October 1977

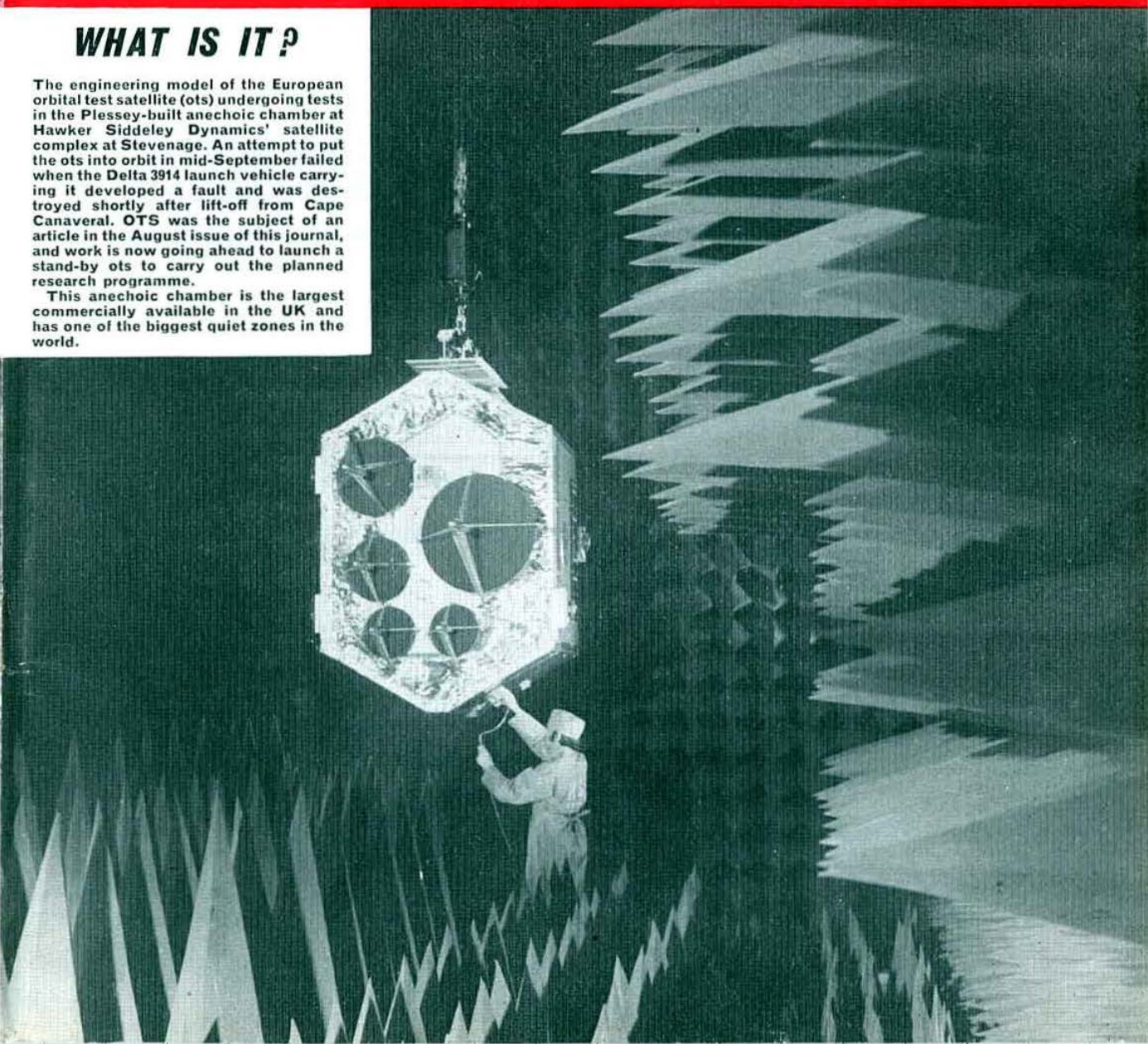
radio communication

journal of the Radio Society of Great Britain

WHAT IS IT?

The engineering model of the European orbital test satellite (ots) undergoing tests in the Plessey-built anechoic chamber at Hawker Siddeley Dynamics' satellite complex at Stevenage. An attempt to put the ots into orbit in mid-September failed when the Delta 3914 launch vehicle carrying it developed a fault and was destroyed shortly after lift-off from Cape Canaveral. **OTS** was the subject of an article in the August issue of this journal, and work is now going ahead to launch a stand-by ots to carry out the planned research programme.

This anechoic chamber is the largest commercially available in the **UK** and has one of the biggest quiet zones in the world.



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VHF COMMUNICATIONS

VHF COMMUNICATIONS is the English language edition of the German publication *UKW-BERICHTE*, a quarterly amateur radio magazine especially catering for vhf/uh shf technology. It is published in spring, summer, autumn and winter.

All special components required for the construction of the described equipment, such as printed circuit boards, coil formers, semiconductors and crystals, as well as complete kits, are available for despatch direct from Germany. Many of the printed circuit boards, in addition to a few selected kits, are stocked in the UK. A price list of kits and materials is available—send sae for your copy.

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SIG80R

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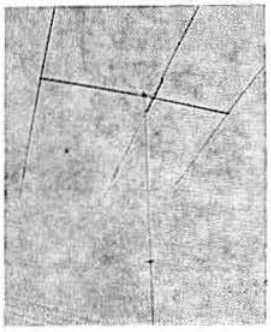

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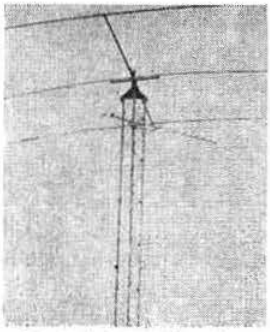

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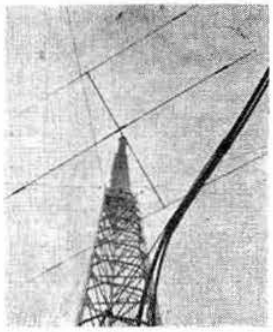

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250 260

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12V D.C. 10W drive 2" × 6" × 10" (11")
(VAT + 12½%), free delivery.
(Over 15 different models—S.a.e. details)
PA10/160/BL 145MHz 160W output **£160**

◀ VHF HANDHELD

KEN KP202 TRANSCEIVER

144MHz, FM, 2W of RF and ½W of audio. Immunity to image and IF breakthrough and performance to rival all walkie-talkies and many a mobile sets.
C/w F plug, leather handle/whip case and telescopic whip.
Fitted 6 channels S20 & S21 + choice S (0, 21, 23, 24), R (3, 4, 5, 6, 7) **£109.50.**
R channel only crystal tone burst **£10.00.**
Flexible stubby ant. **£5.80** Case **£4.90.**
Base charger KCP2 **£11.75** Ni cads **£8.50.**
F to UHF adaptor **£1.65** (all + VAT).

VHF MONITOR RECEIVER ▶

SEIWA MR2 AND MS2 (+ VAT prices)

Ideal for the SWL, the YL or even the XYL as the monitor receiver to keep you in touch Tiny (2½" × 1½" × 4½") and light (8 ozs.) slip into your pocket or onto your belt with the optional case. Sensitive double conversion superhet with 12kHz. band width, auto squelch, and generous audio output c/w Nicads, Mains Charger, Earpiece, Antenna.
MR2(4) 70MHz. 12 switched channels **£53**
MR2 144MHz. 12 switched channels **£53**
MS2 144MHz. 4 scanning channels **£62**
Leather Case **£1.90** Crystals each **£2.00**

MR2

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NEW SUPER VALUE MONITOR SCOPE FROM SMC £69 + 8% VAT

The MONITORSCOPE is a convenient Test Instrument allowing "on the air" monitoring and testing of Radio Transmitters operating in the frequency range 500kHz to 30MHz with a power rating of up to 2Kw PEP (1Kw average).

The Monitorscope is designed to be connected between the Transmitter or Linear Amplifier antenna socket and the Antenna or Antenna Tuning Unit. A visual display of the Transmitter "envelope" is provided. This will allow the Transmitter to be "talked up" to a full power output whilst watching for "flat topping" which would cause distortion and loss of readability also the "splatter" produced would create interference to Stations on adjacent frequencies. By using the 2-tone Test Generator which is incorporated, an SSB Transmitter may be adjusted to ensure that it is operating in a linear condition, necessary for good quality SSB transmission. Likewise, amplitude modulation and Morse Keying characteristics can be observed. A flexible screened lead is provided for connection to the Transmitter audio or microphone input.

Brief Specification

Power requirement: 115,230v. 45–65Hz. A.C. ± 20%. 10 watts.

Input/Output impedance: 50–57 ohms using two SO239 UHF type connectors.

RF Power Capability: 10–2000 watts PEP.

Sweep Speed: 20–200Hz.

Tone Oscillators: Nominally 1·3kHz and 2·3kHz.

Tone Level Output: 0–50mV rms per Tone at 50Kohm.

Max. E.H.T. on C.R. Tube: 1500v. D.C.

Panel Controls: Intensity Power on-off Switch; focus; vertical gain; horizontal shift; Horizontal gain; audio tone (single or 2-tone); tone level; sweep speed.

Rear Controls: Astigmatism, tone balance, "Y" shift. (pre-set).

Crystal Filters. Crystals are only £3.75 a pair (P & P 20p VAT 12½%) at SMC

YAESU

FT2F. FT2FB, FT2AUTO, FT224, FT223 (6, 12, 18 MHz Tx, 14, 44, 52 MHz Rx).

SIMPLEX S (0, 12, 16, 19, 20-24).

DUPLEX R (0-9) and IR (0-9) T & R.

FT200B, FT301(S), FT221(R). FT101 (EX), FT75(B), FR101(S) all £2.20 each.

OTHERS

TR2200(GX), C146A, C826MB, MS2, MR2. (12 MHz Tx and inc. 44 MHz Rx).

SIMPLEX S (0, 20-24)

DUPLEX R(3-7) at least. A large selection of inverse receive crystals.

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YF90H600	600Hz	9MHz	CW 8pl	£16.00
YF90F2·4	2·4kHz	9MHz	SSB 6pl	£16.00
YF90H12	12kHz	9MHz	FM 8pl	£18.00
YF107H600	600Hz	10·7MHz	CW 8pl	£16.00
YF107H2·4	2·4kHz	10·7MHz	SSB8pl	£16.00
YF107H12	12kHz	10·7MHz	FM 8pl	£18.00

Carrier crystals (9 or 10·7MHz) HC18/U ea. £2

YF90

Boom Microphone "Headset"

600 ohms magnetic lightweight boom mic

Ideal for mobile or contests etc. (Post free but plus 12½% VAT.)

MD35 complete	£14.75
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Audio to audio via 10·7MHz mains powered, illuminated meter. FT101 FT2 plugs suitable. All phone modes superb on FM. NEW!

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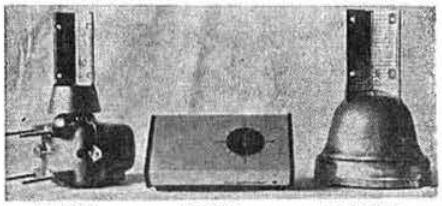
CD44/HAM II

CDE AR33



AR20/30 AR30/40 AR22/40/33

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CDE ROTORS

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AR30 (illus. far left and centre)	£39.50
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CD44 med. duty	£95.00
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2010/220 Stolle though Rotator type	£41.25
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CD562 CDE (up to 2" and 1⅝" rot.)	£4·50
RZ100 Stolle (ballrace)	£10·00

MOUNTING KIT

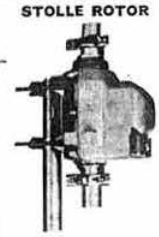
AK121 Mounting plate ..	£3.60

CABLE

5 core—AR30/40/33 2030 .. per yd.	£0.22
8 core—CD44, Ham II .. per yd.	£0.35

RZ100 BEARING

STOLLE ROTOR



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FDK

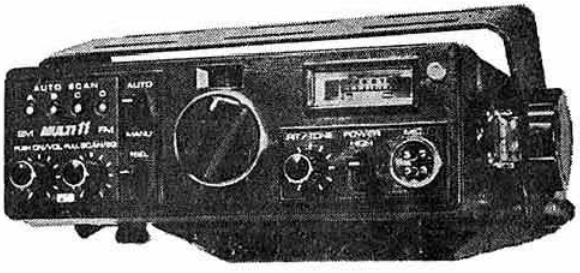
for 70 cms Multi-UII

70cms fm has opened up a completely new era in fm mobile operation. If you haven't yet tried it then send an SAE for full details of the transceiver that everyone is using. 70cms FM—the place to meet a lot of nice people! **£249, 9 ch's fitted.**

FDK

for 2 metres Multi-II

This top selling FM transceiver has the finest front end on the market. Add to this its 4 channel auto-scan facility, punchy 12 watts output and a host of other features, and you have today's most advanced 2 metre fm mobile. SAE for leaflet. **£209. 7 ch's fitted.**



FDK ACCESSORIES

AC PSU with switched voltage outputs, 4 amps capacity and short circuit protected. **£63.50.**

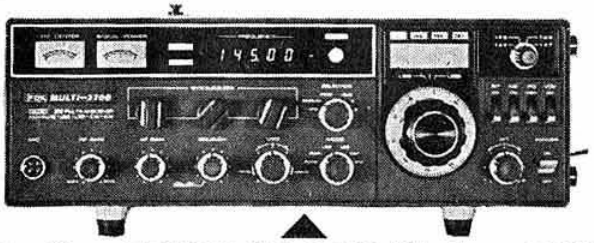
Sound box for fitting beneath M11 for deflecting sound forward. **£10.50.**

Desk top aerial fits all monitor receivers and transceivers **£2.50.**

M11 VFO Full frequency coverage of 2m with repeater shift, **£89.00.**

Mobile mounting brackets (one supplied with each transceiver) **£6.00.**

DC power leads **£1.65.**



FDK XTALS

U-11 reverse repeat pair **£5.90.**

M-11 S21 22 23 sets 6 **£10.00.**

M-11 repeat input ea. **£2.45.**

TM56B repeat sets 5 **£9.00.**

M-11 S24 pair **£4.90.**

1·6MHz 2700 shift ea. **£2.45.**

NOTE all the above crystals are high stability FDK types. Specials to order.

FDK TM56-B VHF Monitor

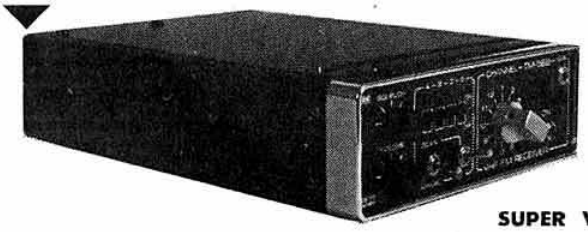
A complete 230V, 12V VHF FM monitor receiver. 12 fixed channels and 4 auto-scan. 10 channels supplied. Amazing performance at an amazing price. **£84, 10 ch's fitted.**

FDK Multi-2700 Mk II

A complete station inc. vox, toneburst, OSCAR rx., variable power control, speech processor, 600kHz & 1.6MHz repeater shift, dual vfo, 15 watts output. SAE for leaflet. **£489 incl. carriage.**

FDK QUARTZ 16

This is a 2 metre FM transceiver for the man who wants a functional transceiver without any frills. Supplied complete with 10 channels, toneburst and all accessories no other transceiver can match its price. **£169, 10 ch's fitted.**



SUPER VALUE

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TELEX 897406

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COMPLETE SYSTEM £29.00

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1200 WATTS
52 OHM FEED
WEIGHT 15 LBS
RADIUS 6 FT 2 INS
WIND 80 MPH

PRICE £94.33
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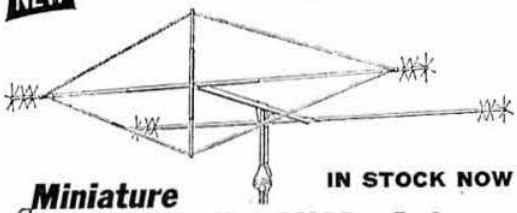
NEW ***Hi-pot Multiple Hat Loaded!***



IN STOCK NOW

***Miniature* Band HYBRID QUAD Antenna**

C-4

10-15-20M
1200 WATTS
52 OHM FEED
WEIGHT 8 LBS
HEIGHT 11½ FT
WIND 80 MPH

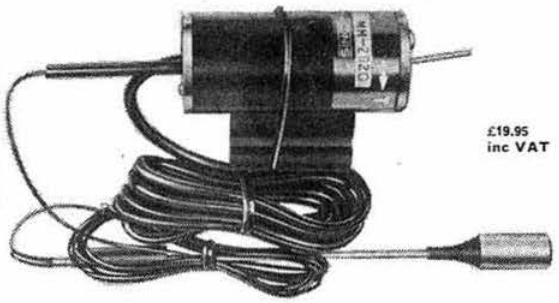
PRICE £41.45
CARRIAGE £1.50

IN STOCK NOW

***Miniature* Band Coaxial Vertical**

NEW! MM-2029

MOBILE SAFETY MICROPHONE



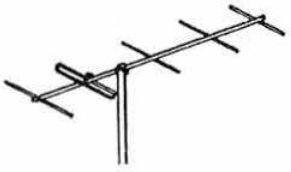
£19.95 inc VAT

This really is a beautiful product that not only gives operational pleasure to the mobile operator but also makes driving safer. No more one handed driving; with the MM-202G it is both hands on the wheel.

The MM-202G comprises a miniature condenser boom microphone weighing a mere 5 grams that clips on to your lapel or the sun vizor of the car. The output from the microphone feeds into a combined matching amplifier and T/R control box that clips onto the car gear lever. The MM-202G will match any transceiver input impedance 600 ohms to 100Kohms and is completely RF proof. Output level is fully adjustable and the DC power is drawn from the PTT socket of the transceiver. The MM-202G comes complete with instruction leaflet and the audio quality is what one might expect from a condenser mix—quite superb!

VHF?

J BEAM ENGINEERING LTD



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MONDAY TO SATURDAY 9 A.M. TO 5.30 P.M. EARLY CLOSING WEDNESDAY

Western

★ 99 GETS 146 →

YES! Back in stock again is the well-known **STANDARD C146A** hand-portable transceiver for 2 metres; and price is only **£99** inclusive of VAT (carriage free). Supplied complete with leather case, crystals on S20 and S22 and automatic tone-burst unit. Base charger unit available for nicads (see illustration right) and crystals for extra channels at £5.29 inc. post and VAT (per channel) or £5.06 if ordered with transceiver. **UNBEATABLE VALUE—DON'T DELAY**—as this offer cannot last for ever!

CSA Base Master/Charger **£28.13**
Set of 10 Ni Cads (AA size) **£9.00**

★165 GETS 828

Yet another super **WESTERN** offer on **STANDARD'S C828M** 10 watt 12-channel mobile transceiver. Only **£165** including VAT (carriage free) for this pint-sized, lion-hearted rig. Price includes quick-release mobile mounting bracket, speaker/microphone automatic tone-burst and **10 CHANNELS FITTED** (S0, S20 to S23 inclusive, R3 to R7 inclusive). S24 and S32 crystals available at £3.04 inc. post and VAT (per channel) or £2.81 if ordered with transceiver.

—FEW ONLY AT THIS RIDICULOUS PRICE—

828 in FCB-01J with CAT-17

ALSO . . .

The **FCB-01J** carrying case for the **C828** is now in stock. Complete with **CAT-17** flexible quarter-wave whip antenna, battery carrier and earphone. Not a soft PVC case, but one with thick, stiff walls for maximum protection of your 828 (or C430) and ease of portability. Takes C-size nicads(10) or HP-11 dry-cells (8).

Price—£27.56 inc. VAT

★165 GETS 223

If you prefer **YAESU MUSEN** for **VHF,** why not sample the new **FT223** at **WESTERNS** special price of **£165** including VAT (carriage free). Yes—as little as this for a brand-new, full-specification 23-channel 2 metre FM transceiver. 10 watts or 1 watt output, automatic tone-burst and **11 CHANNELS FITTED!—YOUR CHANCE TO GET ON 2M FM AT BARGAIN RATES—**

ALSO—FROM YAESU's ACCESSORY LIST . . .

QTR24 World Clock—battery operated .. **£15.75**
YH55 Communications headphones .. **£9.56**

PRICES INCLUDE CARRIAGE AND VAT

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Electronics (UK) ltd

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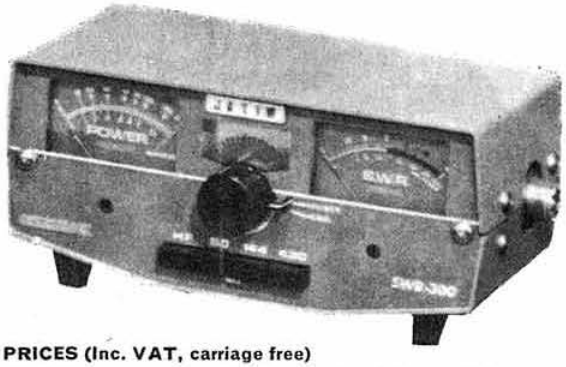
WITH THE

OSKER SWR-300

All the facilities of the long-established and well-known Osker SWR-200, but now with optional add-on couplers for accurate (10%) power and SWR measurements in the 2 metre and 70 centimetre bands. Basic instrument for HF—add couplers for VHF and/or UHF.



SPECIFICATIONS

	SWR-300	SPC-2B	SPC-07A
Freq. range (MHz)	3·5-30	144-148	420-450
Power ranges (W)	0-20; 0-200; 0-2000	0-20; 0-200	0-2; 0-20
Accuracy	±15% FS	±10% FS	±10% FS
Impedance (Ω)	50	50	50
Connectors	S0-239	S0-239	Type N
Dimensions (mm)	95 × 220 × 115	40 × 110 × 66	50 × 85 × 70

PRICES (Inc. VAT, carriage free)

SWR300	£43.20	OR . . . ALL THREE
SPC-2B	£15.12	FOR
SPC-07A	£19.98	£75.00

★ ★ ★ **STILL AVAILABLE—THE OLD FAVOURITE—SWR-200 at . . . . . £38.88** ★ ★ ★

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BRAUN SE600 (2M)	£673.87
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SP400/401 speakers (for FT401 etc).	£11.25
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Unica UR1A gen. coverage receiver	£66.00
Urica UR2A gen. coverage receiver	£99.00

—ALL PRICES INCLUDE CARRIAGE AND VAT—

DON'T FORGET YOUR JAYBEAMS

2 Metres

C5/2M, glass-fibre collinear	£30.78
5Y/2M, 5-el, yagi	£9.23
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10Y/2M, 10-el, yagi	£21.60
PBM10/2M, 10-el. parabeam	£25.31
PBM14/2M, 14-el parabeam	£30.60
5XY/2M, 5-el, crossed yagi	£16.76
8XY/2M, 8-el, crossed yagi	£20.36
10XY/2M, 10-el, crossed yagi	£26.21
PMH/2C—circular polarisation harness for /XY	£5.17
Q4/2M, 4-el, quad	£17.10
Q6/2M, 6-el, quad	£22.05

70 Centimetres

C8/70, colinear	£38.81
U5/70, mobile colinear with coax	£21.15
PBM18/70CM, 18-el. parabeam	£19.13
MBM88/70CM, 88-el. Multibeam	£28.58
12XY/70CM, 12-el, crossed yagi (with phasing harness)	£29.25

23 Centimetres

D15 1296 double 15 slot-fed yagi	£23.18

★ PRICES INCLUDE CARRIAGE (ROADLINE) and VAT (12½%)—CALLERS deduct £2.25 (except PMH/2C-deduct 56p). ★

PAYMENT: **Cash or cheque, ACCESS (Mastercharge), VISA (Barclaycard), GIRO TRANSFER (A/c 288 6154)**
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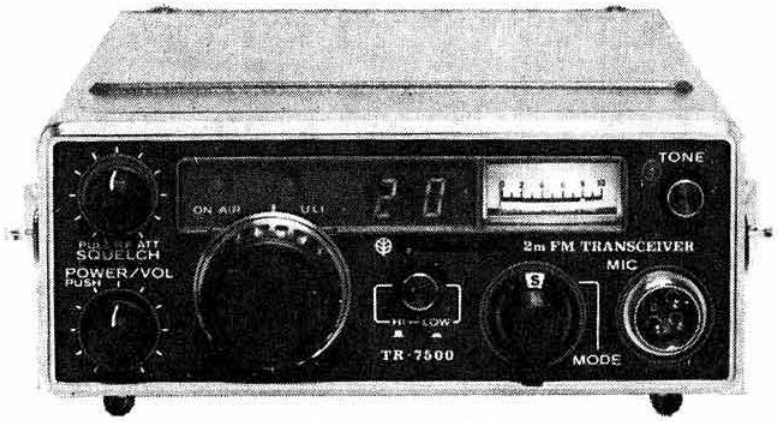
TR-7500

Why settle for anything less?



TR-7500 £225 inc. VAT

The TR7500 is the very latest 2 metre FM mobile to be introduced by TRIO and will delight the owner with its combination of performance, reliability and unique design. It represents another step forward in the TRIO product line and is designed to give you the very best FM transceiver available in its class.

Whatever you now own, or may have been thinking of buying, it would be foolish to settle for anything less than the TR7500.

PLL Synthesiser, no crystals to buy, ever, with the TR7500 since the operating frequencies are generated by a TRIO designed LSI phase locked synthesiser. This provides 80 FM channels at 25 KHz spacing from 144-146 MHz, all 10 repeater and reverse repeater channels. The channels are selected by a single knob and *no programming is required from the user*—just unpack the rig, connect 12 volts dc and you are on the air.

Unique display

TRIO attention to detail at its very best is shown in the method used to display the channel number. TRIO believe that ease of use is the priority consideration, and have arranged the large LED display to show the correct channel number at all times. If you want to operate on S24, turn the channel knob until the display shows 24 — simple isn't it? Need R7? Turn the knob until the display shows 7. There's no need to wonder "did I programme S24 into channel 15 or channel 9?".

Repeater operation

Available at the touch of a front panel switch. Turn this to "N" (normal) and you operate normal repeater with 600 KHz transmit down shift. If you wish to listen on the input, turn the switch to "S" (Simplex), and you are there — and can operate simplex on the input frequency. Need reverse repeater? Turn the switch to "R" (reverse) and you operate with receiver down shift of 600 KHz. This facility is most useful when you hear several stations calling into a repeater with only one (of course) appearing at the output. Using reverse repeater operation, you can call into the pack to invite anyone to a simplex channel for direct QSO.

Automatic tone burst is provided, with a front panel LED to remind you that you have the tone burst on. Needless to say, the 1750Hz is generated by TRIO's unique tuning fork oscillator which guarantees spot on frequency at all times and in all temperatures.

Performance plus

A combination of multi section helical filtering at signal frequency, monolithic crystal filters at 10·7 MHz, and sharp multi pole filters at 455 KHz allows the TR7500 to keep on working under strong adjacent signal conditions when other rigs give up.

The receiver performance for sensitivity is excellent. On the samples checked so far, we obtain 12dB SINAD for a startling 0·18 microvolts and under mobile conditions, we copy repeaters in terrain which previously presented real signal problems.

The transmitter generates a true FM signal at 10·7 MHz which is translated directly to two metres in a fully balanced mixer system. This guarantees a superbly clean signal with no unwanted multiplier products, and an all new PA system with specially developed transistors, gives rugged reliable power in excess of 10 watts.

As a final test for freedom from unwanted in band signals, we ran the TR7500 at full output with a TS700G coupled to it on the bench. Tuning from 144-146 MHz on the TS700G, we found just one signal — the wanted one. It was impossible to find a single unwanted signal coming out of the TR7500 under these extremely severe conditions. Wideband checks using the analyser revealed no spurious outputs detectable above noise level. At this point we retired happy!

Attention to detail

As is well known, TRIO introduced the since copied variable power SWR protection system, and it is of course fitted to the TR7500 with an improved high gain dc amplifier for tighter and faster control.

High/low band change is by push button, with S-meter illumination colour change to remind you of the band in use.

Another simple but typically TRIO thoughtful provision is the special channel knob with a deep moulded indent at S0. You can set this vertical by touch alone and can then count up the channels without even seeing the channel display. Great when mobile and you need you eyes on the road.

Finally the TR7500 with all its potent performance is packaged in a case not much bigger than a TR2200GX!

Accessories

The TR7500 is supplied complete and ready to use with the TRIO quick release mobile mount, microphone, power leads, comprehensive manual etc. etc. Nothing more to buy to own the best mobile/fixed station FM rig on the market.

DON'T SETTLE FOR ANYTHING LESS

LOWE IN LEEDS 27 Cookridge Street, Leeds. 0532-452657

LOWE IN BIRMINGHAM 362-4 Soho Rd, Handsworth, Birmingham. 021-554 0708

The TS700S, is intended to be the top of the line in 2 metre multi mode stations. TRIO have now incorporated all the facilities which customers have expressed a wish to see in the 700 series. Main new features are:

Digital readout

Built into the rig and using the same easy on the eye blue/green readout tube as the TS-820. The counter is a complete frequency measuring system and incorporates the VFO and carrier oscillator frequencies to measure the CW transmit/receive shift as well as USB/LSB shift. The display reads to 100 Hz on SSB and CW but is automatically rounded off to the nearest 1KHz on FM — However — if you insist on reading to 100Hz, the touch of a switch restores this facility on FM also.

Smooth accurate tuning

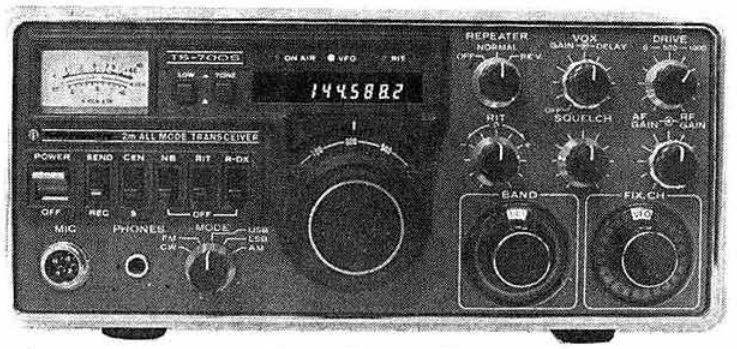
Using the new dual ratio gearbox with flywheel action for fast band scanning. It is true to say that nothing compares with a real VFO when it comes to pin point accurate tuning of SSB and C$\frac{1}{2}$W.

Receiver pre amplifier

The TS-700S is fitted with a low noise switchable receiver pre amplifier with carefully calculated gain figures to give that extra performance when digging into the noise for real DX.

Vox operation

And break in CW using the built in VOX system. Front panel gain and delay controls allow adjustment to suit every situation.



TS-700S £542 inc VAT.

Split frequency working

Using the new external VFO-700S. The frequency of the external VFO is checked by the readout on the TS-700S. Any frequency split or full transceive operation can be carried out using the external VFO. A unique accessory for the VHF operator.

New standards of performance

On the samples which we have checked, the 10dB S/N ratio sensitivity is around 0·15 μV on SSB and the 20dB quieting level is less than 0·2 μV on FM. This gives the TS-700S a real lead over any other rig around.

Plus of course all the features which make the 700 series so outstanding. Remember the signal quality resulting from the use of a high supply voltage on the PA and driver giving unbeaten linearity (TRIO patent). Remember the rugged, go anywhere construction which makes the 700 series so popular on expeditions and field days. Remember the all mode (AM, FM, USB, LSB, CW) operation — not all rigs have them. Remember the Simplex/Repeater/Reverse repeater operation available at the turn of a switch.

Finally, remember the combined reputations of TRIO and Lowe Electronics and you will agree that for the ultimate 2 metre all mode station is has to be the TS-700S.

And what is this intriguing line up below?

Simply more of the exciting new range from TRIO. The big box is the big daddy of all linears, the TL-922 which uses a pair of 3-500Z tubes to give you a cool 1KW key down CW or RTTY input and 2 KW on SSB — from top band (just you dare) to ten metres. WOW.

Alongside it is the new TS-520S which also covers top band to ten with a hot new receiver checking out at 0.2μV for 10dB S/N ratio, and a new speech processor built in, and 15MHz WWV, and facilities for the readout unit DG-5 and, and, . . .

So what else is new Doc? The DG-5 readout takes the VFO, heterodyne oscillator and carrier oscillator frequencies, does magic calculations, and gives you your exact frequency. Not only that, but you can take it with you, feed it on a diet of 12Vdc and use it as a 100Hz to 40MHz frequency counter. Don't weep sir TS-520 owner, we have a mod kit DK-520 to allow you to use it with your rig as well.

There's more equipment but no more space, so see it all at Leicester.

TRIO

ANNOUNCEMENT

We are pleased to announce that in addition to the normal Lowe Electronics retail outlets, the complete range of Trio products is now available from the following well established, full time, specialist dealers who will be pleased to demonstrate and advise you on any item from the range. Like us, they will also be delighted to exchange their goods for your money — but always pleasantly of course.

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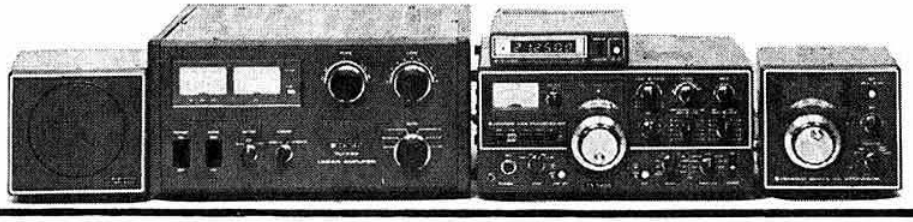

HEAD OFFICE 119 Cavendish Rd, Matlock, Derbyshire. 0629-2817 or 2430

PAUL
G3VJF

ICOM

WHAT'S THIS?

AN IC-240 THAT LOOKS A BIT DIFFERENT**

STILL £198 INC VAT

The IC-240 from Thanet has had a bit of a face change. Gone is the tone button, which doesn't do anything anyway, and in its place is a crafty little switch which gives simplex in the centre position, normal duplex at DUP A and reverse repeat (on Rx AND Tx) at duplex B. With the IC-240 it is the RECEIVER which is shifted when working Duplex and not the TRANSMITTER as with some other rigs we could mention. This means that you can listen on the input channel or work reverse repeat, merely at the flick of a switch—you don't have to re-tune the channel knob as you would otherwise.

The function of the LH switch has also altered as it now gives high power in the up position and LOW in the down, the centre being OFF. This, together with the facility of easy channel change, clear channel indication and sheer rugged construction still puts the IC-240 at the top of the list.

Now that we have sold several hundred 240's we can tell you that these little sets are extremely reliable. The number we have had back for repair under warranty is really very small and the initial teething problems have been ironed out long ago. By the way, should you be feeling a little upset that your nearly new IC-240 has been made out of date have no fear. Unlike a model change in cars, we can sell you a conversion kit for £3 to bring your set right up to date so that you can't tell the difference. Please don't all rush at once though as initial stocks of these are limited. There will be plenty available later.

Check off these points against that competitive rig:

	YES	NO
Can it cover the whole 2m band 144–146?	☐	☐
Is it easy to qsy from say R7 to S20 without too much knob winding?	☐	☐
Is low power available?	☐	☐
Can you add extra channels, in the order you want them, without having to buy crystals?	☐	☐
Is the tone burst automatic?	☐	☐
Is a scanner available?	☐	☐
Is it relatively easy to add peripheral bits and pieces?	☐	☐

If the answer is YES to all these and it's cheaper than an IC-240 it may well be worth buying.

SEE ONE AT LEICESTER—STAND 9

** At the moment this is a THANET mod. Until this is done in Japan you may not find it on all sets bought from other dealers, but we understand that some intend to fit it.

PLEASE NOTE THAT ALL MAIL ORDERS MUST BE SENT TO HERNE BAY AND NOT TO AGENTS.

ALL WARRANTY AND OTHER REPAIRS FOR SETS BOUGHT FROM THANET AGENTS AND SHOPS MUST BE REFERRED TO OUR SERVICE DEPT IN HERNE BAY WHERE WE HAVE A GOOD RANGE OF TEST EQUIPMENT AND THE TECHNICAL SKILL TO USE IT.
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IC-211E
£529
INC VAT

THERE IS NOTHING LIKE THE IC-211E

The IC-211E has been around for sometime now yet we haven't said a lot about it in adverts. Why? Well the reason is simple really. We couldn't get enough of them initially to satisfy those quick-off-the-ground chaps who find out about goodies by keeping their ears to the ground. Now it looks as if things are getting better. The manufacturers are managing to catch up with the monstrous world wide demand, particularly the US, and supply enough for little ole UK.
The 211E is an expensive beast—but it offers you a lot of technology for your money. You won't be able to buy one at a negative profit making price from your local cash and carry but you will get a good back-up service as you do from anything bought from us. What do you get for your money?

WELL, there is:

- ★ A synthesizer to give you the accuracy you can expect from a synthesizer.
- ★ Frequency display to the nearest 100Hz
- ★ An optically coupled VFO
- ★ An electronically controlled flywheel brake
- ★ An electronically controlled tuning lock
- ★ Adjustable power on FM
- ★ A truly excellent transmission on FM, SSB or CW
- ★ A 10·7MHz Rx IF output for monitoring
- ★ A multiway output socket for interfacing with the synthesizer for keypad programming, scanning etc.
- ★ An excellent receiver
- ★ Plus all the things you expect in a decent transceiver such as vox, break-in CW, noise blanker, RIT, centre zero meter, slow or fast AGC, Rx RF/IF gain control etc. etc.

If you want to know how the synthesizer works you will find an interesting article in September's *Wireless World*.

It's hard to do justice to the IC-211E in an advert. Why not see one on display at LEICESTER?

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1N4148	75v	10mA	.03
1N753A	6.2v	z	.25
1N758A	10v	z	.25
1N759A	12v	z	.25
1N4733	5.1v	z	.25
1N5243	13v	z	.25
1N5244B	14v	z	.25
1N5245B	15v	z	.25

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8-pin	pcb	.25	ww	.45
14-pin	pcb	.25	ww	.40
16-pin	pcb	.25	ww	.40
18-pin	pcb	.25	ww	.75
22-pin	pcb	.45	ww	1.25
24-pin	pcb	.35	ww	1.25
28-pin	pcb	.35	ww	1.45
40-pin	pcb	.50	ww	1.95

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25 Amp Bridge 200-prv 1.95

TRANSISTORS, LEDS, etc.

2N2222	NPN			.15
2N2907	PNP			.15
2N3740	PNP	1A	60v	.25
2N3906	PNP			.10
2N3054	NPN			.35
2N3055	NPN	15A	60v	.50
T1P125	PNP	Darlington		.35

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D.L.747 7 seg 5/8" high com-anode 1.95
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FND 359 Red 7 seg com-cathode 1.25

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4004	3.95
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4007	.35
4008	1.20
4009	.30
4010	.45
4011	.20
4012	.20
4013	.40
4014	1.10
4015	.95
4016	.35
4017	1.10
4018	1.10
4019	.70
4020	.85
4021	1.35
4022	.95
4023	.25
4024	.75
4025	.35
4026	1.95
4027	.50
4028	.95
4030	.35
4033	1.95
4034	2.45
4035	1.25
4040	1.35
4041	.69
4042	.95
4043	1.25
4044	.95
4046	1.50
4049	.80
4050	.60
4066	1.35
4069	.40
4071	.35
4082	.45

— T T L —

7400	.15
7401	.15
7402	.20
7403	.20
7404	.15
7405	.25
7406	.35
7407	.55
7408	.25
7409	.15
7410	.10
7411	.25
7412	.30
7413	.45
7414	1.10
7416	.25
7417	.40
7420	.15
7426	.30
7427	.45
7430	.15
7432	.30
7437	.35
7438	.35
7440	.25
7441	1.15
7442	.55
7443	.85
7444	.45
7445	.80
7446	.95
7447	.95
7448	.95
7450	.25
7451	.25
7453	.20
7454	.25
7460	.40
7470	.45
7472	.45

7473	.25
7474	.35
7475	.35
7476	.30
7480	.55
7481	.75
7483	.95
7485	.95
7486	.30
7489	1.35
7490	.55
7491	.95
7492	.95
7493	.40
7494	1.25
7495	.60
7496	.80
74100	1.85
74107	.35
74121	.35
74122	.55
74123	.55
74125	.45
74126	.35
74132	1.35
74141	1.00
74150	1.00
74151	.75
74153	.95
74154	1.05
74156	1.15
74157	.65
74161	.85
74163	.95
74164	.60
74165	1.50
74166	1.35
74175	.80

74176	1.25
74180	.85
74181	2.75
74182	.95
74190	1.75
74191	1.35
74192	1.65
74193	.85
74194	1.25
74195	.95
74196	1.25
74197	1.25
74198	2.35
74221	1.00
74367	.85
75108A	.35
75110	.35
75491	.50
75492	.50
74H00	.25
74H01	.25
74H04	.25
74H05	.25
74H08	.35
74H10	.35
74H11	.25
74H15	.30
74H20	.30
74H21	.25
74H22	.40
74H30	.25
74H40	.25
74H50	.25
74H51	.25
74H52	.15
74H53J	.25
74H55	.25

74H72	.55
74H101	.75
74H103	.75
74H106	.95
74L00	.35
74L02	.35
74L03	.30
74L04	.35
74L10	.35
74L20	.35
74L30	.45
74L47	1.95
74L51	.45
74L55	.65
74L72	.45
74L73	.40
74L74	.45
74L75	.55
74L93	.55
74L123	.55
74S00	.55
74S02	.55
74S03	.40
74S04	.35
74S05	.35
74S08	.35
74S10	.35
74S11	.35
74S20	.35
74S40	.25
74S50	.25
74S51	.45
74S64	.25
74S74	.40
74S112	.90
74S114	1.30

74S133	.45
74S140	.75
74S151	.35
74S153	.35
74S157	.80
74S158	.35
74S194	1.05
74S257(8123)	.25
74LS00	.45
74LS01	.45
74LS02	.45
74LS04	.45
74LS05	.55
74LS08	.45
74LS09	.45
74LS10	.45
74LS11	.45
74LS20	.40
74LS21	.25
74LS22	.25
74LS32	.40
74LS37	.40
74LS40	.55
74LS42	1.75
74LS51	.65
74LS74	.75
74LS86	.75
74LS90	1.30
74LS93	1.00
74LS107	.95
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A new concept in add on units to improve 2 metre performance on transmit and receive.
On transmit the Power Amplifier produces a power gain of 4, up to a maximum of 12 watts in, for 48 watts out. The circuit is suitable for all transmission modes with a sophisticated bias stabilization circuit for correct full power operation rather than the simple diode arrangement normally used.
The receive pre-amplifier has the same performance as our standard Sentinel or Sentinel Auto.
Supply voltage is 13·6 nominal (12–15V), 5mA on receive, up to 6mA on transmit.
Size: 6″ × 2″ front panel, 4½″ deep. Sockets are SO239.
Price **£53.00** + VAT **£59.62.**
Also available without the receive pre-amplifier at **£44.00** + VAT = **£49.50.**

NEW! The only one available

SENTINEL TOP BAND CONVERTER

Top Band (Marine Band) to 20 metre converter. If you miss being able to listen on 160 metres this provides the answer. 1·8MHz–2·3MHz in 14–14·5MHz out. Price **£18.00** + VAT = **£20.25.**

2 METRE CONVERTERS

Sentinel D. G. Mosfet converters. These provide a performance that cannot be beaten. N.F. 2dB, Gain 30dB. Supply 12V(9-15) 15mA. Size is 2¾″ × 1¾″ × 3¼″. IFs: 28–30MHz, 4–6MHz, 2–4MHz. These are also in stock for Marine Band to 28–30MHz and Satellite Band to 20–22MHz. 4 metres to 28–28·7MHz. Price: **£18.00** + VAT = **£20.25. IN STOCK.**

SENTINEL 2 METRE CONVERTER

Containing a mains power unit and RF gain control. Specification as above. Size: 5″ × 2″ front panel by 5″ deep. Price: **£22.00** + VAT = **£24.75. IN STOCK.**

SENTINEL 2 METRE CONVERTER KIT IF 28–30MHz.

Performance as above converters. Complete unit with box, connectors etc. Price: **£11.50** + VAT = **£12.94.** We will get them going if you have trouble for **£2.50,** so you can't go wrong. **IN STOCK.**

70cms CONVERTERS

The most economical method of listening on 70cms is our 70cm to 2 metre FET converter. N.F. 3dB, Gain 30dB. Price: **£18.00** + VAT = **£20.25.** Size: 2¾″ × 1¾″ × 3¼″. **IN STOCK.**

SENTINEL 70

70cms to 28–30MHz, N.F. 3dB, gain 30dB. Size 2¾″ × 1¾″ × 4″. Price: **£20.00** + VAT = **£22.50. IN STOCK**

PRE-AMPLIFIERS

We have now sold thousands of these pre-amplifiers and many who have a V.H.F. unit come back for an H.F. unit or vice versa. Many of you report to us on the improvement in performance obtained and we have had no reports of anyone not finding an increase in sensitivity, I think that we can safely say that they are the most cost effective units you can buy.

THE SENTINEL AUTOMATIC 2 METRE PRE-AMPLIFIER

Contains an RF operated relay for connecting straight into your transceiving aerial co-ax. Performance: 1dB N.F., 18dB gain from selected FETS. Supply 12V nominal. Price: **£13.00** + VAT = **£14.62.** B/L sockets standard, SO239s **£1.50** + VAT = **£1.69**

THE SENTINEL STANDARD 2 METRE PRE-AMPLIFIER

Same circuit as the one above but without the RF switching. Price: **£7.75** + VAT = **£8.72. IN STOCK.**

THE PA3

Size only about 1 cubic Inch to fit inside your transceiver. N.F. 2dB gain 18dB. Price: **£5.57** VAT = **£6.27. IN STOCK.**

SENTINEL H.F. PRE-AMPLIFIER. These are wideband pre-amplifiers from 1–40MHz. N.F. 1dB, gain 15dB. Input and output impedances 50/75 Ohms. Size: 2¾″ × 1¾″ × 3″. Price **£7.00** + VAT = **£7.87.**

SENTINEL H.F. PRE-AMPLIFIER with change over relay. Same specification as above but including a change over relay for switching straight through. This can be operated by your transceiver for direct connection in your aerial co-ax. Price: **£9.00** + VAT = **£10.12. IN STOCK.**

SEM "Z" MATCH

A compact and attractive A.T.U. 80–10 metres tested at 1kW into 50 ohms. Slow motion calibrated dials. Size only 8¾″ × 4″ × 7¼″. SO239 and screw terminals for co-ax fed or wire aerials. Balanced or unbalanced. Price: **£28.00** + VAT = **£31.50. IN STOCK.**

SEM EUROPAC

Now includes a relay controlled by the ON/OFF switch for switching the H.F. equipment between the Europa or your H.F. aerial. I.E. NO PLUG CHANGING.

- Receive converter—2dB N.F. 30dB gain with MOSFETS.
- Transmit converter 200MW drive for 200W input.
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Input Power	280 watts PEP (240 watts on 28MHz)

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SPECIFICATION:

Frequency range: 144-146MHz
Input modes: SSB, FM, AM or CW
Input frequency range: 28-30MHz
DC power requirements: 12 volts nominal
Current consumption: 2·2 Amps peak
Receiver converter noise figure: Better than 2·5dB
Power connector: 5-pin DIN
RF input/output connectors: 50ohm BNC
Size: 187 × 120 × 53mm
Weight: 800g
Power output: 10 watts continuous rating
Drive requirements at 28MHz: 500mW or 5mW
Relative 116MHz output: −65dB
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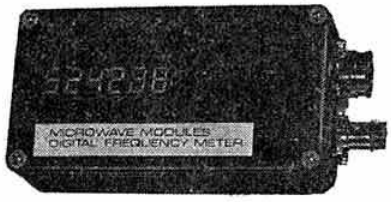
PRICE £88.88 inc. VAT



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The counter has two ranges which are selected by supplying +12 volts to one of two pins on the DIN socket. Internal diode switching brings the input in the 0·45-50MHz range to a wide-band amplifier which drives a high speed TLL divider in the main counter logic. On the 50-500MHz range the diodes switch in a high speed ECL prescaler and the decimal point is changed accordingly.

A low angle AT cut quartz crystal is used giving a typical temperature stability of 0·5ppm per degree C. Provision is made for setting the crystal frequency, and the accuracy of reading is normally better than 200Hz at 50MHz, or 2kHz to 500MHz.

The counter has reverse polarity protection and operates satisfactorily from a nominal 12V dc supply. A suitable 5-pin DIN plug is supplied.

SPECIFICATION:

Digit Height: 10mm **Display Width:** 45mm
Case Size: 111 × 60 × 27mm
Frequency Ranges: 0·45-50MHz; 50-500MHz
Sensitivity: Better than 50mV RMS over 0·45-50MHz
Better than 200mV RMS over 50-500MHz
Input Connector: 50ohm BNC **Input Impedance:** 50ohm
Power Connector: 5-pin 270° locking DIN socket
Power Requirements: 11-15 volts dc at 300mA approximately

PRICE: £85.32 inc. VAT

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2N3866	1w 10dB	28V 175MHz	£0.78
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2N3553	2·5w 9dB	28V 175MHz	£0.95
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SD1143	10w 10dB	12·5V 220MHz	£5.56
2N6081	15w 6·3dB	12·5V 175MHz	£5.32
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2N5945	4w 8dB	12·5V 470MHz	£7.51
2N5946	10w 6dB	12·5V 470MHz	£9.46
SD1136	10w 5·5dB	12·5V 470MHz	£8.10
SD1088	25w 6·8dB	12·5V 470MHz	£16.45
SD1089	40w 4·3dB	12·5V 470MHz	£19.47
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2N5591	25w 4·4dB	13·6V 175MHz	£8.50
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RSGB NEWS BULLETIN SERVICE

The RSGB news bulletin, callsign GB2RS, is broadcast every Sunday morning on hf and vhf, giving almost complete coverage of the British Isles. Its main purpose is to provide an outlet for amateur radio news items and announcements which, by virtue of their topicality or urgency, cannot wait for the next issue of *Radio Communication*.

The bulletin is prepared early on Thursday morning, and news items, marked "GB2RS news" should reach RSGB HQ by first post that day (telephoned items can also be accepted until 10am). No guarantee can be given of inclusion in part or whole of any item submitted and, once broadcast, items are not usually repeated.

SCHEDULE

Time	MHz	Location and coverage (hf) or beam heading (vhf) of station
0930	3·65	G2MI, Bromley, Kent (SE England)
1000	3·65	G8ML, Cheltenham (SW England)
	144·50	GM3UAG, Ellon, Aberdeenshire (NNW)
	144·50	G8GGK, Croydon, Surrey (NE)
1015	3·65	GI3GAL, Belfast (N Ireland)
	144·50	GI3TLT, Bangor, Co Down (N)
1030	3·65	G2CVV, Derby (N Midlands)
	144·50	GM3UAG, Ellon, Aberdeenshire (SW)
	144·50	G3PWJ, Brierley Hill (NW)
1045	144·50	G8CDP, Middlesbrough (NW)
	144·50	G8GGK, Croydon, Surrey (SW)
	144·50	G3SMT, Stockport (NNW)
1100	3·65	G5VO, Bridlington (NE England)
1115	3·65	G3LEQ, Knutsford (NW England)
1130	3·65	GM3TCW, Wishaw, Lanarkshire (S Scotland)
1145	3·65	GM3HGA, Aberdeen (NE Scotland)

An rtty news bulletin, callsign GB2ATG, is also transmitted every Sunday at 1200 and 1900 on 3·590MHz and at 1230 and 1245 on 144·6MHz. This bulletin carries items of interest to rtty enthusiasts.

CURRENT COMMENT

Repeaters

At a meeting with the Home Office on 10 August the Society made proposals to vary the vhf repeater service in the Greater London area to help alleviate the interference problem, and put forward arguments for lifting the embargo on Phase 2 of the Society's uhf repeater programme.

The Society has now received the following letter from the Home Office:

"*I am now pleased to be able to say that as a result of our discussions with your Society, we are prepared to allow stations in Phase 2 of your uhf repeater programme to go ahead.*

"*Arrangements will be made to add the stations to the Society's licence as soon as possible; but I must refer you to the assurance given us at our meeting on 10 August 1977 that in the event of interference to these stations, they would close down. May I also mention that while we are not altogether satisfied of the need for high sites as proposed for some of the stations we are prepared to agree them at present.*

"*However, I regret to have to inform you that we are not prepared to consider applications for any repeater stations outside those already specified in Phase 2, until further notice.*"

The last paragraph of the letter has been discussed and the Home Office has asserted that it could not defend agreement to any further repeater stations until all aspects of the nuisance being caused to GB3LO had been assessed and the methods of resolving it had been determined.

WARC 79

The present time continues to be one of negotiation and consultation, both between national administrations and the representatives of the various services (including the amateur service) involved in WARC 79. Much publicity has been given to the *Notices of enquiry* issued by the FCC in the USA. It must be stressed that these notices are a product of the internal USA system for WARC preparation and have no international significance beyond giving a preliminary indication of the final USA view on the various allocations involved. Because the last USA *Notice of enquiry* does not refer to the proposed new bands at 10, 18 and 24MHz, it does not mean that the possibilities for additional allocations do not exist. On the contrary, the Home Office have indicated, in a preliminary document, that they will support the request for additional bands and are prepared to consider exclusive amateur service segments in bands at present shared. It is hoped that this encouraging attitude will be shared by other administrations, particularly some of the European nations forming part of CEPT. Some national views within this organization are unfavourable to the amateur service.

Little positive has so far emerged regarding the bands above 30MHz. The attitude within CEPT is that the amateur service should have smaller, but exclusive, segments, with additional allocations for the amateur satellite service. The possibilities, as they at present appear, were outlined in a *WARC Newsletter* circulated by the IARU Region 1 Division to all member societies. It must be emphasized that the information is intended to promote discussion within national societies and is not presented as fact. The Society's VHF Committee will be considering the newsletter in detail.

There is now no doubt that the broadcasting service will be making requests for vastly increased spectrum space below 30MHz. The power of this service has recently been increased by the action of the Carter administration in making vast funds available for the extension of *Voice of America* activities. The dangers of the position are completely appreciated by the IARU and appropriate action is in hand. At one time it was said that propaganda broadcasting on the hf bands attracted one listener per kilowatt, this may now have to be revised to one listener per megawatt.

The decisions of WARC 79 will be made by the votes of the 153 member nations. Therefore, in parallel with the efforts of the national societies to secure the support of their administration for their frequency proposals—an activity pursued by RSGB for the past two years—there is a major project designed to secure the support of nations who traditionally do not have a well-established amateur service. Within Region 1, meetings in West Africa, Southern Africa and the Middle East will supplement the triennial Region 1 conference to be held in Hungary in 1978, for which much work has already been carried out.

The preparatory work for WARC cannot be accomplished without considerable expenditure. In Region 1 the national society contribution per licensed member will be raised to one Swiss franc from 1 January 1978. The income will augment the funds already held and which have been accumulated for this purpose over a number of years. No effort will be spared, nationally or internationally, to undertake whatever may be necessary to ensure that in September 1979 the amateur service is well prepared for the most important meeting of the decade. *G2BVN*

"RADIO COMMUNICATION"

CHANGE OF ADDRESS

Since 1 August the *Radio Communication* editorial office has been transferred to Chelmsford, and all contributions, Members' Ads, and correspondence concerning the **CONTENT** of the Journal should now be addressed to:

The Editor,
Radio Society of Great Britain,
88 Broomfield Road,
Chelmsford,
Essex CM1 1SS.

It is stressed that all other RSGB matters, **INCLUDING "RADIO COMMUNICATION" DISTRIBUTION, and subscriptions,** will continue to be dealt with at RSGB headquarters. Editorial material addressed to headquarters and non-editorial matters sent to the new editorial office will result in unnecessary delay and expense.

QTC
amateur radio news

G4BFY
Mr Roland Senter, G4BFY, who joined RSGB headquarter's staff in May of this year as assistant general manager, has resigned from employment with the Society. At this time the administrative section of headquarters is understaffed and members are asked to be tolerant of any delays in correspondence.

Region 14 representative
Only one nomination for this post was received, that of Mr I. McKecknie, GM8DOX, 41 Westerlea Drive, Bridge of Allan, Stirlingshire FK9 4DQ. Subject to confirmation by Council, Mr McKecknie has therefore been appointed to fill this post.

Area representative, Grampian
The following nominations have been received for the above post: Mr G. M. Grant, GM3UKG, and Mr A. Wills, GM8KMO.

Members resident in the Grampian area are invited to elect one of these nominees by sending their votes to the regional representative for Region 12, Mr F. Hall, GM8BZX, 45 Priory Cottages, Lunanhead, Forfar, Angus DD8 3NR, to arrive no later than 31 October 1977.

Facts and figures
The Home Office advises that the following numbers of amateur licences were in force at 31 August 1977:

Class A 16,205 Class B 6,559

At the same date the latest callsigns issued in the G4 and G8 series were G4GIO and G8NXH respectively.

RSGB publications in Chelmsford
A small stock of RSGB publications is held at the editorial office in Chelmsford for local "over-the-counter" sales between 8.30am and 4.30pm, Monday to Friday.

As the stock of titles held is limited because of restricted storage space, intending purchasers are asked to telephone beforehand to ensure that the book they require is available. Titles in stock at RSGB HQ but not held at Chelmsford can normally be obtained on request within two or three weeks.

"Ham Radio Magazine"
Due to the large increase in the size of the magazine and the consequent higher costs in air mail postage the subscription to *HRM* will be as follows from 1 November 1977:

1 year .... £15 3 years £26.50

As a concession to UK subscribers the publisher of *Ham Radio Magazine* has deferred the increase from the original effective date of 1 September 1977. New and renewal subscriptions may be accepted at the following rates until 1 November 1977:

1 year .... £9.25 3 years £21

Please note subscriptions to *Ham Radio Magazine* should be sent to the following address and **not** to RSGB HQ: HRM (UK), PO Box 63, Harrow, Middlesex HA3 6HS.

RSGB PRESIDENT, 1978
Council has elected Dr Dain S. Evans, PhD, BSc, MIM, G3RPE, to be President of the Society for 1978.

Dr Evans has contributed the "Microwaves" feature to *Radio Communication* for the past seven years. He has been a member of Council since January 1976 and is this year's executive vice-president.

"VHF/UHF Manual"
The price of this book was incorrectly advertised on page 679 last month. The correct price of £6.82 incl p&p was given on the inside back cover.

Lady Wallace
The RSGB was sorry to learn that Lady Wallace, wife of its President, was injured while on holiday abroad in August. She is now back home and the Society sends her its best wishes for a speedy and full recovery.

Subscription renewal dates
Members who wish to check the month of renewal of their subscriptions are reminded that these are printed out on the address labels used for mailing *Radio Communication*.

UHF Phase 3 repeater proposals
The Repeater Working Group, on behalf of the VHF Committee, would remind repeater groups intending to submit a proposal under the uhf Phase 3 arrangements, that their *complete* proposals must be with the RWG by 7 December 1977 at the latest. Despite the current problems it is emphasized that the Society must be in a position to submit these proposals, fully vetted and complete in every detail, by the date originally agreed with the Home Office if there is to be any chance of the licences being issued in April 1978.

Transverting from 144MHz to 432MHz
Following a recent case in the Midlands the RWG would remind readers intending to use a 144 to 432MHz transverter for accessing the UK uhf repeater network to read their licence conditions very carefully. Assuming a linear unit, the frequencies required at vhf lie in the range 146·60–146·95MHz, and unless the system is fitted with adequate filters the radiation from a conventional 144MHz transceiver might well access certain Home Office repeaters operating in this part of the spectrum. If this were to happen the amateur is immediately in direct contravention of his licence conditions.

The best way to resolve the problem is to fit an extra crystal to the *transverter* for repeater operation so that in the transmit mode frequencies between 145·60 and 145·95 MHz are generated, while the receiver still operates at 145·00–145·35MHz. The 144MHz unit will need no new crystals if it can operate in the reverse repeater mode since the spacing has now been reduced to 600kHz. Alternatively 1·6MHz spacing can be used with the receiver operating between 144·00 and 144·35MHz.

Raynet at Leicester
All Raynet controllers visiting the Leicester Exhibition are requested to meet daily at 1430 on the Raynet stand.

Assistance required

During the preparatory period leading to WARC 79 the IARU Region 1 secretariat has an occasional requirement for the translation of letters and short documents into, and from, the Russian language. It has been found that translation agencies cause, rather than ease, the problems. If there is any member who would be willing to help, if necessary on a fee payment basis, then a brief note to G2BVN would be appreciated.

Dr John Saxton, CBE

It has been announced that Dr J. A. Saxton has been appointed radio propagation consultant to the Home Office with special emphasis on the preparation by the CCIR of the technical bases for WARC 79. It is anticipated that Dr Saxton will shortly be appointed chairman of the international Special Preparatory Meeting, commencing on 23 October 1977, which is also concerned with WARC preparations.

Dr Saxton has consistently supported the RSGB over a period of many years and has uniquely been President on two occasions, the only member to achieve this distinction during the last decade.

East London RSGB Group competition

A competition is being held by the East London RSGB Group to promote interest in construction of radio, hi-fi and electronic equipment. It is open to every RSGB member. The idea is to make a piece of equipment, totally enclosed by a 2oz tobacco tin with lid. The power source need not be included in the tin. The judges will take into account such factors as tidiness, layout, originality and design. Circuits and/or plans should be available and magazine articles will be accepted as constructional plans. Entry forms with rules can be obtained by sending an sae to G4CJQ, QTHR, before 31 October. Cash prizes will be awarded to the winner and first two runners-up, and extra prizes will be given if the entry exceeds 30.

Rally in Central Scotland

The West of Scotland ARS and the Mid-Lanark ARS intend to hold a mobile rally in the Central Scotland area during the summer of 1978; 3 June having been suggested as a possible date. Any suggestions or offers of assistance would be greatly appreciated.

Racal ARS sale

The Racal ARS will be holding a disposal sale of components and sub-assemblies at St Sebastian's Hall, Nine Mile Ride, Wokingham, Berks, on 22 October 1977. Doors will will open at 2pm. Further information may be obtained from G3NR, QTHR.

South London College courses

The following courses at the South London College, Knight's Hill, London SE27, may be of interest to radio amateurs:

Basic electronic construction. Mondays, 6.30-9pm. For 12 weeks commencing 7 November. Fee £4. Aims to enable students to construct electronic equipment of their own choice using the students' own components. The college will provide technical assistance, tools and test instruments.

OSCAR—Amateur Radio Satellites

by Stratis Caramanolis

Amateur radio communication via satellite is an exciting alternative to ordinary hf communication, and is likely to grow dramatically in popularity over the next few years. Best results can, however, only be obtained if the user has a basic knowledge of satellites, their orbits and the techniques involved. This is where *OSCAR—Amateur Radio Satellites* can help.

The first half of the book discusses the background to the subject, including orbital geometry, satellite anatomy, communication principles and telemetry, in some detail. Only after the reader has a clear understanding of the basic principles of communication satellites does the book go on to describe satellites of the Oscar series and how they can be used for education, communication and experimentation, including QRP tests and slow-scan television. Various methods of plotting Oscar orbits are discussed and the reader is shown how to interpret published orbital data.

Throughout the book, relevant equations and worked examples are given where desirable, and the text is amply illustrated with many diagrams, charts and photographs.

This is the book every serious Oscar user will want to own. Chapter titles are as follows: Planets and their orbits; Satellites and their orbits; Anatomy of a satellite; Satellites as relay stations; Fundamentals of telecommunication via satellites; Telemetry systems; Satellites of the Oscar series; Operating with amateur satellites; Learning with AMSAT—Oscar satellites.

192 pages **£4.20 inc p & p**

Teletext systems (Ceefax, Oracle, Viewdata). Tuesdays, 6.30-8.30pm. For 9 weeks commencing 11 October. Fee £6. Lecturers: Pat Hawker, G3VA, (IBA), J. R. Chew (BBC Research Dept), N. Green (Independent Television Companies Association), J. R. Kinghorn (Mullard Central Applications Laboratories), K. E. Clarke (Post Office Research Centre).

RAE Courses 1977-8

Details of the following courses were received too late for inclusion in the lists published in the August and September issues. Although courses will have already commenced it is often possible to join them a week or two late.

Bedford. Westfield School, Queens Park, Bedford. Wednesdays, 7pm. For 20 weeks from mid-September. Details from the headmaster, tel Bedford 67353, or tutor E. Elsley, G3YUQ, tel Bedford (day) 65171, ext 53, or (evening) 768120.

Burgess Hill. Marle Place Adult Education Centre, Leylands Road, Burgess Hill, West Sussex. Tuesdays, 7.30pm. For 30 weeks from 20 September. Details from the centre, tel Burgess Hill 6355.

Durham. Durham Technical College. Fridays, 6.30pm. Commenced late September. Details from G3ZJY, QTHR. Tel Durham 66773.

Hemel Hempstead. Dacorum College of Further Education. Tuesdays, 6pm. Commenced 13 September. Details from G3VOZ, tel Hemel Hempstead 833300.

London (Acton). Acton Technical College, High Street, Acton. Commenced 21 September. Details from college.

London (Islington). De Beauvoir GLC Evening Institute, Tottenham Road, Balls Pond Road, Islington N1. Tuesdays and Thursdays, 7.30pm. This is a special course for those who have sat the examination, failed and do not wish to start all over again, or have passed and want practical construction and operating experience. Details from G3AGP.

London (Wembley). Wembley Evening Institute. Mondays, 7pm. Details from G8FQJ.

Princes Risborough. Adult Education Centre, Merton Road, Princes Risborough. Mondays, 7pm. Commenced 26 September.

Power supply and control circuits for a 4CX250B amplifier

by A. J. WADE, BSc, G4AJW*

MANY amateurs are now using tetrodes of the 4CX250B family in their power amplifiers, and while such amplifiers usually present little difficulty from the rf point of view—there being several well-proved designs in the literature [1, 2, 3, 4, 5, 6, 7, 8, 9]—many constructors have experienced troubles with power supplies and from the effects of valve flashovers on inadequate power supply and control circuitry. Screen supplies, in particular, are often insufficiently stabilized for linear service, and the fact that the screen supply must be capable of sinking as well as supplying current is not always appreciated.

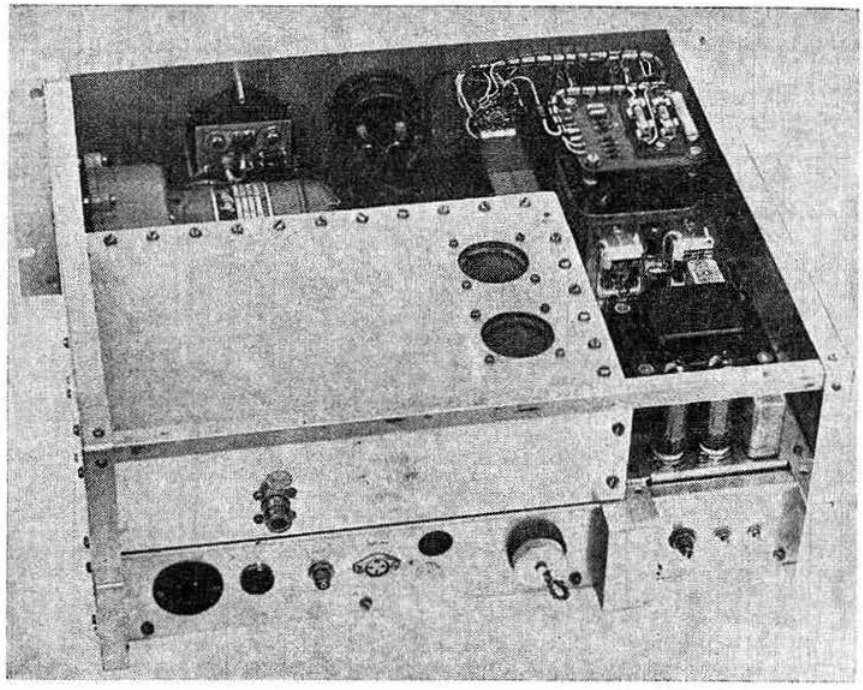
Flashovers from anode to screen can occur quite easily in the 4CX family if the anode voltage is close to its rated maximum and the anode circuit is insufficiently loaded, or if a faulty valve is in use. The flashover can be either internal or external across the ceramic ring, and if precautions are not taken the voltage on the screen pin can rise to 2kV, possibly causing damage to the screen supply or meter circuitry. In some cases flashovers have resulted in failure of the annular decoupling capacitor incorporated in the vhf type of valveholder—a particularly nasty occurrence with these holders becoming even more difficult to obtain.

The circuits presented in this article constitute the author's attempt to design a pa which would operate reliably at high power output, often under arduous contest conditions, which was foolproof in operation and would not blow-up when a valve flashed over. The prototype has now been in use for three years on his linear version of the K2RIW 432MHz pa and has given no trouble at all after the initial bugs were sorted out. This pa retains its original pair of valves and has survived several contests, a dxpedition and a fair amount of general club and home-station use, often operating with 2·5kV on the anodes. The complete design has been duplicated by G8DRE on a 144MHz pa and this was commissioned with few difficulties.

General description

The circuits in Figs 1-3, together with grid and anode circuits for the band(s) required form a pa which is complete except for the high voltage anode supply. No details are given here for the latter since this is very straightforward and in any case usually has to be designed around whatever mains transformer and components the constructor can lay his hands on. It will almost always be built as a separate unit. The control circuit provides a 24V output to drive a contactor or large relay to switch the eht on or off. For a two-valve linear aim to provide between 1·8 and 2·2kV at about 400-500mA continuous rating, but with good dynamic regulation up to 800mA load.

Fig 1 shows circuits for the heater and grid bias supplies together with the control logic and metering arrangements. Switching on the mains activates only the bias and relay



Three-quarter rear view of the author's pa. The psu and control circuits are on the right of the picture, with the heater, relay and bias transformer nearest the front panel. Behind this are RLA and RLB, the bias regulator valve and RLC, the screen supply transformer and the screen stabilizer valves and RLG. The items on the rear apron are (l to r) mains inlet, mains fuse, eht connector, eht contactor skt, rf input socket (recessed), control socket, screen balance pot and the run/set switches

* "Grangemount", Grange Road, Leatherhead, Surrey.

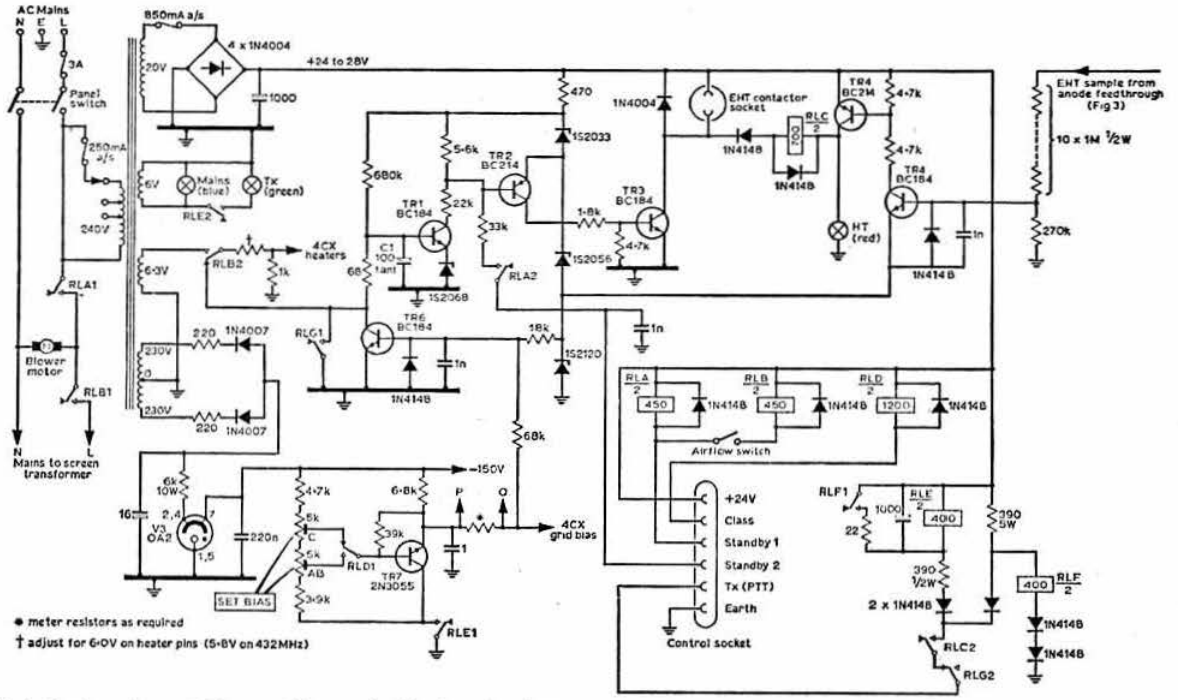
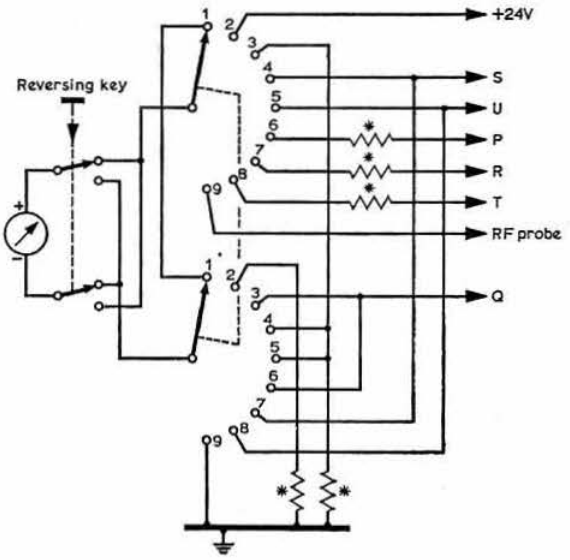


Fig 1. Heater, relay and bias supplies, control logic and metering circuits

Switch positions

1. Off
2. Relay supply voltage
3. Bias voltage
4. No 1 screen voltage
5. No 2 screen voltage
6. Grid current
7. No 1 screen current
8. No 2 screen current
9. RF voltage



supplies—the blower and valve heaters do not come on at this stage. Further action is now initiated remotely via the control socket. Earthing the Standby-1 line switches on the blower. Airflow is sensed by a vane and microswitch arrangement and allows power to be applied to the pa valve heaters. This airflow switch may be thought to be rather a luxury and for fixed station use it probably is—one does not usually have any difficulty in hearing whether the blower is working! However, when operating portable the blower noise is usually inaudible under that of the generator, the howling wind and lashing of rain on the side of the tent, so that, without the switch, the first indication of blower failure would be a dead pair of valves. If any sort of air filter is used, the blower switch is definitely worth having to warn of its blockage.

Application of power to the heaters releases a 1min timer which ensures that the cathodes warm up properly before ht can be applied. Earthing the Standby-2 line produces a 24V signal at the contactor socket which should result in the eht being switched on. The presence of more than about 500V on the incoming eht line switches ht onto the screen shunt stabilizer circuit (Fig 2) and then onto the pa valve screens. Only the −150V grid bias now holds the valves out of conduction.

A shunt stabilizer is used for the screen supply because under certain operating conditions the 4CX250 family can run with negative screen current, ie current flows out from the screen pin, not into it as is usual. This effect is quite normal and results from electron secondary emission at the screen grid. With a linear pa it is usually found that a small negative screen current flows under standing conditions and that it becomes more negative as drive is applied. As the drive is increased the negative current reaches a peak and then falls, eventually becoming positive. Quite large variations in screen current can occur from valve to valve;

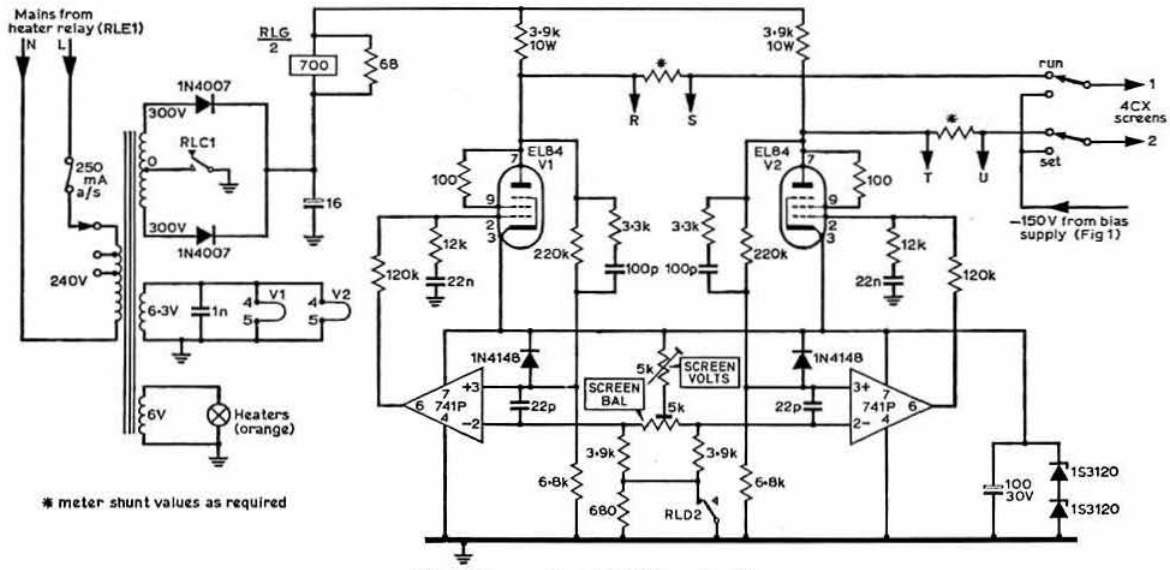


Fig 2. Screen shunt stabilizer circuit

these are not necessarily a sign that anything is amiss. If the screen supply is incapable of sinking the maximum value of negative screen current which occurs, then the screen voltage could rise, increasing the anode current and giving a runaway condition. A series-stabilized supply would need a bleeder consuming an excessive amount of power to guard against this occurrence, so the shunt stabilizer gives a more economical design. Gas discharge regulator valves can provide a simple and adequate shunt stabilizer, but the hard-valve design used here provides a variable voltage output so that both Class AB and Class C operation can be used and the standing currents in a two-valve linear equalized.

Returning an earth on the transmit (ptt) line (Fig 1) lowers the grid bias to about −90V for Class C operation or about −40V for linear service. A short delay is included to allow aerial changeover relays to clear. If drive is now applied the pa will be on the air.

Potentially-damaging fault conditions are dealt with as follows:

Valve or eht flashover: the steep rise in eht current triggers a crowbar thyristor connected to the screens (Fig 3), quickly providing a safe path to earth for the fault current. The short-circuit on the screens is sensed by the screen supply and the relay RLG re-sets the minute timer, thus releasing the eht contactor. Power-up is then automatic after the 60s delay. If, on the author's pa, a screwdriver is dropped into the anode compartment, the eht shuts down without so much as blowing a fuse.

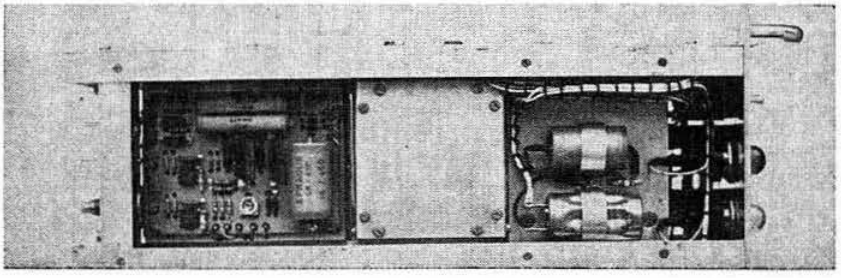
Anode supply failure: screen ht is immediately removed and ptt inhibited. Automatic re-set when eht is restored.

Grid bias failure: the timer is clamped in the re-set condition, thus clearing anode and screen supplies.

Blower failure: all 4CX250 supplies are removed and the timer re-set.

Circuit details

The heater, relay and negative bias supplies in Fig 1 are quite straightforward and readily modified to suit available components. The author's transformer had a rather higher ht winding voltage than was required for the bias supply—hence the 220Ω resistors in series with the rectifier diodes. If a 150-0-150V winding is available these can be omitted. On transmit, the bias is regulated by a simple emitter-follower shunt regulator which is capable of sinking the 50mA grid current from a pair of valves working in Class C. The voltage ratings of the 2N3055 are quite adequate for this circuit, provided that a reputable make of device is employed. There is, of course, no objection to using a higher voltage transistor if this is available. If Class C operation is intended the transistor-heatsink combination must be capable of



Part under-chassis view of the author's pa. The board on the left carries the screen stabilizers, while the logic and bias regulator boards are in the screened compartment in the centre

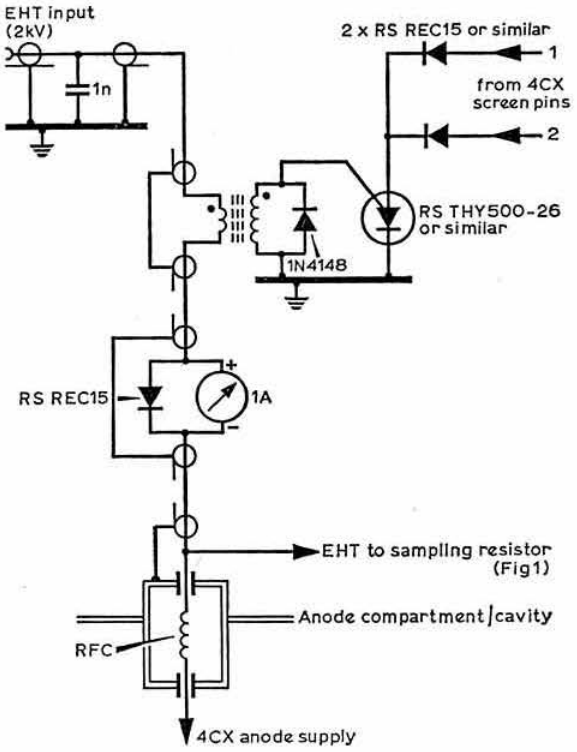
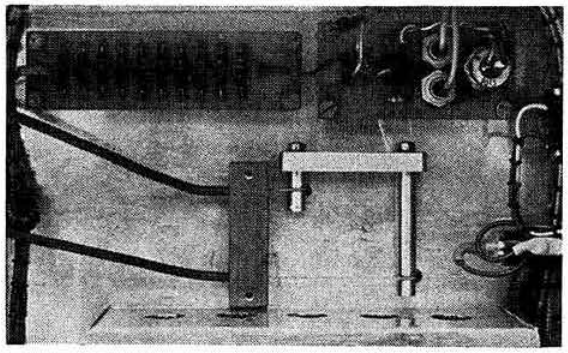


Fig 3. Anode supply wiring and screen thyristor. Trigger transformer details: primary 1t (well insulated), secondary 20t 36swg enam on small ferrite ring (see text)

dissipating about 5W. The bias supply is also capable of supplying a few milliamps, and it appears to be quite normal for perfectly healthy valves to draw 1-2mA *positive* grid current when lightly driven in AB1.

Simple relay circuits are used to switch on the blower (RLA) and the heaters (RLB). Note that a second contact on the latter applies mains to the screen supply transformer so that the EL84 heaters come on at the same time. These relays are octal plug-in types. A miniature double-changeover relay (RLD) switches bias and screen voltages between their linear and Class C values. The functions of this relay can be wired to a front panel switch if the remote control facility is not required. The t/r switching arrangement shown is a little unusual and was designed around some surplus twin-capsule A-form reed relays available at the time. A silent changeover is the result. On receive RLE is de-energized and RLF energized. Earthing the ptt line immediately releases RLF so that the capacitor across the coil of RLE is free to charge and after a delay of about 100ms this relay operates and puts the pa onto transmit. When ptt is released RLF re-closes and quickly discharges the timing capacitor, releasing RLE and biassing the pa back. This slow-on fast-off action guards against operation of the amplifier without rf load. No aerial changeover relay is included in the prototype because a masthead receive pre-amplifier is employed; if required, this component can be wired (with a catching diode) between the relay supply and ptt lines.

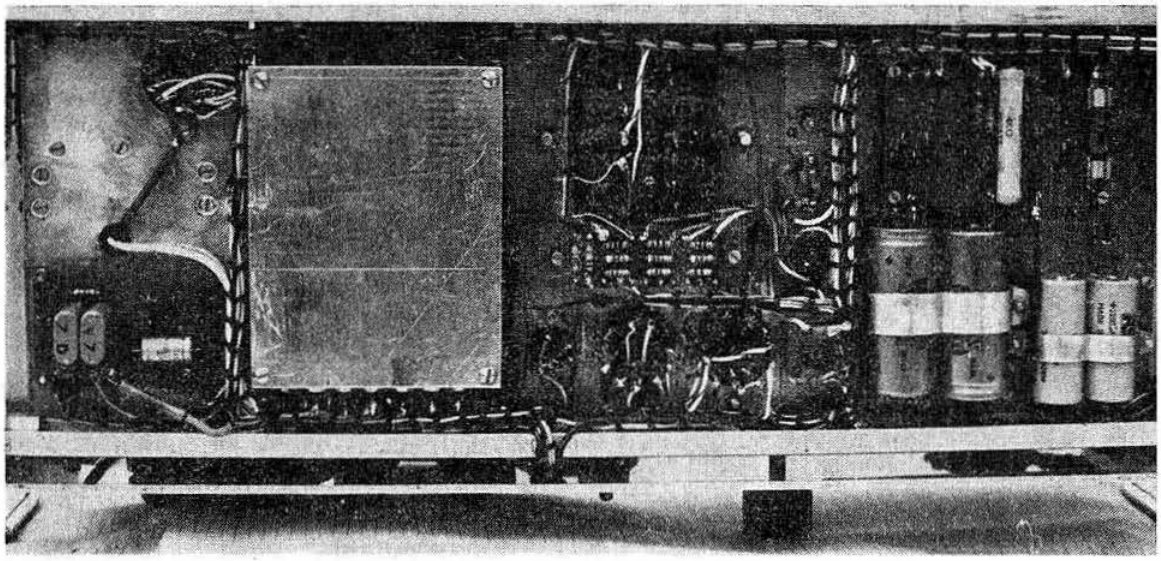


Close-up of the eht divider chain and screen crowbar in the author's pa. Below these are the string drives for the tuning and coupling flaps

When relay contact RLB2 applies power to the valve heaters it also removes a near short-circuit from the timing capacitor, C1. After about 1min C1 has charged to 7·4V and TR1 switches on. Resistor values are arranged so that TR2 will not turn on, however, until the Standby-2 (eht on) line is earthed. TR2 turns on TR3 which closes the contactor in the external eht supply. The anode supply is sensed by TR4 and the associated potential divider chain. Its presence turns on TR4, TR5 and the ht indicator and energizes the coil of RLC via TR3. TR6 is normally held off by the grid bias, but should the latter fail this transistor will discharge C1, so switching everything off.

Turning now to Fig 2, contact RLC1 applies power to two identical shunt stabilizer circuits, each of which comprises a triode-connected EL84 driven by a 741 op-amp. The supply for the op-amps is derived from the cathode current of the EL84s, resulting in a self-contained stabilizer which may be found useful in other applications. Each 741 compares a sample of the EL84 anode voltage with a reference derived from the cathode zener, and adjusts the grid voltage for equality. The voltage fed to the screen of each pa valve is thus the voltage at the inverting input of the corresponding 741 multiplied by 226·8/6·8 or about 33. Compensation networks are included to ensure that the loop is stable when operating into the capacitive load presented by the screen decoupling capacitors, and to give a reasonable transient response to load variations. The diodes between the valve cathodes and the non-inverting inputs of the op-amps protect the latter from any overvoltage spikes on the output lines. Two presets are provided; one sets the average screen voltage and the other gives a differential adjustment so that the standing currents in the pa valves of a linear amplifier can be equalized. To facilitate this operation each screen circuit is fitted with a switch which connects the screen grid to the −150V bias so that the valves can be checked one at a time. The standing current should be set to 100mA per valve. Care should be taken not to operate the switches while the pa is drawing anode current otherwise the momentary floating of the screen may cause the crowbar to be triggered. Contact RLD2 provides the necessary increase in screen voltage when changing to linear operation.

The voltage at the tops of the EL84 anode resistors, about 430V in the prototype, should not be less than 400V. There is no objection to using a higher supply voltage, provided that the 3·9kΩ anode resistors are increased in value to keep



Under the chassis of G8DRE's pa. The small board on the left carries the t/r timing components. The screened box houses the semiconductor logic and bias regulator—note the feedthrough decoupled lead-ins. The next unit carries the screen supply transformer, meter shunt board, OA2 and RLA and RLB. To the right are RLC and RLG, run/set switches and a rectifier board

the current in them at about 20-25mA each when the screen voltage is 350. The resistor across the coil of RLG should be selected so that the relay operates reliably when one of the screen output lines is shorted to earth, but does not pull in under normal circumstances; this means that it should operate when the load on the rectifier is 60-70mA. The overall performance of this screen supply is extremely good. The regulation, determined mainly by the slope resistance of the zener in the EL84 cathode circuit, is of the order of 1V and the shunt configuration results in the ability to sink large amounts of negative screen current for short periods. A further advantage is that the maximum screen dissipation rating of the 4CX250B cannot be exceeded, even in the absence of an anode supply.

Fig 3 shows the eht wiring and the screen crowbar thyristor. The trigger transformer in the prototype was wound on a small (about 5/16in dia) ferrite ring of unknown pedigree, and because thyristors vary enormously in their trigger sensitivity, some experimentation may be required here to achieve the right sensitivity. The thyristor should not trigger when the pa is switched onto transmit with full drive applied, or when fairly hard cw keying is used, but a simulated flashover, achieved by connecting a 1,000pF capacitor charged to a few hundred volts across the primary of the transformer (with the anode supply removed), should trigger it reliably. A low voltage supply and a bulb provide a convenient way of checking for triggering, but remember to disconnect the thyristor from the screen circuits for this test. If the trigger sensitivity is too great, reduce the turns ratio of the transformer or shunt the secondary with a lowish value resistor. For the opposite problem try a higher turns ratio or a better thyristor.

The remainder of the anode wiring is straightforward and is mainly a matter of achieving an adequate insulation breakdown voltage. If the equipment is available it is worth testing the whole anode circuit up to 5 or 6kV. A point to watch is that there are no unearthed external metal parts (such as the adjuster screw) on the anode current meter. The protection diode shown for this meter, and its shunt, should be regarded as essential—many a good movement has bitten the dust in this position!

A single multi-function meter is provided for checking other voltages and currents in the circuit (Fig 1). The reversing key facilitates the reading of negative screen current. Ranges and resistor values will depend on the movement used and its scaling. The instrument in the prototype is scaled 0-5 and is arranged to read 0-50V, 0-500V or 0-50mA. The final switch position is fed from a diode probe measuring the rf output, and this can be used for tuning up if a matched load is assured.

Construction

Construction will not be described in detail as most builders will wish to incorporate a few modifications or perhaps to use only parts of the design here. In an amateur project of

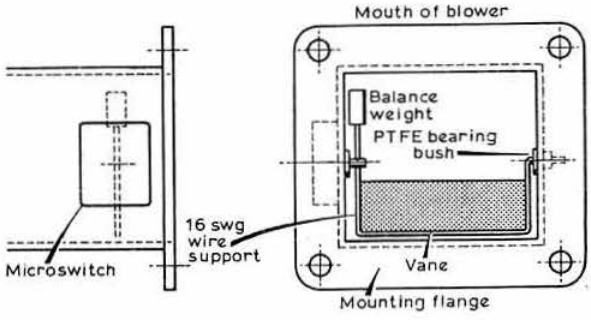


Fig 4. Airflow switch arrangement used by G8DRE

this nature much of the detail will depend on components and materials which are to hand, so no two versions will be the same. No part of the control circuitry is particularly sensitive to layout but reasonable precautions should be taken to prevent rf feedback into the transistorized part of the logic, and into the screen stabilizers. If the grid and anode circuits of the pa are built in efficient rf-tight compartments and power leads are correctly decoupled there should be no difficulties in this respect. In the screen supply the wiring between the 741s and the EL84s must be kept reasonably short and direct.

The eht wiring must obviously be adequately insulated and kept free from sharp spikes which could cause corona. The use of coaxial cable is recommended, and UR43 and UR95 are both quite suitable. The small PET type 101 connector* has been found suitable for the eht lead-in and is available on the surplus market; BNCs are prone to flashover at more than 1·5kV. Remember that the wiring from the screen rings on the 4CX250 valveholders to the crowbar has to carry the fault current from the high voltage supply; it should be kept short and direct to minimize inductance. In this context it is worthwhile including a small resistor in the output lead of the eht supply to keep the peak short circuit current down to 100A or so, and provide a point for dissipating the stored energy in the smoothing capacitors. Without this precaution the fault current can easily be several kiloamps (especially if block paper smoothers are used) and this surge current has to be withstood by the thyristor and the meter protection diode.

In both the prototypes the control logic and the screen stabilizers are built as small sub-assemblies bolted to the main chassis. Double-sided pc boards (continuous ground-plane on the component side) are used for the semiconductor parts of the circuitry. The crowbar thyristor, together with its diodes and trigger transformer, and the eht sampling resistor chain are mounted on separate small pc boards and suitably mounted on the mainframe. The photographs should give a general impression of these layouts.

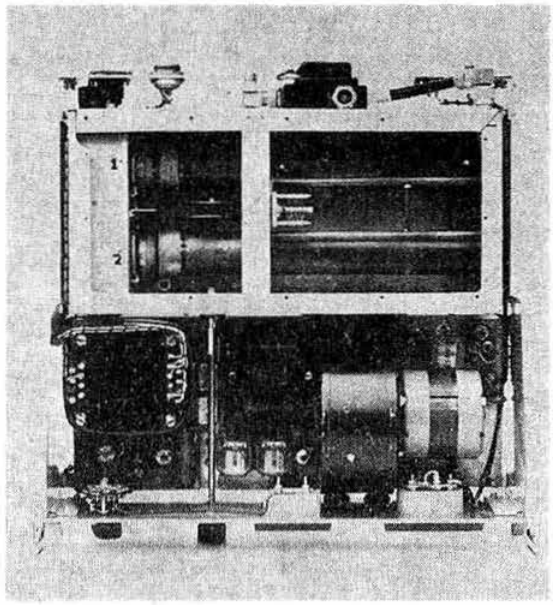
The airflow switch, if used, is left to the ingenuity of the constructor. The arrangement used by G8DRE is mounted in the throat of the blower and is sketched in Fig 4. The microswitch is of the low-torque rotary type used in coin mechanisms. An electronic version has been suggested, using the cooling effect of the airstream on a bead thermistor, but it has not been developed into a practical design.

Modifications

Many modifications are possible of course. The constructor may wish to re-arrange the control circuits to suit a different combination of mains transformer windings or to conform to individual standards. The screen supply and crowbar are really the main features of this design and should be altered as little as possible. If a single-valve pa is being built only one shunt stabilizer will be needed and the screen balance pot can be omitted, as can the run/set switches and both the diodes between the thyristor anode and the screens.

If conduction-cooled valves are used, the Standby-1 function can be dispensed with, and the heaters run all the time. RLA and RLB will not be required but it may be necessary to add a diode between the relay supply line and

* Manufactured by Precision Electronic Terminations (EMI) Ltd· Cramptons Road, Sevenoaks, Kent.



Top view of G8DRE's amplifier, with the anode coverremoved. Screen stabilizers are at the lower left and the crowbar board can be seen on the right, next to RLC. Note the chimney-less method of blowing, as used in the K2RIW design

the top of C1 to ensure that the latter discharges reasonably quickly after switch-off.

Semiconductor types indicated are not critical and the constructor's own pet devices can be substituted, provided that they are adequately rated. TRs 1, 2, 4 and 6 can be virtually any silicon small signal transistors of appropriate polarity and rated at 30V or more. TR3 must be able to carry the operating current of the eht contactor in addition to that of RLC. Note that if this device fails short-circuit the eht will come on regardless of other conditions. TR5 must be able to handle the ht indicator lamp current; the ratings of TR7 have already been discussed. The zener diode in the Fig 1 circuits can be any 400mW type of appropriate voltage, while those in the screen supply must be rated at 1 W or more.

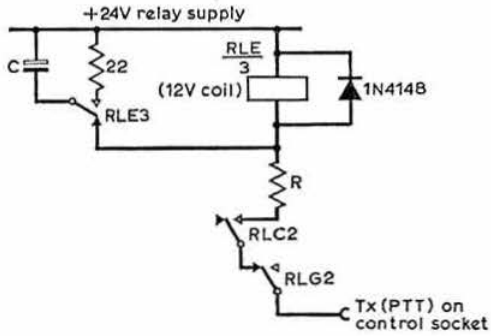


Fig 5. Alternative t/r timing circuit

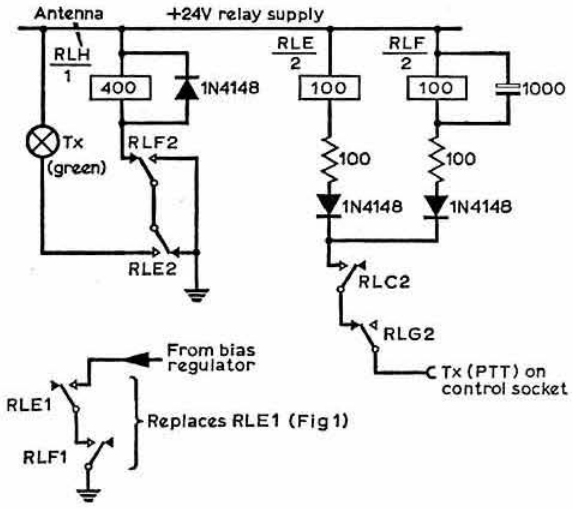


Fig 6. T/r circuit used by G8DRE. RLH1 is the antenna changeover relay (energized on receive in this circuit)

Those who still favour high-level (anode and screen) a.m. may wish to consider applying modulation to the inverting inputs of the 741s in the screen stabilizers. This would enable the advantages of the shunt stabilizer to be retained, avoid large dropper resistors and make for easy adjustment of the proportion of modulation applied to the screens for best linearity. The author has not considered this idea in detail; the pre-regulator screen ht would need to be increased and some modification to the compensation might be desirable. If the modulation for the screens were obtained from an early stage in the modulator it would be necessary to include a network to compensate for phase shifts in later stages and in the modulation transformer.

The ideas in this article are not confined in application to rf amplifiers and could be useful to anyone building a large modulator or high-power audio amplifier.

As mentioned previously, the t/r switching in Fig 1 was designed to use only "make" contacts. If a changeover relay is available the simpler circuit of Fig 5 is suggested. In this the value of R is made equal to the coil resistance of the relay and C is chosen to provide about 100ms delay. Yet another t/r timing circuit is shown in Fig 6; any correspondence on this one should be addressed to G8DRE and not to the author.

Conclusion

This article has dealt in some detail with an aspect of pa construction which is often rather neglected. The circuits here are certainly rather more complex than most arrangements but they are in no way difficult to get going and should result in a reliable pa. The 4CX250 family is a most robust series of valves and they can be run very hard in amateur service, provided that their idiosyncrasies are clearly understood.

The author hopes that he has not discouraged anyone from building an amplifier; there is certainly no substitute for a big pa—except a bigger pa.

Acknowledgements

The author thanks friends and colleagues at GW3UCB for ideas, discussions and comments on this project. In particular he must mention G8DMJ, the reliability of whose pa at one time was an inspiration for this work; G4BRK and G4BRT for repeated (unsuccessful) attempts at destroying the prototype, and G8DRE for being fool enough to prove that the design can be reproduced.

References

[1] "300W output passive grid linear", *Radio Communication Handbook* (4th edn), p10.58. (RSGB).

[2] "Kilowatt amplifiers for 50 and 144MHz", *Radio Amateurs' VHF Manual*, p134 (ARRL).

[3] "General purpose power amplifier for 144MHz", *VHF UHF Manual* (3rd edn) p5.56 (RSGB).

[4] "Compact 150W amplifier for 144MHz", *VHF/UHF Manual* (3rd edn) p5.59 (RSGB).

[5] "QRO linear for two metres", J. D. V. Ludlow, GW3ZTH and C. J. Dunbar, GW8EHK, *Short Wave Magazine* Vol 31 No 5,6 pp286-289 and 351-357 (July and August 1973).

[6] "Coaxial line amplifier for 432MHz", *VHF/UHF Manual* (3rd edn) p5.67 (RSGB).

[7] "High power cavity amplifiers for 430MHz", *Radio Communication Handbook* (4th edn) pp7.41-7.46 (RSGB).

[8] "A strip-line kilowatt amplifier for 432MHz", R. T. Knadle Jr, K2RIW, *QST* April and May 1972, pp49-55 and 59-62.

[9] "A plate line pa for 432MHz", L. Williams, G8AVX, *Radio Communication* October 1976, p752. □

CATALOGUES RECEIVED

The autumn edition of the **Heathkit** catalogue is now available and contains details of the range of kits obtainable. New kits include a range of frequency counters with an upper limit of 1GHz and a solid-state hf bands cw transmitter, the HX-1675, which has an input of 75W to the final stage. There are several other new kits now available in the audio and instruments fields. Copies of the catalogue are available from Heath (Gloucester) Ltd, Gloucester GL2 6EE, or by callers at the London showroom, 233 Tottenham Court Road, W1 (tel 01-636 7349).

The latest catalogue from **Greenweld** contains details of a large range of components, modules, tools and instruments. The latter includes an extensive selection of Russian-built multimeters. Items are obtainable by post or by callers at the Southampton shop. The catalogue contains 50p discount vouchers and is obtainable for 30p plus 15p postage from Greenweld, 443 Millbrook Road, Southampton SO1 0HX (tel 0703 772501).

The new catalogue from **Marshall's** comprises 32 pages in a new format and including new lines such as microprocessors and support devices, cooling fans, digital multitesters and a pull-out transistor guide. Cost of the catalogue is 25p to callers at the Bristol, Glasgow or London branches, or 35p by post from 42 Cricklewood Broadway, London NW2 3ET. Tel 01-452 0161.

A multimode transceiver using SL1600 ICs

by P. L. A. BURTON, G3ZPB*

THE multimode transceiver design presented here is a logical extension from the ssb transceiver described by B. D. Comer, G3ZVC, in *Radio Communication*, September 1974. As in the previous design it is necessary to add local oscillator, power amplifier, preselector and/or rf amplifier, plus microphone, loudspeaker and volume control to complete a transceiver capable of a very high standard of performance.

The transceiver is a fairly sophisticated design incorporating a noise blanker, dual time constant agc, S-meter, squelch control, vox and rf compression on transmit. The majority of the circuit functions are independent of each other allowing one, for example, to build just a single-mode receiver and then add other refinements as and when required.

In order to reduce component cost where possible, use has now been made of the recently introduced plastic encapsulated versions of the SL600 range, designated SL1600. These use the same ic chips as before but are packaged in the popular dil 8 or dil 14 plastic pack. In the figures, the original SL600 designations are used.

Receiver design considerations

The major problem of receiver design is that of strong signal handling during weak signal reception. There is no single cure for it but designs of high performance receivers usually have as little rf gain as possible, followed by a mixer with good strong signal performance, followed at once by a crystal filter. The crystal filter removes the majority of unwanted signals and the rest of the receiver is unlikely to be troubled by them.

The crystal filters do not follow the mixer directly in this receiver, for two reasons: first, to improve the impedance match between the mixer and the filter, and second to permit the use of a noise blanker to suppress impulse interference.

A suitable mixer for high performance receivers must have low noise, as little conversion loss as possible, and be able to handle strong unwanted signals without intermodulation. In this transceiver a hot carrier diode ring mixer, the MD-108 has been chosen. Such ring mixers perform best when they are terminated in 50Ω resistive loads at all ports, but the input impedance of crystal filters, besides being generally higher than 50Ω, is reactive at frequencies away from the filter passband. Therefore a buffer amplifier, which is also part of the noise blanker, is used to terminate both the mixer and the filter correctly.

A major reason for the failure of receivers to reproduce weak a.m. and ssb signals is man-made noise, typically ignition interference, at the antenna. This noise is frequently in the form of very narrow pulses of very high amplitude which can cause the crystal filter to ring at its resonant frequency. Once the filter has been thus stimulated it will stretch the pulse so that it cannot be distinguished from the wanted signal, which it swamps. Only by stopping the ignition pulse before it reaches the filter can this interference be suppressed. The noise blanker must therefore be somewhere in the receiver before the crystal filter, and the best place is between the mixer and the filter.

After the crystal filters the receiver design is quite conventional. There are two filters, each feeding its own i.f. strip. One has a 12kHz passband and feeds the fm i.f. system, which is a double conversion system with a 455kHz second i.f. and a quadrature detector. This double conversion is necessary because the average integrated circuit quadrature detector is somewhat noisy when receiving nbfm at an i.f. of 9MHz.

The other filter has a 2·4kHz passband and its output goes to the cw/ssb/a.m. i.f. strip. This strip has a broadband gain of about 70dB followed by another crystal filter, which is of 2·4kHz bandwidth for a.m. and ssb and 500Hz for cw. There is then another i.f. amplifier stage followed by two detectors. For ssb and cw there is a product detector, and for a.m. there is an envelope detector. On a.m. the envelope detector provides carrier agc to the system, but on cw and ssb an audio-derived agc system is used. Squelch and S-meter signals are derived from the agc line.

The decision to use a 2·4kHz filter for a.m., removing one sideband, was taken on cost grounds, as was the decision to use only one 500Hz cw filter halfway down the i.f. strip; whereas two such filters, one at the input to the strip, would certainly improve strong signal rejection in the cw mode. Ideally there should be four filters at the input (with bandwidths of 12, 6, 2·4 and 0·5kHz respectively for nbfm, a.m., ssb and cw) and a further three filters halfway down the a.m./ssb/cw i.f. strip to reduce i.f. noise to a minimum. This would entail an extra three expensive crystal filters compared with the present system—for only a marginal increase in system performance.

However, the use of two filters halfway down the i.f. strip is well justified. The cw filter in this position removes both unwanted cw signals in the 2·4kHz passband and much of the broadband noise which can cause difficulty in copying very weak signals. The 2·4kHz filter is essential for removal of broadband noise between 100kHz and 30MHz generated by the first two i.f. stages which, if allowed into the a.m. diode detector, would greatly degrade its performance. The improvement due to this filter on the ssb product detector is much less, since product detectors produce supersonic outputs from broadband noise and these can be filtered without loss of wanted signal. There is nevertheless a 3dB improvement in s : n ratio in systems where i.f. noise is the limiting factor on system performance.

Receiver circuit details (Fig 2)

Noise blanker

Probably as much work went into the development of this noise blanker as into the rest of the receiver. It has excellent performance and causes very little degradation of the receiver's strong signal characteristics. A noise blanker is a receiver which receives noise pulses, amplifies and shapes them, and uses them to turn off the main receiver while noise is present. As noise is not evenly distributed throughout the frequency spectrum the noise blanker receiver should be operated in the same frequency band as the main receiver. This in turn suggests that the noise receiver and the main receiver be common and that the blanking pulse be applied late in the

* 20 Thornton Crescent, Old Coulsdon, Surrey.

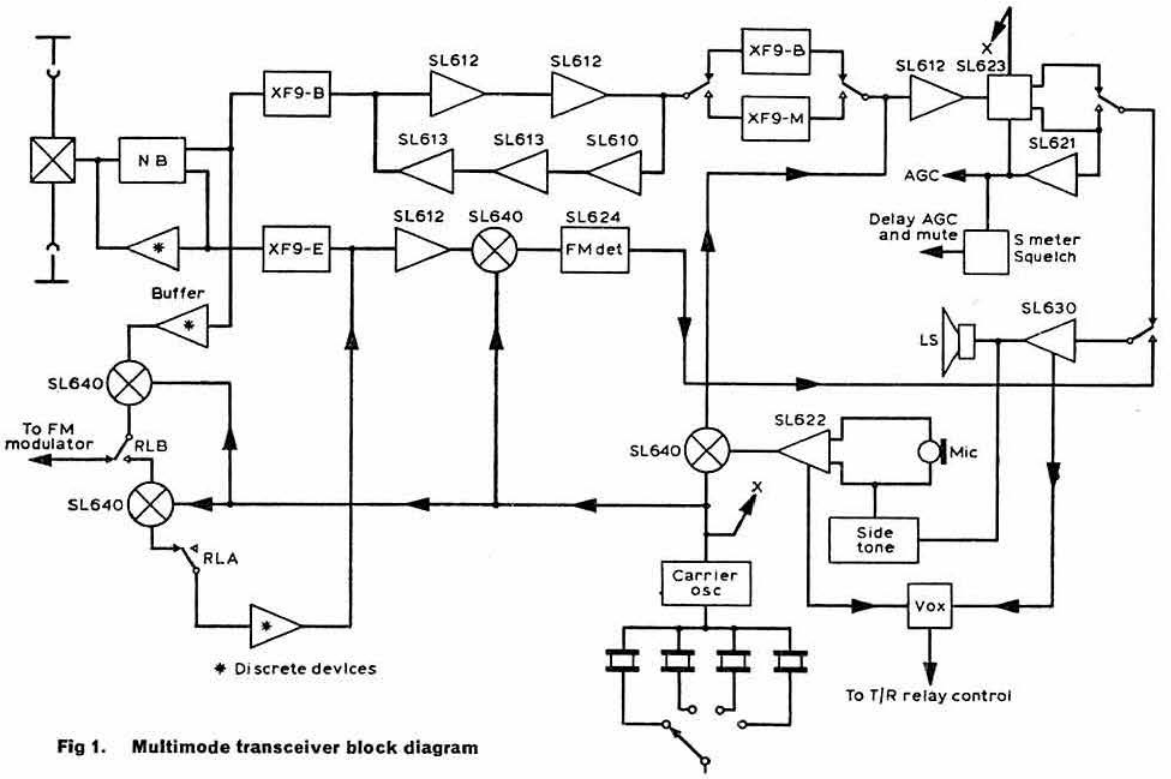


Fig 1. Multimode transceiver block diagram

main receiver. However, if a noise pulse is applied to a crystal filter it is stretched from its original length of a few microseconds to as much as several milliseconds. Blanking must therefore be applied before the crystal filters.

The noise blanker must stop a noise pulse before it can reach the crystal filter from the mixer. Furthermore, if a blanking pulse has sharp (large dV/dt) edges these will themselves act as noise pulses, negating the effect of blanking the received noise. There are therefore two conflicting requirements: the noise blanker must act very quickly to prevent the leading edge of a noise spike from reaching the crystal filter, and it must apply a blanking pulse with a slow rise time to the noise gate to prevent the blanking pulse from acting as a noise pulse. The only way these requirements can be met is to delay the signal between the mixer and the filter in a linear delay line and to place the noise gate between the delay line and the crystal filter.

Various forms of blanking gate were tried during the development of the noise blanker, but none gave better performance than an SL1496 double-balanced modulator. The circuit diagram of the noise gate is shown in Fig 3. Transistors designated TR followed by a lower case letter are those internal to the SL1496. Transistor designations using numerals are employed for all other devices.

In this application, pins 5 and 14 of IC1 are connected together and the emitters of TRa and TRb are thus open-circuited. They are then connected externally to the rest of the circuit. When there is no blanking pulse TR10 is turned off and TRc and TRf are turned hard on. With TRc hard on, TRa acts as an amplifier to signals on its base and its output goes, via TRc to the XF9-B crystal filter. Since TRd and TRe are off, no signal is applied to the XF9-E filter.

When a blanking pulse is applied to TR10 it is turned on and TRc and TRf turn off (slowly because of the resistor in TR10 collector and the 1nF capacitor between inputs 8 and 10 of the SL1496) and TRd and TRe turn on. The signal path is now to F4, and F1 is isolated—noise cannot pass to the cw/ssb/a.m. i.f. strip. The noise blanker is not effective during fm reception and is not used. Instead, TR8 is turned on and this balances the modulator so that TRc, TRd, TRe and TRf are turned on and signals go to both i.f. strips. This is necessary because the squelch is derived from the cw/ssb/a.m. strip in all modes, including fm.

The diodes between pins 8 and 10 of IC1 ensure that the switching drive is at the correct level, and the preset current source TRb keeps the dc current in the filter loads constant as the system switches from the unblanked to the blanked condition. The noise receiver has its input via a tuned circuit to prevent local oscillator leak from the mixer triggering the system. The noise i.f. amplifier consists of IC2 and IC3 which acts as a detector. Gain control is applied to IC2 to set the blanking level.

Pulse outputs from the detector in IC3 are buffered by a pnp transistor TR18 to a simple monostable (TR6, TR7 and TR9) with a 10μs pulse. This pulse operates the noise gate. A 400ns delay line between the mixer and the noise gate ensures that the system is blanked before the pulse that triggers the monostable arrives at the noise gate.

Finally, a feature of the system is that it acts as a matching amplifier between the 50Ω mixer and the 500Ω filters.

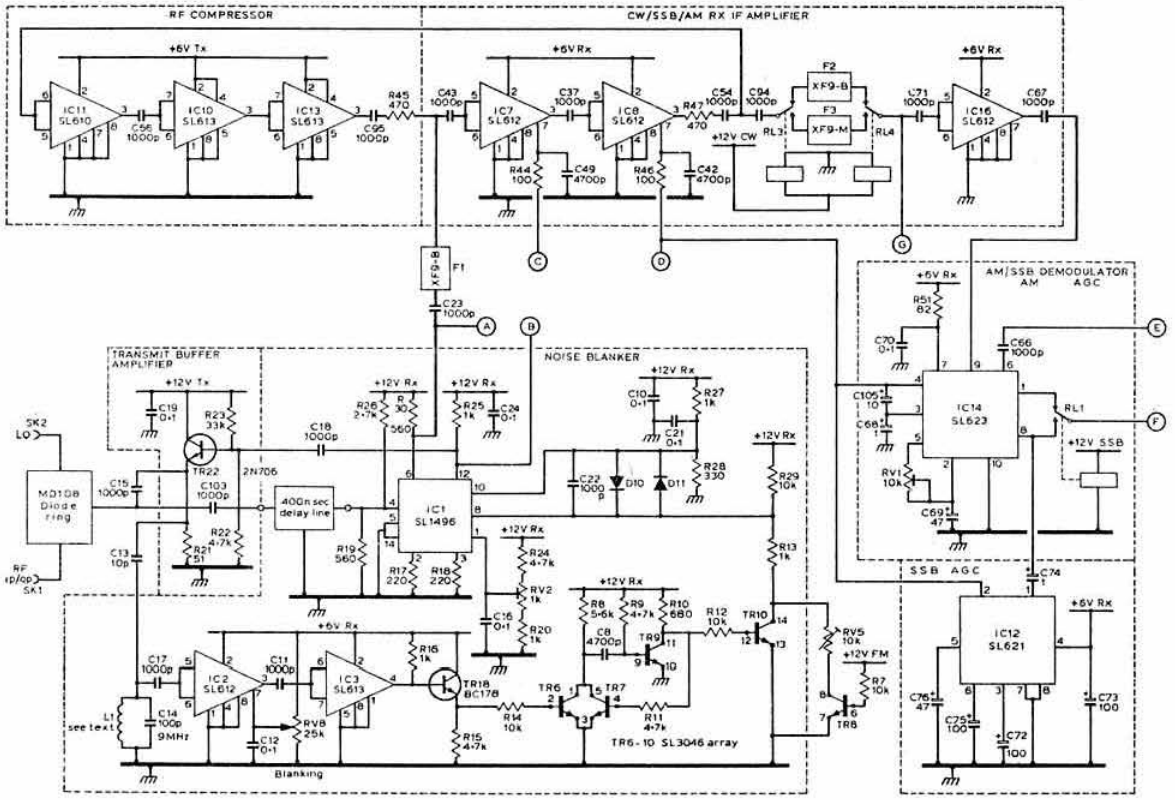


Fig 2. Multimode transceiver circuit diagram (Continued on pages 772 and 773)

AGC, S-meter and squelch circuitry

As mentioned previously, IC14 operates as a carrier agc system during a.m. reception. It also operates in the same mode during fm reception but does not apply agc to the fm i.f.; the agc line being used only for squelch and to drive the S-meter. When the carrier oscillator is turned on, the product detector in IC14 operates and a signal is applied to IC12 connected to its output. IC12 is more sensitive than IC14 and so it takes over as agc source to provide an audio derived agc system for cw and ssb reception. Since the output impedance of both the IC12 and the IC14 agc systems are high when they have no input they are both connected to the agc line and do not load each other.

If fast agc is required during tuning in the ssb and cw modes, IC12 may be turned off and control restored to IC14. This will result in higher outputs but faster decay when tuning from strong signal.

The agc line from these two devices drives IC8 in the cw/ssb/a.m. i.f. strip directly and also goes to the squelch and S-meter circuitry shown in Fig 4. TR3 acts as a buffer to drive the squelch circuitry, and as a diode (0·7V) drop to delay the agc to IC7. The output of TR3 is filtered by 1kΩ and 100nF and applied to a potentiometer (SQUELCH LEVEL) and thence to the base of TR4, which acts as an inverter. The inverter output drives TR5 which mutes the audio amplifier, IC15, by connecting its pin 7 to earth. A three-position switch to earth either TR4 collector (to disable the squelch) or TR5 collector (to mute the receiver) is included. Its centre position neither mutes the receiver nor disables the squelch. If a mute position is not required, a single-pole on/off switch may be used.

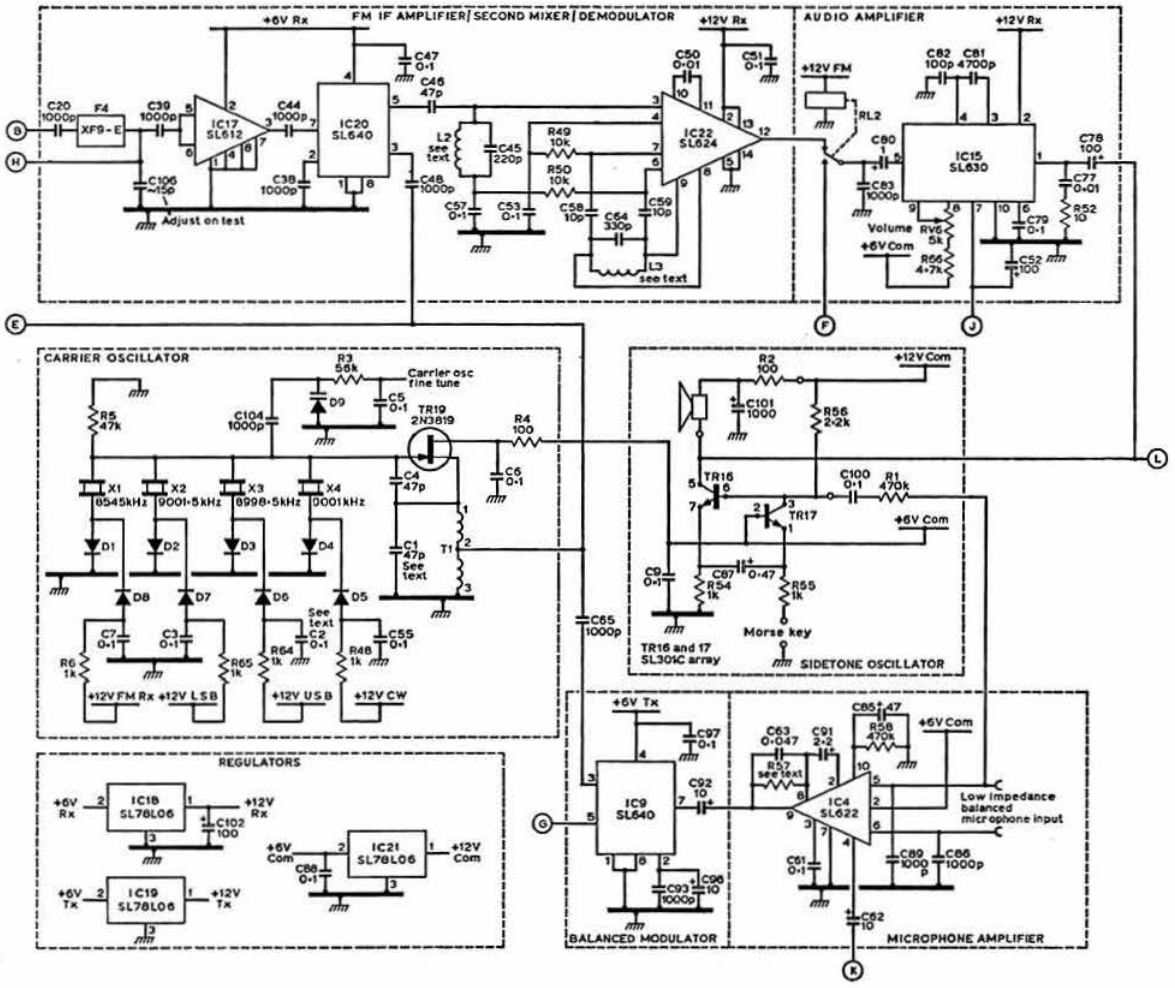
As the agc characteristics of SL600s are somewhat non-linear, a simple voltmeter on the agc line does not make a good S-meter, since it tends to be too sensitive to signal changes near the agc threshold and not sensitive enough to large signals. The long-tailed pair TR1 and TR2 with the diode D12 form a compensating circuit. All five transistors in this block of circuitry are on a single chip, the SL3046. This saves board space and gives a good match between TR1 and TR2.

FM i.f. strip and detector

Double conversion is used in the fm receiver because of the difficulty of providing adequate "Q" at 9MHz for an nbfm quadrature detector. The 9MHz output from the 12kHz-wide XF9-E filter F4 is amplified by IC17 and is then mixed to 455kHz in IC20. A single tuned circuit is used to remove the image and the signal is then passed to an SL624 working as a limiting amplifier/quadrature detector.

CW/SSB/A.M. i.f. strip

The i.f. strip is quite conventional. The output of the XF9-B 2·4kHz filter F1 is applied to two cascaded amplifiers IC7, 8. The output of IC8 goes either to a 2·4kHz XF9-A or to a 500Hz XF9-M filter (F3) depending on whether the receiver



is in ssb/a.m. or cw mode. The filters are switched by two small relays. After the filter there is another SL1612 (IC12) and a detector, IC14. Without a carrier, oscillator IC14 acts as an envelope detector for a.m. and generates carrier-derived agc in this mode. When the carrier oscillator is applied, IC14 acts as product detector for ssb and cw and IC12 at the product detector output takes over the agc. The audio output line must be switched between the two detectors.

Carrier oscillator

The carrier oscillator has four different frequencies: 8,545kHz for second mixer in the fm i.f. system, 8,998·5kHz for usb, 9,001·5kHz for lsb, and 9,001kHz for cw. The circuit is a conventional fet Colpitts oscillator (TR19) and uses diode switching to select one of four crystals. The output of the oscillator is about 1V rms and is therefore reduced in a potentiometer to the 200mV rms required by SL1640s. This potentiometer acts as a virtually constant load to the oscillator and an output buffer is not required.

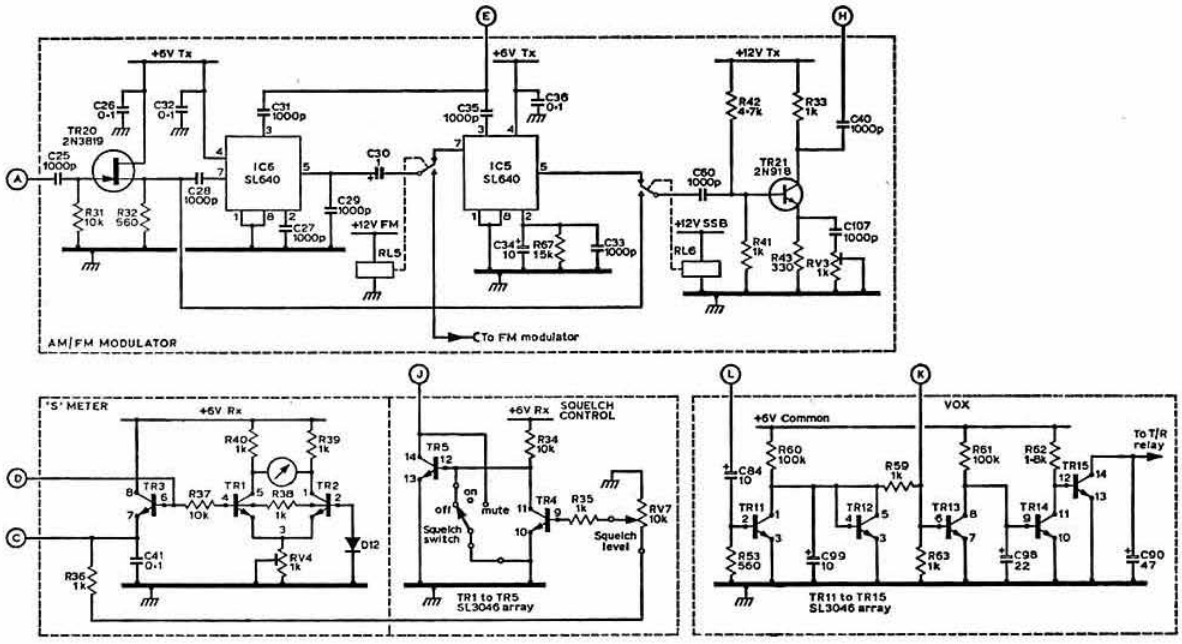
Audio amplifier

The audio amplifier IC15 is driven from a 12V line. It is capable of providing up to 200mW to a small loudspeaker but if a greater output is necessary an additional audio amplifier should be provided. The output of IC15 is also applied to the vox circuitry, TR11 to TR15. Gain is controlled by a voltage applied to pin 8 of IC15.

Transmitter design considerations

The transmitter has to generate all the modes that the receiver is to receive. This is not particularly difficult, but several complexities have been introduced to minimize spurious outputs and broadband noise while making the transmitter as effective as possible.

The modulation envelope of ssb does not resemble the audio producing it, and normal audio speech processing techniques do not greatly improve the s : n ratio at the receiver. RF clipping, however, reduces the peak/mean power ratio of the signal and hence improves the mean power and the readability of the signal. It is also convenient to use the rf clipper for nbfm and a.m., these signals being demodulated from clipped ssb, back to audio, and the audio signal applied to the nbfm or a.m. modulators. This technique gives up to



12dB apparent s : n ratio improvement, and the resulting received audio, while obviously processed, is not unpleasant.

The audio input to the transmitter passes through an audio preamplifier with agc to ensure a roughly constant modulation signal regardless of microphone or audio level. It is converted to dsb in a double-balanced modulator and filtered to ssb which is then applied to a limiting amplifier which removes all amplitude variations. This clipped signal is of course rich in both harmonics and intermodulation products and must be filtered in a 2·4kHz bandwidth filter to remove them. The quality of this filter determines the spectral purity of the resulting clipped ssb and is more important than the first filter producing the sideband.

The 2·4kHz bandwidth filter reintroduces amplitude variations into the signal which must be amplified by a linear amplifier. The signal is then either further amplified and mixed to the final transmitter frequency or demodulated to yield processed audio which can be applied to the a.m. or fm modulators.

The fm system uses this audio to modulate the external vfo while the transceiver board supplies a steady 9MHz output to the transmitter mixer. The a.m. modulator—which also supplies this unmodulated carrier during fm transmission—consists of a double-balanced modulator with deliberate carrier leak. All transmitted signals pass through a 12kHz filter as they leave the board—this costs nothing since the filter is already present in the fm receiver, and removes any broadband noise which the buffer amplifiers may have introduced.

The cw transmitter uses the complete ssb system except that a keyed tone is used as the audio input and the 500Hz filter is used instead of the 2·4kHz filter in the ssb generator. This allows only a single frequency to go to the rf clipper, rather than the several frequencies caused by harmonics from the tone generator, which would result from the use of the 2·4kHz filter.

The majority of the transmit/receive switching is performed by switching power supplies and not signal lines. The power switching itself, however, is performed by a relay which can be driven either from a transmit/receive switch or the vox system. Mode switching, however, is performed by relays, so that when the transmitter and receiver are in different modes some relays change state between transmission and reception.

Microphone amplifier and ssb generator

The audio from the microphone (or the cw from the sidetone oscillator) is amplified by IC4. This contains its own agc circuitry with fast attack and slow decay so that its output is around 100mV rms for over 60dB range of input. There is also a sidetone output which is not affected by the agc and is used to operate the vox. R57 sets the microphone agc threshold and dynamic range. If R57 is open circuit, the threshold is 100μV and the dynamic range is 60dB; if it is 1kΩ the values are 1mV and 40dB, and if it is 100Ω they are 10mV and 20dB. C63 should be increased to 0·05μF if R57 is 1kΩ and to 0·5μF if it is 100Ω.

The output from the IC4 is applied to the signal input of double-balanced modulator IC9 whose carrier input is 8·9985MHz or 9·0015MHz from the carrier oscillator. The output is dsb, which is applied to the 2·4kHz bandwidth 9MHz filter F2, and one sideband removed to produce ssb (usb if 8·9985MHz is used, lsb if 9·0015).

RF compressor

The ssb produced in the system above is normal ssb. Its peak to mean power ratio is fairly large, even though its mean power level is quite constant as a result of the audio agc. It is therefore amplified in a three-stage amplifier consisting of

Continued on page 780

A solid-state 1·8–3·5MHz receiver

by R. S. HEWES, TEng (CEI), FSERT, G3TDR*

THE design of this receiver originated in 1970 with a 1·8MHz receiver using discrete semiconductors throughout. The original receiver, of which about 24 were eventually made, was designed for a club project by members of the Echelford ARS, using readily available components.

In the basic design it was decided to dispense with the normal air dielectric tuning capacitor and substitute varicap diodes for tuning the antenna, rf and oscillator circuits. It was found possible to cover 1·8-2·0MHz using the varicap diode type BA111 with a dc voltage swing of +2 to +6V. The receiver was designed to operate from a 9V supply (for portability) allowing a varicap voltage supply stabilizer to be incorporated. Overall selectivity of the receiver was controlled by a ceramic filter, the MFH41T (6dB bandwidth ≃4·0kHz), which gave acceptable adjacent-channel selectivity for a very low price.

A square-law detector was incorporated for reception of a.m. signals, with a diode-balanced demodulator and carrier-insertion oscillator providing reception of ssb and cw signals. The audio amplifier used germanium output transistors and delivered an output power of 1W into a 15Ω loudspeaker.

A block diagram of the original 1·8MHz receiver is shown in Fig 1.

The 1·8–3·5MHz receiver

The receiver retains varicap diode tuning; however, apart from the audio amplifier, the discrete devices in the rf/i.f. stages and ssb/cw detector have been replaced by integrated circuits. The block diagram of the receiver is shown in Fig 2.

The rf amplifier incorporates a dual-gate fet, and the mixer uses an ic four-quadrant multiplier in a double-balanced mixer configuration. The ic i.f. amplifier has a built-in forward agc facility and a second four-quadrant multiplier is used in a product detector configuration. A dual-gate fet is used in the selective audio amplifier. Bipolar transistors are incorporated in the local oscillator and buffer amplifiers, carrier-insertion oscillator and buffer amplifier, agc, and the complete audio amplifier. A germanium diode is used as the envelope detector. Varicap supply voltage stabilization incorporates a bipolar transistor and zener diode, and the oscillator supply voltage is stabilized with a zener diode. Single varicap diodes are used for tuning. Mode switching is conveniently carried out at af and dc.

The circuit diagram of the receiver is shown in Fig 3, and the description which follows uses, where necessary, the circuit reference numbers.

Signals are routed to the antenna tuned circuits via SKT1 and S1. The nominal input impedance is 50Ω. Tuning is accomplished by VCD1 (MV2111) and the signals are switched to gate 1 of TR3 via S3. S2 completes the band switching of the antenna circuits, L2 for 1·8MHz, L1 for 3·5MHz. The rf amplifier stage gain is limited to 20dB maximum by tapping down the tuned windings to feed gate 1. A manual rf gain control is incorporated in the rf amplifier by RV1. This control adjusts G2 voltage with reference to the source voltage from +4V to −2V. This gives a gain control range of approximately 36dB (60×) on both bands. Amplified signals at the drain of TR3 are routed via S4 to L3 and L4 which are tuned by VCD2.

The input impedance of the mixer IC1 is controlled by R11, and therefore L3 and L4 are tapped down to 100Ω for optimum power transfer of signals which are routed to the mixer input via S5. A high order of rejection of rf and oscillator signals at the mixer output is obtained by using the double-balanced configuration. The oscillator injection amplitude is 100mV rms. Mixer conversion gain is approximately 20dB. Conversion gain is limited by the input impedance requirements of the block filter (5kΩ).

Local oscillator voltage is generated by TR4 (BF254) and associated circuitry. A modified Colpitts oscillator uses the base emitter junction of TR4 with C27 and C28 to maintain stable frequency oscillation. A further improvement in frequency stability is obtained by connecting the base of TR4 to the tuned circuits L5 and L6 via a capacitive divider C27 which limits the level of feedback to 30 per cent. VCD3 and VCD4 provide the oscillator tuning; two paralleled diodes are required to ensure correct band coverage. S7 provides oscillator frequency switching and the signal is routed to a two-stage buffer amplifier via S6. R22 limits the amplitude to approximately 10mV rms, also providing isolation between the oscillator and amplifier.

TR1 and TR2 are connected as a Darlington pair with ac and dc feedback giving a high input and low output impedance. R3 provides the feedback loop, and the amplifier output is developed across R5. This technique considerably reduces the possibility of spurious response reception due to higher frequency signals beating with harmonics of the oscillator frequency to produce signals within the i.f. passband. The oscillator frequency is high with respect to the rf.

The MFH41T filter (T1) is centred on 455kHz (±1kHz), and has a passband ripple of <1dB and >40dB of stopband attenuation at ±8kHz from centre frequency. The insertion loss is 10dB ±2dB. The output impedance is 800Ω with 200pF in parallel. An output matching transformer is included in the filter.

Signals from the mixer are routed via the filter to the i.f. amplifier IC2 which has a nominal gain of 60dB at 455kHz.

The amplified signals appear at T3 which is resonated at the i.f. by C34. T3 has a turns ratio of 1 : 1 allowing the envelope detector to operate in a high impedance detector configuration. This considerably reduces distortion introduced by the detector on low carrier level, high modulation level signals.

Detector D1 drives TR5, an emitter follower allowing the recovered audio to appear across a low source impedance (≃10kΩ) with respect to the audio amplifier input impedance. TR5 also furnishes agc for IC2. An external transistor is needed because IC2 requires 100-200μA of agc drive current for maximum gain reduction, which is more than can be provided by the detector diode alone. The audio signal is routed to S8 via R34 and C40.

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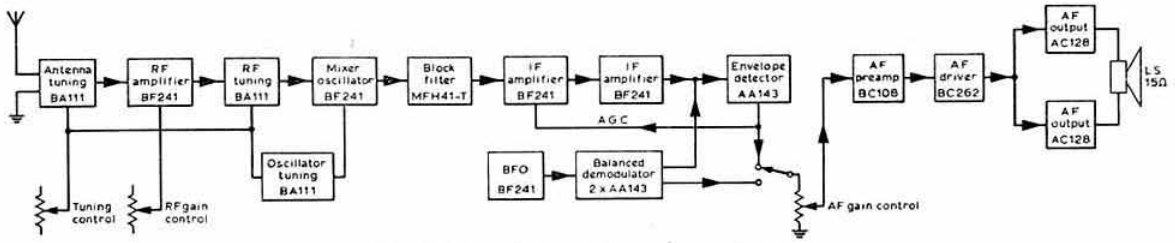


Fig 1. Block diagram of original 1·8MHz receiver

Voltage drive for the S-meter is provided by R38 in the collector of TR5. "Set zero" facility is provided by a voltage differential network R42, RV2 and R40. The meter will read zero when the slider of RV2 is set for ≃10·5V dc and requires 200μA for full-scale deflection. C42 provides sufficient damping of the meter movement, particularly for ssb and cw signals.

Advantage is taken of the very low signal input (≃10μV) for 10dB s : n of IC3 when used in the product detector configuration. In order to avoid switching between a.m. and ssb/cw detectors at i.f., signals are routed to IC3 via R41 providing a 33 : 1 step down of voltage appearing at T3. Even under weak signal conditions sufficient signal will appear at the input of IC3 for correct operation while the low input impedance (decided by R47) will not be reflected back across T3 secondary.

SSB/cw signals at pin 1 and a carrier insertion signal at pin 10 are mixed in IC3, and the resultant product, speech or morse, appears at pin 6. Carrier and signal filtering is provided by C48, R53 and C50. The audio signal is then routed to S8 via C51.

Carrier insertion is provided by TR6 (the oscillator) and TR7 the amplifier. C80 is used as the "pitch" control. R58 isolates the oscillator and amplifier, preventing oscillator pulling under strong signal conditions. The value of R58 is adjusted to give 300-500mV of oscillator drive to the product detector. L7 and T4 are resonated to the i.f. centre frequency with C80 at half capacitance. A stabilized supply of +8·2V (nominal) is switched to the cio and ci amplifier by S9. S8 and S9 are ganged on a two-pole three-way switch which provides the reception mode facility.

The frequency selective audio amplifier TR8 can be switched into the audio line between S8 and RV3 to improve reception of weak cw signals under crowded band conditions. The amplifier may also be used for ssb reception, but with a very limited voice frequency range. The circuit employs a dual-gate mosfet and has a twin "T" RC filter circuit in its output. The network provides regenerative feedback to the input circuit at an audio frequency determined by C62, C65 and C66. The circuit is selective at approximately 1kHz with the component values given.

The audio amplifier is dc coupled throughout using a complementary pair in the output stage, a biasing transistor and a bootstrap network. The input impedance is high, hence the use of 100kΩ af gain control RV3. The input required for 1W output is 9mV, the total output for 10 per cent thd being 1·6W into an 8Ω load. The loudspeaker impedance should not be lower than 8Ω. The upper frequency response is limited by R64 and C70.

Stabilization of the varicap control voltage is controlled by TR9, D2 and associated circuitry. RV5 is the tuning control for the receiver, and R82 between the slider and low end of the potentiometer is selected to give a linear scale readout. The potentiometer itself should be a high-quality component, preferably using a moulded track and carbon brush for accurate resetability. It should be directly coupled to a proven dial drive assembly. The Electroniques SMD2 system with the dual epicyclic (6 : 1 and 36 : 1) is suitable for this application. Alternatively a 10-turn potentiometer can be used, coupled to a multi-turn dial mechanism, eg the AB Electronics 100kΩ potentiometer type 10VA-45, and Beckman "Duodial" 509-428 (46mm diameter). With this alternative system a calibration chart will be necessary, but a high degree of frequency setting resolution will be obtained. RV4 and RV6 preset the varicap voltage range limits.

Zener diode D3 supplies a stabilized 8·2V (nominal) to the local and carrier insertion oscillators and to the cio amplifiers.

While the receiver has been designed to operate from a

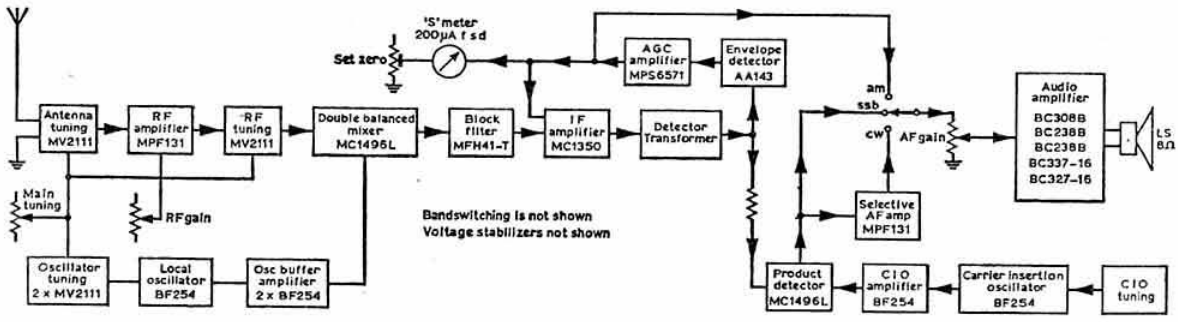


Fig 2. Block diagram of 1·8-3·5MHz receiver

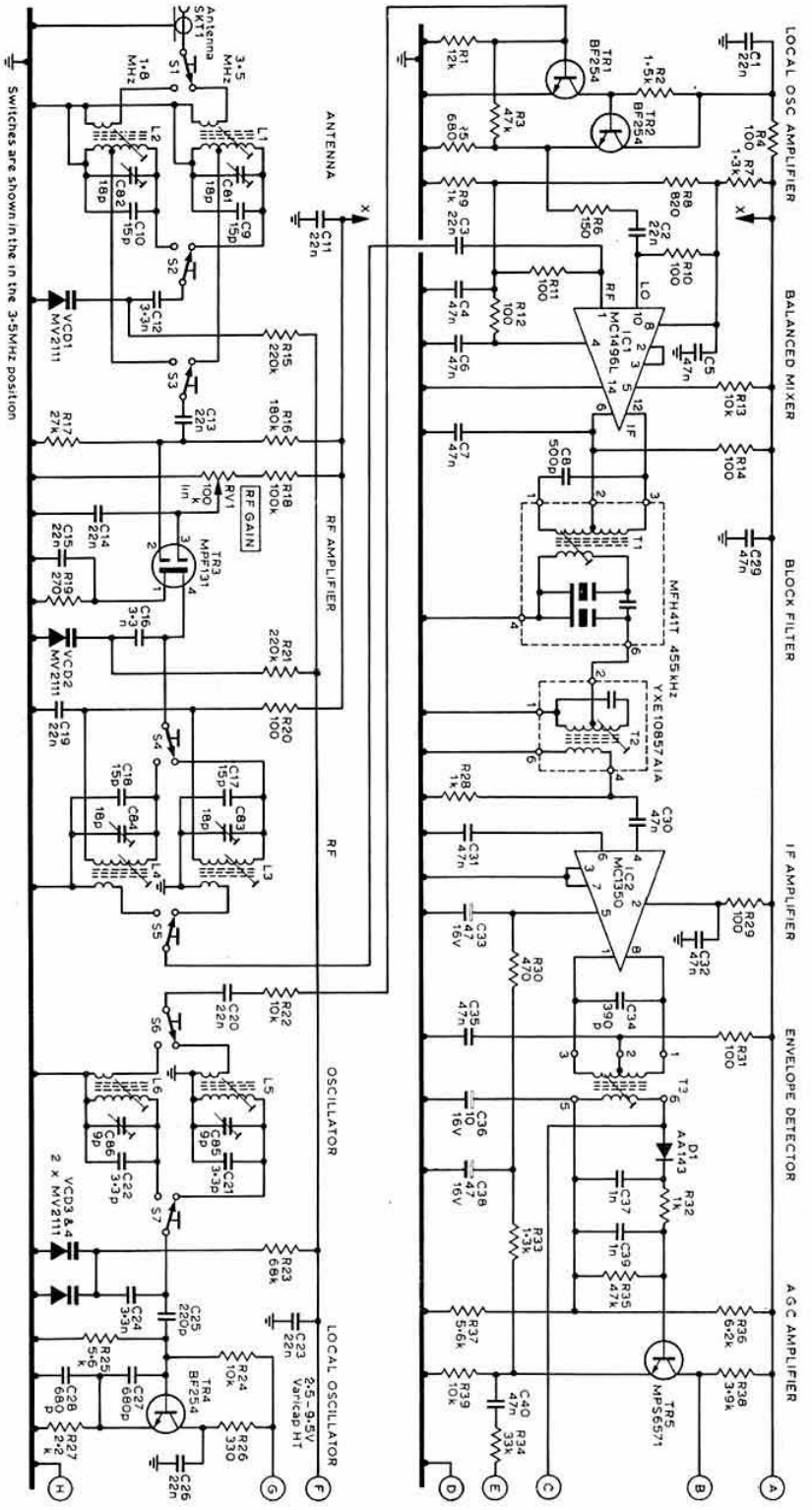


Fig 3. Circuit diagram of 1·8-3·5MHz receiver

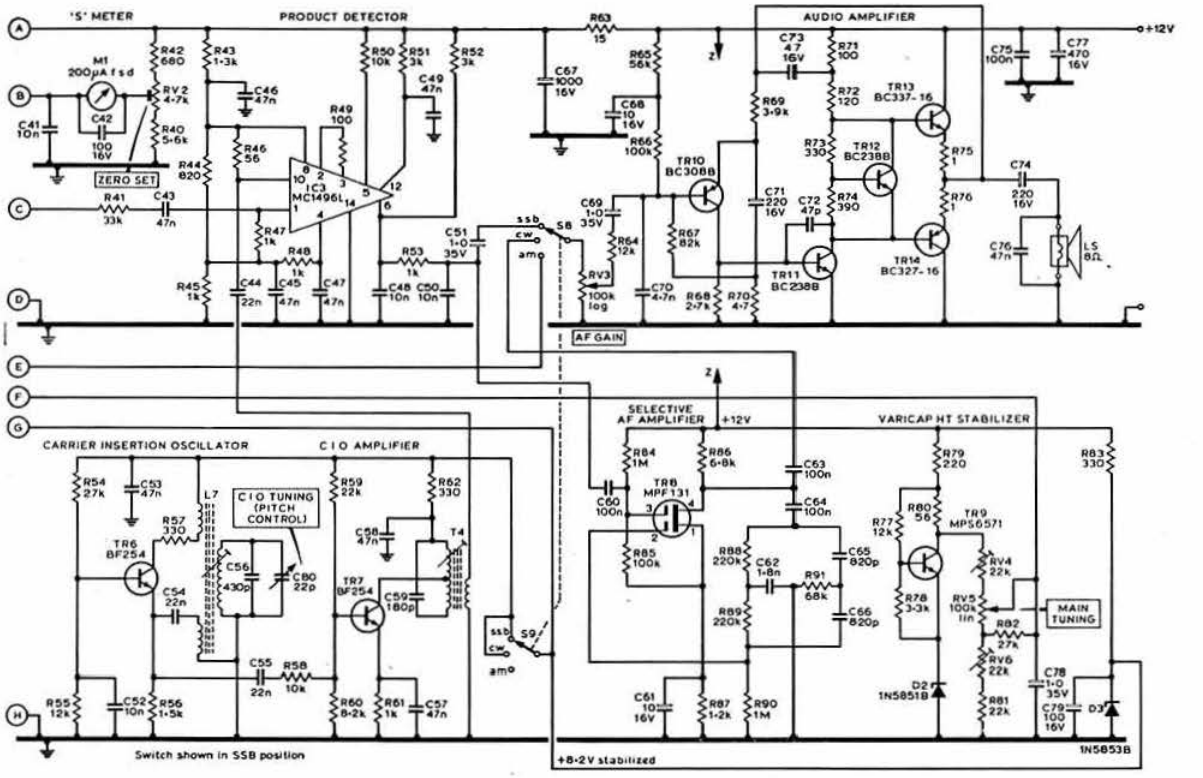
Table 1. Resistors

R1	12kΩ	R32	1kΩ	R63	15Ω
R2	1·5kΩ	R33	1·3kΩ	R64	12kΩ
R3	47kΩ	R34	33kΩ	R65	56kΩ
R4	100Ω	R35	47kΩ	R66	100kΩ
R5	680Ω	R36	6·2kΩ	R67	82kΩ
R6	150Ω	R37	5·6kΩ	R68	2·7kΩ
R7	1·3kΩ	R38	3·9kΩ	R69	3·9kΩ
R8	820Ω	R39	10kΩ	R70	4·7Ω
R9	1kΩ	R40	5·6kΩ	R71	100Ω
R10	100Ω	R41	33kΩ	R72	120Ω
R11	100Ω	R42	680Ω	R73	330Ω
R12	100Ω	R43	1·3kΩ	R74	390Ω
R13	10kΩ	R44	820Ω	R75	1Ω
R14	100Ω	R45	1kΩ	R76	1Ω
R15	220kΩ	R46	56Ω	R77	12kΩ
R16	180kΩ	R47	1kΩ	R78	3·3kΩ
R17	27kΩ	R48	1kΩ	R79	220Ω
R18	100kΩ	R49	100Ω	R80	56Ω
R19	270Ω	R50	10kΩ	R81	22kΩ
R20	100Ω	R51	3kΩ	R82	27kΩ
R21	220kΩ	R52	3kΩ	R83	330Ω
R22	10kΩ	R53	1kΩ	R84	1MΩ
R23	68kΩ	R54	27kΩ	R85	100kΩ
R24	10kΩ	R55	12kΩ	R86	6·8kΩ
R25	5·6kΩ	R56	1·5kΩ	R87	1·2kΩ
R26	330Ω	R57	330Ω	R88	220kΩ
R27	2·2kΩ	R58	10kΩ	R89	220kΩ
R28	1kΩ	R59	22kΩ	R90	1MΩ
R29	100Ω	R60	8·2kΩ	R91	68kΩ
R30	470Ω	R61	1kΩ		
R31	100Ω	R62	330Ω		

Table 2. Capacitors

C1, 2, 3, 11, 13, 14, 15, 19, 20, 23, 26, 44, 54, 55	22nF	±20%	100V	mf
C4, 5, 6, 7, 29, 30, 31, 32, 35, 40, 43, 45, 46, 47, 49, 53, 57, 58, 76	47nF	±20%	100V	mf
C8	500pF	±5%	100V	sc
C9, 10, 17, 18	15pF	±5%	250V	sc
C12, 16, 24	3·3nF	±5%	250V	sm
C21, 22	3·3pF	±5%	250V	sc
C25	220pF	±5%	250V	sm
C27, 28	680pF	±5%	250V	sm
C33, 38, 73	47µF	+80%, −20%	16V	e
C34	390pF	±5%	250V	sm
C36, 61, 68	10µF	+80%, −20%	16 V	e
C37, 39	1nF	±10%	100V	sc
C41, 48, 50, 52	10nF	±20%	100V	mf
C42, 79	100µF	+80%, −20%	16V	e
C51, 69, 78	1µF	±20%	35V	t
C56	430pF	±5%	250V	sm
C59	180pF	±5%	250V	sm
C60, 63, 64, 75	100nF	±20%	100V	mf
C62	1·8nF	±5%	250V	sm
C65, 66	820pF	±5%	250V	sm
C67	1,000µF	+80%, −20%	16V	e
C70	4·7nF	±20%	100V	sc
C71, 74	220µF	+80%, −20%	16V	e
C72	47pF	±5%	250V	sm
C77	470µF	+80%, −20%	16V	e
C80	22pF			
C81, 82, 83, 84	18pF trimmer			
C85, 86	9pF trimmer			

e = electrolytic, t = tantalum, sm = silver mica, sc = silver ceramic, mf = mylar film.



stabilized power supply of 12V positive, the performance is not adversely affected when powered by the battery in the author's car when operating mobile.

An ideal integrated circuit stabilizer which can be driven directly from a bridge or bi-phase ac rectifier and input capacitor is the MC7812, which is capable of delivering 1A (with correct heat-sinking) at a nominal 12V. The input capacitor should not be less than 3,000μF. The raw dc voltage should not exceed 24V or be less than 15V at the stabilizer input terminal.

The layout of the receiver is not critical although the well-proven straight-line layout is much to be preferred. The layout of the author's receiver is shown in Fig 4. It will be noted that the cio and amplifier are located as far as possible from the receiver input circuits. This minimizes possible spurious responses which can be caused by harmonics of the cio appearing in the receiver passband, eg the fourth harmonic is 1,820kHz which could cause interference to an incoming signal on top band at this frequency. The author's receiver employs a pushbutton for bandswitching to ease layout problems in this section of the receiver.

See Table 4 for details of the switches. Eliminating mechanical movement reduces frequency variations of the local oscillator: rotary switches may be used provided care is taken to prevent movement of associated wiring. The trimmer capacitors are the miniature solid dielectric type, and silver mica capacitors are used in the local and carrier insertion oscillator circuits, for optimum frequency stability. Details of components are given in Tables 1, 2, 3 and 4.

All the coils and transformers (except those used in the MFH41T) were handwound using Toko type 10EZ 10 by 10mm piece parts. The bobbin in these coils is actually a ferrite slug on to which the wire is directly wound. All the necessary data is given in Table 6. The windings are locked to the bobbins by melting the end of a stick of wax and

Table 3. Semiconductors

Circuit ref	Type	Make	Equivalents
TR1, 2, 4, 6, 7	BF254	Motorola	BF241 (ITT), BF194 (Mullard)
TR3, 8	MPF131	,,	40822 (RCA), 3N204 (Texas)
TR5, 9	MPS6571	,,	BC239 (ITT), BC149 (Mullard)
TR10	BC308B	,,	BC308B (ITT), BC158 (Mullard)
TR11, 12	BC238B	,,	BC238B (ITT), BC148 (Mullard)
TR13	BC337-16	,,	BC337-16 (ITT), BC337 (Mullard)
TR14	BC327-16	,,	BC327-16 (ITT), BC327 (Mullard)
IC1, 3	MC1496L	,,	uA796* (Fairchild)
IC2	MC1350	,,	ESM1350 (Thomson CSF)
VCD1, 2, 3, 4	MV2111	,,	BA111 (ITT)
D1	AA143	ITT	AA119 (Mullard, Thomson CSF)
D2	1N5851B	Motorola	ZF6P8 (ITT), BZY88C6V8 (Mullard)
D3	1N5853B	,,	ZF8P2 (ITT), BZY88C8V2 (Mullard)

* When the Fairchild uA796 version of the MC1496L is used, the pin numbering is not identical. See table below:

MC1496L	Pin	1	2	3	4	5	6	7	8	9	10	11	12	13	14
uA796	Pin	1	2	3	4	5	6	–	7	–	8	–	9	–	10

The uA796 is a 10-lead metal-can version of the 14-lead dil MC1496. The two ICs have identical electrical performance characteristics.

Table 4. Miscellaneous components

SKT1	BNC 50Ω
S1-S7	Made up from 2 × 6-pole 2-way push-button switch (Lisostalt or AB Electronics) with interlock latching bar, or alternatively 3 × 3-pole 2-way rotary switch wafers with intermediate screens (RS Components)
S8, S9	(Ganged) 2-pole 3-way rotary switch (RS Components)
M1	200μA fsd 1,500Ω internal R, calibrated S1 to S9+

Table 5. Semiconductor electrode voltages with supply voltage of 12V

(Measured under no signal conditions with RV1 at maximum and RV3 at minimum)

BIPOLAR TRANSISTORS

No.	Emitter	Base	Collector
TR1	0V	0·7V	5·7V
TR2	5·0V	5·7V	10·0V
TR4	2·2V	2·9V	8·0V
TR5	4·5V	5·2V	10·0V
TR6	2·0V	2·7V	8·0V
TR7	1·8V	2·5V	8·0V
TR9	6·8V	7·6V	10·5V
TR10	4·9V	3·9V	0·7V
TR11	0V	0·7V	5·6V
TR12	5·6V	6·3V	7·0V
TR13	6·3V	7·0V	12·0V
TR14	6·2V	5·6V	0V

MOSFETs

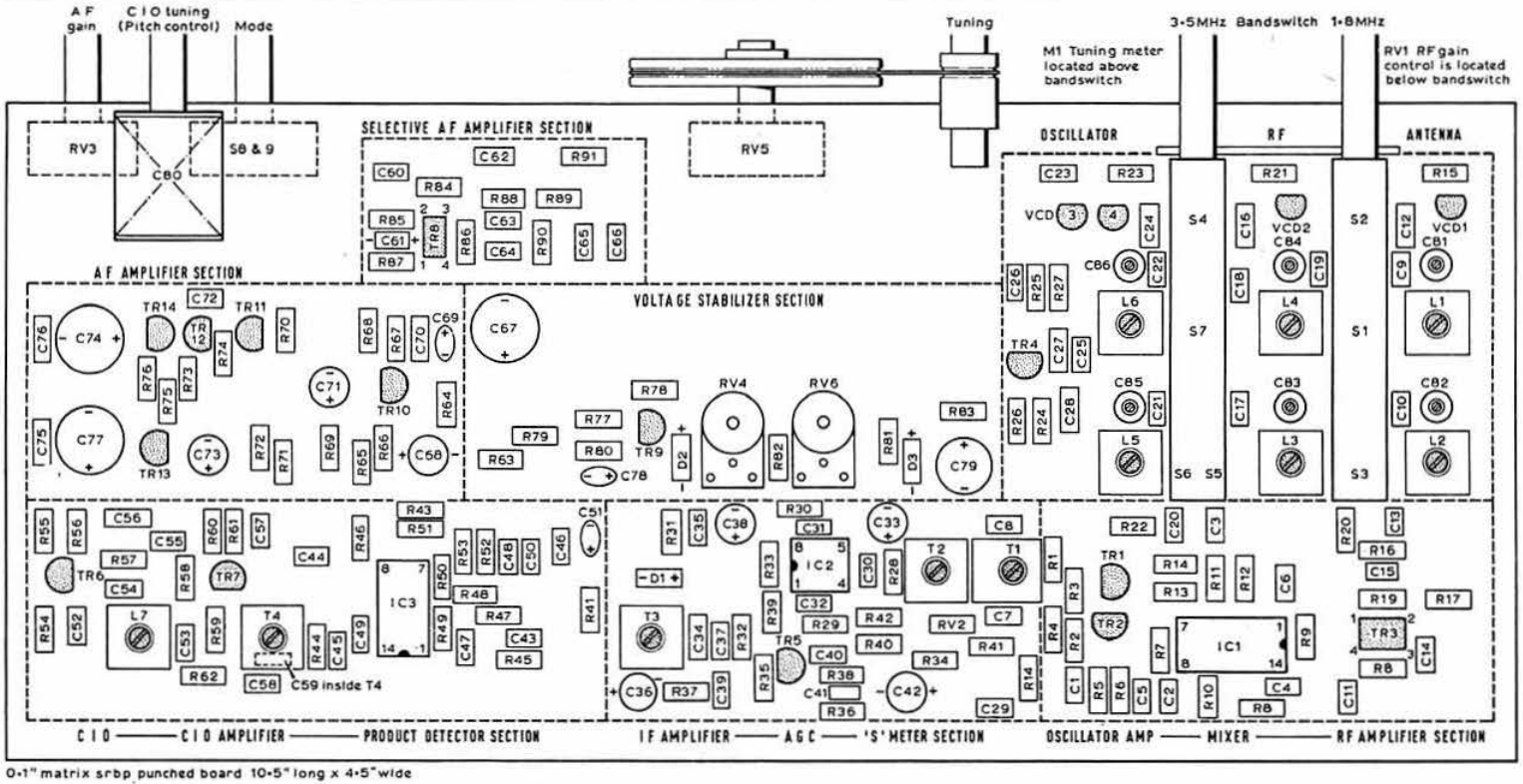
No	Source	Gate 1	Gate 2	Drain
TR3	2·2V	1·2V	6·0V	10·0V
TR8	0·5V	0V	1·0V	7·5V

INTEGRATED CIRCUITS

No	Pin 1	2	3	4	5	6	7	8	9	10	11	12	13	14
IC1*	3·4V	2·6	2·6	3·4	1·2	11	–	6·5	–	6·5	–	11	–	0
IC2	11V	10·5	0	3·2	4·8	3·2	0	11	–	–	–	–	–	–
IC3*	3·4V	2·8	2·8	3·4	1·2	8·5	–	6·5	–	6·5	–	8·5	–	0

Measurements taken with 20,000 Ω/voltmeter, -ve to ground/chassis.

* See note at foot of Table 3.



0·1" matrix srbp punched board 10·5" long x 4·5" wide

0 1 2 3 4 5 6 7 8 9 10 inches

Fig 4. Component location on 0·1 matrix srbp punched board (Veroboard)

Table 6. Coil winding data

(Coils and IFTs wound with 40swg solderable enamelled wire)

Coil	Ant wdg	Tuned wdg	Gate tap	IC1 input wdg	Em wdg	Col wdg
L1	3½	40½	6½*	—	—	—
L2	5½	70½	9½*	—	—	—
L3	—	40½	—	3½	—	—
L4	—	70½	—	5½	—	—
L5	—	20½	—	3½	—	—
L6	—	40½	—	5½	—	—
L7	—	85½	—	—	4½	9½

IFT	Tuned wdg	Det wdg	Col tap	IC3 input wdg
T3	122†	122	—	—
T4	116	—	50*	6

* = Tap turns measured from start of winding.
† = Tuned winding is centre-tapped.

A suitable type of wire is "Conysol Bond". Application of the soldering iron and flux cored solder automatically removes this insulation.

Each winding is wound clockwise from the start. The start of each winding is taken as the "cold" end and should be connected in situ to the "earthy" side of the coil of IFTs adjacent circuitry.

The Toko MFH41-T block filter and matching transformer, and the Toko type 10EZ coil piece parts are available from Ambit International, 37 High Street, Brentwood, Essex CM14 4RH.

allowing just sufficient drops of melted wax to fall on the winding (bees-wax is suitable for this application).

Setting up and alignment

The completed receiver should be checked for ht rail short circuits with an ohmmeter. Apply 12V and note that the current drawn is approximately 50mA (af gain control minimum, rf gain control maximum).

For measurements of output power and to align the receiver some form of output meter is required. It can be a ready-made device, or alternatively an 8Ω 2-3W resistor across the input terminals of an af voltmeter and recalibrated in watts will suffice ($W = \frac{E^2}{R}$). The meter should be connected across the af amplifier output terminals. An oscilloscope would be a very useful aid to monitor the output waveform.

I.F. alignment

Remove ht supply. Switch to a.m. mode. Connect a 1kΩ cf resistor between pin 1 of IC1 and chassis. Connect a signal generator between pole of S5 and chassis. Tune the generator to 455kHz and set the output level to 100μV with 30 per cent 400Hz modulation. Set the af gain control to maximum. Re-apply ht. Tune T3 and T2 (in that order) for maximum output. Very carefully retune the sg between 454 and 456kHz (the outside frequency limits of the filter) and leave set at the frequency which gives maximum output. Carefully, slightly readjust T3 and T2 to obtain maximum output *if* the i.f. is not exactly 455kHz. Do not adjust the core of T1. For those who are lucky enough to have a wobbulator covering 455kHz, the filter and transformers can be aligned for optimum passband/stopband shape. The wobbulator sweep generator should not exceed 20 sweeps per second for accurate resolution. On satisfactory completion of i.f. alignment, remove the ht supply and 1kΩ resistor.

Oscillator alignment

Before alignment can commence it is necessary to set RV4 and RV6 to give the correct varicap control end voltages. Reconnect the ht supply. Connect a high impedance voltmeter between junction RV4/RV5 and chassis. Set the tuning control to an extreme clockwise position. Adjust RV4 to give a voltmeter reading of 9·5V. Reconnect the voltmeter between the junction of RV5/RV6. Set the tuning control to an extreme anticlockwise position, and adjust RV6 to give a voltmeter reading of 2·5V. Repeat the above procedure, adjusting RV4 and RV6 until 9·5V and 2·5V respectively are measured when the tuning control RV5 is rotated to its extreme end positions.

Set the band switch to 1·8MHz and the tuning control to the lf end of the band. Inject a signal of 1·8MHz from the sg at a level of 50μV and adjust L6 until a signal is received. Inject a signal of 2·0MHz at the same output level from the sg. Set the tuning control to the hf end of the band. Adjust C86 until a signal is received. Repeat this procedure until each signal is received at its respective band edge.

Set the band switch to 3·5MHz. Set the tuning control to the lf end of the band. Inject a signal of 3·5MHz from the sg at a level of 50μV. Adjust L5 until a signal is received. Set the tuning control to the hf end of the band. Inject a signal of 3·8MHz. Adjust C85 until a signal is received. Repeat this procedure until each signal is received at its respective band edge.

RF alignment

Transfer the signal generator to the pole of S3. Set the bandswitch to 1·8MHz and the tuning control to the lf end of the band. Inject a signal of 1·8MHz at a level of 5μV from the sg. Adjust L4 for maximum output. Set the tuning control to the hf end of the band. Inject a signal of 2·0MHz. Adjust C84 for maximum output. Repeat this procedure to give maximum output from each signal at the band edge.

Set the bandswitch to 3·5MHz and the tuning control to the lf end of the band. Inject a signal of 3·5MHz at a level of 5μV from the sg. Adjust L3 for maximum output. Set the tuning control to the hf end of the band. Inject a signal of 3·8MHz. Adjust C83 for maximum output. Repeat this procedure to give maximum output from each signal at the band edge.

Antenna alignment

Transfer the signal generator to the antenna socket. Using the procedure for alignment of the rf section, align the antenna section. Adjust L1 and C81 for maximum output at 3·6 and 3·8MHz respectively. Adjust L2 and C82 for maximum output at 1·8 and 2·0MHz respectively.

Functional tests

At this stage the receiver should appear very sensitive and a measurement of noise limited sensitivity can be made. Reduce the signal level to 2μV from the sg at a frequency of 1·8MHz. Remove modulation after noting output level. The output level should fall by >10dB. Repeat this procedure at 3·5MHz.

Checking operation of the rf gain control is simple. Tune the receiver to 3·5MHz, inject a signal of 3μV at this frequency and note the output level. Turn the control to minimum. The signal level will need to be increased by at least 30 × (30dB), ie 60μV, to give the same output level.

The operation of the agc system and the S-meter can be checked simply by varying the signal level input from the sg. It will be necessary to recalibrate the meter to give a logarithmic readout of "S" points on the scale.

Operation

Turn the mode switch to ssb. Inject a signal of 3·5MHz at a level of 5μV to the antenna socket (with the sg modulation switched off). Set C80 to mid-position. Adjust L7 for zero beat signal. Reset C80 to give a beat frequency of approximately 1kHz. Adjust T4 for maximum audio output. Swing

C80 to each side of zero beat and check for equal pitch change at minimum and maximum capacitance.

Turn the mode switch to cw. Rotate C80. At approximately 1kHz beat frequency there will be a very apparent increase in audio output. The receiver will appear to be in an unstable condition; in fact the effect is caused by the narrow peak, generated by the frequency selective amplifier.

The receiver is now ready to be air tested. Connect the antenna (via an atu) and an 8Ω loudspeaker to their respective sockets.

Reception of a.m. signals is straightforward. Due to the sensitivity of the receiver it will be operated mainly with the rf gain control at half setting. This applies particularly to 3·5MHz ssb signals. The pitch control (C80) should be set on the lf side of the i.f. passband for correct resolution of the ssb signals, by approximately 1·5kHz from the i.f. centre frequency (due to sideband inversion in the mixer).

Reception of cw signals requires a little practice due to the high selectivity provided by the selective audio amplifier.

Performance

The receiver has been redeveloped from the original, using stage by stage analysis, thus giving the author detailed information at each stage of the improvement programme. It has been operated in the shack and under mobile conditions and has given a very satisfactory performance.

The frequency stability of the oscillators is of sufficiently high order for their use in driving a balanced modulator and transmitter mixer in the exciter portion of a transmitter. It is only necessary to select two MFH41T filters with the same centre frequency for correct "transceiver" operation.

The receiver will accept signal levels up to 100mV at the antenna socket (with the rf gain control at mid-setting) and the measured image signal rejection ratio is 46dB or 60dB via the station atu.

The agc range is 60dB for 10dB change in output (96dB with the use of rf gain control). The S-meter will indicate S1 for 1μV and S9 for 20μV input, at which level (and above) maximum i.f. gain reduction occurs. On a.m. 1μV signal level will give a s + n: n of 10dB approximately (30 per cent modulation of carrier), on ssb 1μV signal level will give a s + n: n of 20dB approximately referred to a "pitch" frequency of about 1kHz.

Construction

The receiver circuit, apart from the af/rf gain pitch, tuning controls and mode switch, is built on "plain" 0·1in matrix Veroboard measuring 10·5 by 4·5in. The component lead-out wires and, where necessary, additional wire (26swg) "simulate" the printed wiring on a pcb. This technique gives the builder a large degree of flexibility in the placing of components and allows for any subsequent circuit modifications, without the expense of producing modified PCBs. External connections are made by Veroboard pins.

Earth wiring impedance is kept to a minimum by paralleling braid with this wiring. The oscillator components are held rigidly to the board with rubber solution. The layout should, of course, be finalized and the circuit checked for correct operation before applying the solution. The pcb is supported by a metal framework which also provides a firm location for the receiver controls and scale assembly. The S-meter is located to the left of the scale.

Acknowledgements

The author would like to thank Andy Holloway, G3VUQ (at present ZS6BNU) and Dave Wright, G4FBW, for their valuable assistance in building and testing the receivers, from the original to the present design. □

A multimode transceiver

(Continued from page 773)

IC11 followed by IC10 and IC13. IC11 is merely to provide gain but IC10 and IC11 are high-performance limiting amplifiers with symmetrical limiting. The signal emerging from this limiting amplifier preserves its phase information but has had practically all amplitude variation removed from it.

Such a clipped signal is rich in both harmonics and intermodulation products—so it is immediately filtered in another 2·4kHz bandwidth filter, F1, which removes both but reintroduces some amplitude variation.

The above system is used to process all signals which are to be transmitted, in whatever mode the transmitter is operating. However, if a cw signal is being sent, the first 2·4kHz filter, F2, is replaced with a 500Hz filter, F3, to ensure that a single tone is applied to the clipper. After the second filter, however, different modes are processed in different ways.

Single-sideband and cw signals are amplified in a two-stage linear amplifier, applied to a 12kHz filter to remove noise and sent to the mixer via the transmit buffer.

A.M. and fm modulators

When the transmitter is operating in a.m. or fm mode the clipped ssb is demodulated in product detector IC6 to yield clipped audio, which is then applied to the a.m. or fm modulators. The ssb clipping produces audio with a slightly artificial sound which, however, is not unpleasant under strong signal conditions, and is particularly easy to copy through noise.

The a.m. modulator is another SL1640, IC5, with carrier leak deliberately introduced so that the output is a.m. rather than suppressed carrier dsb. This modulator is used both in the a.m. and fm modes, but in the fm mode no signal is applied to the signal input and the output is an unmodulated carrier. In each case the output is amplified, filtered in the 12kHz filter, F4, and sent to the transmitter via the transmit buffer and the mixer.

In fm mode the circuit transmits an unmodulated carrier. Frequency modulation is performed off the board by using the processed audio to modulate the transceiver vfo during transmission.

The carrier on a.m. and fm is not, as one might expect, 9MHz. There is only one carrier oscillator on the board and it is used during transmission to produce clipped ssb. It is therefore working at 9,001·5kHz or 8,998·5kHz, depending on the position of the sideband selector. The a.m. or fm carrier is at the same frequency.

Buffer amplifiers

The buffer amplifiers used between the various parts of the transmitter are simple transistor or fet circuits.

To be concluded next month

Further notes on the DSB1 Mk2

by E. ELSLEY, G3YUQ*

SINCE the publication of the above article in the July 1977 issue of *Radio Communication* a number of queries have arisen, and these are dealt with below.

First, a reference was given in the text to page 333 of the third edition of the *Radio Communication Handbook*. This refers to a section on dsb *not* power supplies as indicated.

Several requests have been received for details of a power supply, and Figs 1, 2 and 3 give details of a suitable unit. Construction should present no problems, but the following points should be observed. Be sure to use a double-pole switch on the mains side of the transformer and fit an indicator lamp as shown in Fig 1. They add little to the cost and may prevent a nasty shock.

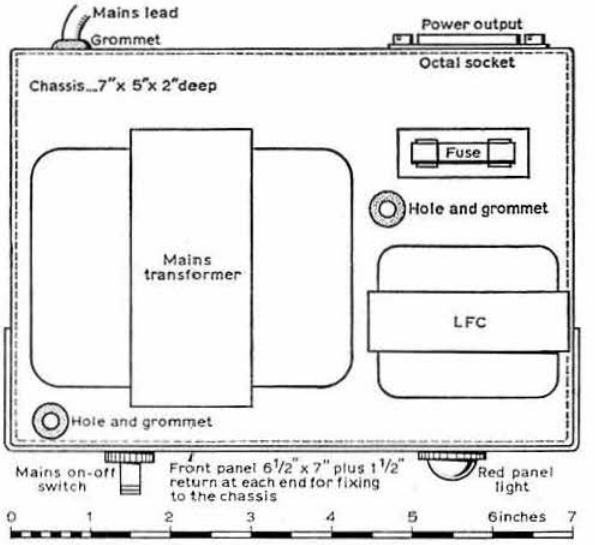


Fig 2. Chassis layout

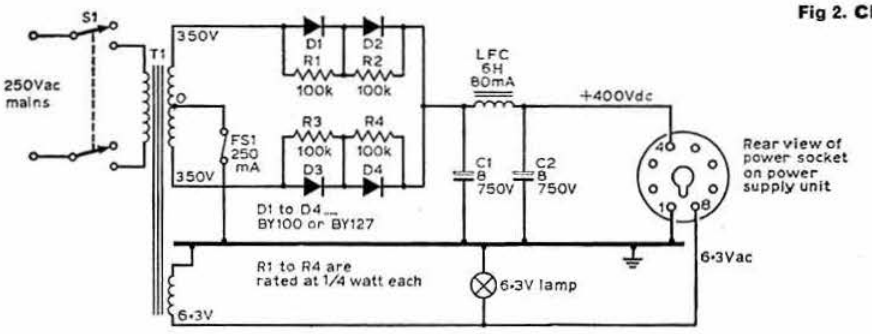


Fig 1. Circuit diagram

The output from the unit is best taken from an octal type socket (valve base) at the rear of the unit. An octal plug and lead can then be taken to the transmitter. Do not wire the 400V and 6·3V next to each other; Fig 1 gives suggested connections. Make sure that the diodes and electrolytic capacitors are connected correctly. Test the unit with a voltmeter before connecting to the transmitter; pin 4 and earth should give 400V dc, and pin 8 and earth 6·3V ac.

The modulation transformer caused a few comments. The author mentioned in the article that a mains transformer may be suitable but had not been tried, but since publication a number have been tried. They *all* work, giving varying outputs. A small 250V primary 350-0-350V secondary was the best, although any transformer having secondary windings of between 250-0-250V and 400-0-400V should be suitable.

A suggestion was made that mains transformers are not suitable as modulation transformers. This is generally so due to the high currents involved; however, in the DSB1 the current drawn by the modulator is quite low and the problem does not arise. If a valve type interstage push-pull driver transformer can be obtained so much the better. Most amateurs

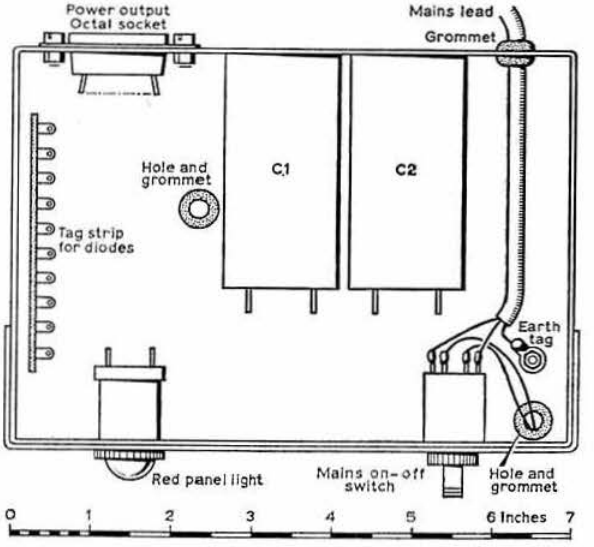


Fig 3. Under-chassis layout

*14 Studley Road, Wootton, Beds.

Components list

T1 250V primary 350-0-350V sec 80mA
S1 2-pole 2-way toggle
FS1 250mA
R1, 2, 3, 4 100kΩ ½W
D1, 2, 3, 4 BY100 or BY127
LFC 6H 80mA
C1, 2 8μF 750V electrolytic
Lamp 6.3V red
Octal valve base and plug

have one in their junk box so a request at the local club may produce one.

One letter mentioned that the pa valves would have the full ht on the cathodes when in the net position and so lead to failure of the valves. As noted in the original text, the rig has been in use for a number of years with no valve failures to date—even when running the 5763s at 600V (note the higher voltage has not been tried with other valve types).

Modifications

A number of requests have been made for information on using the rig for cw. This can be done by inserting a closed-circuit jack socket (the type that shorts itself when the plug is withdrawn) between S1b and earth as shown in Fig 4. With the transmitter in the tune position and the microphone removed the rig can then be used for cw. *Note:* the key would need to be held down or removed to tune the transmitter. Netting is done in the normal way. To increase the output on cw reduce the value of R19 to about 5kΩ.

A couple of modifications have been made to the modulator. It was noticed that upon switching off the ht a noise could be heard in the receiver. This was traced to C27, the 8μF electrolytic capacitor on the speech amplifier, discharging, and was cured by disconnecting R12 and R14 from the ht rail and connecting them *directly* to the 400V ht supply, *not* via ht switch S4. This leaves the speech amplifier running continuously and eliminates the problem. A second modification is to change the value of R18 to 1·2kΩ. This gives a slight improvement to the audio quality.

Comments on the air have always been favourable, but a low-pass filter having a cut-off frequency of 3kHz may help in reducing the bandwidth of the signal. This has not been tried and the author would be interested to hear from anyone trying this or any other modification to the design.

A request was made for details of an antenna tuning unit.

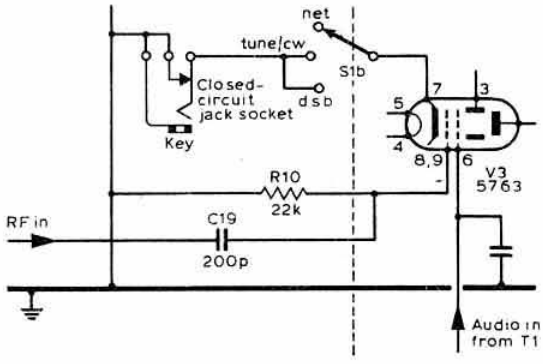


Fig 4. CW modification

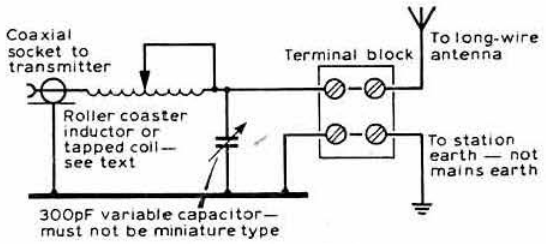


Fig 5. L-network atu

The author uses an L-network as shown in Fig 5. Roller-coaster inductors are not readily available and can be replaced with a coil having 40 turns of 20swg enamelled wire on a 1½in to 2in diameter former (plastic drainpipe will do). Tap the coil every couple of turns or so, and use a switch or crocodile clip to select the required tapping. This can be found by adjusting for best signals on the receiver. The unit will then be just right for the transmitter. *Note:* **do not** adjust the tappings when the transmitter is radiating as this can cause a nasty rf burn: switch off the ht first.

Acknowledgement

The author wishes to thank all those amateurs who have written to him and helped with comments over the air, and he will endeavour to help anyone with any queries regarding the transmitter (sae, please). He also wishes to thank Mr H. H. Davey, BRS20358, who supplied most of the components for the transmitter. □

NEW PRODUCTS

FT101 components

Early models of the FT101E do not have a front panel level control for the speech processor and it is necessary to open the lid of the set in order to make any adjustment. The International FT Club (USA) has made available a modified 5kΩ potentiometer which fits in the loading control position on the front panel of the FT101. The rear section of this controls loading while the front section controls the output level of the speech processor of the FT101E or the G3LLL internal clipper. This potentiometer is now available from Holdings at £6.25 inc VAT and postage.

Also available from the same source are spare epicyclic drives for the FT101/FT401 at a cost of £1.75 each or two for £3 inc VAT and postage. Holdings, Mincing Lane, Darwen Street, Blackburn (tel 59595).

Elpower batteries

A lead-acid battery with solid-gel electrolyte designed as a rechargeable replacement for the lantern battery is now available from Pulsar Developments Ltd. Said to be capable of being charged and discharged at least 300 times, the Elpower 640 is housed in a high-impact polystyrene case and warranted against leaks. The cost of a single battery is £7.45 delivered.

Details of the range of Elpower rechargeable solid-gel batteries are available from Pulsar Developments Ltd, Spracklen House, Dukes Place, Marlow, Bucks (tel Marlow (06284) 73555).

swl news

Bob Treacher, BRS32525 *

News from abroad

It was very pleasing recently to receive two letters from exotic countries far away. First, ZF1AK, Alan, wrote after seeing Dave Sharred's comments in the June issue. Alan has not yet received a card from Dave but invites him to send another one air mail (Box 1029, Grand Cayman, Cayman Islands, BWI) and he will be happy to confirm. He also refers to John Allaway's reference to the issue of ZF2 calls, and points out that ZF1 calls are still issued to Caymanians and Commonwealth citizens but that ZF2 calls are now issued to aliens, which makes Alan's job a lot easier as he is the local QSL bureau. Cards pour in for American expeditions which have operated from ZF1, and Alan simply has to send them to the respective bureau in the USA, thus causing more delay. Next year it is hoped to show the home callsigns of those operating from ZF1 for short periods. This will cause less delay and confusion all round.

The second dx letter was from TT8SM, Jack, who wrote commenting on the mention in the June issue regarding the pile-ups on him. He agrees with Neville Spry's comments wholeheartedly and has even had to resort to keeping a banned list in his shack. It is a real shame when such courses of action have to be taken, but amateurs in some European countries just never seem to learn! Jack points out that he can work EU at any time and his troubles usually start when he is working an American pile-up. His main operating schedule into Europe is between 1800 and 1930, so those needing TT8 now have some first-hand information, although I do not have any information on his preferred QRGs.

News from the home front

Congratulations are due to Dave Sharred who is now G3NKC (obviously a re-issue—more information please, Dave). Someone else will now be after Dave's 1·8MHz crown. Noel Phelps, BRS35608, seems the most likely candidate. Dave's final heard total on 1·8MHz was 61, and his aim now is to work them all—which I suspect will not be quite as easy! Noel has written this time with an updated score but has no startling exotic cw dx news.

Several new correspondents again this time. First, Peter Lee from Solihull (a very popular swl outpost) who has been an swl for nearly two years. He mainly listens to 1·8 and 144MHz, and gets very good reception through GB3SN on R5. Nigel Golds, BRS36910, sends a table score which he has amassed using an AR88D and a long wire. Des King, BRS38960, from Bedford, uses an FRG7, purchased last October at the Leicester Exhibition. He is also interested in 144MHz and also listens via Oscar. As his xyl comes from West Berlin he was particularly pleased to receive a QSL from DC7HM for a heard Oscar QSO. David Lloyd, ARS37790, is our fourth new boy. He is a keen hf swl mainly listening on 14MHz ssb. Recent entries in his log include A9XBD, K5CO/5A, KL7IVO, VS5DM, 9L1NP and 9Y4NP.

* 392 Rochester Way, Eltham, London SE9 6LH.

1977 HF Countries Table

Station	10	15	20	40	80	160	Total	Mode
BRS35608	86	160	185	156	96	35	718	cw
BRS17567	76	163	227	69	117	5	657	ssb
BRS38876	54	133	174	100	115	41	617	ssb/cw
BRS35454	73	144	197	61	94	17	586	ssb/cw
BRS35943	63	129	188	77	101	10	568	ssb
BRS32286	65	143	162	57	110	4	541	ssb
A8841	47	132	209	41	64	0	493	ssb/cw
ARS37223	5	140	163	57	83	15	463	ssb
BRS25901	33	84	173	66	76	13	445	ssb
A9191	39	112	156	32	50	0	389	ssb/cw
BRS38356	34	99	138	39	58	0	368	ssb
BRS37583	31	76	108	43	53	4	315	ssb
BRS37782	27	78	103	26	52	5	291	ssb
BRS37884	24	46	76	36	70	2	254	ssb
A9107	16	27	105	13	30	1	192	ssb
A8837	24	43	74	17	11	0	169	ssb
ARS38280	15	41	62	17	25	1	161	ssb
BRS20185	12	50	78	11	9	0	160	ssb
ARS37790	0	24	78	18	20	2	142	ssb
A9199	21	41	47	17	11	2	139	ssb
BRS37587	2	16	32	23	55	4	132	ssb
BRS36910	8	22	67	3	6	1	107	ssb
A9098	5	11	48	14	20	3	101	ssb
BRS38940	2	13	69	2	2	1	89	ssb

All-time Countries Table

Station	10	15	20	40	80	160	Total	Mode
BRS32525	191	257	278	186	224	25	1161	ssb
BRS17567	228	260	307	129	216	16	1156	ssb
BRS25901	197	269	308	179	182	16	1151	ssb
BRS35943	135	227	266	172	203	18	1021	ssb
BRS38876	74	189	233	150	181	61	888	ssb/cw
BRS32286	96	195	225	75	172	4	767	ssb
BRS35454	79	183	246	95	137	20	760	ssb/cw
A8841	63	153	253	50	99	0	618	ssb/cw

Of our more regular reporters, Robert Small, A8841, seems to have been the most active. Conditions on the hf bands have improved and he has heard TY, 9U, 3V8, VR6 and 5A for five new countries, all on 14MHz. Conditions on the lf bands have seen their customary summer decline, but by the time this piece appears 3·5MHz in particular will be seen to be a little livelier, especially during the early morning hours around sunrise. Robert has heard many exotic callsigns recently including J28AC, ZK1BA, 9M6MA, HS0SEA, OF1AJ/OJ0 and XP1AB (Greenland). Best QSL received was from VE3FXT/S8.

Nick Jarman, ARS38280, sends an updated table score, which is considerably larger thanks to G4FTM who loaned Nick his TS510. Crosbie Rodgers, BRS32286, is finding his secretarial duties at the local club are eating into his listening time and therefore does not have much to report. He has, however, been on 144MHz quite often and was rewarded by hearing a sporadic-E opening, his best dx being Hungary.

Stuart Hammond, BRS37583, is preparing for the 7MHz RSGB contest in October and hoping for a good position. 7MHz is a very good band, where dx is possible over a large segment of the day—if conditions are right—and it will be pleasing to see an increased entry this year in both events.

Dave Brooks provides his BRS number this time—38356. Studying for the RAE and other examinations has precluded Dave's listening habits of late. However, he is hopeful things will change in the near future. Ken Steele, BRS36883, writes with a list of countries confirmed, while H. Squance, BRS37884, comments on superb 14MHz conditions between GI and Central and South America during the late evening hours.

Letters are acknowledged from As 9199, 9191, 9098 and BRS39154, also from BRS37782, BRS17567, A9107 and BRS35943 whose letters were received after the deadline.

That, I am afraid, is that until next time. Comments, news and scores to reach your scribe at his home QTH, please, by 26 October. □

technical topics

Pat Hawker, G3VA

THERE is a common but misleading belief that miniaturization and true portability of communications equipment really began only with the coming of semiconductors and space satellites—possibly to try to boost the importance of "spin off" from space research. This ignores the tremendous amount of work done on compact radio equipment since the very earliest days leading, for example, to the miniature 2MHz receivers carried in police *helmets* in Brighton in the 'thirties; the wartime proximity fuse; short-range hand-held military equipment such as the American SCR536; and the clandestine hf transmitter-receivers and uhf S-phone transceivers used in the secret radio war of 1939-45.

Wartime portability

There was, for instance, the MCR1 miniature communications receiver made in large numbers by Philco for ISRB (SOE/Special Forces) and possibly the first British equipment to use the miniature 1·4V battery valves developed in the USA in the early 'forties and widely used in post-war portable broadcast receivers. This set was sufficiently robust to survive being "dropped" from aircraft.

The 450MHz S-phone super-regenerative walkie-talkie was the 1941 brain-child of Bert Lane who, I believe, was a pre-war amateur working at Masteradio before joining SOE. On the Intelligence side there was SIS's very effective Mark VII transmitter-receiver in its little metal box with hinged lid. It had an 0-v-1 regenerative receiver using two 6SK7 metal valves and a keyed 6V6 crystal-oscillator; it was a good deal smaller than the well-known and relatively bulky B2 suitcase set of SOE, though it had less rf output. When not in use, the valves were removed and clipped into the lid, saving a good deal of valuable space. Much of the weight was in the two separate compact power units; one for mains supplies, the other a vibrator pack for use with car batteries.

It seems a pity that the attache-case Mark VII, which clearly owed much to pre-war amateur techniques, is not even mentioned in the very incomplete list of clandestine radio equipment in M. R. D. Foot's excellent but rather SOE-orientated recent book *Resistance*; nor does it seem to figure in any of the museum collections of wartime equipment. Yet many of these units went into the field and carried a good deal of traffic between Western Europe and the UK during 1942-4 for Intelligence and the "RF Section" of SOE, etc. And there were other, even smaller, equipments despite the non-availability of transistors.

I remember, for example, a Dutch Resistance man showing me a tiny, mains-operated hf receiver which he had built himself in occupied Holland. This was entirely in one small tobacco tin and survived at least one spot search on a train (he took it out of his pocket and pretended to be lighting his pipe). It used the old "Acorn" range of valves which, after all, were not much bigger than an rf power transistor in a medium-sized heatsink, though of course they did need heater power. The set was complete with tiny "mains" transformer (actually wound on an af transformer core) and performed quite well around 7MHz.

Portable power

In fact the main problem with portable operation, now as then, is not so much the size of the basic radio equipment, as the size, weight and cost of power sources. John Brown, G3EUR, has told me that ISRB at St Albans investigated many methods of charging batteries, including bicycle generators (widely used also for SIS equipment), wind generators, even portable steam-driven generators and thermo-couple chargers. One of their more successful efforts was the "beach chair" pedal generator in which one sat in a lightweight metal folding deck chair (which was carried as part of a back pack) and then pedalled like mad.

Many of these techniques are being revived in the current search for alternative technology to meet the coming energy crisis, although we did not then have any of the solar cell panels that are already finding many applications in powering telecommunications equipment (and even some low-power television broadcast relay stations) in places remote from the nearest mains supply.

Jack Toothill recently sent me a clipping from *Motor Boat & Yachting* (September 1977) about the new, low-cost automatic radio beacon installed on the Chichester Bar which transmits the call-letters "CH" continuously on 303·4 kHz and is receivable over a range of about 10 miles; this uses an RAE-developed solar cell panel about 1m square.

Silicon solar cells are still, as energy converters, only about half as efficient as their theoretical limit of 25 per cent (ie about 10-12 per cent). Higher efficiency cells (better than 20 per cent) have been made using gallium arsenide instead of silicon. Unfortunately all solar cell arrays are still expensive for amateur radio use, although new manufacturing techniques promise to reduce the cost before long.

At present those amateurs seeking freedom from mains or the increasingly costly primary batteries generally seem to be drawn towards wind generators. Quite a spate of articles on various aspects of these devices is appearing in amateur journals in many parts of the world; it is a system that has a lot going for it—except portability.

There is thus still much interesting work to be done on the development of compact portable radio equipment capable of communicating over hundreds of miles without the assistance of repeaters (though accepting that a repeater is in fact an excellent technique for low-power portable operation). But it is important to think in terms of the *complete* station—radio receiver/transmitter, power source, earpiece, antenna, antenna support etc—rather than buying a microscope to build a transceiver that fits a thimble but still needs a large heatsink, petrol-generator and three-element beam to get the message through.

Plus or minus?

This little dodge can perhaps best be put into the "Russian tricks with diodeski" category, though equally it could find uses other than just a party trick to show members of the local club. It comes from the technical abstracts columns of *Radio* (No 5, 1977). As indicated in Fig 1 five light-emitting and two conventional diodes can be neatly arranged in a probe or static display to show a positive (+) or negative (−)

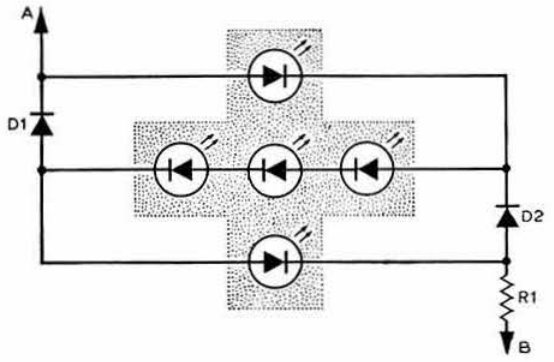


Fig 1. Making use of the "diode" characteristics of light-emitting diodes to provide a plus (+) or minus (—) display from a matrix of five leds and two conventional diodes for current steering

when connected appropriately. Since the current passes through five of the seven devices with each polarity, the appropriate resistor R1 can be chosen to give roughly equal brightness for either symbol.

As a party trick one could offer a prize to the person who first draws the circuit diagram correctly, but make sure they are not readers of *TT* or *Radio* or (I guess) various other journals!

As a probe it would be useful with those ic power units that provide plus and minus rails around a common earth rail, or for some bi-phase digital codes.

D-I-Y general-purpose connectors

Les Mitchell, G3BHK, notes that most amateurs have a range of radio and electronic equipment and find themselves faced with a seemingly endless range of different plugs and sockets. When it comes to making interconnections, this variety, at best, delays the proceedings for those not anxious to spend a small fortune by standardizing on one of the commercial connectors.

He has overcome the problem in a simple, effective yet low-cost way, as shown in Fig 2. His connectors are fashioned from off-cuts of the widely-used terminal blocks, with "plugs" formed from brass or copper nails of suitable size with the heads cut off. He writes:

"By using these connectors, which cost around 10p each, you can match any cable to any other. I mark the screws to be loosened or tightened by dabbing a hot soldering iron on the side of the terminal block adjacent to the screw involved. Perhaps an even better system would be to cut off some of the plastics sleeves above these screws in order to indicate the ones needing a screwdriver to make or break the connections.

"The only safety point to watch is that on the output connector from a power unit the positive side ends in a 'non-nail' connection, with the nail making the negative connection.

"I have found this a most useful dodge; for instance if you have a pair of headphones with a large jack plug that will not fit a receiver having a small socket, it is possible just to break this connector and fit the lead to a small jack plug in a matter of seconds. Or again, one power unit will connect to any of a number of units each with their own different socket arrangements.

"I have found it a real boon to the experimenter."

But note that from the viewpoint of safety it may not be advisable to use the same type of connector for low and high voltages.

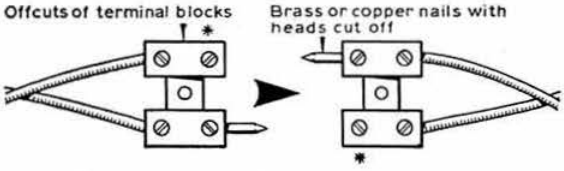


Fig 2. G3BHK has found these home-made "connectors" made from terminal strips a convenient answer to the many different types of plugs and sockets used today. The screws marked * indicate the ones to be loosened or tightened, see text

Division factors and the CD4060

Cedric Marshall, G3YRN, comments on the cmos crystal-controlled toneburst unit described by T. Davies, GW4ADL (*Radio Communication* August 1977). He notes that it is possible to exploit even more fully the CD4060 cmos ic as a frequency divider by using the selective feedback technique described in *TT* (November 1976, see also correction in *TT* July 1977) for the standard ttl SN7490 decade divider ic. He writes:

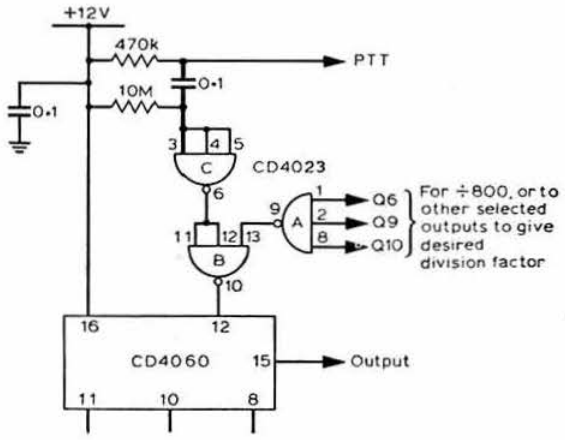


Fig 3. G3YRN's method of modifying a CD4060 crystal toneburst circuit for crystals other than 1,750Hz × 2^n. Note that from inspection of the timing diagram, one or more of Q6, Q9 and Q10 will always be low up to count 799. At count 800 all three go high and the output of gate A will go low. This drives the output of gate B to high, resetting the CD4060 to zero and so restarting the count. Gate C is used as an inverter to retain the same operational sense of the ptt control circuitry. The other connections to the CD4060 are as shown in the article by GW4ADL (August issue)

"This technique is equally applicable to a multi-stage binary counter such as the CD4060, except that external gating will usually be required. I happened to have a 1,400 kHz crystal; this required a division factor of 800 to achieve 1,750Hz output and proved possible by using the arrangement shown in Fig 3.

"Many other division factors are possible by connecting

the nand-gate inputs to the appropriate Q outputs of the CD4060, ranging up to 16,384 which is the unmodified division at the Q14 output. Thus one CD4060 (or similar device) plus a gating-ic can replace chains of several decade counters."

The classic inverted-L antenna

In February 1971 we included a couple of items in *TT* about end-fed and quarter-wave inverted-L antennas, one of which had then been used for about 2½ years on 3·5MHz by Geoff Scholey, G3CDR; a trial that had convinced him that this classic arrangement still possesses a number of useful features. In fact several other mentions were made of the dual- or cross-polarization feature of the inverted-L and similar forms of antennas, and the apparent benefits this could provide.

It was therefore enlightening, if a little *deja-vu*, to find (*QST* April 1977) a full length article by Richard A. Lodwig, W2KK, on the inverted-L antenna. In his case he uses a coaxial-fed dipole bent at 90° so that there is a λ/4 vertical section and, at the top, a λ/4 horizontal leg. Rather optimistically the author suggests this is a "novel" arrangement.

Signal levels received from 7MHz stations by W2KK

Antenna type	Local stations (less than 1,000 miles)	Distant stations (over 2,000 miles)
Horizontal dipole (λ/4 high)	"Reference"	"Reference"
λ/4-monopole (12 λ/4 radials)	—8dB	+2dB
(no radials)	—10dB	—4dB
λ/2-vertical dipole	—15dB	+9dB
Inverted-V (0·2λ-vertex height)	—3dB	+3dB
Inverted-L	—2dB	+6dB

On 7MHz, averaging out a considerable number of tests on incoming a.m. (broadcast?) signals he tabulates the results as shown, though it should not be too readily assumed (reciprocal theory notwithstanding) that the results would equally hold good for transmission. For instance the λ/2 vertical (which shows up very well in his results) *can* be good on transmission when erected over highly conductive soil and well clear of nearby vertical "conductors" such as trees, metal drain pipes, etc but is recognized as being rather temperamental in other circumstances.

Over-range indicator for G3MFJ counter

Alan Longford, G4ARY, has built and put to considerable use a frequency counter built from the article "A digital frequency counter and timer" by G. F. Firth, G3MFJ and D. M. Pratt, G3KEP, in *Radio Communication* March 1976. Although he introduced a number of modifications—including the incorporation of a 12V dc to 300V dc converter, extended the "af" input to 10MHz, input level led indicator, etc—the original counter/timer concept was retained.

One modification made by G4ARY, however, may well be found useful by others who have built this unit. He writes:

"As the Nixie display does not have a leading zero suppression, I built in an over-range (o/r) indicator. This involved substituting a 7493 for the dual flip-flop divide-by-four on the control board and using the spare single flip-flop of the 7493 to detect an overflow condition from the most significant 7490 counter. An additional 7400 was used as inverter, s/r latch and gated (2Hz from oscillator board) led

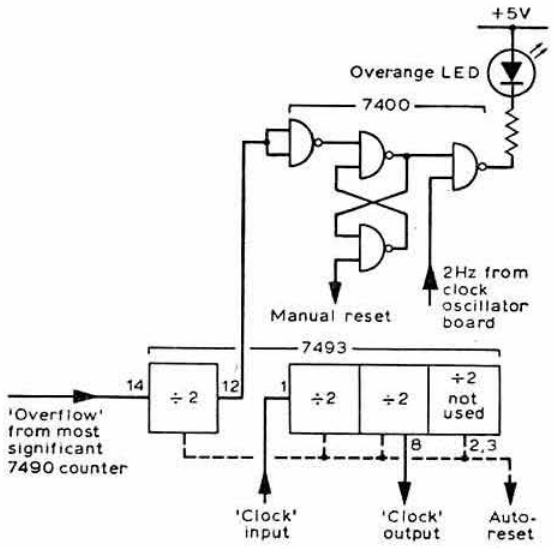


Fig 4. G4ARY's suggested arrangement for adding an over-range indicator to the G3MFJ/G3KEP digital frequency counter and timer

driver. This resulted in a flashing led indicating an over-range input which is cancelled manually by the manual reset switch." See Fig 4.

Developments in rf diathermy

On a number of occasions we have mentioned in *TT* the potential hazards involved in subjecting the human body to large doses of rf energy. It was therefore of considerable interest to learn from George Zitterstein, G8ITS, of recent rewarding use by Reg Patrick, G2BBX, a retired BBC engineer, of an improved form of rf diathermy that appears to offer considerable promise in treating some forms of malignant tumours. This new technique (which depends on improving the coupling between transmitter and patient by using electric-field rather than electromagnetic coupling) has been described in detail in *Electronics & Power* (May 1977, pp415-417) by W. B. Whalley, a Californian medical-electronics consultant. Incidentally it is clear from the illustrations that much of the development work was done using Heathkit amateur radio equipment on the "ism" frequency of 13·56MHz.

Recently W. B. Whalley visited the UK and called on Reg Patrick, an old friend. G2BBX at the time was worrying about one of his geese which was already unable to walk due to a tumour on its left foot; this appeared to be spreading and a local vet feared it would lead to the death of the bird. Acting on the advice of his friend, G2BBX made up a pair of suitable electrodes and fed into them a little 14MHz rf power, taking care that this would not burn the healthy tissue. After a short series of 30min painless treatments a complete cure appears to have been effected, and the goose is now walking and helping to keep G2BBX's lawn trim.

This note is not of course to advocate d-i-y rf diathermy on pets or people but it is pleasant to hear of an amateur taking this part in testing a form of treatment which is still very new in this country.

Polyphase active-ladder networks

Trevor Beamond, G3VLF, recently drew my attention to a letter from J. Haine (University of Leeds) that appeared in *Electronic Letters* (31 March 1977, Vol 13, No 7, pp 216-218) under the heading "New active quadrature phase-shift network". The letter develops a bandstop filter circuit from a lowpass prototype network which can be simulated by a polyphase active-ladder network. The resulting active network, it is stated, can be used as an audio quadrature phase-shifter in an ssb modulator, where it can give a high suppression of the unwanted sideband for only a moderate-degree network. Being based on a passive-ladder network, the new active network should have a low sensitivity to its element values.

It is indicated that an unwanted sideband rejection of more than 35dB can be achieved with a third-degree network.

The letter in fact represents a report of work carried out on the polyphase approach to ssb generation as described originally by M. J. Gingell.

However, G3VLF writes frankly: "The paper is beyond my limited understanding and does not give a practical circuit but it would seem worthwhile for someone to investigate the proposals." I will be equally frank and say that my own reaction is very much the same! The letter is indeed tough going: but perhaps to filter/gyrator devotees all may be crystal clear. If so perhaps someone could give a practical circuit diagram and explain if it is any more suitable for amateur ssb generators than the circuits already published.

Electronic regulator for car alternators

Although perhaps not strictly amateur radio, there is considerable interest among *TT* readers in car electronics, so the electronic regulator circuit shown in Fig 5 may be found useful. It comes from an "Ideas for design" item by A. I. Ozkaynak in *Electronic Design* 15, 19 July 1977. It is claimed to be reliable, maintenance-free and easily repairable. It is based on a CA3085 ic regulator which functions as an error detector and amplifier adjusted to switch at 14V dc.

When the output of the alternator is less than 14V, the power-Darlington transistor is turned on and current in the alternator field winding rises to maximum so that the alternator output voltage increases.

When this rises above 14V, the power-Darlington cuts the field current off, reducing the generated voltage abruptly.

Continuous switching, at a frequency determined mainly by the field coil inductance, provides a constant average 14V. Time delays and temperature coefficients are indicated as very satisfactory.

Burying reverse-tvi?

C. W. Farrell, G8GS, has been trying to do something about that modern urban blight—reverse-tvi or ivt. The large numbers of whiskery signals radiated from the line-time bases and switched-mode power units of television receivers have been increasing in intensity since the swing to colour sets and solid-state power units.

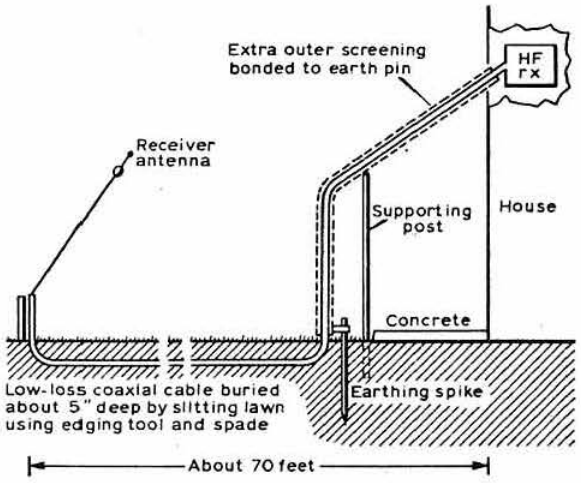


Fig 6. Precautions taken by G8GS to reduce pick-up of interference from local television receivers

G8GS recently made a restart on 3·5MHz from a new upstairs "shack" and finds he can keep down tvi with the arrangement shown in Fig 6 plus the use of a mains rf filter in the supply to the ex-Naval Murphy receiver. The remote receiving antenna is about 30ft of wire connected to the centre conductor of the coaxial feeder, and is thus not a matched system. The buried feeder is of the low-loss tv variety. The exposed length of feeder is covered with a screen consisting of a continuous length of suitably folded layers of kitchen foil rolled around and held in position by lacing with thread, since no suitable braided screening which would slip over the feeder was available.

G8GS is uncertain how much burying the cable in damp sandy soil actually contributes to attenuation of ivt signals and believes that the main benefit comes from the use of a receiving antenna as far as possible from the houses; this also reduces electrical and ignition interference.

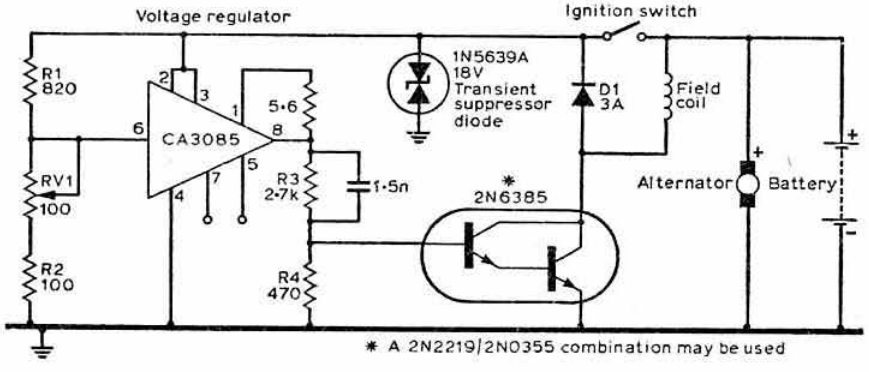


Fig 5. Electronic regulator for car alternators that rapidly switches the field coil of a car alternator on and off to maintain output at a constant average output of 14V. The desired regulating point is set with the adjustable resistor RV1

Eddystone drift correcting technique

From time to time attention has been drawn in *TT* to the disadvantages as well as the advantages of low-cost frequency synthesizers and the triple-mix and other forms of drift cancellation. It was therefore interesting to find similar words of warning—and a novel drift-correction technique that has something in common with the "huff and puff" type of stabilizer—in an article by B. O. Cooke on "A new Eddystone high-stability receiver" in *Communication & Broadcasting*, Vol 3, No 3, Spring 1977, pp18-21. This describes some features of the Eddystone 1837/1838 series of professional-grade hf receivers. To quote:

"The normal methods of obtaining hf stability in a communications receiver are drift-cancelling techniques (as in the Eddystone 958) or by the use of a frequency-synthesizer. Both of these methods tend to cause the generation of spurious signals within the receiver, either as harmonics of the various oscillator and mixer frequencies, or as noise appearing as sidebands on the output of the local oscillators. Great care is therefore needed in their design and construction, and expensive screening and filtering are necessary. In addition there are usually difficulties in providing the facility of continuous manual tuning.

"The system developed for the 1837/1838 series overcomes many of these problems. The operation is simple and is illustrated in Fig 7. With the arrangement of oscillator frequencies used, the frequency f_s of the received signal is related to the frequencies of the first and second local oscillators, f_1 and f_2 respectively and to the second i.f. (f_3) by the expression:

$$f_s = f_1 - f_2 - f_3$$

"Thus assuming no drift in f_3, f_s will remain constant provided that ($f_1 - f_2$) remains constant, and f_1, f_2 need not be separately stabilized.

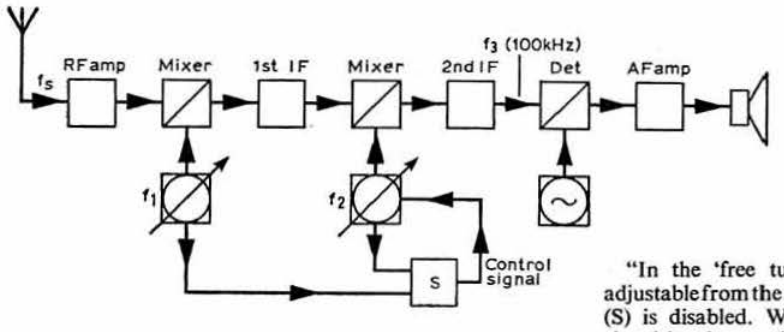


Fig 7. The basic drift-correcting arrangement used on the Eddystone 1837/1838 professional-grade receivers

"In the 'free tune' mode f_1 and f_2 are independently adjustable from the panel controls, and the frequency stabilizer (S) is disabled. When satisfactory reception of a desired signal has been achieved, the 'lock' button is depressed: in the ensuing 1s period, f_1 and f_2 are measured and the difference (f_1—f_2) stored digitally. Thereafter these frequencies are measured respectively and their difference compared with the stored value: the error, if any, is used to control f_2 to bring the frequency difference back to the correct value."

The principles of operation are shown in more detail in Fig 8. While it is not of course the purpose of the article to provide exact details of the circuitry, the functioning of the system is fully described as follows:

In the "tune" state, all logic elements are reset, the integrator capacitor is short-circuited and the control voltage delivered to the f_2 oscillator is therefore zero. Upon setting the tune/lock switch TL to "lock", the subsequent action is dictated by the controller C. There are two phases of operation, the "initial count" phase, and the "correction" phase. In the "initial count" phase, the first operation is the generation of an accurately-timed 1s pulse within C, delivered to G1 and G2 to allow oscillator pulses at f_1 and f_2 to enter counters C1 and C2 respectively. At the end of the 1s pulse the counts stored in C1 and C2 will of course correspond to

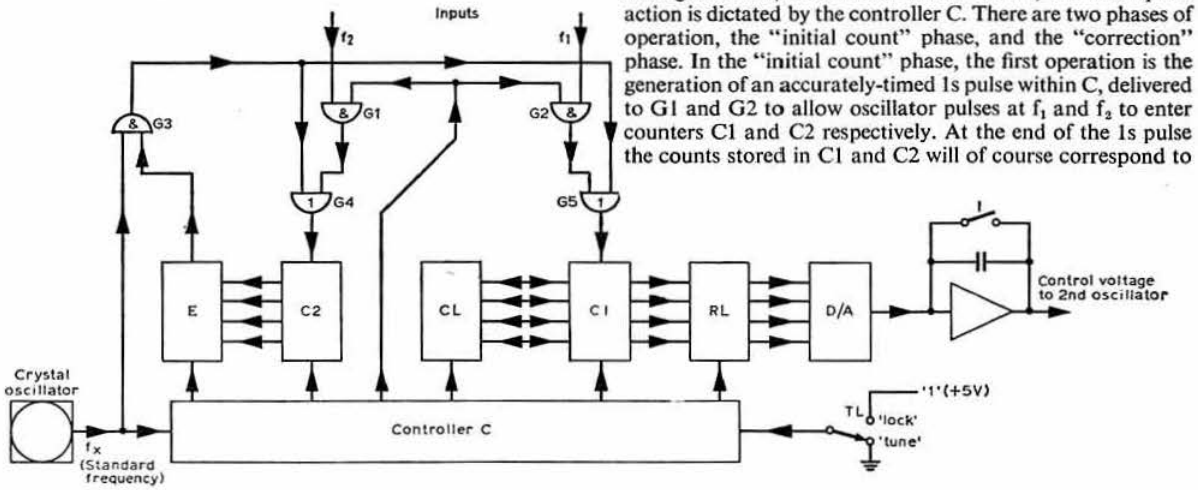


Fig 8. Functional diagram of the digital drift-correcting circuits using a form of "huff and puff" stabilization but applied so as to maintain a constant difference between the two local oscillators

f_1 and f_2. The count in C2 is then subtracted from that in C1 to obtain a count corresponding to $(f_1—f_2)$ by applying pulses at a frequency f_x (via G3) to C1 and C2 simultaneously, via the OR gates G4 and G5, until C2 is full: this state is sensed by the element E, which then disables gate G3 and the counting ceases. Thus an extra count, equal to the complement of that originally in C2, is added to that already in C1, resulting in the total count in C1 now corresponding to $(f_1—f_2)$ which is then transferred to the count latch CL by the action of the controller.

There is then the "correction" phase which lasts until the receiver is retuned. The controller first transfers the complement of the count stored in CL back to C1. The count cycle of the "initial count" phase is then repeated: the 1s timing is applied to G1 and G2, f_1 and f_2 are counted into C1 and C2 respectively, and the complement of C2 is added to the count already in C1. This results in a count in C1 corresponding to the difference between the new count of $(f_1—f_2)$ and the value measured in the "initial count" phase. This difference, of course, represents the frequency drift during the interval between the counts. The residual count in C1 is now transferred to the "residue latch" RL, which is connected to a digital/analogue converter and the output current of the converter is applied to the integrator I. The output of this controls the frequency of the second oscillator, tending to correct the frequency error. This sequence of operations is repeated at approximately 1s intervals.

As a result of the integrator, the control voltage is applied smoothly to the second oscillator, so there is no sudden correction. Normally the drift occurring during the 1s intervals will be very small so that the capacitance of the counters need not be as great as the count of f_1 and f_2. The counters, latches and d/a converter are limited to eight binary digits, representing a maximum correctable drift between cycles of $\pm$127Hz which experience has shown to be adequate. Performance under conditions of shock and vibration is helped by the use of a solid-dielectric variable capacitor in the first oscillator. Total long-period drift correction is limited by the maximum output voltage excursion of the integrator, and corresponds to $\pm$10kHz.

As stated above, circuit details of this arrangement are not given in the article but the description of the logic operations may enable keen exponents of digital techniques to puzzle out the basic stabilizer. For an amateur-bands receiver with crystal-controlled first oscillator, the PA0KSB form of "huff and puff" stabilizer would be simpler to implement.

Droitwich encore

In the July *TT* I was foolhardy enough to point out that the idea of using an extremely simple TBA120 receiver/signal processor as a Droitwich off-air precision frequency standard (as previously described in the March *TT* from a Dutch source) "remains unchallenged". This was tempting fate too far and sure enough several readers have pointed out to me that there is a snag which I had overlooked and which will mean that the 10^{11} accuracy of the Droitwich carrier is bound to be considerably degraded with this simple form of signal processing. The reasons were set out with great clarity by Dr L. E. Schnurr, G5AAN, in an appendix to the article "A simple high-accuracy frequency standard" by C. Bowden, G3OCB (*Radio Communication* May 1971, pp314-318). G5AAN showed that to recover a precision carrier from Droitwich it is necessary to pass the 200kHz rf signal through a selective crystal filter unless one is prepared to meet rather severe problems of time-domain filtering.

Without a sharp filter, the accuracy of an off-air calibrator will depend to some extent upon the degree of residual modulation on the carrier; limiting alone cannot achieve the highest standards of accuracy.

Chris Bartram, G4DGU, points out that although fm quadrature detector ICs, such as the TBA120, will remove the a.m. content from the signal, they cannot in effect remove the basic modulation; rather they act as very efficient phase modulators which may or may not be advantageous.

Of course this does not mean that the TBA120 off-air calibrator is not an extremely useful way of producing a standard frequency, to an accuracy likely to be considerably better than an ordinary crystal calibrator, but it does put a limit on the accuracy and this could be significant for some applications. G4DGU points out that the GM3TFY design in the April 1970 issue, without a crystal filter, achieved a stability averaged over 1s of "only" one part in 10^8 and this could be improved by integrating over a longer period. He mentions a technique being developed by Ian White, G3SEK, capable of $\pm$30Hz at 144MHz using a frequency-domain filtering system but with a temperature-controlled crystal oscillator which is adjusted using the Droitwich signal as a reference.

K. Manson makes some of the same points, based on his experiences while developing simple off-air frequency standards. He found that after a certain degree of limiting, any further similar processing, such as a chain of 7490 dividers, did not produce any further improvement. The modulation depth on programme peaks remained about three per cent, and a quartz crystal filter, as suggested by G5AAN, was necessary to reduce it to negligible value.

The limiting process alone, he points out, was quite sufficient to provide a useful calibrator for checking receivers, oscilloscope sweep rates etc, but he remains convinced that a crystal filter is needed to reduce the modulation depth to a value low enough for the most stringent applications. In his own unit, he first multiplies the 200kHz signal by a factor of five and then performs frequency-domain filtering with a standard 1MHz HC6/U crystal.

He also notes that the problem of residual modulation would appear to limit the accuracy of a published Ferranti design for a simple Droitwich frequency standard which uses ZN414, ZTX300 and ZN402 devices.

So if great accuracy is required reference should be made to the May 1971 issue (and the relatively simple unit described by G3OCB). Nevertheless, for many purposes, the TBA120 unit should prove entirely suitable. I am grateful to both G4DGU and K. Manson for this reminder of the importance of frequency-domain filtering in off-air standards.

. . . . . .

On another topic, Chris Bartram, G4DGU (10 Duke of York Avenue, Milton Heights, Abingdon, OX14 4DU) has been experimenting with the use of parametric up-converters (144MHz to 1,296MHz with 576MHz pump) in the *down-conversion* mode. He is attempting to write-up the up-converter work where he feels he is getting better linearity and conversion gain than most people but seeks published references in either professional or amateur literature containing specific rather than generalized information. Can you help? □

microwaves

Dain Evans, G3RPE*

Microwave round table

A microwave round table will be held at the IBA Engineering HQ, Crawley Court, near Winchester, on 13 November. In the morning programme it is hoped to demonstrate some of the newer 10GHz techniques, and in the afternoon a discussion on equipment for other microwave bands is planned.

1·3GHz news

G3PYB reports that the beacon GB3AND continues to operate well and that since its antenna has been improved its range has increased considerably. It is regularly received to the north despite the presence of hills 300m high. G3PYB passes on the news that G8FZK is currently building for the band.

G4BYV writes to say that PA0DBQ has further developed his 1,296MHz ssb source in which 144MHz ssb is fed into a BAY66 varactor used as a mixer/doubler. The 100mW output on 1,296MHz was sufficient during good conditions to produce S9 signals at G3LQR (Suffolk). On 10 August there was a small lift during which both G3BEL and G8GML (Cambs) worked G8GLM S9 in Hull. During the same lift G4BYV (Norfolk) worked G8BAV in Derby. At the end of July, G4BYV worked PA0EZ, PA0VTW and DJ8XQ, all 59+.

2·3GHz news

G3BNL has a regular Monday evening schedule with G8ADC over the 30km obstructed path from their homes at Bushey to 1km south of Dunstable respectively. Signals are always S9. Similar tests are planned for 3·4GHz.

G3LQR recently worked DC9XG (EN) on this band, and G8PEJ and G8AZA (Scarborough) hope to activate fairly potent equipment. All these stations are, of course, particularly well-placed to work Continental stations.

10GHz news

This month we have a record crop of Microwave Awards to report. No 26 goes to G8ANZ/P for working GW4BRS/P in S Wales over a path length of 157km by super-refraction. Nos 27 and 28 go to GW8DUP/P and GW8EHK/P respectively for contacts with G8CKT/P over the now famous Dartmoor/Prescelly path. For the record, the NGRs of the sites quoted were SX603877 and SN070321. The two Welsh operators have co-operated over the last few years, with GW8EHK concentrating on the electronics and GW8DUP concentrating on the "plumbing". This seems to be a happy way of doing things.

What will presumably lead to further claims for awards are contacts G8BCO and G8ARO had with G3JHM. These were over the 170km non-optical path from 7km northwest of Chichester to G3JHM who was holidaying in Alderney. During the cumulative contest on that day, 21 August, the latter station had other two-way contacts—with G3VPF and G4CNV 8km southwest of Dorchester, and with G3KSU on the Isle of Wight. A few days later, G3IZD had a near two-way contact with G3JHM which, but for a receiver fault, might have led to a further claim for an award.

On 28 August G3JHM had a contact with F5ZA/P on Cap de la Hague to make the first GU/F contact on this band. F5ZA borrowed equipment (a 40mW Gunn oscillator with separate receiver) and travelled 300km to make the attempt, which implies a fair amount of faith. F5ZA confirmed that the beacon GB3ALD was audible from that site.

A feature of all this operating has been the extreme variability of signal strengths observed. This has applied in both directions: the beacon GB3ALD being listened to from the south coast, and GB3IOW being listened to from Alderney. It would be useful to have a record of these observations.

The attempts to work DJ3KM at Cuxhaven were doomed to failure, according to GM3DXJ, both because of most unsuitable weather for super-refraction and because of partial failure of DJ3KM's receiver. GM3DXJ suggests that it will probably be necessary to use a hf rig for talk-back on this sort of attempt. Operating without talk-back does presume proven equipment and a great deal of operating experience, and confidence in the other operators.

During a recent visit to Scarborough G3PYB had his first 10GHz contact with G3PEJ. This local station is particularly well sited for contacts over the North Sea.

A most evocative report is that of a 170km contact between Tete Rousse Shelter, 3,200m up Mont Blanc (DF15a) and Beaujolais (CG64j) on 3–5 August. The Mont Blanc team was composed of F1AVY, F1CGW and F1BGL, with three SWLs. The Beaujolais team was F1CVJ, F1AVW and F8DO. The equipment used at both ends employed 40mW Gunn oscillators with 1N23 mixers. The antennas were dishes either 0·8 or 1·4m diameter. Signals over the three days were 40–60dB above noise, but with fading of up to 30dB. A second notable contact was made on 5 August between Mont Blanc and Mont Saint Rigaud (CG63c), a path length of 184km. Despite trees obstructing the path, signals were 30–40dB above noise. All the equipment, including the dishes, was home-made.

F1AVY/P 3,200m up Mont Blanc during a 170km contact with F1CVJ at Beaujolais; l to r: F1AVY, swl Pascal, F1BGL, swl Philippe and F1CGW. *Photo: F1BGL*

* 4 Upper Sales, Chaulden, Hemel Hempstead, Herts.

Improved Gunn-mixer receivers

The self-oscillating mixer technique, by reputation a very noisy form of mixer, can be significantly improved by the use of afc. This works by reducing the amount of "jitter", thereby reducing the noise bandwidth and, in turn, the effective noise factor of the mixer. A recent reference to this is *Microwave Journal*, March 1977, pp43-47.

Designs for 10GHz bandpass filters

These filters for 10GHz have 3dB bandwidths of 20 or 60MHz, as is shown by the measured response curves given in Fig 1. G3JVL, who designed the filters, uses the former in the local oscillator chain of a receiver to reduce the noise generated at signal frequency which would otherwise degrade the receiver performance. Even if a relatively low i.f. is used, significant rejection of noise can be obtained; for example, at 30MHz the rejection is 27dB. The 60MHz bandwidth filter is used to eliminate effectively the second channel response of the receiver.

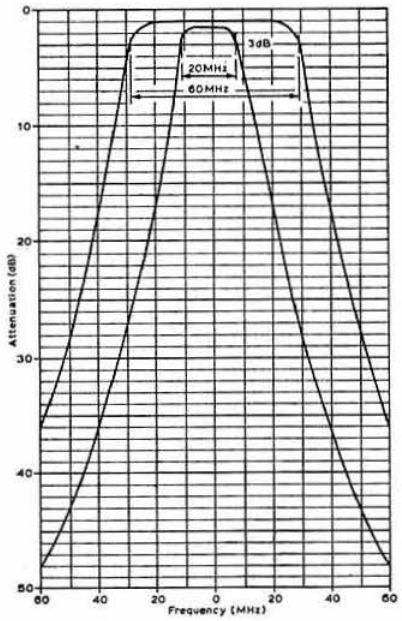


Fig 1. The response curves measured for the filters

Filter 3dB bandwidth MHz	Dimensions (mm) X	Y	d_1	d_2
60	17·8	18·2	9·0	4·3
20	18·2	18·7	6·2	2·95

As is shown in Fig 2, the filter consists of a length of waveguide 16 in which iris plates are used to define three resonant cavities which are coupled by centrally placed holes of specified dimensions. The basic design frequency is 10·5GHz, but the tuning screws fitted may be used to tune the filters down to 9·5GHz at least. Matching screws are fitted at each end of the filter as necessary to tune out any mismatch with the external circuitry.

In order to maintain the Q of the filter, it should preferably be made entirely from copper. Brass should only be used if it can be copper- or silver-plated after assembly. The tuning screws can be of brass only if little of each projects into the cavities, otherwise threaded copper rods should be used. The matching screws can be of brass, or even cadmium-plated steel if little projects into the guide.

The filter can be constructed as follows:

(a) Scribe deeply into the top and bottom broad faces of the guide grooves corresponding to the position of the irises.

(b) Using a fine saw such as a junior hack-saw blade, first cut slots at each corner and then use these as a guide to extend the cuts across the full width of the top and bottom walls of the waveguide.

(c) Fit the iris plates in their correct positions, and fix them in place by bending the corners of the iris plates. Jig the tuning and matching screw bearing nuts (if fitted) using chromium-plated screws. Fit any flanges required and solder all joints in a single operation using a small gas flame. Alternatively, solder only the joints on the underside of the filter, invert it and solder the second set while the first is cooled by small pieces of tissue soaked in water. This technique prevents any solder entering the cavities, which would reduce their Q. It is safer to use plain solder with a flux that can be washed away (eg Baker's Fluid) rather than to risk organic residues being left behind. Note that it is not necessary

(Continued on page 795)

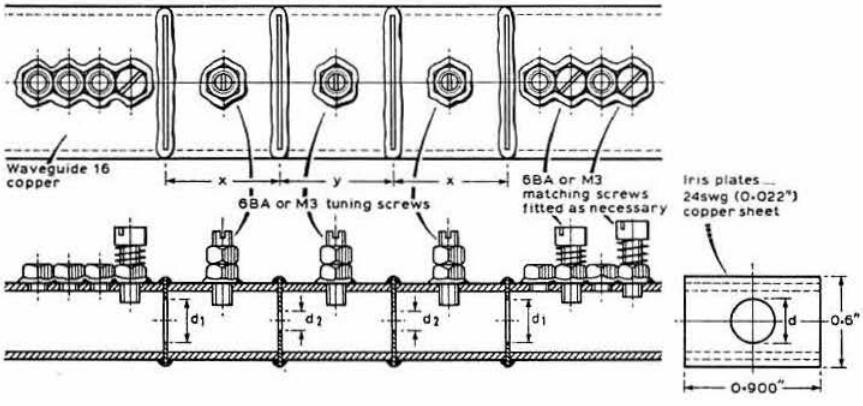


Fig 2. The construction of the filters. The dimensions are given in the table

4-2-70

Graham Knight, GM8FFX*

Another Supreme

The Supreme Award was instituted seven years ago and by the time of its seventh anniversary in April this year only 16 operators had qualified for it. In June G3FIJ of Colchester secured No 17, and now Ray Evans, G4AGE (one time G8AVC and therefore one of the original 432MHz-only licensees) has been awarded No 18 in consequence of adding a 70MHz Senior Award to those already held for 144MHz and 432MHz. It took five years for the necessary QSL cards to reach Bolsover, starting with one from G8VN in 1972 and ending with quite a crop from recent contest operation, to bring Ray his 70MHz Senior No 33 and hence the Supreme.

Ray found that a stamped addressed envelope enclosed with the QSL greatly increased the return rate. Roy Andreang, G4CMT of Hull, used the same technique to gather the last few QSL cards for his newly acquired 432MHz Senior: he now has No 38 which was issued on the same day as No 37 which went to Dave Wood, G4CQR, of Morden Surrey.

The vhf awards manager reports that no fewer than six 432MHz Seniors have already been issued this year, an indication of the large increase in both cw and ssb activity on this band.

"Firsts and longests"

Since the publication in *4-2-70* of the item under the above headline a couple of months ago, the vhf awards manager has received a considerable number of claims and he wishes to thank all who have responded. Only by listing some of the claims submitted is it possible for others to challenge or even better them. Who, for instance, was the first Welsh station to work Malta? GW4CXM puts forward a tentative claim having worked 9H1CD on 23 June during last year's exceptional openings to the Mediterranean.

Some vhf history was made on 14 June 1959 when G5NF worked I1KDB on 144MHz on a.m., a probable first to Italy on this band. It brought Leon Ward a very nice gold medal from Italy.

Here are some more claimed firsts which members are invited to cap if they can by writing G5UM with details:
UK to Capri: G8KKX to IC8FHF on 24 July 1976.
GI to Switzerland on 432MHz: GI8HXY to HB9AMH/P on 26 October 1975.
GI to Isle of Man on 432MHz: GI8HXY to GD2HDZ on 14 June 1976.
GI to West Germany on 432MHz: GI8HXY to DB4EX on 16 June 1977.
UK to Gibraltar on 70MHz: G3RIK to ZB2VHF on 2 June 1967.
Firsts from Andorra during the dxpedition organized by PX1RI (who was in fact G3RIK): 23 June 1968 to G3NKL; 24 June 1968 to both EI9AD and GI3HCG, all on 70MHz via Es.

From Ron Parsons, GI3HXV, who is QSL sub-manager for GI, has come a preliminary list of Northern Ireland firsts which he hopes to top up as further information becomes available. Breaking it down into bands it comes out like this:

70MHz
GI to G: GI3HXV to G3OHH on 28 October 1961.
GI to GM: GI3HXV to GM3EGW on 5 November 1961.
GI to GW: GI3HXV to GW3RUF/P on 1 May 1965.
GI to GC: GI3PGG to GC3POI/P on 4 September 1966 via Ar.
GI to GD: GI3HXV to GD3CUW on 26 March 1963
GI to EI: GI3HXV to EI2W on 10 February 1962.

144MHz
GI to ON: GI3GXP to ON4BZ on 4 January 1956.
GI to DL: GI3GXP to DL1SEA on 5 January 1956.
GI to GC: GI3GXP to GC3EBK on 13 September 1956.
GI to F: GI3GXP to F8MX on 30 July 1957.
GI to PA: GI3GXP to PA0NO on 4 August 1957.
GI to OK: GI3GXP to OK1VR/P on 28 October 1958.
GI to HB: GI3GXP to HB9RG on 7 October 1960.
GI to LX: GI3GXP to LX1CW on 3 February 1965.

432MHz
GI to EI: GI3KYP to EI2W on 24 October 1964.
GI to ON: GI3VPK/P to ON5UN/P on 3 July 1976.

These are given in detail to enable others to challenge them and thus arrive at a definitive list of "firsts" and "longests".

Relief map rush

Since Harold Meerza, BRS34348, mentioned that relief maps were available from W. H. Smith's (July *4-2-70*) they have been in such demand that many branches have sold all their stocks. The maps, which are in vacuum moulded plastic, show the British Isles in relief and are 18in by 12in. A direct source is L and A Map Constructors Ltd, tel 01-602 0435. Several "white stick" amateurs have written to Harold saying how useful it is to have this type of map "at their fingertips".

Beacons

Robert Storeton-West, part of the G3RXF, G8BTX, G8JUK vhf family at Lowestoft, reports hearing on 4 August the new Swedish uhf beacon SK4UHF on 432·960 MHz peaking to S4 at 2015gmt. Simon Freeman, G3LQR, at Woodbridge, has also heard this new beacon which is in QTH locator HT65j. Roger Taylor, G4BEL, in Cambridge, and G3LQR have both noticed examples of selective 432MHz coastal ducting when signals have been received from Sweden at good strengths by the Lowestoft family operators but have been inaudible at their inland locations.

Alex Allan, GM3ZBE, and GM8FFX were in Shetland at the end of August and installed the beacon GB3LER. The site near the Lerwick Magnetic Observatory is 350ft above sea level and has a clear take off. Two separate 8-el antennas fire 50W erp north-east and south simultaneously. GB3LER is on 144·965MHz and the frequency shift keyer sends "de GB3LER QRA ZU65F GB3LER" followed by a 10s carrier. This information is sent twice every minute. The beacon was constructed by GM3ZBE who would appreciate any reports of reception. The beacon, 1,000km north of London, will be a most useful auroral indicator as well as being an interesting tropospheric opening indicator. Over several years various people have promised to make equipment available to reactivate GB3LER and have failed to do so; GM3ZBE

* PO Box 49, Aberdeen AB9 8JA.

deserves all our thanks for actually getting this most important beacon back into service.

The other beacon made by GM3ZBE, GB3ANG on 144·977MHz, completed one year's service on 7 August. It has now clocked up over 10,000h and beaconkeeper GM8BZX reports that it has needed no servicing at all since it was installed.

David Butler, G4ASR, operating from Essex, heard the Gibraltar 70MHz beacon ZB2VHF at RST587 on 11 August between 1100 and 1230gmt via sporadic-E. David measured the frequency as 70·26182MHz (approximately 2kHz high) with a noticeable 100Hz hum on the carrier. Despite many calls G4ASR was unable to raise any replies. The Gibraltar beacon has also been heard via sporadic-E by DL6WU at Darmstadt and by DL8GP at Saarbrucken. G5UM, at Leicester, also heard ZB2VHF on 17 August, he too noticed the note was not T9.

The IARU beacon list print-out from the headquarters computer continues to be updated by the beacon co-ordinator, Brian Bower, G3COJ. This most useful item is available for 19p from RSGB Publications (Sales).

FM activity

During the August lift in conditions, when extended tropo contacts were available on all modes on 144MHz, GM8FFX took advantage of a recently-installed vertical 14-el Parabeam to work through the various repeaters which were very strong signals at Aberdeen. Repeater contacts were made via GB3CS, GB3RF, GB3TW, GB3NA, GB3HH, GB3PI, GB3PO, LA8DR, LA8VR, LA5BR, PI3RWK and OZ3REE. All contacts were free from any interference, the only problem occurred when more than one repeater was accessed with just one tone. During the exceptional conditions many mobile operators were able to access far-away repeaters using simple 10W transceivers and whip antennas. LA3EQ/M could access GB3CS in central Scotland and GB3TW in Tyne & Wear causing pile-ups of stations.

During the same lift period Alec Jones, GM8HGD, operating from near Peterhead in ZR square, worked many stations on 145·525MHz fm. Using a Trio 2200GX and a 10W amplifier to an 8-el Yagi, GM8HGD exchanged five and nine reports with many stations across the border, some of whom were using simple vertical antennas. G8MWV, Essex; G3AMH, Barnsley; G8NHG, near Leeds; G4CBW, Manchester; and GW8CFQ, in Wrexham, were all outstanding signals on simplex fm in north-east Scotland.

YL operators brighten 144MHz

Alison Rogers, G8MVX, at Caldy, Wirral, and Janet McCarthy, G8MVQ, at Thingwall, Wirral, are both 15 and attend the same school where amateur radio is one of the hobbies encouraged by the teachers. When studies permit, both young ladies can be heard on fm, and Wigan operators Max France, G4FDL, and Mike Skyner, G8NBN, report that the appearance of Alison and Janet has considerably brightened the 144MHz band.

Vicki Menday, G8HCL, of Weybridge, continues to be very active on 144MHz fm and ssb. Despite competition from several om operators, Vicki won the recent 144MHz contest. No doubt the Nag 144 linear and her special 56-el array on top of the 60ft Versatower helped. Vicki is now thinking of a really big antenna for 432MHz.

Pat Hargreaves, G3TEY, at Mow Cop, has a 1,000ft asl site that is the envy of many of the gentlemen operators for miles around. Mow Cop is near Stoke-on-Trent and the ordinance survey point for the area is at the end of Pat's garden.

Angelika Voss, G5CCI, is a 16-year-old operator who comes from Germany where she holds the callsign DF2XV. Angelika has been in Britain on an extended holiday and has already made full use of her G5 licence by operating on all modes from such diverse places as the Isle of Man, North Wales, Liverpool and Inverary. On a recent visit to Aberdeen, Angelika showed up GM8FFX by commandeering his rig and switching it to the cw position to participate in the Monday cw sessions around 144·050MHz.

Increased pages for "4-2-70"

The page allocation for *4-2-70* has been increased to four and three pages alternately following a decision by Council to increase the size of *Radio Communication* by 16 pages in alternate months from this issue. Since January more than 500 letters have been received at PO Box 49, Aberdeen,—why not take advantage of the increase in space to get details of your 4-2-70 activities into print. Reports from newly-licensed operators and newsworthy items on repeaters would be particularly welcome.

Data and rtty

On the subject of rtty, a letter from Peter Martinez, G3PLX, makes a plea for fm operators to steer clear of 144·600MHz. He writes: "The frequency 144·600MHz has been the rtty calling frequency for a very long time but it was also fitted to a large number of fm transceivers until the IARU bandplan became widely known. To an fm transceiver, the frequency may seem clear but in reality there may well be long-distance rtty activity going on at a lower signal level than can be detected on an fm transceiver. Many times I have suffered QRM from fm signals which are too weak to copy on that mode but which are strong enough to interfere with the rtty signal I am trying to copy. In these circumstances it is impossible to ask the offending station to QSY and so they remain unaware of the trouble they are causing to rtty stations using the calling frequency." Peter's advice to fm operators is echoed by the VHF Committee "Keep clear of 144·600MHz" even if it seems unoccupied.

G3PLX, who operates from Gosport in Hampshire, has now worked more than 100 different rtty stations and averages about 10 contacts per week. Recent long-distance contacts have been made with G8AWN/A in Otley and with G3WTY at Worksop. Peter, who is QTHR, would like to arrange some rtty skeds to the north as most of the present rtty contacts seem to be east-west.

There are now more than a dozen vhf operators using video display units and three, G8ISI, G3PLX and G3RXQ, are using VDUs in conjunction with microprocessors. Gordon Smith, GM4DSZ, is almost ready with a vdu and will be seeking skeds as soon as the equipment is completed.

Eimac valves and bases

Many vhf amateurs use valves and bases of the 4CX250B type for linear amplifiers. As secondhand bases were being snapped up rapidly at Alexandra Palace for double-figure prices, it may interest many to hear that brand-new Eimac

products are now available in this country from Cambrian Electronics, 13 Sulgrave Road, Hammersmith. This new company is offering free technical advice to all amateurs contemplating building a linear amplifier and is able to supply any Eimac valve, base or chimney from stock.

Gibraltar 50MHz band

ZB2CF, the secretary of the Gibraltar ARS, kindly writes to point out that by a special concession granted to amateurs in Gibraltar as far back as 1967, use can be made of all modes on the vhf segment 50-54MHz. As ZB2 licences are fairly easily obtained, this band could be the basis for an interesting visiting expedition.

Real QRP

David Johnson, G4DHF, at Grimsby, has been using real QRP with good results. He ran a home-made transceiver using Plessey SL600 integrated circuits running just 25mW of output power to an 8-el Yagi during the recent QRP contest. The best dx worked was GD4AFN/P near Peel at a distance of nearly 300km. David worked a total of 40 stations during the event and he would welcome a scoring system which would give an increasing multiplier as power was decreased. This would encourage people to amaze themselves at the potential of low power operation. His final comment is: "It helps to be a great optimist".

DX on 70MHz

Conditions were quite good for the recent 70MHz contest with stations taking part from all over Britain. Roger Hargreaves, G3OHH, stayed on cw throughout the event to work 54 stations, best dx being GC3WMR (YJ60e), GM4DMZ/P (XO26e), and GU3HFN (YJ48G). Another high-scoring station was Martin Dann, G3NHE, who was already up to 60 contacts before midnight with two thirds of the contest still to go. GM3ZBE near Aberdeen had long-distance contacts with G3OIT(AL33c), GW3WRA/P (YL05j), GW2AMV/P, GI3TLT, and (his best dx of 1977) G3DAH at Herne Bay—a distance of 670km.

Meteor scatter

A great many letters have been received asking for an explanation of meteor scatter (ms) propagation. We have recently gone through the period of the Perseids shower which is just about the most reliable annual shower and is probably the easiest to observe and the best for ms propagation. Early on the morning of 12 August, the day the shower reached its greatest intensity, the moon was just a thin crescent and a large number of meteors could be seen clearly at the GM3ZBE QTH. Being out in the country 15 miles from the nearest street lighting, it was easy to see the meteors coming from the radiant point in Perseus in the north-eastern section of the sky; 35 meteors being observed in a 1h period. The meteors have an average separation of 100km and are moving at 60km/s as they enter the earth's atmosphere. They burn up, forming columns of ionized particles which reflect radio signals—they soon diffuse but last long enough for short bursts or pings to be heard on vhf frequencies.

During the Perseids such rarities as SK6JF/OY(WW77j), DB5NA/OH0, UW6MA(TH square) and much more real dx was being worked by ms enthusiasts like G4DSC, G3POI, G8FUF, G4DGU and G3SEK. On ssb Clive Morton, G4CMV, had a 27, R26 contact with OH5NW. The Cambridge University group G6UW used 40W of cw to work UC2ABT(NN18c), SM5AQJ(IS10d), and partial contacts were made with I1TEX, YU2CBM and SM0FFS. Dave Price, GW4CQT, stayed on cw throughout the Perseids to work SK6JF/OY, UK2BAB(MO), UP2BBC(LP) and various DL and SM stations. Clive Penna, G3POI, completed his contact with C31OX in 90min and went on to work SK6JF/OY and numerous Russian stations.

On a historical note it is interesting to record that in 1866 Schiaparelli announced that the Perseids cloud were following the same orbit around the sun as the comet Swift-Tuttle. There are cometary connections with some of the annual meteor showers, with the exception of the Quadrantids and the Geminids. Apparently comets release particles which spread out along their orbits and the meteoroid stream thus formed only gives rise to a shower when the orbit of Earth and the comet intersect. Calculations indicate that the comet Swift-Tuttle has a period of 120 years and is due to return to the sun in 1981. Activity from the Perseids has been stable for some years, and some observers think it is likely that activity will increase during the next few years as we encounter parts of the meteoroid stream closer to the parent comet.

Several serious ms enthusiasts were annoyed at the absolute chaos around 144·200MHz during the Perseids. The antics of some operators who had absolutely no idea of how to conduct an ms QSO had to be heard to be believed'. One dedicated ms operator said: "Reading GW3ZTH's. article in the February 1975 *Radio Communication* should be a licence condition before allowing people loose on 144·200MHz". The next October shower is the Orionids, but to assist in ensuring less chaos the date remains a secret—except of course to those who have done the necessary research!

Tropo conditions

As one would expect at this time of year, there have been long extended periods of good dx conditions. On 144MHz John Aitken, GM8NFG, in Orkney at locator YS07g, has been very much in demand down south. He runs an FT221R and has been working such stations as G3FPK, G8ITS and G3POI. Over in the north-west of Scotland John Hague, GM3JIJ/P, has been operational from Stornaway; he too had large pile-ups of stations anxious to work the Outer Hebrides. GM3JIJ/P eventually worked more than 160 stations, and even took time off the dx to work GM3OSS/M in Nairn on fm with strong signals both ways despite the mountain ranges. Dave Storr, G8GXP/P, made a short trip to the Isles of Scilly and worked a great many stations—some as far away as Scotland. The Chalmers University trip to the Faroes Islands went according to plan. Signals from SK6JF/OY were weak in Scotland although several GM operators were worked. The SK6JF/OY group did very well on ms skeds, as reported above.

"International VHF-FM Guide"

Tom Melvin, GM8MJV, has recently returned from an extended holiday spent visiting many European countries and he comments very favourably on the publication *International VHF-FM Guide*. The book lists the details of most European repeaters and also shows the most popular simplex frequencies in the various countries. Tom found the

REAL DX 1977

70MHz	G3DAH—GM3ZBE	670km
144MHz	G3ZEM—UO5BF	2,400km
432MHz	G8AGU—OZ5GF	1,145km

section on reciprocal licensing most helpful—it lists all the appropriate authorities' addresses and details the information and fees which various countries require before issuing a reciprocal licence. The book also includes a beacon list and a very good explanation of the QTH locator system.

The authors, Kris Partridge, G8AUU, and Julian Baldwin, G3UHK, acknowledge the help of the RSGB and the IARU in compiling the book which certainly gets a great deal of information about vhf operating into one handy volume. The *International VHF-FM Guide*, which costs 90p in Britain, nine IRCs to anywhere in Europe or 14 IRCs to outside Europe is available from Julian Baldwin, G3UHK, 41 Castle Drive, Maidenhead, Berkshire, England.

The grapevine

Could the fact that G8JMC and his wife G8MUM used to live near Cambridge account for the fact that now they are living in Teheran they have the callsigns EP2PI and EP2PY . . . The feeder for GB3TW has been replaced—it was suffering from water cooling . . . DB2BZ is now using four 88-el beams for 432MHz stacked one above the other on a single mast . . . GB3NEE is soon to have an rtty identification sequence added to the existing FSK . . . G4FRX is very grateful for the co-operation of the Home Office Interference Department in assisting him with tvi complaints; he is now able to run full power at any time . . . A nice gesture by the Tyne & Wear Repeater Group in lending the GB3GN group a spare logic board for the Grampian repeater; they even reprogrammed the keyer to read GB3GN . . .

Late news

The general manager, George Jessop, G6JP, read the latest Home Office letter on repeaters to those attending the Glenrothes convention dinner; the letter now gives the go-ahead for the Phase 2 432MHz repeater applications, the first of which is expected to commence operation shortly. In mid-September many stations in England and Wales participated in a good opening on 144MHz to Southern France and to Spain.

Finally, thanks for all the letters, cu on the RSGB stand at the Leicester Exhibition.

Please send your 4-2-70 news to PO Box 49, Aberdeen, as soon as possible. □

MICROWAVES

(Continued from page 791)

for the iris plates to make good contact with the side walls.

It is most unlikely that the filter can be aligned simply by connecting an rf source at one end and a detector at the other. A simple technique is to poke the inner of a short length of coaxial cable down through one of the matching screw holes between the filter and the rf source, and to measure the rf output using a diode connected to the other end. Adjusting the tuning screws will produce peaks or dips at resonance, after which the filter can be aligned in transmission. A more formal technique is to connect one end of the filter to a matched load, and the other end to an rf source via a directional coupler. With the filter off-tune, the amount of reflected power will be high, but this will decrease as the filter is tuned. When the reflected power approaches zero, the filter can be finally adjusted in transmission.

If required, the frequency of the filter can be raised by fitting large (OBA or M6) screws centrally through the side walls of each cavity.

The design of a filter having a 3dB bandwidth of 120MHz and an insertion loss of 0·3dB is given in *Radio Communication*, August 1973, p560, and also on p8.22 of the third edition of the RSGB *VHF/UHF Manual*.

Protecting against reversing the polarity of supplies

One regularly hears of people blowing up their equipment by making wrong polarity connection to batteries, and this seems more common among microwave people simply because most of their operating is portable. Some of the methods used to prevent damage are shown in Fig 3. In (a)

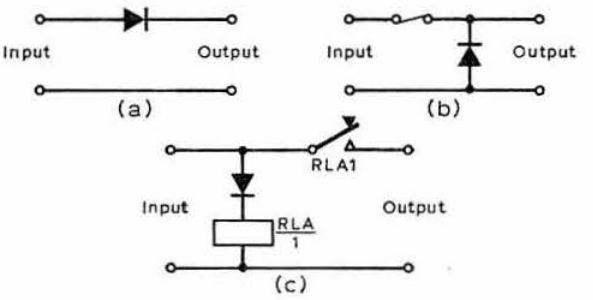


Fig 3. Circuits for protecting equipment against reversing the polarity of dc supplies

a series diode is fitted, which is satisfactory provided that the 0·5–0·7V drop across the diode is acceptable. In (b), a "crowbar" method, the voltage drop is avoided, but at the expense of blowing a fuse each time a mistake is made. If a power rectifier is used, then a high current fuse can be used which will have a lower resistance. A third technique which the writer has just come across (long after everyone else, of course) is shown in (c). The relay contacts simply remain open unless the polarity as determined by the relay series diode is appropriate.

Microwaves at "A-level"

For those of us who are tempted to regard microwaves as a bit "advanced", it is perhaps just a little deflating to hear from G8KAV that one of this year's "A-level" school examination papers had questions on waveguide at 10GHz and the design and equivalent circuits of microstrip circuitry, including that for use at 2GHz. It certainly was not like that when the writer sat *his* "A-levels". □

the month on the air

John Allaway, G3FKM *

LISTENERS to any of our bands—not just hf and lf but also those extending up into the uhf spectrum—must be mystified sometimes by the phonetics being used. Some of them sound very silly and can hardly be expected to impress casual non-amateur radio listeners. A list of suitable words is to be found in our licences.

The request for information on past holders of VS9 calls produced very little response. It would seem that few of them are still in a position to confirm contacts made many years ago and that they therefore prefer to remain incognito!

Top band news

VK3CZ has kindly supplied a copy of his dx log since 15 May 1976. During this period he has managed to contact five new countries—A35AF, ZE7JX, OH2BM, DJ8FRW and KH6CHC. GD4BEG is the first UK station to appear in the list—on 25 June at 2130. The next is G3ZYY on 14 January, and during the rest of that month G3CWI, G3MYI and G4AEH were logged. UK stations were heard on seven days between 1924 and 1935. G3MYI was heard on 5 and 6 February, but no other British signals were noted after the latter date. DHJ was inaudible between 8 July 1976 and 6 August 1977. VK3CZ has a new aerial—a Hygain 18HT with base loading and radials, and during December 1977 and January 1978 he will be active on 1,803kHz most days from 1900 to 1945 listening 1,820—1,825kHz for replies. He asks those calling "CQ" to specify their listening frequency, eg "CQ DX O2".

Dxpeditions

DX News Sheet mentions that there is a possibility that F6BBJ may visit Clipperton Is during December.

The promised visit to the Kermadec Is looks quite likely at the time of writing. A generator and permits are available and the operators are expecting to leave New Zealand on 16 October and to arrive at their destination on the 20th. They intend to be there until 4 November.

W6YO, on board the *Yankee Trader*, expects to be in the vicinity of the Comoro Is during October. He may operate from D6 or FH.

UW3HY visited Franz Josef Land recently but was unable to operate as no equipment was available. However, he intends to return and to take his own gear with him.

A group of W8s (including N8AA, W8DNC, K8MFO and W8VW) together with VE1CD will be on Grand Cayman Is from 19 to 29 November. They will be on all bands 1·8 to 28MHz and expect to enter the CQ WW DX Contest (cw section). Another group of Ws (W5AT, W4UY and W4DL) expect to be on St Maarten from 15 to 30 November and they may use the callsign PJ8CM.

Dr George Collins, VE3FXT, has held 16 calls in the Pacific and African areas during the past 10 years and says that he has tried to be an ambassador for amateur radio. He is leaving on 1 November for Africa and the Indian Ocean area in an attempt to spend a year operating from all countries in the area and in trying to persuade governments to accept amateur radio as a national training service for technicians. He is spending $10,000 and hopes for support from those who think that his cause is worthwhile. VE3FXT's QTH is Box 551, Cambridge, Ont, Canada N1R 5W1.

News from overseas

Roger Western, G3SXW, has written to say that he is now in Teheran, Iran, and on the air with the callsign EP2IA. He has an FTDX401 and TA33Jr beam on the roof of his flat, about 40ft above ground. Dipoles for the lf bands should be in use soon. He prefers cw and says that he is to be found mostly around 14,030kHz and 21,030kHz. Several other EP stations are now active on cw (EP2SV, EP2VW, EP2IK and EP2TY) but the majority use ssb only. QSLs should go via the bureau.

Robin Lyon, VK6LK, was on the air as VS9AH from 20 August 1958 to 2 November 1959 and still has his logs and a small supply of QSL cards. He was ST2GL during the period 1951-4 and also has these logs but no cards. However, written confirmation of contacts made could be provided. His present address is: 450 Riverton Drive, Riverton, W Australia, 6155, Australia.

Welcome

The following overseas amateurs joined the Society during August: F6ESY, F0CGP, ON6LO, ON8WB, SM7CFQ, VE1AYF, VE3IBH, VE7QH, VK3BCN, WB1DDS, WD9ADE, ZL1BJG and 9M2SS.

DX news

The ITU has issued the J3 prefix to Grenada and Dependencies, and H4 to the Solomon Is.

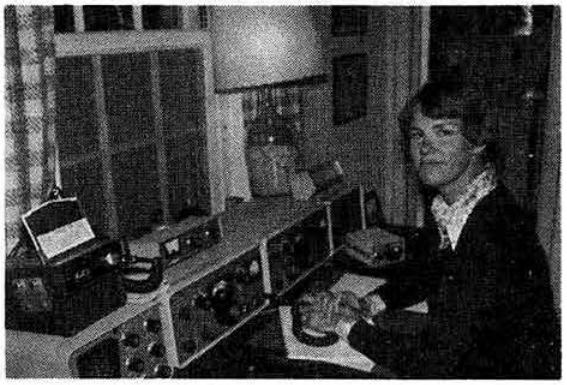
An Australian Government agency has recommended study of petroleum geology in the vicinities of Macquarie Is, Lord Howe Is, Norfolk Is and Heard Is. This may well mean more amateur activity from these areas. It is believed that a New Zealand company is already drilling near Campbell Is.

KX6AU was formerly VR3AR and TA3AR, and VR3AH is now KX6LA. VK0AC says that his QSL cards will begin to be despatched around Christmas time. WB5HVY is anxious to hear from those who still need a card from KJ6DL as he wishes to close his logs. VR1AF is now back on Ocean Is and is hoping to be able to get on 7 and 3·5MHz. VK9JD, Norfolk Is, has been noted on 3·5MHz by stations in the USA. He expects to remain on the island for three or four years.

ZK1DR is Alan Cresswell, officer in charge of the Rarotonga Observatory. He will be in the Cook Is until 1980, and has previously held the calls ZL4FX, ZL2BX and ZL5AC. He hopes to have a quad up soon to improve his results on the hf bands and is to be found on either cw or ssb between 0300 and 0900.

Those looking for a contact with Pitcairn Is may note that

* 10 Knightlow Road Birmingham B17 8QB.



Judi Davidson, VP9IJ (wife of Alan, VP9AD), at the operating position at home in Pembroke Parish, Bermuda

VR6TC has been heard near 14,174kHz at 0700 working into Europe.

Many unusual prefixes being used by Italian stations have been heard recently. A selection (with QSL directions) is as follows: IB0JN (I8JN), ID9ON (I3ON), ID9XRU (I2XRU), IF9ZRQ (IT9ZRQ), IT9SKO/IG9 (IT9ZGY), IH9HLO (I2YBC), IH9IPL (IT9KST), IH9JT (IT9JT), IH9LCK (I4LCK), IH9OEF (IT9JLG), IH9ONU (IT9KST), IH9XIX (IT9XIX), IL7DMK (I2DMK), I0LL/IM0 (I0WHY), IM0RYC (I4USC), IM0USU (IS0UAI). The stations using the IH9 prefix were located on Pantelleria Is, which is within African continental boundaries and is located in *CQ* zone 34 for WAZ purposes.

According to *Mercury*, VS5MC is frequently to be found on Wednesdays at 1300 on 14,175 or 14,190kHz. G5RV has been operating as assistant to TU4AJ and using the callsign TU2FOC. He hopes to appear as XT2HV or XT2XX in due course. G5RV is known to have crystals for 14,025, 14,106 and 14,110kHz and to be found on the band from 0800.

5B4AZ, who is manager of the Cyprus QSL bureau, says that he is receiving cards for "5BA2P/MM"—5BA-5BZ is allocated to Cyprus but only 5B4 is used for amateur calls so "Mario" appears to be a pirate. Two other pirates are "5B4ZE" who calls himself Ali and a "5B4WR" who uses 3·5MHz ssb—the real 5B4WR has no 3·5MHz aerial.

SSTV convention

The British Amateur Television Club is organising an sstv convention at the University of Aston, Birmingham, on Saturday 19 November from 1000 to 1730.

It is hoped that many amateurs will bring pieces of equipment to exhibit and demonstrate. There will be trade exhibits, and lectures are being arranged. Free car parking is available. Admission to non-BARC members will cost 50p. Further details and maps may be obtained by sending return postage to Mike Crampton, G8DLX, 16 Percival Rd, Rugby, Warwicks CV22 5JS.

Awards

WAB British Counties Award

In this Silver Jubilee year the Worked All Britain organization has introduced this certificate which will be issued in two classes—Class 1 for contacts with all UK counties and Scottish regions, plus one with Jersey, one from Guernsey (including Alderney or Sark), and one from the Isle of Man (a total of 76), and Class 2 for any 55 UK counties. All contacts must have been made since 1 May 1974 and no QSLs are needed—only a certified list showing date, time, callsign of station worked, his report and report received, and his county. Listeners may apply on a "heard" basis. Applications should be sent to Alec Brennend, G4AVA, 76 Deneley Avenue, Todmorden, Lancs, and the cost is £1, $2 or 20 IRCs. The cost of upgrading the Class 2 to Class 1 is 50p, $1 or 10 IRCs. Note that all profits from WAB go to RAIBC.

The *WAB/HAB Record Book* is obtainable from G4CON, QTHR, price £2.60 ($5) and contains nearly 200 pages of information on WAB/HAB and awards WAB/HAB, WABCC, WABBA, WABLS, WABDA and WABEMA.

Zone 29 Award

Issued by the WA Division of the Wireless Institute of Australia to licensed amateurs and listeners who have contacted (or heard) any 25 different amateur stations in *CQ* zone 29 since 0001wast on 1 January 1952. Endorsements will be issued for single band, phone, cw, one band cw, one band phone, or listener. Confirmation in writing of all contacts/reports must be submitted to the Secretary, WIA (WA Division), Box N1002, GPO, Perth, WA, 6001, Australia, together with eight IRCs or $1 (A).

Budapest Award

This is now being issued with modified requirements. European stations now require to have contacted (or heard) 75 different HA5 stations since 1 January 1959. DX applicants need 25. VHF/UHF contacts via Oscar or eme count with 500km/QSO value. A certified list of contacts/loggings, plus 10 IRCs should be sent to: Award Manager of BRAL, Dezso Tarcasy, HA5HA, H-1553 Budapest, PO Box 2, Hungary. Note that there are two special activity days for HA5 amateurs—on the hf bands during the second full weekend in May, and on 144MHz the following weekend.

Contests

In the **1977 PACC Contest, G3ESF** scored 1,298 points, G3VTT 992, and G4BYT 200. BRS15822 collected 1,380 points in the listener section. Your scribe would like to apologise to readers for the absence of the rules of this contest from April *MOTA*.

The OK DX Contest

0000 to 2400 13 November

1·8 to 28MHz, both phone and cw. No cross-band/cross-mode contacts allowed. Exchanges consist of RS/T plus ITU zone number (UK is in zone 28). Contacts with Czechoslovakia count three points, with other countries one. Own country may be contacted for multiplier credit only. The multiplier is the number of ITU zones worked on each band added together. Entries may be single-operator single- or multi-band, or multi-operator multi-band. Separate logs should be kept for each band and should note date, time, station worked, numbers sent and received, points claimed, and if new multiplier. A summary sheet showing how the final score was reached and also a declaration that the station

QTH corner

A5IRG	Rinchen Gyeltshen, Radio Amateur Stn, Post Office, Thimpu, Bhutan.
A9XCC	via K4CG, US Coast Guard Stn, 7323 Telegraph Rd, Alexandria, Va, 22310, USA.
AP2ZR	Postbag 479, Rawalpindi, Pakistan.
HC8CD	via I0WDX, C. Casaroli, Pza Conti 2, 00010 Poli, Italy.
HS0SEA	RAST QSL Bureau, Box 2008, c/o GPO Bangkok, Thailand.
W8UOU/KC6	(see 9M8TH).
KX6AU	L. G. Hargis, Box 517, APO, San Francisco, Cal, 96555, USA.
OF0DX	via OH3ZH, K. Kosela, Kolarink 21-E-40, SF-33560 Tampere 56, Finland.
S9RLB	(ex-CR5LB) L. Beirao, PO Box 147, Sao Tome, Rep of Sao Tome and Principe.
ST2QL	via G3KQL, J. L. Weatherley, c/o 116 Mercury Ct, Indialantic, Fla, 32903. USA.
SU1JA	via JA0YJK, S. Tashiro, 646 Yamada, Kurosaki, Nishikabara, Niigata 950-11, Japan.
T75AA	CRAG, Box 115, Guatemala City, Guatemala.
TR8ECM	BP 3999, Libreville, Gabon.
VK9JD	Box 27, Norfolk Is, 2899, Australia.
VP2MJE	via W6EL, S. C. Shallon, 11058 Queensland St, Los Angeles, Cal, 90034, USA.
VS5XU	via DL1LD, E.Wagner, Flurweg 23, 4442 Bentheim, W. Germany.
ZK1DR	via WA0WCR, T. Lindgren, 1260 13th Av, Marion, Iowa, 52302, USA.
4O79WARC	via YU1PCF, M. Miletic, Lenjinova 20/II, 26000 Pancevo, Yugoslavia.
K5CO/5A	(after 15 Oct) T. S. Meadows, 4417 Scottsdale St, Mesquite, Tx, 75150, USA.
ex 8O6BW	WA3WRD, B. D. Walton, RFD2-7, Long Lane, Hummelstown, Pa, 17036, USA.
6Y6CSJ	6Y5AB, PO Box 511, Kingston, Jamaica.
9M8TH	Ted Henry, Box 64398, Los Angeles, Cal, 90064, USA.
WA6ICQ/9Q5	J. A. Waite, c/o ZAMISH, APO New York, 09662, USA.

RSGB QSL Bureau, G2MI, Bromley, Kent BR2 7NH

was operated in accordance with the contest rules and amateur radio regulations in the entrant's country should be submitted. Entries should be submitted before 31 December to: Central Radio Club, PO Box 69, 113 27 Praha 1, Czechoslovakia.

British entrants in the **1976 OK DX Contest** were listed as follows: (Single-operator, all bands) G3ESF (23,670 points), GI3JEX (11,664), GC5AGA (3,834), G3XFW (1,637) and G6NK (837). G4ETK (1,521) and GW3SLA (873) entered on 14MHz, GM3MZV (282) on 28MHz, and G3XWZ (68) on 1·8MHz.

Band reports

Activity has been low during the past month because of the holiday season, but judging by logs submitted conditions have been rather patchy. One interesting point noted is that at least one opening into the Pacific has occurred on 21MHz at around 1900.

Many thanks to the following for sending in the information used in this section: G2HKU, G5JL, G6GH, GI3HXH, GM3LYY, G3NLY, G3RCA, G3VBL, G3UOL, G3YRM, G4DSE, G4EHQ, GW4GCG, BRSs17567, 35608 and 38709.

Stations listed in italics were using ssb.

3·5MHz. 0100 HK3EN. **0200** LU2AFH, VO1IM. **0300** KP4EBH, VE1, W1/2, 9Y4YP.

7MHz. 0000 HR2RF, LU, PY8EA, LU4HCV/TI2, YV, ZP5, K4YT/8R1 (QSL to W2GHK). **0100** *PT2FI, VU2LE, WA6QFO/3D6.* **0400** YS1AG. **0500** *CE, OA4AHO, VP2MHC, W6/W7, ZL.* **0700** *EA9EW, KH6AT.* **1600** *C31HD.* **1800** *JA7ZSQ/JD1.* **2100** *JA4KGR,* UA9FCI. **2200** *C5AAD, CR9AJ, J28AY, ZS1XR, ZS3LK.* **2300** *UL7.*

14MHz. 0100 *VK3XB.* **0700** *KH6AKX,* KX6BU, VK, XF3B, ZL, 5W1AU. **0800** FK8CR, KL7, KM6FF, KM6BU, VR4DX, 3D2s AN, CM, DM, *5A2BDE* (?), *5W1AX.* **0900** KH6, KL7, OF1AJ/OJ0, VK, ZL, 3D2CC. **1200** A51RG, *KL7.* **1300** KA1S, 9M8TH. **1400** P29GO,YB6ACV, 9N1MM. **1500** *P29s JS, MM,* VS5DM (QSL to K9WFG), VS5MC, *VS6FE.* **1600** C31MS (QSL to EA3MS), VS5MS, VS5PM, W6/W7. **1800** A2CZV (Box 202, Gaberone), AP5HQ. **1900** HS0SEA, J28AN, VP2MH, 5H3KS, 9M6MA. **2000** FK8CR, HZ1TA, SU1JA, VP8JB, K5CO/5A, 9Q5FL (QSL to ON5FL). **2100** CE0AE, HK0CLS (Box 392, San Andres Is), KL7IAK. **2200** *N4JI/HC1,* HK0LF, S79R,*VO1OP/VE8,* VP1s, WS, *WCS,* CYL (Box 306, Belize), XE1AE. **2300** A9XCC, XE2RC, 5V7WT.

21MHz 0800 *EP2SV* (QSL to WA6AHF), *HV3SJ,* JA, KL7AXZ, TJ1BB. **0900** A4XGX, VK6JW, VU2LQA. **1000** JA, KX6s BU, *LA,* VE5BO, 7P8BC. **1100** A4XVL (QSL to G3SYP), CT2SH. **1200** JA, P29DM. **1300** 5V7WT. **1400** "BY2RH" (?), *SM0FLK/4U.* **1500** A9, *J28AG* (SP 85038/CT, Djibouti), VP8JC, VU, *ZC4IO,* ZD8RR. **1600** CE7BV, VP8JC, ZD7SD. **1700** *VU2UH.* **1800** S79R, 9L1NP. **1900** *FO8EX, KH6IBA, W6/W7.* **2000** C5AAP, *CO, TI, PY,* ZD8RR. **2100** C6ANG, *CX, HK9BRW, KP4, LU, PY, VE, W7.* **2200** HP, *KP4,* KL7IIU, PJ2FR, *VP2MBC, YV,* 8P6.

28MHz. GW3LYY reports Europeans between 1300 and 1400 and again from 2000 to 2300. **1600** *LU8DQ, ZS3LK.* **1800** LU, PY, ZP. **1900** *C5AAD,* CX, *LU3HAZ,* PY, ZD8RR, *5T5ZR.* **2000** LU, PY, ZP. **2100** *ZP5AO.*

Many thanks to all correspondents, and also to the authors of the following for items extracted: *Long Skip* **(VE1AL/3),** the *West Coast DX Bulletin* **(WA6AUD),** *DX'press* **(PA0TO),** *CQ Magazine* **(W1WY),** the *Ex-G Radio Club Bulletin* **(W3HQO),** *DX News Sheet* **(Geoff Watts),** and *RSZ Newsletter* **(9J2KL).**

Please send all items for **November** issue to reach G3FKM by **8 October,** and for **December** by **5 November.** □

HF propagation study

Predicted HPFs (MHz × 10) for October 1977

GMT →	00	02	04	06	08	10	12	14	16	18	20	22	24
Aden	161	154	154	289	345	359	342	347	318	320	177	162	161
Ascension	176	172	154	152	326	355	359	343	369	313	219	181	176
Bahrain	150	148	149	279	335	347	331	331	285	196	168	153	150
Bangkok	139	128	134	248	301	324	313	282	232	190	147	141	139
Barbados	155	140	136	122	141	263	324	322	322	314	247	180	155
Bermuda	152	131	124	111	124	229	290	298	303	295	237	178	152
Bogota	154	134	133	116	141	168	312	321	319	307	249	182	154
Buenos Aires	167	157	148	139	186	314	345	335	336	323	242	178	167
Cape Town	173	171	152	225	329	369	360	364	378	282	196	181	173
Colombo	145	144	149	277	329	342	326	322	244	210	161	149	145
Cyprus	141	141	133	242	308	324	313	309	282	216	162	147	141
Dakar	167	162	152	150	313	340	351	337	348	314	227	176	167
Denver	149	128	114	111	110	115	147	221	257	249	199	163	149
Fairbanks	145	125	117	121	139	139	139	147	162	181	173	149	145
Falklands	168	161	149	143	202	300	321	336	338	318	237	178	168
Gibraltar	102	101	91	96	199	223	228	220	216	187	140	110	102
Hong Kong	136	111	125	221	272	305	247	190	166	162	145	139	136
Honolulu	141	125	117	117	149	131	139	136	153	206	174	149	141
Iceland	103	86	84	84	139	178	200	195	190	168	130	106	103
Jamaica	152	129	124	116	143	167	300	300	305	296	238	177	152
Lagos	176	172	154	178	340	369	360	356	382	296	202	181	176
Las Palmas	147	143	130	130	266	300	315	304	304	274	205	157	147
Lima	158	147	140	128	154	177	329	324	326	318	248	180	158
Los Angeles	149	128	119	111	126	116	116	190	260	242	196	157	149
Malta	119	119	106	155	249	268	266	257	251	197	152	125	119
Mauritius	161	155	154	288	348	361	351	354	328	235	183	167	161
Mexico	150	129	114	111	134	141	190	275	282	272	214	164	150
Moscow	117	96	94	163	229	260	261	249	214	178	126	120	117
Nairobi	164	164	150	280	348	365	352	360	343	247	186	172	164
New Delhi	140	136	139	267	318	329	317	280	188	164	148	141	140
New York	150	128	119	116	116	177	258	277	285	272	219	167	150
Osaka	139	119	120	176	233	216	187	152	145	141	136	144	139
Perth	145	143	148	276	328	329	293	247	218	206	159	148	145
Rio de Janeiro	168	159	150	141	214	326	341	329	332	321	239	178	168
Salisbury	171	167	152	263	340	361	356	365	364	265	190	177	171
Seychelles	158	153	154	288	333	346	343	354	323	233	180	166	158
Singapore	140	136	139	267	318	329	317	303	249	200	148	141	140
Suva (s)	130	126	122	139	194	225	247	227	176	183	155	143	130
Suva (l)	176	173	157	172	247	199	183	168	145	206	206	185	176
Sydney (s)	136	111	125	221	272	282	242	230	211	157	145	139	136
Sydney (l)	159	147	140	129	216	169	153	149	124	158	205	178	159
Teheran	145	144	149	277	329	342	326	322	244	202	158	149	145
Vancouver	147	126	117	117	116	120	116	162	191	211	181	150	147
Wellington (s)	131	121	117	169	221	252	227	206	158	164	152	141	131
Wellington (l)	169	161	153	147	185	152	148	143	141	191	214	176	169

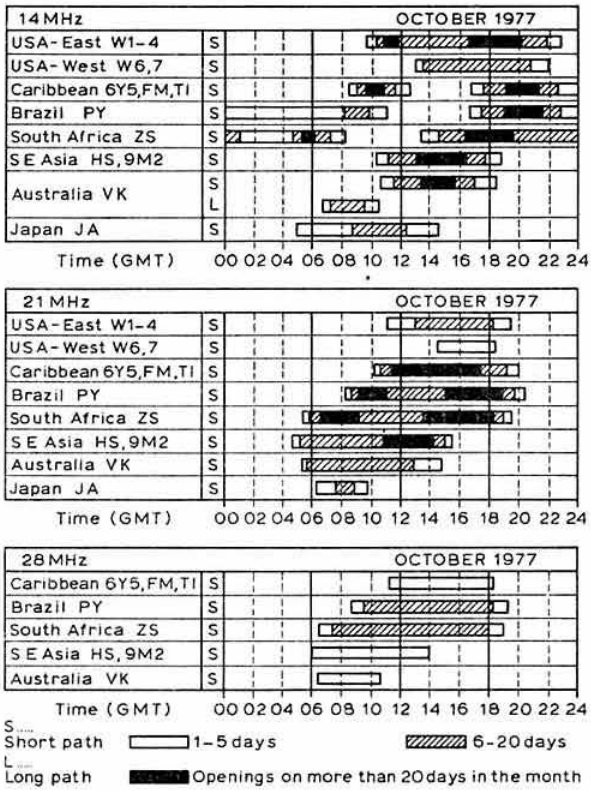
For information on the use of this table, see page 284, *Radio Communication* April 1976. Please send reports to Mr J. Spurling, G4AQI, 15 Tibbs Hill Road, Abbots Langley, Watford, Herts WD5 0EE.

Propagation predictions

After the summer, conditions on the 28 and 21MHz bands will improve progressively, and as a result of the increasing sun-spot activity this improvement will be more noticeable than in the previous two years, particularly on **28MHz**. On **21MHz** traffic with Africa, South America, the Caribbean and South-east Asia will be certain. Other areas will only be heard on days with above average MUFs. 21MHz will be the main carrier of daytime dx, while **14MHz** will play this part mostly during the first half of the night, **7MHz** taking over during the latter half.

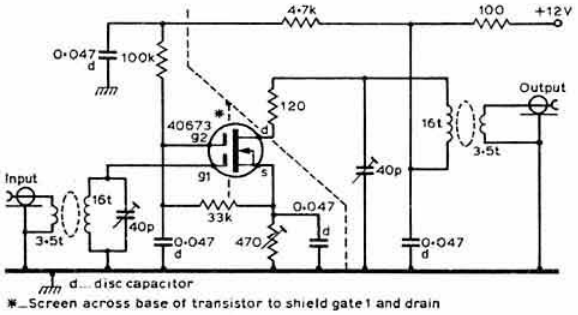
There will be a possibility of dx on **14MHz** with Central and South America, Africa and Japan in the hours before noon, and via the indirect path with Australia. Distances covered on **7MHz** during October will be noticeably longer and as this band, in the present rising phase of the sunspot cycle, will not be interrupted by the dead zone, it will be ideal for local and European traffic. DX on 7 and **3·5MHz** will always be possible when the longer part of the path lies in darkness; this is most important for 3·5MHz. The seasonal decrease in static will improve chances of dx on 7 and 3·5MHz continually. 3·5MHz will be interrupted repeatedly by the dead zone during latter half of the night.

The provisional sunspot number for August 1977 from the Swiss Federal Observatory was 29·9. Solar activity was fairly evenly distributed throughout the month. The predicted smoothed sun-spot numbers for December 1977, January and February 1978 are 34, 36 and 38 respectively.



oscar news

One of the major problems in obtaining satisfactory two-way communication on mode A of Oscar 7 lies in the reception of the 29MHz downlink. As the satellites of the Soviet system RS will use a 29·3-29·4MHz downlink the problem could be a recurring one. Generally the sensitivity of most receivers falls off above 29MHz for various reasons, eg poor noise figure, inadequate gain and poor impedance match. An efficient antenna is a help but a low noise preamplifier is an even better answer to the problem. With a properly designed and operating preamp the noise figure can be reduced to around 3dB and 15 to 20dB of gain realized.



29MHz preamplifier. The toroids are 12·7mm Mullard green spot FX3015 or type T50/6. The latter are available from TMP Electronic Supplies. The mosfet is a type 40673, and a ferrite bead should be placed over the gate 2 lead to minimize the possibility of uhf oscillation. Wire is 26swg enamel. Trimmers are small 40pF compression mica or rotary ceramic

The uplink power required to access Oscar 7 is no more than 100W erp. However, the inability of some stations to hear their downlink signals causes them to increase power beyond that which is necessary, overloading the transponder and reducing the strength of signals to all users.

The circuit of a suitable preamplifier is given here. This has appeared in several Oscar publications and the results obtained have been good. The original design is due to G3HAZ. The preamp can be built on a double-sided 8 by 5cm fibreglass board or Veroboard and mounted in a tobacco or similar tin.

Phase 3 contributions

Thanks are due to the following members who responded to the recent announcement asking for contributions towards the cost of the Phase 3 spacecraft: G3PLI, G3UFP, G3XOZ, G4JJ, G4EZV, G8BFP, G8DTG, G8IPY, G8LTU, G8MCS, G8MPY, G8MSE, G8OQX, G8DKU, CT3AR, ZS5YC, BRS23419, BRS26431 and BRS35271 and Messrs C. D. Ellison and S. North. □

your opinion

REPEATERS

Following publication of the Home Office letter on the subject of repeaters in the August issue, letters to the editor concerning it were received from: G3DNQ, GM3DDE, GW3GHC (chairman, Bristol Channel Repeater Group), G3JAM, G3RXH (hon sec, North Western Repeater Group), G3UKW, G3WXZ, G3YMK (tech manager, Tyne-Wear Repeater Group), G4AGO, GM8ARV, G8BJV, G8DWP, G8EQX, G8HXD, G8IAM (chairman, Coventry Microwave Group), G8IWA (pro, UK FM Group, Northern), R. Maskill (BRS35454) and S. M. Dyke.

The views expressed in these letters were referred to during subsequent negotiations with the Home Office reported in the September and current issues. Because of restrictions on space it is not possible to publish these letters here, but the writers can be assured that their contents have been noted.—*Ed*

The Editor
Radio Communication

Sir—Having been responsible over the past three years for running the UK FM Group (London) and its repeater GB3LO, I would like to ask the opinion of your readers on the future operation of the repeater.

GB3LO has always suffered from interference and mis-use, not the least of which is the idle chatter and constant minor contravention of licence regulations by legitimate stations, many of them unfortunately members of our own group. In spite of close co-operation between the FM Group, RSGB and Home Office, and constant diligent work by Post Office interference staff, these problems continue unabated.

London is now well served by a network of five uhf repeaters, and the original argument for GB3LO is less valid. My committee now feels that the general interest would best be served by closing down the repeater, but before doing this we would like to hear the views of as many individual members as possible, not just users of GB3LO but amateurs around the country who may have strong views on the subject. I would be pleased to receive any such comments, sent to me at: 21 Rosenau Crescent, Battersea, London SW11.

I will of course acknowledge any letters received.

D. J. Davis, G3PAQ

HF BANDS INTERFERENCE

The Editor
Radio Communication

Sir—I have been waiting with evermounting exasperation for some small sign that someone somewhere is doing something effective to end the appalling interference from the Soviet Union in its blatant violation of the radio spectrum. The precise nature of the transmissions is totally irrelevant to the basic principle of the rights of other users but since it appears to be yet another new defence development, it is only a matter of time before the USA and other countries will find themselves obliged to follow suit. There will be an inevitable broadening of the frequency bands involved otherwise the pirates would interfere with one another and that would never do! The apparent total apathy of the authorities presumably indicates that our Government is waiting to see if the technique proves successful.

I am convinced that ordinary users, both amateur and commercial, should take what action they can in their own particular fields against this ridiculous and callous pollution—had either Rhodesia or South Africa been responsible, I venture to suggest that our own authorities would be leading a massive world-wide protest. This letter is not politically motivated and I fully support the accepted ideals of amateur radio as a non-political entity, having enjoyed many delightful contacts with Russian hams. However, I believe we should give a lead to our faint-hearted diplomats along the following lines.

(1) Do not contact Russian stations except perhaps to lodge a strong brief protest about the interference.
(2) Russian stations to be barred from contests and contacts made since the date of commencement of the interference declared retrospectively null and void.
(3) Discuss the interference regularly during QSOs instead of the present habit of maintaining an embarrassed silence.
(4) Write to your MP asking for questions to be raised in Parliament in order that a full official statement may be anticipated. It is high time that we had some explanation from those who are ready enough to demand our annual licence fee.

If we all continue to pussy-foot about much longer, the consequences for amateur radio and communications in general must be disastrous.

A. A. Marr, MB, ChB, DMRD, GM3AYR

The Telecommunications Liaison Officer comments:

The pulse interference heard on the hf bands during recent months has caused interference not only to amateur stations but also to other services, eg fixed and maritime. It is known that the signals emanate from an over-the-horizon radar system associated with a laser missile defence system. Protests to the USSR, through diplomatic channels, have been made by a number of countries, including the UK. Protests have also been lodged with the ITU.

The first two suggestions made by GM3AYR provoke the question—can the Russian amateurs, who are not causing the interference, do anything to secure its disappearance? If not, then we can only run the risk of alienating the amateurs in that country without achieving any result. Certainly the signals have been freely discussed over the air and direct questions asked of Russian operators.

The position is unsatisfactory, but then so is the invasion of our "exclusive" 7MHz band by Radio Peking and others. The ITU Convention, to which both the USSR and China are signatories, has the power of an international treaty. Unfortunately these nations are willing to accept the benefits of such an arrangement without also accepting the responsibilities. *G2BVN*

CONTESTS

The Editor
Radio Communication

Sir—While agreeing with some of Mr Teece's points, I differ with his opinion that the RSGB is contest orientated. Our national society organizes very few hf contests, and limits the duration of these to a reasonable period and, except for the Commonwealth, SSB FD and HF NFD, restricts those it does organize to one or two frequency bands. The rules also ask that we avoid operation in certain parts of the bands.

What Mr Teece seems to forget is that we (the British) are not the only radio amateurs in the world, in fact we form only a small proportion, and other national societies like to organize contests, national and regional, hence the sound of "CQ CONTEST" on nearly every weekend of the year.

This does not particularly worry me, I like the competitive type of operating, but I also like to chat and I find no difficulty in keeping skeds despite contest QRM, in fact I find it a challenge.

I have always used simple antennas, either wire or verticals, during my 26 years on the air, for most of that time from extremely poor locations, ie garden of 45ft in length, but now I use a decent location, HMS *Belfast* (still only wire antennas) but this entails a sacrifice, a 30-mile round-trip to use my own equipment.

Mr Teece, fight the contest QRM, it will make you a far better operator.

D. Walmsley, G3HZI
Operator of G4EOK/HMS *Belfast*

Sir—May I place on record my complete agreement with G4DBR's letter in the July issue.

I often have to cease operation during contest periods and do wish they could leave a part of each band to those who wish not to take part. Even if I say I am not in the contest I still get called "Just a quick report for a multiplier". This is most upsetting when you get it every 5 or 10min.

A. J. P. Robinson, ZC4AJ/G3XEY

Sir—The Amateur Radio Association of Bahrain has discussed the letter from G4DBR, and it was the general opinion that there should be sections of the various bands where contest participants can or cannot go. This would ensure that operators have the choice of participation and not, as it is now, a question of sometimes having to get rid of a breaker by giving him a report. If there were limits of frequency imposed by the contest committee any violators could be reported to the committee and if the case is proven severe penalties should be imposed.

So many thanks to G4DBR for bringing the subject to the fore and we can only hope that something will be done about it now.

Les Anstead, A9XBJ

GE FOR ENGLAND
The Editor
Radio Communication
Sir—So G3JHC wants all the callsigns of stations located in England changed to GE and wonders whether others share his views. G3AAE, who has operated mainly on cw for the past 31 years, and who was the first British amateur to have the letter E in his callsign, is one amateur who does not for the following reasons:
1. He is grateful that his callsign has not been changed when so many have been changed throughout the world for political or other reasons.
2. He believes in keeping things as uncomplicated as possible in this already over-complicated world.
3. He believes that the Home Office should not be asked to make unnecessary changes, which can only add to administrative costs and be reflected in possible increased licence fees.
4. He does not believe that any GM, GW etc, station with the mental ability to obtain a licence cares a jot whether English stations have G or GE callsigns.
5. He has a large stock of G3AAE QSL cards.

J. D. Kay, G3AAE

Sir—I agree with the proposal made by G(E)3JHC with regard to a two-letter prefix for England in the interest of alignment.

There appear to be two possible interpretations of current UK prefixes. Either G specifically represents England in which case the UK appears to be entirely English, which is a false impression, or G(—) represents all of the UK in which case England is NOT clearly denoted.

In either case a two-letter prefix such as GE would be more rational than the current single letter G prefix.

L. D. Strange, G(E)3NYA

Sir—Recent experience in NFD has merely confirmed my view that I do not want to lengthen my callsign by inserting an E in it.

J. B. Roscoe, G4QK

MY OPINION ALSO
The Editor
Radio Communication
Sir—Well said, G2CYV! ("Your Opinion", September 1977).

Mr Meredith's letter puts the financial aspect of the debate into sensible perspective. The percentage of Society funds devoted to the QSL Bureau *is* nugatory, especially when considered in terms of the admirable service provided, and the pleasure which so many members derive from that service. I do not use the bureau myself, but I feel that to cavil about the proportionally small expenditure involved would be, at best, mean and, at worst, anti-social. Selfishness seems out of place in amateur radio.

I also endorse G2CYV's views on the "fun" aspect of amateur radio. It is to be expected that, with the passage of time, our attitudes are likely to change; what was fun 20 years ago may seem very small beer today. But when the fun element disappears, perhaps we should think seriously about channelling our spare-time energies in a different direction.

Reading the letters in your column over the past few years, I am sadly persuaded that, for many members, the "fun" of amateur radio has died. Where good humour and fraternity once prevailed, vanity, pomposity and intolerance now seem to flourish unrebuked.

G. C. Moore, G3MCY

PRESIDENT'S WORKING PARTY
The Editor
Radio Communication
Sir—What a fascinating collection of topics in response to the President's appeal you have published. I think the compiler should be congratulated for packing so much information into one page.

One item in particular caught my eye—"QSL envelopes not filled up". Assuming this is a complaint may I suggest that it is more likely to be remedied if it is sent to the correct quarter—the QSL sub-manager concerned. There are 28 of us and I am sure we all do our best to provide an efficient service to members.

Without more details it is not possible to comment further but perhaps this letter will persuade the complainant to tell his sub-manager so that the difficulty can be resolved.

D. Buckley, G3VLX
Sub-manager, G4DAA-DZZ

SB104
The Editor
Radio Communication
Sir—I feel I must write and tell you of my experiences with my SB104—having read the very well prepared review of the SB104 written by G3EDM.

I built my SB104 from the kit during March/April 1975—this took some 174 hours in construction and a further 20 hours of setting-up, board checking etc. On initial switch-on, the second receiver mixer —a dual-gate mosfet—was found to have an internal short. This was quickly changed and the alignment went ahead with no further faults. The only times the covers have been off the transceiver since then have been to show other interested amateurs the "guts" of the machine.

I have had none of the faults found by G3EDM—incidentally my pa transistors are by TRW—2N6456—and the transceiver has given many hundreds of satisfactory trouble-free hours of use. In fact, from the many people who work me on 80m, I am told that the transmitted audio is of a particularly fine quality.

I have in fact done a comprehensive assessment of my SB104 using an HP spectrum analyzer and a HP6840B signal generator—it does in fact conform to the general specification.

I feel that possibly G3EDM was most unfortunate with his kit—as was G3WFB—and I am writing to you as I feel G3EDM's article is not representative of the normal run of SB104 kits. I do not, incidentally, have anything to do with Heathkit professionally—my work takes me to rather higher planes!

I. R. Matheson, G3RRA

AN APPRECIATION
The Editor
Radio Communication
Sir—I am prompted to write to you concerning the very high quality of the diagrams, drawings, etc, which appear in *Radio Communication* and other RSGB publications. I therefore would like to express my congratulations and appreciation to Mr D. E. Cole, whom, I am pleased to see, is always named on your contents page.

I was a draughtsman for over 30 years, so I know from experience that "a draughtsman's lot is not always an easy one". I wonder whether anyone else has had the pleasure of passing him a bouquet!

"Max" Miller, G3YGI

obituaries

The Society records with regret the deaths of the following radio amateurs:

Mr S. Palmer, G8HHU
Sid Palmer died in his mid-sixties on 23 August. He was well known in vhf circles and was a regular anchor-man in 2m nets in the Leicester area.

Mr L. Boedo-Yanez, G3EHY
Louis Boedo-Yanez died in mid-June. He was active on vhf in the mid-'sixties and was a pioneer of the 4m band.

We have also been advised of the deaths of:
Mr J. Hoffman, G3UG, on 30 August;
Mr E. (Ted) Inman, G2DRA, on 15 July.

Mobile rallies calendar

19 March 1978—White Rose Mobile Rally, Lawnswood School, Leeds. Details from G4DZI.
11 June 1978—Elvaston Castle Mobile Rally. Details later.
23 July 1978—Cornish Mobile Rally, Truro. Details from G3NKE, tel Camborne 712419.

VHF NATIONAL FIELD DAY 1977 RESULTS

VHF NATIONAL FIELD DAY 1977 RESULTS

WINNER: Martlesham RS and Ipswich RC (Surrey Trophy)

RUNNER-UP: March & District RAS

Leading GW group: Wulfrun CG

Leading GI group: All-Antrim-Amalgamated

Leading GM group: Lothians RS (Tartan Trophy)

Leading GD group: Isle of Man ARS

Leading GU/GJ group: Guernsey ARS

70MHz leaders: GI3FFF/P (All-Antrim)

144MHz leaders: G4BPO/P (Martlesham)

432MHz leaders: G8AGU/P (Plymouth)

1·3GHz leaders: G3DY/P (March)

EQUIPMENT OF LEADING STATIONS

Martlesham-Ipswich Group (Suffolk)

70MHz (G3NYK/P): 133W p.e.p. out, 4CX250B pa; 2N3823 rf; eight elements at 55ft.

144MHz (G4BPO/P): 400W p.e.p. out, 2-4CX250B pa; 40673 rf; 10/10 at 90ft.

432MHz (G4CFI/P): 250W p.e.p. out, 4CX250B pa; BFR91 rf at masthead; MBM88 at 85ft.

1·3GHz (G3XDY/P): 50W p.e.p. out, 3CX100A5 pa; BFR91 rf at masthead; four loop Yagis at 78ft.

Band leaders

70MHz (GI3FFF/P, Antrim): 133W p.e.p. out, 4X150A pa; fet rf; nine elements at 30ft.

144MHz—see G4BPO/P above

432MHz (G8AGU/P, Devon): 400W p.e.p. out, K2RIW pa; FMT4575 rf at masthead; 18/18 at 30ft.

1·3GHz (G3DY/P, Cambridgeshire): 50W p.e.p. out, 2-2C39A pa; HP35821E rf; 4ft dish at 40ft.

Band conditions for VHF NFD 1977 were only average for mid-summer, compared with the dx opening of 1976, so it was surprising to find that the scores and the numbers of contacts made by leading stations were hardly affected. On 144MHz the leaders, G4BPO/P, actually exceeded last year's top score, to lift the Martlesham-Ipswich group into overall first place ahead of last year's winners, March & D RAS. Although the top two pulled well clear of the rest of the field it is not essential to operate from East Anglia in order to succeed in VHF NFD. Three countries are represented in the first five places, and Plymouth RC managed sixth place with a three-band entry.

On the bands

This year's report on **70MHz** repeats without apology the perennial grumble about once-a-year equipment and once-a-year operators. If equipment is not thoroughly tested by using it on the band before the contest there are bound to be problems, as the poor quality of some signals testified. The same applies to operators, many of whom seemed unused either to 70MHz or to mixed-mode operating. Some people seemed unable even to recognize their own station's callsign on cw, complaining about cw calls from distant stations as "interference". End of grumble.

Until this year the scoring system has consistently undervalued 70MHz, and the point was not lost on the Martlesham-Ipswich group. Although their geographical position meant that they could not hope to beat the more remote stations they realized that 70MHz would play an important part in their overall effort, and equipped themselves accordingly. The information given in the table will show other ambitious groups where to set their sights.

Finally, many cover sheets bore the comment that 24 hours is too long for the 70MHz part of VHF NFD; indeed, all other 70MHz contests include a compulsory overnight break till dawn.

Conditions on **144MHz** were not at all spectacular, though they improved a little on Sunday as a rainy frontal system passed away over northern Britain. Even so, the band leaders were able to work over 500 Continental stations from their Suffolk site, and the denial of this opening to G3PMH/P further north was to decide the fate of the Surrey Trophy. A number of operators on the south and east coasts mentioned that they preferred to beam east and work Continental dx in relative peace and quiet, rather than brave the bedlam to work British stations for less reward in terms of points per contact.

432MHz provided the answer to those who claim that south-eastern stations have it all their own way. G8AGU/P on Dartmoor proved a clear winner, simply because he took pains to ensure that he could work the same number of stations as everyone else, from a greater distance. With top-line equipment, other remote stations can do the same on all bands.

Although most contest activity is now concentrated at the low end of each band, for some strange reason the action on 432MHz restricts itself to the narrow segment of 432·2-432·3MHz and flatly refuses to spread out. One correspondent pointed out that under these circumstances it does not help to have stations calling CQ for 1·3GHz only, and transmitting carriers for antenna alignment. He suggested that such calls are made around some nominated frequency a little further up the band. How about 432·4MHz?

Equipment on **1·3GHz** is improving rapidly, and many stations can now produce tens of watts of ssb into high-gain antennas. In the south of England it is now possible to establish many contacts directly on 1·3GHz—or it would be if more stations listened on the band after they sign off—but the more remote stations still need 432MHz to attract attention. Even if 1·3GHz is not yet ready to cut all its links with 432MHz, the trend is clear, and it will become increasingly important that the two stations can be operated independently.

The scoring system

Under the new scoring system all four bands carry equal weight. After checking, each band leader's score is set to 1,000 points, and everyone else's scores are adjusted pro rata. A group's final score is simply the sum of its adjusted scores on each band. In mathematical terms, the final scores were calculated by the formula at the foot of the results table, using a programmable calculator (no computers yet, and no Z-fold paper either!).

Obviously the new system has its disadvantages. It is a bit obscure to some contestants, one of whom said "We're not quite sure what you're going to do with the scores, but we hope you do!" The second snag is that until this report appears it is impossible for groups to estimate their final scores and compare them on the air, which is a pity because half the fun of the contest seems to be talking about it afterwards. As last year's report explained, the new system is an attempt to avoid the difficulty of trying to weight all bands equally by fixing multipliers in advance, for the correct multipliers will depend on band conditions during the contest. Under the old system, the correct multipliers for 1977 would have been about 5 for 70MHz, 1 for 144MHz, 4 for 432MHz and 1 point/km for 1·3GHz; but it is very unlikely that the VHF Contests Committee would have chosen those figures on the guidance of previous years' results. Having now experienced both old and new systems, which do you prefer?

A power limit?

The special conditions of VHF NFD tend to magnify the problems of vhf/uhf contests in general, so this is a good place to air the question of a power limit. The committee would like to see both sides of the argument discussed by contestants in letters to the editor, but would also like to remind its "customers" that whatever they may wish or propose, it is the committee that has to try and make it work in practice (and gets the blame if it does not). It would be no service to contestants if we were to introduce rules that cannot readily be enforced, no matter how desirable the objectives may be. To set the historical record straight, the power limits in vhf/uhf/shf contests are at present defined by the terms of the licence, and have been so since 1969 for almost all contests except VHF NFD, from which the 25W limit was removed four years later.

We open the debate with comments from this year's contestants. Cray Valley believe that a power limit should be introduced for several reasons, including the following: all stations could run from one generator, or batteries; more effort would be put into antenna design; more stations would probably be worked because there would be less QRM; the whole effort would cost less to mount; and it would be fairer to small groups with small budgets and

resources. On the other side we have Horsham, who were not themselves using high power but did not wish to see a power limit create a "battle of black boxes"; Southampton made a similar comment, on very surprising notepaper. Horsham also felt that a group who were not prepared to make the effort to take high-power equipment to some high site did not deserve to do well in the contest. Having now set the ball rolling, the committee will retire to the sidelines and watch the debate with interest.*

Postscripts

No prizes next year for the most original short name for a contest group. "All-Antrim-Amalgamated" is suspected to be a front name for the MAFIA contest group. Which Devonian wishes more than ever that his 1·3GHz gear had been working? Leicester are sending their operators on a handwriting and geography course. Who will be the first to work a real ZB2 on 70MHz? Or 144MHz? And which 144MHz leader worked the entire contest with a broken coaxial cable between converter and receiver?

G3SEK

** No undertaking can be given to publish all letters received on this subject because of space limitations, but any not published will be forwarded to the VHF Contests Committee*—Ed.

FINAL RESULTS

Posn	Name of group	Total score*	Position in each band 70 MHz	144 MHz	432 MHz	1·3 GHz
1	Martlesham RS & Ipswich RC	3,280	19	1	3	2
2	March & D RAS	3,009	20	6	4	1
3	Wulfrun CG	2,296	14	3	6	18
4	Harwell ARC	2,244	40	17	5	3
5	All-Antrim-Amalgamated CG	2,141	1	25	15	10
6	Plymouth RC	2,117	9	38	1	—
7	North Kent VHF/UHFG	1,888	17	7	13	26
8	Stockport RS	1,877	39	22	9	6
9	Ebor Group	1,802	4	21	12	—
10	Albright & Wilson ARS	1,800	22	8	21	17
11	Bracknell ARC	1,777	34	18	24	4
12	Reading & D ARC	1,760	49	16	10	7
13	Lothians RS	1,714	6	11	28	—
14	Hereford CG and Poole ARS	1,607	15	25	7	—
15	Crystal Palace & D RC	1,606	64	5	11	35
16	Norfolk VHF/UHF CG	1,593	16	4	66	37
17	Leicester RS	1,589	30	19	49	5
18	Salop ARS	1,583	33	40	22	8
	Last Minute CG	1,583	21	45	29	9
20	Horsham ARC	1,567	31	9	17	40
21	RS of Harrow	1,518	41	12	37	11
22	The Magnificent Seven	1,503	2	29	60	—
23	Hull & D ARS	1,466	26	13	50	15
24	Newquay & D ARS	1,455	7	34	43	—
25	Ayr ARG	1,424	5	52	41	—
26	Doncaster MIHE ARC	1,420	23	46	30	20
27	Isle of Man ARS	1,347	3	14	—	—
28	South Birmingham RS	1,346	29	60	35	14
29	Mansfield RS	1,341	32	20	18	—
30	Southgate RC	1,327	28	42	34	25
31	Sutton & Cheam RS	1,298	13	31	—	13
32	Surrey RCC	1,279	55	24	26	29
33	G3TAL Group	1,262	35	48	15	—
34	Worthing & D ARC	1,259	25	39	31	44
35	Dunstable Downs RC	1,258	51	72	23	16
36	Newbury & D ARS	1,243	47	62	33	19
37	ARC of Nottingham	1,203	42	43	25	42
38	Martlett CG	1,183	27	23	42	—
39	Echelford ARS	1,177	37	51	20	—
40	Great Lumley AR&ES	1,163	11	53	56	—
41	Border ARS	1,083	8	70	82	—
42	Shefford & D RS	1,079	43	57	38	41
43	Northern Heights ARS	1,069	18	37	76	46
44	Bristol & Cardiff/Newport CG	1,068	57	28	58	34
45	Southampton RC and RSGB Group	1,036	48	33	80	28
46	Guildford & D RS	1,023	44	61	65	33
47	Grafton RS	1,001	52	63	63	27
48	Bedford VHF/UHF CG	988	54	84	52	23
49	Medway ARS & Bexley VHFG	963	68	15	19	—
50	Clifton ARS	960	59	86	47	22
51	Southdown ARS	947	77	2	64	—
52	Crawley ARC	928	38	49	70	—
53	West Kent ARS	925	46	58	55	—
54	Wessex ARG	914	45	56	71	43
55	Northampton RC	902	61	66	32	48
56	Farnborough & D RS	894	62	90	45	24
	North Liverpool RC	894	75	101	2	—
58	Vectis Wireless Group	871	36	—	56	32
59	Preston ARS	843	12	79	—	—
60	Guernsey ARS	796	23	71	85	—
61	Mid-Cheshire & Warrington CG	784	63	54	59	—
62	Chichester D ARC	737	71	30	53	36
63	Windscale AR&ES	725	53	41	—	—
64	491 ATC	680	—	86	27	21
65	Caterham RG	648	60	81	74	—
66	Harlow Group and Harlow & D ARS	632	—	68	35	30
67	Chippenham & D ARC	607	—	27	40	—
68	U of Surrey EARS	604	—	36	39	—
69	Nunsfield House Community Assoc ARG	596	50	87	90	—
70	G. M. Taylor, G8HVY	588	—	—	8	—
71	Verulam ARC	568	56	78	—	—
72	Vange ARS	566	—	35	44	—
73	South of Scotland VHF/UHF CG	500	—	—	14	—
74	RAF Sealand ARC	493	—	50	48	—
75	Bell Hill Bombers	473	58	98	—	—
76	Harlut CG	457	—	32	73	—
77	Mid-Sussex ARS	439	—	59	51	—
78	Denby Dale & Spen Valley	418	66	84	83	47
79	Maidenhead & D ARC	393	—	92	68	31
80	Havering & D ARC	386	65	78	—	—
81	Yeovil ARC	381	—	44	77	—
82	Coventry ARS	372	76	89	62	39
83	Melton Mowbray R C G	353	—	73	61	—
84	Milton Keynes & D RS	339	—	82	54	—
85	Ealing & D ARS	336	69	55	94	—
86	Torbay ARS	314	—	76	69	—
87	Addiscombe ARC	299	—	—	—	12
88	Perth & D ARG	284	67	98	87	—
89	WEADCOG	273	—	90	67	—
90	Norfolk ARC	272	—	64	81	—
91	Scarborough ARS	267	—	69	78	—
92	Coulsdon CG	233	—	94	72	—
93	Edgware & D RS	213	—	94	74	—
94	Civil Aviation ARS	195	70	97	—	—
	North Humberside VHFG	195	—	67	88	—
96	Thanet RS	186	73	74	91	—
97	P. D. Aggus, G3YZD	185	—	75	86	—
98	P. T. Gaskin, G8AYY	152	—	—	79	38
99	Bolton & D ARS	145	72	93	—	—
100	St Andrew's Luton Venture Scouts	125	—	96	84	—
101	Norweb ARC	71	74	100	89	—

$$\text{*Total score} = \frac{\text{70MHz score} \times 1{,}000}{\text{70MHz leader's score}} + \frac{\text{144MHz score} \times 1{,}000}{\text{144MHz leader's score}} + \frac{\text{432MHz score} \times 1{,}000}{\text{432MHz leader's score}} + \frac{\text{1·3GHz score} \times 1{,}000}{\text{1·3GHz leader's score}}$$

70MHz band results

Posn	Callsign (/P)	Points	QSOs	QRA	Best dx	Km
1	GI3FFF	1,392	97	XO11	GU4ASO/P	620
2	GM4BVE	1,359	88	XP52	G3MLS/P	610
3	GD3YEO	1,353	119	XO67	GU4ASO/P	530
4	G3UUT	1,302	120	ZO55	GU4ASO/P	540
5	GM3WIL	1,290	90	XP76	G3MLS/P	560
6	GM4DIJ	1,281	93	YP42	G4DWB/P	580
7	G4ADV	1,226	88	XK54	GM4CXP/P	620
8	GM4CXP	1,173	83	YP18	G4DWB/P	650
9	G3UVS	1,138	100	YK21	GM4CXP/P	565
10	G4DWB	1,050	70	XK63	GM4CXP/P	650
11	G4EUZ	1,013	97	ZO22	G3XCS	440
12	G3KUE	979	111	YN18	GU4ASO/P	470
13	G4ADM	966	125	ZN71	GM4AWA/P	375
14	GW3WCS	948	124	YM44	GM4AWA/P	449
15	GW4CNY	932	120	YL05	GM4CXP/P	420
16	G3ZIG	907	97	AM06	G4DWB/P	540
17	G3TAA	894	104	ZK21	GM4CXP/P	582
18	G3UGF	887	104	ZN11	GU4ASO/P	475
19	G3NYK	883	105	AM67	GM4BVE/P	578
20	G3VCV	855	119	AM51	GM3ZBE	560
21	G4BEZ	850	122	YL20	GM3ZBE	609
22	GW3UEY	840	113	YM54	GM4AWA/P	460
23	GU4ASO	835	72	YJ47	GI3FFF/P	620
	G4BZD	835	100	ZN44	G4DWB/P	480
25	G3YHM	826	112	ZK09	GM4BVE/P	585
26	G3AMW	817	81	ZO80	G4DWB/P	560
27	G4AOL	809	110	AK11	GM4BVE/P	620
28	G4ASR	790	98	YL57	GM4CXP/P	490

Posn	Callsign (/P)	Points	QSOs	QRA	Best dx	Km
29	G4EQF	784	122	YM50	GM4AWA/P	445
30	G3HYH	782	116	ZM36	GM3ZBE	530
31	G3NPF	773	111	ZK08	GM4BVE/P	605
32	G3XWZ	768	110	ZN62	GU4ASO/P	405
33	G4AZS	758	115	YM48	GM4AWA/P	440
34	G4DDL	756	123	ZL26	GM3ZBE	526
35	G3TAL	752	73	ZO56	G4DWB/P	557
36	G3WIE	745	94	ZK25	GM4CQP	570
37	G3TDR	743	102	ZL66	GI3FFF/P	570
38	G3TIR	727	99	ZL80	GM4BVE/P	601
39	G3ZOD	718	100	ZN61	GU4ASO/P	424
40	G5RP	716	110	ZL33	GM3YZU/P	576
41	G3MLS	715	99	ZK10	GM4BVE/P	610
42	G4EKW	711	103	ZM04	G4DWB/P	420
43	G4DRS	710	116	ZM79	GM4BVE/P	501
44	G3PJX	708	109	ZL69	GM4BVE/P	560
45	G3NIL	694	91	YK19	GM4BVE/P	547
46	G4DIX	691	103	AL61	GI3FFF/P	565
47	G3WOI	684	102	ZL53	GM4BVE/P	527
48	G4CVI	673	94	ZL52	GM3OBC	550
49	G3MOT	659	112	ZL54	GM4BVE/P	540
50	G3ZBI	658	94	ZN61	GM4BVE/P	320
51	G4DDC	648	104	ZL18	GM4BVE/P	527
52	G3ZKE	633	101	ZL29	GM3WIL/P	545
53	G4EDV	615	63	YO54	G3WIE/P	430
54	G4FEV	614	102	ZM68	GM4BVE/P	484
55	G3KGA	603	83	AL66	GD3YEO/P	510
56	G4CQZ	584	92	ZM80	GM4BVE/P	485
57	GW3MGS	581	79	YL25	GM4DIJ/P	398
58	G3PVW	573	73	YK09	GM4BVE/P	542
59	G3WMR	554	93	AL52	GM4BVE/P	580
60	G3GKF	548	86	ZL60	GM4BVE/P	570
61	G3GWB	529	79	ZM45	GM4BVE/P	435
62	G4FOW	517	87	ZL66	GM4BVE/P	560
63	G4CAX	504	94	YN67	GU4ASO/P	460
64	G3OOU	422	53	AL45	GM3WIL/P	555
65	G4GDG	335	67	AL21	GD3YEO/P	429
66	G3SVC	324	50	ZN32	GM4BVE/P	325
67	GM4AWA	295	25	YQ44	G3BEZ/P	510
68	G5MW	266	44	AL43	GD3YEO/P	452
69	G4CJJ	160	38	ZL26	GM3WIL/P	465
70	G3GDU	159	45	ZL38	G3UUT/P	301
71	G4ETU	137	29	ZK07	G3UUT/P	370
72	G4AGJ	73	16	YN38	G5RP/P	260
73	G3DOE	35	7	AL56	G3TAA/P	240
74	G3XST	27	11	YN28	GD3YEO/P	160
75	G3XMG	8	4	ZN61	G3WZN	75
76	G3UOL	6	2	ZM63	G4ADM/P	112
77	G3WQK	4	2	AK03	G4GDG/P	73
						G5HD

144MHz band results

Posn	Callsign (/P)	Points	QSOs	QRA	Best dx	Km
1	G4BPO	8,871	727	AM67	SM6FYJ	915
2	G8BQX	6,703	571	AK03	OZ6OL	877
3	GW8BHH	6,380	603	YM44	HB9AYX/P	938
4	G4BEW	5,996	505	AM06	SM6FYS	865
5	G3VCP	5,838	534	AL45	DC7HM	840
6	G3PMH	5,791	542	AM51	DL0JR/P	960
7	G8FUF	5,075	469	ZK21	HB9MFJ/P	787
8	GW3OXD	4,968	537	YM54	DK0ZB/P	780
9	G3TNO	4,541	489	ZK08	F5HH	681
10	G4CRC	4,364	311	XK63	GM8FFX	780
11	GM4AOR	4,041	332	YP42	F1BRM/P	755
12	G3EFX	3,544	393	ZK10	F1DXB	735
13	G8GBY	3,447	308	ZO80	DB8AT/P	818
14	GD3FLH	3,327	320	XO67	G4DDY/P	515
15	G2FJA	3,317	402	AL43	GM8FFX	640
16	G4CCC	3,313	422	ZL54	DK7BM/P	682
17	G3PIA	3,252	431	ZL33	DL0SO/P	611
18	G4BRA	3,251	432	ZL26	GM4TKV/P	654
19	G3LRS	3,123	414	ZM36	DK0ZB/P	634
20	G3GRL	3,122	398	ZN62	DK7BN/P	689
21	G3JFO	3,071	319	ZO55	F6CTT/P	570
22	G8GAJ	3,054	452	ZN61	F1DSQ/P	630
23	G4DZO	3,044	366	AK11	HB9MMC/P	645
24	G4DDY	3,032	329	AL66	DL0LK/P	720
25	GW3WRA	3,030	374	YL05	ON4NH/P	670
26	GI4FEE	2,995	235	XO11	F1DPU	817
27	G3VRE	2,928	366	ZL52	DJ0JWA	607
28	GW5BI	2,926	377	YL25	DL0WU	701
29	GM3WFW	2,923	231	XP52	F6CTT/P	772
30	G3IZD	2,889	341	ZK07	DC8TK	680
31	G3LCH	2,873	387	ZN71	F1BEZ/P	615
32	G8LSS	2,832	360	ZL17	GM8FFX	580
33	G8FAB	2,831	356	ZL52	GM8FFX	639
34	G3XC	2,826	228	XK54	GM8MJV/P	740
35	G3YCW	2,783	367	AL33	GM8MJV/P	620
36	GW3IGQ	2,754	332	YM75	GM4FNF	577
37	G2SU	2,717	336	ZN11	DL0WU	655
38	G3ULN	2,657	271	YK21	PA0ZAZ/P	636
39	G3WOR	2,588	389	ZK09	GM3WFW/P	584
40	G3SRT	2,578	342	YM48	DL0KM	620
41	G3WIN	2,508	259	YO54	F1BRM/P	655
42	G3SFG	2,478	332	YL57	DL0AN	621
43	G6CW	2,466	358	ZM04	F1BBD	565
44	G3XFW	2,464	300	YK05	GM8FFX	690
45	G4BBR	2,453	331	YL20	DK3IK/A	688
46	G3UER	2,360	311	ZN44	DL0WU	605
47	G3XBF	2,310	314	AL21	DL0KS/P	605
48	G3SHK	2,290	202	ZO56	DJ4GC/P	734
49	G3WSC	2,282	327	ZL80	GM8MJV/P	669
50	GW3ITZ	2,260	293	YN75	PA0NYM/P	636
51	G3UES	2,220	296	ZL66	GM8FFX	730
52	GM3KJF	2,100	177	XP76	F1BRM/P	740
53	G4FUT	2,013	242	ZO22	ON6JG/P	625
54	G3ZTT	1,965	311	YN67	F1DUN/P	580
55	G3UUP	1,960	315	ZL25	GI4DBB/P	542
56	G8HCI	1,903	238	YK19	HB9AYX/P	762
57	G3FJE	1,897	286	ZM79	GM8MJV/P	548
58	G3WKS	1,896	285	AL61	HB9MGC/P	660
59	G3ZMS	1,890	242	ZK10	GI4FEE/P	575
60	G8LHC	1,831	285	YM50	DF1JC	630
61	G6GS	1,827	293	ZL69	F1DUN/P	645
62	G2CPM	1,821	274	ZL53	PA0JCA/P	728
63	G3AFT	1,754	340	ZL29	DK3IK/A	553
64	G4ARN	1,732	187	AM05	DK0AG/P	570
65	GM8MJV	1,723	117	YQ08	G8FUF/P	682
66	G8LED	1,651	242	ZM45	PA0NYM/P	507
67	G4ERG	1,609	200	ZN07	G4CRC/P	525
68	G8AJR	1,573	237	AL02	GM8FFX	592
69	G4BP	1,539	163	ZO58	G3XC/P	520
70	GM8IIO	1,477	147	YP18	G4CRC/P	657
71	GU3HFN	1,448	146	YJ47	PE0GPL	560
72	G8DDC	1,430	239	ZL18	GM4FNF	590
73	G4FOX	1,418	214	ZM26	DK0ZM	620
74	G3DOE	1,390	175	AL56	F6DKC	810
75	G3YZD	1,370	197	ZN61	DB6BX	619
76	G3NJA	1,369	171	YK33	GM4AOR/P	540
77	G3DQW	1,357	182	ZM47	F6CVN	530
78	G3VER	1,314	—	—	—	—
79	G4GBW	1,292	276	AL21	DK3IK/A	533
80	G8GLS	1,241	141	YN18	PA0ZAZ/P	580
81	GM4AGG	1,176	134	XP09	G4CRC/P	576
82	G4AKG	1,129	211	ZL60	GI4FEE/P	541
83	G8MKC	1,073	201	ZL06	DL0AN	480
84	G4FNS	1,052	168	ZM68	F6CVN/A	515
85	G4CDD	1,037	191	ZN32	ON6JG/P	530
86	G3GHN	1,035	173	AL52	GM3KJF/P	525
87	G4ELO	1,003	191	ZM64	GM8MJV/P	530
88	G3EEO	1,002	160	ZN71	ON4YZ	515
89	G2ASF	977	152	ZM63	PA0JCA/P	509
90	G8MWV	953	153	AL12	DK7BN/P	540
91	G2ZUM	927	174	ZL66	F6EUL	818
92	G3WKX	880	180	ZL37	DL0AN	550
93	G8WY	820	114	YN38	PA0ZAZ/P	440
94	G8KKC	791	167	ZL59	GM3WFW/P	542
95	G3ASR	765	192	ZL39	ON5PL/A	440
96	G8LVS	721	143	ZL19	GM4AOR/P	447
97	G4CAA	720	160	ZL38	GI4FEE/P	490
98	G3ZKA	540	83	YK09	GM3WFW/P	542
99	GM4EAF	516	54	YQ44	G3XC/P	685
100	G8FDL	364	56	YN28	G4CRC/P	440
101	G3VXK	95	26	ZN61	G4CRC/P	425

144MHz LISTENERS RESULTS

Posn	Station	Points	QSOs	QRA	Best dx	Km
1	BRS15822	685	141	ZL40J	GM4AOR/P	485
2	BRS32525	449	140	AL41C	G4CRC/P	407
3	BRS38957	384	58	YN56F	G4CRC/P	389
4	BRS34740	304	56	—	F6AGV/P	379
5	BRS33823	281	67	ZL27J	G8GBY/P	273
6	BRS38519	241	39	ZL52C	G4FUT/P	432
						G3VPK

432MHz band results

Posn	Callsign (/P)	Points	QSOs	QRA	Best dx	Km
1	G8AGU	2,160	186	YK21	PA0EZ	635
2	G3JQA	1,896	217	ZN61	DF1EQ	650
3	G4CFI	1,742	185	AM67	HB9AOF/P	702
4	G4BEL	1,603	195	AM51	DF1EQ	535
5	G3NNG	1,427	179	ZL33	DF1EQ	7,600
6	GW3UBX	1,379	161	YM44	PA0JCA/P	625
7	GW3OBD	1,287	150	YL05	PA0NYM/P	610
8	G8HVY	1,269	145	YK28	DC6MV	599
9	G6UQ	1,249	186	ZN61	PA0JCA/P	540
10	G3AKF	1,142	162	ZL54	DF1EQ	585
11	G3FZL	1,140	145	AL45	PA0THT	412
12	G8FIS	1,124	114	ZO55	ON5EB	525
13	G8AYN	1,088	129	ZK21	DF1EQ	620
14	GM4DMZ	1,079	102	XO26	G4BBW	510
15	G8CLY	1,002	106	ZO56	ON6AT/A	512
16	GI3VPK	969	78	XO11	G4FKI	525
17	G3WZT	952	133	ZK08	PA0JAN/P	560
18	G3GQC	944	132	ZN62	PA0SIP/A	525
19	G8BIS	860	122	AL43	GM3HAM/P	515
20	G2HDJ	848	127	ZL66	GI3VPK/P	570

Posn	Callsign (/P)	Points	QSOs	QRA	Best dx	Km
21	GW3NZS	808	105	YM54	PA0NYM/P	612
22	G3VZG	806	124	YM48	F6BHL	504
23	G4ARD	794	124	ZL18	PA0PX	520
24	G4DDN	785	128	ZL26	GM3YFV/P	517
25	G3EKW	773	110	ZM04	—	—
26	G8TB	760	106	AL66	DB6BX	445
27	G8AMD	753	127	ZM64	PA0NYF/P	490
28	GM3HAM	731	69	YP42	G3THT/P	573
29	G4ERP	730	115	YL20	GM3YFV	455
30	G3WHL	713	96	ZN44	PA0NYM/P	504
31	G8GCP	706	112	ZK09	PA0JCA/P	465
32	G3XTT	698	116	ZM45	PA0NYM/P	507
33	G4EEE	684	106	ZL53	PA0NYM/P	514
34	G4AEZ	664	88	YL57	PA0VV	490
35	G6UT	661	99	AL02	GI3VPK/P	523
	G8KOS	661	105	YM50	PA0ZAZ/P	453
37	G3HBR	644	101	ZK10	G3BW	458
38	G4BWP	642	104	ZM79	PA0JCA/P	425
39	GW4EDW	633	87	YM75	PA0EZ	564
40	G8KBK	599	103	ZL52	GM3HAM	488
41	GM3THI	563	50	XP76	G3THT/P	520
42	G3XUS	554	87	AK11	DL6MV	425
43	G3THT	552	50	XK54	GI3VPK/P	490
44	G3ELM	544	104	AL33	DC6MV	385
45	G4FKI	530	92	AL21	—	—
46	G4FRS	522	94	ZL66	DC6MV	491
47	G4DBW	520	101	AL52	GM4DMZ/P	495
48	GW3LAI	515	78	YN75	PA0ZAZ/P	544
49	G8LM	495	80	ZM36	PA0NYM/P	471
50	G8GLM	489	54	ZO80	G8AGU/P	458
51	G4CXT	488	86	ZK10	PA0NYM/P	420
52	G8FMG	486	93	ZM68	PA0VTW/P	435
53	G2DSP	472	74	ZK07	DF1EQ	560
54	G8HUH	471	82	ZL06	GI3VPK/P	455
55	G4BWH	465	85	AL61	DF1EQ	485
56	G3RND	449	63	ZK25	DF1EQ	581
	G4FRD	449	45	ZO22	G8AGU/P	460
58	GW6YB	436	70	YL25	PA0RPI/P	447
59	G4CDA	432	77	YN67	—	—
60	GM3YFV	425	36	XP52	G3SOU/P	538
61	G8EPT	418	83	ZM26	PA0CKV/P	440
62	G4DSF	417	73	ZM63	PA0NYM/P	504
63	G4DWZ	410	92	ZL29	PA0NYM/P	410
64	G8FEU	408	58	AK03	DF1EQ	445
65	G3TLM	396	90	ZL69	PA0NYM/P	428
66	G8ECN	383	49	AM06	F1ECI	563
67	G8MWV	357	63	AL12	DC6MV	410
68	G3VCT	355	79	ZL37	PA0NYM/P	450
69	G8HJA	344	44	YK33	G8CLY/P	445
70	G3GRO	321	68	ZL80	GD8EXI	459
71	G8BBN	319	57	YK19	G8CLY	390
72	G4FUR	311	83	ZL59	PA0ZAZ/P	—
73	G4FDX	298	70	ZL17	PA0NYM/P	440
74	G3TWJ	274	60	ZL60	PA0HWE/P	380
	G8FAT	274	82	ZL39	ON6AT	275
76	G4ENR	225	49	ZN11	ON6AT	475
77	G3CMH	223	37	YK05	ON6AT	445
78	G4EEV	203	29	ZO58	G8AGU/P	450
79	G8AYY	179	37	ZN71	GI3VPK/P	322
80	G3SOU	172	35	ZL52	GM3YFV/P	522
81	G4ARN	165	21	AM05	G8AGU/P	405
82	GM8BDX	159	19	YP18	G3NNG/P	457
83	G8KMK	109	31	ZN32	PA0ZAZ/P	430
84	G8IXK	95	29	ZL19	ON6AT	285
85	GU8BPN	72	10	YJ47	G3XUS/P	250
86	G3XVA	65	27	ZN61	GW3EDW/P	154
87	GM8JZY	30	6	YQ44	G6UQ/P	360
88	G8FEK	29	7	ZN07	G8ACN	205
89	G8FDL	23	7	YN28	GW3OBD/P	195
90	G8KGC	22	12	ZN71	GW4EDW/P	120
91	G3DOE	8	4	AL56	G8CPK	90
92	GM8MOQ	6	4	YQ08	GM8AZS/P	—
93	G8EQY	4	2	ZM47	G8CRN	70
94	G3THQ	1	1	ZL26	G8FAT/P	39
	GM4AGG	1	1	—	GM3VQJ	—
	BRS33823	80	30	ZL27	G3UQA/P	180
						G8ACJ

1·3GHz band results

Posn	Callsign (/P)	Points	QSOs	QRA	Best dx	Km
1	G3DY	9,998	60	AM51	GI3VPK/P	482
2	G3XDY	8,387	46	AM67	G3AUS	384
3	G4DGU	7,024	52	ZL33	PA0EZ	480
4	G4AUC	5,041	45	ZL26	GI3VPK/P	485
5	G3TQF	4,464	36	ZM36	GI3VPK/P	413
6	G4CBW	4,387	33	ZN61	GI3VPK/P	365
7	G3ULT	3,846	41	ZL45	G3LQR	216
8	G3UQH	3,750	29	YM48	G3XDY/P	261
9	G4ERP	3,578	29	YL20	G3LQR	246
10	GI3VPK	3,550	10	XO11	G3DY/P	482
11	G3HBR	3,065	25	ZK10	PA0EZ	382
12	G4ALE	2,987	34	AL51	G3PQY/P	306
13	G4CQR	2,797	21	ZN71	GI3VPK/P	362
14	G3OHM	2,702	26	YM50	G3XDY/P	224
15	G3PQY	2,639	16	ZO80	G4ALE/P	308
16	G4CPE	2,633	28	ZL18	G4CBW/P	183
17	GW3TGL	2,626	19	YM54	GI3VPK/P	330
18	GW3ONP	2,570	18	YM44	G3XDY/P	310
19	G4EFE	2,299	30	ZL53	G3XDY/P	210
20	G3WHL	2,241	20	ZN44	GI3VPK/P	337
21	G8AMD	2,181	26	ZM64	GW3ONP/P	137
22	G4DBW	2,043	21	AL52	G4CBW/P	260
23	G3WTP	2,033	22	ZM68	G4AEL/P	182
24	G3UAA	1,765	24	ZL66	GW3TGL/P	202
25	G4AEZ	1,725	15	YL57	G3DY/P	230
26	G3XPU	1,704	17	ZK21	G3DY/P	241
27	G4DWZ	1,589	25	ZL29	G3OHM/P	153
28	G5HD	1,543	17	ZL52	G3XDY/P	218
29	G8TB	1,521	14	AL66	ON6AT/A	173
30	G6UT	1,488	15	AL02	ON6AT/A	258
31	G3VCT	1,296	22	ZL37	G3XDY/P	155
32	G3WXC	1,280	15	ZK25	G3DY/P	205
33	G4ECF	1,250	23	ZL69	G8AMD/P	120
34	GW3FYX	1,187	9	YL25	G3DY/P	235
35	G3FZL	1,167	12	AL45	PE0MAR/P	245
36	G2DSP	941	14	ZK07	G3XPU/P	92
37	G8AWZ	878	7	AM06	G4DGU/P	229
38	G8AYY	689	9	ZN71	GW3TGL/P	130
39	G4DSF	646	8	ZM63	GW3ONP/P	125
40	G3WZT	587	8	ZK08	G4DGU/P	108
41	G4EIY	577	11	ZM79	G4DGU/P	100
42	G3TVY	562	8	ZM04	GW3ONP/P	144
43	G4EKE	528	6	YK19	G3UQH/P	180
44	G8GPZ	470	7	ZK09	G3XPU/P	110
45	G8ACE	450	8	ZL73	G4AEZ	97
46	G4DZU	216	6	ZN11	G4CBW/P	55
47	G3SDY	179	7	ZN32	G4FXW	39
48	G8DLZ	125	2	ZM45	G3UQH/P	100
						G3FZL

other contest news

The Commonwealth Contest 1977 results

The 1977 event seems to have been conducted under very similar conditions to the previous year. Conditions for stations in Europe were rather indifferent while trans-Pacific paths for Australia, New Zealand and western Canada were very active. The HF Contests Committee was delighted to find a 10 per cent increase in the number of logs for the transmitting section. This must be partly due to the excellent publicity for the event in Australia organized by John Tutton, VK3ZC, and Eric Trebilcock, BCRS195. We regret the poor publicity in New Zealand and Canada but are taking steps to improve this for next year.

The overall winner this year is Peter Watson, ZL3GQ, whose excellent signals on all bands gave him a total of 347 QSOs. Last year's winner, Lee Sawkins, VE7CC, is in second place. For the fifth year in succession, Al Slater, G3FXB, wins the Col Thomas Rose Bowl as the leading UK station.

In the single-band sections, 14MHz is the only band to attract many entries. The leader here is Stuart Jesson, G4CNY, who made 108 QSOs. In second place is Chris Page, G4BUE. The overseas leader on 14MHz is S. Coleston, AX4XA, who had 91 contacts. G4CNY used a T4XC/R4C combination with a 2-el quad and AX4XA used a FL200/AR88 with a 3-el Yagi.

As last year, the number of entries in the listening section is disappointing. Last year's winner, Eric Trebilcock, BCRS195, again wins the Receiving Rose Bowl and deserves congratulations on his 36th "BERU" entry.

TROPHY WINNERS

Senior Rose Bowl	P. W. Watson, ZL3GQ
Junior Rose Bowl	L. Sawkins, VE7CC
Col Thomas Rose Bowl	A. J. Slater, G3FXB
Receiving Rose Bowl	E. W. Trebilcock, BCRS195

Comments

All the comments included with the logs were read with interest by the committee. There would appear to be no great dissatisfaction with the rules. The only area of debate is on the duration of the contest, with a few entrants preferring a resumption of the 48-hour period or similar with rest periods. There is some comment on the continuing clash with the WSEM contest. Unfortunately, although RSF (the USSR national radio society) is a member of IARU and has the facility of advertising its contests calendar in the IARU journals, it continues to be impossible to find out in advance the dates of these contests. In addition, given the very full contest calendar at this time of the year, unless the contest were to be moved to a completely different period it would be difficult to find an alternative date.

Hope to be licensed for next contest—*A8312.*
Band conditions poor. Activity up. Thoroughly enjoyable—*VK2BPN.*
Poor publicity in VE—*VE1BHA.*
Your publicity is woeful—*ZL1AIZ.*
Do not like the excessive CQs. Maybe CQ machines should be banned—*VE2WW.*
Keep "BERU" as it is—*G3DYY.*
First serious CC. Looking forward to next year—*VE3DU.*
Contest exceedingly boring—*G4ALG.*
Was only told to QSY once—and that by an SP stn calling VS5MC—*G8DI.*
Competed in first BERU in 1930. Perhaps I should get some points for good attendance—*VK2NS.*
Contest marred by WSEM clash. LF bands disappointing—*G3KSH.*
Poor publicity in ZL. Enjoyable contest. Back next year—*ZL2BR.*
Conditions good. Activity from Africa/Asia poor—*VS5MC.*
Some difficulties as QTH (HMS *Belfast*) is open to the public during the day—*G4EOK (G3HZL).*
Not much sign of conditions improving. Maybe '78—*ZL1HV.*

Our grateful thanks to all who sent in logs and congratulations to the trophy winners. Check logs from G3AZ, G3KDB and VK3PT are gratefully acknowledged.

D.J.A.

TRANSMITTING SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	ZL3GQ	4,777	47	GM30XC	1,270
2	VE7CC	4,696		VK5KL	1,270
3	VE7UZ	3,856	49	G3PVA*	1,255
4	ZL2BR	3,658	50	VE2DZE	1,225
5	VE3AKG	3,656	51	G2HLU	1,215
6	G3FXB	3,583		ZL1HV	1,215
7	G3MXJ	3,481	53	AX4XA*	1,211
8	VK5NO	3,431	54	ZL1AIZ	1,185
9	ZL2BCO	3,353	55	ZL2AUP	1,160
10	VK2BPN	3,293	56	G3ESF	1,130
11	VE3KZ	3,275	57	ZL3BK	1,111
12	VE1CD	3,180	58	GW3MPB	1,110
13	VS5MC	3,115	59	VK7JB	1,075
14	9H1CH	3,060	60	VP2MJ*	1,045
15	VK2GW	2,925	61	VK7RY	1,000
16	G3DYY	2,565	62	G3GC	988
17	VO1AW	2,544	63	VE3GCE	974
18	ZD8DO	2,525	64	VE3DU	935
19	VK7BC	2,455	65	VE3EJK	920
20	9J2BO	2,335	66	VE7BS**	910
21	G6CJ	2,325	67	G3VDW*	895
22	G5RI	2,258	68	G5ND*	875
23	AX3XB	2,250	69	G3KAA	845
24	VE2WW	2,188	70	G3VDL	840
25	VE3BWY	2,236		G3VW	840
26	VK3ZC	2,128	72	G4ALG	810
27	VK3XU	1,990	73	G5MY	783
28	G2QT	1,845	74	VP8ON	766
29	VE3IR	1,800	75	G3JKY	740
30	VE1EP	1,720	76	ZE3JO	735
31	ZB2CJ	1,708	77	VE1BHA	730
32	5Z4LW	1,665	78	AX4XJ*	711
33	G4CNY*	1,647	79	G3AWR	705
34	G4BUE*	1,641	80	VK2NS	690
35	VK5DL	1,600	81	G8QZ	675
36	VK7CH	1,575	82	VE6AVO	660
37	VK7RO	1,565	83	GM4GK	655
38	G4EOK	1,553	84	AX7HE	641
39	VK3YK	1,536	85	G3ZDD	640
40	G3KSH	1,485	86	VE2QO*	630
41	G4FAM	1,410	87	VK4KX	610
42	G3EBH	1,375		VK6VK*	610
43	G3SJE	1,355	89	G3VLL	599
44	VK6AQ	1,325	90	G2AJB	585
45	VE5APN	1,308	91	VK2XQ	575
46	VE7AZG	1,278	92	VK2HC	545
93	VK6SM*	530	102	G3ZDW	325
94	VU2GO	495	103	VK5FG	300
95	VE1EK*	490	104	G4FDC	225
96	AX3KS	425		VK3YL*	225
97	VE3CXL	405		VK7ZO	225
98	VK3CG	376	107	G4BBA***	175
99	G8DI*	370	108	G2BLA	150
100	G6NK	345	109	G3ILO	125
	VK3RJ**	345		G8KU**	125

RECEIVING SECTION

Posn	Callsign	Points
1	BCRS195	2,195
2	BRS15822	1,520
3	A8312	1,240

* 14MHz single band
** 21MHz single band
*** 3·5MHz single band
The log from VK7OB—claimed score 2,475—was not accepted as it did not contain signal reports.

HOW THE LEADERS MADE THEIR SCORES

	3·5	7	14	21	28			
	QSOs/Bonus					TX	RX	Ants
ZL3GQ	33/28	94/38	165/49	45/34	10/9	T4XB DX100	R4B 75A4	Quads, V-beam, ground plane
VE7CC	36/28	48/35	155/54	62/39	7/7	No details given		
VE7UZ	34/29	39/31	89/47	44/32	3/3	Home-brew	R4C	Quads, bisquares
ZL2BR	27/23	61/41	79/46	37/23	1/1	HW100	HW100	VK2ABQ beam, delta loop
G3FXB	30/18	32/29	113/60	23/22	2/2	T4XC FLDX500	R4C FRDX400	Quads, slopers
G3MXJ	21/16	29/29	119/55	24/24	3/3	SB401	SB301	TH6DXX, slopers

3·5MHz Field Day 1977 results

A disappointingly-low 13 entries hardly does justice to the interest shown in this contest by portable and fixed stations alike. The indifferent weather almost everywhere served to increase the number of fixed stations worked. With the same high level of portable activity as last year combined with good band conditions, scores generally are up on those achieved in 1976.

The leading station was operated by G3RTE and G3XTJ from Barnet, Hertfordshire. The driver stages of Ten-Tec Triton 2 were used to feed an inverted-V dipole. Second place is taken by a single operator, while in third place G3GQC/P was operated by G3DBZ and G3XWZ.

The HF Contests Committee thanks entrants for the many interesting comments and suggestions. All will be considered before formulating next year's rules.

Subject to Council approval, the Houston-Fergus Trophy will be awarded to the G3RTE/G3XTJ partnership.

G4FAM

Posn	Callsign/P	Location	Contacts	Points	Operators
1	G3RTE	Barnet, HRD	93	660	2
2	G3EJF	Barden, YSN	78	615	1
3	G3GQC	Mansfield, NOT	92	593	2
4	G6OI	Kinver, SFD	81	578	2
5	G4ALG	Reading, BRK	77	573	2
6	G3LHJ	Newton Abbot, DVN	80	570	1
7	G4DDL	Bracknell, BRK	72	560	2
8	G4BUE	Horsham, SXW	69	513	2
9	G4ELZ	Newton Abbot, DVN	62	501	2
10	G3VIP	Calstor, LCN	64	478	1
11	G3JKY	Tatsfield, SRY	50	424	1
12	G2RO	Beeson, DVN	51	420	1
13	G4CDD	Huddersfield, YSW	57	349	2

An entry from G4DDX/P was disallowed under rule 8(f). Check logs from G3ANK, G3FJE/A, G3IAS/P, G3NKS, G3ZDW, G4BWP, G4CNY, G4FAM and GM3OXX/P are acknowledged with many thanks. Thirty portable callsigns appear in the logs.

April 1977 144MHz CW Contest

The entry of Mr K. R. Clarke, G3KRC, was omitted from the list published on page 547 of the July issue. His score of 175 would have resulted in his being placed 27th. This error is regretted. *G3FZL*

RSGB HF Contests Championship 1976-7 results

Posn	Callsign	1	2	3	4	5	6	7	8	9	10	Total
1	G3MXJ	80			25		90					195
2	G3FXB	50				30	100					180
3	G4CNY	30					40		20	50		140
	GI3OQR		70	70								140
5	G4BUE		50		35		30					115
6	G3NAS	40		60								100
	G4BWP								40	60		100
8	G6CJ		25				70					95
9	G4ALG							20	25	40		85
10	G3VMW/A		40		40							80
	G4FAM			20					50	10		80
12	G3ORH		15		20	20				15		70
	GM3ZSP				15	15					40	70
14	G3SJJ				30	35						65
15	G4EOK						20				25	45
16	G3YMC					5		15			20	40

Contests

1 21/28MHz Telephony
2 7MHz CW
3 7MHz Telephony
4 2nd 1·8MHz
5 1st 1·8MHz
6 Commonwealth Contest
7 Low Power Contest
8 Jubilee CW
9 Jubilee Telephony
10 Summer 1·8MHz

Awards
The G2QT trophy to D. J. Andrews, G3MXJ.
Runner-up certificate to A. J. Slater, G3FXB.

Stratford-upon-Avon DF Qualifying Event results

This event attracted 21 teams to the start at Upton-on-Severn. From their initial bearings the competitors were somewhat surprised that both transmitters lay in a northerly direction; they were unaware that the stations had been placed fairly close together to give the contest an unusual layout, with the added advantage that those who had travelled far had only to cover a few road miles during the event.

Transmitter "A" was concealed on Gorse Hill, an area of rough vegetation within the built-up area of Worcester and about 10 miles from the start. Finding the approach through the network of residential streets was only the first problem, as the long aerial system proved to have a complex radiation pattern which confused the true DFers and had been laid through dense thorn bushes to impede the follow-the-wire brigade. The final approach was up a steep earthbank, strewn with locally collected junk.

Transmitter "B" was 5·5 miles farther north on the banks of the Severn at Holt Fleet. Again a long aerial had been set up, to tempt competitors from the riverside path before they reached the transmitter site. If they fell for this ruse they climbed a steep wooded hillside rising some 100ft, and after reaching the top in the wrong place it was almost impossible to traverse the hill because of the thick brambles. The exhausted state of competitors arriving at the transmitter was ample reward for the three hours spent rigging the aerial on the previous day.

Rugby ATS had decided to award their two trophies on the results of this contest, and so the winner received the Rubgy DF Cup (an open trophy) with the Rugby DF Shield being awarded to Brian Mahony, the leading member of Rugby ATS.

Messrs C. D. Plummer and B. R. Poole qualified to take part in the National Final.

Posn	Name	Club	Time of arrival Station "A"	Station "B"
1	P. M. Lisle	Mid-Thames	1435	1517
2	C. D. Plummer	Medway	1529	1431
3	B. M. Bristow	Mid-Thames	1529½	1445
4	P. Tyler	Oxford	1538½	1444
5	B. R. Poole	Mid-Thames	1538½	1421
6	B. J. Mahony	Rugby	1548	1511
7	I. R. Butson	Chelmsford	1500	1549
8	G. A. Whenham	Coventry	1550	1507
9	T. C. Gage	Mid-Thames	1552	1509
10	C. M. Wells	Mid-Thames	1538	1616
11	C. D. Merry	Dartford Heath	1449	1616½
12	A. W. Butcher	Chelmsford	1623	1512
13	D. E. Newman	Slade	1625½	1516
14	W. J. North	Mid-Thames	1432	1626
15	R. J. Parsons	Oxford	—	1515
16	J. E. Drakely	Slade	—	1550
17	P. M. Williams	Slade	1611	—
18	P. Yates	Salisbury	—	1619

Three entrants failed to locate either transmitter.

Chelmsford DF Qualifying Event results

Twenty-one teams assembled near Howe Street for the start of this event. The weather was dismal with slight drizzle. Before the start the operator of station "A" was ejected from his hiding place by two men carrying shotguns who located him without the aid of a df receiver. Naturally one does not argue in circumstances like this and it is a credit to the operator and crew that they had cleared up, found a new site, erected an antenna and radiated a signal within 45min.

The signal from station "A" was very strong at the start and its whereabouts was soon located by most competitors; however, several walked considerable distances and missed the easy way in. The station was located about two miles west of the start in a fairly thick spinney.

Station "B" was forced into a considerably easier location than planned and was not difficult to find. Brian Bristow employed considerable judgement and not a little luck when he positioned himself only a few hundred yards from station "A" just before 2pm transmission and was quickly in. He only took half an hour to drive back to Station "B" and emerged a worthy winner.

Subject to confirmation Bob Vickers and Chris Wells qualify for the National Final.

Posn	Name	Club	Time of arrival Station "A"	Station "B"
1	B. M. Bristow	Mid-Thames	1406	1435
2	J. R. Vickers	Stratford-upon-Avon	1421	1455
3	A. Simmons	Mid-Thames	1506½	1430
4	P. M. Lisle	Mid-Thames	1507	1429
5	E. L. Mollart	Mid-Thames	1508	1402½
6	I. R. Butson	Chelmsford	1508½	1428
7	G. A. Whenham	Coventry	1509	1402½
8	C. M. Wells	Mid-Thames	1509½	1403½
9	W. J. North	Mid-Thames	1511½	1428
10	M. P. Hawkins	Chelmsford	1523	1426
	C. D. Plummer	Medway	1436½	1523
12	T. C. Gage	Mid-Thames	1523½	1432½
13	D. E. Newman	Slade	1524	1429½
14	R. J. Coombes	Salisbury	1509½	1546½
15	C. D. Merry	Dartford Heath	1550	1427
16	A. W. Butcher	Chelmsford	1506½	1551
17	P. T. Tyler	Mid-Thames	1524½	1556
18	R. A. W. Brocks	Chelmsford	1511½	1600
19	W. A. Dix	Chelmsford	—	1434
20	B. Bourn	Chelmsford	—	1509
21	P. Woollett	Dartford Heath	1512	—

Second 1·8MHz Contest 1977 rules

More recently licensed members' attention is drawn to new rule 8(b).

1. The general rules for RSGB HF Contests, published in the January 1977 issue of *Radio Communication*, will apply.
2. **When.** 2100gmt Saturday 12 November to 0200gmt Sunday 13 November 1977.
3. **Eligible entrants.** Single-operator stations only. British Isles entries must be members of the RSGB.
4. **Sections.**
   (a) British Isles Stations (G prefixes)
   (b) Overseas stations including EI.
5. **Contacts.** CW (A1) only in the 1·8-2·0MHz band. In addition to RST and serial number, the British Isles stations should send the appropriate county/region letters as published in the January 1977 issue of *Radio Communication*.
6. **Scoring.**
   (a) British Isles section. Three points for each contact, with a bonus of five points for the first contact with each county/region and each country outside the British Isles.
   (b) Overseas section. Three points for each contact with a station in the British Isles (not EI) with a bonus of five points for the first contact with each county/region.
7. **Logs.** Column 5 to be headed "Code Received". Entries to be sent to RSGB HF Contests Committee, c/o M. Harrington, 123 Clensham Lane, Sutton, Surrey SM1 2ND, England.
8. (a) **Awards.** The Victor Desmond Trophy will be awarded to the leading British Isles entry. The Maitland Trophy will be awarded to the Scottish station scoring the highest aggregate number of points in this contest combined with the 1st 1·8MHz Contest 1978. Certificates of merit will be sent to the runner-up and the third placed entry in section **(a)**, to the first three stations in the overseas section **(b)**, and to the leading station in each overseas country.
   (b) A certificate of merit will be awarded to the highest placed

British Isles entrant who, on the date of the contest, has been in possession of a Class A licence for one year *or less* in this country or abroad. Entries qualifying for this award should show "One year" at the top of the cover sheet and give the date their licence was issued.

70MHz Fixed Contest rules

0900-1700gmt, 23 October 1977

All entries and checklogs to: VHF Contests Committee, c/o Mr R. Taylor, G4BEL, 12 The Rampart, Haddenham, Cambs CB6 3ST.

The following general rules, published in the January 1977 issue of *Radio Communication*, will apply: 1, 2, 3, 4c, 5a, 6a, 7a, 8, 9a, 10a, 11-22.

144MHz CW Contest rules

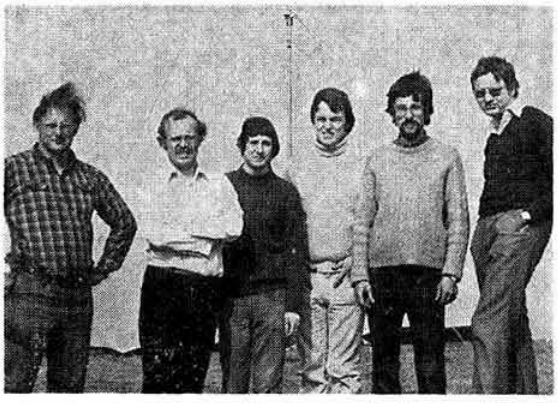
2000-0100 gmt, 5-6 November 1977

All entries and checklogs to: VHF Contests Committee, c/o Mr G. M. C. Stone, G3FZL, 11 Liphook Crescent, Forest Hill, London SE23 3BN.

The following general rules, published in the January 1977 issue of *Radio Communication*, will apply: 1, 2, 3, 4a, 5a, 6b, 7a, 8, 9a, 10a, 11-22.

Contests calendar

15-16 October	7MHz Phone (Rules in June issue)
23 October	70MHz Fixed
October-November	432MHz Cumulative
5-6 November	7MHz CW (Rules in June/July issue)
5-6 November	144MHz CW
12-13 November	2nd 1·8MHz
4 December	144MHz Fixed
1978	
15 January	Affiliated Societies
11-12 February	First 1·8MHz
11-12 March	Commonwealth
9 April	Low Power
7 May	Region Round-up CW
21 May	Region Round-up SSB
3-4 June	HF NFD
24-25 June	Summer 1·8MHz
16 July	3·5MHz FD
2-3 September	SSB FD
14-15 October	21/28MHz
21-22 October	7MHz SSB
4-5 November	7MHz CW
11-12 November	2nd 1·8MHz



Some of the members of the Addiscombe Amateur Radio Club who operated GW4ALE/P 2,700ft asl at the summit of the Berrwyn mountain range during the May 144MHz Portable Contest. Left to right: G3UFY, G3WRR, G8NHF, G4CDY, G3SJX and G3VKI. *Photo: P. J. Greig*

raynet

S.W. Law, G3PAZ *

The Raynet Committee met on 3 September and it was noted that membership now stands at about 1,800. Full data is not yet available as there are still some controllers who have not yet returned the completed questionnaires which were circulated some time ago. Please check that these are completed and returned to G3GJW, QTHR as soon as possible as the information is urgently required in order to complete our records and future planning. Members are also asked to note that the chairman and the supplies officer will be on leave until 17 October and to arrange any correspondence accordingly (please enclose sae if a reply is required).

Message pads

Should any group find difficulty in obtaining supplies of message pads, Cambridge controller G3YAC, QTHR may be able to help. All enquiries direct to G3YAC, please.

Lectures

Raynet Committee chairman G3BPT is to read a paper at the City of London Symposium in connection with disaster operation to be held during October. Thus Raynet will take a place beside the other bodies who will take part in this event. The well-known Norwich train disaster exercise film was shown to great effect at a lecture to the Coulsdon Amateur Transmitting Society: it will again feature at the lecture by Cheshire Raynet (G8DHQ) in October following its presentation by Cumbria Raynet at the NW Amateur Radio Convention at Lancaster University on 16/17 September. Meanwhile such sound-tape material as is available is being transferred to master tapes and should soon be ready for loan to prospective lecturers on application to the supplies officer (QTH as G3BPT).

Around the groups

Torbay is now in being under controller G3PQH. The Channel Isles has a new group controller, GU3YIZ. A re-formed Coventry group is in progress under J. E. Nanson, G8LJE (QTHR for new members, please). V. Budas has resigned and the new Strathclyde group controller is GM3EXX.

In Norfolk G3PTB has resigned as group controller for the central area and the new controller is G3SEM. The newly-appointed group controller for Cambridge city, G3YAC, would be glad to hear from prospective new members. Those who would be interested in joining the Merseyside group should contact Nigel Roberts, "Westwold", Burrows Lane, Prescot, Merseyside. Avon controller G4FRG was trying for participation in the 999 user service event in the next county. Cleveland group are busy making tape and slide lecture material; more of this later.

Our registrations secretary wishes to remind card-renewing members to please enclose sae with applications (QTH as G3PED).

Hon Registrations Secretary: Mrs L. A. Crane, "Greta Woods", Bromley Road, Ardleigh, Colchester, Essex.

* 130 Alexandra Road, Croydon, Surrey CR0 6EW.

Looking ahead

15-16 October—Jamboree on the Air.

27-29 October—ARRA Exhibition, Granby Halls, Leicester.

2 December—RSGB AGM, IEE, Savoy Place, London WC2.

1978

2 April—Northern Radio Societies Association Convention and Exhibition, Belle Vue, Manchester. Details from G8BCG or G4BVE, QTHR.

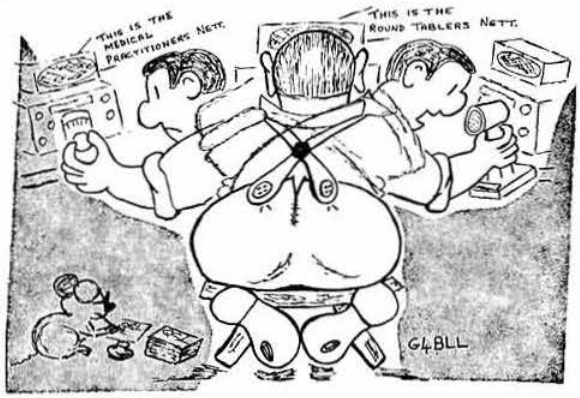
RSGB SLOW MORSE PRACTICE TRANSMISSIONS

These slow morse practice transmissions are sponsored by the RSGB. Alterations and additions to this list should be sent to the honorary organizer, Mr M. A. C. MacBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Clock time	Callsign	MHz	Mode	Town
Sundays				
0900	G3WNR	145·600 omni-direct	F2/F3	South Shields, T & W
1015	G3CGD	1 875	A1/A3	Cheltenham, Glos
1030	G3NPB	1·875	A1	St Ives, Cornwall
1100	G2FXA	1·900	A1/A3	Stockton-on-Tees
1130	G3BLS	1·920	A1/A3	Osney, Oxford
1200	G3HVI	144·750 omni-direct	A2/A3	Stoke-on-Trent, Staffs
1230	GU4CHY	144·500 to north	A1/A3J	St Peter Port, CI
1500	G4EHW	144·250 to southwest	A1/A3J	Peterborough
1815	G4DVZ	1·915	A1/A3J	Leeds, Yorks
1815	G3LEQ	1·815 144·250 145·250	A2/A3 A1/A3J F2/F3	Knutsford, Cheshire
Mondays				
1830	G3VBI	1·910	A1/A3	Goole, South Humberside
1830	G3LR G3NCZ G3ZQS	145·525	F2 A2/A3J	Accrington, Lancs Blackburn, Lancs Darwen, Lancs
1845	GM4CMI	3·550	A1/A3	Kirkwall, Orkney
1900	G3ZRZ	1·980	A1/A3	Blackpool, Lancs
1900	G4FKZ	3·575	A1/A3	Chadderton, Lancs
1900	G4BNV	144·170 horizontally to south	A1/A3J	Ottery St. Mary, Devon
1930	G3RAF	1·920 3·550 145·250 omni-direct	A2 A2 A2 or F2	Locking, Avon
1930	GI3SXG	144·110	A1/A3J	Newtownards, Co Down
2000	G3IBJ	1·910	A1/A3	Southampton, Hants
2000	G3XWZ	1·910	A1/A3J	Mansfield, Notts
2000	GM4ELV	3·570		Arrochar, S/Clyde
2030	G3ASR/A	1·875 144·175 omni-direct vertical	A1/A3J A1/A3J (lsb)	Harrow, Middlesex
2030	G3YMJ	1·975	A1/A3J	Harlow, Essex
2130	G3LQI	145·300	F2/F3	Lancing, Sussex
Tuesdays				
1830	G4BNA	3·590	A1	Swindon, Wilts
1830	G3LR G3NCZ G3ZQS	145·525	F2 A2/A3J	Accrington, Lancs Blackburn, Lancs Darwen, Lancs
1845	GM3CCK	3·550	A1/A3J	Kirkwall, Orkney
1930	G3RAF	1·920 3·550 145·250 omni-direct	A2 A2 A2 or F2	Locking, Avon
2000	G4AEU	1·910	A1/A3	Southampton, Hants
2000	G4EZA	145·525 omni-direct vertical	F2/F3	Colchester, Essex
2030	G4FFC	145·575 to south	F2/F3	Pertenhall, Beds
2045	G4AEU	145·550 omni-direct vertical	F2/F3	Southampton, Hants
2130	GM3UAG	145·400 to south	A1/F3	Ellon, Aberdeenshire
2200	G3AWL	144·110	A1/A3J	Peterlee, Co Durham
Wednesdays				
1830	G3LR G3NCZ G3ZQS	145·525	F2 A2/A3J	Accrington, Lancs Blackburn, Lancs Darwen, Lancs
1845	GM3IBU	3·550	A1/A3/A3J	Kirkwall, Orkney
1900	G3ULY	1·826	A1/A3J	Culgaith, Cumbria
1900	G4FKZ	3·575	A1/A3	Chadderton, Lancs
1930	G3RAF	1·920 3·550 145·250 omni-direct	A2 A2 A2 or F2	Locking, Avon
2000	G8QU	1·970	A1	London N22
2000	G3BPE	1·975	A1/A3	Bexley, Kent
2000	G3SWP	144·200 omni-direct	A2/A3J	Doncaster, South Yorks
2000	GM4DSZ	144·230 to south-south-west	A1/A3J	Aberdeen
2015	G3WVJ	1·845	A1/A3	Staines, Middlesex
2100	G3HVI	144·750 omni-direct	A2/A3	Stoke-on-Trent, Staffs
2130	G3VWL	144·160	A1/A3J	Worthing, Sussex
Thursdays				
1830	G4BNA	3·590	A1	Swindon, Wilts
1830	G3NC	1·968	A1	Swindon, Wilts
1830	G3LR G3NCZ G3ZQS	145·525	F2 A2/A3J	Accrington, Lancs Blackburn, Lancs Darwen, Lancs
1845	GM3MTS	3·550	A1/A3J	Kirkwall, Orkney
1900	G3BLS	1·920	A1/A3	Osney, Oxford
1930	G3RAF	1·920 3·550 145·250 omni-direct	A2 A2 A2 or F2	Locking, Avon
1930 (1st and 3rd weeks of month only.)	G3ASR/A	1·875 144·175 omni-direct vertical	A1 A1/A3J (lsb)	Harrow, Middlesex
1930	G3ZRZ	1·980	A1/A3	Blackpool, Lancs
2030	G3KGU	1·915	A1/A3	Theydon Bois, Essex
2130	G3LQI	145·300	F2/F3	Lancing, Sussex
Fridays				
1830	G4CRI	3·525	A1	Helston, Cornwall
1830	G3LR G3NCZ G3ZQS	145·525	F2 A2/A3J	Accrington, Lancs Blackburn, Lancs Darwen, Lancs
1845	GM3UII	3·550	A1/A3J	Dounby, Orkney
1900	G3NPB	1·875	A1	St Ives, Cornwall
1900	GU4CHY	144·500 to north	A1/A3J	St Peter Port, CI
1900	G4FKZ	3·575	A1/A3	Chadderton, Lancs
1930	G3PQF	144·360 to north-east	F2/F3	Farnborough, Hants
1930	G3RAF	1·920 3·550 145·250 omni-direct	A2 A2 A2 or F2	Locking, Avon
2130	G3VWL	144·160	A1/A3J	Worthing, Sussex
2200	G3AWL	144·110	A1/A3J	Peterlee, Co Durham
Saturdays				
0930	G2FNK	1·930	A1/A3J	Staines, Middlesex
1145	G4DYF	3·590	A1/A3	Sevenoaks, Kent

G3BZU morse proficiency transmissions at 15, 20, 25, 30, 35 and 40wpm are made at 2000 clock time on the first Tuesday of each month on a frequency of 3·520MHz.

Footnote. It would be helpful to stations making simultaneous transmissions (G3ASR/A, G3LEQ and G3RAF) if listeners when reporting, indicated the band that was used for reception.



"CQ80. I'm just a radio amateur, would anyone like to talk to me?"

members' ads

These subsidised flat-rate advertisements are accepted as a service to members of RSGB. They must be submitted on the Members' Ads order form printed in alternate issues of *Radio Communication*, or on a postcard similarly laid out. Each **must** be accompanied by a **recent** *Radio Communication* wrapper addressed to the advertiser, as proof of membership, and a remittance by postal order or cheque for 75p (stamps not accepted). They will not be acknowledged. Those not clearly worded or punctuated will be returned. No correspondence concerning this service can be entered into.

The closing date for each issue is the 1st of the preceding month, but no guarantee of inclusion in a specific issue can be given. Valid advertisements not published in the issue following receipt will be held over until the next issue.

Trade or business advertisements, even from members, will not be accepted for Members' Ads but should be submitted as classified or display advertisements in the usual way. Traders who are members must enclose a signed declaration that the items for sale or wanted are part of, or intended for, their own personal amateur station.

The RSGB reserves the right to refuse advertisements, and accepts no responsibility for errors or omissions or for the quality of goods offered for sale. Advertisements may be edited or abbreviated as necessary.

Post to: MEMBERS' ADS, RSGB, 88 BROOMFIELD ROAD, CHELMSFORD, ESSEX CM1 1SS.

Do not post to RSGB HQ or Advertising Representative.

FOR SALE

Rare "AJS" type F receiver, four-valve, matching horn spkr, 1925 circa, offers. *Wanted:* rx tuning 85 to 170MHz, mains/battery preferred. Williams, 204 Dysart Road, Grantham, Lincs. Tel Grantham 66047.

FT101B, good cond, £310. Homebuilt 2m transverter, £30. G4CDF, 9 Leyburn Close, Woodley, Reading, Berks. Tel 0734 693892 evenings.

Europa B 2m transverter with CPS10 psu and all leads, as new, £95. Shure 444T mic, boxed, £15. G3GHB, QTHR. Tel Inkberrow 792582 after 6.30pm or weekend.

"Waveforms" 2½in oscilloscope, £17. Solartron CD8142 oscilloscope, £45. Rhode and Schwarz HUZ fieldstrength meter 40-220MHz, £10. AN-UPM-1 W/Meter/Siggen/Scope 150-600MHz 110/240V, £20. Advance E2 Siggen, £10. Testset 15077 VHF-W/M Siggen pwr meter with xtals, £14. Collect. G8AXC, QTHR. Tel 0723 85252.

Comprehensive station: a.m./fm, sstv, fastscan tv, test gear, 4m, 2m 70cm antennas, 2m mobile rig, tv cameras, monitors, mixer etc. Components, valves, ICs, transistors, vhf/uhf converters, preamps, manuals, books. WW2 APN1-UHF radio altimeter. G8AXC, QTHR. Tel Scarborough 85252.

Heathkit GR78 £40. Codar AT5 and 250/S psu (looks new), Tavasu 160m whip, hb mobile psu, Codar control box, £30. KW Vanguard tx fb cond, £15. Command tx 3-4MHz, no mods, £6. Carr extra. G3TKU, QTHR. Tel 64792.

KP202, mint S0, S20, S21, S22, S24, R5, case, charger, nicads, toneburst, £90 ono. R209 12V dc rx 1-20MHz rough external cond, good internal, handbook, £8. G3RCE, tel Titchfield 42022.

Eddystone EA12, mint, manual, serviced Eddystone engineers, £130. Garex Twomobile Mk2 12V 6-ch, fitted 145MHz, psu, speaker, £80. Extra xtals, £1.50. Telford tc10 tx, all modes, vfo, £80. EMU vfo 8MHz, £6. Buyer collects. G8HBO, QTHR. Tel 01-399 8196.

DC200 psu, £40. Eddystone 680 rx good, £70. MFJ ssb filter, £7.50. All ono. G4EGN, QTHR. Tel 0869 40609.

FDK Mult 8, the Rolls Royce of fm transceivers, agc/centre zero meter, ac/dc internal PSUs S0 to S24, R5, 6 7 and inputs, quick sale, £115. Martin, Poplars Farm Cottage, Sheriffs Lench, Evesham. Tel Evesham (0386) 870 052.

5in mesh PDA crt type T948H, suitable transistor drive, unused with full data, £20. Muirhead HRO dial/right-angle gearbox, unused, £15. 7BP7 tube unit with psu, suitable sstv rack mounting, £20. Parker. Tel Farnborough (Kent) 51208.

FT221 tx/rx, as new cond, still under guarantee, £295; would consider exchange for hf tx/rx. Heathkit RFIU sig gen, new cond, £20. Tel Lurgan, N Ireland 2854 evenings.

FT200 and FP200, brand-new cond, very little used, £195. G4BQL, QTHR. Tel 04446 41139 after 6pm or weekends.

IC21A mains/battery, 22ch, 10 fitted, toneburst, mic, accessories, handbook, immac cond, three mths use, no mods, as new, original packing, £150. Now running FDK Multi 2700. G8MGV. Tel 01-590 8791 any time.

Racal synthesizer MA150 series, mint cond, with handbook, £25. Creed 75R mk4 teleprinter synch motor, dual speed gearbox, with handbook, £20. Buyer collects. Morris, 3 Astley Road, Bradshaw, Bolton, Lancs. Tel Bolton 52384.

IC22A 12V, 2m, 10W, tx/rx, 145, S20, S21, S22, S23, GB3LO toneburst, mobile mount, mic, manual, offers over £100. BC348 rx 200kHz 18MHz wkg, mains psu built-in, needs bfo, £7. G3GOG, QTHR. Tel 01-856 7442.

Crystals for ladder filter experiments etc: 8·95MHz HC18U, £1 each, 4+ 75p each, 10+ 60p each. Some 5·000MHz HC6U still available, £1 each. Send sae with remittance and order. Bowell, 16 Margarite Way, Wickford, Essex SS12 0ER.

Relays. Leach tpdt 230V, 75p; dpst 24V dc, handle 1,500W, £1; spdt 15W contacts, 75p. New 0-5 rf ammeters 3½in, £2; 0-1 × 2½in, £1. 15V ac voltmeter, £1. 6·3V 6A transformers, £1.50. All post free. GD3TIU, QTHR. Tel 0624 (Marown) 85442.

Eddystone 770R vhf rx 19-165MHz, £90. Heathkit HFW1 sweep gen, £30. Chart recorder 1R-18M, £40. Both factory built. HM102 pwr/swr meter, £15. KW E-Z-match, £15. Telequipment D53A scope, dual beam, dc-25MHz, offers. G3UQR, QTHR. Tel 0234 53466, after 6pm.

70cm 18-el Parabeam, £8, collection preferred. 40MHz converter crystal, £1. Two 10W stereo audio solid-state power amps, £4 pair. IM/A 50μA meters 1½in square, £1.80 each. Mixer unit 10·7 to 455kHz, 70p. Synchronous motor 100V 50 cycle, £1. *Wanted:* 35·5MHz xtal. G8CJO, QTHR. Tel Bristol 772435.

Tower 50ft triangular, 3ft tapering to 1ft, three 15ft sections plus 5ft fitted rotator plates. Offers. G3SYF QTHR.

CDE AR30 rotator, new, boxed, £24. Sony CVC2000B cctv camera, £47.50. 10-el 2m Yagi, £6. TE15 (Tradiper) gdo, £10. Hamgear (latest) pre-selector, unused, £12. Four BSR McDonald MP60 turntables (mag stereo carts) as new, £12.50 each. G3CON, QTHR. Tel Cheltenham 28959.

G2DAF linear, well made, only used in testing, £40 ono. 1,100-0-1,100V transformer, £4. G3XQT, QTHR. Tel Wolverhampton 764923.

FT200, all 10m, £140. Badly made h/b psu, if required, £25. MacDonald, 95 Clifton Street, Swindon, Wilts. Tel Swindon 41012.

Creed 54RP, 7B and 2F reader, solid-state terminal/control unit, pll demod, afsk, fsk, ttl logic, neat circuit, all vgc, £75 lot. G5YD, QTHR. Tel 098 386 3750 evenings.

Collins 75A2 exc cond, £70. Trio JR500S with sp, £50. Eddystone 840A, £40. Lafayette HE40, £20. Datong FL1 audio filter, £45. Heathkit DXU100 tx, £40. Buyer collects. Or exchange above lot for a hf tx/rx. Tel Turner 0842 2484 ext 40 (office) or 0842 61648 after 6pm.

FT220 2m multimode tx/rx, £240. 10el Jaybeam and rotator, £20. TS7200G 2m fm tx/rx, 7ch, ¼ whip, £120. G8JLH, tel 0603 20665.

FT2F S0, S20, S21, S22, S23, S24, R3, R4, R5, R7, 144·48, 144·60, toneburst mic, handbook, £100, carr extra. G3YCC, QTHR. Tel Hull (0482) 658745.

Trio JR500S amateur band rx, with manual, good cond, £40. BC906D cavity w/meter, 45-235MHz, with cal charts and cct, £5. Twin-fan blower, 115V, £2. All plus carriage or collect. G8AKT, QTHR. Tel 0767 260462.

Test oscillator TS47/APR, 40-500MHz. Sale, offers or part exchange tx/rx. G3EJO, QTHR. Tel 021 373 1350.

Racal RA17, 100kHz i.f. strip, circuit, £25. Two QC166 coilpacks, £10/£15. Electriques SSB 3A i.f. strip, circuit, £10. Eddystone 898 dial, nearly new, £8. Codar Q mult, £5. *Wanted:* Exchange for any item, 100kHz xtal. MM 144/28 conv, 432/28 conv. G8HLJ, QTHR.

Video equipment, tv camera, transistorized, £47. National 3020E ½in vtr, £190. Kuba 10in portable colour tv, £75. Pye 22in "DX" colour tv 625 vhf/uhf, £125. Pye 9in monitor, £25. Some ½in and 1in video tapes and vidicons. G8IWX. Tel West Kingsdown 2577.

B2 tx, rx, handbook, coils, crystals, both wkg, orig metal case, carriage included, £20. Roberts, 23 Pine Drive, Ingatestone, Essex. Tel 02775 3442.

New unused 811A valves in orig packing, £6. Two vols *Radio Constructors* 1971/73, *Ham Radio* vols 1971/73, two copies missing. Eight copies various. Two vols *Rad Com* 1971/75. Offers. Whu? *Wanted:* 144MHz DG mosfet converter i.f. 28/144. G6MN, QTHR. Tel 909 3415.

Marconi type 82, Brookman's Two wireless magazine 1929 with blue print, another of similar age. Offers, GI8JPS, Armagh.

FT221 comp with eight crystals, £300 ono. G8LYK. Tel 0905 354727 after 6pm.

2C39As, £1.50. 3-20As, £2. 6-40As, £3. 70cm tripler 12W out, £10. 5in scope tube, £5. 3in tube, £3. Two new 2-6s, £2 each. G8FPT QTHR. Tel 01-504 4942.

IC22A 10ch, mains psu, £130. Shure 444 mic, £10. 8-el Yagi plus rotator, 25ft mast, house brackets, buyer collects, £10. G3FAU, QTHR. Tel 0438 52932.

TC7 mk 2, 28-30MHz rx, £35. 144MHz tx, a.m./fm, 10-50W input, £40. G3EMU 8MHz vfo, suits above tx, £9. Converters: MM 432/28, £19; SSM 144/28, £15, both vgc. 144MHz a.m. tx, 40W input, needs mod, tfrmr, £30. 2m tx xtals (HC6/U): 8·043000, 8·063888, 8·065277, 8·066667, 8·077083, 12·116666, £1.90 each; (FT243): 8·075000, 12·070833, £1.50 each. Antennas, mast, radios, valves, spks, crts, components. SAE please for complete list. Must sell everything. All offers considered. G4FKA/G8HGP, QTHR.

Drake complete stn, every item fb. R4C with spkr plus 0·250 and 1·5kHz filters. FS4 synthesizer. T4XC with psu, £940 (today's price £1,285) or might split. G6RJ, QTHR. Tel 0473 78748 after 6.30pm.

HRO dial, new, boxed, £5. QQVO3-20A, new, unused, £2.50. BC221 miniature headphones, £5. Blank calibration book, £2, both items mint. S/James mk1 multi-tuner, new, in carton, £14. All plus postage. *Wanted: Ham Radio* 1969 onwards, CT160, CT436. G3GUU, QTHR.

"PW" 1966 to 1971, *PE* 1965 to 1968, *SWM* 1967 to 1968, *PT* 1965. Mostly complete. SAE for list. G8FLL, QTHR.

FTDX401, FV401, spkr, KW107 atu/swr, 10/15m beam, negligible use (stored for last four yrs), £400 ono. Will consider good gen cov rx in part exch. Radio Officer *Welsh Voyager,* Welsh Ore Carriers, 34-38 Stow Hill, Newport, Gwent NPT 1JE.

AR88, £45, BC221 with mains psu, charts, £12.50. Low band Pye Westminster, W15FM, offers. G3JPE. Tel 074 382 511.

Ultra Valiant low band a.m. tx/rx, solid-state, 4 ch, £40 ono. SR7919D, 28-function scientific calculator, good cond, £10. G8HWZ. Tel Polesworth 892741 after 6pm.

Collins gen cov rx 51J4, rack mounting, 540kHz to 30·5MHz, manual, £220. Optomax auto zoom lens 80 to 250mm f4·5, unused, Pentax screw, £60. Barratt, 9 Henbury Close, Bronshill Road, Torquay, Devon. Tel 0803 37050.

Eddystone 840 superb cond, £55. EC10, £65. 659/670 Marine, £45. Codar PR70A, as new, £25. R1155, No 19 set, radio/pa unit, offers. B40, £40. G3DVF, QTHR. Tel Alnwick 2487.

Versatower W60 comp with two winches, all luffing gear and brackets, as new, dismantled, buyer collects. £165. G6XY, QTHR. Tel Kenilworth 52679.

Marconi communication rx 52, xtal calibrator, s-meter etc, £22. Cossor db scope 339, £15. Marconi sig gen 1449, £15. Pye service workshop rack, vg sig gen, R/C bridge, output meter contains three meters, £15. 2m valve converter, £5. G3VOZ, QTHR. Tel Hemel Hempstead 833300.

Pair Pye Pocketphones working on RB2, with rechargeable batts, good cond, £35. MM144/2 converter, £12. MM432/144 converter, £16. MM432/144 varactor tripler, £14. MM144MHz preamp, £5. Pye Pocketphone tx wkg, £10. Eddystone S640 rx, £20. G8IZJ, QTHR. Tel Whitstable 262657.

TR3200 vgc, 6 mths old, xtaled all RB, SU8, 18 20 and reverse. RB14, £150 ono. Liner 2 modified for 28-30MHz 2nd output, £120 ono. Two pairs PF1 on SU8, £17 each. Kleinschmit teleprinter rotary head, £45. Creed tape printer/perf, £15. G8GHZ, QTHR. Tel Northampton 61794 or 34833 ext 5314 (office).

KW Vespa in vgc unmodified 120W dc input on all bands, a very nice tx including top band, £85. G3KLF, 7 Snowcroft, Capel St Mary, Ipswich, Suffolk. Tel Ipswich (0473) 310442, evenings or weekends.

FDK Multi 7 2m 10W tx/rx, 5ch S0 S20 S22 R5 144·48, fitted toneburst, £95 ono. Shure 201 mic, £4. Transformers 240/12V 5A, £3; two 240/24V, £1.50 each. G8NAE. Tel Keynsham 2859.

Ajax Electronics marine bands tx/rx. RX 400 to 4,000kHz xtalled 2,009, 2,016, 2,104, 2,182, 2,301, and 2,381kHz, 24V dc, ptt mic, £35. Philips communication rx type PCR mw/lw/sw 5·8 to 18MHz £15. G3YUI, QTHR. Tel 0582 508668 after 6pm.

70cm module, new, ex-ministry exciter/driver two cavities blower, seven valves, all connectors, £25. Jaybeam Q6-2M new, assembled, weather proofed, 5m coaxial, £14. Buyers collect. *Wanted:* Northern Radio type 115 vfo or similar instrument. *QST* August 1970. G3GUU, QTHR.

Digital 2 synthesized tx/rx with toneburst. This sensitive mobile size 2in by 6½in by 7½in weighs only 5lb, covers entire band in 5kHz steps, 10W output, 4W audio, brand new, original packing. Full SMC specification, cost £275, accept £220. G5FH QTHR. Tel 04252 5974.

IC22A 10ch, toneburst, accessories, £140 ono. Stab, protected, mains psu, suit IC22A, £20. 12V 4A/h nicads and charger, £15. 8-el 2m Jaybeam, £6. 13ft, 2in ali poles, 2 off, £4 each. G3XVN, QTHR. Tel Market Drayton 3995 evenings.

Drake TR4C 34-PNB blanker, AC-4 power, RV-4C vfo, all new, boxed, £580, list price over £700. MN2000, brand new, boxed, £140. Trio 9R-59DS, good cond £45. 2m FT221, as new, boxed, £275. *Wanted:* L4B. Taylor. Tel Bournemouth 50400.

Trio 9R59DS, £50. Propelier pitch rotator with power supply, will turn any antenna system, gear drive to 2in pole, £25. Multimobile G-whip with 80m and 160m coils, unused, £20. Mosley Mustang tribander, £45. 1185-0-1185 transformer 360MA, £15. GM4DQX QTHR. Tel 041 638 3386.

FDK Multi 2700, all modes, with toneburst, + and —600kHz and +1·6MHz shift, vgc, £400. MMT432/144 transverter, vgc, £125. Both purchased new March 1977. Byrne, 91 Jessop Road, Stevenage, Herts.

Pair KW traps, W2AU balun, Drake lpf, pwr/swr meter, marine morse key, £50, or part exchange for IC215. GM4EXL. Tel Penicuik (0968) 72417.

Must sell prior to going abroad. Complete shack and electronic workshop: SB102 tx/rx, HP23A psu, SB600 spkr, SB220 2kW linear, HM2103 rf load wattmeter, HM15 swr bridge, HM102 rf power meter, vhf fm tx/rx, 70cm fm uhf tx/rx, cmos xtal calibrator 1MHz-1Hz, audio processing and filter unit, Heath stand mic, two hand mics, atu with high voltage components, OS2 oscilloscope, AW-1U audio wattmeter, 1M-18D vvm with all probes to 30kV, RF-1U sig gen, transistor multitester, Avo meter, 18AVT/WB antenna, 40ft Telomast, all with circuits and manuals, host of test leads, all shack furniture, thousands of components. Must have £1,000, first offer collects. G3ZOJ, 3 Stanton Place, Chalkstone, Haverhill, Suffolk, after 8pm, or pm Sundays.

Storno Viscount low band fm tx/rx, 12V, 4ch with xtal shift, ptt mic, built-in controls and spkr, size 13in by 10in by 4in, 11W rf out, manual, vgc, no xtals, suitable portable/mobile. Exchange AR40 rotator, or offer. GM3TBV. Tel Blairgowrie (0250) 2520.

Video recorder IVCVCR101, 5MHz b/w, six hours tape, service manual, will trade for TS5/820, FT101E or similar. "Computer Workshops" CT1024 computer terminal video and RS232 outputs—two page store, £150. 7B reperforator, reader. Many more items. SAE details. GM3CIG, QTHR.

Xtal filters. XF9B with xtals, £28. XF9E, £24. Both brand new and unused. XF9D, used, £14. Cambridge U10B single chan, £30. G4BBR, QTHR. Tel Cheltenham 27588.

Drake R4C, fitted latest agc modification, £325. Brand-new Yaesu FT221R, offers. Heathkit SB620 Scanalyser, £35. Drake DC4 mobile power supply, £60. G4CHP, QTHR. Tel Swainsthorpe 470365.

Sentinel 2m converter 4-6 i.f., £12. Will exchange for similar with 28-30 i.f. G8JAI, QTHR.

Robot sstv system, 70 monitor, 80A Robot camera, Macro close-up lens, with Hitachi stereo tape deck, vgc, no mods, complete with manuals, will not split, £330. Liner 2, exc cond, with accessories and preamp, £85. G4BFS QTHR.

Heathkit HW100 plus HP23A p/u, fitted SB102 filter, rit, transverter sockets i.f. o/p, £180. Heath HP13A dc p/u, £35. Heath HM15 swr bridge, £7. Trio 9R59DS, £40. GM4AJV, QTHR. Tel 031 334 8993.

Advance DMM3 digital multimeter, ohms to 2MΩ, mV, V, mA, A, both ac and dc, two years old, perfect order, cost over £120 (buying new Fluke). Fair offer please. G3XVP, QTHR. Tel Leeds 812064, after 7pm or weekends.

Hammarlund HQ170 160-6m amateur bands, exc cond, manual, £85, delivered 100 miles. Microwave Modules 432/28 converter, £12. Creed 7B, £8. *Wanted:* A1714 or CV408 valve. G4BOW, QTHR. Tel 0642 87458.

KW Atlanta complete station 400W p.e.p. input, 80-10m, ssb/cw tx/rx, ac psu, Shure 201 mic, manual, spare valves, £275 ono. *Wanted:* Large transmitting valves, any type, must be big. Dr G. R. Morse, Gloucester Royal Hospital, Great Western Road, Gloucester.

Boeing Astro compass, case, gen, £25. LBSC 3½in G "Tich" steam loco frame, part finished, all parts, book instructions, bargain, £60. Metrodynamics speech compressor (USA), £10. G3OSH, 22 St Peter's Close, Horton, Ilminster, Somerset. Tel Ilminster 3349.

RTTY opportunity. Sagem electronic teleprinter model SPE with cover and table console. Integral tape reader and punch. Two-colour print. 45/50/75 bauds switched. Four-bank keyboard. Circuits, manuals, special tools etc, £275 delivered. Creed 7E/RP teleprinter comp with silence cover and base, £35; Creed 7P/N3 known as perforator 45, £15; both items excellent order, carriage or delivery extra, by arrangement. G3RDG, QTHR. Tel 01-455 8831.

FR50B 80 to 10, WWV, calibrator, handbook, G3HBW 2m converter, £65. Set MK sstv boards, built but unaligned (no edge connectors) with 5FP7A equivalent tube and deflection assembly, £15. MMC 432/28 with 7mW 404MHz output, £14, plus carriage. GW4FRE via G8JMO, QTHR.

Heath SB310 sw receiver, full spec on request, £80. GR110 7ch vhf scanner, rx fitted with R0, R5 and R6 crystals, £50. G8IBV, QTHR. Tel Glos 36119.

Heathkit SB101 tx/rx, cw filter, SB600 spkr, HP23 ac psu, good cond, £150. G3SVD, QTHR. Tel 0635 62709.

FTDX401 Yaesu tx/rx 560 p.e.p. cw filter, new cond, boxed, manual, spare pair new matched output valves, mic, spkr, £260 ono. *Wanted:* TR7200C, TR2200CX IC-240, IC-215 etc. G2JHD, QTHR (three miles south Granby Halls). Tel 0533 882764.

Racal 117E, vgc, with cabinet, spare valves, handbook, £250. Yaesu FRG7 with fine tuning control, five hours use only, £145. *Wanted:* Collins 75A4 or gc rx. McAllister, 218 Eckington Road, Coal Aston, Derbyshire. Tel Sheffield 692604, day, Dronfield 413413, evenings/ weekends.

Hallicrafters SX101A, vgc and wkg order, with spkr and manual, £70 ono. G3OZU, QTHR. Tel Dartford 22053, work.

Get on 70cm fm for £32. Pye Cambridge 6ch xtal 433·20. Technical ass rx peak and notch filter plus rx bandpass filter, cost over £50, sell for £25. FM deviation meter ECM5B for 2 and 70, £25. G4CXL, QTHR. Tel Weybridge 43267.

Yaesu FRSDX400 rx 160 to 2m ssb, a.m., cw fm with separate filters for each, notch filters and squelch, good cond, gone transceive, £170 ono. G8KWC, QTHR. Tel 079382 2860.

Heathkit SW717 exc cond, recently aligned by Heathkit, £50 ono. RAE course including extra maths tuition, £30 ono. *Wanted:* Info on ex-army Class D wavemeter No 1 Mk 2. Tel Kingsbridge 2263.

Heathkit HW100 tx/rx HP23 psu (110V ac input) matching spkr, manuals, mic, cables etc, £220 ono. G4EFK. Tel Burnham-on-Sea (0278) 785788.

ICOM IC22A, R3 to 7, S0, 20 to 24, preamp, xtal t/b, comp with mobile mount, h/book etc, immac, £135. KW ant switch, unused, £5.50. KW balun, £2.50. Trio 3·395MHz, ssb, xtal filter, model FED-332-1, £8. QQZO3-20, £2. QQZO3-10, £1. Sinclair Cambridge calculator, £3.50. G4AAQ, QTHR. Tel Wakefield (0924) 862353.

Heath HW8 QRP tx/rx with HWA71 psu, aligned professionally, £85 ono. AR88D exc cond, almost as original, would deliver within 80 miles, £40 ono. Tel 03446 2829.

Shack clearance sale, bargains include 'scope, sig gen spectrum analyser, test meter, digital voltmeter, rx, Pye Cambridge, Pye Vanguard, rtty gear, lots of small units and components. Send sae for list. G3JWK, 4 Over Hall Drive, Winsford, Cheshire. Tel 2466.

KW2000B with matching psu/spkr, £200 ono, prefer buyer inspects and collects. Totten, 29 Unwin Avenue, Bedfont, Feltham, Middlesex. Tel 01-890 6487 evenings.

Liner 2 fitted 2m rx preamp and 10m tx preamp, (for use with QM70 70cm transverter), QM70 28/432 transverter, 10W output, audio speech processor, plugs, cables, manuals etc as supplied, buyer collects, £130 ono complete. G4FAZ, QTHR. Tel 030 57 71053, evenings.

Chinon Super 8 sound movie camera and projector, as new, exchange for hf tx/rx. Trio 2200GX 9ch, as new, in carton, offers. G8KNT. 061-439 5050 ext 573, daytime.

Coaxial relays 6-way 0-2GHz N-type 50 and 75Ω, ledex operated, £6. Magnetic devices 951 antenna c/o relays, £3. N-plugs: elbow 90p, straight 50p. State 50/75Ω, thick/thin coaxial. N-skts: on coaxial 40p, chassis 30p. LO band FM10B, £15. Carr extra. J. Gannaway, St Edmund Hall, Oxford.

Exchange little-used IC22A, auto crystal toneburst, 22ch, R3-R7, S9-S24 comp, new cond in original packing, mains psu available, for 2m ssb/cw rig IC202 etc, or would consider selling. G3UYM, 30 Chiltern Road, Hitchin, Herts. Tel Hitchin 53312.

Teletype 28B, printer only, modified to ASC II, £25. G8CHN. Tel Bradford 74836.

Petrol generator. Onan 24in by 18in by 16in, 115-240V 50Hz ac, 2kW output, gift, £60 ono. Bird power meter 20 to 1,400MHz 1 to 2,000W. TS118A/P lp thermocouple is o/c, N-type socket, 4 ranges, £20, buyers collect. G3EHM, QTHR.

Lafayette HA800 comp with 100kHz cal xtal, also fitted with Pye Westminster fm unit and carrier operated relay, £55. GW8HDH, QTHR. Tel 0792 22287, after 6pm.

R5 input xtal (8·0625MHz), will exchange only for S18 (8·0805 MHz) or S15 (8·0763MHz), all HC6/U, or both with cash adjustment. *Wanted:* Reasonably priced 2m rotator, must be mechanically sound, need not have control unit. G8MGD. Tel Tewkesbury 294082, after 7pm.

IC202 2m ssb rig, eight mths old, as new cond, £130. GW4AZW, QTHR. Tel Newtown 27526.

ACOS xtal mic 39, £1.50. TT21 valve, new GEC, £1.50. *Radio Communication Handbook*, 4th edn, £3.50. ARRL *SSB*, 4th edn, £1.50. ARRL *VHF Manual*, 3rd edn, £1.70. Eddystone slow-motion dial 598, £1.50. UK postage included. GU3YIZ, QTHR. Tel 0481 57868.

Trio 9R59DS voltage stabilizer, exc cond, matching SP5DS spkr, spare valves, manual and carton, £45. Browne, Willoughby, Westhill, Yarmouth, IoW PO41 0RX. Tel IoW 760148.

Trio JR310 rx 80 to 10m, good cond, £55. QRP HW7 cw rig 15, 20, 40m, 2·5W tx/rx, good cond, £27. *Wanted:* Good linear for hf bands. G4EVP, QTHR. Tel Wheaton Aston (0785) 840872.

KW2000A and ac psu, £140. KW600 linear, £100. TW2 tx, £20. TW2 conv, £10, Eddystone 840C, £70. Eddystone 770R, with handbooks, £120 or offers. Tel Haywards Heath (0444) 54233.

TR2200GX, mint, 6ch plus nicads and all extras, £120. Unused Stolle 2030 rotator, £40. Garex 2-mobile 6ch, £85. Unused Jaybeam 10XY plus fittings, £15. Revco 2m whip, £5. Unused Heathkit 10-18U oscilloscope, £50. Tel Northampton 52650.

TC10 multimode A1, A3H, A3J, F3, 2m tx, £95. IC22 fm mobile tx/rx 145, S20, S21, S22, S23, 145·6, 145·8, £105. G4FWG, QTHR. Tel Crowborough 2272.

FL2500 Linear, £160 or offers. *Short Wave Mags, Bulletins, Radcoms* from 1954, mostly complete, odd ones missing. Offers. *Wanted:* KW500/600 linear. Tel Leicester 23382 (work), Melton Mowbray 2755 (home).

Robot 80A camera 25mm 1·4. 70A monitor modded 70B, sensible offers considered. FSS with PU spare 5FP7A 931A, needs attention, buyer collects, £35. HW-7, £25. TE15 gdo, £10. Eddystone dial, £8. Bauer paddle, £4. G4BGE, QTHR. Tel Bracknell 21502.

Yaesu FRG7 rx, mint cond, £130. G8JJB, QTHR. Tel Thurton 213 (Norwich).

Liner 2, £100, pre-amp, extra range, mobile mount. G8JBQ. Tel Pangbourne (Berks) (07357) 2119.

Pye F460 uhf base station to HO spec, vgc, offers. PF1 tx/rx 433·2MHz, nicads, needs alignment, £25. PR1 rx (fair) less xtal, with nicad, £10. PF1 nicads, good, £8 set. All plus post/carr. G8JWN, QTHR. Tel 0472 56362 after 6pm.

Uniden 2030, immac, R6, RR6, S0, S20-24, £110. ETI pa, 40W, prof built, diecast box, £20. HW 100 + HP23A, immac appearance, slight fault, £100. Eddystone 680X, vgc, suit swl, £30. All items ono, carriage included. GM3MXN, QTHR. Tel Larkhall 885204 after 6pm.

Planning permission refusal necessitates sale of Versatower P40 comp with winches, ground post etc, as new, used only three months, £150. Buyer collects or arranges transport. G3KWT. Tel Leeds (0532) 688821.

Going hf FT221R, £265. MMT 144/432, £120. Electronic Developments linear 100W p.e.p. 2m, £105. Liner 2 mk2 and psu, £110. 2m 10-el beam, £13, 2m 8-el beam, £7.50. 46-el 70cm, £13. 18-Para. 70cm, £11. All with cable. G8LZC, 4 York Road, Broadstone, Dorset. Tel Broadstone 696929.

FT221 with full coverage of 144 to 148MHz, 3N204 pre-amp, vgc, £305. Black instrument case to take 19in by 8¾in panel 12in deep, £7. G4FBK, QTHR. Tel 01-864 1412 after 6pm.

Valves. New Philips QE08-200, £6.50. QV08-100B, used, £3. 5B254M, £1.754. 829B, £2.50. QZO3-10, QZO6-20, £1.25. 6146, £2.75. Brooks glass B7G 100kHz 0·01%, £5. Marine exciter ST710A, solid state, 1·6-26MHz 30ch xtals. £18 ono. G3JMJ, QTHR. Tel 073 271 3467.

Two 10in slide-rules, £2.50 each, post paid. Cossor db 'scope, needs attn, but tube ok, with handbook, £6 collect. G2ABD, QTHR. Tel 074 781 509.

Heath IG37 fm stereo sig gen, £45. IB1101 1Hz-100MHz frequency counter, £85, IM102 3½ digit multimeter, £125. All professionally built. Reflected power meter HM15, £10. Jaybeam PBM 14/2m Parabeam, £14. Offers? Buyer collects. G3UAW. Tel Aldbourne 558, evenings.

Good quality transformers and chokes. 800V CT ¼A rms, £10. 600V ¼A rms (and others), £10. 400V 150mA and LTs, £3.50. 250V 150mA, £2.50. Parmeko 10H ¼A, £7.50. 5H ¼A, £3.75. 5H ¼A, £1.50. The lot, £33. Buyers collect, except for smaller items. G8JZD, QTHR. Tel 01-346 1893.

Pye Lynx camera with lens, 24in video monitor, new A66-120X colour tube, Odyssey tv games. Offers to A9191, 24 London Road, Kessingland, Suffolk. Tel Kessingland 336.

50V 15A transformer, £5. 3cm mixer and flexible waveguide, £5. G8FWF, QTHR. Tel Ryde 64085.

FT200B 12 mths old, little used, with G3LLL's rf clipper, 3 mths old, £295. 12AVQ, £25, buyer collects. G4DLW, QTHR. Tel Thornton-le-Moors 433.

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Liner 2 ssb tx/rx, £105 ono. SSM Europa 2m transverter, £58. 2m 5-over-5 slot antenna, £4.50. 80/40 trap dipole, new, £10. G4EPN, QTHR. Tel Sapcote 3404.

KW2000B, vgc, ac psu, spkr new 6146Bs fitted, recently serviced by KW, Shure 201 mic, handbook, £210. G4ETK, QTHR. Tel Slough 29984 evenings.

"Practical Wireless" vols 29 to 48, £1.80 each, £30 the lot. *PW, PE, PTV,* loose, £1 for 12. Tel 01-998 7665 evenings.

FT101E plus cw filter in immac cond, bought new April 1977, few hours use only, will accept £395 ono. Cross. Tel 01-679 3215 evenings and weekends.

Heathkit SB610 scope with Drake T4 rx i.f. installed, £50. Heathkit SB200 lin amp, £150 ono. Hy-gain 203BA 3-el 20m monoband Yagi with BN86 balun, £50. G4DJC, QTHR. Tel 0245 69034.

Colour monitor, home-built, 21in round tube, £25. Rack mounting rx, Pal decoder, £5 each. 5ft enclosed mobile rack, £7. 5in monitor Pye 2797, £5. Unit with two 5FP7 tubes, £7. 5FP7 tubes, £4. Must clear. Mulford. Tel 01-764 6207.

ITT M5 Starphone with SU8, SU20 and RB10, £75. PFI with nicads, h/b charger and SU8, £30. QM70 2m to 70cm f.m. tx/rx converter, £45. 6in Rigonda tv, £25. G8BXJ, QTHR. Tel Bristol 695839.

FT2FB with preamp and 12ch, £120. SR146A with charger, helical, nicads and 5ch, £100. AM10D modified 2m fm, with preamp, toneburst and 6ch, £50. TS700, £290. G8BXJ, QTHR. Tel Bristol 695839.

Trio 9R59DS rx, voltage stabilizer, xtal marker, manual, orig packing, perfect order and immac appearance, £50. BRS39075. Tel Gloucester 35210 10am to 5pm.

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Mains transformer for Heathkit IO-18U oscilloscope. Manual or circuit for CR100. G4DTC, QTHR. Tel Caterham 47667.

HF band beams, damaged or surplus to requirements, or why? Cash or exchange. New 2C39As. *For sale:* Interesting ex-army wind-up 2½in tubular masts, suit portable or fixed use. GM3BQA, QTHR. Tel North Berwick 2519.

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Ex-RAF altimeters 0-50,000ft, K type mk 15 (P), ref No 6A/3381 (Kelvin Hughes) or any aircraft ones like this, must have barometric scale 800 to 1,050mb). Astro compass mk2. Planispheres mk1b ref 6B/178 or mk1A ref 6B/153. Williamson, "Avonmore", Antrim Road, Ballymena, Co Antrim, N Ireland. Tel 41468.

Complete working Pocketphone or similar 2m tx/rx. Amateur bands rx for hf or good quality gen cov rx. Cash waiting for right rig at right price. Kalman, 21 Florence Mansions, Vivian Avenue, London NW4 3UY.

Altimeter, *RSGB Bulletins* etc prior to 1940. GI3VYY, QTHR. Tel Belfast 743520 daytime.

Enthusiastic collector would be interested to know of early radios, complete or components, books, valves etc, pre 1936 only. Sawyer, 210 Gordon Avenue, Camberley, Surrey. Tel. 0276 29460.

Standard C828 tx/rx, must be good cond. Tel 01-870 2024.

Mobile 160 tx/rx, example TW Communicator or similar, must be mint cond ready to instal. No junk please. A.M. preferred. Must be in one cabinet for small car. Prefer TW 160 Communicator if good. G3MUF QTHR.

Commercial tx such as Codar AT5 with psu. Labgear one-sixty twin with psu or TW Topbander with psu etc. G4FJV. Tel Bilston 47148 after 9pm.

Information on Ultra Lion uhf mobile type M2J2F. Will buy or photocopy and return. G3RHR, QTHR. Tel Harrogate 871365.

By young person urgently: Woden UMO or UMI driver transformer, handbook/manual for Codar AT5 and 250/S psu, HW7 in good wkg order and cheap. Pocock, 57 Golden Avenue, East Preston, Sussex BN16 1QX. Tel Rustington 4123.

R209 mk2 in exc cond, ssb gen/demod unit 6202A for Redifon GR410 tx/rx, late UK manufactured 19 set mk3 or mk3/T, rf amplifier No2 mk2, sig gen TF144G, vtvm 1mV-50V up to 10+MHz (eg Furzehill V200A). G3UCT. Tel Fleet 6998.

B2 power pack and lightweight rotator for junior op's fm antenna, manual for advance D1 sig gen. G3LYU, QTHR. Tel Leicester 876459.

Europa B or C, in mint cond, reasonable price paid. Briggs, 8 The Grove, Whalley, Blackburn, Lancs. Tel 025482 3366.

Quantity of 12AU7 valves (CV491 ECC88 E88CC S814A CV4016 6189 etc), must be new and cheap. Antenna multicoupler units by Racal, Trak etc. Manual 881M vlf rx. Fletcher, 62 Moorbridge Lane, Stapleford, Nottingham NG9 8GU.

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Tower with or without hf beam/rotator etc. G8KAO, QTHR. Tel 051 227 1919 day, 051 722 4669, after 6pm.

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Urgently require 10m trap for 18AVQ, needed to put club rig back on the air. Barking Radio & Electronics Society, QTHR. Tel 01-594 6584.

Marine band rt, must have 156·8 with at least one other channel. 12V 10W approx o/p, portable or fixed mtg considered, must be reasonably priced. GI8LCF, QTHR.

Spreaders for quad, bamboo or fibreglass, approx 9ft long, eight needed, or source of supply. Costs refunded. G4BBA, QTHR. Tel Peterborough 65213.

FT2 auto, Pye hi-band fm base rx chassis, uhf base/mobile, rf test equipment. *For sale:* tv FSM 40-800MHz, £45. C-R bridge, £10. VVM, £22. Pocketphone one tx one rx with nicads, £25. O'Neil, 94 Bishops Road, Whitchurch, Cardiff. Tel 0222-617245.

Yaesu FL50B, must be good wkg cond. *For sale:* Codar preselector PR40, hardly used, cond as new, £12. Gregory, 84 Victoria Avenue, Bloxwich, Walsall, Staffs. Tel Bloxwich 77189.

Ex USAF AN/ARR8A or ARR8B vhf/uhf Panoramic rxs, also unmodified ALA-2 Panadaptor *For sale:* Eddystone 770R mk1, a little scruffy but wkg, £50 ono, buyer collects. G8LIU, QTHR. Tel Uxbridge 30006 after 7pm.

Blind SWL wishes to buy tapes of RAE course. Crawford, 24 Main Street, Ballywalter, Co Down, N Ireland.

Elbug, must be wkg, side-tone preferred. Cash available but can exchange for Brenell reel-to-reel tape recorder, three heads, three motors plus thousands of feet of tape, gwo, with manual. G4FPK, 109 Culver Grove, Stanmore. Tel 01-907 2253.

Telford TC7 mk2 28-30MHz tunable i.f. in good cond. Small 70cm beam. *For sale:* Connoisseur BD2 turntable with Shure cartridge. G8IAT, QTHR. Tel 0254 884719 evenings.

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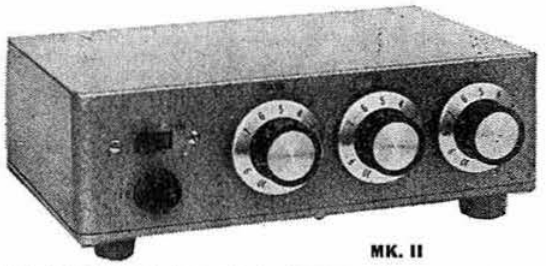

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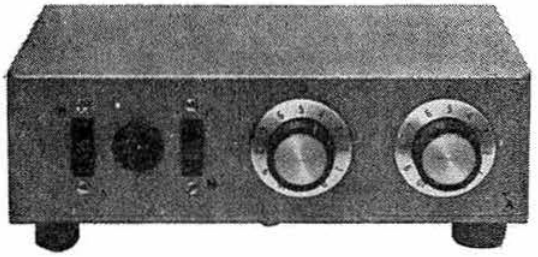

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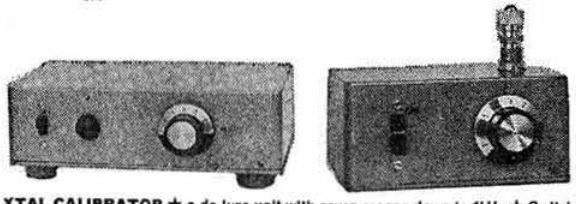

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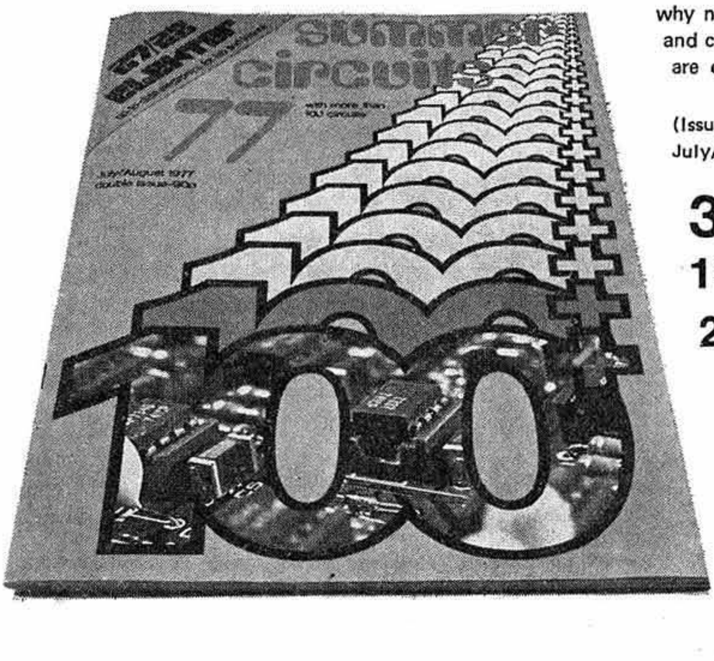

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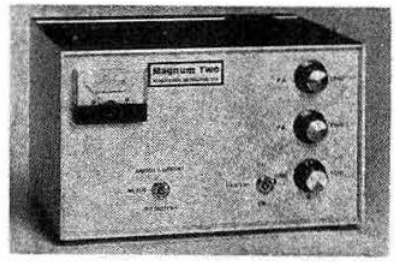
THE MAGNUM TRANSVERTER EDT 144/28: EDT 70/28: EDT 50/28



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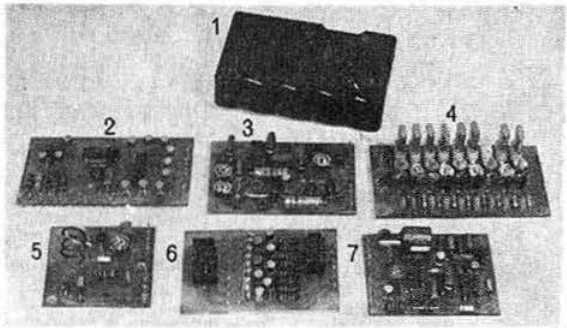

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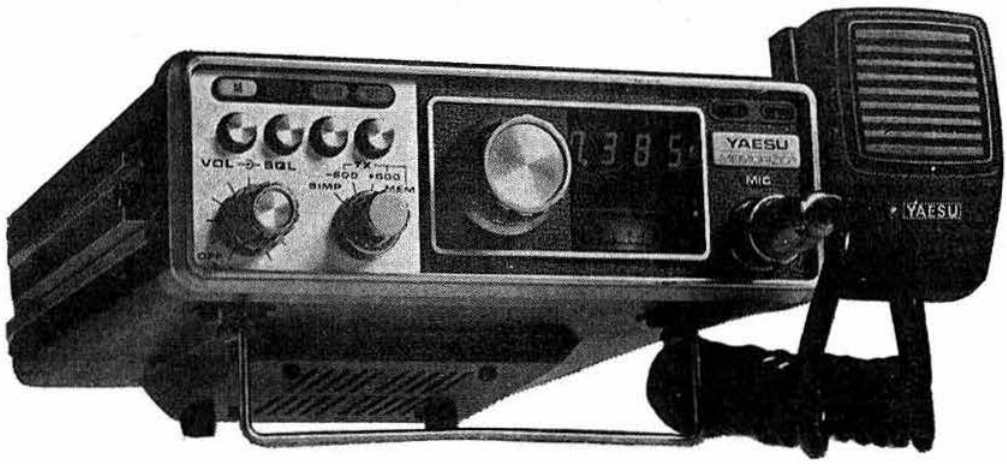

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When will the FT-227R be available? October, 1977.

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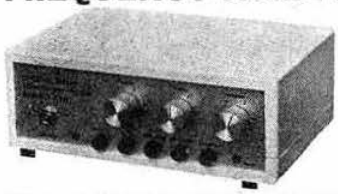

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Adds full receiving coverage from 90kHz to 30MHz to existing receivers or transceivers tuning 28-29MHz or 144-145MHz. The full range is covered inthirty 1MHz wide synthesizer controlled segments. Also works as a two-metre converter. Connects between receiver and antenna.

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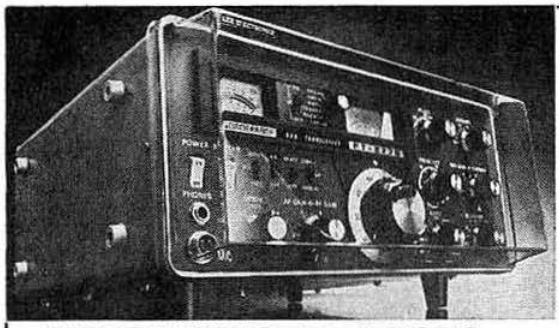

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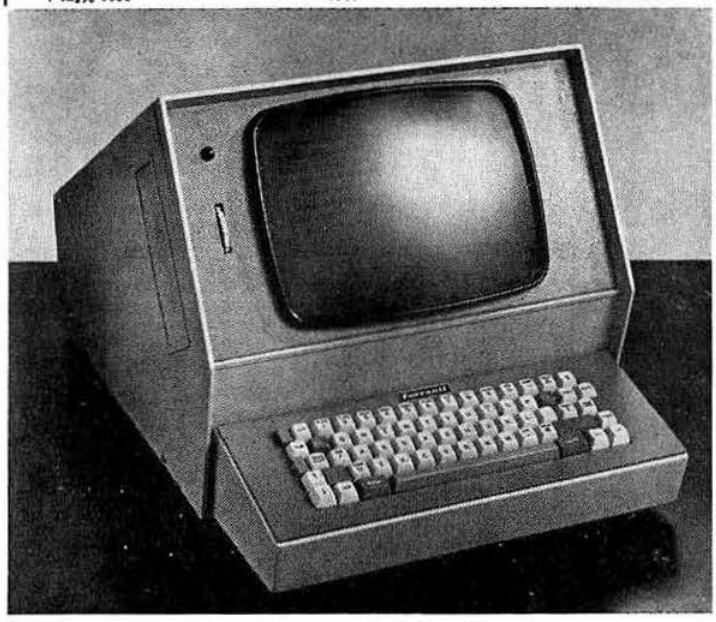

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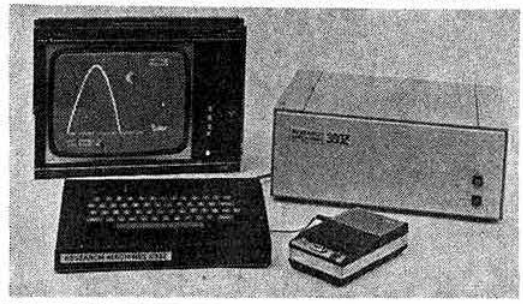

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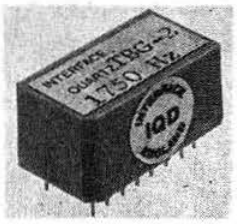

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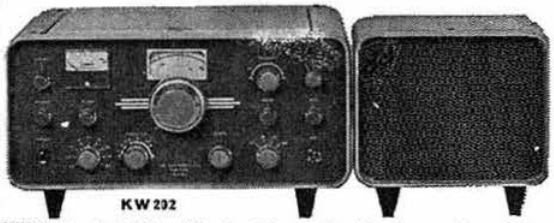

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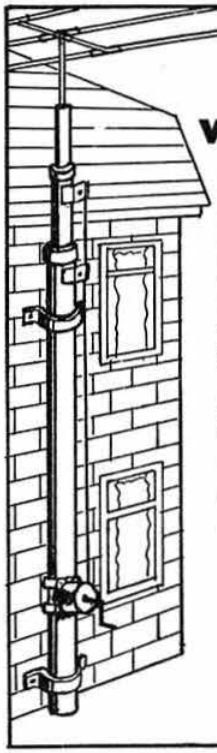

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144·030 ..	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144·4/433·2 ..	a	b	a	b	b	c	b	c	b	b	b	b	b	b
144·480 ..	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144·800 ..	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144·850 ..	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145·000/SO ..	a	a	a	a	a	a	a	a	a	a	a	a	a	c
145·050/R2T ..	a	a	a	b	b	a	b	a	b	b	b	b	b	b
145·075/R3T ..	a	a	a	b	b	a	b	a	b	b	b	b	b	b
145·100/R4T ..	a	a	a	b	b	a	b	a	b	b	b	b	b	b
145·125/R5T ..	a	a	a	b	b	a	b	a	b	b	b	b	b	b
145·150/R6T ..	a	a	a	b	b	a	b	a	b	b	b	b	b	b
145·175/R7T ..	a	a	a	b	b	a	b	a	b	b	b	b	b	b
145·200/R8T ..	a	a	a	b	b	a	a	a	b	a	a	b	a	b
145·300/S12 ..	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145·350/S14 ..	b	b	c	b	b	b	b	b	b	c	c	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	c
145·525/S21 ..	a	a	a	a	c	a	a	a	b	a	a	b	a	b
145·550/S22 ..	a	a	a	a	c	a	a	a	b	a	a	b	a	b
145·575/S23 ..	a	a	a	a	c	a	a	a	b	a	a	b	a	b
145·600/S24 ..	a	a	a	a	c	a	a	a	b	a	a	b	a	b
145·650/R2R ..	b	b	b	a	b	b	a	b	b	a	a	b	a	b
145·675/R3R ..	b	b	b	a	b	b	a	b	b	a	a	b	a	b
145·700/R4R ..	b	b	b	a	b	b	a	b	b	a	a	b	a	b
145·725/R5R ..	b	b	b	a	b	b	a	b	b	a	a	b	a	b
145·750/R6R ..	b	b	b	a	b	b	a	b	b	a	a	b	a	b
145·775/R7R ..	b	b	b	a	b	b	a	b	b	a	a	b	a	b
145·800/R8R ..	a	a	a	a	a	a	a	a	b	a	a	b	a	c
145·95 ..	a	b	a	a	b	b	b	b	b	a	b	b	b	b

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SN7490 **60p**.

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TETFER TRIMMERS Jackson C16 Cat. No 5640 2-10pf, ½" sq. base, temp. coef. less than + 100ppm/°C **40p** each ten for **£3.50**. also 8mm dia. PC mount Cat No 5750 price & info. as 5640.

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STC 445/LQU/929	±15kHz @ 3db imp. 910 ohm (for PYE Pocketfone PF1) **£3.00**.
TOYOCOM 10M-5B-1	±7·5kHz @ 6db imp. 3k ohm **£3.50**.
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ITT 024DC	±3·75kHz @ 3db imp. 910 ohm **£6.00**.
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ITT 044DA	±3·75kHz @ 3db imp. 3·3k ohm **£5.00**.
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1·4MHz LSB, SSB. FILTER made by Cathodeon for PYE SSB125T Radiotelephone **£4.00**.

all above filters are *new* & *unused* except for 445/LQU/909B which is EX-EQUIP.

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