

The SHORT WAVE Magazine

VOL. XXXIV

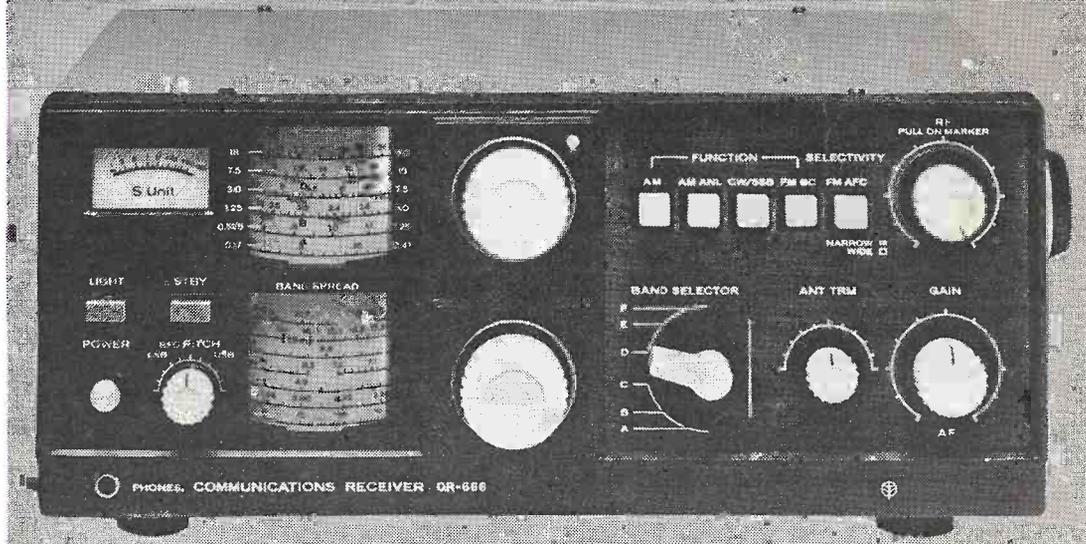
JULY, 1976

NUMBER 5

TRIO

All band receiver QR666

Listen to the world on LW, MW and all short wave bands from 160m. to 10m.



Modern Solid-state Circuitry—guarantees instant operation without warmup time and optimum stability. A total of 20 transistors and 24 diodes is employed, including FET's in the front end, mixer and buffer circuits which account for the excellent input sensitivity, cross modulation and spurious response and for distortion-free, crisp and clean reception of even the weakest signals. It doesn't matter whether you listen to an expedition transmitter station in the antarctic, an amateur radio station in South America or to Radio Luxemburg, reception is always perfect and a real pleasure.

Exceptional Receiving Quality—The multiple-tuned front end with FET complement guarantees an input sensitivity of $1 \mu\text{V}$ on the 80m. band in AM, SSB and CW mode, $3 \mu\text{V}$ in the MW and LW range and $5 \mu\text{V}$ in the FM range. Careful selection of interstage coupling and ceramic filters in the IF stage account for the QR-666's excellent selectivity and image ratio.

Sole Importers: LOWE ELECTRONICS
Cavendish Road, Matlock, Derbyshire
Tel.: Matlock 2817 or 2430



TS-700G

In case you hadn't noticed, the TRIO TS-700 has a new look. Now updated and incorporating all the features which made it the most sought after transceiver on 2 metres, it now includes additional refinements which you, the keen radio amateurs, have requested.

The basic concept remains the same; a complete 2 metre station package operating from a.c. mains or 12v. d.c. supplies, providing full VFO coverage of the 2 metre band with facilities for 22 crystal controlled channels for popular repeater and net frequency working. The same TRIO design standards such as the ultra linear PA operation resulting from the use of an inverter derived 20 volt supply, are still used. The same supply is also used to feed the driver and the audio stages of the receiver. TRIO's acknowledged leadership in the quality audio field has been put to good advantage in their amateur equipment. Everyone comments on the clean crisp audio quality of the TS-700G both on transmit and receive.

The main refinements can be summarised as follows:

- ★ New improved received front end system contributes to a new standard of sensitivity; $0.25\mu\text{V}$ for 10dB S + N/N ratio on SSB, 20dB quieting for $0.4\mu\text{V}$ on FM. This is the best receiver on the market today.
- ★ New FM IF strip with narrower filter for European market.
- ★ New centre zero tuning meter for FM.

- ★ New 100 kHz calibrator with automatic disconnection of antenna to remove confusing outside signals. Automatic transmitter disable in CAL. mode.
- ★ New logarithmic S meter.
- ★ New repeater and reverse repeater operation at the turn of a panel switch. Operates on either VFO or crystal controlled channels.
- ★ New improved audio system for FM and AM transmit.

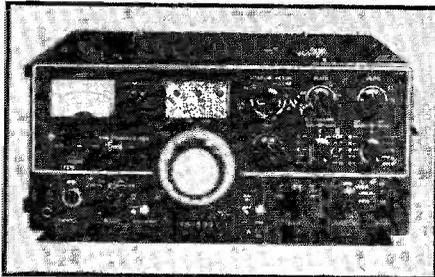
The use of fully balanced mixing at all stages of frequency conversion guarantees a clean signal free from unwanted products. The power output of the transmitter is normally between 15 and 18 watts and this, in conjunction with the TRIO amplified ALC system, gives you an outstanding signal. Just listen to 2 metres and judge for yourself which rig always sounds the best.

If you are considering your once only rig for 2 metres, then the TS-700G has to be your logical choice. Backed by the largest company in Japan making amateur radio equipment, and the best service facilities in Europe at Low Electronics, the TS-700G SSB/FM/CW/AM transceiver has to be the all time best buy.

Sole Importers
LOWE ELECTRONICS
 Cavendish Road
 Matlock Derbyshire
 Tel: Matlock 2817/2430

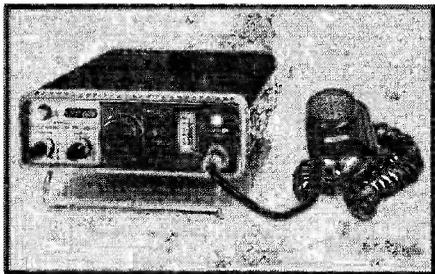
 **TRIO**

LOWE ELECTRONICS



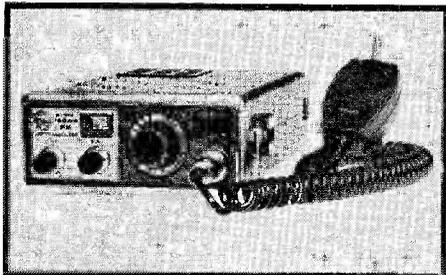
TS520

The TS520 is the best value for money HF transceiver available in Europe today. It incorporates all the features of more expensive equipment at no extra cost—AC/12v, operation, speech compression, 1 kHz readout, all band coverage 80-10, VOX, calibrator, blower cooled PA, transverter outlets, 4 function metering, etc., etc. Why not send for details today and find out what Trio design expertise is all about; or just call on us and try the superb TS520 for yourself. You are in for a pleasant surprise.



TR7200G

The TR7200G has set all 2 metre FM operators talking about its outstanding performance on both transmit and receive. Not only is it the best engineered transceiver on the market, but it's also the most sensitive at 0.3µV for 15 dB quieting and has the cleanest transmitted signal both in and out of band (the economy transceivers simply lack the interstage filtering to ensure that the owner is not put off the air by the Home Office.) Supplied complete with microphone, mobile mount, power leads, spare fuses and incorporating the TRIO exclusive tuning fork access tone generator, the TR7200G includes five fitted channels (S20, 21, 22, R6 and R7) or alternatives if requested.



TR3200

The newest FM handy transceiver from the TRIO range. Superb performance for the 70 cm. operator, 12 channel capability in the range 432-436 MHz with three channels fitted (SUB, SU18, SU20). Transmitter output switched 2W/400mW and incorporating the TRIO exclusive 1750 hz tuning fork access tone generator. $\frac{1}{2}$ -wave detachable antenna for high gain performance on both transmit and receive. Supplied complete with all accessories as the TR2200G and with the new miniature handy microphone.



TR7010

Following the worldwide success of the TS700, Trio have taken the TS700 basic design and packaged it for 2 metres SSB mobile use. The TR7010 sets new standards in receiver sensitivity and low spurious emission on transmit. Operating CW and SSB from 144.1-144.3 MHz, the TR7010 covers all CW, SSB and beacon activity. 40.5 kHz channels plus VXO and RIT provide continuous coverage. 8 extra channels can be used, without retuning, in the range 144-145 MHz by fitting auxiliary crystals. Single conversion using an IF of 10.7 MHz with a superb crystal filter provides outstanding selectivity. Wide range amplified AGC and newly developed FET devices in RF amplifier and mixer stages allow maximum sensitivity to be used with freedom from overload due to adjacent signals. Single conversion transmitter with new fully balanced mixer system generates a beautifully clean signal with crisp audio quality.

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BRANCH OFFICES

119 Cavendish Road, Matlock, Derbyshire. Tel. 2817 or 2430 9 a.m. to 9 p.m.

39 Pound Street, Carshalton, Surrey. Tel. 01-699 6822
Soho House, 362-4 Soho Road, Handsworth, Birmingham. Tel. 021-554 0708
27 Cookridge Street, Leeds. Tel. 0532-452657

AGENTS (Evenings
and Weekend)

Alan GW3YSA, 35 Pen-Y-Waun, Efail Isaf. Nr. Pontypridd. Tel. Newtown Llantwit 3809
John G3JYG, 16 Harvard Road, Ringmer, Lewes, Sussex. Tel. Ringmer 812071
Sim GM3SAN, 19 Ellismuir Road, Baillieston, Nr. Glasgow. Tel. 041-771 0364

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SOUTH MIDLANDS

ESTABLISHED 1958 OVER

NOW! SMC NORTHERN ★ LEEDS BRANCH

SMC is extremely pleased to announce the opening of our Northern branch on July 3rd at the Chambers, No. 3 The Parade, North Lane, Headingley, where we will be delighted to demonstrate our wide range of equipment. For the convenience of our Northern customers, this branch will be open to 8 p.m. on Thursday and all day Saturday.

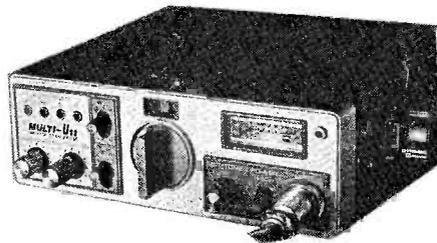
THE 432MHz. FM TRANSCIVER DESIGNED FOR TODAY'S USE AND TOMORROW'S NEEDS THE MULTI UII A NEW DIMENSION IN SEVENTY CENTIMETRE F.M.

A unique combination of frequency control by either external VFO, 23 switchable or 4 instantly selectable auto scanning channels.

Both the Tx deviation and the Rx bandwidth are switchable accommodating 50 or 25 kHz spacing.

The main dial is channel numbered (e.g. 16=433.4, 20=433.5 etc.) and is illuminated only when a channel is crystallised up. "Two R.F. stages in the receiver provide great sensitivity (0.5uV for 30dB NQ). The use of a band pass first IF (CF 45 MHz) gives high image immunity and low channel crystal drift. Further conversions to 10:7 and 455 prevent IF image whilst providing good pass and skirt selectivity". The transmitter of switchable 10/1W output draws only 2.5 or 1.3A (0.6 or 0.3A Rx) and has a netting of new crystal facility.

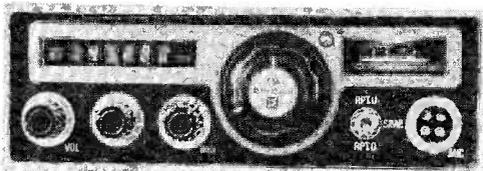
Other features include, diode RF switching, R.I.T., "on the air" lamp, PO meter, S meter, AFP, reverse polarity protection etc.



INTRODUCTORY PRICE ONLY £200 + VAT (AVAILABLE IN JULY)

CRYSTALS — MAINS PSU — SPEAKER BOX — XTAL TONE BURST — EXTRAS

COMPACT STATE OF THE ART 2 METRE FM TRANSCIVER THE DIGITAL II (FM 14.4-10SXRII) NEVER BUY ANOTHER CRYSTAL !!



The de luxe 2 metre F.M. transceiver with a 5 kHz stepped synthesiser and bright digital readout, from 6 seven segment LED's. Selectable 10 or 1 Watt output, for simplex or duplex (up and down shifts), across 144-146 (rx to 149 MHz) from a tiny 6½" x 2" x 7½". Easily underdash mounted with the supplied mounting bracket, or slipped in place of: he broadcast wireless.

For strong signal handling and low noise the R.F. mixer, first IF (16.9 MHz), second mixer (and LO) are all FET's. The front end is tuned by varicaps fed by the DC output of the P.L.L. with superb selectivity provided by a 9 or 15 pole, 12 kHz ceramic filter.

LED lamps indicate if the P.L.L. is unlocked or the squelch open.

The V.C.O. is directly modulated (for exceedingly linear deviation).

Unitary 6 circuit block construction (for serviceability and screening).

Selective calling socket (mic/LS/PTT etc.) on rear panel.

INTRODUCTORY PRICE ONLY £225 + VAT (AVAILABLE IN JULY)

Automatic crystal controlled tone burst wired to shift switch optional extra £10 + VAT

Send large S.A.E. for Free Yaesu catalogue and 22-page Stock/Price SH Lists



PLEASE NOTE THESE PRICES DO NOT INCLUDE VAT (8% or 12½%)
Terms—Cash with order or credit card holders just 'phone in for, if possible, same day despatch. Immediate H.P. available for card owners for amounts up to £225. Holders of current U.K. callsigns (where references have been provided) can be speedily cleared or normal H.P. at competitive rates is available.

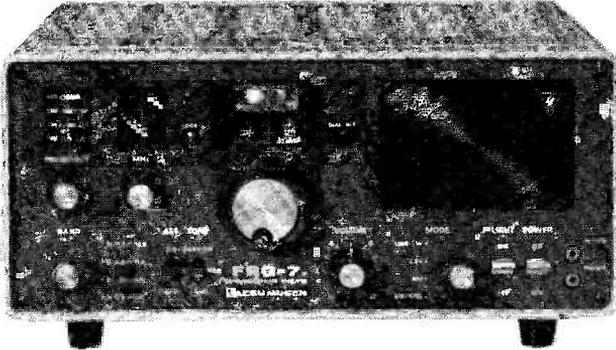


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YAESU SMC 2-YEAR GUARANTEE 24-HOUR SECURICOR SERVICE



FRG7 EX STOCK THIS MONTH

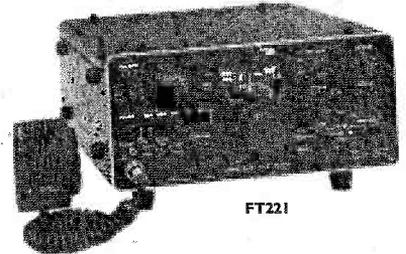
The FRG7 is a general coverage solid state receiver with specifications unparalleled in its price range. A spin tuned, phase locked synthesiser provides complete coverage from 500 kHz to 30 MHz to an accuracy better than 5 kHz. Frequency selection is accomplished by setting the RF (pre-selector and range switch), dialling up the required number of megahertz, then tuning the VFO knob as normal.

The receiver is sensitive (0.5µV or 10dB, S + N/N (SSB)) and stable (within 500Hz or any 30 minutes after warm up) with AM, SSB and CW modes catered for. A 3 position audio filter, RF attenuator, dial lamp conservation switch, recorded and phone sockets are fitted. It is mains powered, but should the supply fail, or portable operation be required, 8 dry cells are automatically switch in.

THREE MORE YAESU WINNERS ALL EX STOCK IN TOTTON

TWO METRE FT221

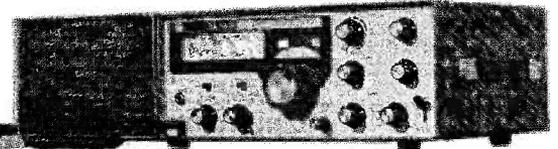
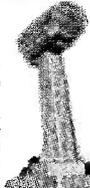
The FT221. The multimode USB, LSB, AM, FM, CW (with semi break-in and side tone), 2m. transceiver offering the choice of : phase locked VFO or 44 crystal channels, simplex or repeater (600 kHz up and down shifts), with unique "double push" auto tone burst, mains or 12v. (3A) operation, excellent selectivity, SSB 2.4 kHz (1.7 : 1 S.F.) or FM 12 kHz. Front panel adjustable VOX and mic gain, a calibrator (1 MHz ÷ 10), 1 kHz readout and linearity, sensitive squelch, clarifier with IRT and IRT with ITT (makes F.S.K. easy), switchable "S" and centre zero tuning meter, noise blander, serviceable plug in boards all contained in 11½" (14") x 5" x 11½", 22 lbs. rigid package.



FT221

ECONOMY TRANSCIEVER FT200B

The FT200B. The "Best Buy"—260W. P1.P. A3j, A1) 75W. (A3), 80 to 10m. (28.5-29 MHz, 3 other crystals optional). Sensitive and selective 2.3 kHz at 6 dB (1.75 : ISF). Solid state, stable, linear (readout to 1 kHz), gear driven VFO. 100 kHz calibrator, VOX/PPT, clarifier (±5 kHz). Semi break in CW with sidetone, etc., etc. The pre mix oscillator system used, yields : low spuri outputs on transmit, and the good signal handling and low noise capability of a single conversion superhet (whilst retaining a 9 MHz IF with high image rejection) and single range VFO stability.

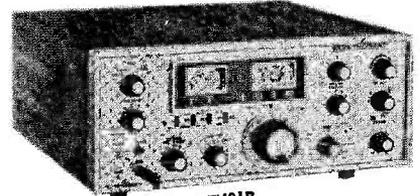


FP200

FT200

BASE STATION FT401B

The FT401B. The powerful base station, 560W. P1.P. A3j. (430W. A1, 90W. A3) on 80 through 10m. (+2 aux bands and 10 MHz RX.) from blower cooled 6KD6's. Stable, linear, V.F.O. (100Hz/30 mins. after warm up, or for 10% line change), readout to 1 kHz with less than 50Hz backlash. The receiver is sensitive and selective (2.4 kHz SSB (1.67 : 1) optional CW filter 600 Hz at 6 dB), with an AGC threshold of 1µV, attack of 2ms and switchable hang of 1 or 2 sec., image rejection of more than 50 dB. and 3W, audio output to external speaker from a compact 16" x 14" x 6", 40 lbs. package.



FT401B

FT301S - 10W Top to Ten SOLID STATE TRANSCIEVER - ORDER NOW

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South Midlands

ESTABLISHED 1958 — OVER 18

ANTENNAS MAKE THE STATION. THERE CAN BE LITTLE DOUBT THAT THE EFFICIENCY OF YOUR STATION IS GOVERNED AS MUCH BY WHAT IS OUTSIDE THE SHACK AS BY ITS CONTENTS
On these two pages we make some suggestions which might help you :

HY GAIN HF RANGE (Carr. £1.00-£2.50) VAT 12½%

The most common approach to the H.F. band beam is the compromise one of a Triband. The 11.3 range being particularly recommended. A more elaborate multi-bander is the mighty TH6DX which overcomes by a total of 6 elements problems of non-constant spacing. Optimum back to front and gain is offered only by the mono-banders. A 203BA with 4 elements on 20 metres provides a big signal.
Many stations are restricted by space, planners, finance or a temporary location. The 18AVT vertical offers coverage 10-80m, with a single slender 25ft. self supporting radiator. It is probably the most popular single antenna of its type on sale today.
For greater power handling elimination of traps ultra low radiation angle for good DX without the use of a rotator, the Hy-Tower standing to a total of 50ft., entirely self-supporting (occupying only 4 sq. ft. of land) is strongly recommended.

BN86 1:1 ferrite Balun ... £12.00	TH3NR 10-20m. 3 ele. ... £96.00
103BA 10m. 3 elements ... £43.50	TH3MKIII 10-20m. 3 ele. ... £137.00
153BA 15m. 3 element ... £54.50	TH6DX 10-20m. 6 ele. ... £151.80
203BA 20m. 4 element ... £103.40	total ... £164.50
402BA 40m. 2 element ... £146.00	HY QUAD 10-20m. 2 ele. ... £181.80
18V 10-80 Load Vert. ... £24.20	DB1015A 10-15m. 3 ele. ... £99.00
12AVQ 10-20m. Trap Vert. ... £32.56	LAI Lightning arrester gas £20.30
14AVQ 10-40m. Trap Vert. ... £46.20	L2 Lightning arrestor spark £3.30
18AVT/VVB 10-80m. Vert. ... £64.40	HY TOWER 10-80m. ... £162.80
TH2MKIII 10-20m. 2 ele. ... £94.00	Vert. ...

MOSLEY TRI-BAND BEAMS (Carr. £2.50) VAT 12½%

Ever popular on HF bands are Triband (10-15-20M) beams such as the TA33 (or 1 or higher powers the Mustang) which still offers good value for money.
TA33 3 ele. 200W R.M.S. ... £64.00 | TA32 2 ele. 300W A.M. ... £44.00
MUSTANG 3 ele. 2kW ... £82.50 | MUSTANG 2 ele. 1kW A.M. ... £66.00
P.I.P. ...

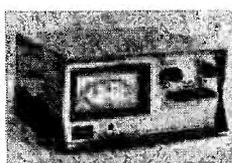
SMC TRAPPED DIPOLES (Carr. paid) VAT 12½%

For those with limited space, or restricted budgets the SMC trap dipole offers coverage of 10-80 (160)ft in 108ft. Suspended as a "Y" from the tower excellent results on 80 and 40m. are obtained.
S500W P.I.P. 14SWG ... £19.60 | P500W P.I.P. Cu/Terylene braid c/w 75' feeder etc. ... £11.75
HP 1K P.I.P. 14SWG ... £21.75

COAX PLUGS (p. & p. extra) VAT 8%

Whilst it is undoubtedly true that the UHF, PL259 range leave much to be desired over 200 MHz, their mechanical performance is excellent. We offer plugs in standard of P.T.F.E. insulation for 3" or (with reducers for) smaller cables. PL259A for specific cable types, nut, 2 or 4 hole fixing sockets and a range of adaptors and converters. For the discerning BNC, N and C types are stocked. For accessory connections we hold from stock phono plugs, plastic or metal barrelled, jack plugs, 1/8" stereo or mono mic plugs, power plugs (for the Yaesu range), and a wide collection of similar ancillaries.
PL59 Standard UHF plug ... £0.48 | SO239 Socket 2 hole ... £0.37
PL259 P.T.F.E. UHF plug ... £0.55 | "T" adaptor ... £1.20
UG175U Reducers ... £0.12 | Right angle adaptor ... £0.90
258 Back to Back ... £0.80 | Phono plug/SO239 ... £0.55

CDE ROTATORS



EX STOCK IN TOTTEN FOR FAST DELIVERY

(VAT—ROTORS 12½%; CABLE and DELV. 8%)
Carrage (B.R.S.) Free. Securicor delivery £1 extra
All rotators complete with appropriate control box and instructions.
AR30 (illus. centre and immediate right) ... £29.95
AR40 (illus. centre and far right) ... £38.50
AR33 De-Luxe control AR40 ... £44.75
CD44 (C.B. illus. left) medium duty ... £75.85
Ham 11 (C.B. illus. left) heavy duty ... £115.00
2010/220 Stolle ... £37.50
Control cable 5 core 20p/yard, 8 core 32p/yard

CUSHCRAFT VHF OMNI (Carr. 90p) VAT 12½%

Top the tower or mount on your chimney stack a 2m. gain vertical. The Ringo Ranger (ARX2) offers over the conventional ground plane elimination of unsightly radials and 6dB gain from only 9ft. 6in. (weighs less than 1½lb!)
If you prefer horizontal, omnis are available for net control, RAEN, SSB mobile, etc., etc.
ARX2 6dB Ringo Ranger ... £19.50 | ABW144 2m. Big Wheel ... £14.50
AR2 3dB Ringo Vert ... £12.00 | ABW125 ABW harness ... £7.30
AR25 ORO AR2 ... £14.20 | ASQ1 2m. Squalo ... £11.75
CX1000 29 MHz Ringo ... £23.20 | ASQ22 Stacked ASQ ... £24.15

JAYBEAM 70 (4m.), 144 (2m.), 432 (70) (Carr. about £1) VAT 12½%

For general work, with the emphasis on distant mobiles, Oscar etc., crossed yagis are increasingly popular. However, for maximum gain needed to push your signal over the horizon we would suggest long yagis, on 2, such as the 14Y/2M (offered exclusively by SMC) or the MBM88 for 70.

D5/2m. 5 over 5 slot feed ... £9.90	D8/70 8 over 8 slot feed ... £11.80
D8/2m. 8 over 8 slot feed ... £13.40	PBM18/70 18 ele. Para ... £13.75
SX/2m. 5 ele. crossed ... £10.30	MBM48/70 48 ele. Multi ... £15.20
8X/2m. 8 ele. crossed ... £12.90	MBM88/70 88 ele. Multi ... £20.35
10XY/2m. 10 ele. cross ... £17.75	12XY/70 12 ele. Crossed ... £20.90
5Y/2M 5 element yagi ... £5.40	4Y/4m. ele. yagi ... £8.50
8Y/2m 8 ele. yagi ... £7.00	PMH2/70 2 way harness ... £4.15
10Y/2m. 10 ele. long yagi ... £13.80	PMH2/4m. 2 way harness ... £6.60
14Y/2m. 14 ele. long yagi ... £17.85	PMH2/C Circ. phasing ... £8.60
Q4/2m. 4 ele. quad ... £10.50	PMH2/2m. 2 way harness ... £4.95
Q6/2m. 6 ele. quad ... £14.00	2010 Rotator automatic ... £40.00
PBM10/2m. 10 ele. Para ... £16.40	RZ100 Rotator bearing ... £10.00
PBM14/2m. 14 ele. Para ... £21.00	JBL15/59 2" Joint sleeve ... £1.65

GEM QUAD FIBREGLASS QUAD (Carr. £2.00) VAT 12½%

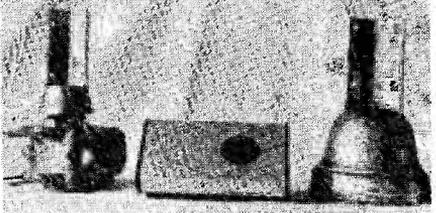
The advantages gained by boomless quad construction are not only mechanical. By the provision of optimum element spacing, on all bands covered, back to front and forward gain are optimised.

GQ2 2 ele. ... £95.00	GQ4E 4 ele. ... £198.00
GQ3E 3 ele. ... £147.00	CK1Q 1 ele. Conv. ... £55.00

CABLES RF FEEDERS (Carr. extra) VAT 8%

Feeders are the point where amateurs often sadly economise. For use mobile a cable with a stranded centre (UR76 etc.), for fixed a long unsupported run without a catenary, or allowing the cable to slap against the mast are taboo, breakages of the centre conductor will arise with disastrous results. If you are using a 3/16 cable changing to 1/8 can be the most cost effective improvement.

UR43 1-6dB at 10, 4:1 at 70, 6:5 at 144, 12:3 at 432 MHz per 100'	RG8/U 0.6dB at 10, 1.5 at 70, 2.5 at 144, 4.7 at 432 MHz per 100'
RG8/U 50 ohm Heavy yd. 30p	UR3975 ohm Medium yd. 23p
UR57 75 ohm Heavy yd. 34p	T3278 75 ohm Dist'n yd. 20p
75 ohm Flat twin yd. 6p	AR43 50 ohm Solid Cent yd. 14p
300 ohm Ribbon yd. 6p	UR76 50 ohm Strand Cent yd 14p



For further details of these items send large (10" x 12") s.a.e. or 15p stamps

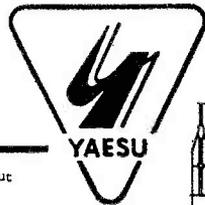


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**ON HF
ON HF/M
ON VHF**

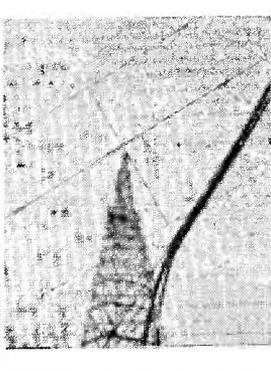
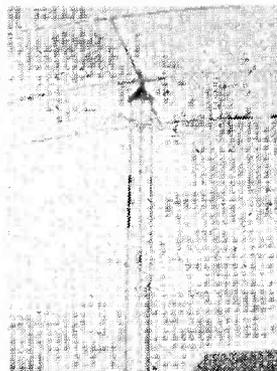
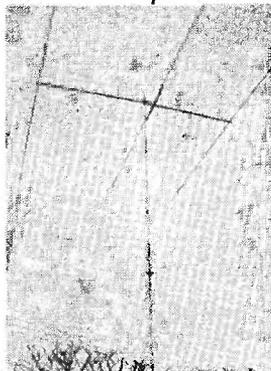
Tune your antennas for best front to back ratio, you will only lose a dB or so in forward gain but the QRM will be well worthwhile.

Try an extenda rod with your G whips to boost your LF mobile signal.

Consider the improvement a few dB's can bring to your 2m. station. If your 99% time distance is 100 miles (for a given signal strength) then an extra 9dB can push this up by 150 miles giving you 7-fold increase in workable area. If your antenna is at 20ft. 3dB comes from a mere 10ft. increase, 6dB if raised to 60ft. (60 miles range). For DX (400 miles) 3dB comes from a 30 to 60ft. change (more where the take off is obstructed). Remember that feeder loss must be added to your receiver noise figure. Pre-amps (and attendant cross-mod) by all means, but remember a change of coax (or buying or stacking antennas) yields a greater receiver improvement and, of course, gives you a higher ERP.

ON VHF/M

You effectively double your receiver sensitivity and transmit power when using a 5/8 whip (over 1/2 wave) and that an even greater improvement is effected with change from a halo to a clover leaf.



VERSATOWERS

TILTING TELESCOPIC

Post - Socket Post - Wall - Base Plate

British Steel have recently announced yet another price increase of 10 per cent (18 per cent on tube). This will be reflected in our prices as soon as our stocks are exhausted. Carr. extra (typically £14) +8% VAT.

P25	£161.59	F80	£366.03
P40	£208.01	W40	£162.03
P60	£246.84	BP60	£268.07

Most ex stock in Totton

ALIMASTS

TELESCOPIC LIGHTWEIGHT

1-5, 2 or 3m.: Quick Lock Sections 13 versions, 6 to 21m. from stock. Rigging extra. Carr. £2 VAT 8%

5 x 2m	£24.75	4 x 3m	£26.50
6 x 2m	£32.90	5 x 3m	£32.40
7 x 2m	£38.75	6 x 3m	£38.75
8 x 2m	£40.50	7 x 3m	£49.00
3 x 3m	£20.50		

a strike considerably (also SKA surge capability!!). RF distribution in the shack by the old faithful KWV, or the new "coax" slide switches. The continuous in line monitoring of VSWR lets you know of any change in your system immediately.

TELOMAST WITH TA33 TELESCOPIC GALVANISED
10' sections without or c/w rigging. Carriage £2.75, ex-stock VAT 8%
30' £22.85 or £41.75 c/w rigging
40' £29.75 or £53.75 c/w rigging
60' £37.95 or £69.95 c/w rigging

HAMTOWER with TH3 Jnr. SELF SUPPORTING
Galvanised lattice 10' sections. Free-standing with climbing steps. Carriage £3.50 ex stock 8% VAT
30' c/w base grillage ... £135.00
40' c/w base grillage ... P.O.A.

TELETOWER with TH3 Mk. III TELESCOPIC GALVANISED
Carriage and rigging (RX) extra
42' ... £121.00 (RK £28)
57' ... £174.00 (RK £28)
79' ... £224.50 (RK £49)
101' ... £303.50 (RK £76)



COAX SLIDE SWITCHES

Up to: 1kW, 1-5 GHz, 0-3 dB loss, 1:2 : 1 VSWR, 50dB isolation. 50 ohm "N" or "PL" fittings available.

EX-STOCK P & P 30p, VAT 8% only
TWS 120G 1 in 2 out Nickle SO239 ... £4.90
TWS 150G 1 in 5 out Gold SO239 ... £10.45



LIGHTNING ARRESTER

Gas discharge (90V strike), 50 ohms, SO239 fittings Up to: 1:1 : 1 VSWR, 1 GHz, 0-2dB loss, 5KA, 5A AC.

Ex-Stock Post and packing 20p VAT 8%
NSK75 Low Price ... £7.50

AEC METERS

Ex-Stock—Power, SWR and Field Strength (p. & p. 40p VAT 8% only)

SWR10 (T.L.H.), 50/75 Ω, SWR (±10%), 1-5 MHz up ...	£8-15
SWR20 (B.L.H.), 50 Ω, SWR (±10%), 1-5 MHz up, F.S., Power 10 and 100W FSD (±10%) ...	£9-90
SWR (centre) 50/75 Ω, SWR (±10%), 1-5 MHz up F.S. ...	£7-80
SWR50A (T.R.H.), 50/75 Ω, SWR (±5%) 3-5 MHz up. Power to 1kW (±20%) ...	£9-60
SWR50 (B.R.M.) as SWR50A (800μA) but 100μA meters ...	£11-20

BANTEX VHF WHIPS (Carr. 80p) VAT 12½%

The mobile season is with us again. For 2m. ssb a Cushcraft, for FM a 1/2 or 3/4 Bantex roof mounted (on the standard or magnetic base). If the mounting is to be lower down use a longer 3dB antenna only.

BS 1/4 145 MHz ...	£6-35	70 1/2 70 MHz ...	£4-00
BGA (f.g. 1/2 2m. fibreglass ...	£8-75	Trunk Lip Mount ...	£5-25
BGA s.s. 1/2 2m. stainless s. ...	£8-50	Magnetic Base Mount ...	£8-50
BSU 1/4 430 MHz ...	£5-00	Standard base unwanted deduct... ..	£0-50

G WHIP HF MOBILE (Carr. 80p) VAT 12½%

For HF your choice from the G Whip range. A self selecting Multimobile, a slimline Tribander, or robust Flexiwhip mounted on the standard base or for an adaptor for the American mount.

Tribander 10-20m. (+LF)	£13-53	Base mount 1/4" hole mount	£2-20
Multimobile 10-20m.		LF40, 80 or 160 ...	£4-51
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Flexiwhip 10m. (+FF)	£11-50	FF15, 20, 40, 80 or 160 ...	£4-67
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We normally have the full range of this equipment available. Check with us for prices and details.

UNIDEN

The new Uniden 2020 Transceiver proving to be very popular indeed, this proved to be a real good seller in May.

We can also supply equipment by Icom, Decca Communications, Belcom, Swan and the new Atlas range. Along with accessories, antenna's by Hy-Gain, G-Whip, Jaybeam, Microwave Modules, Barlow Wyadley, CDR Tech, Space-mark, Technical Associates, etc. Send large S.A.E. and we will send any information you require.

Please note all equipment is air tested before sale. We do not employ any part time employees for sale of equipment all sales made from the above premises and we do not supply to any individual for re-sale from private accommodation.

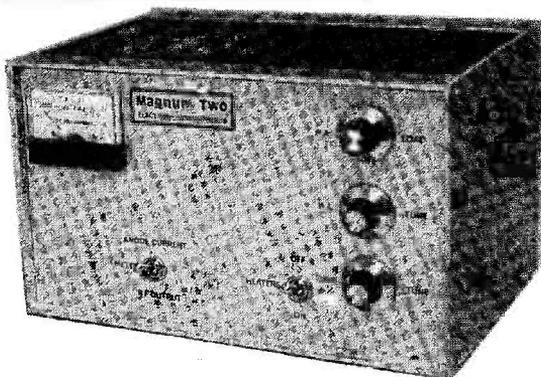
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Tech 15 G.D.O.	(post 48p)	£25.00
Morse Keys	(post 35p)	£6.75
Katsumi Electronic Keyer	(post 48p)	£40.50
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Osker SWR Power Meter (S)	(post 48p)	£24.00
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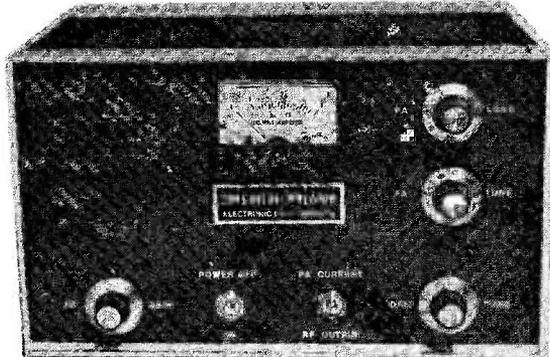
For the caller we have a wide range of cabinets, chassis etc.

SECONDHAND EQUIPMENT

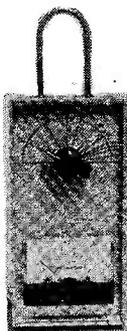
Yaesu FT220 Transceiver	£245.00
Eddystone 940 Receiver	£150.00
Swan 700 CX Transceiver	£380.00
FLDX50D Transmitter	£125.00
Eddystone 840C Receiver	£60.00
Yaesu FT200B Transceiver	£250.00
Liner 2 Transceiver	£120.00
Beltak 2m. Transceiver	£65.00
FL2100 Linear Amp.	£224.00



Electronic Developments MAGNUM 2 and 4 Metre Transverters. 28 MHz low drive input, CW, SSB, AM and FM. Inclusive of relays and power lead, size 10" x 6" x 7". **£100**

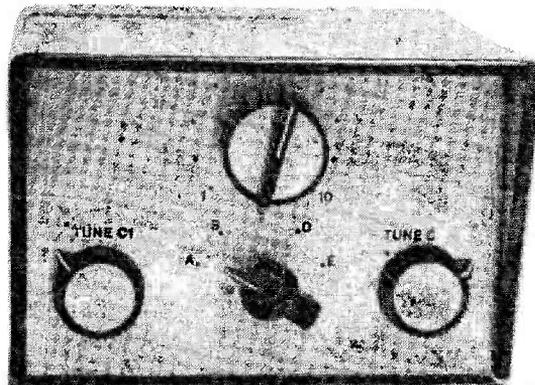


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VHF Absorption Wavemeter. 65-230 MHz. Post free. **£16.00**

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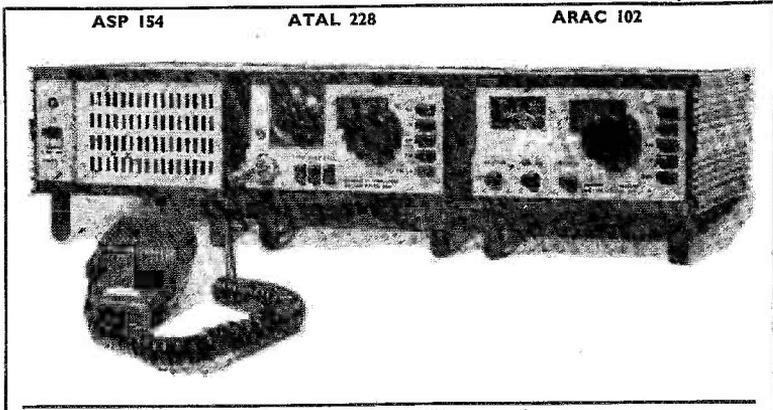
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During the last two years the popularity of the range of equipment by S.T.E. has been growing. The ARAC 102 receiver has been a "Best Seller" (have you seen any second-hand?). Later in the year the Atal Transmitter came into stock and all reports have been good. Now we are offering the complete range of modules for the D.I.Y. enthusiasts. Transmitters, receivers, etc. The construction of these modules are first class — the P.C.B's are the finest we have ever seen.

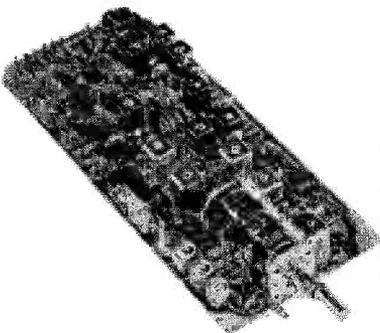
The construction of these modules are first class — the P.C.B's are the finest we have ever seen.

Price List (includes postage)

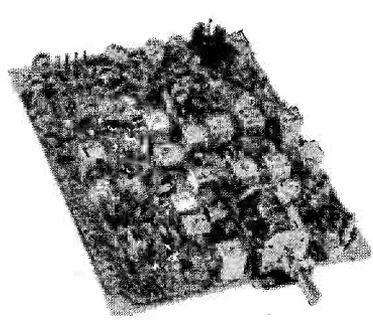
- ARAC 102 Receiver ... £100.00
- Atal 228 Transmitter ... £126.00
- ASAP 154 AC PSU with speaker £35.00
- AR10 Receiver Module ... £35.00
- AA1 Audio Amplifier ... £4.10
- AD4 FM Discriminator ... £4.75
- AL8 Linear Amplifier ... £27.00
- AT22 Transmitter ... £50.00
- AR20 C.C. Receiver ... £50.00
- AT23 C.C. Transmitter ... £36.00
- AS 15 Stabilised psu D.C. ... £10.00
- AG 10 Tone Generator ... £4.50
- AC2A Converter 28-30 MHz £20.00



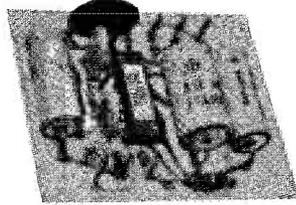
SPEAKER AC POWER SUPPLY UNIT 144 - 146 MHz **AM FM TRANSMITTER** with Microphone 28-30 MHz 144-146 MHz **AM-FM-SSB RECEIVER**



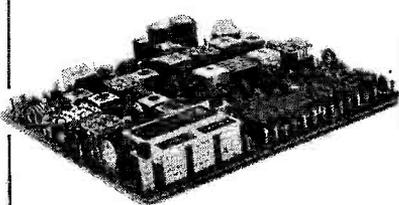
AR10 Mosfet receiver. 28-30 MHz Double conversion superhet. RF and amplifiers stages are gate protected mosfets for good sensitivity and low intermodulation. Noise limiter and squelch circuit. AM, SSB and CW reception. 12v. DC.



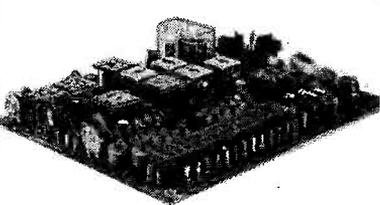
AT 222. A complete transmitter exciter unit for 144-146 MHz on AM or FM. VFO controlled or fixed channel operation. Complete with microphone pre-amp., speech processor including active audio filter. 1 watt output. FM. .25 watt AM. Output impedance 50-75 ohm adjustable. Frequency deviation 3-10 kHz adjustable.



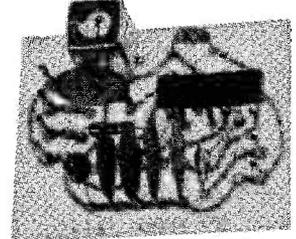
Audio Frequency Amplifier. Output power 1.5 watt at 12v. Output impedance 8 ohm. Frequency response 100-15,000 Hz within 3 dB. Sensitivity 12mV.



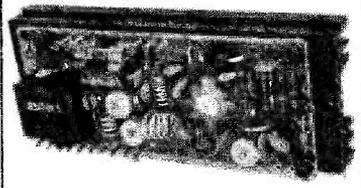
AR20. 12 channel FM receiver 144-146 MHz. Input impedance 50-75 ohm. AM-FM modes. Sensitivity 0.2uV AF output 3 watts. 12v. DC operation.



AT23. 12 Channel FM Transmitter. 3 watts. 144-146 MHz. Frequency deviation 3-10 kHz adjustable. 12v. DC operated AF input sensitivity 2mV adjustable to 50 mV.



455 kHz FM Discriminator Amplifier. Limiting threshold 100uV. Amplitude modulation rejection 40dB. Audio output voltage at 1 kHz 200-300mV frequency deviation + or - 3 kHz.



Linear Amplifier. Frequency 144-146 MHz output 10 watts FM, 8 watt PEP SSB, 8 watt AM. Input power 1 watt FM, .25 watt AM-SSB. Input impedance 50 ohm output impedance 50-75 ohm. 12v. DC.

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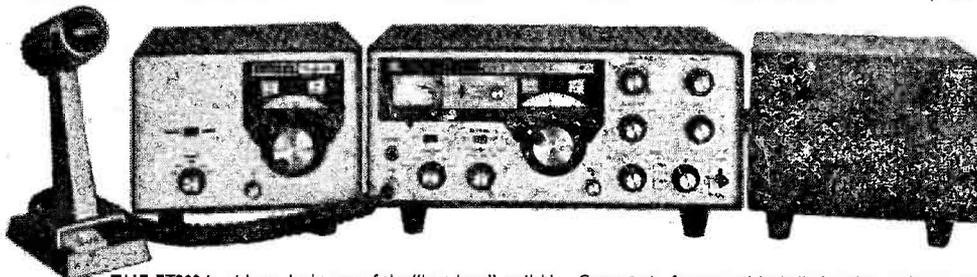
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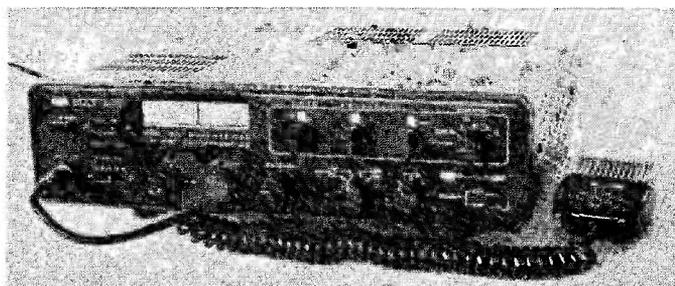
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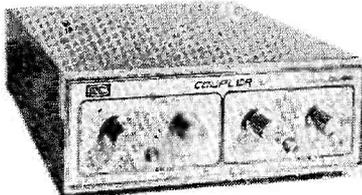
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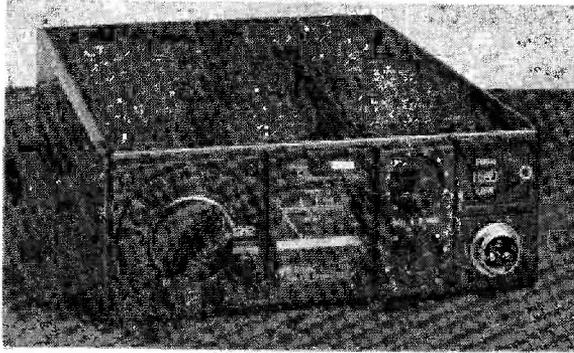


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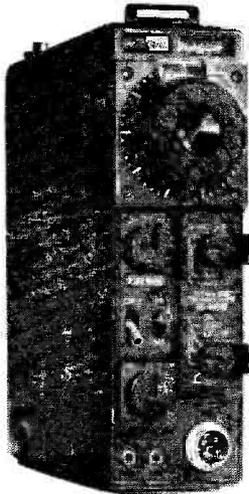


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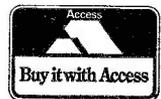
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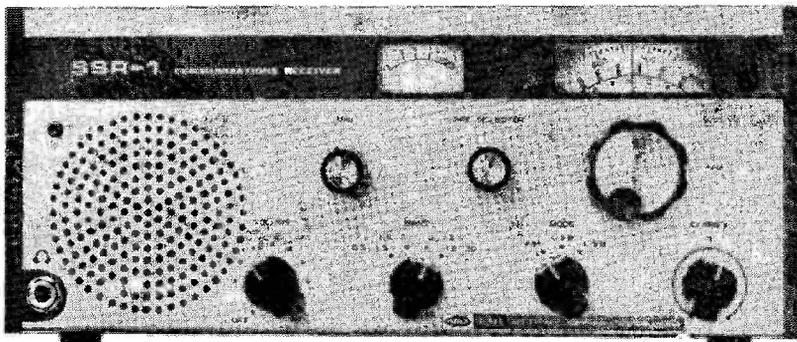
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AMATEUR ELECTRONICS UK

YOUR FIRST CHOICE FOR YAESU MUSEN!

AND THE SUPERB

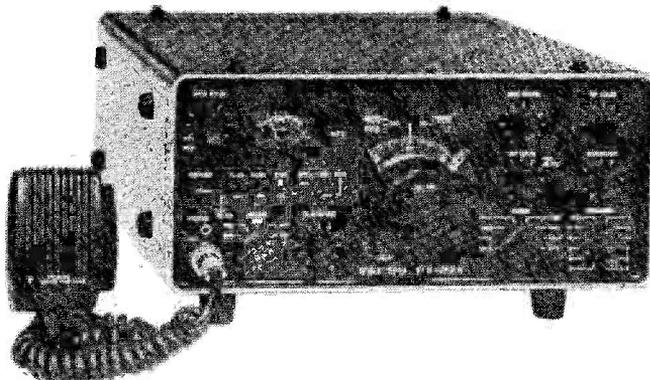
FT-221

SSB/FM/CW/AM

2 Metre

Transceiver

(Ex-stock)



MAIN AGENT

A COUPLE OF STAMPS (NO ENVELOPE REQUIRED) BRINGS THE FT-221 OR ATLAS LEAFLET. IF YOU WOULD LIKE THE LATEST YAESU MUSEN MAIN CATALOGUE—DUE TO LIMITED SUPPLIES OUR CHARGE FOR THIS REMAINS AT 25 PENCE POST PAID, BUT FOR THE BENEFIT OF THE SERIOUS ENQUIRER THIS NOW COMES TO YOU TOGETHER WITH OUR CREDIT VOUCHER VALUE £1 FOR USE AGAINST YOUR FUTURE YAESU PURCHASE.

The Sensational ATLAS-210/215X—LATEST MODELS

SEVEN POUNDS! OF DYNAMITE!

200 WATTS P.E.P. INPUT
SSB AND CW (120W on Ten)



SEE LAST MONTH'S ISSUE FOR FULLER DETAILS OF THIS EXCITING NEW RIG
—BOTH MODELS NOW AVAILABLE EX-STOCK

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AGENTS SCOTTISH—RON TURNER, GM8HXQ, WISHAW 72172
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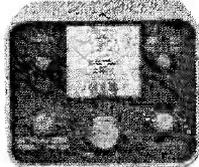
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PROFESSIONAL PERFORMANCE

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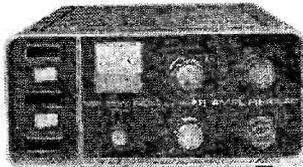
KW 108
KW 108 Monitor Scope. Monitor your transmissions 10-160m. two-tone test generator incorporated to ensure optimum linearity for SSB.



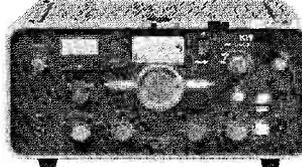
KW 107
KW 107 Antenna Tuning System. Incorporates E-Z match, SWR/RF Power meter dummy load, Antenna switch. High power version KW 109 is available.



KW 2000E and Power Supply
KW 2000E Transceiver covers all HF Bands 10-160 metres (10 metres in 4 Bands), 500 kHz VFO. SSB/CW. Outstanding TX audio quality. Excellent receiver signal-noise figures. Includes VOX, break-in CW, 100 kHz and WWVY calibrator. Reliable 6146's in P.A.



KW 1000
KW 1000 Linear Amplifier. 10-80 metres. 120 watts PEP input max. Designed to be "driven" by KW 2000A/B/E or other Unit of similar power rating. In-built 2.5 Kv. PSU. PA tubes pair T160L. Very quiet in operation.



KW 204
KW 204 Transmitter. Well known for really good audio quality (SSB) and a favourite with CW enthusiasts. 10-160 metres. Reliable PA Tubes (2 x 6146).

Other KW Favourites.
KW 1000 Linear Amplifier; KW E-Z match ATU; KW 160 ATU; KW 103 SWR/RF Power meter; KW Dummy Load; KW Traps (The original and best) KW Trap Dipoles; KW 109 Supermatch (High Power Version) KW Low pass Filter; KW Balun; KW Antenna Switch.
Stockists for Hy-Gain beams and verticals, CDR rotators, Shure microphones, etc.
KW Spares are normally carried for a minimum of five years after date of manufacture of equipment.

Write or 'phone for catalogue to:—
Easy Terms on equipment available over 12, 18 or 24 months

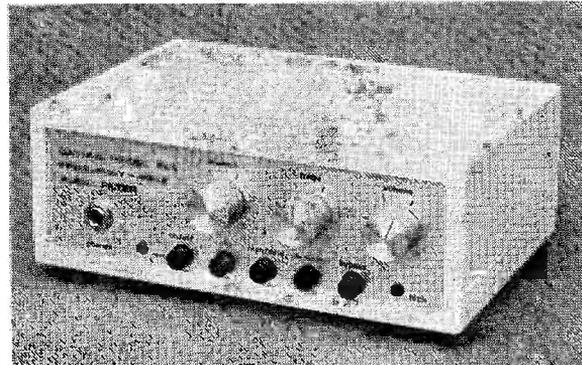
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ADVANCED TECHNOLOGY FOR THE DISCERNING AMATEUR



FREQUENCY-AGILE AUDIO FILTER MODEL FL1

Fast becoming a classic, Model FL1 delights and amazes all who hear it in action. This unique product improves any receiver and is installed simply by connecting in series with the receiver's loudspeaker. It offers the following advanced features:

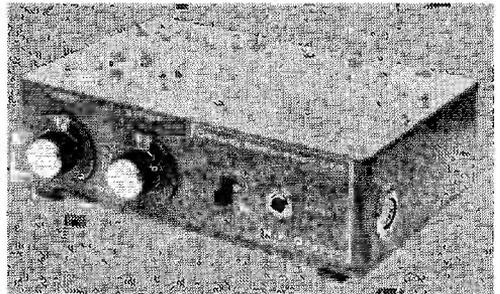
- * A notch filter which tunes itself for fully automatic removal of unwanted whistles in phone reception. With Model FL1 in circuit you can ignore tune-up whistles.
 - * Fully variable bandwidth tailoring for enhancing phone reception in the presence of interference and sideband splatter.
 - * Band pass filtering with fully variable centre frequency and bandwidth (1000Hz to 25Hz) plus s.f.c., for the kind of CW reception which you would not have believed possible.
- Supplied with connectors and full instructions. Ready-made connecting leads also available.

Price £47.50 plus 12½% VAT (£53.44 total)

All Datong products are designed and built to professional standards using high quality components and glass-epoxy printed circuit boards. Prices include free delivery in U.K. only. Free data sheets on any product are available on request.

DATONG ELECTRONICS LTD.

11 MOOR PARK AVENUE • LEEDS LS6 4BT • TELEPHONE 0532-755579



UNIVERSAL R.F. SPEECH CLIPPER

Still unmatched after two highly successful years, the "Datong r. Clipper" has become the standard by which other speech processors are judged. It is used the world over by serious DXers and professionals. As reviewed in Rad. Com. (Aug. 1974) and Short Wave Magazine (July 1975).

- * Comparable to a linear for improving your SSB DX potential, the Datong r.f. clipper introduces negligible distortion, while raising your average radiated power. A Datong and a linear put your signal in the multi-kilowatt class.
- * Gives true r.f. clipping yet with no installation headaches. Simply connects in series with the microphone.
- * Works with virtually any make of transmitter.
- * Equally effective for FM and AM as well as SSB.

Model RFC (illus.) price £38.88 plus 12½% VAT (£43.74 total)
Also available with Jap 4 pin connector and complete with matching output lead, inclusive price, £41.90 plus 12½% VAT (£47.14 total). Please state pin connections required.

Fully aligned and tested P.C. Module, Model RFC/M: price £19.50 plus 12½% VAT (total £21.94)

Do you want to know a secret ?

Keep it to yourself, won't you, but did YOU know that we have the widest range of VHF and UHF equipment available to meet the most stringent requirements of the discerning amateur radio enthusiast, who is continuously endeavouring to keep his shack up to date without upsetting his bank manager.

It's no secret, though, that we have recently expanded our entire production capacity, enabling us not just to manufacture our standard range of first class VHF/UHF converters and varactor triplers, which have gained world wide acclaim over several years, but to arouse new interest by launching on to the market certain new products such as our 432 MHz SSB transverter, 50 MHz 6 digit frequency counter and its companion \div 10 500 MHz prescaler. Even these relatively new products have already earned a valuable reputation both at home and abroad.

This month we are briefly reviewing this wide range, but please do not hesitate to contact us by either post or telephone for any technical details, or to request detailed data sheets for any of the products mentioned below.

1296 MHz

- MMC1296 :** 1296 MHz receive converter utilising a hybrid ring mixer, with a matched pair of schottky diodes driving a Mosfet IF amplifier.
 IF's : 28-30, 144-146 MHz.
 Price : £24.30 inc. VAT.
- MMV1296 :** 1296 MHz varactor tripler. Will accept up to 24 watts of 432 MHz drive and achieves 60% efficiency.
 Price : £27.00 inc. VAT.

144 MHz

- MMC144/28 :** Single conversion 144 MHz receive converter with protected dual gate Mosfets.
 Typical gain : 30dB. Noise figure : 2.5 dB.
 IF's : 12-14, 14-16, 18-20, 24-26, 28-30 MHz.
 Price : £18.00 inc. VAT.
- MMC144/28LO :** As above unit but has an extra buffer amplifier at 116 MHz for use in transverters.
 Provides 5mW, at 116 MHz.
 Price : £19.80 inc. VAT.
- MMC144/2 :** Double conversion 144MHz receive converter which achieves good image rejection at low intermediate frequencies.
 IF's : 2-4, 4-6 MHz.
 Price : £18.00 inc. VAT.
- MMAI44 :** Low noise preamplifier with two independent outputs.
 Typical gain : 18dB.
 Available also for 70 or 136 MHz.
 Price : £11.70 inc. VAT.

70 MHz

- MMC70/28 :** Receive converter for 70 MHz.
 Similar to MMC144/28.
 IF's : 4-4.7, 14-14.7, 18-18.7, 28-28.8 MHz.
 Price : £18.00 inc. VAT.
- MMC70/28LO :** Similar to MMC144/28LO.
 Features buffered local oscillator facility at 42 MHz for transverter use.
 Price : £19.80 inc. VAT.

432 MHz

- MMC432 :** 432 MHz receive converter featuring 2 RF amplifiers and a Mosfet mixer.
 Typical gain : 30 dB. Noise figure : 3.8dB.
 IF's : 14-16, 18-20, 144-146 MHz.
 Price : £19.80 inc. VAT.
- MMV432 :** 432 MHz varactor tripler. Revised specification allows up to 30 watts of 144 MHz drive and achieves 70% efficiency.
 Price : £19.80 inc. VAT.
- MMT432 :** 432 MHz SSB transverter.
 Features : 10 watts RMS output power.
 30dB receive gain.
 3-0dB noise figure.
 Aerial changeover achieved by a pin diode switch.
 IF's : 28-30, 50-52, 52-54 MHz.
 Price : £94.50 inc. VAT.

DIGITAL PRODUCTS

- MMD050 :** Six digit 50 MHz frequency counter.
 Frequency range : 0.45-50 MHz.
 Input sensitivity : Better than 50mV RMS.
 Price : £66.00 inc. VAT.
- MMD500P :** Divide by 10 prescaler to give 500 MHz capability when used with **MMD050**.
 Fully TTL compatible. Output level is 2.5 volts p.p.
 Input sensitivity : Better than 200mV.
 Frequency range : 50-500 MHz.
 Price : £27.00 VAT.

STOP PRESS

DIGITAL FREQUENCY METER BREAKTHROUGH !!
 NEW !! MMD050 / 500
 Combined frequency counter and prescaler : 0.45-500 MHz coverage. All in diecast box 111 x 60 x 27 mm.
 Available from stock at £93.00 inc. VAT.

Just a phone call will put you in touch with our experienced sales and technical staff, who will be pleased to assist you with any queries you may have.

Incidentally, all of our products are fully guaranteed for 12 months.

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S.S.M. SOLID STATE MODULES

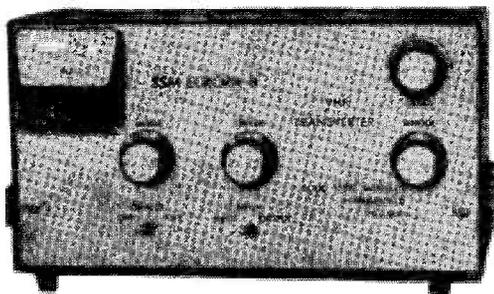
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EUROPA B THE WORLD'S BEST SELLING 2M TRANSVERTER



VHF TRANSVERTER, EUROPA B 2 METRE OR 4 METRE OR 6 METRE

In production now for over three years and in use all over the world and ideal for normal tropo or OSCAR work. The Europa B plugs into Yasu/Sommerkamp equipment and you are on VHF. All other HF equipment can be used with our Europa power supply the CPS 10.

THE EUROPA B gives you :

- ★ The confidence of our most efficient back up service in the 12 month warranty period and beyond.
- ★ Highest transmit power available 200W. Highest receive sensitivity available—2dB N.F.
- ★ Compact, attractive appearance will complement your station. Size : 9" x 4½" front panel, 4½" deep.
- ★ Cleanest output spectrum available. All spurious outputs -80dB.
- ★ Price : £98-50 complete to plug in and from stock.

EUROPA COMPLETE POWER SUPPLY TYPE CPS 10

Supplies all voltages to Europa and contains a dummy load attenuator to make the Europa compatible with any HF equipment. Price : £45-00 —Ex stock.

VHF CONVERTERS, 2 METRES, 4 METRES, 70 cms., SATELLITE BAND AND MARINE BAND FROM STOCK. Other frequencies to order.

SENTINEL DUAL GATE MOSFET CONVERTERS

- ★ N.F. -2dB. Gain -30dB.
- ★ No oscillator frequency multiplication to reduce spurious signals.
- ★ Very high tolerance crystals, 5 p.p.m. for calibration accuracy.
- ★ Strong signal and overvoltage and reverse polarity protection built in.
- ★ Standard I.F.s are : 2 metres : 28-30 MHz, 2-4 MHz, 4-6 MHz, 4 metres : 28-28.7 MHz.
- ★ Size only : 2½" x 1½" x 3" long except 2-4 MHz, 4-6 MHz which are double conversion and 4" long. Price only £16-88 and ex-stock.

All prices include 12½% VAT and delivery. 12 months guarantee on all units. We offer same day COD (£50 limit)

ACCESS



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H.P. or C.W.O.

JUST PHONE YOUR CREDIT CARD NUMBER FOR SAME DAY SERVICE

If you require more detailed information or help, we are a telephone call or a letter away, so do not hesitate to ask
You can call in anytime to inspect or collect equipment. Paul, G3MXG.

SENTINEL 2 METRE CONVERTER KIT, 28-30 MHz IF ONLY
A well proven kit supplied with printed circuit board drilled and with all coils mounted to make assembly easy. Price £11-50, ex-stock and IF it doesn't work send it back with £2-10 and we will align it. YOU CAN'T GO WRONG!

SENTINEL X 2 METRE CONVERTER

A de luxe version of the Sentinel. Performance spec. is the same but it contains an external mains power supply and a front panel RF gain control.

- ★ Size : 5" x 1½" front panel, 4" deep.
- ★ Stock 2 metre I.F.'s : 28-30 MHz, 2-4 MHz, 4-6 MHz. Price : £22-00. Ex stock.

SENTINEL MF— Another Dual Gate MOSFET 2 metre converter which converts to medium wave in 2 switched bands. Price : £20-00. Ex stock.

2 METRE or 4 METRE PRE-AMPLIFIERS. These can be supplied for Satellite and Marine Band from stock. Other frequencies to order. Two models to choose from :

SENTINEL LOW NOISE FET PRE-AMPLIFIER

- ★ This pre-amplifier uses a selected low noise FET to provide the ultimate in sensitivity and selectivity.
- ★ Isolated supply lines, compatible with any equipment.
- ★ Low noise figure—1dB. High gain—18dB.
- ★ Size : 1½" x 2½" x 3". Price : £8-72. Ex stock.

PA3 DUAL GATE MOSFET PRE-AMP

- ★ Small about 1 cubic inch, printed circuit pre-amp. Now incorporated in thousands of transceivers.
- ★ Low noise figure -2dB. Gain 18dB. Price : £6-27 with fitting instructions.

70cm. U.H.F. CONVERTERS AND PRE-AMPS

SM70, 70cm. to 2 metre FET converter. This is a very high performance 70cm. converter at a very attractive price. Size : 1½" x 2½" x 3". N.F. 3-5dB. Gain 30dB. Price : £16-88. Ex stock.

SM71 70cm. (432 MHz) PRE-AMPLIFIER

Selected FET's give a noise figure of -3.5dB and a gain of 18dB. Size : 2½" x 1½" x 4". This unit is also available on other frequencies, e.g. 400MHz region for satellite or radio astronomy use, for which it was originally developed. Price : £10-00. Ex stock.

NEW

SSM Z MATCH 80-10 METRES

This unit has been produced to satisfy the constant demand for a compact matching unit to meet the critical load requirement of the modern P.A. Receivers are also becoming more sensitive to aerial matching and our Z match can of course be used to match the aerial to your receiver. The units have been tested at 2KW CW output power into a Bird Terminal Wattmeter/Dummy load. The aerial connections can be used with balanced or unbalanced feeders and the connectors are screw terminals for wire aerials AND SQ239's for co-ax fed aerials. Don't forget Multiband Aerials respond as well to your harmonics as the wanted signals. Our Z Match will provide harmonic attenuation as a bonus. Price is only £26-55.

Record-breaking Space-saving Antenna

The average house and garden just doesn't lend itself to effective antennae . . . and, after all, be it milli- or Mega-Watts, a good radiator is a MUST . . . you need to hear them too! Flats and other restricted property can be a real headache. BUT THERE IS AN ANSWER, the JOYSTICK VFA (variable frequency antenna), the compact unit giving you a six band omni-directional aerial that can, if you wish, just stand in the corner of the shack.

This revolutionary invention has scored 5 & 9 for the best DX vs. QRP QSO on record and inspired thousands of testimonials. One satisfied customer reports that when operated five feet below ground results equalled the station dipole, elevating the VFA just left the dipole standing!

ALREADY IN USE BY AMATEUR TRANSMITTING AND SWL STATIONS WORLD-WIDE AND IN GOVERNMENT COMMUNICATION

PRICES INCLUDE V A T,
INSURANCE AND DELIVERY
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Just Telephone Your Card Number



Tel.: 0843 62535 (or 62839 after office hours)

JOYSTICK VFA £17-25, **JOYMATCH ATU's** : 111 (Med. wave —30 MHz) £17-25, 111A (1.6-30 MHz) £17-25, 111B (L-match, 1.6-30 MHz) £15-76, **LO-Z 500** (1.8 thru 30 MHz, 500W.) £21-86, **BUDGET LINE ATU** 1.6-30 MHz £8-67, **ATU Med. and SW Bands** £8-67 (both in kit form £7-17) **Aerial Bandswitch** (complete aerial system, medium and SW Bands) £7-17, **Artificial Earth** £7-17, **DX CRYSTAL SET** (Home and world-wide reception) ready to use £4-75, **COMM. HEADPHONES** 8-ohm, £4-54, **FIELD STRENGTH METER** £1-83, **SET VALVES** 9R59DS £5-85, **CO-AX CABLE**, 50 or 75 ohms, per 10 metres £1-50, **SYSTEM "A" VFA** + 111B £32-40, **SYSTEM "D" VFA** + Aerial B/Switch £24-20, **SYSTEM "J" VFA** + LO-Z 500 £38-60.

PARTRIDGE SUPER PACKAGE

COMPLETE RADIO STATION FOR ANY LOCATION

Comprising: Trio QR 666 Gen. Cov. Rx, Headphones, VFA, System "A," all connecting cables. Delivery: Securicor (our risk). **ASSEMBLED IN SECONDS! SAVE £11-06!**—OR QR 666 £163-12 INCL.

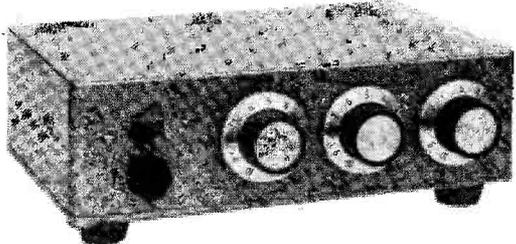
£189-00

Send stamp for details and expert advice

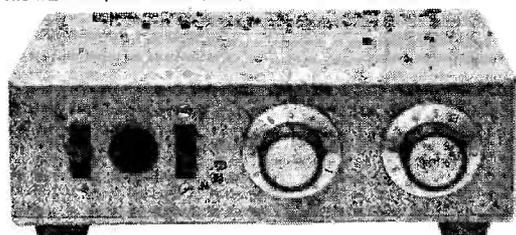
BOX 4 **PARTRIDGE ELECTRONIC LTD** BROADSTAIRS, NENT ENGLAND

G3CED G3VFA

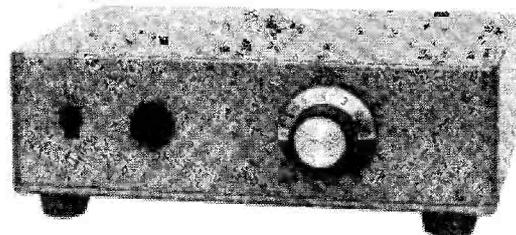
TECHNICAL ASSOCIATES COMMUNICATION AIDS



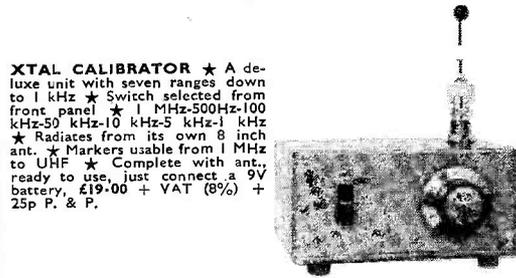
AUDIO COMPRESSOR ★ Suitable for SSB/AM/FM ★ pure compression, no clipping! ★ 24 to 26dBs of compression, with less than 1% distortion ★ fast attack time in the order of 200 microseconds ★ variable decay time, on front panel ★ variable noise gate on front panel prevents ambient noise level tripping, vox or being tx in pauses in speech ★ all functions routed to output in "off" position ★ goes between mic and tx no mods involved ★ these compressors have been tested alongside commercial rf clippers, the only difference at the receiving end was far superior audio quality, £21-00 + VAT (12½%) + 50p P.&P.



RX PEAK AND NOTCH FILTER ★ no gimmicks ★ all integrated circuit ★ will clear QRM in seconds ★ 1 watt o/p stage ★ headphone socket ★ goes between RX and loudspeaker ★ by-pass switch ★ can be used in series with our famous band-pass filter ★ notch-width control for optimum width of notch ★ tune control allows you to put the notch or peak where you want it ★ runs from internal PP9 battery or any supply from 9V to 15V ★ will also peak up CW signals, £23-00 + VAT (12½%), + 50p P. & P.



RX BAND PASS FILTER ★ 9 integrated circuits ★ 1 watt O/P stage ★ headphone socket ★ 8 switched positions of filter ★ high pass—2.5kHz-2.00kHz-1.5kHz-200Hz-100Hz-10Hz-80Hz ★ Bandwidths selected for optimum readability on AM, SSB, FM, CW ★ can be used in series with our peak and notch filter, giving the operator total control over bandwidth and QRM conditions ★ makes the poor RX superb and the superb RX better ★ runs from internal PP9 battery or any supply from 9V to 15V, £23-00 + VAT (12½%) + 50p P. & P.



XTAL CALIBRATOR ★ A deluxe unit with seven ranges down to 1 kHz ★ Switch selected from front panel ★ 1 MHz-500Hz-100 kHz-50 kHz-10 kHz-5 kHz-1 kHz ★ Radiates from its own 8 inch ant. ★ Markers usable from 1 MHz to UHF ★ Complete with ant. ready to use, just connect a 9V battery, £19-00 + VAT (8%) + 25p P. & P.

TECHNICAL ASSOCIATES
83 SCOTLAND WAY, HORSFORTH, LEEDS, YORKSHIRE
Tel. HORSFORTH 586735

WATERS & STANTON ELECTRONICS



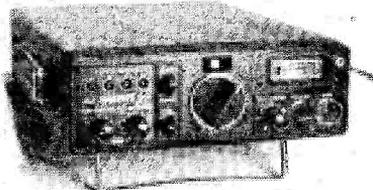
New 2m & 70cm Multi Range

H.P. IS OUR SPECIALITY

WE INTRODUCE A NEW EXCITING RANGE OF ADVANCED EQUIPMENT WITH ALL THOSE FEATURES YOU HAVE ASKED FOR. PRODUCED FOR US BY ONE OF JAPAN'S FOREMOST COMMUNICATIONS MANUFACTURERS. DESIGNED FOR INCREASED FLEXIBILITY AND SAFETY WHEN MOBILE, THIS SUPERB RANGE REPRESENTS TRUE VALUE FOR MONEY WITHOUT SACRIFICING PERFORMANCE.



MULTI-II for 2m.
MULTI-UII for 70 cm.



23 channels + 4 autoscans

- FEATURES:**
- 10W. FM Transceiver
 - Receiver fitted IRT ± 5 kHz.
 - Manual/Auto switch.
 - Anti clipping squelch.
 - Centre zero/S-meter.
 - External VFO socket.
 - 2 stage Rx x'tal filter.
 - Wide/narrow selectivity.
 - Receiver fitted pre-amp.
 - Dual gate Mosfet front end.
 - Front end RF filters.
 - Fully protected output.
 - Tone oscillator for deviation testing.
 - Repeater tone burst.
 - Tx calibrator/monitor switch.
 - 3 watts receiver audio.

This 2-way channel scan transceiver is surely the ultimate in F.M. mobile equipment. Incorporating many features previously unavailable. The autoscans facility ensures safe driving and continuous monitoring of your favourite channels. As soon as a signal appears the transceiver locks onto the appropriate channel. A flick of the switch and you are back to manual control. A unique feature is that only those channel numbers that are fitted with x'tals are illuminated.

For further details send S.A.E.

SEE THE RANGE IN LONDON AT ALEXANDRA PALACE — 30th JULY—1st AUGUST

PRICE: Multi-II 2m. fitted 5 repeat and 2 simplex £ . . .
Multi-UII 70 cm. fitted 5 repeat and 2 simplex £ . . .



IN STOCK AND STILL AT OLD PRICES

IC 201	...	£354.30
IC 21A	...	£219.30
IC 225	...	£225.00
IC 22A	...	£158.60
IC 202	...	£161.10
Trio QR666 Receiver	...	£163.00
New Liner 2 II Transceiver	...	£184.50
R15E Matching P/S	...	£181.50
LA106 Matching Linear	...	£177.75
Nec CO110 Transceiver	...	£625.50
Yaesu FR10IS	...	£303.00
FR10ID	...	£393.00
New FR10I EL	...	£444.00
FT200B	...	£286.00
FL10I	...	£309.00
YC355D Counter	...	£146.00
YO100 Scope	...	£113.00

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Full Range in Stock

JAYBEAM ANTENNAS

4Y/4M	4 el. ...	£8.72 (£1.00)
5Y/2M	5 el. ...	£5.51 (£1.00)
8Y/2M	8 el. ...	£7.20 (£1.00)

104/2M	10 el. ...	£14.18 (£1.25)
PBM10/2M	10 el. Para-beam	£16.82 (£1.25)
PBM14/2M	14 el. Parabeam	£21.60 (£1.25)
5XY/2M	5 el. X'D Yagi	£10.58 (£1.50)
8XY/2M	8 el. X'D Yagi	£13.16 (£1.25)
10XY, 2M	10 el. X'D Yagi	£18.17 (£1.50)
Q4/2M	4 el Quad	£10.80 (£1.00)
Q6/2M	6 el Quad	£14.40 (£1.50)
D5/2M	5 el. Slot Fed Yagi ...	£10.13 (£1.00)
D8/2M	8 el. Slot Fed Yagi ...	£13.50 (£1.25)
XD/2M	Crossed Dipole	£7.43 (80p)
UGP/2M	Ground Plane	£5.34 (80p)
HO/2M	2m. Halo	£2.36 (50p)
HM/2M	2m. Halo and Mast	£2.81 60p
SPM	16' Portable Mast	£7.20 (£1.00)
PME	4' exten. for Double Arrays	£1.24 (40p)
D8/70CM	8 el. ...	£11.59 (£1.00)
PBM18/70	18 el. Para-beam	£14.06 (£1.25)
MBM48/70	48 el. Multi-beam	£15.64 (£1.50)
MBM88/70	88 el. Multi-beam	£20.81 (£1.50)

All types of phasing harness, clamps, mast-ing, brackets, etc. in stock. Telephone for details.

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SHORT WAVE MAGAZINE

(GB3SWM)

Vol. XXXIV

JULY, 1976

No. 393

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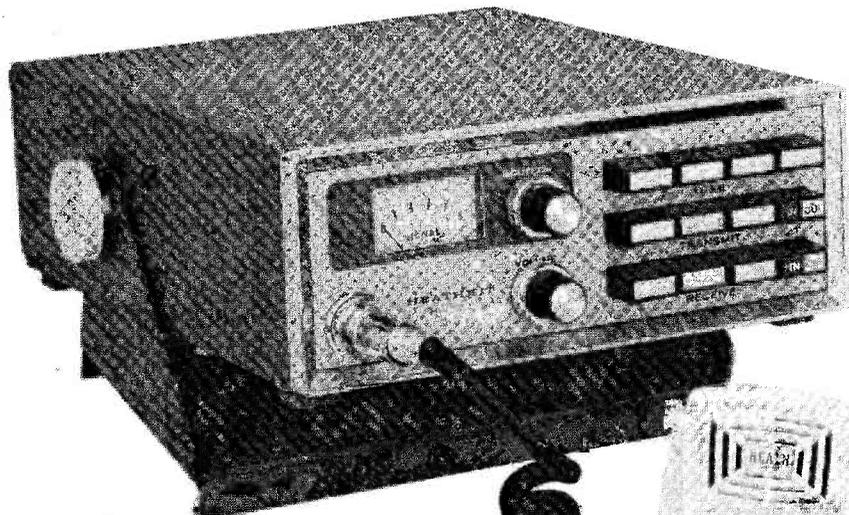
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As with all Heathkit amateur radio equipment this month's selection of 2 metre gear comes to you in kit form. So besides the pleasure you'll get from using it, you'll also get a lot of enjoyment from building it.

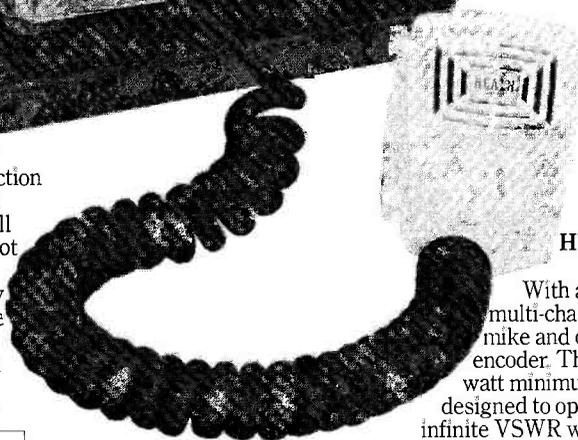
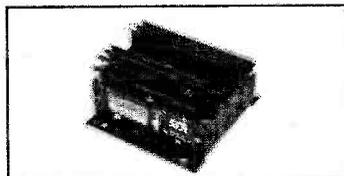
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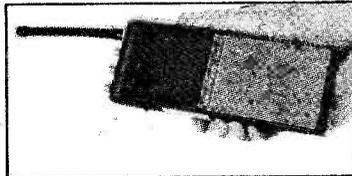


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With all solid-state design, multi-channel capability, PTT mike and optional tone burst encoder. The HW-202 has 10 watt minimum output and is designed to operate into even an infinite VSWR without failure.

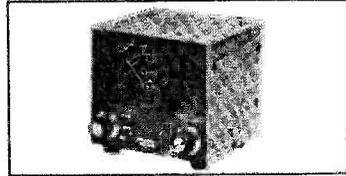
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The SHORT WAVE Magazine

EDITORIAL

RSGB MEMBERSHIP

Some calculations based on the most recently published figures show that of the 21,700 U.K. amateurs now licensed, fully 7,000 (or one-third) are not members of the Radio Society of Great Britain—which, of course, has something like 5,000 SWL's making up the total RSGB membership. This one-third proportion of U.K. transmitters who are non-members has remained fairly constant over recent years. (It is said, not by us, that they are the ones who are not interested in QSL cards!).

COURSES FOR THE R.A.E.

During the coming months, we shall again be publishing, as in previous years, lists of centres offering courses of instruction for the Radio Amateurs' Examination, "Subject No. 765," City & Guilds of London Institute, which sets the Exam. Accordingly, we would be glad to have the necessary details for publication from those responsible for organising such courses. Please give place, date of commencement of the course and relevant details, QTH for student applications, fee to be charged, with if possible the name and call sign of the course instructor. Address only to: "R.A.E. Course," c/o Editor, SHORT WAVE MAGAZINE, BUCKINGHAM, MK18 1RQ.

ALWAYS INTERESTED

We are glad to see at any time articles, short or long, of Amateur Radio interest, especially those covering constructional projects illustrated by drawings or photographs. Material should be prepared in accordance with the guidance given under the heading "Authors' Mss." on the Contents page of any issue of the *Magazine*. Drawings need not be "copper plate" but must be neat and clear for reproduction by our draughtsman, who will size and style to our regular drawing convention. Photographs should be about post-card or "half-plate" size, black-and-white only, glossy finish; pictures suitable for block-making can very often be produced to these standards by good amateur photographers, while almost any local photographic studio can provide prints of "commercial quality."

Also always wanted are pictures in the Amateur Radio context for general illustration through the *Magazine*. These should be fully and accurately captioned on a separate sheet—that is, *not* scribbled on the back of the print—and may be of stations, personalities, Club

groups, mobile rigs in car or boat, and any related subject.

All material used is paid for on publication at good rates, and should be sent to: Editor, SHORT WAVE MAGAZINE, BUCKINGHAM, MK18 1RQ.

POLICY ENQUIRY—Chris. Cooper

We are asked by the West Yorkshire Police (Gipton Division, Brotherton House, Westgate, Leeds, LS21 2RS) to publicise the fact that Chris. Cooper, of Garforth, has been missing since July last year. As well as being a keen SWL, Cooper was one of our photographic representatives and hence would be well known at Mobile Rallies and Amateur Radio conventions. Anyone who knows anything about him—a burly extrovert, aged 38, wearing glasses, with a chin beard, and often carrying photographic equipment—should report the facts to the West Yorkshire Police (Inspector A. F. Masters) address as given, or ring *Leeds 35353*, with whatever information they may have.

DSB NOW BARRED

We have been officially informed by the Radio Regulatory Dept., Home Office, that "double sideband transmission with suppressed carrier," DSB as it is known in Amateur Radio parlance, is no longer permitted. Reasons given are that it is a mode not authorised by international radio regulations, that it is difficult to monitor without special equipment and that "... no undue hardship would be placed on amateurs at the recall of this facility ..."

RADAR FOR SMALL CRAFT

Under the new Merchant Shipping (Radar) Rules, 1976, any vessel of 1600 gross registered tons and upwards must carry radar. The Dept. of Trade recommends that all U.K. vessels, even if under this limit of 1600 g.r.t. be so fitted—meaning the larger yachts and similar craft using crowded waterways, like the Solent and the English Channel. Indeed, anyone who has essayed a Channel crossing by night in a yacht would fully appreciate the point of this suggestion—with many big foreigners not fitted or the radar u/s when they are, and showing the minimum of lights, it can be hazardous. A trip from, say, a Solent harbour to Cherbourg or the Channel Islands—quite usual for many South Coast yachtsmen—means crossing two busy shipping lanes.

Austin Forsyth
G6FO

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

ONCE again the time comes round for us to get out the typewriter and knock out the month's news; and still we drag along at the bottom of a cycle. However, it seems hard to this old scribe to realise that this particular CDXN marks the completion of ten years as your commentator—and still he never ceases to be amazed at how much he doesn't know about DX, or indeed about people. There have been friendships made with regular contributors over the years, correspondence, deeply appreciated, from all the corners of the earth; and the occasional unpleasant moment, such as the odd anonymous letter or meeting someone who clearly thinks it to be impossible to write a column properly unless either phone or CW modes are firmly excluded, depending on his particular interest. We have tried in fact to strike a balance, as between the top-notchers of years and the veriest new chum, as between phone and CW, and without obtruding one's own personal doings into the tale.

Forty Metres

A bit neglected of late, but it is most definitely still its old inscrutable self; there is lots of QRM and noise, a large proportion of which is generated in the station receiver unless you know how to keep things under control, and one suspects this, above all, is the thing that makes radio amateurs so divided about the band—either they love it, or they won't go near it!

G2HKU (Sheppey) compares prices in "one of those pocket-sized editions of the Magazine"—around 1950—with the prices for gear current in the Adv. columns of today, and remarks that the same DX could be worked with the 1947 gear, and probably with more enjoyment at that. Nonetheless, in 1976, this newfangled SSB worked to HK4DHR, YV5FJU and YV5MO, while the CW managed PY4BYI, YV5FNM, XJ3ZZ/1 (St. Paul Is.) and ZL4AC.

G4CCB (New Ollerton, Notts) has passed up the Heathkit rig in favour of a Trio TS-510, used into a KW trapped dipole. Reading the

column over the past few months, Tony noticed the absence of reports on Forty, and so in the first couple of weeks in May he made a study of the situation, with interesting results. First, the majority of CW Europeans use 7-000 to 7-040 MHz, but most of the U.S.A. licence classes only permit CW above 7050 kHz—whence if you hear and call W's on CW above 7050, you are very likely to have them come back to you with some such comment as "My first European QSO!" *at the same time* as any W operating below 7040 is being swamped for hours on end with calls. It seems manifestly unfair that the Extra Class W should bear the brunt, while the General just can't get a look in; so perhaps a few readers will try the effect of calls to W's heard at the upper end of the band and report results. Anyhow, to revert to G4CCB, his log includes EA8FG, HI8JLV, K2UZV, UL7GBL, W1MX, WA1JMO, WA1TZO, WA1VPM, W2EUQ, WA4ZUA, W8TMP/4, WA8NYT and W9WXX; while SSB was not completely neglected insofar as this mode raised VK3CJ, VK3HW, and YV5MO.

G4CQK (Walton-on-Thames) is a member in good standing of the QRP Club and of late has been using a Heath HW-8, which was first put on the air on April 82; the aerial is an end-fed inverted-L, which is used with a Z-match ATU, and the G3RJV's SWR indicator for QRP, which appeared in *SHORT WAVE MAGAZINE* in July last year. Things are made easier by the use of a counterpoise quarter-wave of wire in addition to the main earth, made to the rising water main feeding the radiators. Forty "gave" with three watts, and the contacts included DK8QC, DM3VUH, F8LP, G3PZP, GM3HSF, HB9BAH, I1SHY and ON4UQ.

Eighty

Again a difficult band for many of us to enthuse over, but for another "many" the only band they ever operate. Essentially, the only bits where the DX is to be found is the very HF and LF ends, depending on the mode, while the middle is more or

less filled with ragchew contacts, and chaps complaining about QRM on "my frequency," regardless of the fact that they are not given any set frequency in their licence! Then, of course, there are the Phone types who operate in the CW portion of the band—they escape some QRM to themselves by generating more QRM for others. The Home Office are quick enough, in some parts of the country, to jump on people for technical infringements of the letter but not the spirit of the licence, particularly in Yorkshire, so why the blazes won't they discipline people who infringe both the letter *and* the spirit? The removal of some of these pests would, like shooting Admiral Byng, encourage the others to behave.

G2HKU has just one contact to mention, that being SSB with K2ABA, who was putting an S9-plus signal over here from a New York apartment block, which must be quite some technical trick.

G3CED/G3VFA (Broadstairs) is still using his QRO—the Ten-Tec Argonaut!—and says he has been welcomed back on Eighty by some of the gang "like a long-lost friend!" after his foray on other bands. George mentions G4EVO, who, after 44 years at sea as an operator, finally made his debut on Eighty CW with two watts and a Joystick at the tender age of 76. G4EVO's two-watt output seems to have taken him all round Europe, with UA6LKN as possibly the longest distance; and of course G3CED has been able to do this on Eighty CW for a long time and with even lower power—but this time the work QRM and the gardening got in the way a bit, and even when George did get on, his pump-handle muscles were so worn from the garden that he went on SSB! Nonetheless, the month passed with many interesting QRP contacts on the band and around Europe, in both modes.

Another one to mention the HW8 is G2NJ (Peterborough) who now has worked a couple of stations using them, and is very impressed by the signals they put out. G2CAS/P was worked twice when he was out portable NE of Bridlington, although

he was not using the kite aerial due to insufficient wind; another portable worked was G4CEN near Ringwood, who had just been up a tree to fix up his aerial. The HW8 mentioned earlier was being operated by G6PG at Honing, North Walsham, with G5VU also on the scene, and all three were most impressed with the equipment. On the Bank Holiday, May 31, G3SGH was worked, down in Kent and using a Joystick—and, be it noted, all these stations were QRP in the true sense of the word.

G4EBK writes in to inform us of the sad death of Bill Burgess, G2VY, at the age of 78; Bill was a member of the original Grimsby Club, and in pre-war days was, like most people then, active on 7 and 14 MHz, with time spent on 56 MHz when we had that band for a period following the War. A true amateur, who will be greatly missed.

Top Band

Activity on this band is, not surprisingly, somewhat down on that of, say, ten years ago, and in any case we are in the summer "noise condition" when contact beyond local ranges is to a large degree dependent on the static on the band. Much of the local AM activity ten years ago was by way of the local Club nets and these seem to have disappeared altogether from 160 metres in favour of activity on the repeater and "S" channels of the "citizens' band" now occupying the upper end of two metres.

However, to pleasanter things. G4AYS (Moira) is still at it on Top Band and still using the 600 milliwatt Tx, with which he managed to raise GM3IAA (Inverness)—and was a bit startled to realise that GM3IAA is *ex-R.E.* Signals from World War One and also was VS1AA. G4AYS enters an up-date to his score in the Ladder, which shows an advance to 113 points.

Various people have passed on the word that the Italian station worked by quite a few people on Top Band is a Phoney Phred—there is no Top Band licensing in Italy, and the lad claiming to be "Tino in Modena" is clandestine—shades of 1949 undercover Amateur Radio! G3FKE has not been heard on 160m., largely because he lent his receiver for the band to a YL SWL as a bit of encouragement.

Here & There

Although not mentioned in any of the usual DX media, we have been hearing that there is activity from BY. Indeed, earlier this week there was a "definite" BY being worked from Europe—one wonders if this is not Fred again, as so often in the past, or is in fact the real McCoy at last. If anyone has a QSL card to show, please pass the word to your conductor as it will surely be of interest to the many.

Catterick Garrison Club are putting GB3CAD on the air at the Catterick Army Display, over July 8-11; operation will be on the HF bands SSB, CW and RTTY each day, 1200 to 1700 being the specified operating hours.

July 3-4 is the weekend for the QRP Contest, says WIWY of *CQ Magazine*, although he also reckons the rules are too complex! Exchange RST plus QSO number and power input plus X if crystal-controlled. Score one point a contact for stations in one's own country, two per country in the same continent, three per DX QSO. Stations using QRO send "QRO" instead of the power input; add three more points if the station worked is another QRP station (less than five watts) one more if the station is using 3.5 watts or less, and another single point if the station is crystal controlled, and of course (as it always has been) *double* the last two if the chap at the other end also uses crystal-control or less than 3.5 watts. Multiplier is one for each DXCC country worked in one's own continent, and two for each DXCC country outside one's own continent; JA, PY, VE, VK, W/K and ZS call areas count as "countries" for multiplier credit. Logs by July 31 to Hartmut Weber, DJ7ST, D-3021 Holle, Kleine Ohe 5, West Germany. And we might add that we are a bit surprised that we didn't get the dope on this one earlier from one of the U.K. QRP Club folk!

The group calling itself the "Tops CW Club" is holding a key-contest over the week 15-21 August, all bands Top to Ten. Details from G3IRM, *QTHR*. For some 30 years now, this Club has existed to promote the CW mode.

Now, let us turn to the DX scene

in more detail. First, Bill Rindone caught a "bug" of some sort in Nepal, and so, with temperature up to 105° decided to head back to Lake Oswego for treatment. The latest news we have is that he is now more or less mended and plans are for him to fly back to the Red Sea area, and then down East Africa on the Indian Ocean coast; Abu Ail, Comoro, Juan da Nova Agalega, Tromelin, Geysler Reef, TL8 and Burundi were mentioned, plus at least one "new one" and maybe a second one, in the African continent; he will in fact be in Africa almost certainly by the time this reaches print. And, for those who have been surprised at this unknown being such a skilled DX operator, don't forget that a decade ago he was doing this sort of thing, for a period alone and then with Miller, W9WNV. Financial help will be appreciated, costs having escalated quite a bit, thanks to the necessity for the trip home.

Now to the Colvins. Last month they had got going at New Hebrides, YJ8, and at the time of writing should have been almost home to U.S.A., they having had to return for business reasons.

Baja Nuevo action was compressed somewhat; at Serrana Bank the lighthouse is not functioning, and so they only stayed on the Bank for 1½ hours and 1200 contacts! There were quite a few QSO's on Top Band from Serrana. Then they opened up from Baja Nuevo, signing HK0AA. QSL's for this one go to SM3CXS, and we should think they made a large dent in the number requiring Baja Nuevo!

Then there was the Oki-No-Tori-Shima effort by JARL; this one was a bit compressed by the hurricane which swept through Guam, although they did manage to get in quite a lot of operating. As a sideline to the problems of DX'ing from such a spot, it might be noted that of the three generators, one went in the drink, one just "got wet" and t'other one actually landed in a usable condition! QSL's to JARL. Incidentally, the argument over the status of this 7J1RL operation still continues among the JA's.

14—21—28 MHz

Life on these bands seems a bit flat after all the *kerfuffle* stirred up by the various DX-peditions of the

last few weeks. At the time of writing we are in the middle of a full week of "High-Normal" conditions predicted by W4UMF, and as usual Ted is right on the button, although the heat wave is rather upsetting things with static noise on the lower bands.

However, during the period in review things have been happening on all the bands, as we will see.

First, the letter from G4BHE (Basingstoke), he having spent most of his time on Ten, where he had added 31 countries to his score for the band, including such as CN8, HB0, LU, PY, TU, ZE, 5N2, 9G1, 9L1 and 9Y4, some near misses being with EA9, EL2 and PZ1; and the most interesting thing about this is that G4BHE has hours conditioned by work (as do most of us!) but is on most of the day at weekends—nonetheless, most of his ten-metre DX has been booked in during 1800—1230z. 21 MHz was not completely neglected, there being three all-time new ones by way of 6W8FP, YN1SFL and FG7TD, not to mention contacts with CE3GN, EL2T, F6BJY/KP4, HC1KV, HC2YL, JA2IQB, W/K, KP4EDP, KV4FC, LU's, PY's, PZ1BC, TU2GF, TU2GG, VE1APY/SU, VP9IB, ZP5VO, ZP5WM, ZP5WU, ZS's, 8P6BT and 9Y4OK. Sometimes the band has been holding up with S9 Stateside stations till midnight and later. Now, the next part of the plot is to "acquire" a "decent" aerial for Twenty.

Just one contact on Twenty satisfied Ted, G2HKU, and that one was with PJ2VD.

G3CED/G3VFA complains that the lack of sunspots is such that even with QRO (two watts) he still finds the going hard, as do we all at that. George had a new term for the noise of a SSB pile-up which amused your scribe—like a *mummified disco!* Most of George's activity has been on Eighty, but he did have a couple of European contacts on Twenty, two on Fifteen, and LU8JG on Ten. As for G4EVO, the latter seems to have stuck well down on Eighty, doubtless learning the ropes of QRP operation.

SWL Whitaker has collated the information about the Ten-Metre Activity Day and sends details.

Nearly 400 U.K. stations showed up on April 11, of whom just over fifty were pre-War calls, and 35 were G4E's. A special mention should go to Robert Ward, who once held the call G8CI, but didn't take it up again after Hitler's War. But 37 years later, at the age of 76 he has been swotting hard for his R.A.E.; may we hope that he will soon be heard on the air again, although that particular call has been re-issued. Turning to the DX that actually showed up on the day, ZE and ZS were worked in the late morning, with 9J2's about lunchtime; at 1630z, Ten opened to South America, while at the same time VP9 and ZD8 were being worked, and one G station managed a contact with 5T5. SWL Whitaker received reports from no less than 55 different stations on the event this year, and in response to the many requests for a bit more of this sort of thing, a provisional date of October 3 for the next Test has been pencilled in—and by the time the event is on us, he will have sorted out some suitable calling frequencies to take account of the width of the band, which was such that poor old Andy, G3UUZ, sat up on 28.9 MHz and tuning 28.8 to 28.9 MHz and didn't get a smell of a QSO even!

Anent the comment last time on 10-metre usage, a note from GW4BIQ (Swansea) to the effect that the local Club group runs a net on 28350 kHz from 11.0 a.m. clock on Sundays. They have "pleasant surprises" from time to time when breakers appear from Europe and the Middle East.

Next we have GW4BLE (Newport, Gwent), who reports conditions as pretty mediocre, by and large. On Ten, he found quite a lot of "short-skip" as the HF man terms it, meaning in the main VHF-type openings, from which he gleaned the odd new country and made SSB contacts with CT1QD, EA5ZM, EA8LO, HV3SJ (new 10-metre country), OE50/3/OU, ON6SK for another band new one, PA0PKD for a third new one, several PY's, UK2BAS, VP9HX/MM, ZD7FT for yet another new one, ZE1DX, 5B4DA, 9H4G and 9L1BH as the last of the crop of new ones on the band—this, be it noted, by using Ten at the bottom of the sunspot

trough. On to 21 MHz, where the score was a bit more and the net spread a little wider, with such as AC4BS, DM0FS, HK4DFD, KP4EDP, KP4EGS, TI2PTS/KP4, KZ5VS, KZ5ZK, LU3DTV, PP1ITU, PP6ITU, PT2GFK, VP2MI, ZP5YD, ZS2ND, ZV5ITU, ZV7ITU, ZVOITU, ZY8ITU, 5B4CP, 5T5CJ, 5Z4RG, 5Z4RT and 9J2CB. 14 MHz is of course where most of the action was, and here the contacts included C6ADY, CT2AK, EL3NA, HI8LAR, HK0AA/S (Serrana Bank), HK0AA (Bajo Nuevo), HP1AP, KP4AST, LU9AW, NE1ITU, VE2AQ/TG9, TI2RT, LU4HVC/TI2, VE4AK, VE7IO, VP2MW, VP8OK, VP9HR, YN1MB, YS1BW, YS1MAE, ZB3OANV, 4L5F, 6W8FP, 8P6FU and 9Y4VP. Steve did not hook the Oki-no-Tori-Shima station, although it was heard weakly.

G4BJY (Walsall) is still puzzling over the odd behaviour of his aerial, which is so fond of working out Eastwards but refuses to work West—but when it does condescend it yields good reports in that direction! Frankly, given the data Geoff has been accumulating on this oddity, one is almost inclined to believe that his States-side contacts are in fact being worked the wrong way round—*i.e.*, by radiating a strong signal *Eastwards!* Actually, even at that, the thing is not consistent, in that although Geoff is on at the "right" times, VK and ZL and JA have not been worked, neither have South America or Africa—just this insistent trickle of Asian Russians, the odd KH6 (which is slightly West of North on the Great Circle map), and the small number of East Coast W's, Canadian and VO's. Of course, a long-wire, used on 80, 40, 20 and 10 metres is going to become more and more directional as one goes higher in frequency; however, if one imagines an eighty-metre half-wave excited on Twenty, and then locates a major lobe to hit UF6, UG6 and so on, and another on KH6, the other two major lobes would land on, respectively, the Caribbean and Africa—which jist ain't in accordance with the results!

G3NOF (Yeovil) doesn't usually come in to bat this late in the order, but this time the opportunity has arisen to complete more of the copy

At right, Hal Perkins, G3NMH, addressing his distinguished guests on the occasion of the opening of the new Office and Works of Western Electronics (UK), Ltd., now at Fairfield Estate, Louth, Lincs. Started in Swindon in 1969 by Hal Perkins himself, the record is of continuous expansion, culminating in the move to Louth, for more space and better facilities for customer service. A wide range of Amateur Radio equipment is handled by Western Electronics and the new facilities will enable design and manufacturing, as well as servicing, to be undertaken. The firm is to be congratulated on their enterprise.



ahead of schedule. Don found, on Ten that there were several openings to South America around 1900, plus lots of EU stations; he made contact with A4XFW and FG7AN. On 21 MHz, the short-skip has been similar to Ten, but with the addition of true short-skip around the U.K., the DX openings in general being in the evenings. SSB QSO's were made with G3BID/HB0/M, VE2ARM/4X4, VP2MAI, VP9HX/MM (off EA8), VQ9HCS, TU2GF, W1CBV, W2HCW, ZC4RC and 4U8ITU. Twenty on the other hand, Don felt was good, opening for DX as early as 0600z, and round to the small hours. Pacific stations have been heard at 0600 to about 1100, though not much VK or ZL0 some mornings at this time there have been West Coast W's, VE6-7 and KL7, W7's at 0630, 1230, 1700 and 2200, and East Coast W's from 1000 to the small hours. 2200 seemed a particularly good time to be around, with, in addition to that already mentioned, and jumping from far to near in the skip across the States, into the West Indies and South America, with short-skip S9 G's mixed in! Don made SSB QSO's with A6XR, AL7CFX, AL7MF, AP2SA, AP2SA, CT2AK, FG7XE, HB0XAA, HK0AA (Baja Nuevo), IE9CBM, K3HVG/HR6, KH6VG, KL7CYH, KL7IKG, KM6EA, KV4FZ, N1ITU, N2ITU, N4ISC, NE1ITU, NZ1ITU, OE5GML/YK, OJ0MA, TU2GA, VE7DSR, VE7DSS, VE7SV/XJ8, VK3MO, VP2KAA, VP2SG,

VP2VBG, VQ9HCS, W7JWJ, W7ODQ, WA7RRR, WA7ZLC, WB7DKV, WU1ITU, XJ3ZZ/1 (St. Paul), YS1GMV, ZB30AAN, ZK1DX, ZS3TP, 3D2AJ, 9GILZ, 9K2DT, 9X5AN and 9X5RK.

With his new QRP rig, G4CQK looked at 21 MHz, where he hooked DF1BG, EA1JH, G3EPV, HA5KKG, HB9KO, I5SQI, OK1EX, UK4AAT and YU3CNO. Up half a watt to three watts and Twenty "gave" with DL1DQ, DM3NKF, EA4NU, F6DZE, HA3KHC, I4QAG, IT9UPP, LZ1KCM, OE3AAW, OH5RZ, OK1FA, OZ7JT, SM0ETM, SP5ZHV, UA3ADC, UA9XAH, UB5XBV, UP2PCE, UQ2GDG,

UR2RQT, and YU2ZP—his total countries on all bands since April is now up to 25.

So, there you have the picture of another month; one of quite unusual activity as compared with the months preceding it, on all bands, with the prospect of more of interest during the later part of the summer and into autumn.

QRT

Space runs out too fast! For next time, the deadline is **July 15**, latest, to arrive, addressed "CDXN," SHORT WAVE MAGAZINE, BUCKINGHAM, MK18 1RQ. And may the Wx and the DX both be as good as each other for the coming month!

TOP BAND COUNTIES/COUNTRIES

Starting date, November 1, 1975

Call	AM	CW	SSB	Countries	Total
G4CBQ	23	86	71	13	193
G4EAX	50	25	80	10	165
GW3WMY	71	80	—	10	161
G4EPL	17	46	78	10	151
G4AYS	30	76	—	7	113
G4AEJ	36	48	44	5	103
GM3YOR	—	—	—	27	27

Scoring is on the following basis: one point for a county on SSB, two per county on CW and three per county on AM. In the case of an AM/SSB contact, claim two points, scored in the AM column by the AM station and in the SSB column by the SSB station. No other cross-mode contacts permissible.

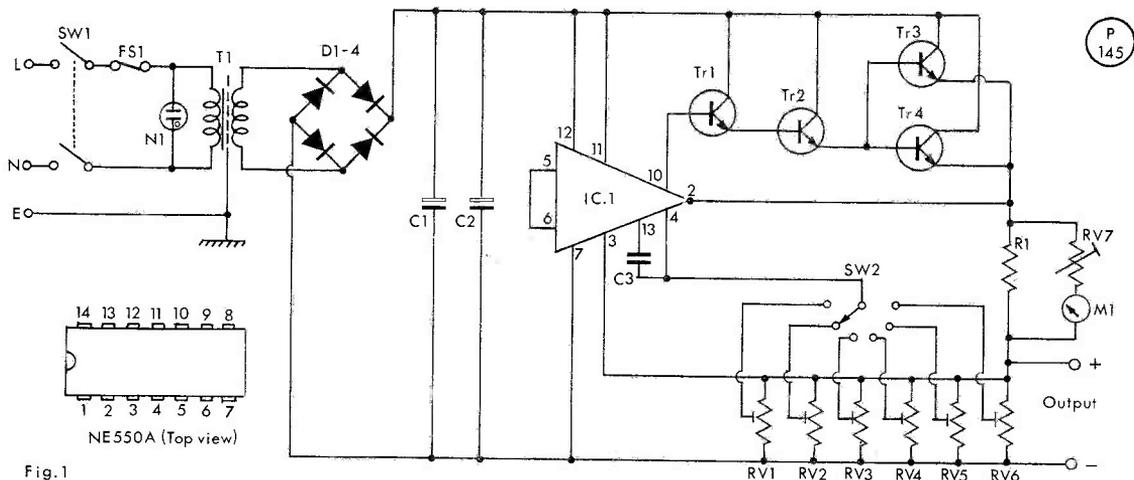


Fig. 1. Circuit of the bench PSU, as described in the text.

HIGH CURRENT LOW VOLTAGE BENCH PSU

D. M. LUSCOMBE (G8JWC)

THE mains power supply unit described here was designed as an inexpensive and easy-to-build PSU for transistor applications, normally involving low voltage but relatively high current, as well as being more convenient than lead-acid accumulators (often used in transistor bench work). When using a line voltage of 12v. it is possible to draw a full 10 amps. with good regulation. The unit can be built into a metal cabinet not more than 8 x 6 x 6 inches.

Circuit Operation

Looking at the diagram Fig. 1, a mains transformer giving up to 10 amps. at 18v. feeds a 12.5 amp. bridge rectifier, which is firmly bolted to the chassis, using a little silicon grease for good thermal contact. For DC smoothing, capacitors in parallel totalling 30K μ F, rated 40v. working, are used. If a slightly higher ripple voltage can be tolerated, rather less capacity might be acceptable. However, if smoothing is reduced too much, poorer regulation and higher ripple at maximum current will result.

Table of Values

Fig. 1/ Fig. 2. Circuit of the Bench PSU

C1, C2 = 15,000 μ F, 40v., elect.	IC1 = NE-550A
C3 = 470 μ F	Tr1 = BFY51
R1 = .055 Ω (see text)	Tr2 = BD123
RV1, RV6 = 10K min. presets	Tr3, Tr4 = 2N3055
RV7 = 100-ohm min. preset	T1 = 18v., 8-10 amp. sec.
D1-D4 = 12.5 amp. 100v. p.i.v. bridge rectifier	M1 = 0-10 mA meter
	N1 = Mains neon indicator
	Sw1 = 2-pole on-off rotary
	Sw2 = 1-pole 6-way rotary

An integrated circuit is used for regulation. For this, the NE-550A was chosen, since it incorporates current limiting and provides its own reference voltage, applied to the non-inverting input of an Op.-Amp. A sample of the output voltage is taken from the preset potentiometer RV6 to the inverting input of the Op.-Amp. By comparing the voltage sampled from the output with the reference voltage, the Op.-Amp. gives a stabilised output.

The NE-550A itself can only supply 100 mA, so extra transistors are required to produce a 10-amp. capability. The output pair Tr3, Tr4 (2N3055) should be near-enough matched for gain at 5 amps. Switchable preset pot-meters are used, as shown, rather than a fully variable control, to avoid the risk of "turning the knob too far" and so destroying the unit by over-voltage (the output can go as high as 25 volts).

Current Limiting

This is used to protect the transformer and bridge

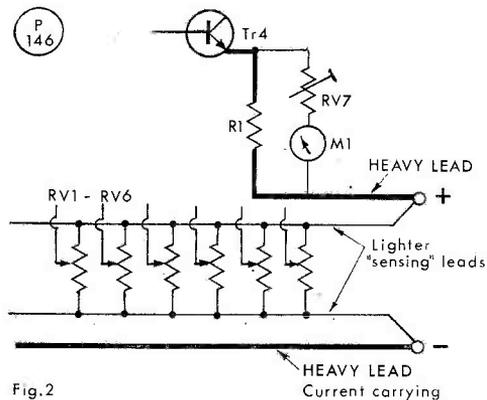
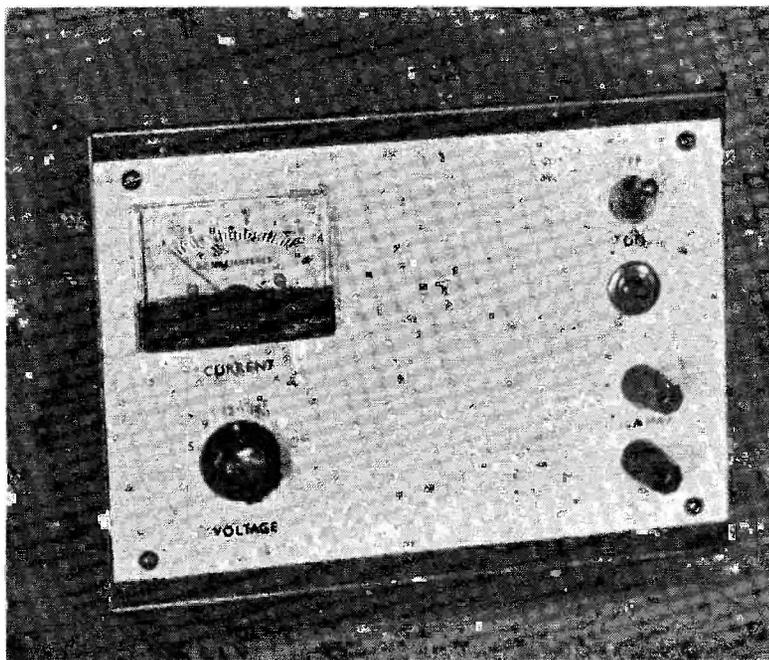


Fig.2

Fig. 2. Method of obtaining better regulation at higher current loads.

The completed unit as constructed by G8JWC. The meter is scaled to read load output in amps.



rectifier from over-heating, if excessive load is put on the PSU. The IC measures the voltage dropped across R1. If this exceeds 0.6v., the drive to the output transistors will be reduced until the "controlled" value of current is being drawn. If further protection is required, a fuse can be incorporated for the emitters of Tr3, Tr4. R1 also acts as a shunt resistor for the 0-10 mA meter, which will read 0 to 10 amps. when used in this circuit.

Construction

This is quite straightforward. All the preset potentiometers, the NE-550A IC, C3, with Tr1 and R1, are mounted on a piece of printed circuit board. The remaining components, with the exception of Tr3, Tr4, are fitted on the chassis. Tr3, Tr4 must be mounted on a substantial heat-sink, of minimal thermal resistance. R1 should be capable of dissipating 7 watts and can be fabricated from six 26cm. lengths of Eureka resistance wire.

If a very high degree of stabilisation is required, presets RV1-6 can be connected as shown in Fig. 2. This will compensate for any voltage drop in the internal wiring when high current is being drawn. This arrangement can be extended when there is a long length of cable between the PSU and the equipment on load.

The PSU should be mounted so that it keeps cool—say, under a perforated metal cover, allowing good ventilation round the unit.

Performance Figures

Maximum current capability at 12v., 10.5 amps. Ripple voltage measured at 12v., zero current, 20 mV.; at 8 amps., 80 mV.; at 9 volts, ripple too low to measure;

at 8 amps., 15 mV. Regulation at 12v., 10 amps. full load, 1.2%.

Measurements were made at 12 volts. However, the unit will give output at any voltage between 2.5 volts and 25v., with differing output characteristics. Although the maximum current at 12v. is 10.5 amps., less than this can be drawn at lower voltages, due to the higher collector-emitter voltage across the output transistors.

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MINI-QUAD FOR TWENTY

BEAM DESIGN WITH REDUCED OVERHANG

THE Cubical Quad has deservedly become a popular and widely used form of beam aerial on the amateur HF bands. Its low angle of radiation, relative ease of construction and some 8 dB of gain over a dipole, together with the ease with which it can be tuned and matched to standard coax feed-line, has resulted in its popularity. A further point in its favour is cheapness of construction, with easily-obtained materials from the local hardware store.

By virtue of its two half-waves in the single loop, the Quad shows an impedance of about 100-120 ohms—not quite the 150 ohms impedance of two dipoles due to the loop construction. With 0.15λ spacing between elements the impedance drops to a figure of 65 ohms with a gain of 8 dB over a dipole. On 14 MHz, this would be a spacing of approximately 9 feet between driven and parasitic loops. Though this is a slight mismatch with 80-ohm cable, it is an acceptable one for practical purposes. Greater gain and an impedance of 75 ohms can be obtained with 0.2λ spacing, giving a distance of about 12 feet between elements, which is very close to 80-ohm cable, showing a gain of about 10 dB over the dipole. This can be fed directly into the now standard *pi*-tank network of the final RF amplifier in the transmitter.

The square form of Quad construction reduces the turning circle by half and a 10-and-15 metre array would have an overall width of about 11ft. 4in. However, on 20 metres this increases to nearly 17 feet and the extra dimensions required on this band necessitate much stronger and heavier booms and "X" pieces. The enclosed area of a 20-metre loop amounts to nearly 300

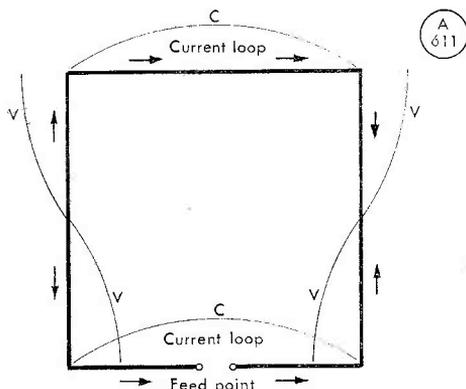


Fig. 1

Fig. 1. The instantaneous current and voltage distribution on a loop aerial of the Quad type. It is from a consideration of this factor that the miniaturised Cubical Quad described in the article has been designed.

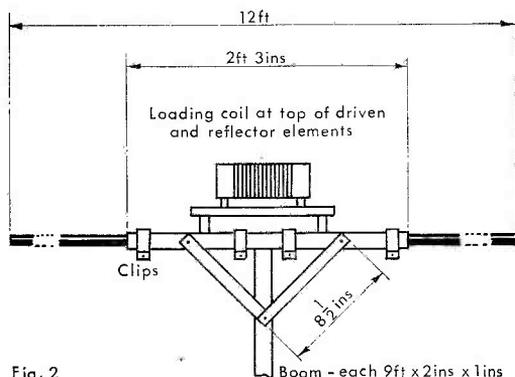


Fig. 2

Fig. 2. Plan view of boom-ends and their supports in the Mini-Quad design. Sections one-inch cube are cut out of the top end of the booms so that they are flush with the 27in. hardwood pieces. The canes are secured under the hardwood.

square feet. In the usual form of construction, 8 bamboo canes are required, in the region of 11 feet long. Although the width of a 20-metre Quad is about half that of a Yagi type array (with its radiator length of 33 feet or so) in many instances the size even of the 20-metre Quad is such that some difficulty arises in finding the space to erect it at a reasonable height above ground. The height at the centre should preferably be between $\frac{1}{2}$ and $\frac{3}{4}$ wavelength, and in the clear.

Possible Reduction

Some thought was therefore given to reducing the area of more manageable proportions without too great a loss of efficiency. Reference to Fig. 1 will show that any form of loading with normal horizontal polarisation must be positioned at the top or bottom centre of each element, or at both. Having some spare ferrite beads, a plain dipole was strung up, vertical fashion, to find the decrease in length there would be over a full-length unloaded 20-metre dipole of 33ft. 6in. This showed that 25 beads each side of the coax feeder connection resulted in a reduction of length to about 23ft. for resonance, a not inconsiderable saving. On air testing, this short dipole appeared to be quite as efficient a radiator as the 33ft. 6in. unloaded version. A loop 12ft. square was then constructed, as it appeared that if 100 or so beads were threaded along the radiator in a position where they would have most effect—that is, at a current max.—they would increase the electrical length of the loop from 48 feet to approximately 68 feet with resonance on 20 metres.

The 12ft. square was an arbitrary selection of size but one which was considered the optimum dimensions at the particular location. The enclosed area formed by this would now be 144 sq. ft. against the full size of an unloaded loop of 289 sq. ft.—a 50 per cent reduction. However, as the point of maximum current produced the greatest increase in flux density in relation to the ferrite material, any movement away from this point results in less increased inductance as a whole, so that adding beads

produces less and less effect as one moves away from the current antinode—indeed, if the optimum size of 12 feet was to be adhered to, a large number of these beads would have to be used to give resonance on 20 metres, namely about 200 on each element! It may be that types of beads other than those used (*Mullard B4-FX1308*) would have produced the required effect with a smaller number.

Loading Coils

Attention was then turned to a more usual method of increasing inductance, by means of loading coils. Two 6in. lengths of $1\frac{1}{2}$ in. diameter paxolin tube were wound with the same wire as used in the aerial—this was plastic covered 3/029 cable, familiar in the electrical trade. This cable, of $\frac{1}{8}$ in. diameter, is particularly suitable for the purpose as it had good insulating properties and tensile strength and is easily handled without kinking. The feed end of the radiator loop was temporarily shorted and the loop and loading coil turns were adjusted to resonate in the 20-metre band. The number of turns required same out to be 23, over a winding length of $3\frac{1}{4}$ inches, which left plenty of room at each end of the paxolin tube for fixing purposes. If the pick-up coil of a grid-dip oscillator is just inserted in one end of this loading inductance a good deflection on the meter can be obtained. For those without a GDO—that most essential of test instruments—these measurements should cause the natural frequency of the loop to fall in the 20-metre band.

Unfortunately, the resonant frequency of an aerial near ground is *not* the same as when erected and allowance must be made for this difference. Again, as hardly any two situations are the same, the change in frequency varies according to surroundings. A correction factor of 400 kHz was allowed and the loop was resonated at 13,750 kHz, to bring the resonant point to 14,150 when 40 feet in the air. If one wishes to work mainly on, say, 14.3 MHz, a frequency just below 14 MHz should be aimed at. In practice it was found that the SWR did not exceed $1\frac{1}{2}$ -to-1 over a band width of 350 kHz—which is not quite as good as the full-size Quad but perfectly acceptable under the circumstances.

This single element was then erected using short lengths of hardwood between mast and loop (about one foot long) to stand the loop off from the metal mast employed. A check with the GDO and SWR meter showed resonance approximately in the centre of the 20-metre band, as required, and a reasonable match was also obtained using 80-ohm feedline. This single loop gave encouraging results. Performance appeared better than a plain dipole at the same height, although theoretically the gain is only 2 dB over a dipole. A useful bi-directional pattern resulted with low-angle radiation. Where space is at an absolute premium the single loaded Quad has much to recommend it as the turning circle is a third that of a full-scale 20-metre rotary dipole.

Adding the Reflector

Two 9ft. booms of knot-free straight white "2 x 1" wood were obtained, and creosoted before being clamped to the mast with a spacing of 12 feet between them. (It may be necessary to drill two holes in the centre of these booms to take the legs of the U-bolts.) The reason for the two booms is that a change of construction from the

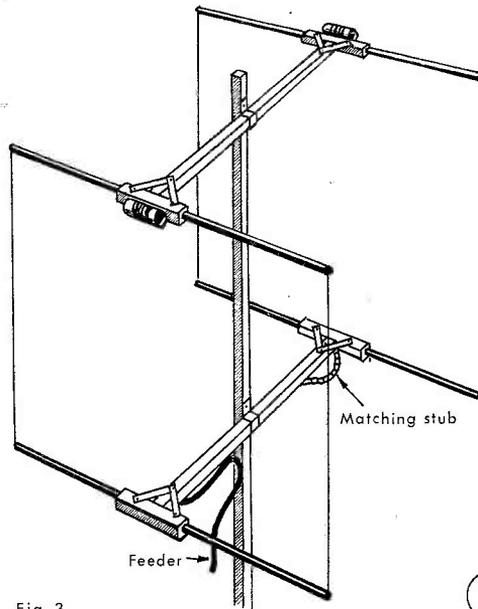


Fig. 3

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Fig. 3. Showing the general constructional layout for the Mini-Quad as described. The loading coils—see text and Fig. 2—are carried on the upper length of each section. Dimensions, tuning and results are discussed in the article.

"X" type of Quad is necessary due to the loading coils, which in the "X" assembly would of course have no support. Eight lengths of bamboo each 6ft. long were used to support the horizontal portions of the Quad and the loading coils; these were cut from 10ft. lengths of ordinary garden canes, with the thin ends removed, leaving 6ft. varying in diameter from about 1in. at the butt end to $\frac{1}{2}$ in. at the outer ends. With the butts fitted in the centre, a strong 12ft. support was obtained without any droop at the ends of the canes. Fig. 2 should make the construction of these supports clear.

Slots were carefully cut into the ends of the canes to take the aerial wire; after this has been positioned PVC tape should be bound around the cane ends and waxed thread over the tape, so as to ensure that the canes do not split and that the wire does not slip through the slots. Originally, it was decided to fit the reflector loading coil at the bottom-centre of this loop, winding on extra turns to provide the necessary reactance of this element, and then adjusting the turns for maximum forward gain. In practice this was difficult and the reflector loading coil was therefore positioned in the same manner as the radiator loading coil, at top centre, and wound with the same number of turns of 3/029 cable.

Adjustment of the reflector was carried out with a stub 5ft. long, spacing $2\frac{1}{2}$ inches between wires. Maximum forward gain was found to be at a point 3ft. 9in. from the 3in. insulator fitted at the bottom centre of this loop. Bare 14g. copper wire was used for the tuning stub and after the optimum point was found, soldered across, the

remaining portions being cut off and the stub bent back in a half-circle, with the free end fixed to the lower boom. Three spacers were needed for the stub line (made from used-up *Biro* pens) each 3in. long and drilled to take the 14g. wire; coil dope was squirted through each open end to prevent entry of water and to fix the spacers to the copper wire. Two croc. clips fixed to a short piece of brass were used to carry out tuning adjustments on the reflector.

To give added strength to the element supports four pieces of hardwood each 27in. long by 1in. square were used between boom ends and canes, the butts of the canes being fixed to the hardwood by means of "Jubilee" type hose-clips, two to each cane, making 16 in all. These clips make a very effective fixing and are unlikely to slip under any circumstances. The ends of the booms are held to these hardwood strips by a long enamelled wood screw and also by lengths of $\frac{3}{4}$ in. diameter aluminium tubing (which happened to be available). The ends of these $8\frac{1}{2}$ in. long tubes were flattened and drilled to take 2in. and 1in. enamelled wood screws into the boom and hardwood end pieces respectively. An engineer's square was used to ensure a perfect right angle between hardwood pieces and boom before screwing up tight. Brackets each side of each end of the boom would probably do as well, but these aluminium "struts" make a very strong fixing and prevent flexing in wind. In very exposed locations, it might be found advisable to use longer lengths than $8\frac{1}{2}$ inches for the struts.

Feeder Connection

The coaxial connection at the bottom of the radiator was made from two small pieces of $\frac{1}{4}$ in. polystyrene sheet

with a tab each end whereby the connector can be screwed to the underside of the lower boom. Grooves were cut out to take the inner and outer coax and the two pieces cemented together with dope, to make a water-tight joint. The coax was then bound to the boom and down the mast with PVC tape. The aerial wire itself should also be fastened in the same way along the bamboos. Three such tapings should be sufficient for each 6ft. length of cane. The loading coils are fixed to the hardwood ends by 1in. stand off insulators and the ends of the coils soldered to the aerial wire *in situ*.

Results

On-the-air tests over a period show that this "Mini-Quad" compares very favourable with the full-sized version. Contacts to the Far East are normally very difficult due to sharply rising ground and a semi-circle of pylons, but in a few hours VS1, VS4, 9M2 and ZE2 were raised with it. These stations could not even be heard on the 200ft. long-wire which had been previously used on 20 metres. Contacts on 5 watts have been made in QRM conditions with stations on the East Coast of America using the Quad, and it certainly seems that any loss in efficiency due to the scaling-down in size must be very small. The DX contacts made support the contention that the low-angle radiation properties of the full Quad are being obtained.

For those who find DX working difficult with a long-wire or a dipole under the crowded conditions of our 20-metre band today, and have not the room to put up a full-sized 20-metre Cubical Quad, this "Mini-Quad" design may be a solution.

BOOK REVIEW

"VHF/UHF MANUAL"

THE long awaited third edition of the RSGB *VHF-UHF Manual* was published at the end of April, in time for the Brunel Convention. It consists of eleven chapters, the first of which is an introduction listing the various bands, from 70 MHz up, available to U.K. amateurs, together with the IARU band plans. (The final U.K. 70 cm. repeater frequencies were agreed too late to be included). Eleven spot aeronautical frequencies in the 2m. band are still listed whereas only 144.00 and 144.54 MHz must still be kept clear.

The second chapter is entitled "Propagation," its 21 pages discussing the various modes used by VHF/UHF workers. There is an analysis of the big tropo. opening on January 20, 1974. To make a reasonable assessment of extended tropo. possibilities one needs a fair amount of meteorological data and how to obtain this from special broadcasts is explained. The section on Auroral-E propagation is very detailed. The 13 pages of Chapter III cover all one needs to know about tuned circuits and is well illustrated with 27 charts, diagrams and tables.

Chapter IV deals with receivers and retains a number of valve type designs from previously published material.

The compiler's aim appears to have been to cater for those wishing to modify and add to existing valve equipment as well those wishing to build new in solid-state. The section on frequency modulation is a re-run of the corresponding section on receivers in the *NBFM Manual* published in 1974.

The longest chapter runs to 115 pages and is devoted to transmitters. As well as many designs for low, medium and high power transmitters, there are useful tables and charts covering such matters as self-resonant frequencies of capacitors and the ratings of commonly used PA valves. A failing of some other, similar, manuals is the absence of worked examples. The writer was pleased to see that in this book several, detailed, worked examples of the design of various stages of a transmitter have been included. Such information is invaluable to anyone wishing to design his own equipment properly rather than slavishly copying someone else's. Again, most of the FM material is derived from the *NBFM Manual*. Filters are briefly, but concisely, dealt with in the next chapter, including an inter-digital band pass type for the 23 cm. band.

Chapter VIII is devoted to the all-important topic of aeriels. Much previously published material is included but that is no criticism; it just goes to prove that basic aerial theory does not change and that established designs are good. Yagis, skelton slots, quads and helical

types are thoroughly discussed and profusely illustrated for the *D-I-Y* enthusiast. Brief mention is made of the log-periodic feed approach for a single-band aerial to achieve wider bandwidth. A 2m. aerial, scaled down from a 50 MHz design, is featured but no mention is made of the possible attraction of a log-periodic to cover the 144 and 432 MHz bands. Such an aerial would be ideal for those who cannot accommodate separate aerials for each band and will be specially attractive should we get a new band around 220 MHz after 1979.

"Microwaves" is the title of Chapter VIII. One is immediately aware of the amount of mechanical engineering required to get going on the Gigahertz bands. The 70 pages are packed with information of a very practical nature. The aerial section includes the increasingly popular "Long Quad Yagi" for the 1296 MHz band, whilst the practical design of dishes, horns and feed systems is excellently covered.

Under the heading of "Space Communications" the ninth chapter deals with orbiting satellites and moon-bounce communication. The geometry of orbiting satellites is clearly explained mathematically and charts

derived for tracking purposes. The principle is applicable to existing "Oscars" and future ones. The all-important "link budgets" for satellite and E-M-E communication are examined.

All the test equipment likely to be required for experimenting and to comply with licence regulations is described in great detail in Chapter X and the last chapter, entitled "Data," contains much useful information on component colour codes, waveguide sizes, the characteristics of coaxial cable, etc. (The copper wire table is still in imperial units).

The book is well indexed and superbly illustrated throughout with clear drawings and photographs. The accent is on home construction and there is even a design for a *D-I-Y* coaxial relay. The writer feels this publication is a "must" for every VHF/UHF enthusiast. The *VHF-UHF Manual* is published by the RSGB in hardback, in 10 x 7½ inch format. The authors are Evans, G3RPE and Jessop, G6JP. It is available from stock at £5-60 post paid from the Publications Dept., SHORT WAVE MAGAZINE, 34 High St., Welwyn, Herts., AL6 9EQ. N.A.S.F.

THE MICROPROCESSOR

SOME POSSIBLE APPLICATIONS IN AMATEUR RADIO

R. KILLICK (G8KWR)

AT the present time Microprocessors are gaining rapid acceptance in industry, being used in many spheres of control and data collection, from heavy machinery to washing machines, and from "intelligent terminals" to the Toronto bus system. The result of this is that prices are dropping equally fast, bringing them slowly into reach of the amateur, price drops in the range of 20 : 1 not being uncommon. In the U.S.A. it is now possible to buy microprocessors and their ancilliary chips from the normal mail-order companies catering for the amateur. It has also brought a number of articles, in a wide range of publications, describing the microprocessor and its uses. There is no reason why the British amateur should not make as much use of this useful and versatile component as his American colleague. This article attempts to give an outline of what a Microprocessor actually is and does, its advantages and disadvantages, and a list of suggestions of possible uses in RTTY.

The Principle

A typical computer system consists basically of one or more Input/Output ports (I/O Ports), a Memory system and a Central Processing unit (CPU). Any system, if it is going to interact with other systems, requires some "interface" with them, and in the Computer, this is taken care of by the I/O ports. The most commonly known I/O devices are the teleprinter (already a connection with RTTY), and the Visual Display Unit (VDU). But there are other possibilities, and it is often necessary for the computer to be directly linked with other hardware, perhaps machinery or instrumentation under its control,

or another computer. The advantage of such systems is that human error is removed, and hence accuracy as well as speed is increased. The Memory system is the part of the computer, where information is stored, either for immediate or later use. There are a number of devices open to the designer, each suitable for a particular use, and price. For information which is constant, ROM's or PROM's can be used, and the information cannot be lost, either due to power failure or operator error. But the computer requires some memory which it can access very quickly, for the temporary storage of information. This is known as the Core-Memory, and in a small system all that is needed are a few RAM's. The disadvantage of these devices is that the information is lost with power failure. In larger computer systems it is also possible to use tape, disc or drum magnetic storage for the long-term retention of information.

The CPU, which is basically a Microprocessor, is the part of the system that does all the work. A typical CPU comprises three interconnected units: Registers, Control circuitry and Arithmetic/Logic Unit (ALU). The registers are for temporary storage within the CPU, some having specific uses, such as the programme and instruction registers, and others which may be used as the programmer desires. The ALU carries out all the arithmetic and logical operations on the binary data, according to the instructions it is given. The third unit is the control circuitry, which maintains the proper sequence of events within the CPU.

If all the aspects of Amateur Radio are considered, RTTY would appear to be the most suitable application for the microprocessor. RTTY stations already have a convenient method of interfacing with the microprocessor system, the station teleprinter (or even in some cases nowadays, the station VDU). RTTY uses a binary principle as does the microprocessor. Below is a list of suggestions of possible applications, although some may not prove viable, and there are certainly other possibilities not mentioned.

(over)

Recognition Programmes: The microprocessor offer a very useful way of scanning incoming signals for pre-selected information, and carrying out some operation, such as switching on the teleprinter, as a result. Such information may be a callsign, a CQ, etc. The possibilities are only limited by the amateur's imagination. Where bad conditions prevail, it is possible to introduce carriage return and line feed signals into the teleprinter circuit, to avoid overprinting and subsequent loss of information.

Automatic Transmission: It should be relatively easy to store certain information either permanently or temporarily in the system, and to print it out as and when required. Such information may include test messages, time, date, callsign, station description, location, CQ and so forth.

Logging: The microprocessor also offers a unique method of preparing logging information, particularly useful during contests, listing callsigns, reports and, with appropriate hardware, exact frequencies, signal strength, times and so on, possibly calculating scoring during contacts as well.

Speed Changing: Again with the appropriate hardware, it is possible to cater for different speeds and codes within the system, carrying out any conversion when required, which is particularly useful with the amount of ex-computer equipment coming on to the market. It may even be possible to programme recognition of the incoming speed and react accordingly.

Station Control: A fifth and very useful function for the microprocessor is in the area of station control. With the arrival of frequency counters and VFO's with digital output, it should not prove difficult to link such equipment directly to the microprocessor, enabling not only logging of frequencies, but also automatic scanning of preselected channels for a given callsign or CQ. The system can also be used for the input/output selection of auto-transmitters, reperforators as well as any other equipment in use in the station, Transmit/receive switching can be taken care of, and even the beam rotator can be brought under control. CW identification can be given automatically, and if and when RTTY through repeaters becomes common, it would be possible to monitor the "timeout" period, temporarily store the information to be transmitted, reaccess the repeater, and then release the flow of information, all without the intervention of the operator.

Cassette Recorders: These offer a cheap method for the amateur to store large amounts of data for extended periods, such as perhaps a complete log of all stations ever worked, at a very low cost.

As can be seen, the microprocessor offers many interesting possibilities to the amateur, but one of their major advantages is flexibility. Once a hardware system has been built (and most of the things listed can be done with hardware), it can be very difficult and expensive to change, requiring considerable use of soldering iron and wire cutters. With few exceptions, most changes required within the microprocessor system can be done by changing the programme as necessary. Another of their advantages is the reduction of hardware required for a given system. To carry out some of the suggestions

above with hardware would require a vast amount of circuitry, and using TTL, also a great deal of power, whereas apart from the microprocessor and its associated memory, only an extra I/O would be required.

The Snags

Unfortunately at the moment, there are two main disadvantages to this type of system, both of which will certainly be reduced as time goes on. The first is the cost of memory. At the moment RAM, ROM and PROM memory is still very expensive relative to the microprocessor itself, although the price is dropping and within the near future, will no longer be a drawback. The second difficulty, which is considerable, but not insurmountable, is that of programming. The microprocessor itself operates on instructions given in binary code, and are very basic. This makes programming tedious and liable to error. For industry, programmes are available called "cross-compilers." These programmes are run on larger computers, and converts a "higher level language" to the instructions acceptable by the microprocessor. This enables the operator to write his programmes very much more easily and quickly.

Unfortunately this possibility is not open to most amateurs, and for one person alone, the programming required would be difficult. But it would perhaps be viable for a group to work on such a project together, particularly if, through his job, a member had access to a cross-compiler.

So it can be seen that the microprocessor can be very useful within RTTY, bringing the computer-controlled station within reach of the amateur. These devices will almost certainly find uses in other aspects of Amateur Radio, but their immediate application would appear to be most advantageous in RTTY.

Of necessity, this article can only deal briefly with, and outline the possibilities of, a concept which has a long way to go in the field of Amateur Radio. It will be seen that it takes the "black-box idea" even further—which may or may not be a good thing!—*Editor*.



"... If I could get £300 for this rig,
I'd go SSB ..."

RF AMPLIFIER FOR SEVENTY CENTIMETRES

SIX WATTS OUTPUT

THE Mullard QQV02-6 double tetrode has not been heard of much in amateur circles. This valve is of very modest dimensions, and is exceedingly easy to drive as a straight-through PA stage and exhibits excellent efficiency up to nearly 500 MHz.

The unit was designed to be operated from an existing two-metre rig, which employs push-pull 6C4 valves in the final, but almost any two-metre drive, above a watt or so, would be entirely adequate.

In order to utilise the QQV02-6 to its fullest capacity, it was decided to run "straight through." It was necessary therefore, to employ a tripler stage between the exciter and this double-tetrode PA stage. The tripler stage was mounted on the same chassis as the PA.

Owing to the low drive requirements, an ECC91 was found more than adequate to drive the output stage, and this valve, acting as a push-pull tripler, was "unity coupled" to the PA grids. This method of coupling tends to be somewhat inefficient, but that was quite acceptable in this instance owing to the "spare" drive available. (It also has the advantage that the number of tuning coils is reduced.) Should sufficient drive not be available, an improvement could be effected by ensuring that the grid loop resonates with the input capacity of the QQV02-6.

Very low screen voltage is recommended for the PA valve, this being obtained from the HT rail *via* a dropping resistor, or from the modulated supply in the case of AM 'phone operation.

The final anodes of the PA are series tuned, as this provides greater efficiency. The output capacitance of the QQV02-6 is, however, extremely low, and should the half-wavelength lines prove an embarrassment (by reason of their physical dimensions) a quarter-wave line would still be reasonably satisfactory.

Power take-off is obtained through a standard co-axial outlet on top of the chassis, utilising the usual hairpin loop. A series capacity is provided here, however, to cancel the reactance of the loop, and improve power transfer. Foam polythene TV co-axial can be used with a material reduction in cable losses.

Pilot lamps can be used as a dummy load, but care should be taken to terminate the co-axial correctly, if the lead is more than a few inches long.

Construction

The unit is actually constructed on a 24g. brass sub-chassis, bent in the form of a "U" 12in. by 2in. with sides 1in high. The sub-chassis is contained inside a 5in. x 17in. standard chassis. This actual method of construction has no significance.

The whole unit was built, and in fact, all the development work was done, using the brass sub-chassis alone. All connections to the unit are brought out through the sides of the "U" *via* feed-through insulators, except those which require by-passing, which are made with capacity bushes, the latter item being very effective owing to their low internal inductance. The brass sub-chassis was first drilled for the tuning condensers, and using it as a template, corresponding holes made in the larger chassis. Using the tuning condensers are temporary bolts, the unit was assembled inside the

Table of Values

Fig. 1. Circuit of the 70 cm PA

C1 = 25 x 25 μ F	C9 = Philips 2-8 μ F trimmer
C2, C3 = 15 μ F disc ceramic	R1, R2 = 33,000-ohm, $\frac{1}{2}$ w.
C4 = 3-rotor 2-stator each section	R3 = 22,000-ohm, $\frac{1}{2}$ w.
C5 = .001 μ F feed-through bush	R4 = 1,500-ohm, $\frac{1}{2}$ w.
C6, C7 = .001 μ F sub-min. ceramic.	R6, R7 = 2,200-ohm, $\frac{1}{2}$ w.
C8 = 25 x 25 μ F	R7 = 5,600-ohm, $\frac{1}{2}$ w.
	V1 = ECC91, Mullard
	V2 = QQV02-6, Mullard

COIL DATA

- L1 = 3 turns insulated flexible PVC, interwound with L2.
- L2 = 4 turns 18g. enam. copper on 3/8in. diam. former, centre-tapped.
- L3 = Hairpin loop, see sketch Fig. 2 for dimensions.
- L4 = Hairpin loop, see sketch Fig. 2 for dimensions.
- L5 = Half-wave line: 16g. wire spaced 5/8in. centres, 6in. long, toed in at V2 anode pins.
- L6 = Suitable hairpin loop for L5, see sketch Fig. 2.

Fig. 1. Circuit of the driver-PA unit for 70 centimetres. The QQV02-6 is a small double-beam tetrode on a B7A base and will give six watts RF output at up to 500 MHz, for less than two watts of drive. The equivalent valve type is the TT23.

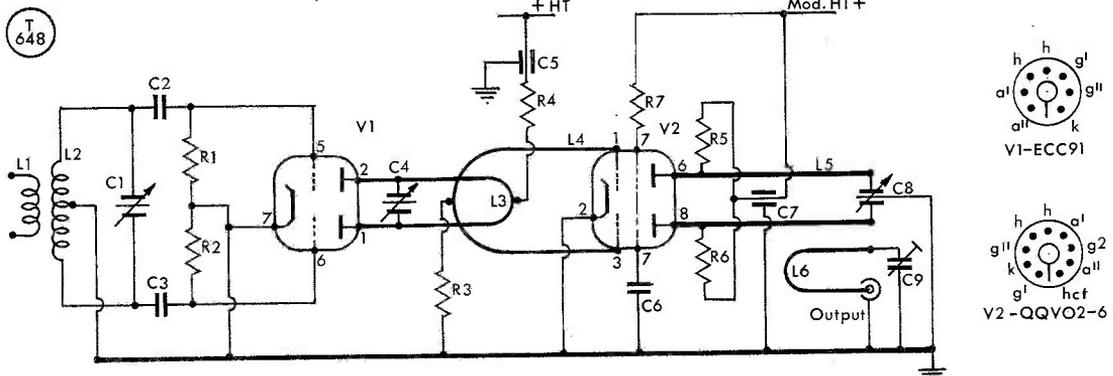


Fig. 1

large item and both the valve holes and attachments made in conjunction. This ensures that the items will mate at a later date. Only four bolts were required to attach the two chassis together, almost sufficient attachment being obtained from the various components.

The output of the existing two-metre transmitter was 300 ohms, and this was fed to the push-pull input coil through two insulating feed-through bushes, and connected to the coupling coil of insulated wire inter-wound amongst turns of L2. Drive can be varied by adjusting the linkage of this coupling.

The input coil L2 is tuned by a small split-stator condenser and bias for this tripler stage is obtained from the grid leaks.

The anode circuit of this valve is a quarter-wave hairpin loop which, being very tightly coupled to the final grid, is rather broadly tuned. The tuning control for this stage is of similar pattern to C1, but most of the rotor and stator plates are removed. The modified condenser covers the tuning range quite adequately. The grid circuit following, being well damped by grid current, is broadly tuned by the input capacity of the PA valve, and has no tuning control. Screen supply for this stage is obtained via a feed-through capacity and dropping resistor R7 from HT+, note being made of the low HT rail voltage that is required.

The anode circuit of the PA is series-tuned by another microdenser, C8, the capacity of which might seem somewhat large to those unfamiliar with this mode of operation. The stator vanes of this condenser are at HT potential, and care should be taken to avoid them taking up any metal swarf, otherwise the HT will be shorted to chassis; the rotor is of course at earth potential, and therefore quite safe to handle from the top of the chassis.

The HT feed for series tuning is supplied at the voltage node and in this case the 2,200 ohm resistors R5, R6, are acting both as voltage droppers and RF chokes. This is necessitated because the HT rail allowed for the QQV02-6 is only 175 volts, but has the advantage that the "chokes" are truly aperiodic, and will obviate any ringing troubles. They also act as safety resistors, should an abnormally heavy HT demand develop.

The coupling loop is short and stiff enough to be fitted *in situ* without any additional anchorage, this being accomplished by wiring the hairpin directly between the output receptacle and the series capacity, which is sweated to the side of the brass chassis, providing excellent rigidity. The output loop is adjusted in place such that it runs parallel with the half-wave lines, with a spacing of about a quarter inch.

Tuning and Setting Up

The unit was designed to be reasonably foolproof, as difficult or "fussy" adjustments are always a curse at these frequencies.

Anyone in possession of a grid dip meter for both 70 cm and Two will experience no difficulty in setting up. The 70 cm section lengths were arrived at by cut-and-try

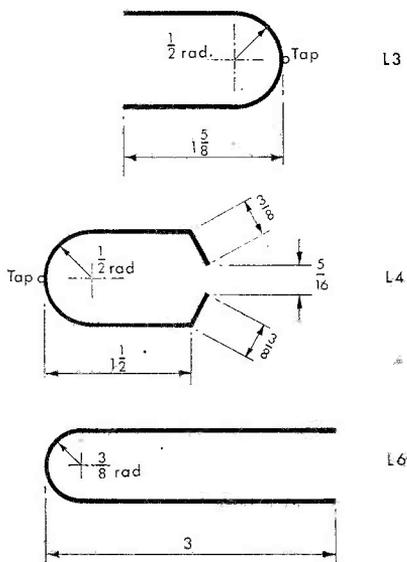


Fig. 2

Fig. 2. Dimension details for the hair-pin inductances in the 430 MHz tripler-PA unit. The wire specified is 16g. enamelled.

methods. However, having established suitable dimensions for the latter, no trouble should be experienced.

The input circuit was tuned right up "on the nose" using the grid dip meter. Check can be made using the grid current as an indication. The two grid leaks should be strapped together, and by-passed to earth, before being led away to a 0-5 mA meter, connected between the "cold" ends and chassis.

Using this method, connect heaters, and adjust C1 for maximum grid current in V1. Open the bottom end of R3, and insert the meter between bottom end and earth; be sure to by-pass the "earthy" end with a .001 μ F ceramic or miniature mica condenser. Tune C4 to give maximum grid current to the Pa with HT on V1 only.

Solder R5 and R6 approximately in position, and clean a good inch of wire either side the connection.

A 60 milliamp pilot bulb may now be connected to the output socket, and reduced HT applied to the PA plate and screen. Tune C8 for maximum output, had having done so, carefully touch an insulated handle screw-driver along either line to establish a point where no flickering of the lamp occurs. This point is the correct voltage node, and may vary from model to model. Once this is found, the HT should be taken off, the resistors R5 and R6 resoldered at this point, and the HT reappplied. Unless the tapping point happened to be right

first time, slight readjustment of C8 may now be necessary for maximum output. Check back over the previous stages using the output lamp as indicator, to counteract any slight final trimming necessitated by removing the grid meters, and reinstating the grid leaks.

The 60 milliamp bulb can now be replaced by a 6.3 volt pilot bulb, and full 175 volts applied to the PA. It should be noted that this figure is the actual plate voltage, checked at the RF end of R5 and R6. A much more usual HT rail voltage can be employed, but

account must be taken of the drop in these two resistors.

The dummy load of 6.3 volt pilot bulb will light quite brightly; a further increase in brilliance can be effected by trimming out the pick-up loop inductance with C9. The transmitter is then ready for testing on aerial.

Field strength checks show that the RF output is superior to much more ponderous gear consuming many times the current and something more ambitious can be added as a linear RF amplifier.

DATONG FL-1 FREQUENCY AGILE FILTER

TEST REPORT

TUNABLE rejection notch filters and Q-multipliers have been around for many years. The earliest devices used valves and the successful designs were later "transistorised." The advent of cheap, integrated circuits has now made possible the realisation of very complicated communication accessories at very reasonable cost and the *Datong* FL-1 Frequency Agile Filter is a prime example.

How to Instal it

The FL-1 is simply connected between the headphone or speaker socket of the receiver, and the loudspeaker.

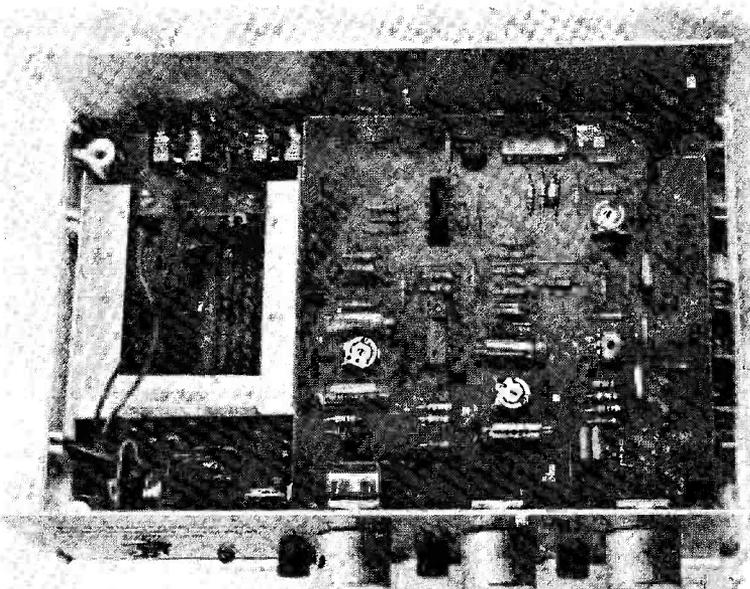
It can be internally powered from a 9-volt battery or from an external 6.5 to 16 volt DC source. Reverse polarity protection is provided by "idiot" diodes. Input, output and external power supply sockets on the rear are DIN types and a preset control is incorporated to enable the output level from the FL-1 to be matched to that of the receiver alone.

What it Does

Basically, the FL-1 is an active filter which permits either the peaking up or notching out of frequencies in the audio passband of 280 to 3,000 Hz. Both the centre frequency and the width of the band to be peaked or rejected can be smoothly varied by front-panel controls. The device incorporates its own, 2-watt power amplifier for 4 to 16 ohm speakers.

So far this is quite conventional. Where this product is unique, as far as this reviewer is aware, is that it can

Interior view of the *Datong* FL-1. Battery space is to the left of the main circuit board, and the input, speaker and external power sockets are on the rear panel. There is another circuit board underneath.



be set up to seek out *automatically* an interfering heterodyne within its passband, and notch it out by at least the claimed 40 dB. It does this by scanning the passband every second or two and locking on to the unwanted signal provided its peak-to-peak level at the input exceeds 100 millivolts. Positive lock is indicated by an LED lamp.

What the Buttons and Knobs do

To get the best from this ingenious accessory it is essential to "learn to drive it." In addition to the three control knobs there are five push-buttons. The "on/off" button function is obvious and the "bypass" one, when pushed in, routes the input straight through to the output. Depressing the "-afc" button disconnects the automatic frequency control which otherwise operates over a 100 Hz range in the manual tuning mode to take care of "Happy Wanderer" signals. For automatic filter tuning the "man/auto" button must be out, whilst depressing it enables manual tuning with the "frequ" knob to be carried out. The "pk/notch" function is in the peak mode when the button is depressed and in the notch or reject mode when it is out.

So much for the buttons. There are three knobs, one of which is a volume control used instead of the one on the main receiver. The "frequ" knob varies the centre frequency of the filter in the bandpass or band reject mode between 280 and 3,000 Hz and the "b/width" one varies the width of the pass- or reject band between 25 and 1,000 and 20 and 800 Hz respectively.

Using the FL-1

To get the maximum benefit from this accessory it is strongly recommended that the accompanying leaflet be read several times so that the function of the many controls are thoroughly understood.

For CW reception, the filter was set up in manually tuned, peak mode with the "b/width" knob in the anti-clockwise, wide band position. The "frequ" control was then adjusted to peak the chosen audio note, after which the band width was progressively reduced. On most signals, reducing the passband to around 25 Hz caused the keying to sound very "soft" making it difficult to copy faster keying speeds, as to be expected. With the "-afc" button out, the "lock" LED lit up with all but the weakest of signals. One interesting result when using the FL-1 in peak mode during television hours, when the racket from colour TV line time bases can be chronic, was that, using very narrow passbands, it was possible to hear signals that would have been buried in the TV rubbish with the normal receiver band width.

On SSB when operating in the reject mode, the controls were set up as recommended in the data sheet. An S7 signal was tuned in and a netting signal from the station Tx introduced to read S9-plus-20 dB. With the filter in the "bypass" mode, the SSB signal was ruined, but less than a second after switching in the FL-1, the note had been captured and suppressed drastically to enable the SSB to be copied adequately, even though the receiver's S-meter was still ready S9-plus-20 dB, of course. Furthermore, due to the very narrow width of the notch coupled with the very steep skirts, such a small part of the audio spectrum was removed that intelligibility was hardly affected. For wider band interference it was found necessary to increase the reject band width and some compromise had to be found for best intelligibility and greatest reduction in interference.

During use, an external 10.5 volts DC supply was used. The maximum current drawn was 250 mA into a 4-ohm loudspeaker at high volume, the minimum, quiescent current being 36 mA. The specification suggests supply voltages of 6.5 to 16 volts, the corresponding currents being 160 and 320 mA maximum.

Physical Details

The FL-1 is housed in a strong, white, standard *Verob Electronics* plastic case measuring 8in. wide, 3in. high and 5½in. deep. The two fibreglass printed circuit boards are mounted one above the other and accommodate eight integrated circuits, six transistors, five preset potentiometers and the usual capacitors and resistors. The variable controls, push-button assembly and sockets are all types specially designed for p.c.b. use. The weight with battery is about 2½ pounds.

Conclusions

The writer rates this as a very ingenious and useful accessory for both phone and CW operators and it is most encouraging to realise that it is entirely British designed and made. A major criticism is the use of identical sockets for the loud speaker and external power supply. Damage to the signal source could occur, as warned in the leaflet, if the external supply were inadvertently plugged into the loud speaker socket with the FL-1 off. Another slight criticism is that plugging-in headphones does not disable the speaker; the only way to do that is to pull out the plug on the back. At £47.50 plus VAT at the current 12½%, this device can be thoroughly recommended as very good value for money. It should be a good foreign currency earner.

N.A.S.F.

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SHORT WAVE LISTENER FEATURE

By Justin Cooper

RECEIVER PROJECT—QUESTION OF AERIALS— PHASED VERTICALS—NOTES, NEWS AND THE HPX LADDERS

Quite apart from the economics of the thing, those who never make anything for the station themselves miss out on one of the basic pleasures in life; there is some interest in just building something, but there is more to come when it is prevailed upon it to work as its designer meant and its builder hoped. And even if it doesn't, most of the components can be re-used in some other project, and something will have been learned. In addition, for those who for one reason or another lack confidence—and this in some wise a bit of all of us—a successful constructional project is a valuable boost, while the failures will have provided experience for the future.

Since so many of your letters over the years have referred to constructional activities, and this piece has largely skated around the subject, the time has perhaps come for us to restore the balance a bit. Let us, therefore, look at a simple construction project a little more closely.

First, there is the starting data: More often than not, just a circuit diagram, maybe a photograph, and a few paragraphs in which the originator discusses his brain-child, what it does, and how it achieves the end. Rarely does one get a wiring layout pictorially shown, or any mechanical detail, and this is precisely the point at which our hero usually develops feet of clay. Let's for the moment consider simply a transistor gadget, say, a direct-conversion receiver for Top Band. Essentially, this will comprise an audio amplifier, and its associated output stage to headphones or a loudspeaker; an oscillator to cover the range 1.8 to 2.0 MHz; and a mixer stage. Forget the mechanical "packaging" of the project for a moment, and just consider the circuit. It can be built up in three pieces, just as outlined above, and tested part by part before combining them. First we tackle the audio amplifier, for which we will require the electrical components, some wire, and a piece of *Veroboard*. This last can be obtained from your local radio dealer, who will be able to get it as "strip board" or you can doubtless obtain some from any "amateur constructor" operation, or from one of the advertisers in *SHORT WAVE MAGAZINE*. Get a complete sheet of board. It matters not whether you use the large-pitched or the smaller pitched centre type, though the former is less prone to track-lifting if you are clumsy with the soldering-iron. You will end up with some over—it'll come in handy some time, and you'll have some more to use if you make a right shambles. You need an engineer's twist-drill of a size suitable for cutting the tracks as necessary—either get one of the little sets from Woolworth's tool counter, or go and choose a suitable size for your board in the local tool dealers. You *don't* use it in a drill; the object of the exercise is to fit the point into one of the holes in the *Veroboard*, and twiddle the drill until it *just* removes the

copper track around the hole without penetrating right through the supporting SRBP material. The idea is to fit the components on the opposite side of the board to the copper, with the wires sticking through the holes, so that the tracks of the *Veroboard* run from place to place where needed, and are broken with the drill where they are not needed or would short out components.

Make a "map" of the *Veroboard* holes on a bit of paper, referencing the rows of holes with letters and the tracks by numbers. Now take your circuit diagram, and lay the components on to the "map" as near as you can just like the circuit diagram—the bottom track can be your ground common and the upper one the HT supply line. Bear in mind the size of your components, and allow, say $\frac{1}{4}$ in. either end of the component for the wire to be taken away straight before bending down to go through the holes in the board; a good trick is to make paper templates of the components to place on the plan, which will show at a glance if a component will fit just as one desires. Sketch in the component symbols as they are settled with a coloured pencil, and then the points where the track is to be cut by showing a ring of a contrasting colour around the relevant hole. Once your "map" is complete, put it to one side, and tomorrow evening check that it is tight, or, better still, get someone else to check it. If a component such as a resistor or capacitor insists on having both ends in adjacent holes, don't forget that you can mount it standing upright from the board,

HPX LADDER

(All-Time Post War)

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W. Bingham	(Carrickfergus)	1595	G. F. Gullis	(Ogbourne St. George)	824
S. Foster (Lincoln)		1587	C. K. Verstage (Old Basing)		800
K. Kyezor (Irechester)		1573	W. H. Smyth (Hartlepool)		793
R. Shilvoek (Kingswinford)		1500	B. T. Mackness (Dagenham)		773
R. Carter (Blackburn)		1362	M. Rodgers (Harwood)		741
J. Fitzgerald	(Gt. Missenden)	1334	L. Craven (Alvechurch)		737
B. Hughes (Worcester)		1308	P. Rooney (Liverpool 4)		725
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P. C. Jane (East Loos)		1280	L. Gibson	(Barrow-in-Furness)	664
K. A. Whiteley	(Castleford)	1170	J. Aspinall (Leeds)		628
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J. H. Sparkes (Trowbridge)		1067	G. Clegg (Deeting St. James)		506
Mrs. J. B. Jane (East Loos)		1020			
E. W. Robinson	(Bury St. Edmunds)	968			
H. M. Graham (Harefield)		915			
M. C. P. Bennett (Datchet)		906			
P. Barker (Sunderland)		864			

Starting Score 500 for Phone, 200 for CW. Listings include only recent claims.

so it has one very short lead and one longer one from the upper end of the component. If the result isn't pleasing, don't hesitate to put the map to one side and do another, which can be slightly different; after checking, compare the alternative layouts and choose the one which "looks best"—there is much truth in the old engineering adage that if it looks right, it probably *is* right!

A final check is now made that everything is on the map that should be, with the right number of leads leading away to the volume control, entering the input signal to the circuit, and taking output to the speaker or headphones, and that all is shipshape and Bristol fashion. Take the actual *Veroboard* out of its polythene packing, and cut off a piece of suitable size for your layout; lay the board out flat on the table, with the cutting edge as near the edge of the table as you can, support it with the left hand, and cut it very carefully with the finest teeth in the hacksaw blade or the saw which you can manage and the blade as flat to the *Veroboard* as you can, so as to get several teeth working at once; the last little bit can be cut more neatly by sitting the cut area on a scrap of wood offcut and sawing quite flat so that the saw finally penetrates and marks the bit of wood. Tidy up the cut edge with a nail file or similar tool, and proceed to wire up in accordance with the chosen plan. Remember that the components are on the opposite side to the foil when "reading the map" and fitting the components. Solder using cored solder, and a small hot iron, which should be checked before use for any sharp edges and rounded off if necessary. If you are in doubt about the solder "taking" cleanly, have a practice run on another bit of board, and if it shows any inclination to form "blobs" rather than blend into the copper, clean the board on the track side with *Vim* until the copper is all bright, washing off with plenty of cold water and letting it dry naturally.

The oscillator can be a similar "printed circuit board" out of another, smaller piece of *Veroboard*, with the proviso that there will be a couple of leads to go to the tuning capacitor. Likewise the mixer stage, save that here we have a FET device to deal with. Map all out and wire as before, but before taking the FET out of its packing, wrap a bit of bare wire round the three leads of the FET so they are all shorted together; keep 'em like this until safely soldered in circuit, and always put them in the circuit *last*, so the various leads are connected to components and static charges can't build up while soldering or handling either the transistor itself, or any component soldered in later; shorting the leads *and* wiring the FET last, plus shorting the HT rail and earth rail together until the last moment, should be enough to save "popping" a good FET.

Now, we come to the mechanical assembly; and this will have to wait until next time round. Also in next time's piece will be circuits and values for these three modules, if you want to follow this out.

The Mail

And, right away, it should be said that because of the space devoted to the construction project above, many more than usual of the letters will have to be included in the final "acknowledgements also from letters from . . ." paragraph—which doesn't say they've not been read and

enjoyed; they have, and any major points have been picked up.

First letter is from *Mrs. J. Jane (E. Looe)* which enclosed her own and the OM's table entries. She says she started originally with the "if you can't beat em, join 'em" idea, after once or twice being asked if she could recognise that elusive call or confirm his own ears; then she caught the bug and carried on for her own pleasure. However, Jackie is surprised at the lack of YL participation in the HPX Ladder or indeed in SWL. True enough, there have only been a few in the ten years since this writer took over the piece. Some just dropped out and disappeared, but most passed on to the ranks of the licensed amateurs; one recalls G3XVC, Maureen, and her OM, G3WQC; also a family of father, son and daughter in (one seems to recall) Southampton or Portsmouth, who used to scrap over who got a read of the Ladder first; a laddie in Hull who converted his YL to SWL'ing and then married her; and a YL who wrote just once from the Cray Valley area, but who continues to figure prominently in the local club activities. There were one or two more, but one rarely has seen more than one YL name at any time on the HPX roll.

K. Kyezor (Irchester) who like so many other radio-amateur and SWL types, has other hobbies, and among them building steam engines and models; the photograph he sent of the chassis and motion work of a model of the ex-U.S. "Austerity" locomotive which ran on British metals for a while after the War made your old conductor blush at the thought of his own efforts in this line!

A most interesting question is posed by *M. C. P. Bennet (Slough)* when he asks whether a TA33Jr beam would be better than a 12AVQ plus a hundred feet of wire tuned through an ATU. This sort of thing is so difficult to answer unless one knows the detailed circumstances; for example, is the 12AVQ at ground level or above the rooftop, how good is the earth with the end-fed, and how high could a beam be raised in the air, not to mention the question of how the three-element beam could be rotated. Personally, the writer is of the opinion that the horizontal Yagi beams at normal "practical" heights are a bit over-rated; the vertical does not basically *need* height to achieve its performance, though elevating it to rooftop level and using it with radials will often stop much absorption by nearby buildings and other objects, while height for a tri-band Yagi is a compromise—it must be up a half-wave on each band to give the desired low-angle radiation pattern, and *never* an odd number of

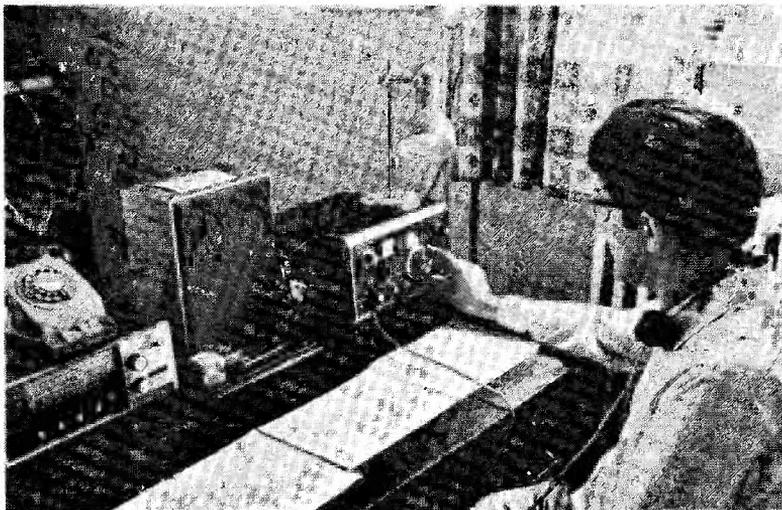
ANNUAL HPX LADDER

(Starting date January 1, 1975)

SWL	PREFIXES	SWL	PREFIXES
M. Gibson		R. Rennard (Redditch)	298
(Barrow-in-Furness)	478	R. G. Williams	
S. T. Bowen (Kippax)	442	(Borehamwood)	233
J. J. Ryan (London, W.11)	333	C. K. Verstage	
M. Kelly (Lisburn)	312	(New Zealand)	219
G. Ridgway (Ardleigh)	311	R. Staples (Lymm)	214
J. B. Cooke		P. Ramsay (Stevenston)	203
(North Walsham)	312	P. Polanyk (Coventry)	200
R. A. Charlesworth			
(London, N.22)	302		

Starting Score 200, in accordance with HPX Rules.

SWL station of Roy Charlesworth, High Road, Wood Green, London, N.22, who has as receivers a Heathkit SW-717 and Trio JR-310. His aerial is a trap dipole on the roof. Score is over 200 prefixes logged since January.



quarter-waves high. J.C. has a soft spot for a *vertical* array such as a couple of ground-planes spaced quarter-wave and both driven; in phase, the pattern is slightly egg-shaped with the maximum in the plane perpendicular to the line joining the elements, while feeding them 180° out-of-phase gives two equal lobes end-on to the line joining the elements; changing to 90° phasing results in a single lobe end-on to the line joining the elements, which can be reversed in direction by reversing the 90° phasing. Something similar happens at 3/8 wavelengths spacing between the elements, and again at 1/8 wavelength, save that in this last case the single-lobe pattern end fire is produced by means of 135° phase-shift. It doesn't take a lot of imagination to see how this could be adapted to, say, a couple of 12AVQ aerials fed equal lengths of coaxial line to a box by the receiver containing a switch to connect extra lengths of coax into one or other feedline to get the desired patterns. Such an array doesn't need height like a horizontal Yagi to function, and it gives its gain at lower angles for real DX results; for the few occasions when the DX signal is hitting the site from a *high* angle a *low* dipole can be brought into play. But the combination of hundred-foot wire end fed, and a 12-AVQ is not by any means to be sneezed at.

C. Verstage (New Plymouth, New Zealand) has been hearing some interesting DX calling Lloyd and Iris Colvin during their expedition. Chris returns to the U.K. in the first week of August, and it is his intention to sell the gear over there; it seems difficult to get a new bit of equipment imported unless you already have a transmitting license; while those few shops handling Amateur Radio gear mostly require a firm order placed before they will import anything, so a wait of 3-4 months is not unusual. Looking at the bands (as heard using a 3/8-wave whip for Seventycems!) the SS/TV has picked up ZL/VK/JA, G3WW several times, KH6, the odd European before Christmas, but no Yanks at resolvable strength. Eighty and Forty are much better over there than in the U.K., with no Continental QRM to battle through, though on Eighty most of the activity is concentrated

between 3.8 and 3.9 MHz. As a final thought, Chris says he would be interested in the idea of a SS/TV Ladder, based maybe on countries, as was suggested by P. Barker last time.

A new reason for losing out on SWL-ing is offered by A. F. Roberts (Kidderminster), Tony being a grass-track fanatic—than takes old J.C. back thirty years, to a rorty great Ariel he used to ride on grass!

E. W. Robinson (Bury St. Edmunds), like others, comments on the Spring lift, he having had daily sessions on the FR50B. Most have been on Twenty, but Fifteen has been open on occasion, and even Ten has come up trumps now and again, though largely by way of Sporadic-E. And, in terms of results, anyone who can add 54 new ones to an existing total of 914, and in addition log a great wad of good DX, has made his point!

Although no-one came back to him as a result of the mention in the March issue, R. Roberts (Mold) did get in touch with G3DLF, and as a result is the proud owner of an HRO; but the aerial is a length of wire attached to the bed frame, at least for the moment. Such an aerial will benefit more than most from an ATU; probably a series-tuned circuit on most bands, link coupled to the receiver. As for the output impedance at the headphone socket, from what your conductor recalls, the HRO was not too fussed, although J.C. always used high-resistance ones, around the 2000-ohm mark.

A lucky chap in for congratulations is L. Craven (Alvechurch), he having passed R.A.E. and Morse at the age of 56, and obtained G4EQI. Already the call has been flung round the world, aided by a trap dipole, and a KW EE-Zee Match ATU, which tunes up nicely on 80, 40 and 20 but only yields 3 : 1 SWR on Fifteen—this is not too serious, and provided the loading is watched it should not worry the transmitter too much—but it might be an interesting scheme to feed the reflectometer through a known 50 or 75 ohm resistor with a whiff of power and see what it says, just in case the reflectometer is being awkward, as they sometimes are at higher frequencies.

G. Ridgway (Ardleigh) wonders what the SWL can do in helping to preserve amateur frequencies at the

forthcoming frequency-allocation conferences. Probably the best thing is by way of letters to one's M.P. asking that British delegates press for retention and, preferably, expansion of amateur allocations of frequencies—such a letter, if it does nothing else, will at least cause the members concerned to “bone up” on amateur frequency allocations and such matters, and, maybe, realise that Europe, Russia, and U.S.A. combined, plus JA/VK/ZL, who between them have most of the world's amateurs as their citizens, are hardly a drop in the bucket compared with the African states who know not of Amateur Radio, nor care, but want frequencies for emitting their propaganda—and one vote per country means these people could well over-rule the major countries by simple majority.

A somewhat similar theme comes in the letter from *R. Carter (Blackburn)*, who “has a go” on the question of pollution of the airwaves, in the simple terms of QRM. He finds an awfully large collection of BC stations in among the DX on Twenty—seventeen of them at one count! This sounds as if there is a receiver problem for Ben either because of images or, possibly, rectification effects due to a dry joint somewhere up the aerial. Of course, there is still an enormous amount of BC station operation in “improper” parts of the bands, and far more in the way of “spark” transmitters disguised as bits of domestic equipment inadequately suppressed!

R. G. Williams (Boreham Wood) sends in a first list, compiled with the aid of Trio 9R59, Heath SW-717, ATU, and pre-selector, to a piece of wire draped around the ceiling at bedroom level. Bob asked for the return of his HPX list, and sent an s.a.e. for that purpose, but we must ask that this is not allowed to become a general practice.

M. Webb (Rainhill) is all in favour of a SS/TV list as was suggested last time. Maurice has the Trio TS-520 set-up for the HF's, plus converters for 70, 144, and 430 MHz. On the aerials side there is a two-element close-spaced beam for Twenty, which is the main interest, this beam apparently being home-built and sitting on a home-brew tower. As for the SS/TV signals, they are all held on tapes as a permanent record.

T. Grimbleby (Hull) finds Twenty a favoured band, and has had much pleasure from the “spring lift” this year on his favoured 14 MHz band, for which there is a 100-foot wire which as yet has to be tuned in some way; the receiver is a Trio 9R-59DS which has been modified about as far as it will stand.

H. Glass (Plymouth) says he is taking a holiday—to let *N. A. Phelps* have a chance to catch him up at the top of the CW Table! And, oddly enough, the very next letter on the pile is from reader Phelps, who has a remarkably long list of prefixes heard considering how high in the table he lies—so Bert Glass will have to look to his laurels if he is not soon to be displaced from the top of the CW ladder. On a different tack, SWL Phelps wonders about the status of 8Z4AA, heard on 7 MHz, around 2100z, asking for QSL's by way of DL8FL—and he also mentions YI3A, calling for QSL's via W2GNK. Both these two must be written off as phonies, even though there are “rumblings in the air” about possible YI activity from various points of the compass. However, it seems to matter not where the proposals come from, they all fall to the ground on the basis of

not having a licence to operate allocated.

M. Gibson (Barrow-in-Furness) harks back to the “other Gibson” and says this is his brother; and there'll soon be a third one as Dad is on the brink of sending in his first entry!

P. Barker (Sunderland) offers a question, namely the counting of the OE50 prefixes, where the operator uses his own suffix after the OE50—for example OE50/3LTA. There seems to be no real ambiguity in the rules as far as this is concerned; such a one would count as an OE53, ridiculous as this would seem.

P. Polanyk (Coventry) is 15 and has been an SWL since he was around 10 years old, initially on the BC bands but more recently on ours, since a meeting with G3YGB “converted” him. The receiver is an AR88LF, in an outside shack; fed with an end-fed wire aerial.

Our sympathies to *M. Barton (Market Deeping)* on his coming unstuck in the R.A.E., into which wound salt was rubbed by Graham Clegg from Deeping St. James, who is now G8LJR, having contrived the slightly better marking which was needful.

On to *A. Probin (Burnley)* who started SWL at the beginning of the year, and has the advantage of a high site for his home, over 1000 feet a.s.l. For the moment, it is HF, the favoured bands being 80 and 20, with a Trio 9R-59DS, Hamgear preselector, and a roller-coaster ATU. Allan queries the origin of the OE50 prefix—just a celebration OE call, just as the AH6BB call is among the celebration American call-series.

It is rather interesting to read through the note from *H. M. Graham (Harefield)* of his activities on Ten. Up to May 10, nothing had been heard, save for the odd I or YU station. These were joined on May 10 by HA and RP2, after which to the time of writing there were openings on eight days, mostly European but including CE3, TU2 and an RAØ.

Time-Out

Which is where the Editor bats your scribe over the head and says “Enough of this.” That being so, we must acknowledge and thank some other writers for their entries for HPX, their chat, and give their names and towns as follows: *M. J. Quinton (Wotton-u-Edge)*; *J. Dougherty (Sunderland)*—congratulations on G8LRN; *P. Rooney (Oxford)*; *K. A. Whiteley (Castleford)*; *G. F. Gullis (Ogbourne St. George)*; *L. Gibson (Barrow-in-Furness)*; *D. Taylor (Harborne)*; *H. A. Londesborough (Swanland)*; *R. Charlesworth (London N.22)*; *B. F. Hughes (Worcester)*; *S. Foster (Metheringham)*; *A. C. Roberts (Shepshed)*; *P. Ramsay (Stevenston)*; *M. Cuckoo (Herne Bay)*; *W. H. Smyth (Hartlepool)*; *B. T. Mackness (Dagenham)*; and *S. Bowen (Kippax)*.

And, of course, this is also the time to remind you that the next round of letters, with scores, chat, questions, and whatever, should be posted to arrive by first thing on **July 22**, addressed as always to “SWL,” SHORT WAVE MAGAZINE, BUCKINGHAM, MK18 1RQ.

METHODS OF MEASURING INDUCTANCE

FOR COIL WINDING

J. S. CUSHING (G3KHC)

WINDING an inductance for use in a transmitter, receiver or whatever is a job which frequently faces constructors when suitable ready-made coils are unobtainable.

Winding of the coil itself is not too troublesome. Rather, the major difficulty is determining just how many turns to place on a former and nearly always becomes a matter of trial and error. Unless a published design is meticulously followed (and even then some of the following can still be found useful) a method often used is to hunt through any handy publication until approximately suitable data as to wire gauge former size and so on are found and this is used as a starting point. After the coil has been wound it is checked out one way or another, turns being added or removed as necessary.

Checking is sometimes possible by wiring the coil into a circuit under construction, but this method can be very much hit-or-miss so it is far better to be able to make some form of measurement before installation.

This does not imply complex test gear to measure directly the value of inductance, for a grid dip oscillator or its solid-state equivalent a dip oscillator is satisfactory for amateur applications.

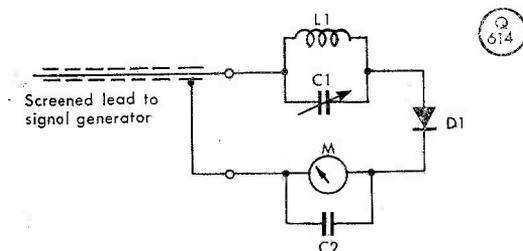
Alternative way is to use an ordinary signal generator, a serviceman's type being quite good enough provided its calibration is up to standard, and if any check is thought necessary this is soon done with a general-coverage receiver which in turn may be checked against a crystal calibrator.

The generator, using its socket which gives a nominal one-volt output, is coupled into the circuit shown here, where L1 and C1 represent the coil under test together with its capacitor.

When the generator is running, so long as it is not at the resonant frequency of the tuned circuit (L1 and C1) only resistive elements in circuit limit passage of current, so the meter will deflect appreciably. At resonance, however, the tuned circuit presents a high impedance so current will be lower and the frequency can be read from the generator's dial.

A diode (D1) is necessary in this circuit as a DC micro or milliamp meter will not indicate RF current and capacitor C2, across the meter, is to bypass RF.

On the practical side this is the type of circuit which can be hooked up in moments with a few short lengths of wire and some croc. clips, but if the idea is found useful a more permanent arrangement can consist of a small container with a socket for the generator lead, a couple of flying leads terminated with clips to connect to the coil, and a built-in meter or a pair of terminals to allow easy connection of a meter. The latter may be a multi-



Layout of the circuit discussed in the text. L1 is the coil under test, C1 to resonate L1. C2 can be .001 to .005 μ F, the meter 0-1 mA and D1 any small signal diode.

range job instead of a single range instrument, or ear-phones are an alternative. High impedance 'phones (nominal 4,000 ohms) or low impedance ones (nominal 50 ohms) both work well and there is no difficulty hearing the null at resonance, though to do this the generator's internal modulation should be on.

Trying Out

Initial experiments are probably best made at a lowish frequency, using a coil and capacitor of known value and a medium-wave coil with a 500 μ F variable is suggested. With the capacitor fully meshed the meter should give a noticeable dip at about 600 kHz, depending on make of coil and the position of its slug. If the variable is fully opened resonance will be at around 1,500 kHz.

Further experiments at higher frequencies are worthwhile. It will probably be noticed that at HF the null becomes less easy to detect and eventually the procedure fails to give reliable indications. This happens because as frequency is raised an appropriate tuned circuit will tend to have relatively less impedance. It may also be noticed the generator output varies with frequency and it may be minor dips are produced by the generator.

In some respects this way of using a signal generator is superior to employing a GDO. A generator's dial accuracy is almost always better than a GDO and a GDO is easily pulled off frequency. Screened coils can also be measured by this method, which is something a GDO cannot do easily. On the other hand, coils for VHF as well as coils *in situ* are best dealt by a GDO.

This method of checking out a coil does not measure inductance directly, but rather a frequency at which a coil and capacitance resonates. However, if the capacitor is, for example, a 1% tolerance silver mica it is fairly easy to calculate the value of inductance. Formulae covering this will be found in many Handbooks and manuals dealing with Amateur Radio.

VHF BANDS

NORMAN FITCH, G3FPK

Contests

FROM the Association of Sheffield Amateur Radio Clubs' *Newsletter No. 11* comes the results of the South Yorkshire contest on two metres on April 11. The S. Yorkshire winner was G4AWU with 298 pts. from 55 QSO's, with G4BZD as runner up. The winner outside Yorkshire was GW3WRA/P with 324 pts. from 101 contacts, with G4BWG runner up 15 pts. behind.

The results of the 70 cm. Open contest over May 1/2 are to hand and reveal that the winner of the portable section was GW3UBX/P whose 106 contacts brought a score of 692 pts. GW3UCB/P was the runner up (103/657) with GW8AWM/P in third spot (93/644). In the fixed section, G3JXN had 69 contacts which scored a total of 256 pts. giving John a clear win over G3KMS (33/184). Third place went to G3BW (19/149).

Of the 2m. Portable event, May 22/23, there has only been time to learn of some claimed scoring QSO's. GW3WRA/P amassed 554 and GW8BHH/P 493. Southerners G3REI managed 350 contacts. In the CW contest on the Sunday, G3POI is claiming 619 pts. and GW3NNG 576. May we have your reports on the June 19/20 *Microwave* contest and Region 1 VHF event on June 20 for the next issue? There will just be time for your reports on conditions and possible scores in VHF NFD, July 3/4, too. On July 25, there is the two-metre QRP contest in which one watt DC input or 2-67 watts p.e.p. to the PA is all one is allowed; time it 0900-1700 GMT. Looking ahead to August, the weekend 7/8 is the time for the 4m. portable event. RTTY readers

may obtain details of the BARTG VHF RTTY contest over September 11 and 19 from G8CDW, *QTHR*.

DX-Peditions

Your scribe was surprised to have a CQ call on June 6 answered by Paul Widger operating as GM8AGU/P near Lockerbie in Dumfries and Galloway Region. Paul explained that the crystal in his 23 cm. equipment failed prior to his departure so no operation on that band was contemplated. Gregg Gilman, G3SCP, has everything sorted out for the Luxembourg trip. This is a student camping vacation and they will be in the Grand Duchy from July 19 to August 2. He will be QRV at any time but will be on definitely from 1800 on Saturday, July 24 and all day on the Sunday, around 144-24 MHz. He suggests that stations do not waste time giving his call, but just their own. If things get hectic, he will work split frequency, say plus/minus 10 kHz and probably call specific QTH squares only. Gregg asks that callers co-operate so that he can work as many as possible.

The Cambridge University and G8AGU/GM3JFG Scottish trips, plus the Channel Islands one, will be over by when this is published. Perhaps the groups concerned will send their comments by July 9 in time for the August column. GM3BOC/A expects to be QRV from Brora (Highlands) in YS square from July 16 to 30 on 2m. GM4DZO/P will be on Two from the Isle of Arran in Strathclyde Region (XP) for a week from July 25.

Beacons

From time to time readers ask is a list of beacons can be printed. This is a sensible idea but unfortunately, it seems that beacon keepers and/or the VHF managers of the numerous, Region 1 IARU societies do not always make up-to-date information available. Also, some of these are very QRP and/or beam nowhere near the U.K. Now that the Sporadic-E season is with us, here are some of the beacons likely to be received:—F3THF at *Lannion*, Dept. 22 in QTH square Y113 on 144-002 MHz. This beams East $\pm 30^\circ$ and its call sign is sent in rather chirpy FSK. In Italy, 12A in DE27h on 144-139 MHz only

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G8FUF	—	63	138	201
G3POI	—	—	137	137
G3CHN	—	—	114	114
G3FPK	—	—	109	109
G4CDF	—	—	109	109
G4BWG	—	18	102	120
GM4CXP	—	12	92	104
G8HVY	—	—	86	86
G6UW	—	—	80	80
G4BAH	—	—	74	74
G8BKR	1	6	73	80
G8GML	—	4	68	72
G8HHI	—	—	66	66
G4DGU	—	30	64	94
G4DKX	2	—	61	63
G4CIK	—	—	61	61
G8GII	—	7	57	64
G8KLN	—	—	55	55
G3COJ	10	45	54	109
G8KSP	—	—	53	53
OZ9IY	—	—	53	53
GC8AAZ	—	5	52	57
G8KKX	—	—	49	49
GD3YEO	—	—	48	48
GW8HVP	—	—	48	48
G3BW	—	21	47	68
G8JJR	—	—	46	46
G8HAF	—	—	45	45
G4AEZ	—	15	44	59
GD2HDZ	6	19	41	66
G4EYL	—	—	41	41
G8JEF/A	—	—	38	38
G3FIJ	—	6	34	40
G2AXI	—	29	33	62
G8ITS	—	1	31	32
G8IFT	3	11	29	43
G8JEF	—	—	25	25
G8JAJ	—	—	23	23
G8JKA	—	—	21	21

Starting Date January 1, 1975. No satellite or repeater QSO's. "Bard of the Month" is Two Metres.

runs one watt output to a horizontally polarised, 2 ele-Yagi. After its call, there is 15 seconds of unmodulated carrier. 14A in FE77h is on 144.1425 MHz with 7 watts output to a 2-bay horizontally polarised turn-stile. It sends its call and locator in CW followed by 90 seconds of unmodulated carrier. 10A in GB12d runs 10 watts output to an omni-directional turnstile, horizontally polarised, the QRG being 144.1475 MHz. This one sends its call, locator in CW, followed by 30 seconds of carrier. A new device in Monaco is 3A2B nominally on 144.900 MHz, soon to be sited at 1095 metres, a.s.l. on Mount Agel in DD18j. This runs 8 watts output to an omni-directional, horizontally polarised aerial and the sequence is, call for 13 secs., 3½ secs. of unmodulated carrier, audio tone for 7 secs. then unmodulated carrier for a further 3½ secs. (The audio tone pitch will depend upon atmospheric temperature).

From time to time, further beacon information will be given in this feature and reports would be appreciated on the reception of *any* beacons not normally heard. On 70 cm. the Swedish beacon SK6UHF is now on 432.925 MHz from square GR51 and there are plans for a 23 cm. beacon.

Our mention of the need for some low-loss coax for the Dunstable Downs 23 cm. beacon GB3DD did not fall on deaf ears. G3XWS (Luton) reports several offers and delivery of some super coax from a kind benefactor is expected any time. So GB3DD should be on again in the reasonably near future.

And now to some band news . . .

Nine Centimetres

From Newsletter No. 11 of the Association of Sheffield Amateur Radio Clubs, it is noted that G8AGN seeks approval for the first 9 cm. beacon on 3.456 GHz, call sign suggested GB3UOS. 10 watts nominal e.r.p. with a 10 dB gain aerial firing North-South is proposed from a 400m. a.s.l. location Northwest of Sheffield.

Twenty-Three Centimetres

Paul Davies, G8HBQ (Leeds) advises he is now QRV on 23 cm. using a 70 cm. AM transmitter into

a BXY35A varactor tripler giving 5 watts output. The aerial is a single, home made, *Quad Loop Yagi* at 46ft. On the receive side he uses a two stage, BFR90 pre-amp. to a *Microwave Modules* converter. Paul mentions G3HCW, G3ZIV, G8BCL and G8EOP as being active locally and that 144.17 MHz is the local, Yorkshire 23 cm. talkback frequency. G4AEZ (Enfield) writes that he hopes to be on SSB in the near future.

Seventy Centimetres

G3BW (Cumbria) reports that he sked with G3AUS in Devon on 432.15 MHz from 2115 GMT usually results in their being able to detect each other. The three-way between Bill, G3KMS and GD2HDZ continues with 100% success. In a QSO with G8JHL (Salford) John mentioned that he and G4CVW have a "K2RIW" linear amplifier between them and that they have built a *Quad Loop Yagi* scaled up from the 23 cm. design. There were hints of a very big dish in the offing with E-M-E as the eventual goal. GD2HDZ (Laxey) has been very busy of late moving into the new QTH but is now back on the air. Arthur was on the band to good effect in May and will no doubt be giving G3BW a run for his money from now on. GM4CXP (Borders) was very pleased to work GW3NNF on May 22 for a new QTH square, county and country, but says conditions were generally rather uninspiring at his end during April and May, a sentiment expressed by many correspondents.

From Jersey, GC8AAZ was lucky to get 12 QSO's *via* the French, balloon translator *Anjou* 8 on May 23. He had his first contact at 0750 GMT but at 0820 it suddenly vanished. The balloon carried a 70 cm/2 m. translator rather like *Oscar 7* on mode B, receiving on 432.35-432.65 MHz and relaying on 145.45-145.75 MHz with CW and SSB the preferred modes. Lawrence managed QSO's with QTH squares AD, AF, AG, AH, AJ, BI, BJ, ZE and ZH, plus G8AGU in Devon. Summing up, GC8AAZ wrote. ". . . I did not realise there were that many French stations on 70 cm. SSB."

A recent release of U.S. surplus AN-T271 transmitters has enabled a number of 70 cm. operators to contemplate high power finals. As

bought, the PA uses two 4X150A valves in a silver-plated cavity, readily tunable to 432 MHz without modification. Some re-vamping of the grid circuit is necessary. It is suggested that anyone who has got one of these units going may like to send the details of "the mods" to G3FPK (*QTHR*) for possible inclusion in a data sheet which could be distributed to those who have acquired these amplifiers.

Alan Evans, G8GII (Shepparton) has been busy of late with academic work but hopes to be more active now with the *FT-101B* "prime-mover" driving a transverter. A single 4CX250B linear is proposed whilst he hopes to add a second 46-ele. *Multibeam* stacked above the existing one. (N.B. The makers weren't too keen on this idea, Alan.) A bespoke phasing harness made from brass tubing is contemplated. G8GII is on 70 cm. most evenings and so is looking for contacts from his 15ft. a.s.l. location.

During the GM8AGU/P QSO mentioned earlier, Paul told your scribe that he was surprised at the amount of 70 cm. SSB activity in Scotland. As this is being written, G3JFG/P is operating from Northumberland and working many 70 cm. SSB stations all over the country, so the team seems to be giving many the chance to work a new county and/or QTH square.

Two Metres

Pride of place this month must go to Lawrence Woolf, GC8AAZ, who can claim the first Jersey to Malta QSO on two metres and probably the first U.K. to Malta as well? Sporadic-E propagation was responsible, of course, for the QSO at 1512 GMT on June 6, SSB. Heard was another 9H1 and IT9WPN. The QSO was with 9H1CD (HV03e) and the distance works out to 2006 km. Congratulations to both stations, especially since this distance is near the upper limit for *Es* propagation. We are now in the peak season for *Es* and it is hoped that those readers who do manage any 2m. QSO's by this mode will write giving the usual details.

G3BW found conditions generally to have been poor. Nevertheless, Bill has "gone to the top of the class" as far as the Three-Band

Annual Table is concerned. He writes: "Listening on 2m. to the Moel-y-Parc repeater leads me to wonder if VHF any longer holds the attraction it did . . ." A contrasting view is mentioned by Alan Scott, G4BYP (Liverpool) who reckons that GB3MP's appearance has given a boost to local FM activity. G8BKR (Bristol) reports nothing really startling in the month. John worked 53 portables on the May 22/23 weekend, the best DX being G8DAZ/P in Co. Durham. GD2HDZ added GM8HYF/P on May 29 in Dumfries and Galloway. Arthur has his 6-ele. Quad on the tower now.

North of the border, GM4CXP sums it up; "... auroral season over, tropo. season, *ugh!*" Derrick only worked 18 stations in the 2m. CW contest, remarking that the best he could give your conductor was 419. (You've got keen ears, OM. G3FPK only had *two* contacts anyway!). Gordon Rolland, GM8AKB (Penicuik, Lothians) writes that conditions were really poor in the May 22/23 contest with locals as thin on the ground as the more distant stations. Only G8FAB/P near Andover at 485 km. was at any reasonable strength. By contrast, GM8EIR/P (YR80a) over a mainly sea path, seems to have fared better with more than 100 contacts. GM8AOB/P, on the summit of Ben Nevis in two feet of snow, probably gave many their first Highland QSO this year. GM8FIH/P, near Kyle, whilst not very strong in East Scotland, was worked by several stations over difficult terrain, QRB 240 km.

The log at G3FPK confirms that the conditions in the South have been unexceptional. The May 22/23 weekend contests were used to find new 1976 countries. All that resulted were G8DAZ/P (Durham), GC3ZNU/A (Jersey) and G3BW (Cumbria), the Jersey QSO adding another country as well. The Welsh portables were not as strong as in previous contests and signal strengths varied a lot. In the last few days before compiling this piece, the band has been open into the near continent with the stronger DL's coming through, along with PA, ON and F stations.

Azores on *Two Metres*; G3CHN (Devon) told your scribe that an

American amateur will be using the call CT2BL over July 15-25 and will have 2m. gear. He will be QRV on 144-05 MHz CW from 2200-2300z. The nearest point to the British Isles would be about 1,250 miles, so QSO's should be quite possible over this sea path.

Faeroe Islands on Two Metres: G4DWZ (London) passes on the information that OY5NS in Torshavn is QRV on the band with 100 watts p.e.p. to crossed 10-ele. Yagis and is looking for U.K. contacts. Niels already operates through the satellites.

Four Metres

Virtually nothing to report on 4m. activity this month. G3BW still continues persevering but finds things "very quiet." Bill suggests that perhaps everyone is on FM? Hopefully, VHF/NFD will provide something worth reporting. In a 2m. QSO, GW3XJQ mentioned he is now on the band with an *FT-101*, home built transverter and 4-ele. Yagi and is probably the only Dyfed amateur on the band. That activity is rather low on Four seems to be borne out by the small increase in the scores in the table.

Meteor Scatter

Held over from last month was some very interesting information from Johnny Stace, G3CCH (Scunthorpe) who has been active on MS for many years. For successful MS working, it is most important to attain high frequency stability and to be able to measure time accurately. On transmit, G3CCH uses an 8 MHz crystal in an oven with proportional temperature control. The receiving side is the usual converter into HF-band receiver but again with the accent on stability. Frequency measurement is done by a *b.c.d.* read out frequency meter, whose oven-controlled oscillator is compared on 144 MHz to a phase locked oscillator on the 200 kHz Droitwich BBC transmitter signal. For the station clock and timing, he uses a 1 MHz Xtal dividing down to 50 Hz. This is then amplified to 200 volts to operate a normal, eight inch, domestic clock with a large sweep seconds hand. The 50 Hz is further divided by 15,000 to produce a pulse each five minutes which operates the send/receive switching

automatically.

Johnny employs three auto keyers. One has a "read only" diode matrix of "de G3CCH" which is inserted automatically at precisely 18 w.p.m. once only at the beginning and end of each transmit period. The main keyer can be programmed for any call sign plus G3CCH and has report inserter facility at the throw of a switch. The third keyer is for messages such as "73," "GL," etc., sometimes used as time fillers after completion of a QSO.

Johnny, like G3POI, has regular weekly skeds with SM3BIU (HX19h) which have been over 50% successful. Tests with SM7AED (GQ56b) at half the distance have produced nearly as many signals but far more "pings" only. This confirms that there is an optimum distance for MS contacts between 800 and 1,200 miles to get maximum use of the average height of meteor trails. G3CCH has tried off-setting the aerials to increase the path length but that has not made any improvement. He has also been experimenting with height diversity using two aerials separated 10 metres in height, the upper one a 10-ele. Yagi, the lower a 40-ele. colinear feeding completely independent receivers. Quite differently times pings occur on the two channels but strong bursts come through on both. Just occasionally a burst starts on one channel, becomes much stronger on the second, but continues for longer on the first receiver. Very rarely has a marked Doppler shift on one channel, *versus* the other, been observed.

As to results, G3CCH had made 156 MS QSO's up to April and suggests we are only yet scratching the surface regarding the usefulness of this mode of communication. He would like to see more space in the column devoted to VHF "DX" working.

G3POI (Downe, Kent) has been regularly active on MS with weekly skeds with SM3BIU and OE3UP (HI70j). A recent successful QSO was with UCAAB (NN18c) also F1CYO in AE21g the latter being copied on tropo. too for part of the time on June 8. Clive's QTH score is now 137, in part due to MS work. GM4CXP also made it with F1CYO on May 5 with Derrick using CW,

whilst Jöel was on SSB. From Horsham, G3WZT reports another MS contact with EA4AO (YA42) on June 5 and UB5WN reports hearing John's MS signals in the January *Quadrantids* shower from PK52j.

This is all most interesting stuff and proves that there are still "fields to conquer" on VHF.

Satellite News

Following a short "off" period from May 10 due to low battery voltage, *Oscar 6* is now available on Monday, Thursday and Saturday, ascending orbits only; *i.e.* late afternoon and evening passes. The Sunday morning descending orbits are no longer part of the schedule. Many *Oscar 7* users have queried why Mode A reception is so poor for some minutes after the satellite has come within range during overhead passes. The reason is that the space craft is magnetically stabilised and that its 10m. aerial is pointing end-on to us. Whilst our 2m. signals are getting in well and being relayed to Africa, it is very difficult to hear one's own signal and those of any African stations. Several casual *Oscar* users have asked G3FPK over the air if we can print reference orbits in the column. Unfortunately space is at a premium but we could consider the idea if there is a genuine demand.

Repeaters

The 2m. Barnsley repeater GB3NA has been taken out of service. The problem is that the IC-22 transceivers used by the locals have enough output on one half the R3 frequency—*viz.* 72.5375 MHz—to cause unacceptable interference to local hospital two-way radio. An obvious approach to cure this would be to fit an open-ended, quarter-wave stub to the output of the rig. For the usual velocity factor of 66%, it is suggested you start with a 70 cm. length, trimming bits off, barber-fashion, until the 72.5 MHz signal is at a minimum. The theoretical length is about 68 cm.

Deadlines

Please send your offerings for the August column by **July 9** and for the September number by **August 6** to:—"VHF Bands," SHORT WAVE MAGAZINE, BUCKINGHAM, MK18 1RQ. 73 de G3FPK.

THREE BAND ANNUAL VHF TABLE

January to December 1976

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	
G3BW	28	6	54	14	26	5	133
G5DF	34	3	58	13	20	3	131
G4BWG	27	3	59	16	18	4	127
GM4CXP	11	3	69	19	9	4	115
G8HBQ	—	—	64	10	23	3	100
G2AXI	23	2	39	9	19	3	95
G3BOC	30	4	48	9	—	—	91
G3FPK	—	—	68	17	—	—	85
G4AEZ	17	2	40	9	13	1	82
G8BKR	—	—	60	10	6	2	78
G4BYP	19	5	39	6	—	—	69
G8GML	—	—	46	9	9	1	65
G8GII	—	—	38	8	10	3	59
G4CZP	—	—	51	7	—	—	58
G8KLN	—	—	44	10	—	—	54
G4DKX	14	2	23	11	—	—	50
G8KSP	—	—	41	9	—	—	50
G3FIJ	14	2	15	4	8	4	47
G8HHI	—	—	37	10	—	—	47
G8KKX	—	—	40	7	—	—	47
G8HAF	—	—	42	4	—	—	46
GD3YEO	—	—	35	7	—	—	42
G8ITS	—	—	37	5	—	—	34
G8IFT	—	—	19	2	11	2	34
GC8AAZ	—	—	17	8	5	4	34
GD2HZ	2	2	3	3	18	2	30
G8GLS	—	—	18	4	—	—	22

THE MONTH WITH THE CLUBS

By "Club Secretary"

(Deadline for August issue: July 8)

TO the poor old Club Secretary, scratching around to make up his programme, it may come as a surprise to find out just how much talent there is within his own outfit! Even if—and it is very rarely the case—there aren't any "professional" amateurs who can give a talk, it will almost certainly be that there are members knowledgeable in other fields than Amateur Radio, to whom the Hon. Sec. may turn. For instance, the local photographer, or model engineer, or technical director of the local glass-making establishment—these are mentioned as all having at one time or another given a talk at the Club to which your scribe belongs, at which it must be remarked, the average turn-out over the last ten years has been around fifteen members. Other groups know of a local pub with a skittle alley, and challenge the group in the next town to an evening at skittles. Nothing to do with Amateur Radio of course, but very much to do with the filling of the odd hole in the programme, or for that matter, providing the excuse for a little change from serious matters, once in a way.

R.A.C.

All club secretaries should note that the Royal Automobile Club now runs a scheme for membership at reduced rates to those interested in Amateur Radio, as a *group*. All those who would like to save themselves a substantial sum—at this writing it looks like £2.50 (or fifty bob in *real* money!) a year—should get in contact with the Group Secretary, GM8HBU, whose address appears in the appropriate column of the Secretaries' Panel. It should be noted that existing RAC members can transfer into this group membership scheme, which also qualifies one for the discount rates on motor insurance offered to special groups by the RAC.

The Mail

Straight down the pile this time, starting at Yeovil, where member G3MYM seems to be taking a bit of a hammering in the way of talks of late; he is down for July 15, to discuss Pulse Arithmetic, and on July 29, to tackle the important question of "How the layers were found"—meaning of course the ionospheric layers on which all our long-distance communication depend. Were this not enough, the willing horse is pressed into service each Friday evening to give Morse practice, and he will also do an R.A.E. course if there is enough interest. The normal weekly meetings of the group are on Thursday evenings, at 7.30, at the Youth Centre, 31 The Park.

Then these are A.R.M.S., which looks after the interests of those members who are of the /M persuasion. In the current issue of the *Newsletter* there are a couple of thought-provoking comments on the subject of the present state of two metres—one from a VHF man, and one from a chap who is taking a look at the present VHF situation for the first time after years of HF operation,

both base and mobile.

At Cray Valley the prevailing mood is one of pleasure at the results arriving for the past year's competitive activities. For their own sessions, which are held at Eltham United Reformed Church Hall, 1 Court Road, we see that on July 1 they have a main meeting and the matter on July 15—one of these two, it is hoped, will be devoted to a Surplus Sale.

Surrey now, where the Hq. is at the Sea Cadets T.S. *Terra Nova*. They seem to have their booking for the first Wednesday in each month for the formal stuff—lecture, films, or whatever—and the third Wednesday for the informal sessions recently introduced, when there will probably be a rig on the air, with other activities; this informal scheme is still very much in the formative stage for Surrey and they are thinking up all sorts of goings-on to keep the group amused. As for the venue, we suggest you get in touch with G3FWR, as Panel, for details of how to get there if you intend making a first visit to this new Hq.

At Thames Valley the "catchment area," as it were, is essentially Thames Ditton and district, Giggs Hill Library, Giggs Hill Green Road, Thames Ditton, being the Hq. address. July 6 sees them listening carefully to words of wisdom on the subject of Receivers from G3TDR; and for the warm August 3 date, G3KQR will blow fresh air on various aspects of Amateur Radio in his own light-hearted way.

Murphy seems to have paid a visit to York during their recent GB2YST activity, and, to boot, upset the Clerk of the Weather—hard luck! However, they still have July 3, for a show, signing GB2JRS, at Joseph Rowntree School, New Eastwick, and July 13-14-15, when they will be on as GB2GYS from the Great Yorkshire Show, at Stand 576; and in August they have GB2TS going, on the 14th! Busy, indeed . . . in addition, they can be found on Friday evenings (except the third in each month) at the British Legion Club, 61 Mickle-gate, York, where they welcome visitors.

Back down South again we have West Kent, who are on alternate Fridays at K.E.C. Adult Education Centre, Monson Road, Tunbridge Wells; on the Tuesdays after the Fridays there are informals at the Drill Hall in the same locality. For more details, we suggest you get in contact with G8LMV, as Panel.

Radial is the newsletter of the R.A.I.B.C., which group is the one looking after those who are interested in Amateur Radio and are invalid or blind—which means of course that the club divides into two sections, the "full members" and the "supporters." If you know of any SWL or amateur who should be a member, point him/her at the Hon. Sec., see Panel, for their own benefit; and while you are about it join up as a supporter, for which the duties are as onerous as you care to make 'em.

We have a note from the secretary of the Grimshy Club on other matters, so we have taken his name and address on file—which means you will be able to find out all about the local group from him.

There are sometimes hidden snags to Club publicity efforts with the general public, as Edgware found to their cost when they waved the flag at Stanmore Carnival Shopping Week—their first enquiry was from an 11-year old who wanted to know how to become a disc jockey!

The West Kent Amateur Radio Society's Club Constructional Contest was won by G3XPX—with a small transmitter and receiver, conceived because somebody bet someone that it was not possible to work Europeans with just a torch battery for power. The Tx works on 80m. and uses four BFY52 transistors and incorporates SWR indication.



As for the dates, they get together on July 8, and on July 22 for a Junk Sale, followed (tactfully, for those who bought at the Sale??) by a month free of meetings during August. More details, from G4BZY, as Panel.

At **South Manchester** they recently had an AGM, at which G3UTL stood down as treasurer after ten years, and at which also G3RVQ was elected an honorary life member, in appreciation of all he has done for the Club—shack on his property, with all the attendant aerials and complication of members tramping across his land, and many other things, too. To turn to the programme for July, on the 2nd they make the final plans for VHF NFD, and on the 9th there is a mini D/F contest. Microwave Modules are the guests on the 16th, and on the 23rd there is a VHF Night on the Air. Finally, on July 30, G8GDM will be talking about Nucleonics.

There is nothing in the current *Newsletter* from **Echelford** to tell us exactly what they have planned for July, apart of course from operation in VHF NFD; this is likely because the recent AGM resulted in the erstwhile secretary becoming chairman, and the election of a new Hon. Sec. However that may be, while they are getting things set up (and, knowing this group, they are usually well set up for lectures) suffice it to say that they can be found on the second Monday and the last Thursday of each month, at St. Martins Court, Kingston

Crescent, Ashford, Middx., at 7.30 for 8 p.m.

The Association of **Sheffield Clubs** comprises the University, Polytechnic, Sheffield and Worksop groups, each of whom have their own programme and venue, but have combined Association meetings in addition, and also a combined *Newsletter*; and it is also fine from our point of view because we can refer your queries to the secretary of the Association at the address in the Panel.

Silverthorn have a Hq. at Friday Hill House, Simmons Lane, Chingford, London E.4, where they get together weekly. However, the current newsletter does not give any further details, for which we have to refer you to G4AJA.

Right down into the West Country now, to **Cornish**; July 1 is the date, G3EWQ (talking about his overseas call signs) the speaker, and the SWEB Clubroom, Pool, Camborne, the venue. However, they also have their 13th Annual Mobile Rally on July 18, on the campus of the Cornwall Technical College, Pool, Camborne.

Hereford will be dealing with Electric Shocks, and what to do about them(!) on July 2, while on July 16, if the weather permits, they have a picnic evening on Westhope Common. The Hq. is at the Civil Defence Hq., Gaol Street, Hereford.

Every Wednesday evening the **White Rose** crowd can be found at 83 Armley Town Street, Leeds 12; and it is there you should go for details on the on-coming

programme, which at the time of writing is a little unsettled. However, doubtless by the time this reaches print all will have been sorted out by the committee.

Although the **Bury** group get together informally on every Tuesday, they regard the second Tuesday in each month as *the* meeting, with lecture, films, or what have you. On July 13, they are entering a two-metre Fox Hunt with other local groups. For more details, contact G4BVE.

The move of Hq. of Cheltenham (RSGB), although forced upon them at short notice, seems to have been a blessing in disguise. Try the first Thursday of July—or any other month for that matter—at the Old Bakery, Chester Walk, behind the Library in Clarence Street, and see what you think!

The holiday month in GI is July, so the **Bangor** chaps have only one major event, namely VHF NFD, for which they will be parked 1600 feet above sea level in the Mourne Mountains, looking for *lots* of contacts.

D/F at **Peterborough** provided members with some entertainment recently, the hidden station being so sited that people with ambiguous bearings probably landed on the *wrong* side of Crowland High Wash, at a point where the right side was, shall we say, somewhat inaccessible. Friday, July 16 sees them watching the films put on for their entertainment at the Scout Hut, Occupation Road, from 7.30 p.m.

Sad to say, the **Star Club** have lost their Hq. due to demolition, and at the time of writing there did not seem

to be any alternatives easily obtainable. This being the case, we must advise you to keep in touch with G4BUU.

"Receivers" will be the subject at **Sutton & Cheam** on July 20, and the speaker G3TDR; the venue for this one will be Sutton College of Liberal Arts, Cheam Road, Sutton, Surrey.

Back in the West again, to **Torbay**, who have their social evenings every Friday, plus the once-monthly formal affair on the last Saturday of each month; the topic for July had yet to be settled at the time of writing. The Club has its being at Bath Lane, rear of 94 Belgrave Road, Torquay, and looks forward to meeting visitors.

A change of Hq. address is notified by the **Oxford** group, they having now moved to the Civil Service Sports Club, Marston Road, Oxford, where the booking is for the second and fourth Wednesday of each month and visitors will be welcome.

A familiar fist appears next, from the secretary at **Acton, Brentford & Chiswick**—it ought to be, as he has hardly missed a month since your scribe started writing this piece more years ago than he cares to recall. They get together at the Chiswick Trades and Social Club, 66 High Road, Chiswick on July 20, when they have G3CCD, describing the method he used for putting up his Versatower.

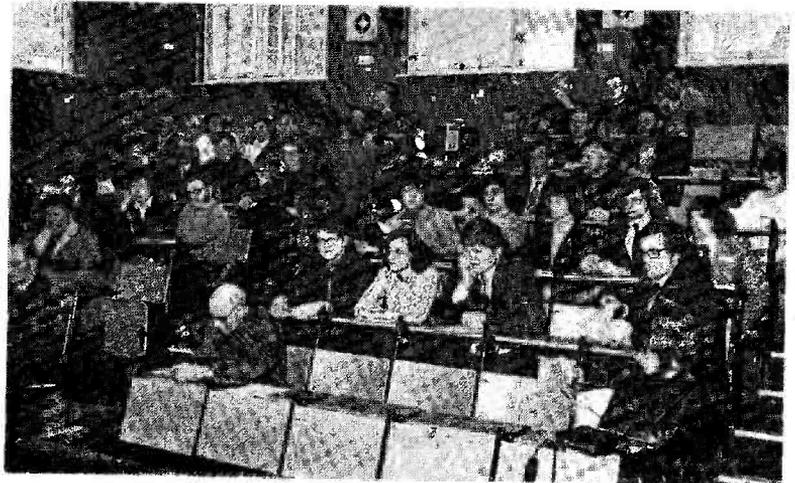
On July 17/18 there will be a double attraction for most radio amateurs, in the Polegate Steam Engine Rally, at which they have GB2SS to add to the fun, operated by members of the **Southdown** group. Earlier

Names and Addresses of Club Secretaries reporting in this issue:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London W3 8LB.
A.R.M.S.: N. A. S. Fitch, G3FPK, 40 Eskdale Gardens, Purley, Surrey CR2 1EZ.
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BISHOPS STORTFORD: M. G. Long, 17 Lea Close, Bishops Stortford (51768), Herts.
B.A.R.T.G.: J. P. G. Jones, GW3JGG, Heywood, 40 Lower Quay Road, Hook, Haverfordwest, Dyfed, SA62 4LR.
BURY: J. Clifford, G4BVE, 10 Arley Avenue, Bury, Lancs. (061-764 3466.)
CHELTENHAM (RSGB): G. D. Lively, G3KII, 26 Priors Road, Cheltenham (34785), Glos.
CORNISH: S. Halfyard, G4EIS, Studio 12, Rosewall Terrace, St. Ives (5576), Cornwall.
CRAY VALLEY: M. Tripp, G3YWO, 57 Cathcart Drive, Orpington (38199), Kent.
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DERBY: F. C. Ward, G2CVV, 5 Uplands Avenue, Littleover, Derby.
ECHELDFORD: R. S. Hewes, G3TDR, 24 Brightside Avenue, Laleham, Staines, Middx.
EDGWARE: P. D. Ling, G4BZY, 42 Greencourt Avenue, Edgware, Middx. (01-932 2495.)
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R.A.I.B.C.: Mrs. R. Shepherd, G3NOB, 59 Paintain Road, Loughborough, LE11 3LZ.

SHEFFIELD (Association): B. Flounders, 24 Birley Spa Lane, Sheffield, S. Yorks.
SILVERTHORN: C. J. Hoare, G4AJA, 41 Lynton Road, South Chingford, London, E4 9EA. (01-529 2282.)
SOLIHULL: S. R. Jones, G4AXW, 112 High Wood Avenue, Solihull, Warks.
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SOUTHGATE: S. R. Oughton, G4AEZ, 48 Morley Hill, Enfield. (01-366 7166.)
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WEST KENT: P. Reeve, G8LMV, 2 Court Road, Tunbridge Wells (24689), Kent.
WEST OF SCOTLAND: G. Milne, GM4BLO, 22 Norse Road, Scotstoun, Glasgow.
WHITE ROSE: R. R. Hughes, G4DZI, 3 Primley Park Crescent, Leeds, LS17 7HY.
WIRRAL: H. Crofts, G3DLF, 3 Barmouth Road, Wallasey, Merseyside. (638 2575.)
YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset.
YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

A meeting was held recently in Leicester to form a Repeater Group. A committee was elected to progress the proposed 70 cm. installation, with representatives of Clubs in the adjoining counties. It is appreciated that considerable expenditure will be involved in such a project.



in the month, on July 5, at Victoria Hotel, Latimer Road, Eastbourne, they will be admiring each other's demonstrations and descriptions of their latest or current constructional projects.

There are six activities for Nottingham in July—on the 1st, it is preparation for VHF NFD, and on the 8th a Forum. July 15 is down to G4AFJ to talk about Aerials, whilst the 22nd and 29th will be Activity Nights. Then there is July 31-August 1, when they will have a station signing GB3MRC at Rail-Ex '76, held at Stapleford.

It is always the fourth Thursday in each month at Verulam, unless something special crops up, and the venue is the Market Hall, St. Albans. On July 22, G3DAH is coming to talk about 70/23 cm. SSB, and as usual in the summer months the group have an informal gathering on the second Tuesday at Salisbury Hall, London Colney, once the home of Sir Nigel Gresley, and later the place where the Mosquito fighter-bomber was designed; now it has one of the prototypes

of that wonderful wooden aircraft on display.

The second Thursday in the month is the normal date for Southgate, at the Scout Hut, Wilson Street, but sad to say, our copy of the *Newsletter* has nothing to say on the July arrangements; thus it would be advisable to get in touch with G4AEZ.

July 20 it is at Solihull, at the Manor House, High Street, Solihull, for an evening of Films which is being arranged by the Secretary.

Over to Crystal Palace, where the date to book is July 17, at Emmanuel Church Hall, Barry Road, London, S.E.22. The subject will be that of the QSL Bureau, and the speaker G2MI.

The secretary at Tyneside has thrown your scribe into a right tizzy—back in May we referred to a letter containing an amendment to an earlier one which failed to arrive; this set off a further letter containing a photostat of the original, and, believe it or not, the photostat copy failed to land! However, the event, whatever it is, for which they want some publicity is on July 10, we we suggest you get on to the Hon. Sec. *quickly* to find out all about it, and also about the group itself, where it foregathers, and when, so you can join it.

Successful Convention

The British Amateur Radio Teleprinter Group (B.A.R.T.G.) held its own convention on June 22, with an attendance exceeding last year's within an hour of the opening. RTTY enthusiasts travelled from all over the U.K., and the stands did good business, a noteworthy feature being the excellent teleprinter equipment available. G3PLX had an audience of over 80 for his talk on VDU's, while the "tape factory" ran all day producing some very fine picture tapes. The on-the-air RTTY news bulletin, signing GB2ATG on 3590 kHz at noon on Sundays, with transmission also on 144.6 MHz at 1230 and 1245 clock, has got off to a good start—but more reports are asked for to establish the coverage achieved.

One of the strongest Clubs in the country is the Derby & District Amateur Radio Society, with a history going back to 1911. Their July programme shows meetings



"... did you say we need some top cut here ..."

each Wednesday at 119 Green Lane, Derby, starting with a surplus sale on July 7.

South Birmingham have a "field day inquest" meeting on July 7, at their Hq., Hamstead House, Fairfax Road, West Heath.

Nice to hear again from the **West of Scotland Group**, with headquarters at 22 Robertson Street, Glasgow, G2, open every Friday at 7.30 p.m. Here, they particularly welcome SWL's and they have two on their committee of eight.

Up at **Wirral**, they meet on the first and third Wednesdays each month, 7.45 p.m., at the Sports Centre, Grange Road West, Birkenhead. As well as contest activity, this group has a particular interest in D/F operations, with a contest slated for July 7; rules for this event appear in their latest *Newsletter*.

Visitors will be welcome at the **Midland** meeting on July 20, when G3FIK and his staff will be displaying the

wide range of amateur-band equipment available from the well-known firm of Amateur Electronics, Birmingham. Place is the University of Aston, Costa Green, Room 110.

Finally, and almost forgotten, the **Bishops Stortford** lot; they have a regular booking at the British Legion Club in Windhill on the third Monday in each month, which this time means July 18. No details are to hand for the programme at the time of writing.

Finale

Which is where we are at the bottom of the pile for another month; for next time, we need your August details, the Hq. address or the location of the activity, the dates, and the Secretary's name and address for the Panel, with a telephone number (if he has one); all of this should be sent to arrive by first post on **July 8**, addressed as usual to "Club Secretary," **SHORT WAVE MAGAZINE, BUCKINGHAM, MK18 1RQ.**



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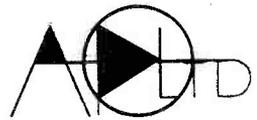
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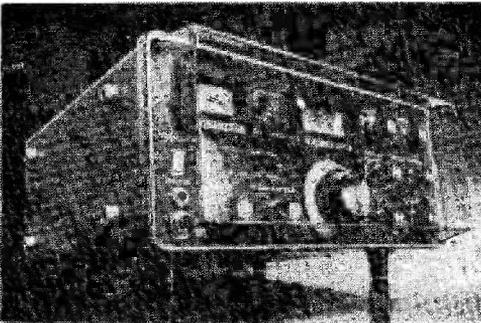
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Let me tell you a bit more about this catalogue. It lists about 5,000 items and has about 2,000 pictures (so they tell me—I haven't actually counted them) and it's laid out so clearly that even I can find my way around it easily. It also tells you all about their Deposit Credit Scheme which I will be able to join as soon as I'm eighteen. I find it quite exciting to think that I shall then be able to pick up the phone on a Sunday night and read over my order to their answerphone machine, and by Monday my gear will be on its way to me. I can hardly wait!

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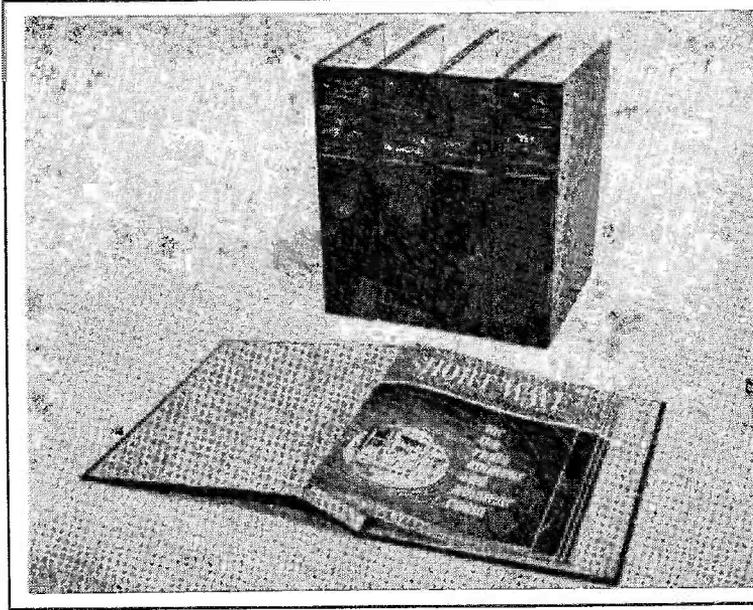
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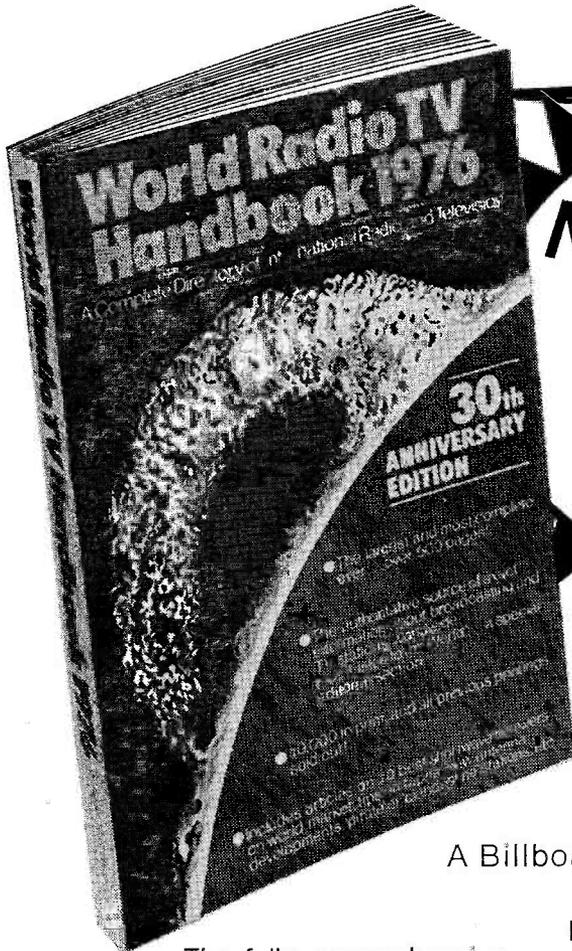
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144-030 ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144-4/433-2 ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144-480 ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144-600 ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144-700 ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-000/SO ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-050/R2T ...	a	a	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	a	a
145-100/R4T ...	a	a	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	a	a
145-150/R6T ...	a	a	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	a	a
145-200/R8T ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-300/S12 ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-350/S14 ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-400/S16 ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-500/S20 ...	a	a	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	a	a
145-550/S22 ...	a	a	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	a	a
145-600/S24 ...	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-650/R2R ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-675/R3R ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-700/R4R ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-725/R5R ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-750/R6R ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-775/R7R ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-800/R8R ...	b	b	b	b	b	b	b	b	b	b	b	b	b	b
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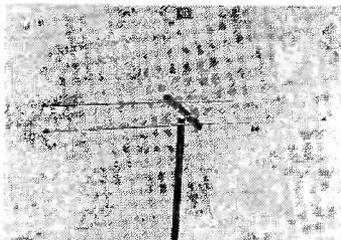
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