
HEATHKIT SW717 G.C. Receiver	£50.00 (£3.00)
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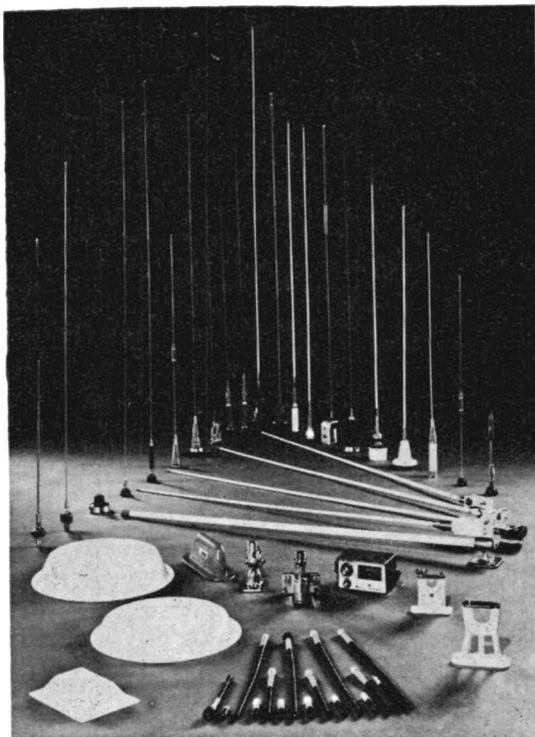
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