



March 1977

# radio communication

journal of the Radio Society of Great Britain



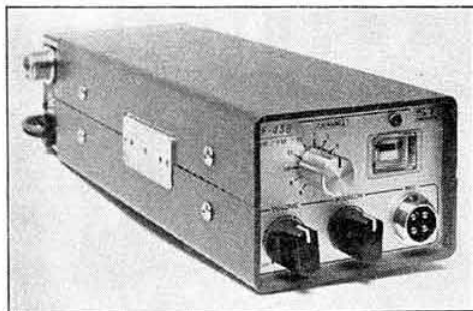
## RSGB PRESIDENTIAL INSTALLATION 1977

(Report on p214)

Dr E. J. Allaway, immediate past-president, installs Lord Wallace of Coslany as 43rd President of the RSGB

Former Presidents of the Society with Lord Wallace after the installation ceremony. Left to right (years of office in parentheses): Mr R. J. Hughes, G3GVV (1972); Mr A. D. Patterson, G13KYP (1967); Mr G. R. Jessop, G6JP (1974); Mr J. C. Graham, G3TR (1969); Mr E. W. Yeomanson, G3IIR (1965); Lord Wallace, BRS3003634; Mr G. M. C. Stone, G3FZL (1964); Mr L. E. Newnham, G6NZ (1958); Mr F. C. Ward, G2CVV (1971); Dr E. J. Allaway, G3FKM (1976); Mr R. F. Stevens, G2BVN (1966)



**LOWE****FOR 70cm FM****KF430 — £202 incl. VAT**

**Only £202 including VAT. Absolutely unbeatable at any price, the KF 430 is incredible at this level. See it soon.**

\* Small size  $9\frac{1}{2} \times 3\frac{1}{2} \times 2\frac{1}{2}$ " \* Light weight only 1.2 kg. \* Frequency range 433-436MHz. \* Power output 10W or 3W switched. \* Receive sens. 0.4 microvolts for 20dB quieting. Fitted nine channels and auto tone burst.

**TR 3200** TRIO have always set the pace in the handy portable field starting with the TR 2200 2 metre powerhouse. Following the success on 2 metres, the TRIO TR3200 gives the radio amateur the lead on 70 cm as well, with all the quality engineering for which TRIO are famous.

The transmitter section of the TR 3200 features the latest semiconductor devices to give a high power output in excess of 2 watts, with switched reduction to 400 mW for local contacts. The audio section has a tailored speech response and an integrated circuit limiting amplifier which, together with a new style miniature microphone, gives that first class speech quality you like.

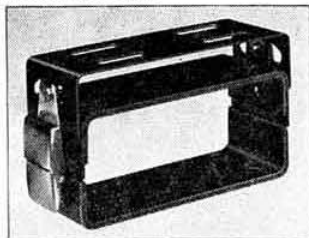
The sensitive (less than 1 microvolt for 20dB quieting) double conversion receiver provides an output of more than 0.7 watts into either the built in speaker or an external speaker or earphone. Multiple filtering a 10.7MHz and 455 kHz, together with no less than five 455 kHz limiters, guarantees top performance, noise free reception.

A noise detection squelch system allows optimum sensitivity so that you do not miss those weak signals.

Multi function metering provides S meter, RF output meter and battery check facilities at any time.

The TR 3200 has space for 12 channels and is fitted at the factory with crystals for SU8, SU18 and SU20. Most repeater channels are available ex stock. The TR 3200 is fitted with the TRIO exclusive tuning fork controlled tone generator which ensures access first time every time.

The TR3200 comes complete with microphone, carrying case and shoulder strap, removable high gain 5/8 wave antenna, battery charger for the optional Nicad pack and three factory fitted channels. Contact us now for further details of the best portable rig around.



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**2S-700G NOW ONLY £392**  
**INC. VAT**

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**MBIA MOBILE MOUNT FOR**  
**TR 3200 OR TR 2200 SERIES**

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Soho House, 362-4 Soho Road, Handsworth, Birmingham. Tel. 021-554 0708

27 Cookridge Street, Leeds. Tel. 0532 452657  
Alan GW3YSA, 35 Pen-Y-Waun, Efail Isaf, Nr. Pontypridd, Tel. Newton Llantwit 3809  
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**NEW PRICE DEAL FOR**  
**TR-7200G**

**SEND 30p IN STAMPS FOR FULL CATALOGUE & PRICE LISTS OR 50p TO INCLUDE OUR ANTENNA BOOKLET.**

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# radio communication

March 1977

Volume 53 No3

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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	G13GAL, Belfast (N Ireland)
	144-50	G13TLT, Bangor, Co Down (N)
1030	3-65	G2CVV, Derby (N Midlands)
	144-50	G4DCH, Burnham-on-Sea (NW)
	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	G8BHQ, 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 on 3-590MHz and at 1230 and 1245 on 144-6MHz. This bulletin carries items of interest to rtty enthusiasts.

*Radio Communication* is published by The Radio Society of Great Britain as its official journal on the first Thursday of each month and is sent free and post paid to all members of the Society



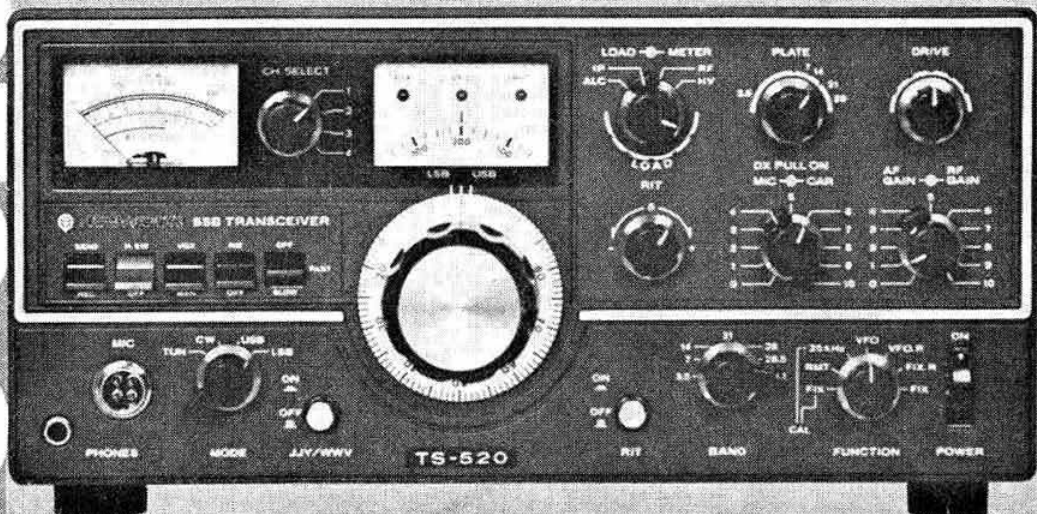
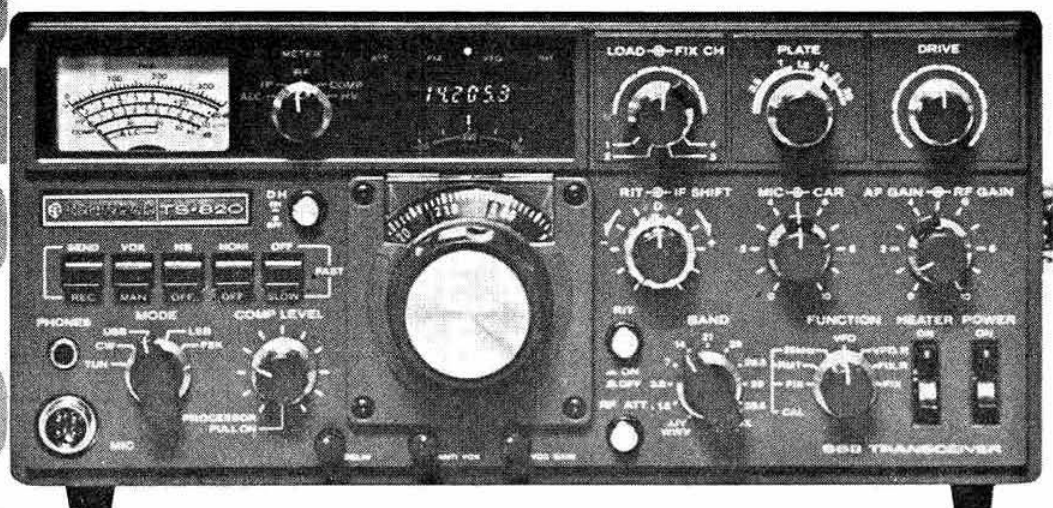
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GREAT BRITAIN 1977

Contributions and all correspondence concerning the content of *Radio Communication* should be addressed to: The Editor, *Radio Communication*, 35 Doughty Street, London WC1N 2AE. Tel 01-837 8688. (Circulation queries should be addressed to: The Subscriptions Department, RSGB). Closing date for contributions unless otherwise notified: 4th of month preceding month of publication.

Advertising, other than Members' Ads, should be sent to the above address marked for the attention of Mr C. C. Lindsay. Tel 01-686 5839 (ADVERTISING ONLY).

# TRIO... the leaders in





# communications

The ultimate transceiver... **TRIO's TS-820**. No matter what you own now, a move to the **TS-820** is your best move. It offers a degree of quality and dependability second to none, and as the owner of this superb unit, you will have at your fingertips the combination of controls and features that, even under the toughest operating conditions, make the **TS-820** the leader that it is.

Unprecedented demand plus the painstaking care **TRIO** lavishes on each **TS-820** has created a back-log of orders, but rest assured, it's well worth waiting for. Once you have operated the **TS-820** you will not be satisfied with anything else.

## Features

Following are a few of the **TS-820**'s many exciting features.

**SPEECH PROCESSOR** ● An HF circuit provides quick time constant compression using a true RF compressor as opposed to an IF clipper. Amount of compression is adjustable to the desired level by a convenient front panel control.

**IF SHIFT** ● The IF SHIFT control

varies the IF passband without changing the receive frequency. Enables the operator to eliminate unwanted signals by moving them out of the passband of the receiver. This feature alone makes the **TS-820** the pacesetter that it is.

**PLL** ● The **TS-820** employs the latest phase lock loop circuitry. The single conversion receiver section performance offers superb protection against unwanted cross-modulation. And now, PLL allows the frequency to remain the same when switching sidebands (USB, LSB, CW) and

eliminates having to recalibrate each time.

## TS-820

### Specifications

FREQUENCY RANGE: 1.8-29.7MHz (160-10 metres)  
MODES: USB, LSB, CW, FSK  
INPUT POWER: 200W PEP on SSB  
160W DC on CW  
100W DC on FSK

ANTENNA IMPEDANCE: 50-75 ohms, unbalanced  
CARRIER SUPPRESSION: Better than 40dB  
SIDE BAND SUPPRESSION: Better than 50dB  
SPURIOUS RADIATION: Greater than -60dB (Harmonics more than -40dB)  
RECEIVER SENSITIVITY: Better than 0.25µV  
RECEIVER SELECTIVITY:  
SSB 2.4kHz (-60dB)  
4.4kHz (-60dB)  
CW\* 0.5kHz (-60dB)  
1.8kHz (-60dB)  
\* With optional CW filter installed.

IMAGE RATIO: 160-15 metres: Better than 60dB  
10 metres: Better than 50dB

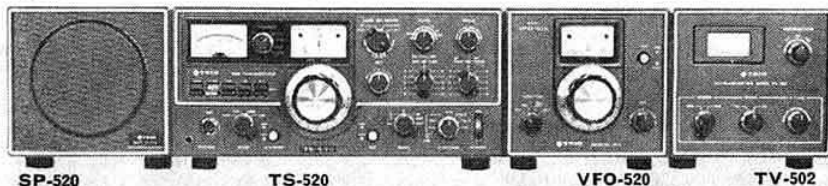
IF REJECTION: Better than 60dB  
POWER REQUIREMENTS: 120/220 VAC, 50/60Hz, 13.8 VDC (with optional DS-1A DC-DC converter)  
POWER CONSUMPTION: Transmit: 280W. Receive: 26W (heaters off)  
DIMENSIONS: 13 1/2" w x 6 1/2" h x 13 1/2" d  
WEIGHT: 35.2lb (16kg)

DG-1, digital readout optional



## VFO-820

Solid state remote VFO designed exclusively for use with the **TS-820** "DXpert"  
Contains its own RIT circuit and control switch... is fully compatible with the optional digital display in the **TS-820**.



As a **TS-520** owner, you go on the air with a sense of pride and confidence. Thousands of these precision-built beauties are in operation all over the world... in ham shacks, field day sites, in DX and contest stations and in countless mobile installations. No other rig has ever offered the performance, dependability, versatility and value that is built into every **TRIO TS-520**.

You have certainly heard the **TS-520**'s clean signal on the air and have probably heard a lot of glowing praise by other hams. So if you don't already own a 520, maybe it's time you did.

MODES: USB, LSB, CW  
POWER: 200W PEP input on SSB, 160W DC input on CW  
ANTENNA IMPEDANCE: 50-75 ohms, unbalanced  
CARRIER SUPPRESSION: Better than -45dB  
UNWANTED SIDE BAND SUPPRESSION: Better than -40dB  
HARMONIC RADIATION: Better than -40dB  
AF RESPONSE: 400 to 2,600Hz (-6dB)  
AUDIO INPUT SENSITIVITY: 0.25µV for 10dB (S + N)/N

SELECTIVITY: SSB 2.4kHz (-60dB), 4.4kHz (-60dB), CW 0.5kHz (-60dB), 1.8kHz (-60dB) (with accessory filter)  
FREQUENCY STABILITY: 100Hz per 30 minutes after warm-up  
IMAGE RATIO: Better than 50dB  
IF REJECTION: Better than 50dB  
TUBE AND SEMI-CONDUCTOR COMPLEMENT: 3 tubes (2 - 6X4, 12BY6A), 1 IC, 18 FET, 44 transistors, 84 diodes  
DIMENSIONS: 13 1/2" w x 5 9/16" h x 13 1/2" d  
WEIGHT: 35.2lb



## TS-700G

The same attention to good design embodied in the **TS-820** and **TS-520** is also evident in the **TRIO** two metre transceiver. The **TS-700G** has become the standard by which all others are judged. Full two metre coverage, VFO or crystal controlled. All modes, AM, FM, USB, LSB and CW. Mains or battery operation. Normal and reverse repeater facilities. **TRIO** exclusive tuning fork access tone generator. Plus, of course, **TRIO** quality and reliability backed by Lowe Electronics service. If you have not yet seen the **TS-700G**, go to one of our branches and be prepared to be impressed.  
15W output, 0.25 microvolt sensitivity. European standard FM selectivity. This rig has all the others beaten.  
**PLUS PLUS PLUS**. **TRIO** have reduced the price to you. Ask now for details.

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

**TRIO**

PAUL  
G3VJF



## INTRODUCE THE MOST EXCITING NEW RIGS YET ON THE 2 METRE MULTIMODE MARKET



**IC-211E**  
**£529.00**  
incl. VAT  
and delivery

### The IC-211E Base Station and its smaller brother, the IC-245E

When it comes to multimode 2 metre transceivers there is nothing quite like the IC-211E, which, although more expensive than its competitors, is really in a class of its own. The new ICOM developed LSI synthesiser provides you with all the advantages of a synthesised transceiver, with a digital display to the nearest 100Hz, without the disadvantage of having several knobs to turn to set up the frequency and consequent inability to "tune the band". The VFO is tuned with a single knob which provides complete coverage of the band in 100Hz or 5kHz steps. The VFO is lockable and the knob is fitted with a flywheel break to facilitate rapid tuning. For even finer tuning on SSB there is an RIT control which automatically cancels itself when the main VFO knob is moved. The RF power is continuously variable from 0.5 to 10 watts and on receive there is an RF gain control which controls the gain of the RF and I.F. stages and backs off the S-meter, providing a "quiet background" when working strong signals on SSB. Dual independent VFOs are incorporated into the LSI chip and there is

an accessory terminal on the back for a keyboard input. Add to this the features you would expect such as VOX, repeat, reverse repeat and comprehensive metering and you have the 211E.

Its smaller brother, the IC-245E is a very similar animal yet small enough to use mobile if you want to (its size is approx 90 x 155 x 235mm deep). True, you do sacrifice VOX, LSB, RF and MIC gain controls and have less digits on the frequency display. But apart from that you get the same ICOM LSI synthesiser, giving VFOs with any split you like on repeaters, and single knob tuning moving the VFOs in 100Hz or 5kHz steps. This rig is a serious competitor to other manufacturers' "BIG rigs". At a price of £396 inc. VAT it is well worth thinking about an IC-245E.

Don't forget the other items in the popular ICOM range as described in our FEBRUARY advert:  
IC-215, IC-202, IC-30A, IC-225, IC-3PA, IC-3PS, IC-20L and BC-20

**FOR DETAILS LEAVE YOUR NAME AND ADDRESS ON OUR  
ANSAFONE (02273 63850) DURING THE EVENING WHEN CALLS ARE CHEAP**

Why not see and buy the excellent ICOM range at your nearest Thanet agent—phone for an evening or weekend demonstration.

LONDON—Terry G8BAM (01-556 9366)  
SCOTLAND—Ian G8MDX (07883 3223)  
DEVON—Bob G3PQH qthr

WALES—Tony GW3FKO (0222 702982)  
MIDLANDS—Tony G8AVH (021 329 2305)  
NORTH WEST—Gordon G3LEQ (Knutsford (0565) 4040)

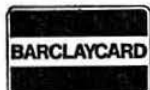
NORTH—Peter G3TPX (022678 2517) ... Peter has  
outlets in  
HULL—Tony (0482 886392) and the NORTH EAST

HP TERMS AVAILABLE

YOUR SOLE AUTHORISED UK IMPORTER FOR ICOM

**THANET ELECTRONICS**

143 Reculver Road, Beltinge, Herne Bay, Kent (02273 63859)



**ICOM****DAVE  
G4ELP**

# Produce the latest in FM Mobiles 10 watts 22 channels (15 already wired) and you need never buy another crystal!!

Size:  
58 x 156 x 218 mm deep

**IC-240**  
**£198.00**  
incl. VAT



The IC-240 is the start of a revolution in 2 metre transceivers. It has all the advantages of the highly popular IC-22A, with its easily selected 22 Channel capability, but does it all with a phase locked synthesised system. Hence you can programme it for all 22 channels **WITHOUT HAVING TO BUY ANY CRYSTALS**. Channels are hand wired using diodes according to clearly described instructions. We supply the UK version with 15 channels already wired in, these being 10 simplex and 5 repeater. Thus there are 7 more frequencies for you to programme at your own whim —ideal for RAYNET and local net use. You can programme for any of the 80 channels at 25kHz spacing between 144 and 146MHz.

Duplex (for repeater use) operates by shifting the RECEIVE frequency. This means that by switching to SIMPLEX when using repeater channel you will automatically be listening on the INPUT channel of the repeater without having to wire in special "Reverse Repeater" channels.

The main advantage over other more expensive synthesised rigs is that by not having some 400 selectable channels, at 5kHz spacing (most of which are redundant as they don't fit into the UK 25kHz channel spacing system), you are relieved of multiple knob twiddling to change from one popular channel to another. 22 channels are ample for UK national simplex, repeater and local net channels and these are selected by one knob which is easier, quicker and safer than "trying to open a combination safe while driving".

As an optional extra, a built-in scanning system will be available which will scan all 22 channels.

The IC-240 has the same excellent FM performance as the well known and highly popular IC-22A. Consider these points which all contribute to providing optimum communication either direct or through the ever-growing number of repeaters in the UK:

- \* Low noise dual-gate mosfet in the front end of the receiver.
- \* 5-section helical filter after the front end to provide high rejection of unwanted out-of-band signals.
- \* Dual conversion with I.F.s of 10.7MHz and 455kHz for excellent image rejection and selectivity, with filters at each I.F. frequency.
- \* Narrow filter giving high rejection of adjacent channel signals 25kHz away.
- \* Hard I.F. limiting using an Ic.
- \* A sensitive, temperature compensated, adjustable squelch circuit with front panel indicator to show when the squelch is open should the gain control be turned back to please the XYL.
- \* 1.5 Watts of audio from its built-in speaker giving ample volume for copy on the move.
- \* Line voltages are filtered and regulated for reduction of interference from the dynamo or alternator.
- \* A full 10W output from a sturdy PA transistor.
- \* Built-in automatic 1750Hz tone burst for repeater use.
- \* Automatic PA protection.

The channels already programmed are:

SIMPLEX S0, S16, S17, S18, S19, S20, S21, S22, S23, S24.

REPEATER R3, R4, R5, R6, R7.

Accessories supplied with the rig:

- Microphone
- Quick release mobile mounting bracket
- Fixing screws
- Spare Fuse
- DC power cord

**ICOM****THANET ELECTRONICS**

Direct Ansafone line 02273 63850 (evenings and weekends)



PAUL  
G3VJF



DAVE  
G4ELP

# IC-215 HANDY FM PORTABLE

15 channels 3 watts



ICOM are pleased to introduce their first FM portable and a careful look at the features will soon show how popular it's going to be. You can use it ANYWHERE. Change vehicles, use it in the shack or take it for a walk to the local high spot and you have the high quality FM communication, for which ICOM are so famous, available all the time. The batteries are larger than those of its competitors, thus giving considerably longer life. The 3 watt output and high sensitivity receiver makes it a useful main station set, where it can be operated from an external power supply and a good antenna system. Thus the IC-215 can be a good starting point for the man who has just obtained his licence and wants to get on the air without having to spend too much money.

#### LOOK AT THE MAIN FEATURES:

**Aluminium Die-cast Frame** The IC-215 chassis and main frame are integrated into an aluminium die-casting rendering it light but resistant to vibration or shock when carried.

**15 Channels** The unit incorporates 15 channels to select from: 12 by the main channel selector and a further 3 by the function switch. All crystals are plug-in-type HC-25/U and are the same as the crystals used in the popular IC-22A. Being fundamental crystals, they are tunable over a reasonably wide range and a separate trimmer is supplied for each crystal making accurate frequency adjustment possible. This is very important for optimum results with minimum interference.

**Dual Power Mode** The output power can be switched to 3W on HI for long distance work or 0.5W on LOW for short distance contacts or working a nearby repeater. Battery consumption is minimised in the LOW power mode.

**Dial Illumination** The dial can be illuminated to facilitate night operation. This is controlled by a selector switch on the front panel.

**Power Pilot Lamp** If the power voltage falls below the required value a red LED power indicator goes out as an indication that the batteries are almost exhausted or the external power is inadequate.

**External Power and Antenna Sockets** Sockets for external power and antenna are provided on the rear. The antenna socket takes a standard PL259 plug.

**Whip Antenna** A fully collapsible antenna is built into the top of the rig. This can be unscrewed and removed to provide a screw socket for a flexible helical antenna. We have had an Antenna Specialist flexible antenna specially made and tuned to suit the IC-215.

**Meter** The meter indicates receive signal strength during reception and relative output level during transmission.

**Squelch** A sensitive squelch control is fitted rendering the set silent when no signal is being received.

**External Speaker Jack** An external jack is fitted to the front panel for a larger speaker or an earpiece. The internal speaker is muted when this is used.

**Discriminator Meter Jack** By removing a rubber grommet on the side of the transceiver a jack socket is available for connection of a 50 microamp centre-zero meter. This is very useful when tuning extra receive crystals.

**Tone Burst** A 1750Hz tone burst is fitted for opening UK repeaters.

**Shoulder Belt** A shoulder belt is supplied and is fixed to clips on the top of the rig. There is also a microphone hook. The side panels of the set itself are covered in leather simulated vinyl.

**Excellent FM Audio Tailoring and Clipping** This feature, already well known from the excellent quality produced by the IC-22A, ensures clear optimum talk power without over deviation. This makes the IC-215 a far better rig for use with repeaters and gives an optimum range, for the power used, on simplex contacts.

#### ACCESSORIES INCLUDED:

Dynamic microphone  
Microphone Case  
Shoulder strap  
Power supply plug  
Comprehensive English handbook

External speaker plug  
Discriminator socket plug  
Earphone  
9 x Dry cells type C (U11)

#### OPTIONAL EXTRAS:

IC-3PS Power supply which doubles as a holder for the IC-20L linear and supplies power for both the 215 and the linear.  
IC-20L 10 watt linear amplifier.  
IC-SM2 Desk type condenser microphone with built-in amplifier.  
Ni-Cad Batteries.  
Charger for charging the Ni-Cads in situ.  
Helical stub antenna.

FOR LIST OF AGENTS SEE PAGE 168



YOUR SOLE AUTHORISED UK IMPORTER FOR ICOM

## THANET ELECTRONICS

143 Reculver Road, Beltinge, Herne Bay, Kent (02273) 63859 — 2 lines

DIRECT ANSAFONE 00273 63850



# ELECTRONIC DEVELOPMENTS

## Professional Quality for the Amateur

### THE MAGNUM TRANSVERTER EDT 144/28: EDT 70/28: EDT 50/28



Our Transverter is fully YAESU compatible and may be operated with most other HF transceivers. Drive required at 28MHz up to 500mW. Power Input up to 200 watts (50% efficient). Each Transverter is aligned using our SPECTRUM ANALYSER to obtain an extremely clean output spectrum. Microwave Modules receive converters are fitted to all our Transverters.

PRICE £151.90 inc VAT

### THE MAGNUM LINEAR/PREAMP EDL 144



This Linear Amplifier has been developed by us to fill the need for a high power add-on unit for use mainly with low power SSB transceivers. The unit also contains a low-noise receive preamplifier which is equipped with an RF gain control. Mains operated. Drive requirement: 5-20 watts. CW and SSB, 5 watts maximum AM & FM. P.A. 50% Efficient. R.F. switched so no modification to transceiver is necessary.

PRICE £151.90 inc VAT

### NEW PRODUCT 70cm LINEAR EDL 432P



Following the success of our 432MHz Linear Amplifier assembly EDL 432 and due to the increasing enquiries for a self contained unit, ELECTRONIC DEVELOPMENTS are pleased to announce the unveiling of a new linear filling these needs, the EDL 432P. This new unit utilises the same P.A. as the EDL 432 and is complete with mains power supply, blower, aerial change over relays and full metering.

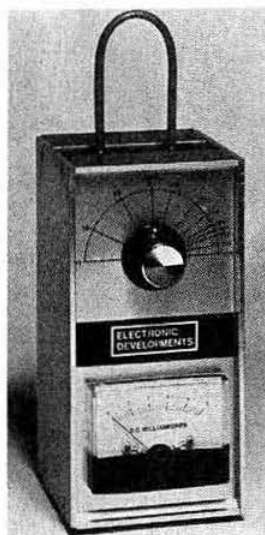
PRICE £151.90 inc VAT

#### SPECIFICATIONS:

Typical efficiency 50% at 50 watts.  
Input drive 5-10 watts  
Output power 50 watts RMS  
Input connector: BNC, 50 ohm. Output connector: "N" Type, 50 ohm.  
Size: 10½ x 6½ x 10½ in (26 x 16 x 27cm). Weight: 22lb (9.9kg)

EDL432 £56.25 inc VAT (see previous adverts for further details or write for data sheet).

### WAVEMETER 65 - 230MHz



General coverage VHF Absorption Wavemeter. Its high sensitivity makes it ideal for checking spurious outputs as well as the transmitted frequency.

PRICE £19.00 inc VAT

YOUR ORDERS, ENQUIRIES  
AND TECHNICAL QUERIES  
WILL BE DEALT WITH BOTH  
PERSONALLY AND  
QUICKLY

## POLAR ELECTRONIC DEVELOPMENTS LTD

DOMVILLE ROAD, LIVERPOOL, L13 4AT. Tel. 051-220 6666



# South Midlands

TOTTON (H.Q.), LEEDS, CHESTERFIELD, LINGS., (SMC NORTHERN)

**EXTENSION OF SERVICE:** we take pleasure in announcing that from 1st March, 1977, the old established firm of J & A Tweedy Ltd will combine with South Midlands Communications Ltd.

Any items from the S.M.C. catalogue may now be ordered from Chesterfield, Derbyshire or Woodhall Spa, Lincolnshire.



## DIGITAL II from KYOKUTO

SCANNER AND CRYSTAL T.B. OPTIONS

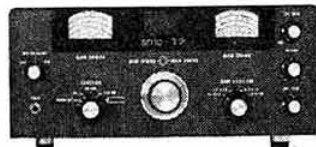
The Digital II offers complete 5kHz step coverage across 2 meters and now with the Scanner 33, 25kHz channels from 145MHz upwards covered in around 10 seconds. It offers full lock and lockout on all channels. The scanner stops on a required channel for 10 seconds, then unless locked moves on. The bright digital readout comes from 6 seven segment LEDs.

Selectable 10 or 1 watt output for simplex or duplex (up and down shifts), across 144-146 (rx to 149MHz) from a tiny 6 1/2" x 2" x 7 1/2". Easily underdash mounted with the supplied mounting bracket, or slipped in place of the broadcast wireless.

For strong handling, and low noise the R.F. mixer, first I.F. (16-9MHz) second mixer (and LO) are all FET's. The front end is tuned by varicaps by the DC output of the P.L.L. with superb selectivity provided by a 15 pole ( $\pm 8\text{kHz}$  at  $-6\text{dB}$   $\pm 15\text{kHz}$  at  $-70\text{dB}$ ). Ceramic filter. LED lamps indicate if the P.L.L. is unlocked or the squelch open. The V.C.O. is directly modulated (for exceedingly linear deviation). Unitary 6 circuit block construction (for serviceability and screening). Selective calling socket



DIGITAL II, £235; CRYSTAL TB, £10; SCANNER, £49.50  
ALL PRICES EXCLUDE VAT (12 1/2%)



SMC73 Ex-stock, only £114.50 + VAT

**KP202**  
**KCP2**

## 6 CHANNEL 144MHz HANDHELD FULLY CRYSTALLED UP

The handheld KP202 with its 2W of RF and 1W of audio, immunity to image and IF breakthrough, offers performance to rival all walkie-talkies and many mobile 10W sets. The KP202 is supplied with telescopic whip, leather handle/whip case and F type plug. Accessories include automatic (R channels only) crystal tone burst (£10.00), flexi stubby antenna (£5.75), leather case (£4.75), base charger KCP2 (£11.25), set of 10 ni cads (£8.50), F to UHF adapters (£1.45), F plugs, spare whips, spare hods, etc.

EX-STOCK IN TOTTON

SIX CHANNELS FITTED S20 and S22 and any 4 of: S0, S21, S23, S24, R3, R4, R5, R6, R7, only £104.75 (+ VAT)

## SOLID STATE MOBILE LINEARS

2 meter, SSB/CW/FM, RF sensing with manual override, "Microstripline"  
12V D.C. 10W drive  
2" x 6-5" x 10" (11") (VAT + 12 1/2%)  
(Over 15 different models—S.A.E. details)  
PA144/160/BL 145MHz 160W output £155



## RF SPEECH PROCESSOR KP12

Audio to audio, via 10-7MHz mains powered, illuminated meter, FT-101, FT2 plugs suitable all phone modes superb on FM.

P & P 40p (+ 8% VAT) £53.50

## Microwave Modules Transverters

From Ten, Six or Two Metres (a '101 etc, a '620B or a '221R).

10W output, balanced Tx mixers, low spurious content, high sensitivity with dynamic range. (VAT + 12 1/2%) (full converter range stocked S.A.E. details).

MMT144/28 or 50 2 metres £79.00  
MMT432/28 or 50 70 centimetres £97.00  
MMT432/144 Double conversion £133.00



## YAESU CLOCK

Analog clock with automatic advancing 24 hour time zone hour disc giving, at a glance, time in principal cities or time zone. Battery powered, self starting, shock resistant.



QTR24 only £13.00 (VAT + 8%) p & p 30p

## CRYSTAL FILTERS & CRYSTALS (P & P 20p VAT EXTRA at 12.5%)

YAESU FM crystals (£3.75 pair)  
FT2F, FT2FB, FT2Auto, FT224  
Simplex S (0, 12, 16, 19, 20-24)  
Duplex R (0-9) and IR (0-9) (T&R)  
YF30F350 350Hz F\* 101 CW  
YF30F600 600Hz F\* 101 CW  
YF30F12 12kHz F\* 101 FM

TRIO & STANDARD FM crystals (£3.75 pair)  
TR2200(G), C146A, C826MB Simplex S (0, 20-24)  
Duplex R (3-7) and IR (3-7) R  
YF90H600 600Hz 9MHz CW £16.00  
YF90H2.4 2.4kHz 9MHz SSB £16.00  
YF90F12 12kHz 9MHz FM £18.00

YAESU and other crystals (£2.20 each) FT260 (B), FT301 (S), FT101 (EX) FT75 (B), 38-666, 42, 50-5MHz SSB carrier crystals (HC18/U) 9 & 10-7MHz, FT221R  
YF107M600 600Hz 10-7MHz CW £16.00  
YF107M2-4 2-4kHz 10-7MHz SSB £16.00  
YF107M12 12kHz 10-7MHz FM £16.00

SEND A LARGE (10 x 12) SAE OR 15p STAMPS FOR YOUR FREE



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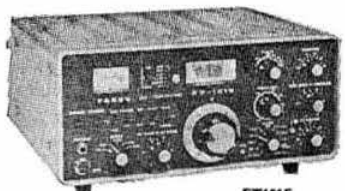


## YAESU MUSEN 2-YEAR GUARANTEE "24-HOUR" SECURICOR SERVICE



### FT221R—WE THINK IT THE BEST NOW IT COSTS LESS—£339 (+ VAT 12½%)

Thanks to our bulk buying policy, we have beaten inflation and the falling pound saving you £22.50 on last year's price! As an added bonus all new SMC FT221Rs cover 4MHz and are equipped with 600kHz and 1.6MHz shifts. YAESU's state of the art, fully modular, plug in board, multimode, 2m transceiver renders over the boards 'rats nest' wiring obsolete. A 134MHz VCO, automatic varicap tuning of transmitter and receiver, gives you an exceedingly clean signal, sensitive receiver combined with good strong signal handling.



FT101E

### FT101E, the world-famous complete HF station, FT101E (EE-EX) ex-stock

The FT101E a complete mains or 12V DC station contained in a compact 30lb package. 260W P.I.P. of SSB (with in-built R.F. speech processor), 180W, CW and 80W of A.M., 10 to 160m. (inc. 10MHz RX). The sensitive and selective (permeability tuned R.F. stages and 8 pole crystal filter) receiver offers: threshold adjustable noise blanker, switchable 25 and 100kHz calibrator,  $\pm 5K$  clarifier (with separate on/off switch), etc., etc. The VFO is stable and linear (readout to 1kHz), external VFO or crystal control can be selected, with LED indicators illuminated accordingly. Carrier level is adjustable for: tune up, A.M., for CW operation, whose performance with the semi break in keying, with side tone, and the optional 600Hz filter installed is of a high order. Linear and transverter provisions are made with sockets for: relay contacts, ALC output, all internal HT supplies. low level RF heater links and switches, etc., etc.

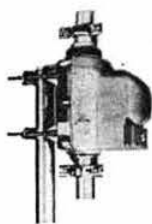
### THE FTV250 144MHz TRANSVERTER, ex-stock

The FTV-250 styled to match the FT-101, etc. sensitive receiver converter with good image rejection and RF gain control on front panel. 10W P.E.P. (A3J and A1) 4W. (A3 and F3) metered; power output, and drive level (3V RMS at 29 MHz) 12 lbs., 11½" x 8½" x 6".

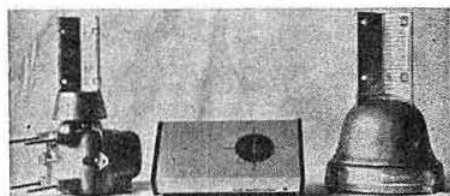


### ROTATORS

Ex-Stock in Totton for fast delivery.  
VAT: Rotators 12½%. Cable and deliv. 8%.  
Carriage (BRS or post) FREE. Securicor delivery £1 extra (mainland).



AR30 (illus. right near and centre)	..	..	£39.50
AR40 (illus. right centre and far)	..	..	£46.00
AR33 (de-luxe control AR40)	..	..	£57.50
Big Torque sim CD44 Head	..	..	£79.50
CD44 (C.B. illus. left) med. duty	..	..	£95.00
Ham II (C.B. illus. left) heavy duty	..	..	£129.00
2010/220 Stolle though Rotator type	..	..	£41.25
2030/220 De-luxe Stolle	..	..	£45.50
AK121 Versatower Mounting Kit	..	..	£3.60
5 core—AR30/40/33/2030 per yd	..	..	20p
8 core—CD44, Ham II per yd	..	..	32p



### CUSHCRAFT

VHF OMNI (Carriage 95p) VAT 12½%

ARX2 Ringo Ranger 145MHz	..	£21.50	ARX450 Ringo Ranger 432MHz	£21.50
AR2 3db Ringo Vert	..	£12.75	ABW144 2m Big Wheel	£14.50
AR25 QRO AR2	..	£15.00	ABW12S ABW harness	£7.30
CX1000 29MHz Ringo	..	£25.75	ASQ1 2m Squalo	£11.75

### SMC TRAPPED DIPOLES (Post 45p.) VAT 12½%

S500W P.I.P. 14SWG	..	£19.60	P500W P.I.P. Cu/Terylene	..
HP 1K P.I.P. 14 SWG	..	£21.75	braid c/w 75' feeder, etc.	£21.75

### MOSELY TRI-BAND BEAMS (Carriage £2.50) VAT 12½%

TA333 3 ele 200W R.M.S.	..	£64.00	TA322 2 ele 300W A.M.	£44.00
Mustang 3 ele	..	£82.50	Mustang 2 ele 1kW A.M.	£66.00

### GEM QUAD FIBREGLASS (Carriage £2.00) VAT 12½%

GQ2E 2 element	..	£119.00	GQ4E 4 element	£238.00
GQ3E 3 element	..	£178.00	CK1Q 1 ele Conv. kit	£60.00

### G WHIP HF MOBILE (Carriage 90p) VAT 12½%

Tri-bander 10-20m (+ LF)	..	£16.10	LF40, 80 or 160	£4.87
Multimobile 10/20 (+ MM)	..	£19.00	MM40, 80 or 160	£4.87
Flexiwhip 10m (+ FF)	..	£13.35	FF15, 20, 40, 80 or 160	£5.04
Basemount ½" hole mount	..	£2.20	Telescopic whip for coils	£1.85

### AERIAL WIRE (Carriage extra) VAT 8%

14SWG hard drawn cu	..	yd. 10p	7/044 cad cu standard	..	yd. 17p
Cutylene braid	..	yd. 13p	7/036 cad cu standard	..	yd. 13p

### CABLES RF FEEDERS (Carriage extra) VAT 8%

RG8/U 50 ohm Heavy	..	yd. 35p	74 ohm Flat twin	..	yd. 8p
UR57 75 ohm Heavy	..	yd. 38p	300 ohm Ribbon	..	yd. 8p

### ROPES (Carriage extra) VAT 8%

3mm HT steel	..	yd. £0.13	X150 Rustproof 150m	..	£10.85
5mm HT steel	..	yd. £0.20	7 x 18g Galvanised 100'	..	£2.20

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Our usual personal service will continue but reinforced with an increased range and larger stocks.

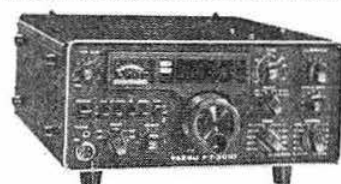
Thank you for your patronage in the past, and assuring you of our best attentions in the future.

Signed J. R. Tweedy, R. Baines, B. A. Tweedy.

## THE FRG7, GENERAL COVERAGE RECEIVER Ex-Stock UNPARALLELED IN ITS CLASS AND NOW ONLY £145 + VAT

The FRG7 is a general coverage solid state receiver with specifications unparalleled in its price range. It uses a Barlow Wadley Triple-mix, drift cancelling loop for continuous, spin-tuned inclusive coverage of 0.5 to 30MHz with calibration accuracy better than 5kHz. Frequency selection is accomplished by setting the RF (pre-selector and range switch), dialling up the required number of megahertz, then tuning the VFO knob as normal.

The receiver is sensitive (0.5µV for 10dB, S + N/N (SSB) and stable (within 500Hz for any 30 minutes after warm up) with A.M., SSB and CW modes catered for. A 3 position audio filter, RF attenuator, dial lamp conservation switch, recorder and phone sockets are fitted. It is mains powered, but should the supply fail, or portable operation be required, 8 dry cells are automatically switched in. EX-STOCK IN TOTTEN £148.50 (+ VAT).



## THE FT301 RANGE EX-STOCK AT NEW LOW PRICES

The new FT-301 transceiver range (with options installed) offers: Full solid state 12V DC working, external matching mains power supplies with speaker, and an external VFO are available. Plug in board construction. 160-10m operation in 500kHz segments, MSF and CB receive, RF speech processor, noise blanker, front panel controlled VOX (with M.O.X.) and P.P.T., semi break-in keying with side tone, clarifier with separate ON/OFF switch, 11" x 5" x 13 1/2", 25kHz crystal calibrator, internal VFO or 11 crystal per band (or external VFO with same facility) 3W audio to internal or external speaker.

## YAESU MUSEN PRICES

with two year guarantee & "24 hour" Securicor Delivery

FT301 T/RX 1-8-30. 100W 12V	£485	FT223 T/RX 2m. FM 23 chnl. 12V	£139.50	FP501 External PSU/speaker	£60	SP401 External speaker	£15.50
FT301D Digital Readout '301	£585	FT224 T/RX 2m. FM 23 chnl. 12V	£148	YD844 Desk microphone	£18	YC500E 500MHz 0-02 P.P.M.	£285
FT301S 10W PEP '301	£340	FT2Auto T/RX 2m. FM Auto Scar	£215	FR101S Rx 1-8-30. 12/240V	£229	YC500S 500MHz Counter 1 PPM	£225
FV301 External VFO	£62	Sig 80R T/RX 2m. FM 80 x 25kHz 12V	£220	FR101D Deluxe 'S' BC, FM	£390	YC500J 500MHz Counter 10 PPM	£155
FP301 PSU/speaker	£79	FTV250 Transverter 2m 12/230V	£139	FR101SD Digital Readout 'S'	£387	YC355D 220MHz Counter AC/DC	£139
FP301D FP301 + Clock, Ident	£125	FTV650 Transverter 4m.	£120	FR101DD Digital readout 'D'	£480	YC355 35MHz Counter AC/DC	£105
FT75B AC PSU/speaker	£43.50	FTC212 T/RX 4m FM 12 chnl 12V	£205	SP101B External speaker	£15.50	YC601 Dig. Display 101 & 401	£110
DC75B DC PSU/speaker	£43.50	FTV650B Transverter 4m.	£120	FL101 T.X. 1-8-30MHz 230V	£325	YO301 Monitor scope	£123.50
VC75 VOX and Compressor	£18.75	FTG202B T/RX 6m 'All Mode' 12/230V	£280	FL2100B Linear 1-2kW PIP	£248	YO100 Dummy 2 tone osc	£118.00
FT200B T/RX 3-5-30	£249	FT501 T/RX 3-5-30-500W Digital	£440	FT101EE T/RX 1-8-30 AC/DC	£408	YP150 Dummy load/wattmeter	£44
FP200B AC PSU/speaker	£54			FT101E 'EE' with RF CLIPR	£429	FF50DX Low pass filter	£15.25
FRG7 RX 5-30 cont. AC/DC	£145			FT101EX 'EE' less DC PSU etc	£389	Fan as for FT101	£12.00
FT221R T/RX 2m. 'All Mode'	£339			FV101B External VFO	£62.75	QTR24 World time clock	£13.00
				FT401B T/RX 3-5-30 560W	£365	YD846 Hand mic	£7.50

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## BANTEX VHF WHIPS (Carriage 90p) VAT 12 1/2 %

701 1/2 70MHz fibreglass ..	£4.00	BSU 1/2 432MHz ..	£5.00
1441 1/2 145MHz FG or SS ..	£3.50	UCL Mid loaded 432MHz ..	£8.00
B5 5/8 145MHz ..	£8.35	TLM Trunk lip mount ..	£5.25
BGA FG 1/2 2m fibreglass ..	£8.75	MB Magnetic Base ..	£8.50
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## HY GAIN HF RANGE (Car. £1.00-£2.50) VAT 12 1/2 %

BN86 1:1 ferrite Balun ..	£12.00	TH2MKIII 10-20m 2 ele ..	£94.00
103BA 10m 3 element ..	£43.50	TH3JNR 10-20m 3 ele ..	£96.00
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203BA 20m 4 element ..	£103.40	TH6DXX 10-20m 6 ele total ..	£164.50
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18V 10-80 Load Vert. ..	£24.50	DB1015A 10-15m 3 ele ..	£39.00
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2F polyprop ribbed ..	14p	SMCP1 8" carbon polyprop ..	85p
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## COAX PLUGS (p & p extra) VAT 8 %

PL259 Standard UHF plug ..	£0.48	258 Back to back (female) ..	£0.80
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"Solderless" UHF UR43 ..	£0.51	Phono/car to SO239 ..	£0.55
UG** Reducers state UR43 or 70 ..	£0.12	SO239 2-hole socket ..	£0.37

## JAYBEAM 70 (4m), 144 (2m), 432 (70) (Car. £1) VAT 12 1/2 %

D5/2m 5 over 5 slot feed ..	£25.20	PBM14/2m 14 ele Para ..	£25.20
D8/2m 8 over 8 slot feed ..	£14.75	D8/70 8 over 8 slot feed ..	£12.50
5XY/2m 5 element crossed ..	£12.90	PBM18/70 18 ele Para ..	£15.00
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10Y/2m 10 ele long yagi ..	£17.20	PMH2/70 2 way harness ..	£4.75
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Q4/2m 4 element quad ..	£13.20	PMH2/C Circ. phasing ..	£4.10
Q6/2m 6 element quad ..	£17.60	PMH2/2m 2 way harness ..	£5.50
PBM10/2m 10 ele Para ..	£20.50	JBL 15/59 2" Joint sleeve ..	£3.37

## ROGER BAINES G3YBO

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## PRICES EXCLUDE VAT, 8 or 12 1/2 %

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Items on this, or other SMC advertisements are  
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# YAESU MUSEN

## FT301 SOLID STATE GOLD LINE



FT301D

YAESU'S fully solid state transceiver line features the latest in technology:- Bandpass filters with wideband PA eliminates PA tuning for band changes, RF speech processor, IF tunable rejection control full No compromise top band to ten (2MHz) coverage

### PROFESSIONALLY ENGINEERED TRANSCEIVERS FOR THE UNCOMPROMISING

FT301S 10W analogue

FT301SD 10W Digital

FT301 100W analogue

FT301D 100W Digital

### FT301D FEATURES (WITH OPTIONS INSTALLED)

160-10 metre inclusive coverage  
Multi mode USB-LSB-CW-AM-FSK  
12VDC (234V with FP301 & FP301D)  
11 1/2" (14") x 5" x 11 1/2", 22 lb weight  
Silky smooth precision VFO drive  
Readout to 100Hz (digital version)  
11 fix channels per band Segment

Semi break in with sidetone  
4 models—10/100 Dig/analogue  
RX on M.S.F. (5MHz) and CB  
Front panel microphone gain  
R.F. derived feedback circuit  
Rejection tuning (I.F. passband)  
RF speech processor

Adjustable carrier level  
Adjustable 3 position A.G.C.  
Clarifier (IRT with RT and TT)  
600Hz, 2.4kHz, 6kHz bandwidths  
Triple PA protection circuit  
100kHz crystal calibrator  
Switchable noise blanker

### FT301 SPECIFICATIONS

**Frequency range**  
160-10 metres transceive  
M.S.F. and CB receive  
**Modes**  
USB, LSB, CW, AM, FSK  
**Frequency stability**  
>100Hz/1/2H (A.W.U.)  
<100Hz for 10% line change  
**Backlash**  
50Hz or better  
**Antenna impedance**  
50 ohms, nominal  
**Power requirements**  
234V AC with FP301  
13.5V DC 1.1A RX 21A TX

**Sensitivity**  
1µV for 10dB N + S/N @ 14MHz  
**Selectivity**  
SSB 2.4kHz at 6dB (1.67:1SF)  
AM\* 6kHz at 6dB (2:1SF)  
CW\* 600Hz at 6dB (2:1SF)  
FSK as SSB  
**Spurious responses**  
Image > -50dB  
Internal spurious <1µV  
**Audio output**  
3W (int. and ext. speaker)  
**Audio distortion**  
<10% at 3W output

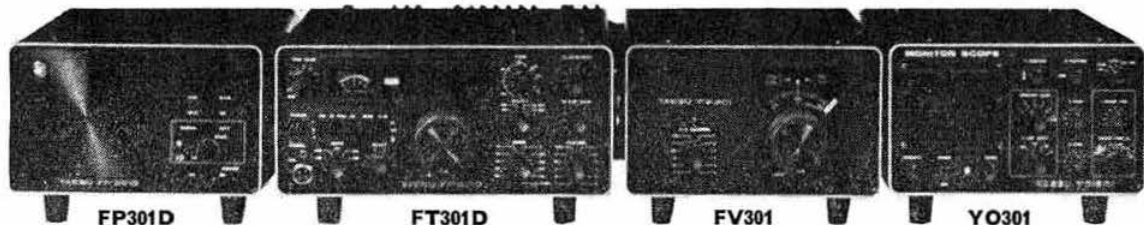
**Input power**  
>200W PIP A3j  
>200W DC A1 (50% duty)  
>50W A3 and F1  
**Audio response**  
0.3-2.7kHz ±3dB  
**Carrier suppression**  
> -40dB  
**Sideband suppression**  
> -50dB  
**Spurious radiation**  
> -40dB  
**Dimensions**  
11 1/2" (14") x 5" x 11 1/2", 22lb

#### THE FT301D AND ACCESSORIES ALL YOU NEED FOR A COMPLETE HOME STATION

The FP301D AC PSU with built in speaker, 12/14 digital clock and optional automatic CW identifier.

The FV301 external V.F.O. for split frequency working with a 11 crystal channels per band segment capability.

The YO301:- Monitor; TX (1.8-50MHz @ 10-500W) RX IF (9-10.7MHz). Oscilloscope 4MHz BW. 2 Tone Oscillator.



FP301D

FT301D

FV301

YO301

#### OUR AGENTS

Amateur Electronics,  
508-514 Alum Rock Road,  
Alum Rock, Birmingham B8 3HX

South Midlands Communications Ltd,  
S. M. House, Osborne Road, Totton,  
Southampton, Hampshire SO4 4DN

Western Electronics (UK) Ltd,  
Fairfield Estate,  
Louth, Lincolnshire LN11 0JH



# WATERS & STANTON



**IF WE CHARGED YOU FOR ALL THE EXTRAS  
THIS RIG HAS, IT WOULD COST YOU A FORTUNE  
... SO WE GIVE THEM TO YOU FOR NOTHING!**

**USB/LSB/FMn/FMw/CW/AM/"OSCAR" STILL ONLY £449.00 incl. VAT**

**NORMAL/REVERSE  
REPEAT  
VOX/IRT/CALIBRA-  
TOR  
DX SPEECH CLIPPER  
HIGH/LOW POWER  
NOISE BLANKER**



**10W/1W OUTPUT  
12v/230v SUPPLY  
DUAL VFO CONTROL  
DIGITAL OR ANA-  
LOGUE PLL FOR  
STABILITY**

**FEATURES** Immediately you see the FDK Multi-2700 Transceiver you realise it is a little different from the rest. Of course it has all the standard features you would expect of a modern 2 metre all-mode transceiver in 1977. But FDK engineers have gone a little further to provide the most versatile single package station available today. In the space available it is impossible to list all its many features but if we whet your appetite a little, we have a feeling that you will want to send for the full 4-page brochure on the Multi-2700.

That such things as VOX, IRT, noise blanker, crystal calibrator, etc., are fitted as standard, goes without saying. But FDK is a lot more versatile than this. For example, whilst other operators get bored with flat conditions on 2 metres you can enjoy the excitement of chasing Inter-continental DX through OSCAR 6 and 7. America, Canada, Africa, Russia; they are all within your grasp with the Multi-2700. Simply press the OSCAR button on the front panel and you automatically receive the 29MHz downlink signals. And for the future 70 cms downlink planned by

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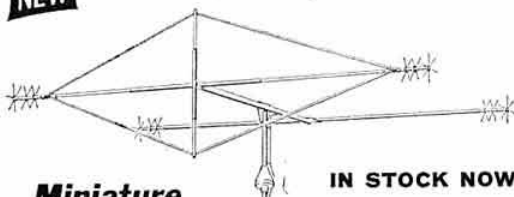
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**WITH AUTOSCAN!  
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**FITTED 5 CHANNELS**

channel to another, the TM56-B automatically hunts out the signals leaving the operators hands free, a particularly useful feature so far as safety is concerned when used under mobile conditions. An extension of the auto-scan facility renders it possible for any one of the 4 channels to be muted whilst scanning continues on the remainder. Bright LED's indicate the scanning progression and an additional front panel switch enables the operator to select full manual control whilst a further switch ensures instant switching between the 4 priority channels and the 12 manual channels.

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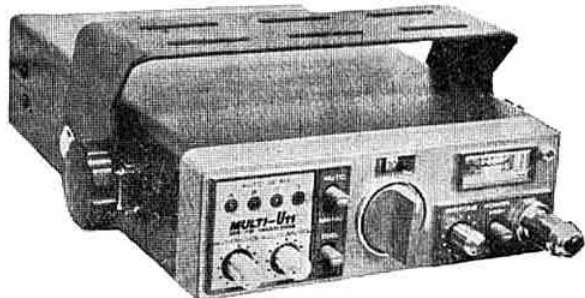
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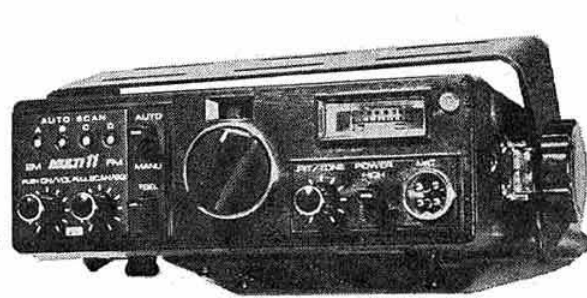
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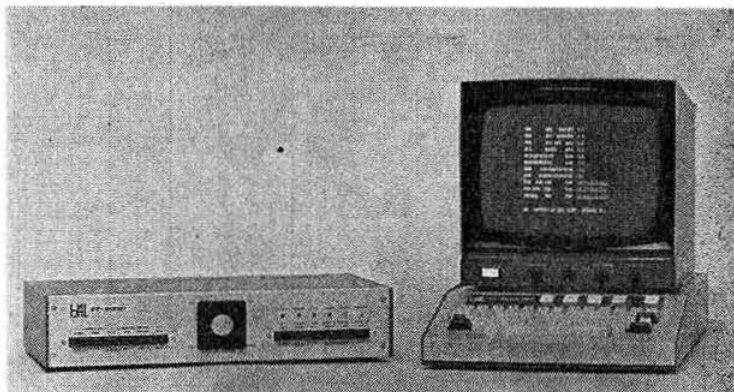
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DS-3000	KSR version 1 · X Baudot	972.00
DS-3000	KSR version 2 · X ASCII/Baudot	1,134.00
DS-3000	RO version 2 · X ASCII/Baudot	837.00
DS-4000	KSR version 1 · X ASCII	972.00
DS-4000	RO version 1 · X ASCII	756.00
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# RADIO SOCIETY OF GREAT BRITAIN

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Telephone 01-837 8688

Founded 1913

Incorporated 1926

Member society, International

Amateur Radio Union

**PATRON: HRH The Prince Philip, Duke of Edinburgh, KG**

**The national society representing all UK radio amateurs**

Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for membership should be made to the general manager, from whom full details of Society services may also be obtained.

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A. W. Hutchinson

## ANNUAL SUBSCRIPTION RATES

**UK corporate:** £8, including VAT.

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**Associates under 18:** £3.

**Students aged 18 to 21:** £4.50.

**OAPs with 15 years' membership:** £4.50. **Affiliated societies:** £6.50 (including

*Radio Communication*); £3.25 (excluding *Radio Communication*).

## CURRENT COMMENT

### 1979 World Administrative Radio Conference

A widening of the area of consultation in preparation for the 1979 World Administrative Radio Conference in Geneva—the results of which will govern the allocation of radio frequencies to particular services for the rest of this century—was announced in the House of Commons on 26 January by the Home Secretary the Rt Hon Merlyn Rees, MP.

In a written reply to Mr Phillip Whitehead, MP, Mr Rees said that although a substantial measure of consultation with users and manufacturers of radio equipment had already taken place, a wider programme of consultation was desirable before the UK's proposals for the conference were formulated. "Inevitably there will be conflicts between the claims of different services," said the Home Secretary. "Significant decisions will have to be made about economic and social priorities; large scale investment plans will be affected."

Mr Rees added that comments from all interested bodies and members of the public should be sent to the *Home Office Radio Regulatory Department, Waterloo Bridge House, Waterloo Road, London SE1 8UA*, by 30 April 1977.

The *Amateur Service* and the *Amateur Satellite Service* are both services recognized in the Radio Regulations of the ITU. As the body representing the amateur service in the UK, the RSGB, after an initial meeting with the Home Office, sent to the administration in June 1976 a 25-page document setting out the proposals of the amateur service in this country for the World Administrative Radio Conference 1979.

As already reported in *Radio Communication*, the representatives of the amateur service throughout the world have agreed on the basic proposals to be presented to national administrations for WARC 1979. This represents a degree of co-operation never before achieved. The international working group of the IARU, which converts proposals into action, will be meeting again in the UK in June 1977 when progress will be reviewed.

Many of the Home Office representatives took part in the Satellite Broadcasting Conference in Geneva which ended on 11 February 1977 and following their return to the UK a further round of meetings concerning WARC is expected to take place. The RSGB will be fully involved in these.

If any member or group should write to the Home Office concerning WARC 1979 please send a copy of the letter to the Telecommunications Liaison Officer at RSGB headquarters. □

**Results for the first six months of the financial year**

The unaudited figures for the six months to 31 December 1976 show a surplus of approximately £9,500. This surplus is mainly due to exceptional sales of two new books (*VHF/UHF Manual* and *Radio Communication Handbook*). It should be stressed that these results are for a limited period only.

G3DVV, hon treasurer

**Region 1 representative**

Only one nomination was received to fill the vacancy of representative for Region 1 following the election of Mr B. O'Brien to Council. This was for Mr W. M. Furness, G3SMM, and subject to approval by Council he has been declared elected unopposed.

**Correspondence to honorary officers**

Members are asked to address all correspondence for the honorary officers of the Society direct to them and *not* to RSGB HQ for forwarding. All these officers are QTHR and none of them work at HQ.

Direct mailing will reduce delay and be economical in time and money to HQ operations.

**Area representatives, Grampian**

The post of area representative for the Grampian area of Region 12 is now vacant, and anyone wishing to fill it is asked to contact Frank Hall, GM8BZX, Region 12 representative, or RSGB HQ.

**RSGB International Radio Communication  
Exhibition and Convention  
Alexandra Palace, London  
6-8 May 1977**

**Members' Mart**

This will be held on Sunday 8 May in the west corridor of Alexandra Palace. The cost of hiring space for one trestle table only will be £10 for the day, and the number of spaces will be limited to 40. Members of the Society not engaged in "the trade" and affiliated clubs and societies are invited to book these spaces now. Applications accompanied by remittances should be addressed to Mr J. Hitchens at RSGB HQ, cheques being made payable to RSGB.

Should more than 40 applications be received, a draw for the spaces will take place at HQ on Tuesday 26 April, after which successful applicants will be notified and remittances returned to unsuccessful ones.

**Dinner/dance**

Following the announcement in last month's issue, applications for tickets for the dinner/dance are already being received as we go to press, and it is timely to remind members that the number will be limited.

**WATCH OUT FOR FULL DETAILS IN NEXT  
MONTH'S ISSUE**

**Antenna and mast planning problems**

In *Radio Communication* (December 1975) members who had appealed against refusal of planning consent for an antenna or mast, or against an unacceptable condition in a planning consent for an antenna or mast, were requested to notify the general manager at RSGB headquarters. Unfortunately, the result was disappointing.

It had been hoped that by this means a considerable amount of useful information and experience could be collected and then made available for the benefit of other members who find themselves involved in similar appeals.

A further effort is now being made. Would all members who have been involved in such appeals to either the Department of the Environment or the former Ministry of Housing & Local Government, and who have not notified RSGB since December 1975, please do so as soon as possible. Only their name, address and callsign are required initially, and then they will be given further details of the information which is needed. The Society wants to hear from members who have been unsuccessful with appeals, as well as the more fortunate.

**Facts and figures**

The Home Office advises that the following numbers of amateur licences were in force at 31 January 1977:

Class A	15,964	Class B	6,160
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The callsign record received from the Home Office dated 28 January 1977 gives the latest callsigns issued in the G4 and G8 series as G4FQU and G8MUN respectively.

**Satellite broadcasting conference**

The World Administrative Radio Conference for the planning of the broadcasting satellite service in the 12GHz band took place at Geneva between 10 January and 12 February 1977. This was a specialized conference not directly affecting the frequency allocations of the amateur radio service. However, many of the delegates present will also be attending the 1979 WARC.

The President of the IARU, Noel Eaton, VE3CJ, was host at a reception at the ITU for conference delegates at which some 130 persons were present. This afforded a valuable opportunity for discussion with representatives of African and Asian countries. VE3CJ was assisted by Bruce Johnson, WA6IDN, from IARU HQ and G2BVN, the secretary of Region 1.

**4U1ITU**

M M. Mili, secretary-general of the ITU, attended a meeting of the International Amateur Radio Club at Geneva on 17 January during which new equipment for 4U1ITU was presented. A Yaesu FT101E and FL2500 were accepted by M. Mili, who is patron of the IARC, for the club station which is located in the ITU headquarters building. This equipment was donated to 4U1ITU by the Japan Amateur Radio League through Shozo Hara, JA1AN, the president.

**"Radio Communication Handbook"**

A specially-bound and blocked edition of volume 1 of the handbook was presented to M. Mili by Roy Stevens, G2BVN, during the course of a recent visit to Geneva. The foreword to the new edition of the handbook was contributed by M. Mili. A similar presentation volume will be handed to the Society's Patron, HRH The Prince Philip, Duke of Edinburgh, KG.

### Microprocessors in amateur radio

The Microprocessor Applications Group of the IEE is planning a lecture and demonstration meeting on "Low cost applications of microprocessors" (including industrial, domestic, hobby and leisure activities) and would very much like to contact anyone using microprocessors in amateur radio or related fields. Please write to: Dr J P Stuart, G8LWC, chairman of MAG, Institution of Electrical Engineers, Savoy Place, London WC2R 0BL.

### Central Scotland FM Group

The central Scotland repeater GB3CS came into service on R6 from the IBA site at Black Hill on 30 January. Users are asked to note that while every effort will be made to maintain service, breaks in transmission will be necessary to replace temporary equipment and carry out tests and adjustments. Full coverage is not expected until the low gain aerial is replaced.

The first AGM of the Central Scotland FM Group will be held at Wrangholm Hall, Jerviston Street, New Stevenston, Motherwell, on Sunday 13 March at 2.30pm. All users of GB3CS are invited to attend.

### Scottish Amateur Radio Convention

The Glenrothes & District ARC has decided to hold an amateur radio convention in the Adam Smith Centre, Kirkcaldy, on Saturday 10 September 1977. This convention will differ from recent conventions held in Scotland in that it will cater for vhf and hf. As well as talks covering a wide aspect of amateur radio, it is proposed to have numerous trade stands and other attractions in what should be the biggest and best convention yet held north of the border.

XYLs and families can spend an enjoyable afternoon in the foremost shopping centre in the region. As well as a covered shopping precinct, Kirkcaldy has modern indoor swimming pools, a cinema, three large parks including one with a boating pond, and an esplanade over a mile long. If staying for the weekend, accommodation will be available in an adjacent hotel, and there is also a caravan site.

The Adam Smith Centre is close to the railway station, situated on the main London-Aberdeen line, and buses to and from the main Scottish cities pass the door.

Any Sassenachs on holiday in GM land at the time will be most welcome to come and sample Scottish hospitality.

### Reactivated callsigns

The Medway Amateur Receiving & Transmitting Society has been reissued with the callsign G5MW which it first held in the 'thirties. The society is grateful to the family of the late holder of this callsign for their assistance in getting it reissued to them.

Another reissue is that of G2XV to the Cambridge & District ARC. This was formerly the callsign of the late Gerry Jeapes, a member of the club, and it is being retained as a memorial of a vhf/uhf pioneer and great club member. The club's thanks are extended to Mrs Dorothy Jeapes for allowing his memory to be marked in this way.

These callsigns join two other well-known and recently reissued callsigns—G6CW (John Curnow) to the Nottingham Club, and G8LM to the Leicestershire Metre-Wave Contest Group—on the vhf bands.

### RAC/Amateur Radio Group Scheme

This scheme was inaugurated on World Telecommunication Day (17 May) last year, and in order that it may continue under the rules prevailing it is essential that more amateurs join the group.

Membership of the group offers the same services and benefits as individual membership of the Royal Automobile Club at less cost. At present the saving is £1.50 per year. Existing members of the RAC can also make a saving by transferring to the group scheme when their membership is due for renewal. A group member also receives a discount on RAC car insurance. RAC membership includes husband and wife for the same fee.

The organizer of the scheme is Mr M. Parks, GM8HBU, who will be pleased to supply full details. His address is 18 Netherplace Crescent, Newton Mearns, Glasgow G77 6BT.

### New Edinburgh club

The Edinburgh & D ARC has recently been formed and meets every Tuesday at 7.30pm at The City Observatory, Catton Hill, Edinburgh. The secretary is Mr J. Martin, 22 Ross Gardens, Edinburgh EH9 3BR; tel 031-667 8707, who would be pleased to hear from anyone who would like to visit or join the club.

### Sutton & Cheam dinner/dance

Lord Wallace of Coslany, RSGB President, will be guest of honour at the 29th annual dinner/dance of the Sutton & Cheam RS at The Woodstock, Morden, Surrey, on Saturday 19 March. Full details and ticket application forms can be obtained from G3MES, QTHR, tel Burgh Heath 56095.

### Accommodation wanted

An 18-year-old French amateur, F6EGK, who is a member of REF and an electronics student, wishes to stay with an English amateur during July or August in order to improve his knowledge of English and to take part in amateur activities.

Anyone able to offer accommodation is asked to send particulars of facilities and cost to: M Roy Régis, Route d'Avignon, 30650, Rochefort du Gard, France.

### Transatlantic Nutley call

The Nutley ARS Inc, Nutley Red Cross Building, 169 Chestnut St, Nutley, NJ, 07110, USA, would like to contact amateurs in places of that name in the UK. As the two Nutleys in the UK are small villages in Hampshire and Sussex respectively, it is suggested that if no amateurs reside in them perhaps others who live nearby may be interested in contacting the Nutley USA amateurs.

### Odd lines

**RAIBC.** The new honorary secretary of the Radio Amateur Invalid & Bedfast Club is Mr H.R. Boutle, G2CLP, 14 Queen's Drive, Bedford MK41 9BQ.

**Raynet.** Would members interested in serving the community and the Society through Raynet in the London area please contact G3IIR or G8EAY, QTHR.

**Radio Fraternity Lodge No 8040.** At the February meeting of this lodge, Mr H. Peers, G3BEZ, was installed as Master for 1977-8. The secretary is Mr S. Howard, G8TY, QTHR. □

# A third method ssb generator

by G. V. ENTWISLE, G3MXT\*

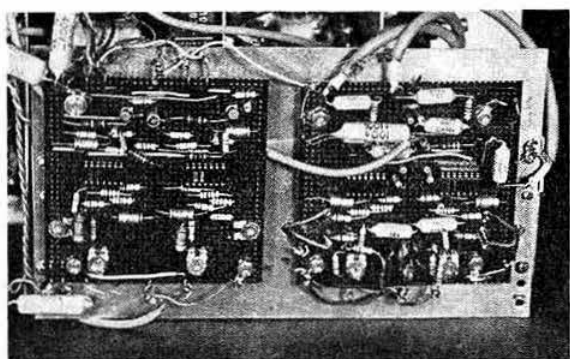
THE idea of ssb generation by the so-called third method has been around for many years, but having been unable to unearth a complete circuit diagram of such a generator, the author decided to attempt a practical evaluation of the system.

The result is an ssb generator which is stable in operation, positive in sideband switching and produces very good quality speech. The prototype is intended for use on the 80m band, the external vfo tuning 14.4MHz to 15.2MHz. An internal 7.250MHz crystal provides an output at 1.812MHz, giving one channel on 160m, or this may be fed to a following mixer to allow operation on the higher frequency bands. Both the 7474 and the 74H74 worked well at the above frequencies.

It may be possible that by substituting a 74S74 and connecting the output of a 36MHz crystal oscillator to the vfo input socket, an output frequency of 9MHz could be obtained; thus a following mixer with a vfo tuning 5.1MHz to 5.4MHz would allow operation on either 80 or 20m.

## Construction

The use of 0.1 Veroboard greatly simplifies construction; in the prototype, the components of Figs 2(b) and 3(b) and the power supply (Fig 4) are mounted on three separate boards each measuring 3½ by 3½in, while the components of Figs 2(a), 3(a) and 5 are also mounted on three separate boards each measuring 3 by 2in. All the trim pots are miniature



Balanced modulator circuit boards, af (left), rf (right). The gain adjust skeleton pots are mounted along the lower edge and balance pots on the side edges on the af board. The preset rf balance pots have been removed from the board and replaced by variable types controlled from the front panel. Similarly the two edgewise mounting presets (lower centre) have been replaced by a single 10kΩ variable fine balance control

skeleton type horizontal mounting made to fit neatly into the Veroboard. It is advisable to use holders for the ics and transistors rather than soldering these devices directly to the board. In the circuit diagram all ic pin connections are as viewed from the top.

The photographs show how the various boards are assembled and fastened to the inside of the front panel so that the complete unit can be removed from the 12 by 7½ by 7½in metal box. It is by no means necessary to follow this method of assembly as one of the advantages of the system is that it affords some degree of flexibility of layout.

All the components of Fig 2(a) and (b) could with advantage be mounted on one piece of Veroboard measuring 5 by 3½in, as could all the components in Fig 3(a) and (b). The twin low-pass filters may be built on one piece of Lektrokit board measuring 4 by 4½in. In fact, if metal work is considered tedious all the circuit panels may be mounted in the same plane on one sheet of aluminium by means of 2½in 4BA screws. This approach would result in a somewhat larger front panel but at least the box would only need to be some 3in deep.

\*12 Booths Hall Grove, Boothstown, Lanes M28 4LQ.

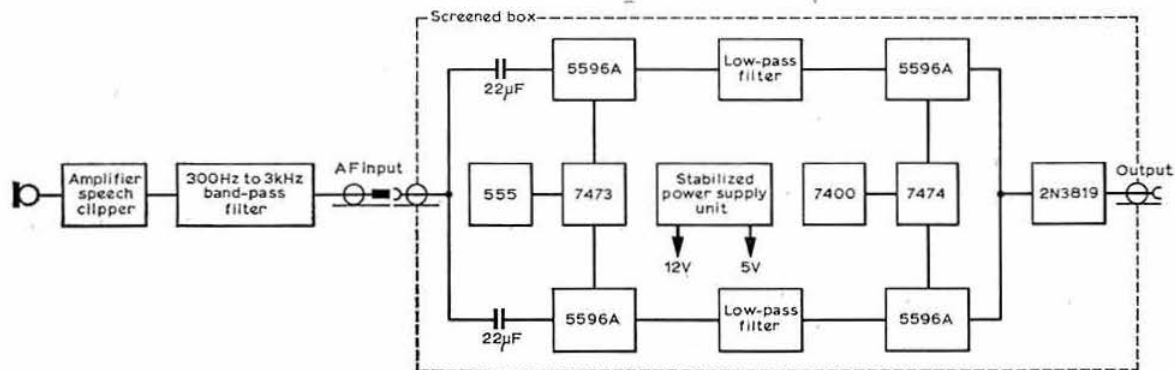


Fig 1. Block diagram

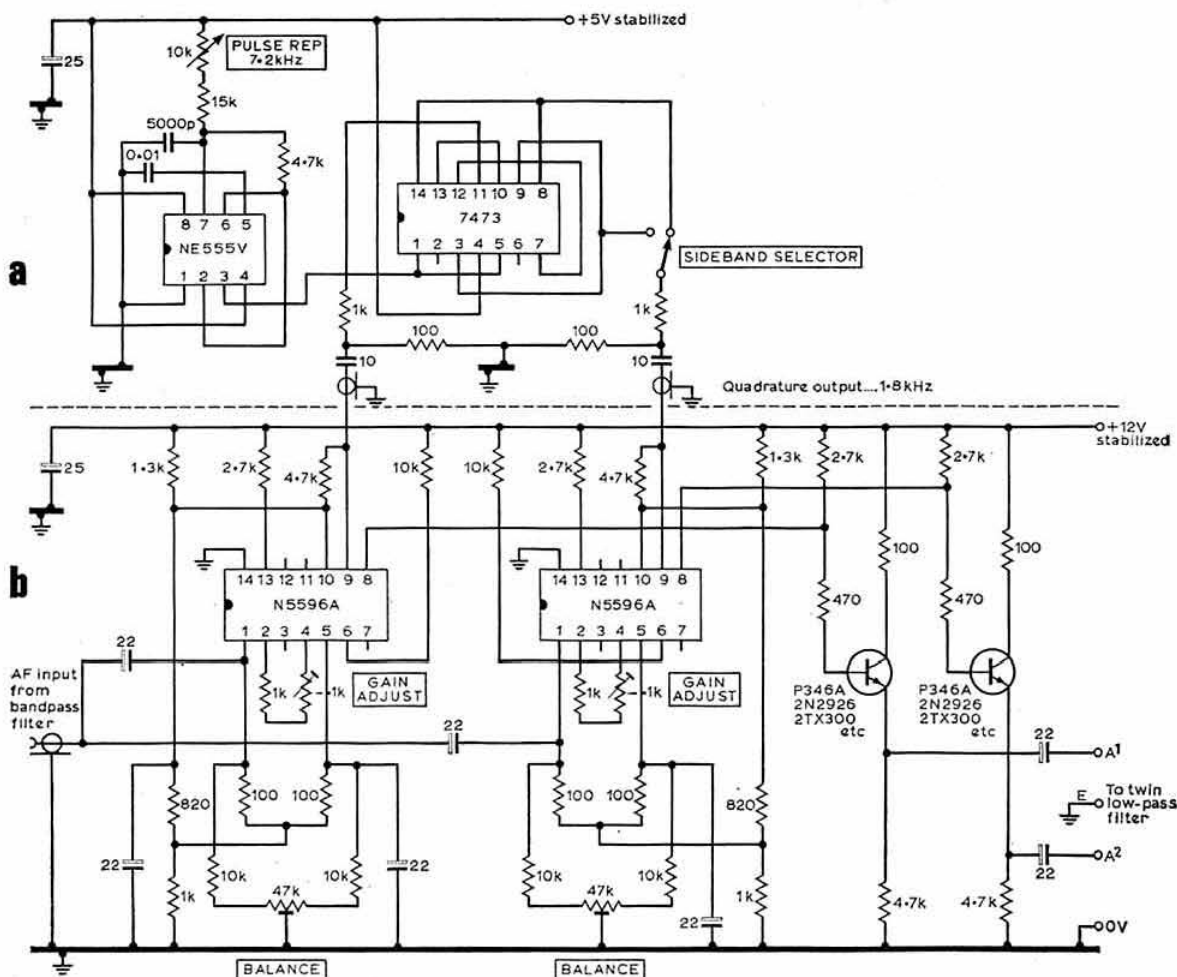


Fig 2. Pilot carrier balanced modulators

Whatever form of assembly the constructor decides to adopt, the following remarks should be noted.

The 12V and 5V stabilized supplies should be substantially ripple free. The positive supply leads should be screened single pvc flex, separate (not looped from one board to the next), and adequately decoupled to chassis at the point where they connect to the board. The negative lines on the boards are taken to chassis via the fixing bolts. The four 1k $\Omega$  variable resistors marked GAIN ADJUST in the modulator circuits may be omitted and a 1k $\Omega$  fixed resistor connected between pins 2 and 4, in which case suppression of all unwanted frequencies to about -40dB may reasonably be expected. If, however, they are left in circuit and carefully adjusted in conjunction with the balance pots, suppression in excess of -50dB is possible.

Suppression of the unwanted sideband and pilot carriers appears to remain constant at this level, but as a slight short-term drift is associated with the centre carrier at switch on, the three rf balancing pots are controlled from

the front panel by means of extension shafts (in the prototype), the components themselves being mounted close to the circuit board to which they are connected. Very long leads or screened leads are not permissible.

In a monitoring receiver the carrier, if present, is audible as a background 1.8kHz tone. This is very easily nulled out and after a warm-up period of 10min or so, no further adjustment is required. The leads to and from the low-pass filters are not so critical; in the prototype they are three-wire twisted pvc flex and about 8in long.

A 7.250MHz crystal is used to provide a channel on 1.812MHz. It was found that the circuit would still oscillate when the 50pF series capacitor was reduced to 4 or 5pF, albeit with a change of frequency to 1.814MHz; therefore care must be taken not to introduce any appreciable capacity in the switching arrangements. A three-position rotary switch with the centre position left open has proved adequate.

The two emitter followers (Fig 2(b)) are type P346A transistors; numerous other types would be equally suitable.

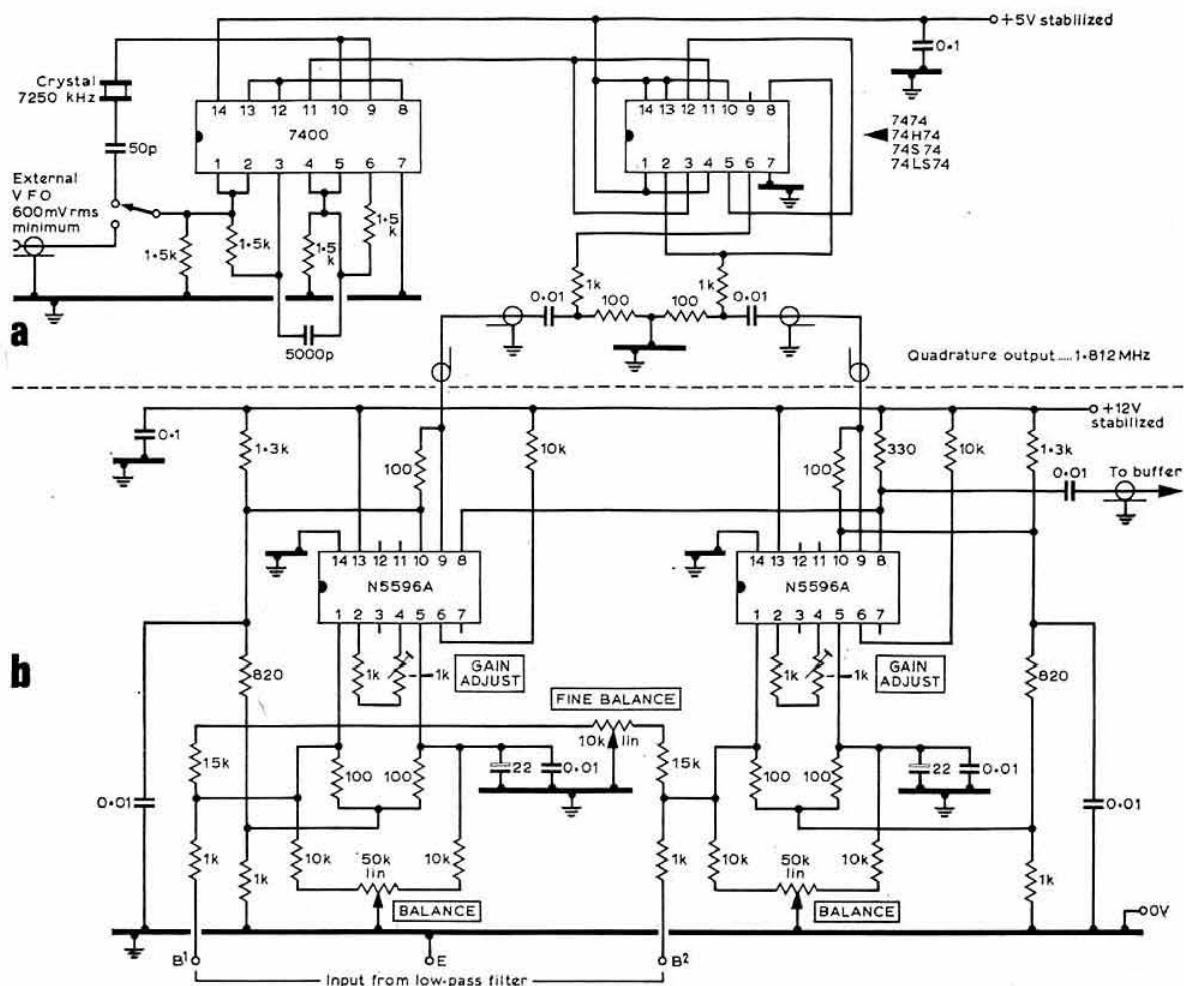


Fig 3. RF carrier balanced modulators

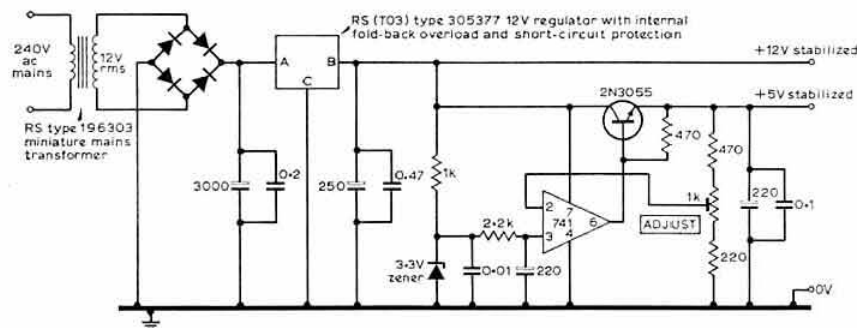
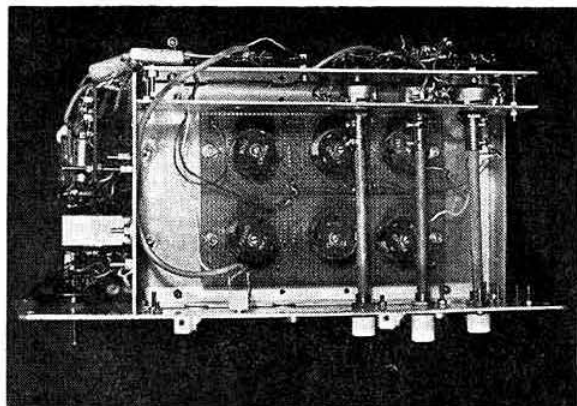


Fig 4. Stabilized 12V and 5V psu



The twin low-pass filters and the three rf balance pots

All the fixed resistors used in the prototype are  $\pm 5$  per cent tolerance 0.5W rating. The  $22\mu\text{F}$  electrolytic capacitors are small, 1 by  $\frac{1}{2}$ cm, wire ended, convenient for fixing to Vero-board. The ICs are: NE555V timer; 7400; 7473; 7474, and four Signetics N5596A.

### Cost

Depending to some extent on how one shops around, the total cost of the generator should be in the region of £10 to £15.

Copperclad 0.1in pitch Veroboard is available from Trampus Electronics, 58-60 Grove Road, Windsor, Berks SL4 1HS.  $3\frac{1}{2}$  by 5in—37p. Veroboard pins (useful for inter-connecting) 36 for 28p. They also supply most of the ICs at competitive rates.

A postcard to Quarndon Electronics, Slack Lane, Derby, should bring their current price list of all ICs and transistors.

### Low-pass and bandpass filters

From Fig 6(c) it can be seen that the desired sideband and the unwanted sideband occupy virtually the same part of the spectrum. If the unwanted sideband is insufficiently suppressed, the transmitted signal will be distorted and unpleasant to listen to; therefore a high degree of suppression is desirable.

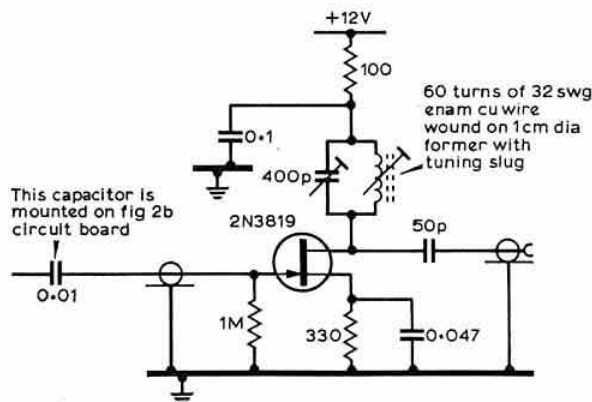


Fig 5. Buffer amplifier, 1.8MHz-4MHz

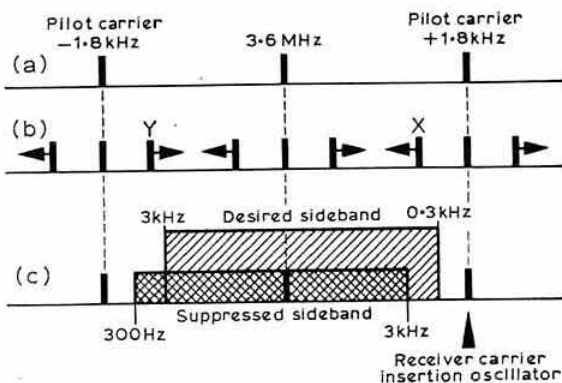
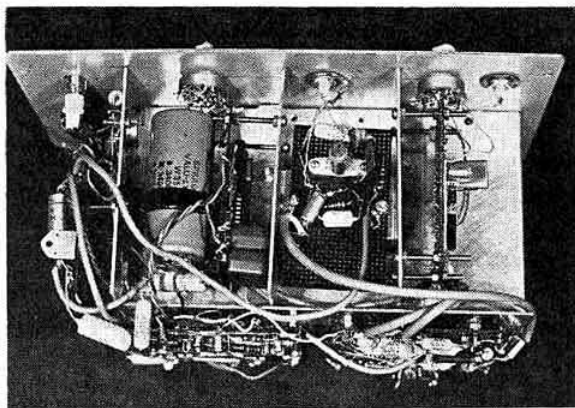
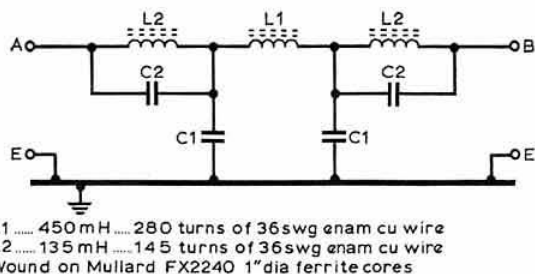


Fig 6. (a) A 3.6MHz carrier with attendant pilot carriers. (b) An af input signal of 500Hz produces sidebands associated with each carrier; if the carriers are unbalanced these frequencies, to a greater or lesser extent, will appear in the output of the generator. The arrows indicate the direction in which the sidebands travel as the audio frequency is increased. X is the desired sideband, Y is the suppressed sideband. (c) Shows how the desired sideband and suppressed sideband relate to each other in a third-method generator, and in particular how a receiver "sees" them



Top view showing, l to r: power supply, 7.2kHz pulse generator and phase splitter, buffer amplifier, crystal oscillator and phase splitter



L1 ..... 450 mH ..... 280 turns of 36swg enam cu wire  
L2 ..... 135 mH ..... 145 turns of 36swg enam cu wire  
Wound on Mullard FX2240 1" dia ferrite cores

Fig 7. Low-pass filters. See Fig 8 for frequency response and values of C1 and C2

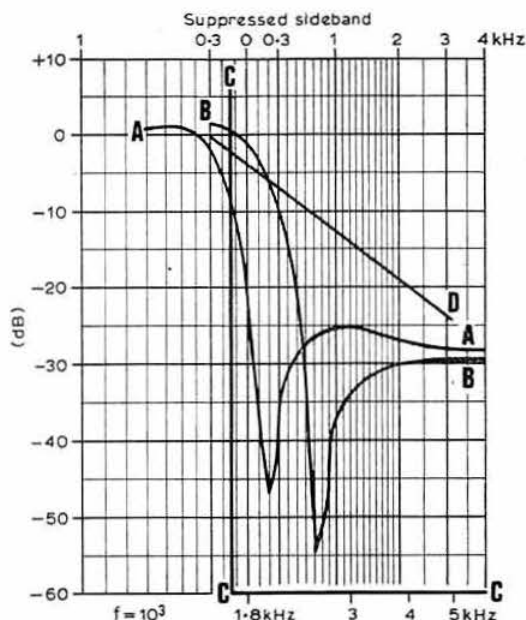


Fig 8. Frequency response curves.

C1( $\mu$ F) C2( $\mu$ F)

Curve A 0.0428 0.03564

Curve B 0.042 0.032

For practical purposes, if C1 remains 0.042 $\mu$ F, varying C2 from 0.032 to 0.035 $\mu$ F effectively changes the curve from B to A

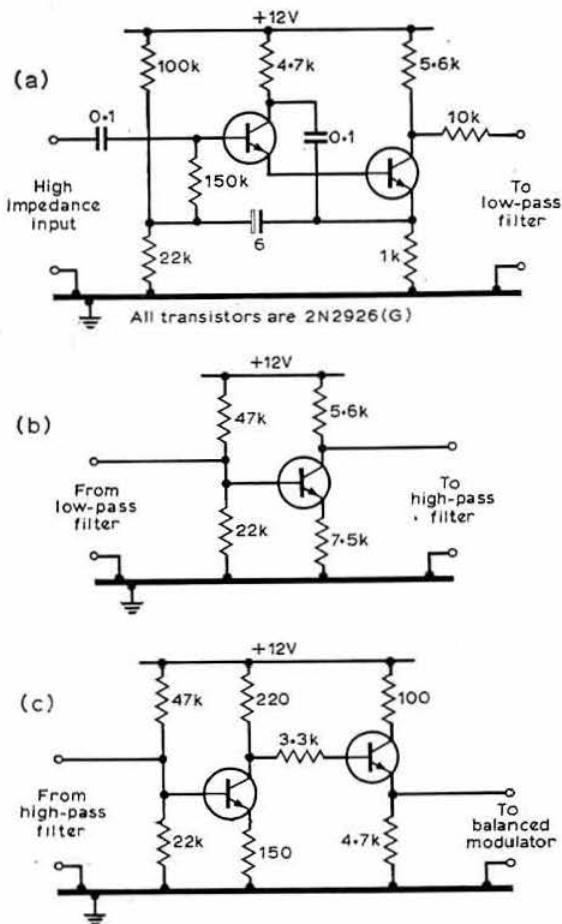
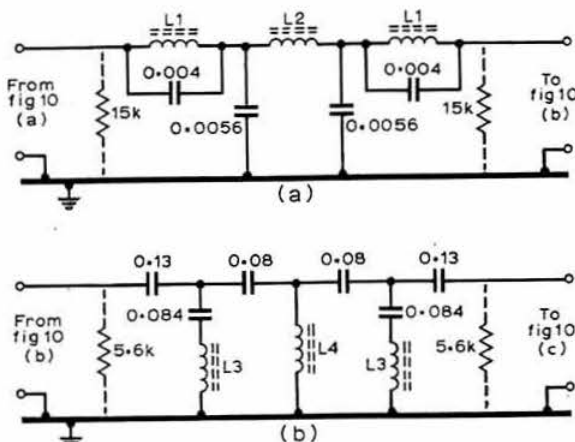


Fig 10. Filter impedance matching circuits. Voltage gain  $\approx$  unity in the passband 360Hz-2.2kHz

Stable sideband suppression in the prototype generator is greater than -50dB; this is in some measure due to the design of the low-pass filters. The addition of the M-derived end section to the simple "constant K" filter is well worthwhile.

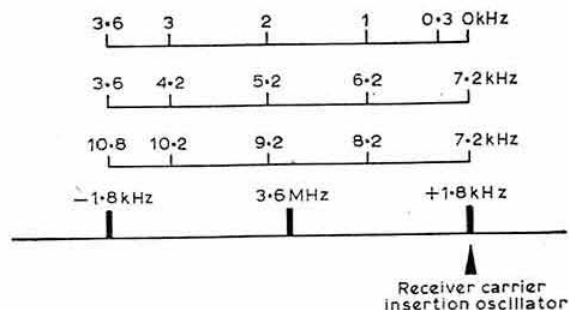
The low-pass filters (Fig 7) were designed for a cut-off frequency of 1.5kHz. The measured frequency response, curve A in Fig 8, is referred to the frequency scale along the bottom of the graph paper. The values of the capacitors C1 and C2 were changed to 0.042 and 0.032 $\mu$ F respectively, resulting in curve B. C represents an ideal but unobtainable attenuation characteristic. D is the measured response of the simple "constant K" filter. Referring to the frequency scale along the top of the graph paper, it can be seen how these curves relate to the desired and unwanted sidebands. Note that curve A is -36dB at 300Hz and that curve B is only -10dB at 300Hz, its -30dB point being 600Hz. Note also that the bandwidth at -30dB is from 100 to 400Hz in curve A, while that of curve B is from 600Hz to 2.2kHz.

Curves A and B really represent the extreme outer limits



L1 ..... 0.48H ..... 340 turns of 36swg enam cu wire  
L2 ..... 1.6H ..... 600 turns of 36swg enam cu wire  
L3 ..... 4.2H ..... 1000 turns of 40swg enam cu wire  
L4 ..... 1.25H ..... 530 turns of 36swg enam cu wire  
All inductors are wound on Mullard FX2240 1" dia pot-cores

Fig 9. Bandpass filter, 300Hz-3kHz. (a) Low-pass filter, -40dB at 3kHz. (b) High-pass filter, -40dB at 300Hz



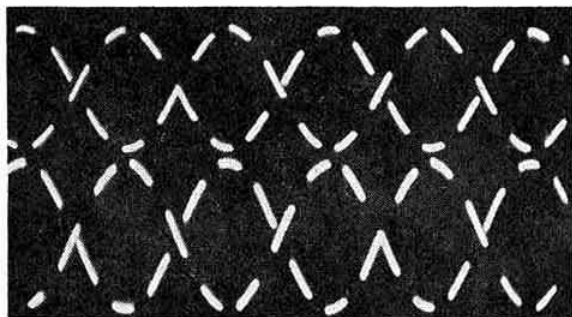
**Fig 11. Fold-over effect associated with third method generators**

permissible in the design of the low-pass filter, with the proviso that if filter B is adopted as in the prototype generator, it then becomes essential to use the bandpass filter of Fig 9 prior to applying audio to the af balanced modulator. This is necessary in order to compensate (in a somewhat indirect manner) for the poorer attenuation by the low-pass filters of frequencies below 400Hz which would otherwise produce some distortion in the transmitted signal. The inclusion of the bandpass filter also removes a possible cause of distortion which occurs when frequencies higher than about 3kHz are applied to the af balanced modulator.

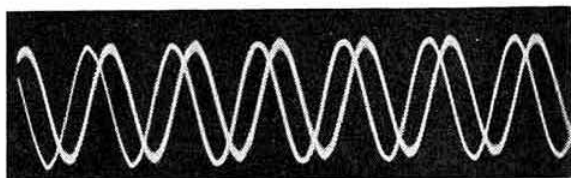
Fig 11 illustrates the fold-over effect associated with third method generators. An af input at 4.2kHz would be reproduced by the receiver as a 3kHz tone, a 9.2kHz input as a 2kHz tone, etc. The human voice contains very little energy at frequencies higher than about 2kHz, particularly in the male, therefore the fold-over effect, even without a bandpass filter, should not produce any appreciable distortion. However, if the extra "punchy" signal provided by speech clipping is desired, the bandpass filter is a must.

To those aggressive types (mostly male) who, in the old a.m. days, achieved a "punchy" signal by speech clipping without giving due regard to the necessary filtering arrangements—take heed, the third method metes out its own unique form of poetic justice, any rubbish you generate will be bang on your own patch.

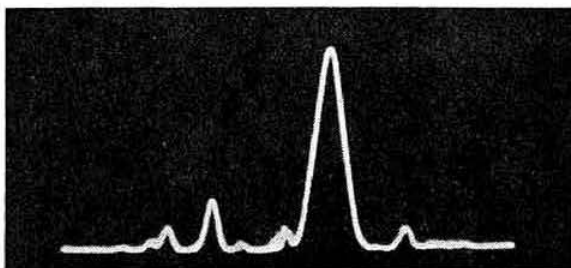
To summarize, if the af bandpass filter is included, the low-pass filter characteristics may lie anywhere between A



**Fig 12. Correct waveforms at input to IpF as displayed on a double-beam 'scope. CRO inputs connected between points A and E (chassis) in Fig 2(b)**



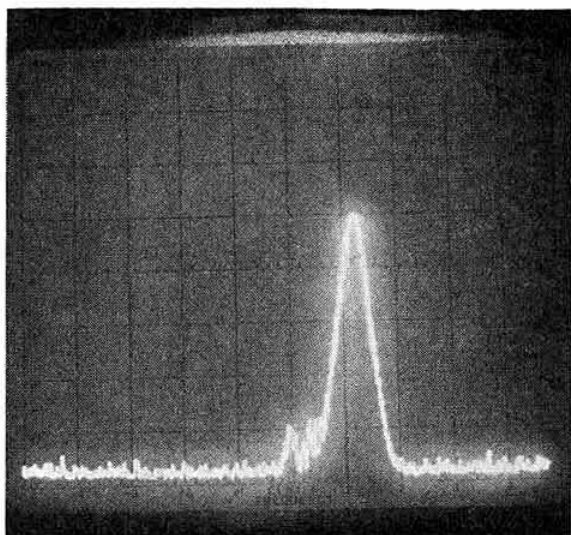
**Fig 13. Correct waveforms at output of IpF. Superimposed showing 90° phase shift. CRO inputs connected between points B and E in Fig 3(b)**

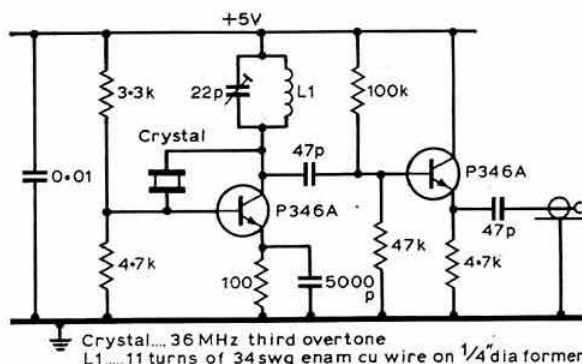


**Fig 14. Typical output spectrum of generator as displayed on a Hewlett Packard spectrum analyser**

Above, with a 1.3kHz audio tone applied via a clipper circuit and bandpass filter to the af of the generator, the peaks are, l to r: pilot carrier; 2nd harmonic (produced by the clipper) at 2.6kHz and -35dB; suppressed sideband; centre carrier at 3.6MHz; the 1.3kHz tone, and pilot carrier

Below, with a 1.5kHz tone applied to the af input but not processed by a clipper and fed via the bandpass filter. In the Y axis, the signal is referred to the logarithmic scale calibration just visible on the right hand edge of the graticule, this is 10dB per division. In the X axis, the centre frequency is 3.6MHz and the scale is linear at 500Hz per division. The trace shows the desired sideband tone of 1.5kHz and also the centre carrier at -40dB, the two sub-carriers and the unwanted sideband are suppressed below the noise level at -50dB





**Fig 15. Third overtone oscillator and buffer. By substituting this oscillator for the vfo the generator will give output on 9MHz. The only other modifications required are to change the 7474 to 74S74 and tune the output tank circuit of the 2N3819 buffer amplifier to 9MHz**

and B, the curve of B being marginally better. If the af band-pass filter is not included, the curve A is to be preferred. The inductors for the low-pass filters and bandpass filter are available from Solec Products, 68 Dale Street, Manchester M1 2HS.

### Setting up

The first thing to do is to set the frequency of the pulse generator in Fig 2(a) to 7.2kHz by adjusting the 10k $\Omega$  variable resistor. This may best be carried out with the aid of a calibrated af signal source and an oscilloscope. Having done this, all that is required is a receiver with an S-meter or a simple rf probe and 1mA meter.

With no audio applied and the output of the generator loosely coupled to the antenna of the receiver, first the carrier, then the pilot carrier balancing pots, are adjusted for minimum reading on the S-meter, taking care to keep the receiver rf gain up so that a null is discernible on the meter. When this has been done, a microphone may be plugged in and the receiver set to receive an ssb signal in the normal way. The audio input level should be about 100mV rms. The rf output level is about 300mV.

The rf adjustment procedure may also be carried out by connecting an oscilloscope to the output of the generator, the object being to achieve a straight-line trace.

By applying an audio signal of about 800Hz to the af input socket and connecting an oscilloscope between points A and E in Fig 2(b) it is possible to check for correct operation of the af balanced modulators. The correct waveforms are given in Fig 12 and typically have an amplitude of about 450mV p-p.

Transferring the oscilloscope to points B in Fig 3(b), the correct waveforms (Fig 13) will in this example have a peak-to-peak amplitude of about 200mV. An oscilloscope also permits observation of the square wave outputs of the 7473 and 7474.

Any apparent troubles are most likely to be due to inadequate decoupling, particularly of supply lines, provided of course that the circuits have been wired up correctly.

### Acknowledgements

To the University of Salford for the use of their wonderfully-equipped telecommunication laboratories, and to my colleague G3EJZ for his useful comments.

### Bibliography

A. J. Turner, G3UEP, *Wireless World* September 1973. "Technical topics", *Radio Communication* October 1974. □

## oscar news

In the first week of the new year the battery on board Oscar 6 took a turn for the worse. Downlink telemetry indicates that bus volts (channel 3A) are down by some 7 to 8 counts, while the  $\frac{1}{2}$ -battery voltage (channel 3B) reads normal or slightly higher than normal. This indicates that one of the nicad cells in the upper half of the spacecraft's battery has failed.

At present the cell behaves as though there were a parallel combination of a diode and a resistor in series with it, thus still allowing the battery to be charged to some degree. Should the cell fail completely then it will look like a diode when current is drawn from the battery and appear open circuit when the battery is in the charge mode. If this does happen then the battery will irretrievably discharge.

Oscar 6 is in total sunlight at this time and heat is a problem. Telemetry on channel 3D indicates a battery temperature in excess of 57°C.

Careful monitoring of the telemetry and strict adherence to the operating schedule is essential if Oscar 6 is to survive the year. Despite the battery problem, the beacon and

transponder performance remains unaffected and with careful nursing the satellite may remain useful for some time yet.

Oscar 6 will be switched off immediately a channel 3A count of 44 is registered (20.06V) and will remain off until the battery volts recover.

Any telemetry should be sent to UOS-Amsat, Department of Electronic Engineering, University of Surrey, Guildford, Surrey, and will be gratefully received.

### News broadcasts

News bulletins will be transmitted on the following orbits:

9 March	Oscar 6	20106	Oscar 7	10581
		20112		10587
23 March		20281		10757
		20288		10763

### AMSAT-UK

Membership enquiries should now be directed to the new treasurer, James Keeler, G4EZN, Church Farm, Banningham, Aylsham, nr Norwich, Norfolk. Due to other commitments G3WPO and G8FBR are unable to continue their activities on behalf of AMSAT-UK and correspondence should not now be sent to them. □

# Modifying 120/128-line sstv equipment to transmit and receive 240/256-line video

by P. BURNETT, G4BLT\*

**K**EEN slow-scanner operators will have noticed a new type of sstv signal on the hf bands and will have found that they have been unable to resolve the pictures on their conventional 120/128-line monitors. The modifications necessary to display the new 240/256-line format are very simple indeed and are described for the Venus and W6MXV monitors. The same approach may be adopted for almost any monitor, whether commercial or home-built.

The new standards introduced by Robot are:

No of lines: 256 ( $128 \times 2$ );

Line frequency: 7.5Hz ( $15/2$ );

Frame rate: 34s ( $8.5 \times 4$ ).

The figures in brackets show how the new standards are derived from the original 128-line standard.

The majority of existing sstv equipment in use in this country, especially if it is home-built, is based on a 120-line standard which when converted gives a new standard of:

No of lines: 240 ( $120 \times 2$ );

Line frequency:  $8\frac{1}{3}$ Hz ( $16\frac{1}{3}/2$ );

Frame rate: 28.8s ( $7.2 \times 4$ ).

(The sync pulse duration remains unaltered).

Any modifications to existing equipment should be capable of displaying these two extremes. With monitors this means

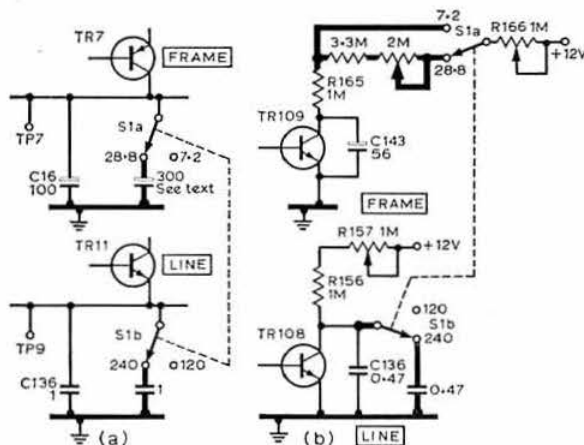


Fig 1. (a) Modifications to the Venus SS2 (C136 should read C36). (b) Modifications to the W6MXV monitor

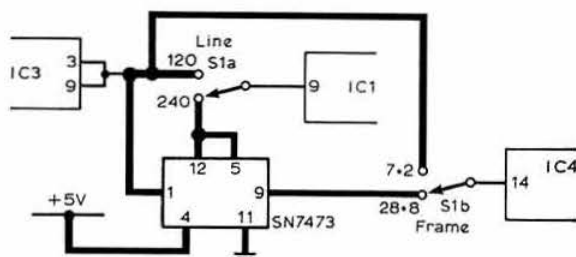


Fig 2. Modifications to the G3RHI flying spot scanner

a slight underscan for 240-line and a slight overscan for 256-line readout, which in practice should be perfectly acceptable.

## Modifying the Venus SS2 monitor

From the figures given above it can be seen that the line period is increased by a factor of two and the frame by a factor of four. Therefore it is simply necessary to increase the time constants in the scanning circuits by the same factors. In practice, if the printed circuit board tracks are not to be interfered with, the values of C16 and C36 should be increased to approximately  $400\mu\text{F}$  and  $2\mu\text{F}$  respectively. Fig 1a shows the complete circuit for the modification, which enables changeover between the two standards as desired.

It will be necessary to try several values of capacitors to obtain the correct frame scan, as the marked values of high capacitance electrolytics can vary quite considerably from their actual values. Closer tolerance tantalum capacitors would be better, but at these high values and at 20/25Vdc working they are very expensive components.

## Modifying the W6MXV monitor (de G3UEU)

The scanning circuits are shown on page 85 of the *Slow Scan Television Handbook*. A further  $0.47\text{mF}$  capacitor is placed in parallel with C136 to increase the line period, but a better way of increasing the value of C143 for the frame is to place a  $3.3\text{m}\Omega$  resistor plus  $2\text{m}\Omega$  variable in series with R165. The  $2\text{m}\Omega$  pot enables the frame rate to be set precisely (Fig 1b). It was not thought necessary to modify the noise immunity circuits.

## Modifying the G3RHI flying spot scanner

The G3RHI flying spot scanner was originally described in *CQ TV* February 1973 and represents an effective and easy first step to transmitting sstv. It also lends itself admirably to modification to the new standard by the introduction of a further process of division by two for the line and four for the frame. This can conveniently be  $\div 2$  line and frame and a further  $\div 2$  for the frame simply by the use of a single SN7473 as shown in Fig 3. IC1, IC3 and IC4 are the original circuitry and by incorporating two single-pole double-throw switches it is a simple matter to switch from one standard to the other. A double-pole double-throw switch could be used but this would preclude the transmission of a quarter frame on the 240-line standard. The only necessary modification to the original circuit board, apart from the addition of the

\* 319 Leeds Road, Nelson, Lancs BB9 8RW.

(Continued on p200)

# Monitoring for auroral propagation

by P. K. BLAIR, G3LTF\*

## A brief outline of auroral occurrence

Anomalous vhf propagation by reflection from an intense ionization in the E region of the ionosphere by auroral processes has been known to amateurs for more than 40 years. Its usefulness in making long-distance contacts has been demonstrated on all the vhf/uhf bands up to and including 432MHz, and it is probably only a matter of time before a 1,296MHz contact is reported as it is known that the reflections are effective well beyond 3GHz, having been observed there by radar. The attraction of the mode is in some ways even greater than that of dx tropo propagation in that the QRM level is usually low and there is a high degree of geographical selectivity (similar to the "skip" effect on the hf bands). Hence some unexpected and rare countries turn up via aurora which are probably inaccessible by modes other than eme or meteor scatter.

The occurrence of auroral propagation is closely linked to the 11-year sunspot cycle and to some extent concentrated about the equinoctial periods, although some of the best auroras to date have occurred outside these. The mechanism of the aurora is complex and only a brief outline of it will be given here. For further background the reader is referred to [1].

Following the occurrence of some sort of explosion on the sun in which a solar flare occurs, large quantities of charged particles are thrown off. The flare is usually, but not always, associated with a sunspot group. The particles possess sufficient energy to travel the 93 million miles separating the earth from the sun and are accelerated towards the earth by attraction from its magnetic and gravitational fields. Of course, if the outburst occurs on the surface of the sun facing away from the earth then there is little chance of an aurora occurring. From the amateur's viewpoint, the best situation is for a flare to occur at the point on the sun's surface facing the earth. Note, incidentally, that the sun's surface rotates with an equatorial period of about 27-28 days with a slightly slower rate at latitudes near to its poles.

Concurrently with the flare there is likely to be a large increase in the solar noise level which can be observed at radio frequencies, for example in the way demonstrated by Ron Ham at Storrington, Sussex. However, this is not always a reliable warning although the author has the feeling that all major auroras could be predicted in this way.

When the stream of particles nears the earth they become trapped in the magnetic fields associated with the Van Allen belts and are guided by them towards the polar regions. They spiral down to around the E region where they give up part of their energy by collision and ionize the molecules which make up the E layer. This highly increased level of ionization allows the E layer in that region to reflect signals of a much higher frequency than normal, analogous to the reflections in summer known as sporadic-E.

Another effect of the solar flare is to release large quantities of X and gamma rays which are mostly absorbed in the D region of the ionosphere before reaching the earth's surface. This causes the radio blackout or Dellinger fadeout which affects propagation in the 3-30MHz region immediately following the flare.

The reader will see from this brief description of the auroral mechanism that there are a wide variety of effects which could be used to predict the onset of an auroral opening. These will be discussed in the following section which will also assess the reliability with which they may be used to anticipate auroral propagation at vhf.

## Methods of anticipating auroral occurrence

This section will examine ways in which the amateur can anticipate auroral propagation conditions; continuous monitoring of the low end of the 144MHz band is ruled out as being too time consuming.

### Visual

Starting with the sun itself, visual monitoring for sunspots is perfectly practicable—British weather permitting. This can be done by using a small telescope or a pair of binoculars and displaying the image on a white card. A larger piece of card as a shield against the direct light, with a hole for the telescope, would be useful. In no circumstances should the eye be in any way exposed to the light from the eyepiece, even with a home-made filter, or serious eye damage could result. The sun's image will, if there is some activity, show dark spots, often in clusters, which will pass across the disc, taking about 10 days to do so. Large groups of spots are a good sign of aurora, as is their sudden appearance. The nearer to the solar equator, the more likely is the spot to influence the ionosphere. However, the shortcomings of this method are obvious—limited observation time and no direct correlation between observation and effect.

### Magnetic

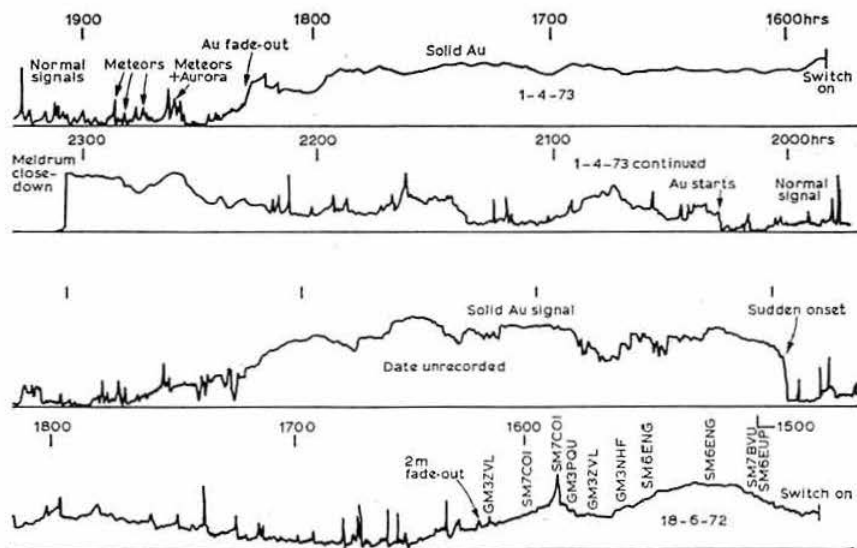
A solar outburst has a direct effect on the earth's magnetic field. This can be observed as a sudden change in dip angle, that is the angle which a magnet makes to the vertical when suspended at its centre point on a horizontal pivot. This change is very small, far less than one degree of arc, and consequently it is difficult to detect without special equipment. A strong change would appear to correlate well with the occurrence of a magnetic storm, which again is likely to coincide with the onset of the aurora.

### Induced currents

It is well known that in the days before the effects were understood, magnetic storms caused considerable trouble to the telephone companies by inducing strong out-of-balance currents into certain lines. Measurement of these currents,

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Fig 1. Some typical auroral signal recordings



which can produce measurable voltages on long lines, has been used in conjunction with auroral monitoring but it should be noted that to connect apparatus to the Post Office lines is against the law in Britain.

#### Radio effects

##### (a) HF fadeout

This well-known effect is sometimes called the Dellinger effect after its first observer. To the operator on 28, 21 and 14MHz it is a nuisance but it can serve as a prompter to look at vhf. The symptoms are a very rapid fadeout of all but local, groundwave, signals from the high frequency end of the spectrum downwards. By high frequency is meant the maximum frequency at which F layer propagation is occurring; the lowest affected frequency depends on the time of day and the intensity of the solar storm. The effect can be very rapid with a fadeout rate of some 40dB over a 3min period. Propagation returns at a much slower rate, typically  $\frac{1}{2}$  to 1h, and then with a very fluttery hollow-sounding note to the signals.

The Dellinger fadeout is caused by the sudden ionization of the D layer and is coincident with the arrival of [the fast-moving high-energy particles emitted by the solar outburst some 3min after it leaves the sun. The slower particles take much longer and so the onset of vhf aurora is delayed on the Dellinger by anything up to 30h. More than one fadeout may occur because a very active group of spots will produce a succession of flares. This tends to put the hf bands into a low state of health for some days.

The vhf operator who is also an experienced and regular hf operator will be sensitively alert for these effects. The more casual operator may not be. The author has tried continuous recording of the 6MHz transmission from Radio Luxembourg but, though fadeouts did occur, they were not always easy to spot on the chart and sometimes occurred when the transmission was off.

##### (b) D layer ionization

D layer ionization is responsible for another propagation effect which should be measurable by amateur equipment, though the author has not attempted it. This effect is known as the "sudden phase anomaly" (spa). An lf signal is propagated by ground waves in the space between the earth and the ionosphere, forming a "waveguide". When the D layer is strongly ionized the waveguide height drops suddenly and the phase of the signal received undergoes a change.

This can also be regarded as a sudden change of phase between a direct (strong) and indirect, reflected (weaker) signal. By observing the phase of the Droitwich transmission on 200kHz against the phase of a stable oscillator, counted down from 1MHz, a phase anomaly should be readily observable on top of any phase cycling due to the slight drift of the local standard against the Droitwich signal.

##### (c) Solar noise

Observation of solar noise level on a regular basis, as described by Ron Ham and others, can give adequate warning of the solar outburst. The author feels sure that with experience amateurs can become expert in interpreting the record so as to be able to guess fairly accurately which level increases are significant. Casual observation will not be enough, but any sudden outbursts—and they can be very strong—should give an alert to the vhf operator that auroral happenings are imminent. Solar noise can be observed on any convenient and locally clear frequency above about 30MHz. There are components below this frequency but they tend to be masked by other noise sources except when extremely strong.

##### (d) VHF transmission effects

After trying several of the above ways of anticipating the onset of auroral propagation conditions at vhf, the author came to the conclusion that the only way to avoid false alarms and missed auroras was to use a more direct method,

that of detecting auroral effects on a vhf transmission. No novelty is claimed for this approach and it is used by a few others in the UK. What is required is a transmission in the low vhf region, so that it will go auroral before 144MHz does, and in the northerly direction rather than north-east or north-west. The author has yet to hear an aurora where GMS and the north of England were *not* prominent, whereas for stations east and west the geometry is more critical and the chances of missing an aurora are much greater. For example, the fm transmissions from eastern Europe which appear on 70MHz during the sporadic-E season are poor as advance warnings, as are the 144MHz beacons of which very few come through regularly on aurora.

Convenient transmitters are provided by vhf tv sound transmitters. Although nominally all are on "spot" channels (1, 2, 3, etc) the sound carriers of stations using the same channel are separated from each other over a range of about 50kHz. This means that even with a relatively strong "local" signal the more distant transmissions can be separated out. For example, on Ch 4 (58.25MHz) there are five or six separate identifiable signals. Locally, relatively speaking, there are Manningtree and Sutton Coldfield; others are Wenvoe and, the two of most use to aurora spotters, Meldrum and Carlisle.

The Meldrum transmitter is without doubt the most reliable indicator of aurora. Its frequency is some 35kHz lf of Sutton Coldfield and being so far to the north and with a good part of its transmission aimed that way, it comes through in the south when there is the faintest trace of aurora about. It may be that in some parts of the country the signal from Meldrum is obliterated by the remnants of the vestigial attenuated sideband of the adjacent channel vision. The author has used his Meldrum monitor in several areas of eastern England and on the Black Mountains in South Wales without experiencing any trouble. If this were a problem the Carlisle transmission, 19kHz hf of Sutton Coldfield, can be tried. The author has noticed Carlisle coming through well during auroras but not as strongly as Meldrum.

With regard to the "normal" signal level from Meldrum, the author believes that at a range of some 350 miles it is mainly troposcatter with aircraft reflections noticeable. Many meteor pings and bursts occur, on average about 5-10/min, and there are occasional extended tropo ducts, though these are much rarer than on 144MHz. The average signal is around 6dB over noise in 1kHz with a simple antenna. When aurora occurs the signal comes up by anything up to 40dB with a rasping growl that spreads 10kHz or more and is quite unmistakable. Levels of around 6-10dB of auroral signal do not seem to produce 144MHz reflections,

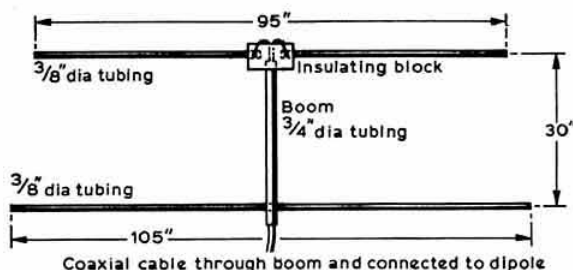


Fig 2. Meldrum aerial

## Components list

<b>C1, C4</b>	6.8pF ceramic	<b>R1</b>	5.6kΩ
<b>C2, C5, C11, C24</b>	12pF tubular trimmers	<b>R2</b>	18kΩ
<b>C3, C16</b>	0.5pF ceramic	<b>R3, R5</b>	100Ω
<b>C6</b>	390pF ceramic	<b>R4, R9</b>	1kΩ
<b>C7</b>	1-10pF tubular trimmer	<b>R6</b>	82kΩ
<b>C8, C10, C18, C22</b>	1,000pF feedthrough capacitors	<b>R7</b>	2.2kΩ
<b>C9, C21</b>	1,000pF ceramic	<b>R8</b>	68Ω
<b>C12</b>	4.7pF ceramic	<b>R10</b>	4.7kΩ
<b>C13</b>	33pF ceramic	<b>R11</b>	6.8kΩ
<b>C14</b>	22pF (to suit lft L4)	All 1/4 or 1/2W carbon	
<b>C15</b>	3,300pF disc ceramic	<b>TR1</b>	GMO290 or similar low noise—AF 139, AF 239
<b>C17</b>	0.01μF 15V	<b>TR2</b>	2N3819
<b>C19</b>	180pF ceramic	<b>TR3</b>	2N3904
<b>C20</b>	18pF ceramic		
<b>C23</b>	0.22μF 15V		
<b>L1</b>	10 turns 1/4 in id 18g enam close-wound tapped 2t up		
<b>L2</b>	As L1 but tapped 4t up		
<b>L3</b>	11 turns 1/4 in id 18g enam close-wound tapped at one turn and five turns from cold end		
<b>L4</b>	I.F. transformer appropriate to crystal chosen		
<b>L5</b>	Six turns 20g on 1/4 in slug tuned form (for 65MHz crystal)		
<b>L6</b>	Nine turns 1/4 in id spaced wire diameter		

though as an aurora dies away it can sustain 144MHz when Meldrum is only at this level.

Fig 1 shows some typical recordings of Meldrum signal levels. A sudden onset of the auroral signal, say within 2min, will almost always indicate 144MHz aurora within 10-15 min or less. The more gradual onsets are sometimes delayed 30min or more. Only rarely does no 144MHz aurora result. On 70MHz no time should be lost as there is not even 10-15 min warm-up time! VHF auroral openings frequently run in phases, with an opening around 1500 and then at around 1700 and again near 2200-2400. By recording the signal on paper tape from midday onwards, the working vhf operator can be warned when he returns home.

The only snag with Meldrum is that it is switched off at the end of television transmissions but often there is a clue from the signal behaviour before closedown and from what has occurred earlier in the evening. Few auroras put in their first appearance after midnight; occasionally, however, some do, and the author does not yet know how to be alerted for them.

## Equipment

The equipment which the author has used for monitoring the Meldrum transmission comprises a simple horizontally-polarized two-element beam, radiator plus reflector, mounted at about 18-20ft above ground and pointing roughly north (Fig 2). This is fed to the converter which is quite conventional and uses a convenient crystal to give an i.f. of around 7MHz. The circuit diagram and layout are shown in Figs 3 and 4.

Alignment consists of first making the oscillator work, and checking that it is crystal controlled by listening to it or its harmonics on a suitable receiver. The signal circuits are then peaked for maximum level on the strongest of the signals received and finally the input is tweaked for best s:n ratio on the desired weak signal. The 144MHz trap is tuned

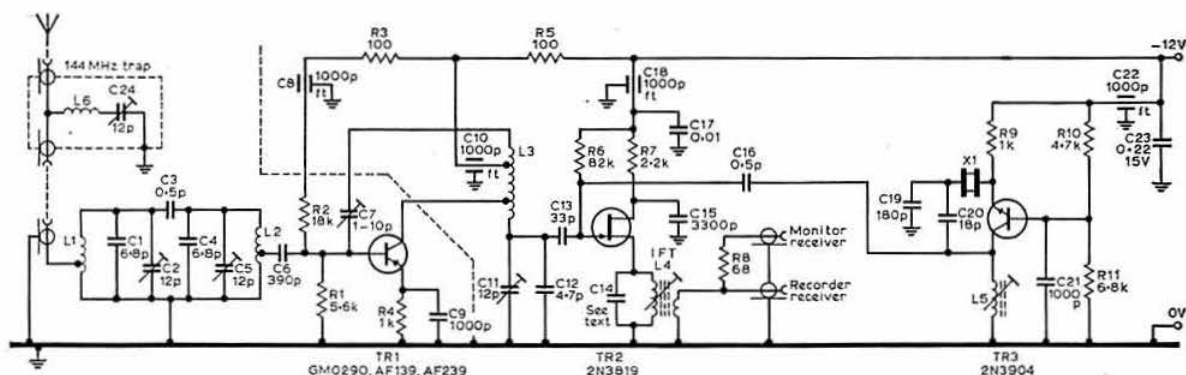


Fig 3. Circuit diagram of converter

up in front of a 144MHz converter with a simple attenuator between it and the converter to avoid instability.

Two outputs are available from the converter. One goes to a fixed-frequency simple receiver made from a Mullard module i.f. strip and 7MHz mixer with variable oscillator. The i.f. strip agc is measured by a simple dc amplifier driving a meter—in effect a near-conventional S-meter. However, if a spare receiver is available in the station, this can be used. The author takes the second converter output to an R1475 which enables detection of the slight growl (only a few decibels over noise) which can mean that aurora is about and may turn up the next night.

Variations on the converter design are possible; for instance, the rf stage could use a fet. One point worth noting is that the 144MHz trap stops the 144MHz transmitter from blocking the receiver, which can be annoying if a recording is being made.

### General auroral operating hints

First, be ready for repetition of the previous auroral opening on a 26/29-day period—as the area on the sun's surface comes round again it may still be active and give a second auroral opening. This can conveniently be done by plotting any auroral events noted on a 27-day chart; their recurrence, if any, will show up as a near vertical line. In particular, be on the lookout in the months of February-May and September-November.

Second, if possible always check the monitor in mid-afternoon and early evening, and again around 2200. These seem to be the times when aurora is most likely to be present; the author has rarely heard any in the 1900-2200 period.

Third, if you are fortunate enough to be in at the beginning of an opening, look first at the easterly bearings—sometimes almost due east. This is where the real dx comes in and use can then be made of the wide E-W spacings. The strong GMs will be there later and they will also be looking for easterly dx.

Fourth, give a call on 432MHz; aurora works on that band too but our narrow antennas cause the problem of where to aim the beam. The use of stacks or other antennas with wide azimuth beams would do a lot to boost the auroral QSO rate on 432MHz.

Fifth, use cw. The QSO rate is much higher, and there is no question that the real dx auroral signals, over 1,100 miles, are weak. The very distant ranges are highly non-optimum in their reflection geometry and hence, by definition, signals can only be weak.

### Reference

[1] J.A. Ratcliffe, *Sun, Earth and Radio*, World University Library, 1970. □

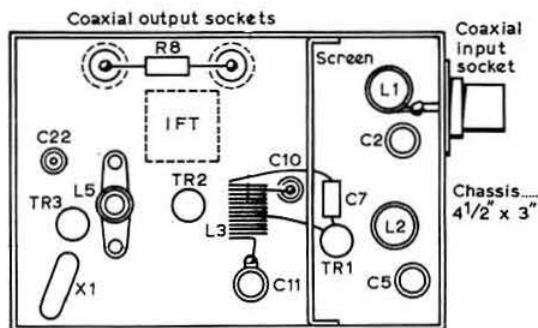


Fig 4. Layout of principal components

## CATALOGUE RECEIVED

### Doram Electronics Ltd

Now available is an amendment leaflet which is an up-date to the Doram catalogue, edition 3, published last August. The leaflet contains details of many new components and kits now stocked by Doram. Of particular interest to the radio amateur will be the cmos morse keyer, crystal calibrator and fm vhf test generator kits. Copies of the amendment leaflet are available from Doram Electronics Ltd, PO Box TR8, Wellington Road Industrial Estate, Leeds LS12 2UF. □

## EQUIPMENT REVIEW

# The Yaesu FRG7 receiver

by T. GILES, G4CDY, and  
R. F. STEVENS, G2BVN

### Description

This receiver is a solid-state equipment powered from either ac mains or a 12V source and covering the frequency range 0.5–30MHz. It is of the triple conversion superhet type using a Wadley loop to provide stable and continuous coverage, without bandswitching, across the complete frequency range. Antenna input can be either single wire or 50Ω coaxial cable above 1.6MHz, with wire feed below this frequency. There is a three-position attenuator to assist in the reception of very strong signals. The rf stage is a mosfet with the usual preselector circuitry. A tone select switch provides a choice of audio response, and the transformerless output stage delivers up to 2W to an internal speaker. Alternatives are headphone output, a jack for an external speaker and an independent output for a tape recorder.

An S-meter is fitted and there is an automatic noise limiter intended to suppress pulse type interference. There is a diode detector for a.m. reception and a balanced demodulator for reception of ssb and cw. Internal regulation is provided for the oscillator and harmonic generator.

The received frequency is determined by the combination



of the "MHz" dial and main tuning dial settings\*. The former selects the band every 1MHz and the latter selects the frequency at 10kHz increments from 0 to 990kHz within the chosen band. To receive GB3SX on 28,185kHz it is first necessary to set the "MHz" dial precisely to 28, and this will be indicated by the "lock" led extinguishing—maladjustment of this dial will be indicated by the led lighting. Then set the main tuning dial to 185 on the scale and adjust within the calibration tolerance of the equipment to receive the beacon signal. The preselector should be adjusted for maximum S-meter reading.

### Operation

The receiver is simple to operate and lacks any controls requiring delicate adjustment. Controls are clearly indicated and their positions are not cramped. The markings on the dials are clear but may be somewhat small for some users. Quality from the internal speaker is adequate.

In actual use the FRG7 compared well with a more sophisticated (and expensive) equipment. Checked against beacon transmissions the stability was good and the tone

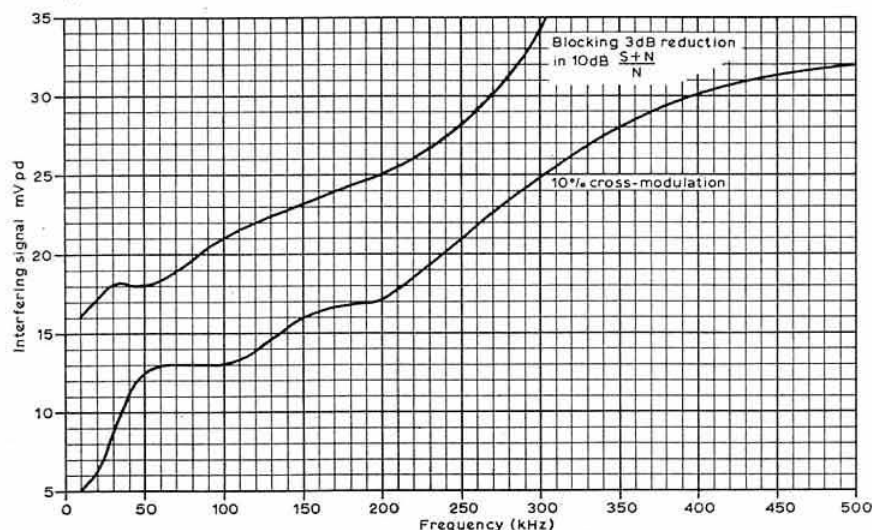


Fig 1. Cross modulation and blocking performance measured at 7050kHz

\* Western Electronics advise us that the FRG7 is now fitted with a fine tuning control which varies the received frequency a few kilohertz, making the tuning of ssb slightly easier.—Ed.

## Technical data

<b>Frequency range:</b>	0.5MHz-29.9MHz
<b>Types of emission:</b>	a.m. ssb (usb or lsb), cw
<b>Sensitivity:</b>	ssb/cw: better than $0.7\mu\text{V}$ at s:n 10dB a.m.: better than $2\mu\text{V}$ at s:n 10dB
<b>Selectivity:</b>	$\pm 3\text{kHz}$ at $-6\text{dB} = \pm 7\text{kHz}$ at $-50\text{dB}$
<b>Stability:</b>	Within $\pm 500\text{Hz}$ during any 30 minutes after warm up
<b>Antenna impedance:</b>	High impedance for 0.5MHz-1.6MHz 50 $\Omega$ unbalanced for 1.6MHz-29.9MHz
<b>Speaker impedance:</b>	4 $\Omega$
<b>Audio output:</b>	2W
<b>Power requirement:</b>	100/110/117/200/220/234V ac 50/60Hz. 12V dc external or internal dry cells
<b>Size:</b>	340(W), 153(H), 285(D) mm
<b>Weight:</b>	Approx 7kg without batteries

switch gave a limited amount of choice in the selection of the response to suit receiving conditions. The rf attenuator was of particular value when listening on and around 7MHz.

The equipment is housed and finished in the usual Yaesu style and access for servicing presents no unusual problems. The manual includes all the information likely to be required in the use and maintenance of the receiver, and the presentation and diagrams are clear.

## Measurements

The Wadley loop drift cancelling principle requires three cascaded mixer stages which, unless a great deal of care is taken, can lead to poor signal handling and a nearly infinite number of spurious responses. The FRG7 minimizes these problems by using two dual fets and one balanced mixer, together with a total of eight interstage tuned circuits and a four stage low-pass filter. These tuned circuits are all carefully screened in the usual Yaesu manner and these precautions have paid off in the performance of the receiver. Tests made at random frequencies throughout the whole range of the receiver did not reveal any spurious responses which were less than 60dB down. I.F. breakthrough at any of the three i.f. frequencies was more than 60dB down. One potential problem source with this type of receiver is rejection of signals on the adjacent megahertz band, eg when tuned to 7.152 kHz, signals on 8.152kHz or 6.152kHz. This rejection is mainly dependent on the quality of the bandpass filter used to derive the second local oscillator from the "MHz set" oscillator and harmonic generator. In the example given, the adjacent megahertz signals were 63 and 60dB down on the correct signal.

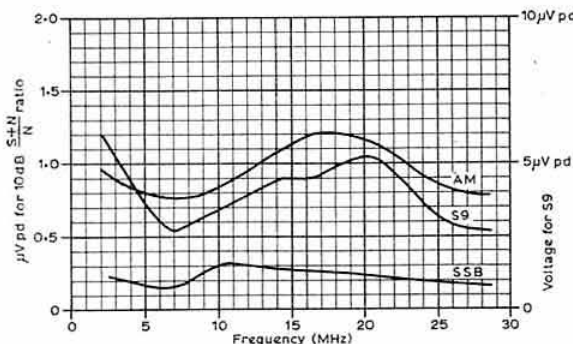


Fig 2. Measured sensitivity and S-meter calibration

It was felt that the 55.5-54.5MHz i.f. could suffer from tv breakthrough in certain parts of the country. However, even with a signal generator producing 20mW into a piece of wire wrapped around the outside of the receiver case it was impossible to provoke a response. Fig 1 shows the cross modulation and blocking performance measured at 7,050kHz. The cross modulation curve is for 10 per cent transfer of modulation on to a 100 $\mu\text{V}$  on-tune signal. The blocking tests were made by degrading a 10dB signal + noise-to-noise ratio down to 14dB.

The sensitivity was found to be very good and also fairly constant over the full range. Fig 2 is a plot of the signal required for a 10dB  $\frac{S+N}{N}$  for a.m. and ssb. A nice characteris-

tic of the receiver is that there is no drop-off in sensitivity at 28MHz; this, combined with its excellent frequency calibration, would make the receiver ideal for listening to the Oscar 6 and 7 downlink. The third curve is the signal needed to give a S9 reading on the S-meter. It would appear that the meter will tend to be very generous if used to give signal strength reports. In addition it was only necessary to double the input voltage (+6dB) to take the needle to the S9 + 20dB mark. However, the S-meter would still be a useful tuning indicator for adjusting the preselector or aerials. The input attenuator is out in the normal position and gives 10dB attenuation in the dx position and 20dB in the local.

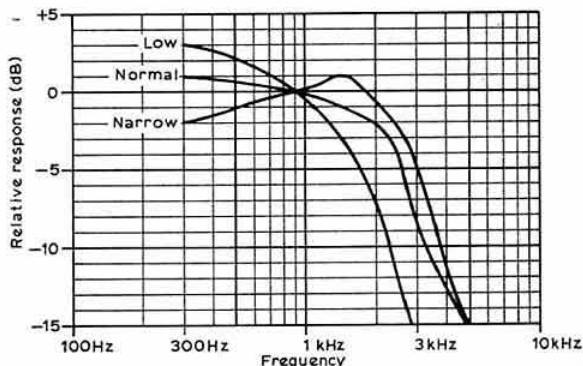
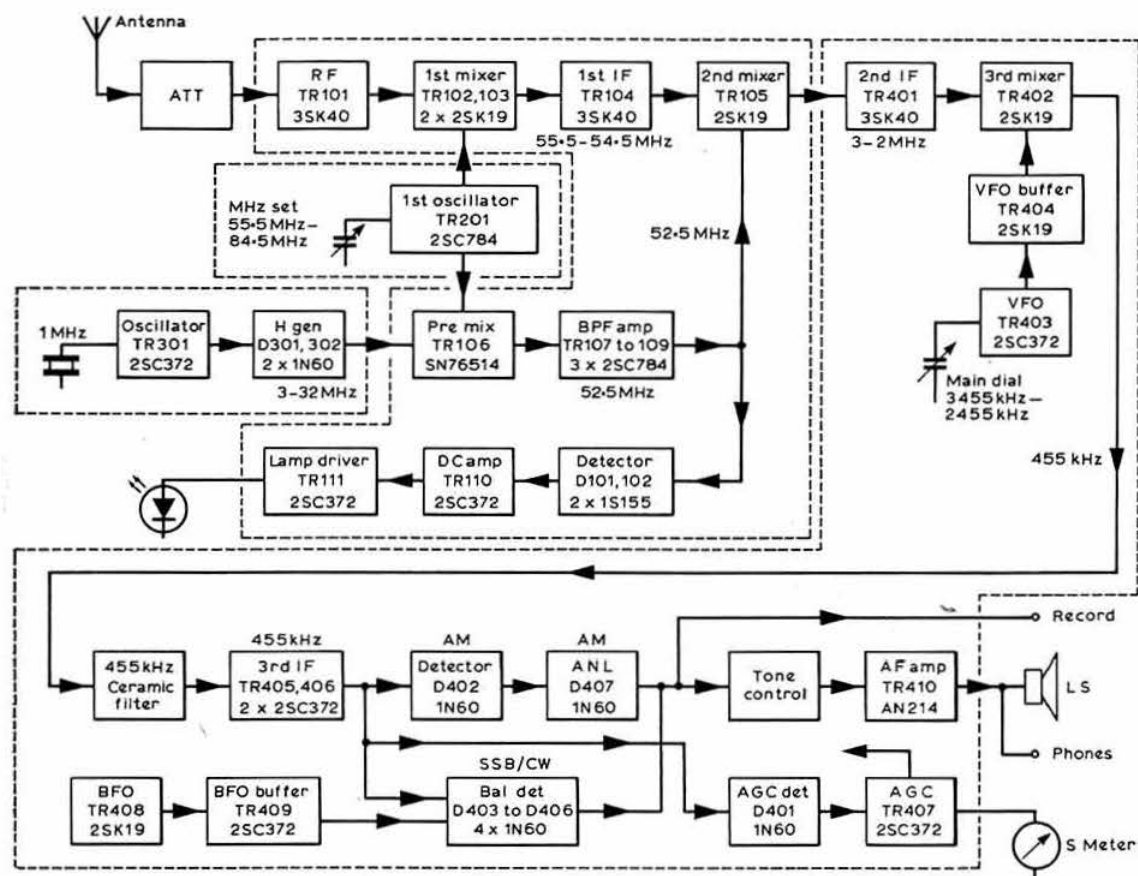


Fig 3. Audio response

The main i.f. selectivity is provided by a ceramic filter at 455kHz, the 6dB bandwidth was measured as  $\pm 2.8\text{kHz}$  and  $-3.2\text{kHz}$ . It was impossible to measure the skirt response without removing the filter from circuit but the published figure is  $\pm 7\text{kHz}$  at  $-50\text{dB}$ . The audio response can be modified by a switch on the front panel; the effect of this is shown in Fig 3. An a.m. automatic noise limiter is fitted and proved effective at removing ignition noise when the receiver was used as a tunable i.f. for a 144MHz converter. There is no fm detector but the receiver resolved nbm signals quite well by slope detection.

The FRG7 is inherently self-calibrating, there is a signal that appears at zero on the main tuning dial and the cursor on the scale can be suitably adjusted. The scale is calibrated every 10kHz and it is quite easy to read to 5kHz, and was never more than  $\pm 2\text{kHz}$  out of calibration over the whole



megahertz range. The receiver drifted less than 100Hz in 30min after a 5min warm-up period.

## Conclusions

The FRG7 represents a fairly sophisticated piece of equipment for a relatively small financial outlay, especially considering the low value of the £ compared with the Yen. It would make a useful addition to the shack which already has an amateur-band-only receiver or as a first receiver for

an swl. The ability to tune the receiver to within 5kHz of a frequency without using a calibrator is novel in this class of equipment and makes it ideal for monitoring beacons and other transmissions on known channels.

## Acknowledgement

The equipment used in the preparation of this review was loaned by Western Electronics (UK) Ltd, Fairfield Estate, Louth, Lincs, to whom we express our appreciation.  $\square$

## Modifying 120/128-line sstv equipment

(Continued from p193)

7473, is to break the connection between IC3 (3 and 9), IC1 (9) and IC4 (14) and bring these three connections out to the switches.

## Conclusions

It may be asked why these modifications are necessary in the first place. An obvious disadvantage when viewing on a conventional long-persistence tube is that the top of the

picture is almost lost before the frame is completed and the picture has to be viewed in a dark room. However, this disadvantage is overcome when viewing on a fast-scan monitor fed from a slow-to-fast-scan converter.

The two main advantages of the transmission and reception of 240/256-line video are that (1) picture quality and resolution are greatly improved, and (2) it exhibits a built-in immunity to noise and interference. Pictures have been copied on 256 under conditions of QRM where it was impossible to copy 128-line video from the same station.

Why not carry out the modifications described here and judge for yourself? ☐

# microwaves

Dain Evans, G3RPE\*

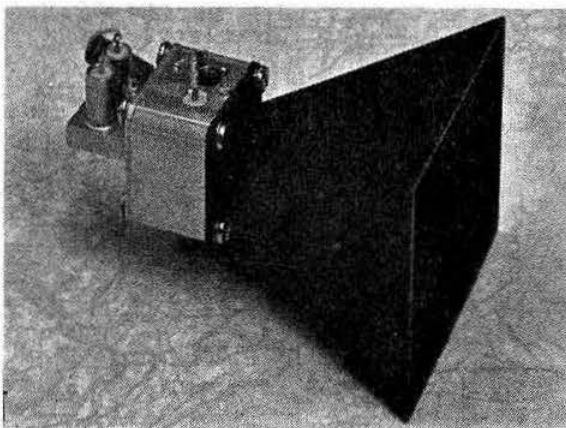
## Microwave round tables

For the first time in one issue, we have two round tables to publicise. On Sunday 20 March another meeting in a long-established series will be held at the IBA Engineering HQ, Crawley Court, about a mile off the A272 between Winchester and Stockbridge, and the organizer is G3JHM. The main item will be a discussion of path planning and other operating techniques, and will therefore offer an opportunity of exchanging ideas on how best to make contacts. People begin to gather at about 1030am.

A welcome addition to the microwave scene is the round table which will be held at 2pm on Saturday 30 April in the Dept of Electrical and Electronic Engineering at the University of Sheffield, Mappin Street. The initial objective is simply to provide an opportunity for all those interested or potentially interested in microwaves in that part of the world to meet, to decide what they want to do, and then to start things moving. G8AGN, who is responsible for organizing the event, expects to see at least something for most of the microwave bands. A sae sent to him will produce a map showing how to get there.

## A commercial Gunn transceiver for 10GHz

It is perhaps something of a compliment to amateurs that Microwave Associates in the USA have felt it worthwhile to produce a Gunn transceiver front-end specifically for the 10GHz amateur band. Details are given in their *Bulletin 7624*. In the complete unit shown in the photograph, the rear part consists of a Gunn oscillator generating 20mW which is tuned, unless otherwise specified, to 10,250MHz. Each unit may be tuned mechanically by  $\pm 100$ MHz to shift the centre frequency, and also by up to 60MHz by varying the bias on a tuning varactor over the range 1-20V. This latter



Microwave Associates front-end

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

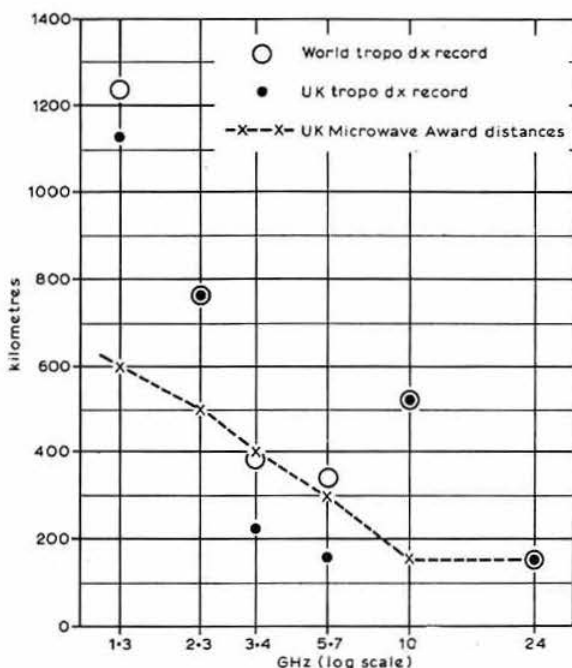


Fig 1. Some of the current microwave records

facility may in addition be used to apply frequency modulation, for fine tuning and for introducing automatic frequency control.

The front portion consists of a waveguide-mounted Schottky diode mixer and includes, most significantly, a circulator. The latter means that the full output of the oscillator and the potentially low noise figure of the mixer—expected to be better than 12dB—can be obtained at the same time from a “single-ended” device, with all the advantages that the latter feature implies. As illustrated, the unit is fitted with a horn antenna of 17dB gain, which is rather low compared with the 25-35dB gain of the antennas mostly used by UK amateurs. Nevertheless, even with these antennas, the range over line-of-sight paths according to my back-of-an-envelope calculations should be at least 70km if an i.f. bandwidth of 200kHz is used. In a perfect duct, the range will be thousands of kilometres.

Prices for these devices in the USA are: \$60 for the Gunn oscillator alone, \$85 for the transceiver without the horn, \$108 with the horn or \$180 for a pair. A transceiver similar to that described above could also be made available for 24GHz if there was sufficient interest.

## Microwave dx records

Following the publication of a provisional list of tropo and eme records in January's *Microwaves*, GD2HDZ (XO68b) has confirmed a 1,130km contact with HB9AMH/P (DH66c) on 26 October 1975. Signal reports were 548 and 539.

This set of tropo records is shown in Fig 1. It is perhaps a little surprising that a convenient scale for distance in units of 100km! The drawing also includes for comparison

(Continued on p203)

# RTTY—Beginners' terminal unit

by J.B. HODGSON, G3YKB,\* on behalf of the British Amateur Radio Teleprinter Group

THIS device is offered as a beginners' unit because it is both unsophisticated and of very sound design. In fact many operators have constructed it and have not found any need to advance any further—the author himself is still using one daily, some five years after “throwing it together” for a contest. This unit and an fsk/afsk generator, with full constructional details is fully described in *RTTY—the easy way*.

## Circuit description

The design is based on the very successful ST-5 by Irv Hoff, W6FFC [1], and has been modified to suit the double-current signalling requirement of British machines. IC1, a 709 operational amplifier, performs a limiting function which takes care of fading of one or both of the tones (the station receiver should be operated with the avc off). Limiting occurs with less than 1mV of signal and yet the amplifier can recover from overload conditions within microseconds—

protection from destructive overload voltages is afforded by diodes D1 and D2.

Frequency discrimination, to determine which of the two tones is being received, is achieved using two 88mH inductors with appropriate resistors and capacitors to form an approximately linear fm detector. Audio ripple in the output is minimized by the use of full-wave detectors and removed by a simple RC filter. Diodes D3 and D4 provide a metering signal which is also useful during alignment.

The output of the discriminator, typically +3V for space and -3V for mark, is fed to a second operational amplifier, a 741 type, which determines the polarity of the signal and produces well-defined output levels, approximately +10V for mark and -10V for space.

The reconstituted telegraph signal is then fed, via a phase splitter (TR2, TR3), to a high-voltage bridge circuit (TR4, TR5) which, operating at its extremes of imbalance, causes the maximum current to flow through the teleprinter magnet one way or the other. The high voltage is used to provide a current drive which is necessary to reduce time constants in the selector circuit. Local copy is achieved by substituting the signals from IC2 with similar signals from the keyboard; switch S2 also provides a means of isolating the selector magnet from the receive circuits while signals are being tuned in. Power requirements are +80, +12 and -12V, all at 50mA. The high voltage should not be less than 80V.

## Alignment

(1). Place a short across SK1 and connect a dc voltmeter between TPA and earth. Adjust RV1 for a zero voltage reading—this may not be possible as the meter is likely to

\*234 Gillingham Road, Gillingham, Kent ME7 4QT.

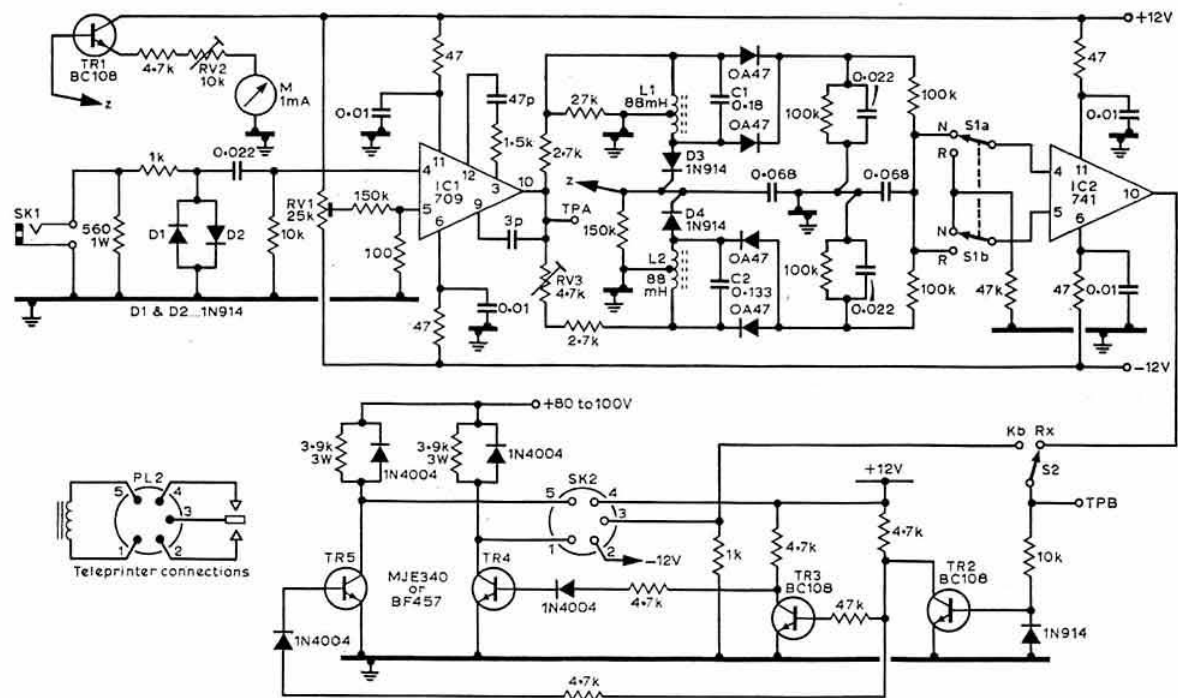


Fig 3. Circuit diagram of the terminal unit

swing from one extreme to the other over a very short travel of the preset. If this happens, get as near as possible and leave it. Remove the input short and disconnect the meter.

(2). Feed in a space signal (1,275Hz) at SK1, any level between 10mV and 1V, and adjust L1/C1 for a peak reading on the tuning meter. Set RV2 for a convenient meter reading, say 70 per cent of full scale.

(3). Using a mark tone (1,445Hz), repeat the tuning process for L2/C2 and adjust RV3 to obtain the same meter reading as in (2).

(4). Plug the teleprinter into SK2 and switch S2 to keyboard. With the motor running, check that TPB is positive; if it is negative then change over terminals 2 and 4 of SK2.

(5). With the motor running, the printing mechanism should be stationary—if it is "racing" change over terminals 1 and 5 of SK2.

### Construction

Layout is not critical; the only precaution to take is to keep the leads to and from S1 fairly short, say less than 2in. Any of the common construction media may be used, eg matrix-board, Veroboard etc; however, for those who prefer to use a printed circuit, boards are available through BARTG. The whole unit, including power supply, can be accommodated in a standard 222 by 147 by 55mm diecast case.

### Components

Most of the components are readily available through the usual retailers; the exceptions are:

(1) L1, L2 (88mH toroids)—from Spacemark Ltd, Thornfield House, Delamer Road, Altrincham, Cheshire.

(2) Mains transformer (65-0-65 and 12-0-12V rms)—from BARTG, type P282.

(3) Printed circuit board (includes fsk/afsk generator)—from BARTG.

If all parts, including transformer and case, are purchased new, the total cost should be in the region of £20-£25. The author will send details of the BARTG items on receipt of an a/c.

If BARTG PCBs are used, the booklet *RTTY—the easy way* will be needed for component location and wiring data.

### Operation

Ideally the tu should be fed from a 600Ω output of a receiver, but in practice the device works perfectly well when connected in parallel with the loudspeaker.

Connect the tu to the receiver audio, plug in the teleprinter and switch S2 to "keyboard". Find a narrow shift signal (likely frequencies are 3.58, 14.09 and 144.6MHz) and tune the receiver for a maximum steady reading on the tu meter. Switch S2 to "receive" and if all is well the machine should start printing—it may also be necessary to switch S1 to the "reverse" position. A little practice will soon educate the user in getting optimum performance.

### Reference

[1] *RTTY Journal* May 1970, and *Teleprinter Handbook and Radio Communication Handbook*, 5th edn, 10.13 (RSGB Publications).

### "RTTY—the easy way"

Published by BARTG, this booklet provides an introduction to the mode, and contains all the information needed to get started. It is available through RSGB Publications (Sales), price £1 post paid. □

## Microwaves

(Continued from p201)

the UK Microwave Award distances. The only other observation one has is that clearly we could do better on 3.4 and 5.6GHz.

### Microwaves in Czechoslovakia

Antonin Jelinek, OK1DAI, now the uhf/shf manager in that country, writes with news of activity in his country on 2.3 and 10GHz. The equipment being used on 2.3GHz is as follows:

OK1AIB Tx: 144MHz  $\times 4 \times 4$  varactor multipliers, 0.5W output.

Rx: 1N21. Ant: 1m dish with log-periodic feed.

OK1AIY Tx: As above 1W output.

Rx: BFR34A-1N21. Ant: 3m dish or  $4 \times 15\text{el}$  Yagi.

OK1KIR Tx: 384MHz  $\times 3 \times 2 + 2\text{C39BA}$  120W input.

Rx: BFR34A-1N21. Ant: 1m or 1.8m dish horn feed.

OK1KKL Tx: 384MHz  $\times 3 \times 2$  1W output.

Rx: 33NQ52 mixer. Ant: 3m dish dipole feed.

OK1WFE Tx: 460.8MHz at 30W  $\times 5$  varactor, 10W output.

Rx: Schottky diode mixer. Ant: 1.8m dish or  $4 \times 15\text{el}$  Yagi.

OK1KTL is also active.

Since the first 2.3GHz contact over a 10km path in 1959, there has been steady progress. The current record is 403km and was established by OK1WFE/P (JJ33g) and OK1KIR/P (GK45d) in July 1974. Other notable contacts include those of OK1KIR/P with DJ8QL at 336km, DL2AS/P at 300km and DL7QY at 238km. A beacon OK0EA is planned to come into operation at HK18d in July 1977.

There are four stations active on 10GHz. OK1VAM, OK1KTL and OK1WFE all use transmitters producing 100mW output from 144MHz drivers, receivers using Schottky mixers, and antennas which are horn-fed 1.8m dishes. The best dx so far is a 201km contact between OK1WFE/P at GK45d and OK1VAM/P at HK29b in June 1975. In December 1976, OK1WAB used a Gunn transceiver to work OE3WLB for the first foreign contact on this band. At this time there are no beacons on 10GHz.

Licensing conditions for these bands are similar to those in the UK: OK1DAI gives the frequencies allocated as 2,300-2,450 and 10,000-10,500MHz with permitted modes as A1, A2, A3, A3a, A3b, A3j and F3. Class C and D licensees are allowed 25W input, Class B 75W and Class A 300W input. With special permission, Class A licensees are allowed to use up to 1kW input on 2.3GHz. According to RSGB records, they are also allocated 1,215-1,300MHz and 5,650-5,670MHz but not 3.4 or 24GHz. □

# technical topics

Pat Hawker, G3VA

RECENTLY Professor W. Gosling of Bath University gave a highly stimulating talk ("The age of silicon") to the Royal Signals Institution. One passage was of particular interest to those of us who find it difficult to decide which path amateur equipment should tread: the simple or the complex.

He postulated that within electronics the development of microelectronics represents a quantum jump; that as a result the communication of information is still at the exponential stage of its growth curve; and that we shall see unprecedentedly cheap transmission of information by electronics: "Microelectronics makes possible systems of almost unlimited complexity... though needless sophistication is a trap... we have to learn to manage hyper-complexity of almost biological order... it is a challenge to learn to use the tools now placed in our hands... we need to avoid false nostalgia for a simpler age."

As one who unashamedly admits to a frequent nostalgia for the simplicity of old-time amateur radio equipment, this passage struck home. Is it perhaps mistaken to pursue the idea that simplicity is still possible and has merit in this age of silicon? Or is there another way that we—as amateurs—can look at the new opportunities; to see them perhaps as an opportunity of using integrated circuits and discrete devices not as a basis for highly complex units but to provide easy-to-build, low-cost equipment that a few years ago would have represented a major constructional project. Several of this month's topics reflect this second view: a precision frequency standard; a simple wobulator; a calibrator providing switchable 10 or 12.5kHz markers. In all these the complexity is in the device, not in the project itself.

## Droitwich frequency standard/stabilizer

The use of the BBC 200kHz Droitwich long-wave station as a highly accurate frequency standard has been described over the years in a number of constructional articles in *Radio Communication* and elsewhere. It is worth stressing that the

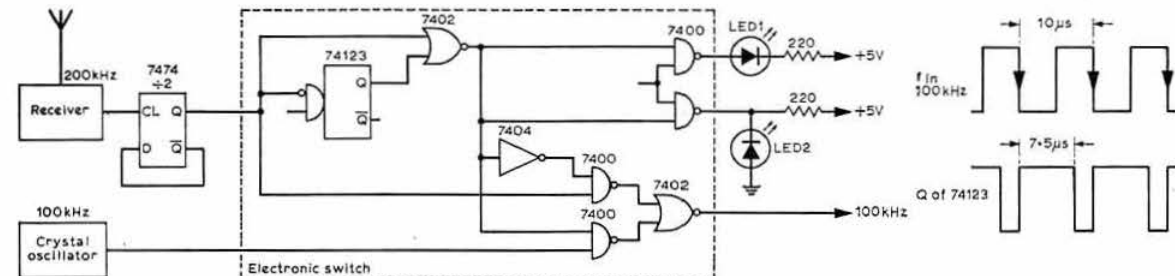


Fig 2. Block outline of frequency standard with automatic switching to local 100kHz crystal when Droitwich is off the air

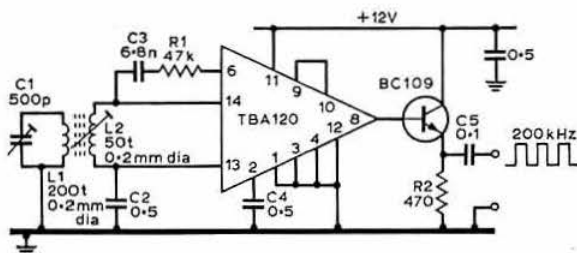


Fig 1. The 200kHz "receiver" providing 200kHz output pulses

long-term accuracy of the carrier is maintained within a few parts in  $10^{11}$ , a degree of accuracy that no amateur could hope to achieve from a local source. These signals are well received in most parts of the UK except the extreme north of Scotland (where there are plans to put up another station on 200kHz). The only snag is a quite short night-time close-down, though if the purpose is to use the transmissions as a frequency standard this will affect only the night-owls; this is why MSF on 60kHz is normally used for time-keeping.

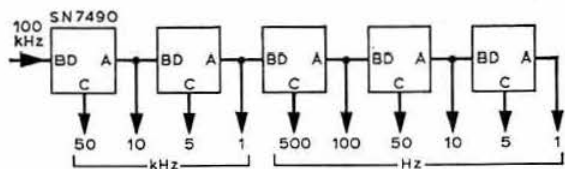


Fig 3. Divider chain for use as required with frequency standard

In *Electron* (January 1977), G. van den Broek, NL4465, describes a frequency standard based on Droitwich but which also includes an ovened 100kHz crystal which is automatically switched into circuit whenever the Droitwich transmitter goes off the air. The 200kHz receiver is extremely simple, consisting of a single ic (TBA120 or possibly the similar SN7666ON) with a ferrite-rod tuned circuit/antenna and followed by a transistor emitter-follower (Fig 1). The unit could be considerably simplified by the omission of the electronic switching where the local oscillator facility is not required, but the whole system is shown in Fig 2. When LED1 is glowing, this indicates that the output is derived

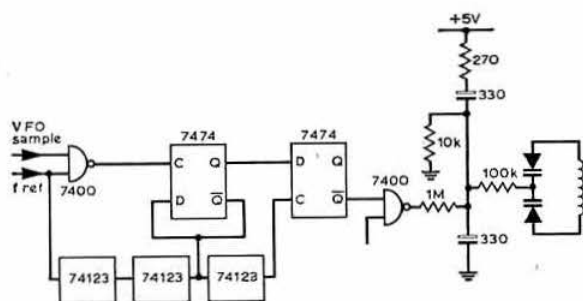


Fig 4. Application of frequency standard to "huff and puff" vfo stabilizer

from Droitwich; LED2 shows it comes from the internal 100kHz oscillator.

From the pulsed 100kHz output, use of 7490 decade dividers allows symmetrical outputs to be obtained at 10kHz, 1kHz, 100Hz and 1Hz, and NL4465 points out that the system is ideal for use with the PA0KSB "huff and puff" form of stabilizer (see Figs 3, 4) which was described in some detail in a series of *TT* items during 1973 and 1974 and can be found in *ART5*.

### Versatile calibrator

*TT* (November 1976) showed how the 7490 ic decade divider can, by variation of connections, function as a *divide-by-n* device, where *n* is any integer from 2 to 10. An interesting example of how this facility can be put to very practical use is to be found in a handy crystal calibrator designed by G8JKL and G8ISY. This provides marker points for use up to vhf at intervals of 1MHz, 100kHz and then the option of either 10 or 12.5kHz markers.

G8JKL writes: "Since operation on fixed channels has become the vogue on vhf and I use a tunable receiver, the need for something better in the way of crystal calibrators than the original band-edge marker soon became apparent. To this end the tt calibrator shown in Fig 5 was designed by G8ISY and me. The switching allows netting on to the fm channels which are 25kHz apart by arranging the second 7490 to divide by either 8 or 10. The unit can be built on Veroboard and conveniently fits into a tobacco box together with three No 8 cells making a 'jam' fit."

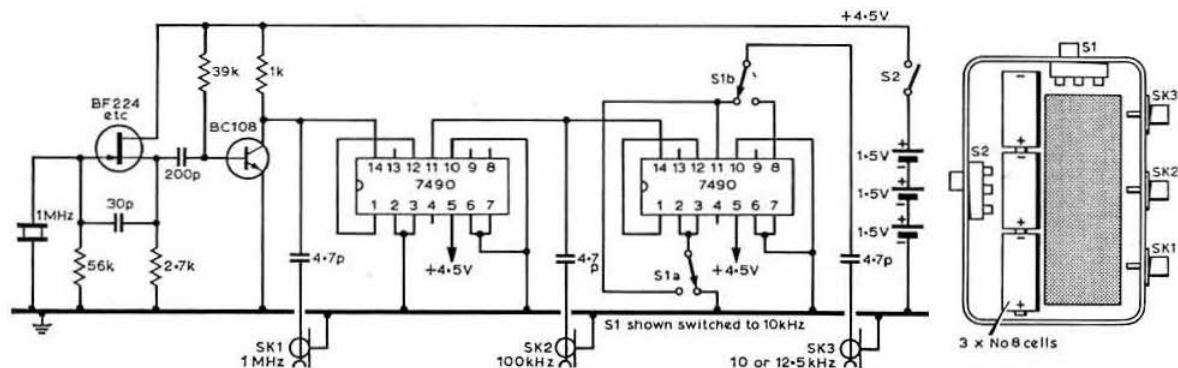


Fig 5. The versatile calibrator providing switchable 10 or 12.5kHz markers

### Discrete linear ohmmeter

The direct-reading ohmmeter using a 741 op-amp reported in the January *TT* has attracted a number of comments. There is no doubt that the system provides a convenient and useful test-meter, though several readers have been puzzled at the specification of the relatively high supply potential of 30V, and it does appear that the circuit works well with considerably less than the figure shown in the original *Electronics* write-up. But it is an ill-wind that blows no good, as the following comments from Cedric T. Marshall, G3YRN, indicate:

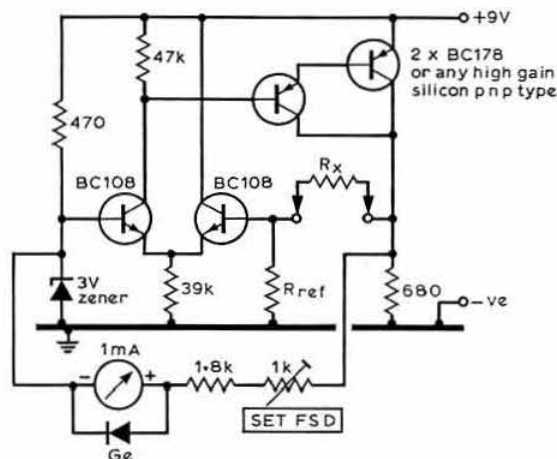


Fig 6. G3YRN's "discrete" low-voltage version of the direct-reading linear ohmmeter

"Just occasionally I manage to put two and two together with tolerably accurate results. The inspiration this time was the direct-reading ohmmeter. The design appealed to me but I was not too keen on the 30V supply as I prefer to keep my test equipment fully portable if possible. However, faint signals in my memory led me to *Wireless World* June 1972 where J. Linsley Hood described an electronic multimeter based on a "home-brew" op-amp working on a  $\pm 1.5V$  supply. This inspired me to lash up the arrangement shown in Fig 6, providing a discrete equivalent to the January circuit.

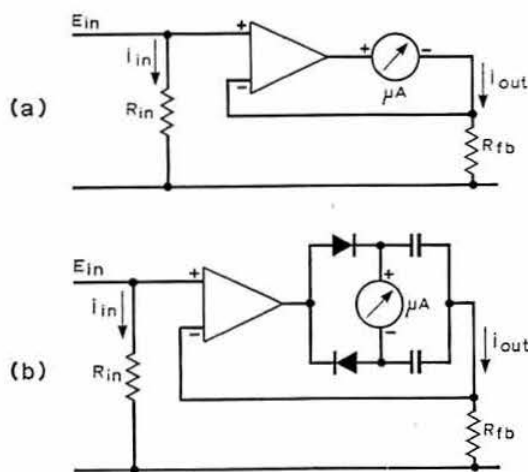


Fig 7. Basic arrangement of the simple electronic multimeter described by J. L. Lindsey Hood (*Wireless World* June 1972): (a) dc current multiplier system; (b) ac current multiplier

"Linearity appears to be entirely adequate on all ranges and the unit can be used down to 100Ω f.s.d. The limitation is the  $I_c$  (max) rating of the BC178 devices since 10Ω f.s.d., for example, would require 300mA "drive" through  $R_x + R_{ref}$ . Sensitivity to changes in supply voltage is quite good but can be no better than the stability of the zener reference. A perfectionist might wish to improve on this aspect: I would not expect temperature stability to have any very significant effect."

G3YRN also points out that the original Linsley-Hood multimeter (Figs 7, 8 show the basic arrangement without all the ac/dc range switching etc) is an excellent circuit in itself.

He also reveals himself as someone with just a shade of a doubt about "the age of silicon" by wondering if we are

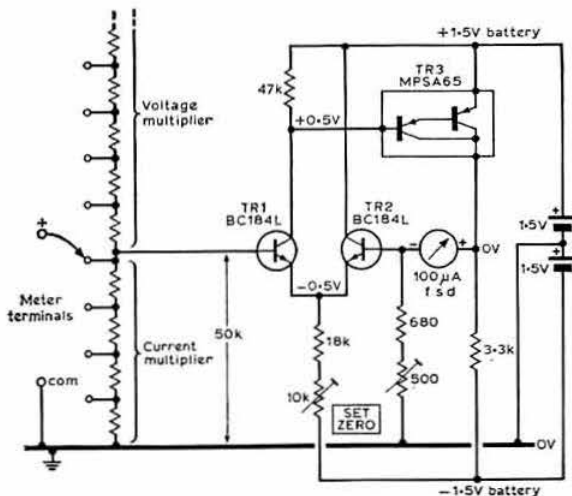


Fig 8. General arrangement of the discrete transistor op-amp system used for the dc meter circuit

possibly in danger of becoming hypnotized by integrated circuits. "Just because they come in a package," he writes, "must they always be good?"

### Metering made easy

C. R. Street, G8BNO, recently sent along a sample of what he calls "a little gadget" that he has devised to make it easy to measure battery current in the many domestic and portable receivers, cassette tape recorders and the like that use several 1.5V cells or similar low-voltage units in series. Often these cells are stacked between spring contacts and the form of construction makes it difficult to connect a testmeter in circuit using conventional meter probes and connectors.

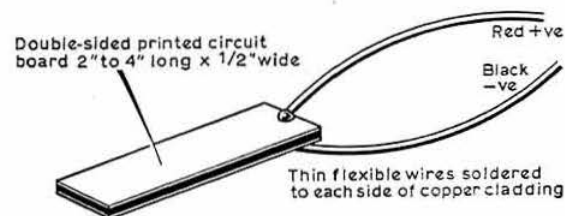


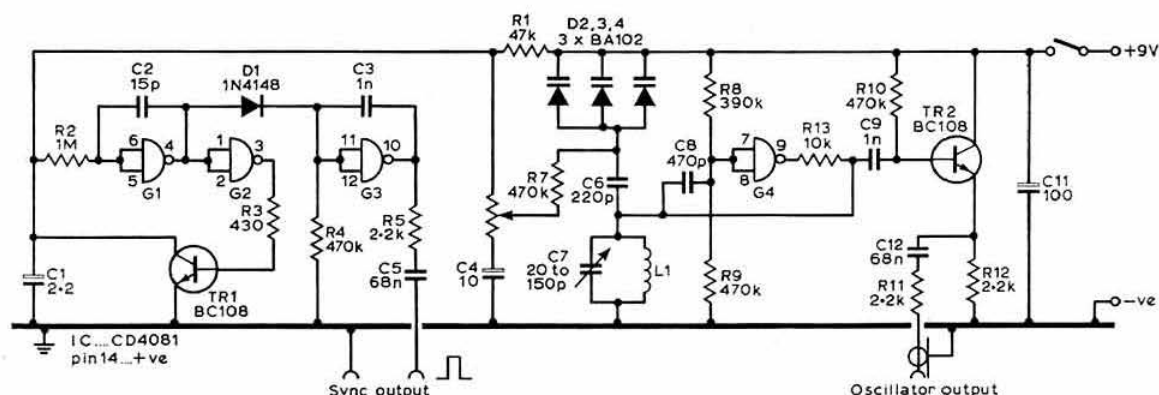
Fig 9. The G8BNO battery "probe" to facilitate current measurements on battery-operated equipment

In his form of probe (Fig 9), G8BNO uses a small strip of copper-covered pcb (about 2.4in long by 0.5in wide) with a second piece of copper foil fixed on the other side using high-speed Araldite adhesive; G8BNO points out that it would be even simpler to use a piece of double-sided pcb, but the "stuck-on" version seems to make a good substitute. Black and red wires are then soldered to the two copper foils. The whole thing is rather like a home-made low-value capacitor. The technique is then simply to push the probe between two cells, or possibly between one end of a battery and the spring contacts, using the wires to make the appropriate connections to the meter. It may all sound too simple and obvious to be really useful; in fact it seems as useful a new gadget as if somebody had just invented the traditional crocodile (alligator) clip!

### Low-cost 455kHz wobulator

There is little doubt that modern integrated circuits and semiconductor devices have made it possible for the amateur to put together with simple wiring useful test equipment that formerly would have represented quite complex projects. An example of this is to be found in *Electron* (December 1976) where the Dutch listener A. M. Bosschaert, NL4714, describes a low-cost wobulator based on the four AND gates of a cmos ic (CD4081) plus a couple of transistors, three BA102 electronic tuning diodes and a few resistors and capacitors (Fig 10).

Such a unit should provide a useful tool for the alignment of i.f. stages, nbfm discriminators and the like. The centre frequency of the LC oscillator (G4) is governed by C7-L1 plus the three BA102 devices; in the original model this was made 455kHz by using an ex-transistor radio coil unit with all the coils in series, but it is suggested that G4 can be made to operate up to about 5MHz if this is required. The LC oscillator is frequency modulated by the action of the three BA102s under the influence of the low-frequency oscillator comprising gates G1 and G2 and the BC108



**Fig 10. Low-cost wobbulator as designed for operation around 455kHz.**  
**Note:** the gates are AND, and not NAND, as shown. The potentiometer is R6, 500k $\Omega$

transistor TR1. The amount by which the 455kHz oscillator is swept depends upon the setting of R6. A shaped positive synchronizing pulse is available from G3. Another BC108 (TR2) functions as an emitter-follower buffer stage. The output impedance is about 2.5k $\Omega$  and the output voltage is about 5V p-p. The wobbulator operates from a 9V supply requiring only about 3mA. Care should be taken when wiring the CD4081 cmos device into circuit to avoid electrostatic puncture.

### Absorptive tvi filter with harmonic monitor

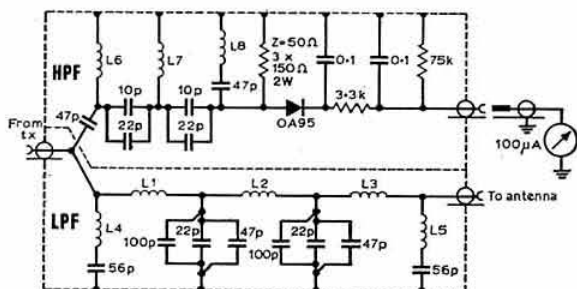
Some years ago (*TT* February 1969 and *ART*) attention was drawn to an unusual form of low-pass tvi filter that had been described in *QST* by two Collins Radio engineers. They had pointed out very strongly that few amateurs ever really know what is the attenuation of their filters to harmonics, no matter how carefully they study published attenuation curves or attempt to draw up their own. For such curves are constructed from measurements made with a signal generator tuned to the harmonic frequency and correctly matched to the input impedance of the filter. Some of the recent discussion on crystal filters has emphasized that a conventional filter performs correctly *only* when correctly terminated.

In the real world the output impedance of a transmitter is unlikely to be the same at the harmonic frequencies as it is at the fundamental frequency. We may think that the source impedance into our lpf is 50 $\Omega$ —and indeed it may be on the frequency we are trying to radiate, but it can be very far from this at the various harmonics we are trying to stop from going out. In the original *QST* article it was suggested that it is sometimes possible, even with a well-designed lpf unit, to *increase* rather than attenuate some harmonics—and the authors suggested that we needed to emerge from “an unhappy chapter in filtering”.

That was 1968–9, but in the years since then there have been relatively few attempts to follow their advice and abandon the conventional lpf for an absorptive filter which combines an lpf with a high-pass filter terminated in a resistor to absorb all the harmonic energy rather than attempting just to block its path. At the time we likened this approach to the hi-fi practice of using cross-over filters to direct the higher audio frequencies into the tweeter and the lower frequencies into the woofer; in this case the woofer is the

antenna and the tweeter a harmless resistor of about 5W rating.

After many years of silence, the absorptive filter has re-emerged in a design by Hans A. Rohrbacher, DJ2NN, in *CQ-DL*, August 1976 (Fig 11). This is claimed to reduce vhf harmonics of an hf transmitter by some 70 to 100dB and, as an added feature, includes a harmonic output indicator that allows an occasional or continuous check to be made on the total harmonic output of the transmitter, simply by measuring the voltage across the harmonic dissipating resistor at the end of the high-pass sections. DJ2NN emphasises how much the harmonic output of an ssb transmitter increases when the “linear” output stage is overdriven so that flat-topping occurs.



**Fig 11. DJ2NN's "absorptive" tvi filter with harmonic output indicator.** The lpf is capable of reducing vhf harmonics by about 70–90dB, with the parallel hp and matched termination to absorb the harmonic output

### Winding details

- L1, L3 9t, 20mm
  - L2 12t, 27mm
  - L4, L5 (With 56pF gives resonance on 35MHz) 7t, 11mm
  - L6 3t, 6.6mm
  - L7 3t, 7mm
  - L8 6.5t, 13.5mm (with 47pF gives resonance on 45MHz)
- All coils on 10mm formers

The illustrations in the German magazine show that DJ2NN built his hp and lp sections in separate compartments in the filter box but does not use screens between the individual sections, although these are carefully laid out to minimize coupling.

## Dangerous capacitors

Recently, we seem to have been repeatedly calling attention to dangers and health hazards. It is far from our wish to become a prophet of doom; on the other hand there is little doubt that without a few warning voices many amateurs would be totally unaware of the potential dangers of electromagnetic radiation and of some of the tricky substances used in workshops or some components. The following notes on polychlorinated biphenyls and chlorinated naphthalenes come from the November 1976 issue of the *Technical Review* of the Asian Broadcasting Union:

"Of all the chemicals commonly found in electronic equipment, a group of compounds known as polychlorinated biphenyls (pcb) probably constitute the single greatest danger to health. These compounds, colourless liquids at room temperature, have been widely employed to impregnate the dielectric of capacitors (particularly high-voltage paper types) and as cooling fluids in large transformers. They have also been used as hydraulic and heat transfer fluids, as plasticisers and solvents in adhesives and sealants, as components of paints, varnishes, printing inks and brake lines, and in carbonless reproducing paper of the kind used in forms.

"Skin contact with polychlorinated biphenyls causes brownish discolouration and a severe acne called chloracne. Ingestion and absorption through skin (which occurs whether skin is broken or not) can lead to systemic symptoms such as fatigue, nausea and vomiting and to respiratory problems and liver damage.

"Polychlorinated biphenyls are also a considerable problem environmentally. They are non-flammable, are virtually insoluble in water and are very inert chemically. If simply dumped they can leach into waterways and lie on the bottom for years. They are absorbed by fatty tissue and tend to concentrate in fish... The only disposal method yet developed appears to be incineration at extremely high temperatures.

"Avoid contact with all capacitor and transformer fluids unless certain they are relatively harmless compounds such as vegetable, mineral or silicone oils. Note that polychlorinated biphenyls are also known as chlorinated diphenyls and as akarels, as well as by numerous trade names. They have been used commercially since 1930 but were not recognized as a health hazard until 1966... in 1968 about 1,000 people in Japan became ill after eating food cooked in contaminated rice oil and since then many other cases of contaminated foodstuffs have been reported in the USA. Japan, Sweden and the USA have legislated against various aspects of the manufacture, use, importing and disposal of polychlorinated biphenyls.

"Chlorinated naphthalenes are other, but less well known, classes of compounds which pose a similar health hazard as polychlorinated biphenyls. They are waxes and have been used in small paper capacitors."

## Barbed wire radials

To judge from the lists of stolen equipment that are appearing in amateur radio journals in many parts of the world, any ideas that will discourage the help-yourself crowd are rapidly becoming a priority for those who have to leave bits and pieces lying around. But the loss suffered by the broadcast station WOR in New York must have taken some picking up: 20,000ft of exposed copper-wire earth radials.

The owners, recognizing that if the wire was replaced it was likely to produce a repeat performance, looked around for something a little less pocketable; as a result the engineers came up with a new approach: they laid out 20,000ft of best grade (American class C) galvanized steel *barbed wire*! This was silver soldered to the buried earth mat. Results have been good and a report concludes: "In locations where theft of copper radials is a problem, or where cost is an important factor, the use of barbed wire radials may be a practical solution". It is, however, pointed out that care should be taken to ensure that there are no legal restrictions, no chance of children playing in the area, and that warning signs are erected.

## Desoldering dil ICs tip

Several hints have already been given in *TT* for coping with the problem of removing integrated circuits from printed circuit boards (eg Fig 7 of *TT* June 1976, or *TT* October 1976, p762). To add to these tips, Harold Chorley, G5YH, comments:

"To remove from a pcb (a) a blown dual-in-line (dil) ic that has been soldered in; or (b) to remove for re-use a dil socket, proceed thus:

(1) Cut a strip of thin aluminium (eg 18 gauge) to fit snugly between the pins (for obvious reasons use aluminium and not copper).

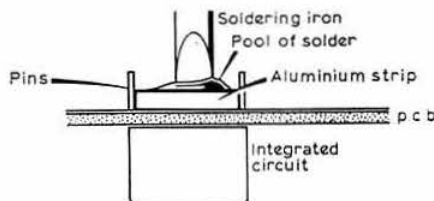


Fig 12. G5YH's technique for desoldering dual in-line integrated circuits

(2) Place the strip of aluminium between the pins of the ic or ic socket; hold it down with the tip of a heavy-duty iron that has a wedge-shaped bit, and run on a small pool of solder to act as a heat conductor, as shown in Fig 12.

The ic or the socket should then simply drop out."

## G6FO

Many of us have heard with deep-felt regret of the death of Austin Forsyth, OBE, G6FO. For me he was the first professional editor prepared to accept a contribution from a 16-year-old schoolboy; the author of the first series of *The Helping Hand to Amateur Radio*; an entertaining and always interesting companion on various press trips and occasions; someone who, by providing highly professional competition, has for years kept us all on our toes.

Characteristically, in July 1975, after my contributing some "Reflections" on the first 50 years of *Radio Communication*, I received a charming note from him, acknowledging my references to the era when he was closely associated with the *Bull* and the Society, and recalling "The fifty years during which I am proud to have been able to play some small part myself". In truth it was no small part. □

# the month on the air

John Alloway, G3FKM\*

**T**HE IARU Region 1 HF Band Plan, reproduced in January *MOTA*, has brought forth comment from one reader that the reservation of 3,500-3,600kHz for cw use seems somewhat unwise in view of apparent lack of such activity during daylight hours. He also points out that we must be seen to be using all our frequencies and wonders if it is wise to allow this state of affairs to continue. Your scribe believes that, although the amount of activity on this band at the time mentioned is limited by the absence at work of many amateurs within receiver range, the criticism may well be justified. A temporary remedy would be for such activity to be encouraged, but the subject may well be discussed at the next IARU Region 1 conference (in 1978). Band plans do not just follow arbitrary decisions made many years ago but are the result of much thought by representatives of national societies throughout the region.

It seems that G2OF's callsign is not being pirated—the error seems to have arisen from misreading of the callsign on some QSL cards intended for G2DF.

## DX news

A letter from Richard Barnes, formerly VQ9D, now S79D, confirms the fact that Seychelles prefixes were changed on 1 January and that suffixes remain the same. A national society has been formed—the Seychelles Amateur Radio Society—and the new address for bureau QSLs will be found in "QTH Corner".

PA0TO advises that with effect from 1 January 1977 PA3 prefixes will be issued to new Class A and B licence holders in the Netherlands. New Class C calls will have the PE1 prefix, and Class D PD0. On acquiring Class A or B licences present Class C holders will retain their suffix but change to a PA2 prefix.

7P8BC is W9JER and uses a Drake line. He keeps schedules with stations in the USA at around 1800 on 14,283kHz on Saturdays, and is also believed to like checking into the Int'l YL SSB Net on 14,333kHz at 1800 on Mondays.

*West Coast DX Bulletin* reports that stations in Yugoslavia are now permitted to use 1-8MHz. YU1PCF was noted on 1,830kHz and it is believed that the band may be limited to 10kHz in width. Other Region 1 countries may issue permission for their amateurs to use this band and it is said that approaches are likely to be made in Denmark, the Faeroes Is, Norway and Sweden for such privileges. Portugal, the Azores and Madeira may also become active, and signals from Italy have already been heard.

It is likely that QSL cards from D6A will be accepted for DXCC credit from 1 March. A new station from Crozet Is,

FB8WJ, was due to begin operation early in February. A large icebreaker is being constructed for the South African Government and is due for completion in the autumn. This will be equipped with two helicopters and will be used for supplying the bases at Marion Is, Gough Is, and in the Antarctic at ZSIANT. It will also visit Bouvet Is for the purpose of constructing an automatic weather station. TJ1BB has been noted on 14,215kHz at around 1600. Some stations using the new S8 prefix have also been heard and it is of course possible that Transkei will be added to the DXCC list in due course.

FR7ZL should now be on the air as FR7ZL/T from Tromelin Is. He seems to prefer operating just below 14,200kHz on ssb and around or below 14,025kHz on cw. He has a reputation as a good QSLer.

According to February *QST* Aldabra, Desroches and Farquhar Is have now been deleted from the DXCC country list, as has Comoro (FH8). Two new countries—Comoro Is and Mayotte Is have been added to replace the latter. The former have now become part of the Republic of the Seychelles.

Danny Lockyer, VR1AA, left the Gilbert Is during February and will soon be back in Wales with his GW3HCL call. Since his arrival in VR1 in August 1971 he has had 33,594 contacts.

The *Yankee Trader* sailed from the USA early last month on a round-the-world cruise. There is a licensed amateur aboard and the ship will visit the Galapagos and Easter Is during March, and Pitcairn Is during April.

## Expeditions

In a letter dated 5 January, Lloyd and Iris Colvin said that they had just completed their stay in Anguilla as VP2EEQ, and that they had made over 8,000 contacts with a total of 123 countries. Their stay was cut short by a few days by the breakdown of their generator. They ended 1976 having made in excess of 70,000 contacts from nine different countries and hope that this year will produce similar results! They noted that KV4AA amassed the staggering total of 35,000 contacts during the year using his special bicentennial prefix as AJ3AA.

*DXpress* reports that F6BBJ is planning a trip to various places in the Indian Ocean. Depending on transport and political problems he hopes to use the following calls: F6BBKZ, F6H0BKZ, F6BBJ/D6, F6H0BKZ/G, F6H0BKZ, F6BBJ/3B8, F6BBJ/3B9, F6BBJ/3B7, and possibly also F6BBJ/VQ9 from Aldabra. Operating frequencies are likely to be (cw) 3,505, 7,005, 14,045, 21,045 and 28,045kHz, and (ssb) 3,765, 7,085, 14,102, 21,265 and 28,515kHz. The expedition is likely to take place early in March. It is understood that donations would be welcomed and should be sent to J. Billaud, 11 rue R. Champenier, 58000 Nevers, France.

Wayne Warden, W9MR, who has previously operated from a number of exotic locations, was in W Samoa at the time of writing. He was hoping to be able to visit the Tokelau Is for a two-week stay. Failing this he hoped to visit Niue for a week and Lord Howe Is for another week before going on to Manila. His operating frequencies are given as 25kHz above band edges on cw and with most activity taking place on 14,195kHz ssb. QSLs should be sent via INDXA, Box 125, Simpsonville, Md, 21150, USA. This operation may be past by the time this is being read, but the information may still be relevant if delays occur.

\* 10 Knightlow Road, Birmingham B17 8QB.

## QTH Corner

<b>AP5HQ</b>	STC, Kohar, Pakistan.
<b>C21PS</b>	PO Box 3888, Nauru.
<b>H21EL</b>	via K6KIL, C. Moore, Box 1338, Arcadia, Cal, 91006, USA.
<b>H21AB</b>	Hqtrs USMTSA, Attn: J-6, APO, New York, 09616, USA. (Plus sse/IRCs).
<b>LUIZA</b>	via LU2AFH, PO Box 100, SUC 28, Buenos Aires 1428, Argentina.
<b>S79</b>	QSL Bureau—SARS QSL Bureau, Box 7388, Victoria, Mahe, Rep of Seychelles.
<b>S79P</b>	Dick Pagendam, Box 223, APO, New York, 09030, USA.
<b>S79R</b>	via G3LOP, 11 Firecroft Close, Tilehurst, Reading, Berks, RG3 6LJ.
<b>VC9UM</b>	via VE4UM, Univ. of Manitoba ARS, Student Union Bldg, Univ. of Manitoba, Winnipeg, R3C 2E9.
<b>VK9ZM</b>	VK4ABW, J. H. Willson, 9 Ladybird St, Kallangur, 4503, Queensland, Australia.
<b>YV4BK</b>	via W2GHK, PO Box 7388, Newark, N. J., 07107, USA.
<b>ZF1RD</b>	via W4BAA (see 9L1JM).
<b>3Y1VC</b>	via NRRL.
<b>3Y3CC</b>	via NRRL.
<b>5T5CY</b>	via W4BAA (see 9L1JM).
<b>9L1JM</b>	via W4BAA, D. L. Jones, Box 1, Captiva Is, Fla, 33924, USA.

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

## Welcome

The following overseas amateurs joined the Society during January: AP2AL, A4XGX, A4XGZ, DC6TX, DJ8RI, EA7IR, IW1AIP, I3PRK, KL7IQG, LA8IF, OE1FF, OE3EKC, OH1LW, OH2BCB, SM7AFV, SM7DOX, VE3CRU, VK2BLA, WA2CBU, WA6IDN, WB2BVB, ZS2SG, ZS6BLY and ZS6KU.

## YL day

A suggestion, originating from Germany, that a special ladies net should be set up has been forwarded by G4EKX. The idea is that on the 15th of each month lady operators should congregate around 14,250, 14,310, 21,250, 21,400, 28,500 and 28,600kHz.

## Awards

### The 1977 Cape Town Festival Award

For contacts made between 2200 1 April and 2200 30 April. Contacts must be made with either ZS1CTF or ZS1CTM, and two other ZS1 stations. QSL cards are not required but log extracts certified as correct by two licensed amateurs plus SA R1 or US \$2 should be sent to Derek Siegel, ZS1DP, SARL CT Branch, PO Box 5100, Cape Town 8000, Republic of South Africa. Closing date for applications is 31 July 1977 and certificates will be posted after that date.

## Contests

### The CQ WW WPX SSB Contest

0000 26 March to 2400 27 March.

Only 30 of the 48 hours may be operated by single-operator entrants. The 18 hours of rest may be taken in up to five breaks which must be clearly indicated in the log. All bands 1-8 to 28MHz may be used, two-way ssb only. There are single-operator (a) all-band, and (b) single-band, and multi-operator all-band single- or multi-transmitter sections. In the last category only one signal per band may be radiated. Exchanges consist of RS plus serial QSO number (from 001). Multi-transmitter entrants use separate numbers on each band. Contacts between stations in the same continent count one point on 14, 21 and 28MHz, and two points on the other bands. Those between stations in different continents count three and six points respectively. Note that stations in one's own country may only be worked for multiplier and not QSO credit. The multiplier is the number of different

prefixes worked—each counts once only, but stations may be worked on each band. Logs should be accompanied by a signed declaration that all rules and regulations for amateur radio in the entrant's country have been observed, and by a summary sheet giving scoring data, category of entry, and name and address in block letters. All should be postmarked before 9 May and sent to: CQ WPX SSB Contest Committee, 14 Vanderventer Av, Port Washington, NY, 11050, USA.

## Worldwide SSTV Contest

1500-2200 19 March and 0700-1400 20 March.

All bands 3-5 to 28MHz. Messages to consist of exchange of pictures including callsign, report and serial number (from 001). Contacts count one point except on 28MHz where they count five. The multiplier is 10 for each continent, and eight for each DXCC country worked on each band. USA/VE call areas count as countries. Stations may be worked on each band. There are two sections—for entrants transmitting and receiving video and for entrants receiving video only. Logs should show date, time, band, callsign, reports sent/received, numbers sent/received, points, multipliers and final score. They must reach Prof Franco Fanti, Via A. Dallolio n.19, 40139 Bologna, Italy, by 30 April. If \$1 or equivalent is included the results and next year's rules will be sent. G3WW points out that due to the recent licence changes UK sstv stations identification may be made on ssb or cw—and that therefore they now share this advantage with USA entrants.

## Band reports

This month it is pleasing to note considerably less interference from "Big Brother" and even fewer intruders on 7 and 14MHz. Band conditions were very much the same as for last month with 3-5 and 7MHz providing morning and evening paths into JA, VK and ZL. The 14MHz band has been slightly better for the Pacific in the mornings. Very little has been reported on 28MHz—however, G3RMF did hear 22 countries on the band during January. Results of the special activity Sundays are awaited, and in the meanwhile G3ISX has suggested the use of a "calling channel" on the band—eg 28,550kHz. This would help considerably when the band is very quiet—a quick change of frequency being made when contact is effected.

ZE2JV is transmitting a "beacon" signal on 28,330kHz between 1000 and 1030 and 1700 and 1730 on Saturdays and Sundays. This will be a tape, but if he hears a reply he will answer.

The chairman of the Propagation Studies Committee would like to thank those who answered the request for reactions to the new tables. They seem to be of quite considerable value.

Many thanks to the following for providing information used in compiling the following section: Gs 2FYT, 2HKU, 3HB, 4RZ, 5HJ, 5JL, 3AAE, 3KSH, 3LOL, 3NKQ, 3RCA, 3RMF, 4BUO, 4DXE, 4EAN, 4EDV and 4EHQ, GM3CFS, BRSS 17567 and 35608, and A8312.

Stations listed in italics were using cw, the rest ssb.

**1-8MHz.** 0000 PJ2VD, YU1BCD, YV10B. 0100 WA1RFM/VP9. 0200 K3ZO, K4LRO, W1BB. 0300 W5s AB, USM, SUS. 0400 PY1MAG, W4EV/VP9. 0500 PY1RO/0, W5WZQ. 0600 KG4FU, KV4FZ, VE2. W1-W4, N5DX. 0700 KZ5AA, W2,3,8,9. 0800 W5DC, W9MAL. 2100 IK1AMO, ST2AY. 2200 EA8CR, ZC4IO, 4X4NJ, 9H1CG. 2300 F3AT (F8EX, 8DB and 8VJ also reported around 1,826kHz). YUs have been noted between 1,825 and 1,835kHz and 1,855 and 1,875kHz.

**3.5MHz.** 0000 AP2KS, C31FR, 4S7WP, 9K2DR. 0100 PY1RO/0, VP5 2DD, 5MB, W7VO. 0600 VP5LDH, 9Y4NP. 0700 HR4BBA, VP1EK, VP1KS (QSL to DL1KS), VP1MPW (QSL to W5QXP), W6, ZL2-ZL4. 0800 D4C8S, ZK1BA, ZL2-ZL4. 1500 K0WQ/DU2. 1700 JA5ANP, 7X4AM. 1800 U18Z. 1900 JA1ELY, JA6BSM, VKs 2OI, 3MR, 3XB, VU2BM, OE5MGL/YK. 2100 K6GJH, ZS7SD, Z54GX. 2200 A4XGZ, FP8ZZ, HZ1AB, JA1SGX, 6W8DY, 9J2WR. 2300 A9XBD, JX0AF, PJ8KG (QSL via YASME), PY0ZAE, WA6EGL/VQ9, YV1NX, ZD8EW, ZS1XR, 9L1SE, 9M2PV.

**7MHz.** 0000 A9XBB, FM0COO, F08EH/FM7, H2EL (QSL to K6KII), PJ8KG, PY1RO/0. 0200 PY0FOC (QSL to PYTPO), TU2GK, WA6EGL/VQ9, VU2CK, YS10, 9M2PV. 0300 OA2CD, ZS5A, 9Y4MM. 0800 JA, VP1EK, ZL. 1100 W1HRJ. 1700 UA0, VK3ACV. 1900 9J2WR. 2200 VP2KR, VP8AD. 2300 FM0COO, PY0ZAE, VS5MC.

**14MHz.** 0800 FK8s AI, BK, KG6RI (QSL to WA7JCB), YJ8RD, JA1TES/5A, 9V1QB. 0900 FK0TX (BP 328, Noumea), JA, KX6BS, VK9ZM, VP8HZ, VR4DX, VK, VS6, ZL. 1000 CR9AK, KL7. 1100 P29AZ, SU1MA, VP2SZ (WB00BA), 5V7WT (QSL to F9GL). 1300 PJ8KG, WA4RQK/VQ9 (QSL to W4FLA), 6Y5HJ (Box 160, Kingston 10). 1400 4S7WP. 1500 TR8BA (BP 3853, Libreville), VK0TB (QSL to VK3ADD), VP5LDK (QSL to W88LBH), VUTANI (QSL to WA3HUP). 1600 D6AA, FB8ZI, FO8DO, FR7BL, FR7AI/E, HK0LE, OX3UP, W1VE7, 3B8CN. 1700 FROCYZ, KH6, PY0FOC. S79NLB (Box 234 Mahe), 5T5JD (BP 237 Nouakchotte). 1800 VP1EK. 1900 FL8KP (QSL to W3HNK). 2100 FG7AR/FS7, KC4USN, KL7, XT2AE.

**21MHz.** 0900 EP2YK (Box 894 Esfahan), VU2BK. 1000 JA, S79DF, 5N2ESH, 7P8AR. 1100 AP2SA, PY1RO/0, PY0ZAE, VK3. 1200 A9XS, ST2RK. 1300 A4XGR (QSL to WB4ND), HR3JJR, PJ8KG. 1400 W1, 4, 8, 0. 1500 A2CED, CE, FM0COO, VP5 2LCG, 8HA. 1700 TR8RS, TU2GK. 1800 VP8HR.

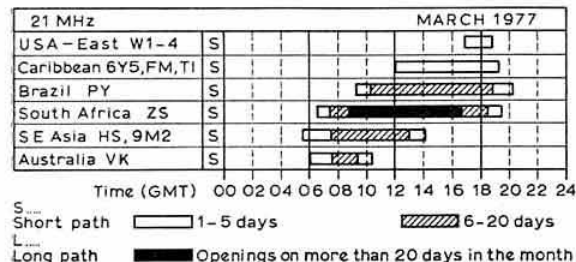
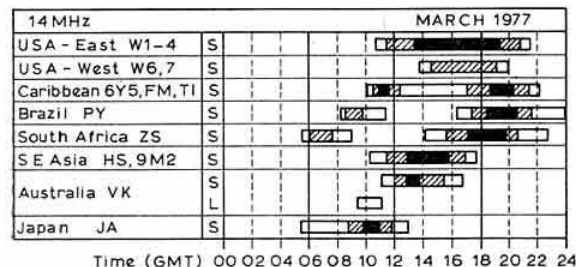
**28MHz.** 1000 ZS3AV. 1200 ZS6BDT. 1600 UA6AGZ.

Acknowledgements to the authors of the following for items obtained from their publications: *Long Skip* (VE1AL/3), *The West Coast DX Bulletin* (WA6AUD), *DX press* (PA0TO), *CQ Magazine* (W1WY), the *Ex-G Radio Club Magazine* (W3HQO) and the *29 DX Club Bulletin* (VK6RV).

Please send all items for April issue to reach G3FKM no later than 12 March, and for May by 8 April (earlier date due to Easter).

## Propagation predictions

During March the MUFs are almost equally divided between the northern and southern hemispheres as the spring equinox approaches. Traffic with the southern hemisphere will therefore



improve considerably compared with the winter months. Solar activity is still low, so 28MHz will be of little importance for dx. Traffic with Africa might be possible in exceptional circumstances between 0900 and 1630gmt; there is an even smaller chance of traffic with South America between 1400 and 1600gmt. As summer approaches, traffic on 28MHz will increase through sporadic-E short-skip contact over distances of about 700 to 1,800km.

The low sunspot activity and approaching summer mean relatively poor conditions on 21MHz. This will be noticeable in traffic with North America: the east coast (W1-4) will only be heard during late afternoons of days with above average MUFs; the west coast including Hawaii and Alaska will not be heard. Only traffic with Africa is certain on this band.

Conditions on 14MHz will improve as nights shorten and the band will remain open longer. Contact with all continents will be possible, but chances of dx via the indirect path will be very small at the time of the equinox. On days with markedly above-average MUFs there will be possibility of dx with Hawaii between 1640 and 1830gmt, and with Alaska between 0830 and 1200gmt and between 1530 and 1830gmt.

DX will also be possible during March on 7MHz when the longer part of the path lies in darkness. Traffic with South America, Australia and South Africa will improve. QRM permitting, eastern North America will be heard from about 2100gmt. During the latter half of the night there will be interruptions as frequencies fall to low. The F2 MUFs at present are below 7MHz, so this band will be interrupted frequently by the dead zone during daytime.

The 3.5MHz band will see a slight worsening of dx traffic compared with the previous months, as QRM will increase slowly this month and continue throughout the summer months. During the latter half of the night (sometimes even sooner) local traffic will be interrupted by the dead zone.

## HF PROPAGATION STUDY

	Predicted HPFs (MHz x 10) for March 1977																								
GMT=	00	02	04	06	08	10	12	14	16	18	20	22	24												
Aden	131	131	130	216	265	286	288	276	258	223	157	133	131	135	134	131	130	237	277	301	304	291	282	232	158
Ascension	135	134	131	130	237	277	301	304	291	282	232	158	135	130	130	130	215	258	270	272	262	249	187	140	131
Bahrain	130	130	130	215	258	270	272	262	249	187	140	131	130	111	106	130	204	223	239	239	218	164	139	131	116
Bangkok	111	106	130	204	223	239	239	218	164	139	131	116	111	119	112	105	92	119	185	238	253	247	249	224	164
Barbados	119	112	105	92	119	185	238	253	247	249	224	164	119	107	94	87	81	140	213	224	224	224	211	158	116
Bermuda	107	94	87	81	81	140	213	224	224	224	211	158	107	114	107	94	87	107	133	227	251	243	243	224	166
Bogota	114	107	94	87	107	133	227	251	243	243	224	166	114	129	129	124	112	152	214	274	292	270	265	233	159
Buenos Aires	129	129	124	112	152	214	274	292	270	265	233	159	129	129	124	112	152	214	274	292	270	265	233	159	129
Cape Town	129	134	122	158	258	296	308	307	288	268	210	148	129	129	134	122	158	258	296	308	307	288	268	210	148
Colombo	108	124	135	216	255	263	265	255	242	188	145	130	108	122	122	115	185	232	249	251	246	235	200	145	124
Cyprus	122	122	115	185	232	249	251	246	235	200	145	130	108	135	134	131	128	237	276	301	304	290	282	232	157
Dakar	135	134	131	128	237	276	301	304	290	282	232	157	135	105	79	74	74	86	151	172	186	172	133	105	117
Denver	105	79	74	74	74	86	151	172	186	172	133	105	117	106	93	106	131	143	150	157	172	158	144	117	130
Fairbanks	117	106	93	106	131	143	150	157	172	158	144	117	130	130	126	119	158	220	288	275	267	233	158	130	130
Falklands	130	130	126	119	158	220	280	288	275	267	233	158	130	130	126	119	158	220	288	275	267	233	158	130	130
Gibraltar	83	81	75	83	139	164	176	180	174	166	141	98	83	97	91	128	192	210	221	225	163	134	106	105	97
Hongkong	97	91	128	192	210	221	225	163	135	134	106	105	97	130	130	126	119	158	220	288	275	267	233	158	130
Honolulu	117	106	93	106	131	143	150	157	172	158	144	117	130	130	126	119	158	220	288	275	267	233	158	130	130
Iceland	60	59	59	61	102	141	145	145	145	135	114	78	60	106	94	87	81	94	126	213	230	227	229	211	106
Jamaica	106	94	87	81	81	94	126	213	230	227	229	211	106	106	94	87	81	94	126	213	230	227	229	211	106
Lagos	135	134	130	144	251	291	313	312	296	282	223	152	135	130	130	130	215	258	270	272	262	249	187	140	131
Las Palmas	117	116	110	108	187	225	247	251	241	237	202	139	117	121	117	107	98	133	116	242	263	256	253	228	163
Lima	121	117	107	98	133	116	242	263	256	253	228	163	117	121	117	107	98	133	116	242	263	256	253	228	163
Los Angeles	111	92	81	81	81	86	92	164	185	185	159	131	111	105	88	124	180	201	209	208	202	187	148	108	105
Malta	105	105	88	124	180	201	209	208	202	187	148	108	105	105	88	124	180	201	209	208	202	187	148	108	105
Mauritius	133	120	130	210	265	290	295	289	263	235	161	134	133	93	74	74	74	93	111	158	205	205	211	186	145
Mexico	93	74	74	74	93	111	158	205	205	211	186	145	93	133	133	125	197	265	295	301	290	270	249	185	133
Moscow	87	79	78	143	174	191	195	194	190	161	111	97	87	133	133	125	197	265	295	301	290	270	249	185	133
Nairobi	133	133	125	197	265	295	301	290	270	249	185	134	133	121	119	112	133	210	238	249	249	242	182	144	133
New Delhi	119	112	133	210	238	249	249	242	182	144	133	121	119	94	81	81	81	108	181	201	205	210	190	145	94
New York	94	81	81	81	81	108	181	201	205	210	190	145	94	91	84	103	158	187	188	172	136	130	128	106	105
Osaka	91	84	103	158	187	188	172	136	130	128	106	105	91	130	122	135	215	252	262	248	312	305	286	260	197
Perth	130	122	135	215	252	262	248	312	305	286	260	197	134	134	133	125	185	265	304	312	305	286	260	197	134
Rio de Janeiro	130	130	126	119	139	251	280	288	275	268	234	159	130	134	133	125	185	265	304	312	305	286	260	197	134
Salisbury	134	133	125	185	265	304	312	305	286	260	197	134	134	133	125	185	265	304	312	305	286	260	197	134	134
Seychelles	131	121	130	213	266	290	290	285	263	232	158	133	131	119	112	133	210	238	249	249	242	182	144	133	121
Singapore	119	112	133	210	238	249	249	242	182	144	133	121	119	94	81	81	81	108	181	201	205	210	190	145	94
Suva (s)	106	106	106	119	164	172	178	174	110	138	125	119	106	135	128	133	138	197	172	171	150	133	158	232	154
Suva (l)	135	128	133	138	197	172	171	150	133	158	232	154	135	128	133	138	197	172	171	150	133	158	232	154	135
Sydney (s)	98	92	124	194	210	210	187	182	173	144	106	105	98	124	120	112	103	149	140	116	103	94	114	187	159
Sydney (l)	124	120	112	103	149	140	116	103	94	114	187	159	124	120	112	103	149	140	116	103	94	114	187	159	124
Teheran	130	124	135	215	255	263	265	255	238	181	143	131	130	117	106	87	93	93	92	105	136	155	163	145	130
Vancouver	117	106	87	93	93	92	105	136	155	163	145	130	117	93	92	106	154	183	180	192	177	152	130	106	106
Wellington (s)	93	92	106	154	183	180	192	177	152	130	106	106	93	128	126	119	135	107	93	87	87	133	185	159	131
Wellington (l)	131	128	126	119	135	107	93	87	87	133	185	159	131	130	130	126	119	135	107	93	87	87	133	185	159

# 4-2-70

Graham Knight, GM8FFX\*

## Four metres

The remarks made in the January 4-2-70 about fm on 70MHz prompted several operators to write reporting fm activity in their areas. From the letters received there would appear to be a great many fm 70MHz enthusiasts, the largest group reported being in the Bournemouth area. G3PFM mentions over 30 home stations and many mobiles using fm on 70.26MHz and 70.48MHz. Many of these stations in the Poole-Bournemouth area are using four-element beams or quad antennas, three of the group are also on ssb, but all are looking for dx contacts. For skeds contact G3PFM, QTHR.

## Seventy centimetres

The 432MHz band was fairly quiet for dx during the first two months of the year. G4DGK thought the band might be open when he noticed a good signal from Yorkshire Television on his uhf tv set. Despite it being nearly midnight he went out portable near London and was able to hear good signals from the GB3EM and GB3SC beacons. Reports of 5/5 were exchanged both ways with Aberdeen on ssb at around 0100gmt but at this late hour no other activity could be heard on a band which was obviously open.

G3OSS and GM8FFX have both been using the new Ampere 432MHz linear amplifier since it became available some months ago at the Leicester Exhibition. The amplifier, which is suitable for all modes, operates from 12V dc and uses a CM40-12CTC device. With 10W of drive the amplifier's output measures 42W dc on the writer's Bird wattmeter. The unit has built-in rf sensing and this works well on a.m. and fm, although both operators have found it advantageous to over-ride this on ssb. G3OSS also uses the output of the linear to drive a Microwave Modules 1,296MHz varactor tripler to 15W. Using equipment like this it is now possible to run a very compact portable station, in fact as everything operates from 12V the day of the four-band 4-2-70-23 mobile operator is here.

## Two metres

Undoubtedly the best dx on this band has been worked via meteor scatter, 17 correspondents having sent in reports on ms contacts, which is an indication of the large interest in this special mode of propagation.

G3SEK took time off from his work as chairman of the VHF Contests Committee to work several *real* dx stations during the Quadrantids. Outstanding among the more distant stations contacted on cw were SM1DIE and SP4ERZ. His best dx was UR2RX in QTH locator MT63C, a distance of 1,758km. G3POI worked I1BEP and many others on ms ssb. A tape recording made by G8DVD, near Carlisle,

illustrates clearly the excellent signals he received on ms ssb from FIJG and FICYO during several consecutive 20s bursts.

A very large number of stations took part during these recent meteor showers; however, some of the operators on the ms calling frequencies were poorly prepared for the event. G4DGU sums up the viewpoint expressed in several letters:

"To be successful with meteor scatter requires that, not only is the equipment adequate, but that correct procedure is used. Judging by some of the liddery heard on 144.200MHz during the Quadrantids, I would guess that even some very well-known operators have no idea of how to conduct a ms QSO. The ultimate piece of goonery in this context is to call CQ ms and then to reply to a local station (who should not have called anyway) and then to continue to conduct a local QSO on the ms calling frequency. Another silly thing to do is to use speeded-up speech on the ssb ms calling frequency. This is a sure way to cause confusion at the other end and is the sort of thing which should be reserved for skeds.

"Please don't think that I am in any way trying to dissuade people from trying meteor scatter on either cw or ssb. May I through 4-2-70 appeal to anyone thinking of using this mode for the first time to listen around first, to read, at least, GW3ZTH's article in *Radio Communication* February 1975, and to talk beforehand to someone who is already operating meteor scatter. I am sure the present ms operators will welcome and advise new recruits to this most interesting yet complex mode."

The points he makes are correct, we should all take care to avoid using 144.100MHz and 144.200MHz, the cw random ms frequency and the ssb random ms frequency.

Two interesting proposals regarding ms contacts have been made by G3WSN and G3SEK. If generally adopted these suggestions would allow more operators to work dx via meteor scatter.

The first concerns unscheduled ms contacts around 144.100MHz. Many of these contacts could be completed more quickly by shortening the transmit/receive periods from the customary 5min. In order to be able to tell which tx/rx cycle is in use, G3WSN proposes the following frequency division: 144.100-144.105MHz, 5min tx/rx cycles; 144.105-144.110MHz, 2min tx/rx cycles; 144.110-144.115MHz, 1min tx/rx cycles. The same arrangements could apply to unscheduled ssb ms around 144.200MHz.

The second proposal, from G3SEK, concerns ordinary scheduled contacts, most of which are on a 5min cycle. He makes the point that as ms activity increases there will be more need to co-ordinate transmitting periods to avoid QRM. Stations in Sweden, Italy and Bulgaria already co-operate in this way. G3SEK suggests a preference for G stations to transmit in the first 5min. Obviously this will not always be possible but it would be preferable to no co-ordination at all. Comments on these suggestions would be welcome.

## Hot repeater news

GB3SN, the vhf repeater at Fourmarks in Hampshire, was deliberately damaged by fire in January. Volunteers from the group have rebuilt the building which housed the repeater. The equipment has been serviced and the repeater is now back in full operation.

\* PO Box 49, Aberdeen AB9 8JA.

The Central Scotland FM Group has now been re-organized under a new chairman, GM3KMG. One of the members of the new committee, GM3SNO, climbed 500ft up the mast at Black Hill to adjust the temporary antenna to enable tests to commence. GB3CS is now in operation on an output frequency of 145.750MHz.

GB3BR, the uhf repeater at Race Hill near Brighton, is nearing completion, further details next month.

## Beacons

The RSGB has decided to use two-letter calls to identify repeaters and three letter calls to identify beacons. The changeover will take place gradually as the equipment is serviced. The Sutton Coldfield beacon on 432.890MHz will soon change callsign to GB3SUT.

The Durham beacon, GB3NEE, came back into service on 27 January on a frequency of 144.127MHz. The power output is still 3W but this will soon be increased to 30W.

EI4CB confirms that EI4RF, the IARU-listed 70MHz beacon, is no longer in service.

## RTTY

RTTY enthusiasts who would like a QSO with the Nottingham area can contact G8CXV, G8DBY, G8DVN or G4EGY on 144.590MHz. The four stations participate in a long-established a.m. net on this frequency and are able to QSY for an rtty contact. GM4AXB, Aberdeen, and GM4DTH in Edinburgh are working hard on their teleprinters investigating the possibility of using them from a high portable location.

## Alexandra Palace event

As Brunel University is not available for a vhf convention this year, the up-coming event at Alexandra Palace, the RSGB International Radio Communication Exhibition and Convention, will be a combined exhibition and convention. Lectures on vhf will be taking place on each day, and details of these will be notified in the general advertising of the event elsewhere in *Radio Communication*. Several well-known Continental vhf operators have already booked their travel arrangements to London for the exhibition.

## The grape vine

G4DGU runs a water-cooled linear but says it is not as big as you would think... Dumfries is another centre with a large amount of a.m. around 145.800MHz... G5UM had 816 contacts on 70MHz last year, almost twice the 1975 figure... The chairman of a south of England club reports himself as disenchanted with S-numbered simplex channels—there is too much "cb-type" QRM... G8GMB suggests a 100kHz slot in the 144MHz band for QRP stations running less than 5W dc input... G8HAL is full of praise for the officers and operators at Cullercoats Radio who enabled him to become G4FRX; he is now searching on cw for northern counties and the next aurora... A German amateur recently ordered a 70MHz Microwave Modules converter so he will be able to work 70MHz crossband from DL... G8HUY needs further reports on the 144MHz interference reported in last month's 4-2-70... GM3KJF is almost ready with his 144MHz slow-to-fast scan converter... 144.750MHz is now well established as the video

## REAL DX 1977

70MHz	G3TSA-GM3ZBE	380km
144MHz	G3SEK-UR2RX	1,758km
432MHz	G4DGK-GM8FFX	600km

natter frequency... GM4CXP had the unfortunate experience of an incomplete QSO by meteor scatter with an HB9; the contact, which was on ssb, was complete apart from the last letter of the HB9's call... Three crossband repeaters are among the latest being considered by the Repeater Working Group and the VHF Committee... Repeater proposals awaiting decisions include an rtty and a tv repeater.

## Aurora

Several stations made contacts via the aurora on Sunday 31 January. The event started at 2030gmt and continued until 0052gmt. SK4MPI, the Swedish beacon on 144.960MHz, was heard at a steady S5 throughout this period.

Scottish stations GM3UU, GM3ZBE and GM8LHE were among those who were working LA, SM, DL and OZ on both cw and ssb. The RSGB auroral warning net soon had G3BW at Whitehaven, G3VSA at Manchester and G3POI beaming north-east and working dx. Operators in the south generally found signals weaker but peaking around 2330gmt. SK6AB worked several G stations and UR2RDR in Estonia. The band was monitored until 0330 but no further auroral signals were heard.

The aurora could be seen clearly from Aberdeen fully two hours before any radio signals could be heard. The arcs were mainly blue and green in colour and covered a large portion of the sky. These bands of light moved like a blanket being folded, and spectacular colours could be observed looking at the aurora through an ordinary telescope.

## Contests

The recent 70MHz contest took place at a time when conditions were at a low ebb. GM4CXP reports only 18 stations heard during the entire contest. G3WRA, G4CMT, G4BBA and G3OHH were among the more distant stations he heard. Several correspondents report hearing nothing at all during the event.

FM operators will be interested in a German fm-only contest which takes place between 1400 and 2400gmt on Saturday 16 April.

## Late news

GB3URS is the callsign to be used by a 432MHz beacon planned for operation from Northern Ireland. The frequency will be 432.930MHz. GB3SX on 70.685MHz has developed a fault and will be off the air for a short time. GB3NS, the vhf repeater in north Surrey, became operational on 21 February using circular polarization. Thirty-one uhf repeater proposals have been passed to the Home Office under Phase 2.

Finally, special thanks to this month's 58 correspondents. The large amount of letters received from all over Britain is greatly appreciated. Please send your news and views as soon as possible for inclusion in next month's 4-2-70. □

## Historic setting for 1977 Presidential Installation

Lord Wallace of Coslany was installed as 43rd President of the RSGB on 22 January 1977 in the historic setting of the Palace of Westminster, where much of his political life has been spent. Until he received his life peerage, Lord Wallace was a well-known and respected Member of the House of Commons, and it was particularly appropriate that his installation took place in the Members' Dining Room of that House. The RSGB is indeed grateful to the President for arranging for the reception which accompanied the installation to be held in such a privileged meeting place; one to which members of the public are not normally admitted.

Some 250 members of the Society, wives and guests were present in that great room where portraits of former distinguished Members of Parliament looked down from the carved panelling of its walls; and where, seen through the tall windows, the lights of London on and across the Thames complemented the sparkling lights and glittering blue and gold ceiling over their heads. After a period to allow those present to enjoy the refreshments and greet old friends and acquaintances, the formal part of the evening took place.

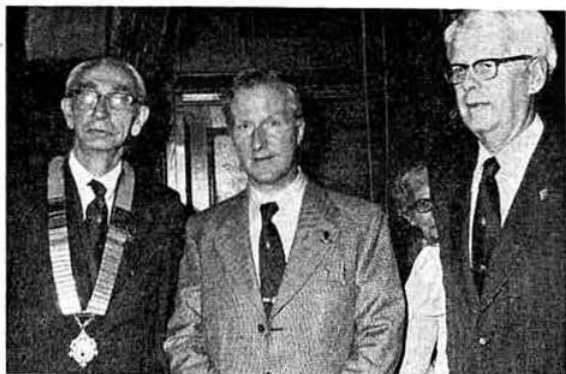
Lord Wallace was introduced by the retiring President, John Allaway, G3FKM, who spoke of the great interest the new President had in amateur affairs and how he had been active in promoting these within the confines of that great building, the Houses of Parliament. John Allaway then invested Lord Wallace with the Presidential collar to the warm applause of those present.

In reply, Lord Wallace said: "I greatly appreciate the honour of acting as President of the RSGB during the Jubilee Year of Her Majesty The Queen and in so doing to serve my fellow members of the Society."

"The Radio Society of Great Britain as a corporate body, and through its individual members, has rendered and is still rendering valuable service nationally and internationally in the field of radio communication."

"I am convinced that the time has come for its achievements to be given greater recognition, especially by the media which has come into being, at least to some extent, as a result of the research and expertise of some of the Society's members—particularly the early pioneers in radio and television."

"Employers in the communications industry themselves



Among the distinguished guests at the installation was Mr Noel Eaton, VE3CJ, (right) President of the IARU, seen here with Lord Wallace and Dr E. J. Allaway

have reason to be grateful to the Society for the enthusiasm and expertise implanted in many of their young apprentices through membership of local radio clubs and the Society itself. I hope more firms will take a closer and more practical interest in the RSGB in the future.

"Tonight it is my privilege to welcome guests from overseas radio societies and to bid them a warm welcome. In a world torn by political differences it is inspiring to find in the world-wide brotherhood of amateur radio a spirit of friendship overcoming political barriers and those of race, colour and creed."

"Tonight we meet in an historic spot, the Palace of Westminster, the home of the Mother of Parliaments which has given so much inspiration and encouragement to democratic institutions. I hope that full recognition will be given to the work of the Society as valuable in the life of the nation and as an organization which accepts and carries out its responsibilities to its fellow citizens."

"In conclusion may I, on your behalf, thank John Allaway for his work as President during the past year, coupled with our sincere thanks for the great service he has rendered and continues to render to the Society and amateur radio generally. A different 'Radio Doctor', may I add, whose



Lord Wallace presents badges of office to three newly elected Council members. Left to right: Mr J. Bazley, G3HCT; Mr B. O'Brien, G2AMV; Mr J. Anthony, G3KQF



Lord and Lady Wallace (centre) with Council member and Mrs W. F. McGonigle after receiving from G13GXP a piece of Waterford glass presented by GI amateurs

## council proceedings

A brief report of the Council meeting held on  
22 January 1977

**Present:** Lord Wallace (*President, in the Chair*), Dr E. J. Allaway, Messrs A. M. Allan, D. J. Andrews, J. Anthony, P. Balestrini, J. Bazley, J. O. Brown, Dr D. S. Evans, Messrs W. F. McGonigle, B. O'Brien, D. M. Pratt, W. A. Scarr, R. F. Stevens, G. M. C. Stone, C. J. Thomas, D. M. Thomas (*members of Council*), G. R. Jessop (*general manager/secretary*), A. W. Hutchinson (*editor*), Mrs H. M. Allin (*minutes secretary*).

An apology for absence was received from Mr C. H. Parsons who was unable to attend due to ill health. Council expressed their best wishes to him for a speedy recovery.

Lord Wallace welcomed the new members of Council: Messrs A. M. Allan, J. Anthony, J. Bazley and B. O'Brien.

### Executive vice-president

The President called for nominations to fill this post and Dr Evans and Mr Balestrini were proposed. A ballot was held and Lord Wallace declared Dr Evans elected and welcomed him as executive vice-president.

### Financial report for the half year

Mr Brown reported that the figures up to 31 December 1976 appeared to be very satisfactory, showing a surplus of £9,500 against a budgeted deficiency of £4,500. Subscriptions, and revenue from advertising and book sales had risen considerably, and the sales of the *VHF/UHF Manual* and the *Radio Communication Handbook* accounted for a considerable amount of the increase.

Mr D. M. Thomas queried the deficiency of £13,000 last year. Mr Brown explained that last year's accounts had included sums written off for the data processor, and bad debts which had been taken into consideration last year had now mainly been recovered and would appear in the next figures.

Mr D. M. Thomas enquired the cost of the IBM32 software. Mr Jessop could not quote the actual figure but confirmed that a considerable amount of stationery, including membership cards and envelopes, had been purchased for future use.

### Data processor

Mr Jessop reported that the larger memory for the IBM32 had now been delivered.

undoubted charm and bedside manner somewhat conceals determination, drive and enthusiasm.

"Thank you, John."

Several messages of congratulation which had been received from home and overseas, including one from HM King Hussein of Jordan, were then read out. A more tangible expression of congratulation was conveyed in the presentation to Lord Wallace of a piece of Waterford crystal by Mr W. F. McGonigle, G13GXP, on behalf of Northern Ireland amateurs.

Lord Wallace then had the pleasant duty of presenting a past-President's badge to John Allaway, and Council member badges to three newly-elected Council members who earlier in the day had attended their first Council meeting of the year.

Among several overseas visitors attending the installation were Noel Eaton, VE3CJ, President of IARU; Bruce Johnson, WA6IDN, assistant secretary of ARRL; Louis van der Nadort, PA0LOU, chairman of IARU Region 1; Mr M. Browne, VK2OR; and Mr D. Wallace, ZL2TLL.

The feedback from members having received their membership cards had been excellent. Many amendments had now been notified by members, resulting in a much more accurate membership record.

### Appointments

Council approved the appointment of the following:

- Mr R. L. Senter, G4BFY, as assistant general manager;
- Mr A. L. Mynett, G3HBW, as technical secretary.

### Structure of committees

It was agreed that the working party to be set up would comprise the President, immediate past-president, executive vice-president and the general manager. It was agreed that the report of the 1973 President's Committee, if still relevant, would be considered by the working party.

### Membership and representation

It was resolved:

- (i) to waive the subscriptions of five members;
- (ii) to accept reduced subscriptions from 12 members;
- (iii) to grant affiliation to: Decca Survey Amateur Radio Club; Dumfries and Galloway Radio and Electronics Club; East Midland Repeater Group; First Contest Group; G-QRP Club; Institute of Post Office and Electrical Engineers; Inverness Technical College Amateur Radio Club; ITT (Hastings) Social and Athletic Club; Hastings Electronics and Radio Club 1976; Minto House Radio Society; North Lindsey College of Technology Radio Club; Plymouth Polytechnic Amateur Radio Club; Yate and District Amateur Radio Club.

Following Mr B. O'Brien's election to Council, a vacancy had arisen for a Region 1 Representative. So far only one nomination, that of Mr W. Furness, G3SMM, had been received.

The representative for Region 13, the Rev. S. Smith, GM4DNM, had resigned for health reasons and nominations would be called for to elect a successor.

The appointments of the following area representatives were approved:

- T. M. Allen, G4ETU, West Sussex, south of the Downs;
- D. Bland, G8KIK, Teesside area;
- P. G. Brooker, G3WXC, Isle of Wight;
- G. D. Cole, G4EMN, Bournemouth;
- S. Powell, G3WRA, Herefordshire;
- S. Purser, G8GHZ, Northamptonshire;
- C. J. Railton, G3YQV, Harrow and District;
- L. J. Smith, G3HJF, Bedfordshire.

### Proposed mobile rally at Woburn 1977

Following Council's decision at its last meeting not to proceed with a rally this year, a letter had been received from the chairman of the Mobile and Exhibition Committee, in which he said the committee was dismayed at the Council's views. Various reasons were given why this event should take place and the committee had understood that the Alexandra Palace exhibition was a replacement for Woburn only in 1976.

After further discussion it was agreed that this event could continue subject to the preparation of a satisfactory budget.

#### **GB2RS mode(s) of transmission**

Mr Brown reported that he had recently made an observation on the occupation of the 2m band, the conclusion of which was as follows: fm, 60%; ssb, 28%; a.m., 8%; cw, 4%. He said that as half of the fm users and half of the ssb users could not receive on 144.5MHz this meant that approximately 50% could not receive the RSGB news bulletin, and he suggested that the modes used should therefore be fm and ssb.

Certain members felt it was also important to transmit the bulletins on a.m. as this would benefit the short-wave listener.

Mr Stevens said that the Telecommunications Liaison Committee had been asked to consider these changes and a form of ballot had taken place through a notice in *Radio Communication*, the result of which was that out of 80 replies, two to one were against a change of mode.

Dr Allaway reported that he had been given a petition containing 37 signatures requesting all modes, rtty, a.m., cw, fm and ssb to be used.

Mr Stone said that when he was a standby newsreader, his use of fm had been welcomed by many listeners. He pointed out that fm could be received on an a.m. receiver but not vice versa. He thought all modes should be used to allow operators to adapt.

Mr Allan said there would be a fair distribution of modes if individual newsreaders were allowed to choose.

Mr Jessop said that there were no problems of interference on 2m but these would occur on a channelized system.

It was decided that this subject be discussed by the VHF Committee and Council would await the committee's recommendations.

#### **Honorary managers, representatives on outside bodies, committees**

The honorary managers who had held office in 1976 were re-appointed, with the exception of the vhf manager, Mr G. M. C. Stone. After some discussion Mr Stone offered his resignation as vhf manager and it was decided to declare this position vacant.

Dr Allaway then read a letter received from Mr A. O. Milne, G2MI, who had been QSL Bureau manager for 37 years. Mr Milne stated that he wished to relinquish this job within the next two years. He asked whether Council wished to advertise the vacancy or if the matter of a successor would be left to him.

Council agreed that Mr Milne and his wife had given exceptional service to the Society in the complete running of the QSL Bureau. A letter of appreciation would be sent on behalf of Council. It was also agreed that any recommendations from Mr Milne regarding his successor would be investigated by the Finance and Staff Committee and Council.

Mr Balestrini raised the question of creating the appointment of a Raynet emergency communications officer. It was agreed that Mr Balestrini would set out the required terms of reference for Council's consideration.

Dr Evans reported that at the IARU Conference it had been decided that national societies should each appoint a microwaves manager. Finland, Holland, Italy and Germany had now made their appointments and the VHF Committee recommended that this action be taken and terms of reference be considered.

Mr Stone reminded Council that the terms of reference for the vhf manager should also be revised.

It was agreed to put Mr Pratt's name forward as a member of the RAE Advisory Committee, and that although Mr I. Jackson, G3OHX, had resigned from the Interference Committee during the year, he would remain as a representative on the BREMA Interference Sub-Committee at present.

Council considered the composition of its committees and made certain amendments to and recommendations about them.

#### **Committee minutes and matters arising**

Council accepted the minutes of the following committee meetings: Interference (10.9.76), IARU Working Group (3.10.76, 18.11.76), HF Contests (14.10.76), Education (16.10.76, 20.11.76, 4.12.76), VHF Contests (21.10.76), Membership and Representation (9.11.76), Finance and Staff (9.11.76), Propagation Studies (11.11.76), Repeater Working Group (13.11.76), Technical and Publications (15.11.76), VHF (22.11.76), Telecommunications Liaison (25.11.76), Mobile and Exhibition (30.11.76).

It was agreed to write a letter of thanks to Mr G. T. Peck, who had resigned from the HF Contests Committee after many years of organising df events.

Mr Pratt reported that the RAE questions and answers booklet was in preparation and that a revised tape lecture was available.

Five hundred people had attended the Science Museum lectures this year.

Mr Andrews reported complaints regarding lack of liaison between the Society and amateurs affected by transmissions of the Oscar 6 command station at Guildford. Mr Stevens did not accept this and stated that Home Office officials were satisfied with the conduct of the station and that the chairman of the Guildford Club had attended a meeting with AMSAT UK to discuss the matter. Letters had been sent to clubs in the Home Counties area.

#### **Dates of Council meetings and AGM**

It was agreed to hold Council meetings on the following dates in 1977:

Saturday 26 February at 12 noon;

Thursday 14 April at 2pm;

Saturday 18 June at 12 noon;

Thursday 29 September at 2pm;

Saturday 19 November at 12 noon.

Mr Jessop reported that the IEE had been booked for the Society's Annual General Meeting on Friday 2 December 1977.

*The meeting closed at 5.20pm, after which members saw a film about amateur radio. This had been made by BBC Wales and had since been purchased by the BBC for network use.*

## obituaries

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

#### **Mr L. G. Blundell, G5LB**

Len Blundell died on 10 January. He was a keen experimenter active on 5m during the early 'thirties, and devoted much effort to the development of crystal control on these frequencies and later to stable vfos on 10m. In recent years his main interest was 40m cw.

#### **Mr T. Butterfield, G3XSY**

Trevor Butterfield died recently aged 24, following a motorcycle accident. A keen constructor, he was active on 160m cw and 2m fm, and was a founder committee member of Denby Dale RC.

#### **Mr H. J. Clements, G2QL**

H. J. Clements, who died in June 1976, gained his licence in the 'thirties and remained active until his death.

#### **Mr A. J. E. Forsyth, OBE, G6FO**

Austin Forsyth died on 15 January aged 69. He was well known as proprietor and managing editor of *Short Wave Magazine*, which he took over in March 1938.

He was first licensed in 1926 and remained active on the air until the last years of his life. In 1932 he became the first amateur to transmit across the Atlantic on 1.8MHz. During the second world war he was awarded the OBE for work on radio counter measures while serving in the RAF.

#### **Mr J. Keller, G4BYX**

Joe Keller, who died on 15 January, was an ardent and accomplished mobile operator and recently gained a DXCC mobile award.

#### **Mr D. W. Lilley, G3FDF**

Doug Lilley died on 19 January aged 53. A keen constructor, he operated on all bands and modes and was always ready to help fellow amateurs.

#### **Mr C. W. Packe, G3OJ**

Charles Packe died on 15 January aged 73. His interest in amateur radio dated from pre-war days and as a RAOTA member he was well-known on all bands. He did much to encourage younger radio enthusiasts.

#### **Mr J. J. Thomson, GM2DRD**

James Thomson, who died on 19 January, was well-known as a cw operator on 2m. He was an early user of nbfm and was known on the Continent for his work during periods of auroral activity.

#### **Mr H. Woodhead, G2NX**

Harold Woodhead died recently aged 73. He is believed to have been the first amateur to transmit ssb in the UK.

The Society has also been notified of the deaths of:

#### **Mr F. C. Elliott, BR531239,**

#### **Mr F. J. Finn, G6UF, and**

#### **Mr J. Plant, G8DU.**

# contest news

## NFD 1977 rules—Note

With reference to Rule 2 (p142, February issue), groups should note that application forms (HFC10/77) must be submitted to Mr D. S. Booty not later than 30 April 1977.

## General rules for vhf/uhf/shf contests 1977

Please note the following amendments to Rule 15 published on page 53 of the January issue: cw sub-band 70-05-70-15MHz should read 70-025-70-15MHz.

## /A stations in vhf/uhf contests

The status of /A stations in vhf/uhf contests has long been a problem for the VHF Contests Committee. Within the limitations of column space and the need to keep the rules simple, we try to protect home stations from having to compete with stations set up to gain a temporary advantage. Many events are divided into two sections (1977 general rule 4a) and /A stations are listed with portables; in fixed-station contests /A stations are now excluded (1977 rule 4c). However, it also seems wrong to accept entries from /A stations in portable contests (4d) since they have fewer problems with weather and power supplies.

The 1976 general rules were not clear about the status of /A entries in fixed-station contests, so such entries have been accepted for the 144MHz event and are reinstated in the results of the 70MHz event (January, p57).

## 432MHz Open Contest rules

0900-1700gmt 20 March

All entries and checklogs to: VHF Contests Committee, c/o Mr L. Hawkyard, G5HD, 100 Shirley High St, Southampton, Hants.

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

## 70MHz Open Contest rules

0900-1700gmt 3 April

All entries and checklogs to: VHF Contests Committee, c/o Mr L. Turner, G4CUT, 59 Harewood Road, Chelmsford, Essex CM1 3DH.

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

## 2nd 1-8MHz Contest 1976 results

Good conditions and higher than normal activity in Europe made the contest a busy one and many entrants expressed their appreciation of the number of Continentals heard/worked. Altogether 278 different call signs appeared in the logs, including 38 OKs who were also taking part in the OK WW DX contest, and 51 UK counties were represented. Alas some of the latter disappeared after one or two QSOs, leaving only 38 precious bonuses to be fought over.

The winner is once again Stephen Wilson, G3VMW, who operated /A from the city of York, using an FT101E and an inverted V dipole. Runner-up was Christopher Page, G4BUE, with an FL101/FR101 combination to a dipole at 40ft, and in third place Christopher Burbanks, G3SJJ, using a KW204 tx, SB301 rx and a half-wave antenna at 60ft. Kevin Smith, G4EHF, was the highest placed entrant in the under-18 section coming 12th overall with a KW2000A and dipole at 40ft.

In the overseas section, DK5PD took first place with 371 points from 72 QSOs with 10W to a dipole, while DJ8WL scored 340 points from 67 QSOs. EI3CP at his first attempt in the contest operated EI9ONE for third place, and last but not least was HB9ANW/P who used a KW2000A at 10W and a 4m whip on the car roof.

Entrants are thanked for the high standard of logs submitted and for the many comments accompanying the logs—too numerous to reply to individually, but they will be considered in detail when the rules for the next contest are being formulated.

The Victor Desmond Trophy will be awarded to the winner, and certificates of merit to the runners-up and to the leaders in the overseas section, and to the under-18 winner. G3KKQ

## UK SECTION

Posn	Call sign	Bonus QSOs	Points	Posn	Call sign	Bonus QSOs	Points
1	G3VMW/A	47	689	22	G3OVL	36	443
2	G4BUE	41	625	23	G3SYM	38	431
3	G3SJJ	46	619	24	GM3YOR	36	422
4	G3MXJ	43	605	25	G4BYG	32	403
5	G3ORH	39	546	26	G4CWH*	32	402
6	GM3ZSP	44	537	27	G3XTT	38	401
7	G3IGW	39	536	28	G2MJ	35	395
8	G3SVW/A	38	527	29	G4AAL	36	371
9	G3NYY	37	525	30	G4ALG	32	363
10	G4EOK	37	522	31	GM4DGT	28	329
		(G3HZL)		31	G4ERW*	30	329
11	G1JEX	39	509	33	G3WQK/A	26	311
12	G4EHF*	40	494	34	G3HTI	30	309
12	G3TIR	39	494	35	G2BTO	29	300
14	G3XSC	37	491	36	G4CEN	29	299
15	G3YMC	37	488	37	G3UFP	26	284
16	G4BXT	34	473	38	G4BWP	26	280
17	G3IGZ	36	469	39	G3ILO	25	250
18	G3SJE	37	451	40	G3RSD	24	248
19	{ GM3CFS	37	447	41	G4CCQ	18	219
19	{ G4CNY	37	447	42	G4EBK	22	200
21	G3OUR/A	33	446				
		(G4BUO)					

\* Under 18

## OVERSEAS SECTION

Posn	Call sign	Bonus QSOs	Points	Posn	Call sign	Bonus QSOs	Points
1	DK5PD†	32	371	8	OK2PGU	21	213
2	DJ8WL†	28	340	9	OK1AXD	21	202
3	EI9ONE†	29	321	10	OK2BTW	18	180
		(EI3CP)		11	OL5ATZ	15	143
4	EI2BB	28	311	12	PA0TA†	16	141
5	OK1DKW†	27	287	13	OL4ATY	14	140
6	DK8HA	26	253	14	OK2PAW	14	127
7	DF2KC	23	240	15	HB9ANW/P†	5	35

† Certificate winners

Check logs received with thanks from G2FNK and A8312

## 1976 432MHz Winter Cumulatives results

Thirty-five entries; over 200 G stations on the band; the winner a member of the VHF Contests Committee; many requests for a repeat; GD2HDZ sending an entry again. All very satisfactory after the 1975 Cumulative flop.

A glance through old copies of the *RSGB Bulletin* provided the sobering information that a 432MHz Contest held more than a decade ago attracted 55 entries.

Congratulations and certificates to G3VPK and G3KMS. G5HD

Posn	Call sign	Score	QSOs	QRA	Best dx (kms)	Power	Antenna
1	G3VPK	953	125	AL14	532	200	68-el Mb
2	G3KMS	739	109	YN38	423	100	2 x 14-el Yagi
3	G8LOW/A	635	118	ZN73	450	180	88-el Mb
4	GD2HDZ	590	60	XO68	440	100	18-el Pb
5	G3DY	565	113	ZM40	410	100	—
6	GW3UCB/p	535	86	YN51	1,099	10 & 400	2 x 46-el Mb
7	G3WCS	509	102	YN47	347	10	48-el Mb
8	G3UBX	430	98	—	340	45	88-el Mb
9	G3VZV	415	104	ZL18	1,020	150	18-el Pb
10	G4ERP/p	405	109	ZL01	1,100	6	46-el Mb
11	G8GP	403	105	ZL50	465	25	18-el Yagi
12	G8HQJ	388	80	ZL79	555	300	88-el Mb
13	G5UM	305	73	ZM35	328	10	14-el Yagi
14	G3OHM	274	60	ZM41	325	10	68-el Mb
15	G8LZU	264	63	ZL23	210	10	48-el Mb
16	G8EOP	240	64	ZN22	450	100	46-el Mb
17	G3TQF	238	80	ZM24	385	100	18-el Pb
18	G3LRP	217	47	ZN33	450	5 & 35	8-el Yagi
19	G3OHC	207	53	ZM31	355	10	18-el Pb
20	G4DKK	204	50	YM10	277	30	48-el Mb
21	G8CTT	197	57	AL41	440	6	46-el Mb
22	G6XM	183	37	ZL22	318	10*	19-el LY
23	G8DLX	174	42	ZM54	285	14	18-el
24	GW4DRR	156	26	XN58	315	10	68-el Mb
25	G2AXI	145	41	ZL55	260	10	46-el Mb
26	G8CTP	144	50	YN39	287	10	18-el Pb
	G4FMD	98	31	ZL22	215	12	18-el Pb
	G3ZOD	98	20	YN50	261	10	15-el Yagi
27	G4ASR	76	19	AL22	205	80	88-el Mb
28	G8LXZ	72	38	ZL50	285	10	8/8 slot
29	G8FUO	49	19	ZL47	270	10	12 x Yagi
30	G4EZX	46	30	ZN22	160	8	46-el Mb
31	G8BXJ	39	15	YL38	286	6*	46-el Mb
32	G8ABJ/A	19	17	ZL39	52	6*	46-el Mb
33	G4CTZ	19	17	ZM03	97	6*	46-el Mb

Stations not using ssb indicated by the asterisks.

## December 144MHz Fixed Contest results

Poor conditions and low Continental activity helped to make this a contest which will be quickly forgotten by most entrants. Awards go to the winner, GW8JHL/A, and to the runner-up, G8HCL.

G3VPK

Posn	Call sign	Op	Score	QSOs	QRA	DX	Km
1	GW8JHL/A	S	1,625	245	YN75	PA0VHA	558
2	G8HCL	M	1,146	230	ZL58	GM4DSZ/A	642
3	G6YB/A	M	1,107	187	YL49	GM4DSZ/A	612
4	GD3FLH/A	M	1,041	115	XO67	GC3HFN	525
5	G8GMF	S	770	178	ZL76	PA0EUS	465
6	G3UKC	M	628	116	AL56	GD3FLH/A	490
7	G8KUN	S	622	152	ZL08	GD3FLH/A	402
8	G8LED/A	S	599	133	ZM66	GM8DOX	470
9	G4EUR	S	578	122	YL50	PA0VHA	449
10	G8EYC	M	571	178	ZL50	GD3FLH/A	422
11	G8LHW	M	569	159	AL34	GC3HFN	340
12	G3SWB	M	544	160	ZL46	G3BW	376
13	G8IQO	M	540	86	AK12	F6ACU	520
14	G3XFW	S	535	113	YK07	F6DTE/P	272
15	G8AZA	M	507	81	ZO69	G4CUS	372
16	G3UGF	M	505	133	ZN11	G8LHW	300
17	G3SDC/A	M	504	122	ZM35	GM3PXX	410
18	G4CQR	S	501	146	ZL49	GD3FLH/A	440
19	G8IWA	M	463	83	ZN18	F6CKZ	455
20	GW3ITZ	M	453	91	YN66	G3POI	310
21	G6UW	M	442	100	AM61	PA0DUO	375
22	G4EYV	S	405	151	ZL40	PA0DUO	400
23	G3BPM	S	393	140	ZL48	F6CKZ	290
24	GW8ERP	M	391	72	XN70	GM4DSZ/A	450
25	G8CSA	M	386	150	AL31	PA0DUO	412
26	G8HHO	S	383	100	ZM79	GD3FLH/A	365
27	G3ERN	M	374	120	AL11	GD3FLH/A	413
28	G4CTF	M	373	111	ZM41	GD3FLH/A	270
29	G8KHN	M	364	84	ZK21	G4AEQ	321
30	G3FJE/A	M	363	103	ZM79	GD3FLH/A	360
31	G4BWH	S	348	122	AL62	GW3JHL/A	295
32	G4ASR	S	342	100	AL22	GD2HDZ	410
33	G8JUR	S	338	92	ZN45	GM8BDX	278
34	G8ETB	M	337	119	ZL37	F6GER	340
35	G3USF	S	336	81	YN79	G3UKC	275
36	G8HAF	S	335	91	ZN44	G3FPK	260
37	G4ECQ	M	324	78	ZM41	GD3FLH/A	265
38	G8KTB	M	319	119	ZL68	G3CHN	263
39	GC3HFN	M	311	39	YJ48	GD3FLH/A	525
40	G3LCH	M	309	115	ZL50	GD2HDZ	470
41	G4BZD	S	300	82	ZN34	EI9Q	464
42	GD2HDZ	S	289	21	XO68	G3UKC	480
43	G4ETP/A	M	283	47	XK56	G8BQX	383
44	G8HVF	S	280	102	ZL28	PA0VHA	325
45	G8AHK	M	271	107	ZL68	GW8JHL/A	267
46	G8LVM	M	264	80	ZM14	GM3PXX	374
47	G8LVD	M	240	116	AL51	GW3ITZ	267
48	G4EFV	S	235	67	ZN37	GD3FLH/A	270
49	G8KPA	S	230	48	ZM41	G3UKC	240
50	G8GRB	S	228	108	ZL49	GD2HDZ	420
51	GW4EA1	M	219	50	YL25	EI9Q	253
52	G3UER	M	215	75	ZN34	G8GMF	265
53	G4DLB	S	208	58	ZM74	G3BHW	203
54	G8KKX	S	207	54	ZM58	GW8JHL/A	185
55	G8MFJ	M	206	54	ZL42	GD3FLH/A	360
56	G8KAX	S	198	92	AL32	GW8JHL/A	288
57	G8IMV	S	196	98	ZL37	G4DKX	143
58	GM3PXX	M	195	37	YP11	G3POI	555
59	G8KHI	S	192	80	ZL09	G8IWA	207
60	G8DAY	M	188	102	ZL38	G3XFW	170
61	G3FPK	S	170	52	ZL60	GW8JHL/A	281
62	G8AWA	S	165	44	ZL34	GD2HDZ	350
63	G8ITS	S	164	110	ZL40	G6YB/A	160
64	G8LDY	S	152	78	ZL30	G3XFW	195
65	G8JEG	S	121	64	AL31	G3ION	125
66	G8FLH	S	112	32	ZM16	GD3FLH/A	290
67	G8FFI	S	89	33	ZK15	G4ETP/A	262
68	G3SZS	S	80	21	YL10	G4DKG	224
69	G5KV	S	79	34	ZL46	G8GTZ	167
70	G8ILO	S	42	8	YL29	GM4CXP	420
71	GM3IBU	S	1	1	YS06	GM8LMA	0, 4
71	GM8LMA	S	1	1	YS06	GM3IBU	0, 4

Check logs received from G2BLA, G3DNQ, G8KYU/P, G8LJA and BRS33915.

## Contests calendar

5-6 March	144MHz Open and SWL (Rules in January issue)
5-6 March	ARRL DX Phone
12-13 March	Commonwealth (Rules in December issue)
19-20 March	ARRL DX CW
20 March	432MHz Open (Rules in this issue)
26-27 March	CQ WW WPX SSB

3 April	70MHz Open (Rules in this issue)
16-17 April	Bermuda AR Contest (phone/cw)
17 April	Low Power (Rules in February issue)
24 April	144MHz CW
1 May	Queen's Jubilee CW
14 May	1-3GHz Open
15 May	432MHz Open (trophy) and SWL
22 May	Queen's Jubilee Phone
28-29 May	144MHz Portable
11-12 June	HF NFD (Rules in February issue)
18-19 June	Microwave (3-4-24GHz)
25-26 June	Summer 1-8MHz
2-3 July	VHF NFD and SWL
17 July	3-5MHz FD
31 July	144MHz QRP
13-14 August	70MHz Open (trophy) and SWL
3-4 September	SSB FD
3-4 September	144MHz Open (trophy) and SWL
1-2 October	UHF Contest (432MHz-2.3GHz)
8-9 October	21/28MHz
15-16 October	7MHz Phone
23 October	70MHz Fixed
October-November	432MHz Cumulative
5-6 November	7MHz CW
5-6 November	144MHz CW
12-13 November	2nd 1-8MHz
4 December	144MHz Fixed

## Mobile rallies calendar

3 April	White Rose Rally, Lawnswood School, north Leeds (junction of A660 and A6120). Open from 11am to 6pm. Free car parking, trade stands, grand raffle, talk-in stations G8LVQ (2m fm) on S22, G3XEP (80m ssb) on 3-7MHz.
17 April	North Midlands Mobile Rally, Drayton Manor Park, nr Tamworth, Staffs. Trade stands, competitions, talk-in stations on 2m, 70cm and 160m. Details from G8DEM, G3ZKQ or G8BHE.
1 May	Spalding Tulip-Time Rally, Glead Boys School, Halmer Gardens, Spalding.
22 May	Welsh Mobile Rally, Barry Rugby Football Ground, Merthyr Dyfan Road, Barry, South Glamorgan. Trade stands, raffles, talk-in by GW3VKL on 2m, S20 and via GB3BC on R6. Details from GW2DPD.
22 May	Northern Mobile Rally, Victoria Park Hall, Keighley.
29 May	Hull & D ARS Rally. Details and venue later. Full details from G3LZQ, 73 West Hall Garth, South Cave, Brough, Humberside HU15 2HA.
29 May	Suffolk Wireless Revival, Ipswich. Details later.
29 May	Southend & D RS Mobile Rally, FitzWimarc School, Hockley Road, Rayleigh, Essex. Details from M. Daniels, 25 Swayne Avenue, Southend, Essex SS2 6JQ.
5 June	Maidstone Mobile Rally, "Y" Sportscentre. Details from G3WXL, QTHR, or Maidstone (0622) 890031.
12 June	Longleat Mobile Rally. Details nearer the date.
12 June	Elvaston Castle Rally, near Derby. Further details from P. Neal, G3WFL.
19 June	Royal Naval ARS Mobile Rally, HMS Mercury. Organizer: M. Puttick, G3LIK, 21 Sandyfield Crescent, Cowplain, Portsmouth, Hants PO8 8SQ.
10 July	Upton Radio Rally, Hill High School, Upton-on-Severn. Details from G8ASO.
17 July	Cornish RAC Mobile Rally, Truro Rugby Club Ground. Details from G3NKE, QTHR.
14 August	Derby Mobile Rally. Lower Bemrose School (Rykeld School). Details from G3FGY, QTHR.
14 August	Pembroke RSGBG Bucket and Spade Party, Regency Hall, Saundersfoot. Details from GW3XJQ.
25 September	Harlow & D ARS Rally, Netteswell Comprehensive School, Harlow. Details from G3WUX, G8FRG, G3YDI, QTHR.

# club news

RSGB affiliated societies and clubs, and RSGB groups, are invited to submit items for inclusion in "Club News" to their regional representatives (not direct to the editor).

Items of news and dates of forthcoming events should reach RRs by 26 March for the May issue.

## REGION 1—RR W. M. Furness, G3SMM, 16 Coniston Avenue, Sale, Cheshire M33 3GT.

**Ainsdale (AARC)**—10, 24 Mar, 7, 21 Apr, 5 May, 8.15pm. Ainsdale Scout Headquarters. Further details from G2CUZ.

**Blackburn (East Lancs ARC)**—First Thursday in each month, 7.30pm. YMCA, Blackburn. Sec E. A. Lomax, G4DGR, West End PO, Accrington, Lancs.

**Blackpool (B&DARS)**—Mondays, 8pm. Pontins Holiday Camp, Squires Gate, Morecambe. Sec 7.30pm.

**Bolton (B&DARS)**—First and third Wednesdays in each month, 8pm. Bolton Recreation Club, Kensington Place. Sec G8LXD.

**Bury (BRS)**—Main meeting on the second Tuesday in each month. RAE classes and Morse instruction every Tuesday as well as an informal meeting of club members. Mosses Community Centre, Cecil Street, Bury. Sec E. R. Thirkell, G4FQE, 59 Oulder Hill Drive, Bamford, Rochdale, tel Rochdale 46585.

**Carlisle (C&DARS)**—Mondays, 7.30pm. Currock House, Lediard Avenue, Currock, Carlisle. A very full programme of lectures and demonstrations had been arranged for the coming months. Full details from G8DVD.

**Chester (C&DARS)**—Tuesdays, 8pm, except for first Tuesday in the month. YMCA Chester. Further details from the ASR, G3PYU.

**Douglas IoM (IoM ARS)**—Mondays fortnightly, Highlander Inn, Crosby. Visitors welcome. Sec C. Matthewman, G8LFA, 20 Terence Avenue, Douglas, tel Douglas 22295.

**Eccles (E&DARS)**—Tuesdays, 8.30pm. White Swan, Worsley Road, Swinton. Sec G4AEQ.

**Lancaster University (UoLARS)**—Wednesdays, 8pm. Furness College. Visitors are welcome, as are skeds on hf and 2m—club callsigns are G8DOU and G3ZBY. There are RAE and Morse test classes. Enquiries to John Morris, G4ANB, Dept of Physics.

**Leyland (LHARG)**—Second Monday in each month, 7.30pm. "Rose & Crown", Ulnes Walton, Leyland. Details from G3XII.

**Liverpool (L&DARS)**—Tuesdays, 8pm. Conservative Association Rooms, Church Road, Wavertree. Sec G4EST.

**Liverpool (North Liverpool RC)**—Tuesdays, 8.30pm. Informal meetings. "Nags Head", Thornton, Crosby, Liverpool 23. Visitors welcome. Sec R. Porter, 11 Cranmore Avenue, Crosby, Liverpool L23 0QD.

**Liverpool University (UoLARS)**—Meeting at lunchtime and on Mondays, 5pm. Club shack, Reilly Building. The club is active on all

## REGION 1 LECTURE

8pm Friday 1 April 1977

### Antenna Systems from VLF to SHF

by Peter Jones, G2JT

at

The Grappenhall Community Centre,  
Bellhouse Lane,  
Grappenhall, Warrington

Admission to RSGB members by ticket obtainable free of charge (but with s.a.e. please) from G3MMD, 3 Willow Close, Lymm, Cheshire, or G3SMM, 16 Coniston Avenue, Sale, Cheshire M33 3GT.

The community centre is close to the M6/M56 intersection to the south-east of Warrington.

Ample car parking—licensed bar.

Talk-in on 2m. A listening watch will be kept on 'MP' and 'RF'.

Accommodation is limited to 200, so apply early.



Mrs Melanie Keegan, daughter of the late G3VVQ, presenting the G3VVQ Trophy to the 1976-7 winner, Mr J. Monohan, who was voted to have done most to help the Bury Radio Society in the preceding year. In the background is Mr M. Horrocks, G8GTP, the society's chairman

bands 80/2m—callsigns G3OUL/G8JUL. Details from hon sec, c/o Students' Union or c/o GW4FJK.

**Manchester (M&DARS)**—Wednesdays, 7.30pm. 203 Droylesden Road, Newton Heath, Manchester 10. Sec G8LYX.

**Manchester (South Manchester RC)**—4 Mar (Discussion on tv etc), 11 Mar ("Recent developments at vhf" by P. Torry, G3SMT—postponed from 7 Jan), 18 Mar ("Rx front ends using ics" by R. Myers, G8LUL), 25 Mar ("Preparation of pc boards" by D. C. Holland, G3WFT), 1 Apr (Club quiz), 8 Apr (Club closed), 15 Apr ("Micro-processors" by B. Morris, G3VBG), 22 Apr (Activity night and preparation for NRSA convention), 29 Apr (Homebrew contest). 8pm. Sale Moor Community Centre, Norris Road, Sale. Informal meetings Mondays at "Greeba", Shady Lane, Baguley, Manchester 23. Details from sec G3VIV.

**Manchester University (MUARS)—G3VUM.** Interested parties should contact G4AOS, QTHR.

**University of Manchester (UoM—IoS&TARS)—G3CXX** is active on all hf bands and G8FOT on 2m and perhaps 23cm. Items for club/magazine/newsletter, or letters from intending members gratefully received by sec, c/o UMIST.

**North Western Repeater Group**—Informal meetings on the third Thursday in each month, 8pm. "Globe Club", Willows Lane, Accrington, Lancs. Details from sec G8HCW.

**Preston (PARS)**—Thursdays fortnightly commencing 10 Mar. Morse practice 7.30pm. Meetings commence at 8pm. "Windors Castle" (private room), St Pauls Square, Preston. Sec G8KTM.

**Salford (Dial House RS)**—Wednesdays, 5.30-9.30pm. Dial House, W45, 55 Portland Street, Manchester M60 1BA. Net channel 145.25MHz a.m.—most members are now mobile on this channel, and the club station G3WDH now monitors this frequency every club night for calls from any other station. Sec G8JCN.

**Stockport (SRS)**—Second and fourth Wednesdays in each month, 8pm. Blossoms Hotel, Buxton Road, Stockport. Sec G3FYE.

**Thornton Cleveleys (TCARS)**—First and third Wednesdays in each month, 8pm, Morse practice from 7.30pm. St John Ambulance Hall, Fleetwood Road North (next to "Gardner's Arms"), Thornton. Details from sec A. Bullock, G8MKQ, 26 Lancaster Avenue, Thornton Cleveleys, Blackpool.

**UK FM Group (Western)**—All inquiries to G. Adams, G3LEQ.

**Warrington (W&DARS)**—Tuesdays, 7.45pm. Grappenhall Community Centre, Bellhouse Lane, Grappenhall, Warrington. Sec R. E. J. Staples, G3MMD, 3 Willow Close, Lymm, Cheshire, tel Lymm 3533.

**Wigan (W&DARS)**—First and third Wednesdays of each month. Poolstock Cricket Club, Keats Avenue, Poolstock. Sec A. Cunliffe, G4EII, 50 Langholm Road, Garswood, Wigan.

**Winsford (Mid-Cheshire ARC)**—Wednesdays. Technical Activities Centre, rear of Verdin Buildings, Verdin Comprehensive School, Grange Lane, Winsford. RAE class 7pm to 8pm. Morse class every third Wednesday. Net nights 160m Mondays, 8pm, 2m (fm) Tuesdays, 8pm. Sec G8HAV.

**Wirral (WARS)**—First and third Wednesdays in each month, 7.45pm. Sports and Recreation Centre, Grange Road West, Cloughton, Birkenhead. Sec G3DLF.

**Retiring Region 1 representative Basil O'Brien, G2AMV**, took the chair for his last annual meeting of the region's ARs and ASRs on 15 January. The meeting was honoured by the presence of the immediate past-president, John Allaway, G3FKM, who opened the proceedings and presented the regional trophies to winning members. This was followed by the usual lively discussion, covering all aspects of society affairs in the region, including members' problems, repeaters, a report on the HQ data processor, future events and contests. In the evening, Basil and Mrs O'Brien, G3WIO, gave a buffet supper in the Victoria Hotel, Heswall, during which John Allaway paid tribute to the dedicated service which Basil has given over his 25 years as Region 1 RR, and welcomed him to Council as member for Zone A; a sentiment echoed with acclaim by all present, on behalf of the whole region.

**Liverpool Luncheon Club**—members wishing to attend should contact G3VQT or G2AMV.

**The 1977 North West Amateur Radio Convention** will be held on 17-18 September 1977. Its format will be similar to that used with great success for the first two conventions. Further details will become available early this year. Enquiries to J. R. Morris, Dept of Physics, University of Lancaster.

**Belle Vue Convention, Manchester, 1977**—the date has been fixed for 24 April.

**REGION 2—RR R. C. Andreang, G4CMT, 6 Beech Avenue, Bilton, Hull, Humberside.**

**Barnsley (B&DARS)**—Fourth Friday in each month, 7.30pm. King George Hotel, Peel Street, Barnsley. Sec G3LRP.

**Denby Dale (DD&DARS)**—Wednesdays, 7.30pm. Pie Hall, Denby Dale. Visitors always welcome. For coming events contact Sec G3FQH.

**Goole (G&DARS)**—Fridays, 7.30pm (during school term only). Goole Grammar School, Full details from chairman G3VBI.

**Halifax (Northern Heights ARS)**—7.45pm. Peat Pitts Inn, Ogden, Halifax (four miles north of Halifax town hall). Sec G3MDW.

**Hornsea (HARS)**—Wednesdays, 8pm. Rear of Victoria Hotel, Hornsea (facing Hornsea Mere). Club callsign G4EKT. Visitors welcome. Sec G4CHH.

**Hull (H&DARS)**—Fridays, 7.30pm. Dorchester Hotel, Beverley Road, Hull. Sec G8IED.

**Leeds (White Rose RS)**—3 Apr (White Rose Rally, venue as usual). Wednesdays, 7.30pm (lectures start 8pm). 83 Town Street, Armley, Leeds. Sec G4DZI.

**Leeds (LUARS)**—Tuesdays, 8pm. Union Annexe (second floor), Woodhouse Lane. All new students welcome. Sec G4CNG, QTHR or at "E" block, Lupton Flats, Alma Road, Leeds 6, during term.

**Otley (OR & ES)**—Tuesdays, 8pm. 14 Back of Court House Street, Otley. Sec J. H. Marchbank, 116 Brooklands Lane, Menston, Ilkley, W Yorks LS29 6PJ.

**Scarborough (SARS)**—Fridays, 7.30pm. Scarborough Technical College, Corby Road, Scarborough. Visitors always welcome. Hon sec G3RTN, PRO Charles Whitaker, 1 Ryefield Close, Eastfield, Scarborough YO11 3DN.

**Sheffield (SU&PRS)**—Thursdays during term, 5.30pm. "The Phoenix", Charles Street. Details from A. Marvin, G8CZO, 74 Kirkstone Road, Sheffield S6 2PP.

**Sheffield (Association of Sheffield ARC)**—Chairman P. Bradbury, G4EXK; sec B. Flounders.

**Wakefield (W&DARS)**—15 Mar ("Constructional tips" by G3TDZ), 29 Mar (Junk sale), 12 Apr (Rag chew), 27 Apr (AGM). 7.30pm. Ings Road School. The club's constructional project for 1977 is a synthesizer 2m fm tx/rx under the guidance of G3WVI. Sec G3WWF.

**York (YARS)**—Fridays, 7.30pm (except for the third Friday in the month). United Services Clubroom, 61 Micklegate, York. The club co-operated with the local St John Ambulance Group in "Operation Ebor" on a very snowy Knivesmire in December. The police and fire brigade were also involved. Sec G3WVO.

**Any club wanting a talk or lecture** should contact G4CMT, tel 0482 223761 day, 0482 812115 night.

**REGION 3—RR H. S. Pinchin, G3VPE, 61 Cole Bank Road, Hall Green, Birmingham B28 8EZ.**

**Birmingham (Midland ARS)**—29 Mar, 3 May (Construction and

club station). 7pm. Brasshouse Centre, off Broad Street, Birmingham. 15 Mar ("70cm repeaters" by G8AMD and G8FTU), 19 Apr. 8pm. Room 110, University of Aston, Gosta Green, Birmingham. G3ZKQ.

**Birmingham (Slade RS)**—Alternate Fridays, commencing 18 Mar. 8pm. The Committee Room, Church House, Erdington, Birmingham. G4FGF.

**Birmingham (South Birmingham RS)**—Shack night Fridays, 7pm. 6 Apr, 4 May (lectures). 8pm. Hampstead House, Fairfax Road, West Heath, Birmingham B31 3QY. G8KPA.

**Birmingham (Birmingham University RS)**—Every Tuesday during term, 7pm. Students' Union. G3IUB. Sec G4CKK.

**Bromsgrove (B&DARC)**—11 Mar (AGM), 8 Apr ("70cm repeaters" by D. Fitch, G8IMN). 8pm. Avoncroft Art Centre, Bromsgrove. G8JTK.

**Cannock Chase (CCARS)**—First Thursday in each month (Business meeting), other Thursdays (HF and vhf club stations, natter-nites, morse classes, talks etc). Visitors welcome. 9pm. Bridgton Social Club, Walsall Road, Cannock. G4CHI.

**Coventry (CARS)**—Fridays, 8pm. Baden Powell House, 121 St Nicholas Street, Radford, Coventry. G8DMI.

**Coventry Technical College (CTCARS)**—Mondays and Thursdays, 7pm. Winfray Annexe of the College. G8ISJ.

**Coventry (University of Warwick ARS)**—Wednesdays during term. Talk-in on S20. 7pm. Cryfield Farm, University of Warwick, Coventry. Vice-president G8MIA.

**Hereford (HARS)**—First and third Fridays in each month. Civil Defence HQ, Gaol Street, Hereford. G4CNY.

**Lichfield (LARS)**—First Monday and third Tuesday in each month, 8pm. Swan Hotel. Tuesday meetings are natter-nites. Sunday net noon, 21.150MHz. G3RTY.

**Lichfield (Chad RC)**—Alternate Wednesdays, commencing 2 Mar. 8pm. The Naval Club, Burton Old Road, Lichfield. G4ESK.

**Mid-Warwickshire (MWARS)**—First and third Mondays in each month, 8pm. 61 Emscote Road, Warwick. G8CXL.

**Redditch (RRC)**—Second and fourth Thursdays in each month, 8pm. The Old People's Centre, Park Road, Redditch. G3EVT.

**Shrewsbury (Salop ARS)**—Thursdays, 7.30pm. New members welcome. The Albert Hotel, Smithfield Road, Shrewsbury. Joint secs Bob Carter, 11 Ash Close, Sutton Farm, Shrewsbury SY2 6HU, and Dave Doody, 56 Ellesmere Road, Shrewsbury SY1 2QP.

**Solihull (SARS)**—15 Mar (Demonstration of QM70 products), 19 Apr ("Radio in Japanese prisoner of war camps" by Tom Douglas, G3BA). 7.30pm. The Manor House, High Street, Solihull. G4EQF.

**Stoke-on-Trent (S-on-TARS)**—Thursdays, 7.30pm. 2A Racecourse Road, Oakhill, Stoke-on-Trent. G4CWN.

**Stoke-on-Trent (North Staffs ARS)**—First and third Mondays in each month—lectures etc. Second, fourth and fifth Mondays in each month—natter nites, Raynet and club station G4BEM. Newcomers welcome. 7.30pm. Harold Clowes Community Centre, off Dawlish Drive, Bentilee, Stoke-on-Trent. G3YBY.

**Stourbridge (S&DARS)**—Informals on the first Tuesday in each month, 9pm. "Shrubbery Cottage" public house, Heath Lane, Oldswinford, Stourbridge. 21 Mar (AGM), 18 Apr. 7.45pm. Longlands School, Brook Street, Stourbridge. G4CLX.

**Sutton Coldfield (SCRS)**—Second and fourth Mondays in each month, 7.30pm. Central Youth HQ, Clifton Road, Sutton Coldfield. Sec Miss E. Lamb, 190 Birmingham Road, Sutton Coldfield B72 1BX.

**Tamworth (TARS)**—Second and fourth Mondays in each month. Indoor Sports Centre, Corporation Street, Tamworth. New members welcome. G4EUF.

**Telford (T&DARS)**—9 Mar ("The radio spectrum"—an open discussion), 16 Mar ("Outdoor survival and portable" by G8BMD), 23 Mar ("Oscar" by G3UKV), 30 Mar, 6 Apr (AGM), 13 Apr (Natter-nite), 20, 27 Apr, 4 May. 7.30pm. Phoenix Centre, Webb Crescent, Dawley. Visitors welcome. G4AXZ.

**Willenhall (W&DARS)**—Alternate Wednesdays. Morse classes available at the end of each meeting. "The Three Crowns", Stafford Street, Willenhall. G3YHN, XYL.

**Wolverhampton (WARS)**—7 Mar ("Amateur tv" by G5KS), 14 Mar (Natter-nite), 21 Mar (Visit by Dudley ARC), 4 Apr ("A decade of microwaves" by Alan Wakeman, G3EEZ), 11 Apr (Natter-nite), 18 Apr (On the air—hf and vhf), 2 May (Home-built gear competition), 9 May (Natter-nite). 8pm. Neachells Cottage, Danescourt Road, Stockwell End, Tetterton, Wolverhampton WV9 9PH. G8EDG.

**Worcester (W&DARC)**—7 Mar (Talk by Tom Byrne, G3NDQ, RAE lecturer at Worcester Technical College), 19 Mar (Hints and tips on contest operating), 25 Mar (Skittles match—see sec), 4 Apr (Annual construction contest), 16 Apr ("Safety in the shack" by R. Voisey, G8IDK, and G. Barker, G4DXD), 2 May ("Receiver design techniques" by R. D. Allan, G3TQZ). 8pm. The Old Pheasant, New Street, Worcester. G4DXE.

**REGION 4—RR T. Darn, G3FGY, Sandham Lane, Ripley, Derbys.**

**Derby (D&DARS)**—9, 16 Mar (AGM), 23 Mar (No meeting), 30 Mar, 6 Apr (Bring and buy sale), 13, 20, 27 Apr, 4 May (Surplus sale). 7.30pm. Clubroom, 119 Green Lane, Derby. Morse classes are held on Tuesday nights at 7.30pm. G2CVV.

**Derby (NHCAARG)**—Fridays, 7.30pm. Nunsfield House, Boulton Lane, Alvaston, Derby. G4CTZ.

**Grimby (GARC)**—10 Mar (A talk about the RSGB by Tom Darn, G3FGY), 24 Mar, 7, 21 Apr (To be arranged). 7.30pm. Alexandra Social Club, Cleethorpes. G4EBK.

**Leicester (LRS)**—Mondays, 7.30pm. Club House, Gilrose Estate Cottage, Leicester. G4ERT.

**Mansfield (MARS)**—First Friday in each month, 7.30pm. "The New Inn", Westgate, Mansfield. G3XWZ.

**Melton Mowbray (MMARS)**—18 Mar ("The production of a magazine" by G3KYY of the *Wireless World* staff), 15 Apr (Visit to the GPO museum at Leicester, by courtesy of G3FXP and G4AMK). 7.30pm. St John Ambulance Hall, Asfordby Hill, Melton Mowbray. G3NVK.

**Nottingham (ARCoN)**—10, 17 Mar (Activity night), 24 Mar (The one that got away, or the home brew that failed to ferment), 31 Mar (Junk sale), 7 Apr (AGM), 14 Apr (Activity night), 21, 28 Apr. 7.30pm. Sherwood Community Centre, Mansfield Road, Sherwood, Nottingham. G4EKW.

**East Midlands Amateur Radio Group**—23 Mar ("Radio spectrum utilization—co-ordination or chaos?", group lecture by J. A. Saxton, DSc, PhD, CEng, FIEE, FInstP, director of the Appleton Laboratory). 7.30pm. St Helen's House, King Street, Derby. Admission by (free) ticket. See your local club sec or contact G3FGY.

**REGION 5—RR P. F. Chilcott, G4BBA, 258 Coneygree Road, Peterborough PE2 8LR.**

**Bedford (B&DARC)**—Thursdays, 8pm. United Services Club, Broadway. Sec G4FEV.

**Cambridge (C&DARC)**—Fridays, 7.30pm. Corporation Yard, Victoria Road. Sec G4BAO.

**Cambridge University (CUWS)**—Tuesdays during term. Sec G4EAG, St Catherine's College.

**Corby (CTCARG)**—Mondays, 7.30pm. Corby Technical College, Clubhouse and GB3CI in grounds.

**Dunstable (DDRC)**—Fridays, 8pm. Chews House, 77 High St South. Sec G3WXS.

**March (M&DRAS)**—Tuesdays, 7.30pm. 2 Grays Lane. Sec G8GNE.

**Northampton (NRC)**—3 Mar (Garex Electronics visit), 10, 17 Mar ("RTTY" by G4DAW), 31 Mar (Test equipment evening), 28 Apr ("Pulse code modulation" by Roger Pye, G8AAT). Thursdays, 8pm. Spencer Dallington Community Centre, Tintern Avenue, off Gladstone Road. Sec G8GHZ.

**Peterborough (GPARG)**—24 Mar (Equipment night), 28 Apr ("RTTY simply" by G4BBA). AGM changes made: V. Cunningham, G4DFD, chairman; R. Smith, G4DXW, vice-chairman; P. Chilcott, G4BBA, secretary, and A. Petrie, G4DJZ, treasurer. 7.30pm. Southfields Infants School, Stanground.

**Peterborough (PR&ES)**—Third Friday in each month, 7.30pm. Scout Hut, Occupation Road. Sec G3EEL.

**Sheffield (S&DRS)**—3 Mar (Field day planning), 10 Mar (Mini talks), 17 Mar (Quiz), 24 Mar (Quiz), 31 Mar (Members' rigs). 8pm. Church Hall. Sec G3TAZ.

**L. Smart, G3WMH**, recently became a silent key. The majority of amateurs around Peterborough, your RR included, were introduced to amateur radio by his transmissions. Top band and 2m will never be quite the same again without the "peawhistle signal enjoying a cup of tea"—G4BBA.

**REGION 6—RR D. C. Andrews, G4CWB, 63 Bulmershe Road, Reading, Berks.**

**Banbury (BARS)**—Fridays, 7.30pm. 43 North Bar, Banbury. New members and visitors welcome. Details from sec G3LTN, tel Banbury 710623.

**Bracknell (BARC)**—First and third Mondays in each month, 8pm. Alternate Mondays, morse. Visitors welcome. Sec G3YMC.

**Burnham Beeches (BBRC)**—First Monday in each month, 8pm. Hedgerley Scout HQ. Sec Peter Fynn, tel Farnham Common 2609.

**High Wycombe (Chiltern ARC)**—23 Mar (Junk sale), 27 Apr (TBA). 8pm. 42 Castle Street, High Wycombe. Information from G8HDL, tel High Wycombe 31314.

**Maidenhead (M&DARC)**—First Thursday and third Tuesday in each month, 7.30pm. British Red Cross Hall, The Crescent, Maidenhead. Sec G4ALG.

**Milton Keynes (MK&DRS)**—14 Mar ("Microwaves" by G3WKL), 11 Apr (Chat night at "Rose and Crown"), 9 May ("GB3BD Bedford repeater" by G8FMG). 8pm. Lovat Hall, Silver Street, Newport Pagnell, Milton Keynes. Sec G3THC, tel Milton Keynes 316730.

**Newbury (N&DARS)**—First Monday in each month, 7.30pm. Newbury College of Further Education, Oxford Road, Newbury. Everyone most welcome. Sec G4EFE, tel 0635 45747.

**Oxford (O&DARS)**—Second and fourth Wednesdays in each month, 7.30pm. Civil Service Sports Club, Marston Road, Oxford. Visitors welcome. Sec G4BHR.

**Oxford (Oxford University RS)**—Wednesdays. 62 Banbury Road, Oxford. Sec G4CNV, Keble College, Oxford.

**Reading (RARC)**—1 Mar ("Linear amplifiers" by G3IKN), 15 Mar (Junk sale), 5 Apr ("Civil aviation" by G3WGV), 19 Apr (Contest preparation), 3 May ("Aerial circus" by Doug Charman). 8pm. "White Horse", Emmer Green, Reading. Sec G4CCC.

**REGION 7—RR N. A. Smith, G3HFO, 7 The Byeways, Surbiton, Surrey KT5 8HT.**

**Addiscombe (AARC)**—Tuesdays, 9pm. "Spreadingale", Portland Road, Woodside. Sec G3SJK.

**Ashford, Middlesex (Echelford ARS)**—Second Monday and last Thursday in each month, 7.30 for 8pm. St Martin's Court, Kingston Crescent, Ashford, Middlesex. Sec G3TDR, tel Staines 55513.

**Bexley Heath (North Kent RS)**—Second and fourth Thursdays in each month, 8pm. St Mary's Institute, 2 North Cray Road, Bexley. Sec G4ARQ.

**Coulsdon (CATS)**—First Thursday in each month, 8pm. 10th Purley Scout HQ, Chipstead Valley Road, Coulsdon. Third Monday in each month, 8pm. 1st Purley Scout HQ, Purley Park Road, Purley. Sec G4DL, tel 25 59556.

**Cray Valley (CVRS)**—17 Mar (Natter-nite), 7 Apr (AGM), 21 Apr (Natter-nite), 5 May (To be arranged). 8pm. Eltham United Reformed Church Hall, 1 Court Road, Eltham, London SE9. Sec G3YWO.

**Croydon (Surrey Radio Contact Club)**—First and third Wednesdays in each month, 7.30 for 8pm. TS "Terra Nova", 34 The Waltons, Croydon. Sec G3FWR, tel 01-657 3258.

**Crystal Palace (CP&DRS)**—19 Mar ("RTTY" by G3YKB), 16 Apr, 21 May (Microwaves and lecture contest). 8pm. Emmanuel Church Hall, Barry Road, London SE22. G4AVV, tel 01-653 4340.

**Guildford (G&DRS)**—Second and fourth Fridays in each month. Model Engineers HQ, Stoke Park, Guildford. Sec G4BHQ, tel Guildford 76375.

**Kingston (K&DARS)**—Second Wednesday in each month, 8.15pm. Berrylands Scouts and Guides HQ, Stirling Walk, Raeburn Avenue, Surbiton. Sec G4APG.

**New Cross (Clifton ARS)**—Fridays, 8pm. 225 New Cross Road, London SE14. Details from R. A. Hinton, 58 Camilla Road, Bermondsey, London SE16.

**Reigate (RATS)**—15 Mar ("Frequency allocation" by Tim Hughes, G3GVV), 19 Apr (AGM), 17 May (Surplus equipment sale). 8pm. Constitutional Centre, Warwick Road, Redhill. 1 Mar, 5 Apr, 3 May (Natter-nites). 8.30pm. "Marquis of Granby", Hooley Lane, Redhill. Sec G3SXZ, tel Reigate 43130.

**Sutton & Cheam (SCRS)**—Third Thursday in each month, 7.30pm. Sutton College of Liberal Arts, Cheam Road, Sutton. Sec G4BOX.

**Thames Ditton (Thames Valley ARTS)**—First Tuesday in each month, 8pm. Giggs Hill Green Library, Giggs Hill Road, Thames Ditton. Sec G3ZNW.

**Wimbledon (W&DRS)**—Second and last Fridays in each month, 8pm. St John Ambulance HQ, 124 Kingston Road, Wimbledon SW19. Sec G3XTC, tel 01-644 3698.

**REGION 8—RR D. N. T. Williams, G3MDO, "Seletar", New House Lane, Thanington, Canterbury, Kent.**

**Burgess Hill (Mid-Sussex ARS)**—7.45pm. Marie Place, Burgess Hill. Details from G3PEQ.

**Canterbury (East Kent RS)**—3 Mar ("Answerphones" by G3YMP), 7 Apr ("The electric pumpkin"). Details of future events from G8GHH.

**Chichester (C&DARC)**—First Tuesday and third Thursday in each month. Lancastrian Boys School. Details from G4ETU, tel 0243 88069.

**Crawley (CARC)**—United Reform Church Hall, Ifield, Crawley. Details of future events from G3MGL.

**Dartford (DHDFC)**—Second Friday in each month, 8pm. The Scout House, Broomfield Road, Dartford.

**Dover (South East Kent YMCAARC)**—2 Mar ("TV and the amateur" by G8GHH and G4EVD), 9 Mar (HF evening), 16 Mar (Film night), 30 Mar (Project evening, G8KEN), 6 Apr (AGM). Details from G8KSD.

**Eastbourne (Southdown ARS)**—7 Mar ("Amateur television" by Mike Biles, G8AAI). From April there will be a change of venue for meetings. Details from sec G8CVV. PRO G3LFZ.

**Gravesend (GRSGBG)**—Mondays, 7.30pm. The Windmill Tavern, Shrubbery Road, Gravesend.

**Hastings (HERC)**—Details of club events from G8DNO.

**Hastings (ITT(H)S&AC)**—Details of club activities from G8DNO.

**Horsham (HARC)**—First Wednesday in each month. Civil Defence HQ, Moons Lane, Brighton Road, Horsham. Details of future events from G3NPF.

**University of Kent (UKC)**—Wednesdays, 3.30pm (during term). Further information from Jon Hudson, G4ABQ, Rutherford College, University of Kent, Canterbury.

**Maidstone (MYMCAARS)**—First and third Fridays devoted to the beginner, RAE and Morse tuition, 7.30pm. Melrose Close, Loose, Maidstone. Alternate Fridays, a wide variety of lectures and use of the club shack. Details from Harry Poppy, G8KMX, tel Maidstone 61792.

**Medway (MARTS)**—Fridays, 7.30pm. Aurora Hotel, Gillingham. Details from G8APB.

**Ramsgate (Kent Coast ARC)**—Details of future events from sec G4DTA.

**North Sussex Repeater Group**—Details from C. M. Goadby, G8HVV, "Twin Firs", Hophurst Lane, Crawley Down, West Sussex RH10 4LJ.

**Tunbridge Wells (West Kent ARS)**—Details of future events from G8LMV.

**Worthing (W&DARC)**—8 Mar (Constructional contest), 22 Mar (Construction techniques), Tuesdays, 8pm. Adult Education Centre, Union Place, Worthing. Details from P. J. Robinson, G8MSQ, 46 Hillview Road, Worthing.

#### REGION 9—RR H. W. Leonard, G4UZ, 4 Start Bay Park, Strete, nr Dartmouth TQ6 0RY.

**Camborne (Cornish RAC)**—3 Mar ("Electrical safety in the home" by G3XFL, 18 Mar (Annual dinner, Bookdale Hotel, Truro), 7 April (AGM), 7.30pm. SWEB Clubroom, Pool, Camborne. Visitors always welcome. Cornish net Sundays 11am on 3.685MHz. Details from G3NKE, tel Camborne 2419.

**Exeter (EARS)**—Second Monday in each month, 7.30pm. Community Centre, St Davids Hill, Exeter. Details from G3HMY.

**Newquay (N&DARS)**—Alternate Wednesdays, 7.45pm. Treviglas School, Newquay. Details from G8GOR, tel Newquay 4168.

**North Devon (NDRC)**—Second Wednesday in each month at QTH of G4CG, fourth Wednesday at QTH of G2FKO. Details from G4CG.

**Plymouth (PRC)**—3 May (AGM). First and third Tuesdays in each month, 7.30pm. Virginia House, Bretonside, Plymouth. Visitors most welcome. G4EJO.

**Saltash (S&DARC)**—First and third Fridays in each month, 7.30pm. Burraton Toc-H Hall, Saltash. Sec J. Reynolds, G8LLR, 47 Lulworth Drive, Roborough, Plymouth PL6 7DT.

**Torbay (TARS)**—12 Mar (Annual dinner, Templestowe Hotel, Torquay), 26 Mar (To be arranged), 30 April (AGM). Fridays, with special meeting on the last Saturday in each month, 7.30pm. Rear of 94 Belgrave Road, Torquay. Torbay net weekdays 10.30am on 3.785MHz. G3UIQ.

#### REGION 10—RR R. G. Barrett, GW8HE, 23 Carshalton Road, Beddau, Pontypridd, Glam.

**Barry (BCoERS)**—Thursdays, 8pm. Barry Rugby Football Club, Reservoir Road, Barry. Details from sec GW3VBP.

**Blackwood (BARS)**—Fridays, 7pm. Oakdale Community Centre, Oakdale, Nr Blackwood. Details from sec GW3KYA.

**Bridgend (Glamorgan VHF/UHF Group)**—Second Wednesday in each month, 7.30pm. NCB Social Club, Tondur, nr Bridgend. Details from sec GW8HEZ.

**Cardiff (CRSGBG)**—14 Mar (Measurement night), 11 Apr ("Oscar"). 7.30pm. The Pantmawr Inn, Pantmawr Estate, Cardiff. Details from sec GW3VOW, 9 Millrace Close, Llsवानe, Cardiff.

## RSGB publications in S Wales

Members in the S Wales area may purchase RSGB publications at over-the-counter prices from Mr C. H. Parsons, 90 Maesycod Road, Heath, Cardiff, Glam. This service to personal callers will save the purchaser the cost of postage and packing—a not inconsiderable sum these days.

**Merthyr (Hoover ARS)**—Mondays, 7.30pm. Hoover Social Club, Pentrebach, Merthyr. Details from sec GW8HHY, QTHR.

**Newport (NARC)**—Mondays, 7pm. Adult Education Settlement, Brynglas Road, Newport. Details from sec GW8MER.

**Pembroke (PRSGBG)**—Last Friday in each month, 7.30pm. Defensible Barracks, Pembroke Dock, Dyfed. Details from sec GW3XJQ.

**Pontypool (PRSGBG)**—Tuesdays, 7pm. Education Settlement, Park Hill Road, Pontypool. Details from GW3JBH.

**Port Talbot (British Steel Corporation ARS)**—Thursdays, 7.30pm. BSC Sports and Social Club, Margam. Details from GW4ESV.

**Rhondda (RARS)**—Every other Thursday, 7.20pm. Transport Employees' Club, Porth. Details from GW3PHH.

**Sully (S&DSWC)**—Mondays fortnightly, 7pm. Sully Bowls and Social Club, 58 South Road, Sully. Details from sec GW8JHF.

**Swansea (SARC)**—Tuesdays fortnightly, 7.30pm. The Commercial Inn, Killay. Details from sec GW4AYJ.

#### REGION 11—RR P. H. Hudson, GW3IEQ, "Silhill", Dinas Dinlle, Caernarvon LL54 5TW.

**Bangor (UCNWARS)**—Thursdays, 7.30pm. Small lecture theatre, School of Engineering Science.

**Conway Valley (CVARC)**—10 Mar (A talk on the Oscar projects and/or sstv by F. Pardy, GW3DZJ), 14 Apr (A talk by Dr David Last, GW3MZ). The Quarries, Llandulas, Colwyn Bay.

**Rhyl (R&DARC)**—It is regretted that this club has been closed until further notice.

#### REGION 12—RR Frank Hall, GM8BZX, 45 Priory Cottages, Lunanhead, Forfar, Angus DD8 3NR.

**Aberdeen (ARS)**—Friday evenings. Clubrooms, rear of 91 Crown Street, Aberdeen. Sec GM4BKV.

**Dundee (Kingsway Technical College ARC)**—Wednesdays, 6.30pm. Kingsway Technical College. Visitors welcome. Sec Robert Officer, 17 Broomhill Gardens, Monkie, Broughty Ferry, Dundee DD5 3QP.

**Lerwick (LRC)**—Wednesday evenings. Annsbrae House, Lerwick. Sec GM3HTH.

**Moray Firth (MFARS)**—Wednesdays, 7.30pm. Elgin Technical College. Sec GM8LVG.

Items of news are required for this column, especially club programmes and news of general interest to the region. There is bound to be something happening in Region 12—why keep it to yourselves pass it on to GM8BZX.

#### REGION 13—RR (Post vacant)

**Border (BARS)**—First and third Fridays in each month, 7.30pm. Roxburgh Hotel, Berwick-upon-Tweed. Further details from GM8IO.

**Dunfermline (DARS)**—Second Wednesday in each month, 7pm. CCTV Studios, Pittencrief School, Maitland Street, Dunfermline. Further details from GM8HEY.

**Edinburgh (Lothians RS)**—Second and fourth Thursdays in each month, 7.30pm. Adult Education Centre, Riddles Court, High Street.

**Edinburgh (Pioneer Club)**—Tuesdays, 7.30pm. Church Hall, Ravenscroft Place, Gilmerton. Details from sec GM4DTJ.

**Glenrothes (G&DARC)**—First Sunday in each month and Wednesdays, 7.30pm. Old Nursery Buildings, Leslie, Fife. Sec GM3YOR.

**REGION 14—RR A. J. Mitchell, GM3UDL, 7 Limetree Crescent, Newton Mearns, Glasgow G77 5BJ.**

**Ardeer (ARCARS)**—Thursdays, 7.30pm. Ardeer Recreation Club, Stevenston, Ayrshire. Details from GM8BOM.

**Ayr (AARS)**—Every second Sunday evening. Community Leisure Centre, 24 Wellington Square, Ayr. Details from GM3THI.

**Falkirk (F&DARC)**—Temperance Cafe, Lint Riggs, Falkirk. Details from GM3OQI.

**Glasgow (West of Scotland ARS)**—Fridays, 7.30pm. 22 Robertson Street, Glasgow. Programme and other details from G. Milne, GM4BLO.

**Greenock (G&DARC)**—Tuesdays and Fridays, 7.30pm. 22 Inverkip Street, Greenock. Details from GM3LYI.

**Motherwell (Mid-Lanark ARS)**—4 Mar (AGM), 18 Mar ("ATV" by GM3SZP), 1 Apr (Phone patch discussion), 15 Apr ("SSTV Kbd and slow/fast converter" by GM3KJF), 22 Apr (Motorola visit), 29 Apr (Quiz night). Wrangholm Hall Community Centre, Jerviston Street, Motherwell. Details from GM8HBY.

**REGION 15—RR H. J. Campbell, G18FOK, 26 Kilcoole Park, Belfast BT14 8LB.**

**Ballymena (BRC)**—Tuesdays, 8pm. 86 Old Cullybackey Road, Ballymena. RAE and morse classes. Fridays, club night; Sundays, special projects, 3pm. Sec G18LSF.

**Bangor (B&DARS)**—First Friday in each month, 8pm. Redcliff Hotel, Seacly Road, Bangor. Sec G14EMS.

**Belfast (QUORC)**—Tuesdays, 8pm. Queen's University Radio Club, 37 Fitzwilliam Street, Belfast. All welcome.

**Belfast (CoBYMCARC)**—The club is active on the air from 7.30pm on Tuesdays and 2.30pm on Saturdays. Meetings at same times. 7 Brunswick Street, Belfast. Sec D. Kane.

**Belfast (BRSGBG)**—Third Wednesday in each month, 8pm. 90 Belmont Road, Belfast. Interesting winter programme arranged. Visitors most welcome. Further details from G18FOK.

**Carrickfergus (CYMCARC)**—25 Apr (AGM). Last Monday in each month, 8pm. Carrickfergus YMCA. New members very welcome. Sec. C. Morrison, G18KZU, 3 Donegall Square, Carrickfergus, Co Antrim.

**Mid-Ulster RSGB Group**—First Sunday in each month, 3pm. At QTH of G14BAC. Sec G13WVY.

**North Ulster (NURSGBG)**—For particulars of change of venue and other details contact G18AYZ.

**REGION 16—RR R. E. G. Kendall, G8BNE, "Wesley", Rannoch Road, Hemblington Corner, Blofield, Norwich NR13 4PJ.**

**Chelmsford (CARS)**—First Tuesday in each month, 7.30pm. Marconi College, Arbour Lane, Chelmsford. Details from R. Brooks, 30 Rowan Drive, Heybridge, Maldon.

**Colchester (CRA)**—Wednesdays, 7.30pm. Stanway School, Colchester. Sec G3YAI.

**Great Yarmouth (GYRS)**—Last Thursday in each month. 67 Southdown Road, Great Yarmouth. Details from G3NHU.

**Harlow (H&DRS)**—Tuesdays, 8pm. Mark Hall Barn, First Avenue, Harlow, Essex. The club hopes to introduce regular RAE and morse tuition, as well as a series of lectures on a wide range of radio and electronic topics. Details from G3WUX.

**Ipswich (IRC)**—Details from G4BAV.

**Loughon (L&DRS)**—Second and fourth Fridays in each month, 8pm. Loughon Hall, near Debden Station. Sec G4CMD.

**Lowestoft (L&DARC)**—Fridays, 7.30pm. Morse class every Tuesday. YMCA, Park Road, Lowestoft.

**Martlesham (MRS)**—Details from G. Murchie, G8AXU, Post Office Research Centre, Martlesham.

**Norwich (Norfolk ARC)**—9 Mar ("Electricity supply" by B. Russell), 16 Mar (CW tuition), 23 Mar (Surplus equipment auction), 30 Mar (CW tuition), 7.45pm. Crome Community Centre, Telegraph Lane East, Norwich. Details from G4EOL.

**Norwich (W. of East Anglia R&EC)**—Details from P. Gowen, G3IOR.

**Stowmarket (S&DARS)**—Details from K. J. Bertrand, 35 Curwen Road, Stowmarket.

**Vange (VARS)**—Thursdays, 8pm. Youth Hall, Barstable Tenants Community Association, Long Riding, Basildon. Details from Mrs D. Thompson, 10 Feering Row, Basildon SS14 1TE.

**REGION 17—RR L. Hawkyard, G5HD, 100 Shirley High Street, Southampton, Hants.**

**Basingstoke (BARC)**—First Saturday and third Wednesday in each month, 7.30pm. Chineham House, Popley, Basingstoke. Sec G3CBU.

**Basingstoke (UKFM Group, Southern)**—2 Mar, 6 Apr ("Man's conquest of the Moon" by Ron Ham), 4 May. Chineham House, Basingstoke. Details from PRO G8ECO.

**Bournemouth (Wessex ARG)**—First Friday in each month, 7.30pm. Dolphin Hotel, Holdenhurst Road, Bournemouth. Sec G4EMN, tel Bournemouth 20027.

**Chippenham (C&DARC)**—Tuesdays, 7.30pm. Sheldon School, Hardenhuish Lane, Chippenham. Sec G8BXG.

**Fareham (F&DARC)**—Wednesdays, 7.30pm. Porchester Community Centre, Room 9. Sec D. Thompson, tel Fareham 2799.

**Farnborough (F&DRS)**—Second and fourth Wednesdays in each month, 7.30pm. Railway Enthusiasts' Club, Access Road, off Hawley Lane, Farnborough. Sec G4FEA.

**Guernsey (GRES)**—Tuesdays and Fridays, 8pm. Details from sec G4UITE, PO Box 100, Guernsey.

**Horndean (H&DARC)**—Second Thursday in each month, 7.30pm. Merchiston Hall, Horndean. Net Sundays 6.30pm. 21.40MHz. Sec G4CHO.

**Jersey (JARS)**—Sundays, 10.30am, and Fridays, 8pm. Le Hocq Tower, St Clement, Jersey. Sec Mary McTaggart, 19 Parade Road, St Helier.

**Poole (PRAS)**—First Friday in each month, 7.30pm. Poole Technical College. Sec Graham Tizzard, tel Poole 4641 ext 34.

**Portsmouth (P&DRC)**—Wednesdays, 7.30pm. Portsmouth Community Centre, Malins Road, Buckland, Portsmouth. G3CNO.

**Salisbury (SR&ES)**—Tuesdays, 7.30pm. Salisbury Activity Centre Wilton Road. Sec G2FIX.

**Southampton University (SUARC)**—Tuesday evenings, also informal meetings every lunchtime in the clubroom, Old Union Building. Sec T. Williams, G3YOZ.

**Southampton (SRSGBG)**—Second Saturday in each month, Lanchester Building, Southampton University; Wednesdays, the clubroom, Kent Road; both at 7.30pm. AR G4COM.

**South Dorset (SDRS)**—7.30pm. Lecture Hall, South Dorset Technical College, Newstead Road, Weymouth. Details from G3YWG.

**Swindon (SD&ARC)**—Alternate Wednesdays, 7.45pm. Clubroom above Coldharbour Public House, Blunsdon, just north of Swindon. Sec G8KWC.

**Winchester (WARC)**—First and third Fridays in each month 7.30pm. Antrim House, St Cross Road, Winchester. G4BKE.

**REGION 18—RR P. J. Fay, 5 Harland Way, The Glebe, Wasington, Tyne & Wear NE38 7RB.**

**Durham (DUARS)**—This club has been reformed and meets on alternate Wednesdays at the department of physics, Durham University. All amateurs in the area are invited to join. An extensive series of lectures is being planned which will cover elementary radio as well as catering for the advanced amateur. There will be a talk-in by G4DUR at all meetings. Details from R. S. Arak, G4EEJ, physics dept.

**Easington (AR&EC)**—Tuesdays and Thursdays, 7.30pm. Easington Village Workingmen's Club. Tuition for the RAE and morse will be given if required. Owing to pressure of studies, Ron Hutton has had to relinquish the post of secretary G4COL.

**Hartlepool (HRC)**—Mondays, 7.30pm. Methodist Church Hall, Grange Road. Sec G3NWU, 73 Eamont Gardens, Hartlepool.

**Middlesbrough (PORC)**—Sec G8CDP, 200 Marton Road, Middlesbrough.

**Morpeth (Northumbria RC)**—Now meets Thursday's, British Legion premises, Gambois, nr Blyth. Sec G4AVO.

**Newcastle (Tyne & Wear Repeater Group)**—First and third Wednesdays in each month, 7.30pm. Arts Common Room, University of Newcastle. The repeater is now functioning, and appears to be in almost continuous use. Further work is necessary on GB3TW, but this will take place with the minimum of closure. The amended frequency of the beacon is 144.130MHz, and not as given in the last Club News. The group has attracted members from all over the north-east, especially isolated, non-club amateurs. Meetings are very well attended, but there is plenty of room for more—the club is open to all amateurs. Several members of the committee met the newly formed Teesside Repeater Group (PORC) on 21 January and gave all information possible to get the Teesside venture going. Copies of the group's excellent newsletter may be obtained by sending a large sae to sec G3URE.

**South Shields (SSD&RS)**—Fridays, 7.30pm. Trinity House. Old and new members welcome. Sec G8BQF, 67 Lauderdale Avenue, Kings Estate, Wallsend.

**Sunderland (SARS)**—This club has now been wound up. It has been without a meeting place for some time and the last secretary has gone to sea. G3XID hopes to rekindle interest at the next HF NFD. This is a loss to the region as for some years the club has held a well-attended mobile rally, and amateurs keen to keep it going should write to G3XID or to G3AKG.

**Tyneside (TRC)**—Mondays, 8pm-9.30pm. The Community Centre, Vine Street, Wallsend. Sec F. Addison, 3 Wilton Close, Whitley Bay, Tyne & Wear.

#### REGION 19—RR D. S. Smith, G4DAX, 151 Hamper Mill Lane, Oxhey, Watford, Herts.

**Acton, Brentford & Chiswick (ABCRC)**—15 Mar ("The TH3 Mk3" by G3CCD), 19 Apr (What's new in amateur gear), 7.30pm. Chiswick Trade and Social Club, 66 High Road, Chiswick.

**Barking (BR&ES)**—Mondays (Constructional), Wednesdays (CCTV techniques), Thursdays (Informal). Morse classes Tuesdays, 7.30pm. Westbury Recreation Centre, Westbury School, Ripple Road, Barking, Essex. Sec G8JEG, tel 01-599 1103.

**Bishops Stortford (BS&DARS)**—Third Monday in each month. British Legion Hall, Windhill, Bishops Stortford. All welcome. Details from G3XSE, 89 Birchanger Lane, Birchanger, Bishops Stortford.

**Cheshunt (CDRC)**—Wednesdays, 7pm. Rosedale Sports Centre, Andrews Lane, Cheshunt.

**Chingford (Silverthorn RC)**—Fridays, 7.30pm. Friday Hill House, Simmonds Lane, Chingford E4. Visitors very welcome. Sec G4AJA, tel 01-529 2282.

**Ealing (EDARS)**—Tuesdays, 8pm. Northfields Community Centre, Northcroft Road, London W13. Sec R. Blackwell, 4 Coinbrook Avenue, West Ealing, London W13 8JY.

**East London RSGB Group (Wanstead)**—Third Sunday in each month, 3pm. Wanstead House, The Green, Wanstead, London E11. Sec G4CJQ, tel 01-524 3169.

**Harrow (RSH)**—4 Mar (Lecture), 11 Mar (Discussion on HAVS exhibition), 18 Mar (Practical), 19 Mar (Display at HAVS exhibition, Harrow Leisure Centre), 25 Mar ("VHF propagation" by G3YQV), 1 Apr (Club project), 8 Apr (No meeting), 15 Apr (Practical), 22 Apr (Bring and buy), 29 Apr (Quiz), 6 May (RAE revision), 8pm. Roxeth Community Centre, Harrow.

**Hasling (H&DARC)**—Wednesdays, 8pm. British Legion Club, Western Road, Romford.

**Holloway (Grafton RS)**—4 Mar ("Cabinet and chassis—how to get that professional finish"), 7.30pm. Holloway Institute, Archway Annex, Highgate Hill, London N19. Sec G3ZKE.

**Ilford RSGB Group**—Thursdays, 8pm. 50 Mortlake Road, Ilford. Details from D. T. Sapworth, G3YMW.

**Northolt (British Airways European Division ARS)**—First Monday in each month. Trident Club, Western Avenue, Northolt, Middlesex. This club is open to non-BA employees by invitation. Contact G3OUF, tel Amersham 21573 for details. Civil Aviation Sunday net at 1100-1200gmt on 3-68MHz, listen for G3NAF or G3BEA.

**South Kensington (Baden Powell House Scout ARG)**—Third Tuesday in each month, 8pm. Baden Powell House, Queensgate, South Kensington.

**Southgate (SRC)**—Second Thursday in each month, 8pm. The Green, Winchmore Hill, London N21. Sec G4AEZ, tel 01-366 7166.

**St Albans (Verulam ARC)**—24 Mar (Film show), 28 Apr (Constructional techniques), 7.30pm. Market Hall, St Albans. Informal meetings on the second Thursday in each month. RAF Association HQ, Victoria Street, St Albans.

**Stevenage (S&DARS)**—First and third Thursdays in each month, 8pm. Hawker Siddeley Dynamics Ltd, Gunners Wood Road. Sec Paul Tewkesbury, 267 York Road.

**UK FM Group (London)**—Second Tuesday in each month, 7.30 for 8pm. Grove Park Hotel, Junction Bolton/Spencer Roads, Grove Park, Chiswick.

#### REGION 20—RR G. Mather, G3GKA, 8 Hills Close, Keynsham, Bristol.

**Bath (B&DRG)**—Tuesdays, 8.30pm. The Crypt, Ascension Church, 35a Claude Avenue, Oldfield Park, Bath. Sec N. S. Cridland, Flat 3, 30 Paragon, Bath BA1 5LY.

**Bristol (BRSGBG)**—28 Mar (Open), 25 Apr ("Lasers in communications" by J. Gower of Bristol University). For details of venue contact sec G8JBR, tel Portishead 773204.

**Bristol (BARC)**—Tuesdays, 7.30pm. The University Settlement, Barton Hill, Bristol 5. Sec G8KGE.

**Bristol (Shirehampton ARC)**—Fridays, 7.30pm. Twyford House, Shirehampton. New members most welcome. G4BWB.

**Cheltenham (CRSGBG)**—First Thursday in each month, 8pm. The Old Bakery, Chester Walk, Cheltenham. Sec G3KIL.

**Cheltenham (CARS)**—Wednesdays, 8pm. St Marks and Hesters Way Community Association, Brooklyn Road, Cheltenham. Visitors very welcome. Sec G8JAY.

**Gloucester (GARS)**—Thursdays, 7.30pm. The Chequers Bridge Centre, Painswick Road, Gloucester. Formal meeting on the first Thursday in each month. Sec G3MA.

**Taunton (T&DARS)**—Fridays, 7.30pm. Jelalabad Barracks, The Mount, Taunton. Sec G. Swetman, "Little Copse", Monkton Heathfield, Taunton. Tel West Monkton 298.

**Weston-super-Mare (WsMRS)**—Second Friday in each month, 7.30pm. Room Lewis M2, Worle School, New Bristol Road, Worle. G3PQE.

**Yeovil (YARS)**—3 Mar ("Speak to me only with your PIs, how to bring your computer to life" by G8AVR), 10 Mar ("QSL card design" by G3MYM), 17 Mar ("Big fleas and little fleas, the technical progress of miniaturisation" by G8AVR), 24 Mar (Visit to control tower Yeovilton, arranged by G3WAO), 31 Mar ("The computer under the stairs—1984" by G8AVR), 7 Apr (Visit to Bridgewater Club), 21 Apr (RSGB tape and slide lecture "World at your fingertips"), 5 May (AGM). 7.30pm. Due to possible change of venue contact sec G3NOF.

## Special event stations

### 16-19 March (callsign uncertain)

Operational by the Sutton & Cheam RS at the Wallington Hobbies Exhibition, Public Hall, Wallington, Surrey, from 10am to 9pm on hf and vhf. Apart from amateur radio equipment, a wide range of hobbies and crafts will be on display. Visiting amateurs will be welcome. Details from G3LCH.

### G3HZL, G3XRN/A, G4EOK, 8-17 April

Operational by the Royal Naval ARS from HMS Belfast, Pool of London, on all bands 1-8-28MHz and 144MHz.

## Looking ahead

**24 April**—NRSA Convention, Belle Vue, Manchester.

**6-8 May**—RSGB International Radio Communication Exhibition and Convention, Alexandra Palace, London.

**10 September**—Scottish Amateur Radio Convention, Adam Smith Centre, Kirkcaldy.

**17-18 September**—NW Amateur Radio Convention, University of Lancaster.

**15-16 October**—Jamboree on the Air.

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

### East Midlands Amateur Radio Group Lecture

7.30pm, 23 March 1977

### Radio Spectrum Utilization (Co-ordination or chaos)

by

Dr J. A. Saxton, CBE, DSc, PhD, CEng, FIEE, FInstP  
Director of the Appleton Laboratory

at

St Helen's House, King Street, Derby.

Admission by ticket.

Seating limited

Details from Tom Darn, G3FGY, QTHR, or Ripley 2972,  
or from local club secretaries

# members' ads

These subsidized 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 50p (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, "RADIO COMMUNICATION", 35 DOUGHTY STREET, LONDON WC1N 2AE.**

## FOR SALE

**Heath HR10B rx**, 29.7-4MHz, xtal calibrator, good wkg order, £40 plus carr. G8DFZ, QTHR. Tel 09434 3083 evenings.

**FT200 and spkr**, sell or swap for 2m ssb and/or fm gear, 2m converter, £10. FM Vanguard, 25W, comp on S20, £30. J. Shades, GM8MRK, 30 Stonecrop Place, Kincaidston, Ayr KA7 3XA.

**FRDX500**, with manual, vgc, £125. R216, 19-157MHz, with manual, £65. G13TLT, QTHR. Tel Bangor 61024.

**FV101B**, £45. Wanted: Heath HM1203 hf dummy load/wattmeter. KW160 tuner. GM4DHJ, QTHR. Tel 041 889 9010.

**Belcom Liner 2**, with preamp, spare mic, mobile mount and suitable mains power pack in as new cond, manual, £110. G3ZQF, QTHR. Tel Medway 723694 evenings or weekends.

**Liner 2**, with psu, preamp and modified mic, good cond, £130. Datong speech clipper, hardly used, £32. Pye Pocketphone, rx on 432-900, tx needs xtal, good cond with brand new presentation case, £20. G8IRK, QTHR. Tel Durham 3574.

**QTH**, residential area north of York, comprising three bedrooms, bathroom, dining room, kitchen, cavity wall insulated, large garage and carport, good gardens, three stage Versatower approved, no tv, £10,500 ono. G3ZDI, QTHR.

**Marconi sig gen type TF390G**, 16-150MHz in four bands, a.m./cw, with original manual, charts and spares, 26in long, weighs 60lb. Sorno Viscount, 4m, 4ch inc 70.26, sig gen, £20. Tx/rx, £20. G3APV, QTHR. Tel Seascale 449.

**FT101B**, with cw filter and FV101B remote vfo, immac, £350 ono. Eddystone 940, immac, £100. G3RDC, QTHR.

**Sig gen CT212**, brand new, 85kHz, 32MHz, 12V dc 240V ac, a.m./fm, with manual copy, £25 ono. Buyer collects. New boxed 2C39BA, £5 each. BAY96, £2.50 each. Narda Lab frequency meter, 500-1,500MHz, as new, £25 ono. Buyer collects. G3RNV, QTHR. Tel 061 477 0315 after 6pm.

**Power supplies**, 21V 7A plus, 20V 3.2A plus, 11V 6A, unused, buyers collect, £5. G3VXZ, QTHR. Tel Maidenhead 27350.

**70cm Microwave Modules converter**, 28-30, £13. 70cm varactor tripler BAY96, £12. 4m fet converter, 2-2.7, £9. Tvi filters, £1.25. Mains transformers, 1,185-0-1,185V 360mA, £6. Transformer, 450-0-450V 500-0-500V 250mA with it taps, £4. See enquiries, carr extra. G4DFE, QTHR.

**Aircraft rx**, Hallcrafters pocket size model CRX101, range 108-135MHz, £15. Chorley, 7 Fox Field, Harts Farm Estate, Everton, Lymington, Hants. Tel Milford-on-Sea 5231.

**R216**, 19-150MHz, cw/a.m./fm, matching mains psu, manual, £55. AR88D, manual, £35. HC6/U xtals, 7-445, 8-041, 8-047, 8-051, 8-053, 8-055556, 8-058, 8-061, 8-7825MHz, £1.50 each, £11 the lot. Shure 201 mic, £5. LED swr bridge, £3. 6ft enclosed 19in rack, £5. All carr extra. G3NRU, QTHR.

**QTH Cornwall**, Lands End two miles, 17th century thatched cottage in secluded sub-tropical valley, two-three beds, 2 acre gardens, £17,300. Parsons, G3RBP. Tel Burton-on-Trent 216161 ext 649 weekdays.

**Pye ssb tx/rx**, type SSB125T, comp with mic, mains psu, manual, h/b outboard 80m vfo, spare filters, good inexpensive rig normally xtal controlled between 3 and 15MHz, £65. A9014, c/o G3PWW, QTHR. Tel 021 373 2956.

**FT101**, good cond, £200. Buyer collects. Tel Hoddesdon 62315 evenings.

**New Londex high power vhf coaxial relay**, with connectors, £5.50. MM 28/144 converter, new, unused, £13. New boxed valves, RCA 7860, £4. 6082, £3.50. 3BE6, 3BZ6, 3CB6, 5U8, 7AU7, £1.50 each. All items plus postage. Wanted: CT380, CT381, G3GUU, QTHR.

**70cm Cambridge front end cw L-board**, 70cm in 10-7MHz out. Creed teleprinter, GPO type, ac psu, s/cover inc, neater, quieter. Navy tu, AN/SGC-1A, offers. Wanted: FDK Multi-8 vfo. Dow-key, similar relays. Marconi wavemeter TF975. 150MHz+ prescaler. 100kHz B7G. HRO-500. G3ZXN, QTHR.

**Eddystone EC10 Mk2**, ac psu, £75. TE20D sig gen, £15. G2HKW, QTHR. Tel Chislehurst Ford 5566.

**FR50B**, good cond, £45. Microwave Modules 2m converter, 28-30MHz i.f., £12. G4EYA, 19 Orchard Way, Shirley, Croydon, Surrey CR0 7NP. Tel 01-776 0902.

**Swap Adler electric typewriter** in good wkg cond for any operating 2m rig. C. Howett, 10 Bishops Close, Little Downham, Ely, Cambs. Tel Pymore 341.

**GDO TE15**, as new, £14. TE20D sig gen, £15. Reace SWR3, £4. Sinclair DM2 multimeter, £50. Koyo 11 band battery/mains rx, £40. Sony TC152SD stereo cassette deck, mono playback, Dolby, nicads, £125. G8KRR. Tel Drayton 313 after 7pm.

**One Ekco colour tv rx CT823**, 1977 model, brand new, boxed, exchange for FT101B, FT401 or Trio TS520, similar. G3HQU, QTHR.

**Components clearance**, mostly new. Transistors, ics, switches inc thumb wheel, meters, dvms, valves, mics, capacitors, vidicons, power units, motors etc. Please write for seven pages list, stamp appreciated. Callers by appointment only. 114 Green Lane, Sunbury on Thames, Middlesex.

**Eddystone vhf rx 770R**, 19-165MHz, £100 ono. G3PHJ, QTHR. Tel York 55624.

**El-bug bits Bauer paddle**, comp, as new, plus pc board with all electronics for a fully automatic keyer, £10. 2m pa QVQ0320, comp, £5. Tel Hornchurch 55733.

**Heathkit HW202 tx/rx**, fitted S0, R4, R6, R7, S20, S22, toneburst, 20W o/p, fb performance, £100 inc delivery Essex/Lancs or junctions M1/M6. R3, S21, £4 each. Belcom psu, £20. Julian Moss, G8ILO, 110 High Road, Halton, Lancaster LA2 6PU.

**RAE ICS manuals**, £30 ono. Sharpe, 10 Ascot Gardens, Belfast 5.

**Trio 9R59DS rx**, 160-10m, matching SP5DS spkr, 500kHz xtal marker, stabilizer valve fitted, manual, perf cond, £50. Woodward, 18 Tewkesbury Road, Gloucester. Tel 25311.

**Lafayette HA500 amateur bands communication rx**, 80-10m, £40 ono. Heathkit HW177 gen cov rx, checked by Heathkit, £35 ono.

**Wanted**: For disabled operator, FT400, FT250 or equivalent. GM3RVL, QTHR. Tel 031 334 7152.

**Robot 80A sstv camera**, pc board, comp with circuit, requires only power and vidicon. Scanning coils for 70A Monitor. Vidicon and Plumbicon camera tubes. 2in 16mm lens, ideal sstv/cvtv camera. Wightraps. YD844 mic. Offers. Cash needed for slow/fast sstv converter. G13MBB, QTHR. Tel Bangor 61946.

**IC22A**, exc cond, mobile mount etc, £120. Sweetland, 5 Ridgeway, Ingatestone, Essex. Tel Ingatestone 2797 after 6pm.

**Datong rf clipper**, £30. G2DMR, QTHR. Tel Burgh Heath 58729.

**Microwave Modules 2m converter**, 4-6MHz o/p, £10. Parmeko mains transformer, 6.4-0-6.4V o/p at 12A, £2. HC6U xtals, 8-055555, 8-061, 10-000 and 1-000MHz, £1.50 each. Wanted: Any information, particularly circuit diagram, on Thorn power unit type VQ301. G8KAX, QTHR.

**2m a.m. tx**, 15W i/p, quality speech, £40. Buyer collects. Sentinel 2m converter, 28MHz i.f., £13. Dummy load, £3. New 2m xtal, 38-68MHz, £2 plus postage. Parker, 133 Station Road, Cropston, Leicester LE7 7HH.

**Trio 9R59DS rx**, vgc, voltage stabilizer, £42 ono. G8IPW, QTHR. Tel Brookwood 2257.

**New 4CX250Bs**, £6.50. 2C39As, £3. 6CH6s, 40p. 4X250Bs, £5. Used but fully tested 4CX250Bs, £2.50. 4X250Bs, £2. G4AFS, QTHR.

**Cambridge AM10D**, 6ch wkg 2m, £30. H/B 12½kHz 6ch, £35, p & p £1.50. PF1 Pocketphones tx and rx, £20. Pair wkg, unmod xtals. Wanted: TA33, TH33 hf antenna. G8JEW, QTHR. Tel North Shields 79887.

**FT101E**, in mint cond, only eight months old, now surplus to requirements, first realistic offer secures. G4EKL, QTHR. Tel Mansfield 861274.

**LLL rf clipper for FT101 Mk2 etc.**, comp with all instructions, £35. KW swr meter, £8. KW lpf, £7. Technical Associates audio compressor fitted with FT101 plugs, mint, £18. G3MSL, QTHR. Tel Fleet 21446 after 6pm.

**TA factory built rx**, bandpass filter, unwanted Xmas gift, snip at £15. G3ZCK, QTHR.

**Kokusai MF455-15**, £10. YF90F, 9MHz, £10. Both with xtals. 2m converter (G3HBW), 2-4MHz, £5. MD108 mixer, £4. Leak valve stereo 24W, £10. Truvox stereo tape deck with h/b electronics, £20. CT53 sig gen, 8-9-300MHz, £15. G3TMA. Tel St Albans 53205.

**Building a counter**? 6 7490, 6 7475, 6 74141, 6 ZM1020, end viewing numerators and bases, £9 the lot. G8JNL, QTHR. Tel Godalming 22834.

**Stolle memomatic rotator**, £25. AEC SWR-10 swr meter, £5. CR100, ok except oscillator for band three, £10. All one, buyer collects or pays carr. G8HSH, QTHR. Tel Falkirk 23860.

**70cm Pye Westminster W15U boot mount**, wkg on SU8 (433.2), with xtals, clean cond, comp, offers around £80. Prefer buyer collects. G3VJSJ, QTHR. Tel Hoddesdon 68052 after 6pm or weekends.

**Drake R4C**, fitted new agc system, mint cond, nearest £300. Heath HW32A, HP13, £85 ono. 2m 6 over 6, new, £6. BC221 xtal, new, boxed, £5. 10-7MHz filter 445/LQU/901B, £3. Wanted: Heath coaxial switch. G3LDI, QTHR. Tel Norwich 41190.

**Datong rf clipper**, new, £35 ono. GW3YVC, QTHR. Tel Cardiff 755190.

**HA600 gen cov rx**, mains or 12V dc, amateur bandspread, original packing, manual, £35 ono. Pair moving coil telephone handsets, ideal intercom, £6. Wanted: 2m fm rig, IC22A, TR7200G etc. All letters answered. G3VSD, QTHR.

**Hallcrafters SX100 Mk2 rx**, with manual, good cond, 538-1,580kHz, 1-72-34MHz usb lsb, £75 ono. Stephen James swl antenna tuner, as new, £10. Buyer collects. Tel 062 981 2398.

**Eddystone 880/2**, exc cond, offers over £300. Tel 0602 607917.

**Sony TC255 stereo tape recorder**, deck, £60. Cambridge AM10D, a.m./fm, £25. Hudson base station tx/rx, £35 ono. Mini oscilloscope, £20. Power supply 1,000V/A, 450V 250mA, 300V ct 250mA, 0-4-0-6-3 6A, 0-75, 0-100V 100mA. G8HNY, QTHR. Tel Formby 79077.

**Late TS700**, superb cond, with rx, preamp, vox unit and four extra fixed channel xtals, £315. G8IMI, QTHR. Tel Haverhill 2852 after 7pm.

**QTH**, TH33 80m dipole, 2m 12e par, attractive three bedroom detached bungalow with gas central heating and garage built three years ago, close to town, sea, M6, Lake District, large driveway and rear garden, freehold property in delightful position, 125ft asl, £12,000 ono. G4DXX. Tel Carnforth 4274.

**Trio 7010**, mint, duplicate gift, with extra xtals, £145. SV101 wkg, £640. QM70 50W linear, 70cm, £25. G8HVV, QTHR. Tel 0342 712005.

**Viscount**, 4ch, preamp, toneburst, £40. Another single channel, some work required, £20. Low band Viscount, no controls, £10. V3Jr three band hf vertical, £10. G4DAT. Tel 01-546 7481 daytime.

**Trio 7200G**, auto toneburst, 23ch inc S0, S12, S14, S16, S20, S24, R2, R7, £150 ono. Tv rx project: *Television* magazine Apr 72-Aug 74, all boards 95% comp, all components to comp, aligned Pye i.f. strip, £50 ono. Buyer collects or carr extra. G8IYJ, QTHR. Tel 0793 32600 day, 0793 22383 evening.

**Europa 2m transverter**, plus spare pa, £55. 6-el quad, £10. GW4ESL, QTHR. Tel Caerleon 421 195.

**FT200**, and h/b 250V power pack, unused, £250. Three 10ft triangular lattice sections, £50. G3JPS, QTHR. Tel 07356 3323.

**KW Vespa Mk2**, £80. JR599CX rx, £150 separate, as a pair £210, carr extra. GM3XNZ, 7 Ninian Drive, Virkie, Shetland Isle. Tel 09506 274 working hours.

**TS520**, Immac, £325 ono. H/B 2m and 70cm transverters, for sale only with TS520, £30 each. G4DDK, QTHR. Tel Stone 4889.

**SSM Z-match**, 80-10m, new and unused, £20. Wanted: 7E/RP or 7E, good cond. G4FAJ, QTHR. Tel 054 33 2169.

**30ft mast**, 20ft steel, plus 10ft aluminium with 2m 8-el Yagi, buyer must dismantle and remove, £12. 7 Howard Close, Ashchurch Garden Estate, Tewkesbury, Glos.

**Trio 7010 2m ssb tx/rx**, 48ch fitted, in perf cond with all original accessories, £130. G4BRF, QTHR. Tel Polperro 349.

**FR50B rx**, little used, manual, £68. J. N. Burgess, 6 Wilmot Way, Banstead, Surrey. Tel Burgh Heath 53754.

**IC22**, good cond, comp with mobile bracket etc, fitted S0, 20, 21, 22, R4, 6, 7, manual, tone, £110. Buyer collects. G8IAM, QTHR. Tel 0227 76423.

**Trio 7010 2m ssb tx/rx**, new and in absolutely mint cond with mic and car mount, £165. G3XFB, QTHR. Tel Brewood 850033.

**FT221 2m tx/rx**, ssb/fm/cw/a.m., seven months old, mint cond, covers whole band, mains/12V operation, £350. ARAC102 2/10m rx, a.m./fm/ssb, 12V operation, £80. B40 gen cov rx, needs some attn, £15. G8IRJ, QTHR. Tel Steyning 814089.

**DX100U tx** with SB10U ssb adapter, fb cond, mod for grid block, keying, fully tvf-proofed and relay controlled, comp with interconnecting cables, manual, £55. G3GNM, QTHR. Tel 01-907 3733.

**Sommerkamp FTD500**, exc cond, tx recently realigned by Lowe Electronics, £220 ono. Liner 2 with preamp, fb cond, £120 ono. Prinzsound R999 gen cov rx, eight band, four hf, four vhf, £40 ono. GM4DZX, QTHR. Tel 041-959 4455.

**STE 28-30MHz rx**, matching fm discriminator, AD4 G8AEV 144-28 converter, QM70 Mk1 432-28 converter, £55 ono. Will split for sensible offers. Ranger 2207 boot set, comp, offers. Wanted: Good hf tx/rx, FT200, why? State price and cond. G8DXD, QTHR. Tel 0905 20135 after 6pm.

**2m fm portable tx/rx**, Stornophone 500, four sets nicads and Antec antenna and charger, manual, channels R6, S20, S22, £75. 60ft All telescopic mast, fittings, £25. I. Ross, G4DPF, 6 Winmarleigh Close, Bury, Lancs. Tel 061 764 2624.

**Shack clearance**. FTD401, TR7200G (10ch). Eddystone 1001. Europa CPS10 psu. 1kVA generator. 30in Microwave dish (steerable mount). 50ft² fibre acoustic tiles. Swivel chair. 36ft telegraph pole. 10X2 2m antenna. Sae list of smaller items. Offers. G8DNF, QTHR. Tel Sheffield 303758.

**Atlas 210X** with PS200 portable ac supply, new spotless cond, intended mobile use, not pursued, £440, or would consider exchange deal for vhf rig FT221/R or TS700G in sound cond, or FR101D rx etc. G3MIN, QTHR. Tel 01-632 5314 office hours.

**IC202**, £145 ono. UMI, £150. *Radio Communication*, £150. Many DIN plugs and very small motors, offers. Cheques disliked. G8ERQ, QTHR. Tel Harrogate 69801.

**Drake TR4C tx/rx**, AC4 psu, MS4 spkr, one year old, mint cond, £400. G13YDH, QTHR. Tel Belfast 643913.

**HRO rx**, overhauled. FM Vanguard, aligned 2m. Minimitter multi Q Heathkit 10W modulator. Motorola 60W 2m tx. CW handbooks. 1,500-0-1,500V .75A approx transformer. 4-25H 5kV .3A choke. 8µF 2,000V electrolytic. Offers. G4EZG. Tel 01-398 1106 after 6pm.

**FR101D**, all options except digital readout, exc cond, 18 months old, £300 ono. G8CGB, QTHR. Tel 0782 812367 evenings.

**Codar AT5**, T28, 12MHz mobile psu, control unit 12R/C, mains psu 250/S, mic, spkr, 160m whip/base, all connecting leads, £45 or exchange for comp wkg 2m fm mobile and whip, Cambridge or similar considered. G4ARI, QTHR. Tel Leicester 782655.

**TR2200G**, nicads, charger, mic, carrying case, 10½ch, manual, maker's box, perf cond, little used, £110. Bailey, 50 Waverley Avenue, Great Barr, Birmingham B43 7PR.

**18AVT antenna** with spare 80m loading coil and top whip, exc cond, £40, no offers. G4EOW, QTHR. Tel 0794 512475.

**Trio 7010 mobile 2m ssb tx/rx**, 144-1-144-34 fitted, £130. As new 2m 14-el long Yagi, £12. 8-el Yagi, £2. ½ mobile 2m whip, 50Ω, £4. Buck, G3LWT, 17 Sanden Close, Hungerford, Berks. Tel 048 86 3396.

**Pye Cambridge AM10B**, 2m fm, £25. Pye 2780 video monitor, £25. Hallcrafters SX28 rx, £15. G3TKQ, QTHR. Tel Colchester 74917 evenings.

**FT101 with FV101B**, 10-160m, £300. TH3 Mk2 with balun and lattice tower, 35ft, £100. Lafayette rx HA700, 110V, £30. G3XMA, QTHR. Tel 0203 69673.

**AM10B Cambridge**, good cond, highband, comp with handbook, comprehensive 2m conversion reprints, remote control switching/spkr unit, cable, £18 ono. Carr at cost. G3POG, QTHR. Tel Martins-town 372.

**Liner 2**, mint, £130. Cambridge AM10D, a.m./fm, fitted 145-00, 145-20, 145-50, 145-55, R7, £45. EC10, £30. 2m converter for Heathkit SB300 rx, £8. Transformer 350-0-350V 150mA, 6-3V 4A, £3. Lear jet radio and 8 track cartridge player, £20. G8CJM, QTHR. Tel Medway 47280.

**Eddystone EA12 rx**, as new, with manual, £130. Marconi CR100 rx, nice cond, £20. UM3 mod trans, £2. 350mA 5HY choke, £1. G3WEX, QTHR. Tel 021 354 4265.

**Liner 2**, with preamp, extra range mobile mount, manual, £120. Heathkit el-bug HD10, manual, fb cond, £27. Telford 2m converter, I. 28-30, £10. G3FNV, QTHR. Tel 35357.

**SF102**, HP23, TA32Jr, £280. DX60B, £30. SX28, £15. BC221, £18. Kyoritsu grid dipper, £8. 898 dial, £7. Eagle stereo, mf/vhf, cw spkrs, £20. Minibeam G4ZU, £19. Valves 813, £1. 6146, £1.50. G3DKE, QTHR. Tel Brimscombe 3956.

**FR101 digital deluxe**, 2-160m, brand new, cost £540, snip at £395. Eddystone EC10, as new, £90. 2m Paraband, new, £16. BC221, £16. Jim Taylor, 5 Luther Road, Winton, Bournemouth. Tel 50400.

**Coscor 20W fm mobiles**, 70-475/70-500/70-525, £65. TF801/A1, £35. TF1102 modulators, £20. TF1345/2 10MHz precision counter, overhauled, revalued, needs final adjustments, £50. Matching converters, mint, TM5951, 10/100MHz, £20. TM5952, 100/220MHz, £20. TM5953 time interval unit, £15. G3HTC, Tel Sunbury 84422.

**Shibaden SV700E video tape recorder**, 625, good cond, running on original heads, buyer collects, £170. G8BBH, QTHR. Tel Hatfield 64342.

**600W audio amp** made by Whitley Elec Co, comp in 6ft rack cabinet, handbook, clean cond, £45. Marconi tv camera with CCU psu, monitor, viewfinder, four lenses, circuit wkg order, £75. Three monitors, from £15 each. G8GQS, Tel Gainsborough 3940.

**Transformer**, tapped primary, secondary 2,000-1,500-0-1,500-2,000V at 1.75kVA, perf, £10. Europa 2m transverter with relay, coaxial etc, £40. 2m 6-el quad Jaybeam, £10. G2KA, QTHR. Tel Gunnislake 832777.

**339A double beam scope**, almost as new, £75. GPO type purpose built enclosed rack, seven chassis runners, approx 78in high by 22in wide by 16in deep, £55 ono. G3GKG, QTHR. Tel 01-399 2730 office hours.

**Heath (USA) HW16 cw tx/rx**, 80, 40 and 15m, 90W, £75, or exchange for Marine vhf fm tx/rx. *Wanted*: Good quality keyer paddle. GW3-TKG, QTHR.

**AVO electronic 97 range multimeter CT38**, with manual, £25. Sig gen CT53, 6-9-300MHz, six ranges, manual, £20. T/R power pack, 480V 175mA twice, 350V 225mA 6-5V 5A twice, £10. CV power pack, 25V 8A, £12. Sig gen TF144G, manual, £15. G4DVH, QTHR. Tel St Helens 53018.

**PR40**, little used, £10 ono. Heath IG-102 sig gen, as new, £25. 28yd UR67, unused, £10. 8E Yagi, £5. DX and American Callbook, £3. Buyers collect. G. Thompson, Tel 021 472 4678.

**KW Viceroy 3A**, £75. KW500 linear, £40. AVO electronic multi-meter, £15. Onan generator, 110V 350W, £30. Buyers must collect. Tel 0473 79186.

**QTH**, 17 miles north of London, Broxbourne, Herts, six years old, centrally heated, three bedrooms, semi-detached, through lounge kitchen, downstairs cloak room, bathroom, integral garage inc shack, roof mounted TA33 with BN86 balun with mast and guys rotator and feeder, £17,250. G3ZZQ, Tel Hoddeston 64896.

**Green Davis 2m/70cm tx**, a.m./f.m./cw, ac/dc psus, £50. Marconi base 2m fm tx inc psu, 6-40A pa, £25. Cambridge dash 2m, £25. Coscor high band C303, 12kHz plus handbook, £20. Vanguard AM25B, £8. 2m converter, £8. Prices negotiable. G4ERX, Tel Brentwood 225736.

**Heathkit 0-12U oscilloscope**, with manual, £35 ono. Professional transistor power pack, 12V dc in, 50V dc out, 500mA, £20 ono. Mechanical counters, four digit, 12-24V, £1.20 each. *Wanted*: Double beam scope. G3NXX, QTHR. Tel 0562 850570.

**FR50B rx**, 160-10m, 100kHz, bar handbook, no spkr, vgc, £75 ono. G3GVN, QTHR. Tel 021 706 7992.

**FT401**, unmarked, recently overhauled, perf order, £275. *Wanted*: G-whip. G3RWF, 55 Fox's Covert, Fenny Drayton, Nuneaton. Tel Atherstone 4161.

**QM70 70cm converter**, 28-30MHz i.f., £8. Microwave Modules 10W o/p transmit strip, £4. HW17 tx, pcb with valves, £2.50. HC25U 48-333MHz, 51-9MHz, £1 each. Coaxial relay, 12V, £4. Singer magic memory knitting machine, £45. Sherratt, 32 Springfield Way, Cranfield, Beds MK43 0JN.

**Blank QSL cards**, one type only, see for sample, adding call sign and address is on you, 8p each plus p&p. G4FDC, QTHR.

**Liner 2**, mic, mobile mount, vgc, £130. GM8AKB, QTHR. Tel 0968 72299.

**Heathkit IG-102 sig gen**, 100kHz-220MHz with internal 400Hz modulator and manual, as new, £25. Will exchange above and/or sea fishing tackle for hf tx, electronic keyer, trap vertical etc. G4FEQ, QTHR. Tel Leeds 863361 evenings.

**Trio QR666 gen cov all-mode comms rx**, in absolute mint cond, £125. G4CJY, Tel 0494 30018.

**Trio 9R59DS**, £30. Alan Staniforth, 7 Horsley Road, Rochester, Kent. Tel Medway 48932.

**Barlow Wadley XCR30 Mk2 gen cov (0.5-30MHz) rx**, good cond, snip at £80. Marshall, 322 Mountcastle Drive, North Edinburgh EH15 1NG. Tel 031 669 6652.

**Drake SSR-1 rx**, mint, £125 inc Securicor delivery. I. F. Meiklejohn, Castle Steps, Bayards Cove, Dartmouth, Devon TQ6 9AX. Tel Dartmouth 2583.

**Marconi TF955A/5 sig gen**, a.m. or fm, good wkg order, comp with service manual, £200 or offers. G8HJT, QTHR. Tel Bournemouth 767299.

**Trio JR310**, topband, 10AZ filter, calibrator, fm discriminator, spkr, £75. 120W phasing ssb/cw 80m tx with atu and psu, £25. G4EAG, QTHR. Tel 0277 219017.

**TV502 2m transverter for TS520**, mint cond, few hours use only, £125 ono. JVC type 3050 portable tv, with fm/mw/sw radio, mint and perf, £100. G8WS, QTHR. Tel Maldenhead 23239.

**FT101**, contest winner, good cond, £220 for this fine rig. G3ZER, QTHR. Tel Northwood 22085 after 7pm.

**Liner 2**, with handbook, mobile mount, mic, preamp fitted. Shack clearance, many old valves etc, see with your requirements. G4CUE, QTHR. Tel 0604 64007.

**QTH, Chesham, Bucks**, very good uhf site, easy access city on no-change Met line, two bedrooms, large living room, kitchen, garage, neighbours happy, £15,350 ono. G8AUG, QTHR. Tel 02405 71909.

**FT220, £230 ono**. Write first. G8LKF, 180 Victoria Street, Hartshill, Stoke-on-Trent, Staffs ST4 6HD.

**FL50B**, with vox, £65. FR50B with 160m and calibrator, £65. 4m boot mtg Cambridge on 70-26 a.m. with control and cable, £8. BCC69G 12V a.m. tx/rx, xtal tx, tuneable rx, £8. Collect or plus carr. G3KQF, QTHR. Tel Derby 27361.

**Multi 2000**, vgc, fitted preamp, cmos tone, original packing, manuals, £250 ono, or would accept IC202, FT2 Auto or why vhf/uhf in part exchange. *Wanted*: 23cm tripler converter, PF1 nicads, PF1 rx board. 144MHz Monitor rx. G8GHZ, QTHR. Tel Northampton 61794.

**DL6SW 2m converter**, 28-30MHz i.f., £10. Xtals, 72-025, 72-0937-MHz, £2 each. 11-155MHz, £1. 100kHz, glass, £1.50. 1.4MHz xtal filter, no data, lsb, £3. 10-7MHz xtal filter, 12-5kHz bw, £2. Z-match, 3-5-30MHz, £3. Postage extra. 8-el 2m Yagi, £3. G3LFM, Tel Reading 64712.

**KW dc psu**, with interconnecting lead, for mobile operation, suit KW2000 series, £15 ono. G4ANW, 16 Chestnut Drive, Broadstairs, Kent.

**Ham-M rotator (series 5)**, used but ok, £50. Heath HM2102 vhf swr/pwr meter, £10. Two Jaybeam 5XY/2m, used but ok, £5 each. All carr extra. G2BVN, QTHR.

**Pye Cambridge AM10D dash mount**, 6ch, tx fm, rx a.m., wkg on 2m, good cond, £40. 62 set, good cond, £30. Buyers collect. P. M. Cleaver, 86 Main Road, Dovercourt, Harwich, Essex. Tel Harwich 2195.

**Yaesu FT221**, few months old, original carton, manual, £295. Prefer buyer collects. KW p.e.p. meter and E-zee manual, offers. Four Eddystone CROC 24 by 5 coil formers. *Wanted*: Good compact air band rx. G3OUV, QTHR. Tel 021 327 2466 day, 021 354 7240 evening.

**Pye Reporter**, manual, £150. Marconi 600kHz B7G xtal, £1. Pair Philips 80Ω 3in spkrs, £2. 20W compact modulator, pair 6L6s, £2. WD 1mA meter, 100mA, round, 2 1/2in diameter approx, £1.50 each. G3MBL, QTHR. Tel 01-445 4321.

**Pye Cambridge boot mount**, 2m fm, single channel with control box and cable, £30. Two Pye Rangers, low band, high power boot mount, untested, with control box and cables, £10 each. Carr extra. G8JJC, QTHR. Tel Boston 68590.

**As new KW202, £140**. AVO8/9 Mk4 with leads, probes, £45. Very good B40D with all extras, £60. 1035 Mk3, 1049 Mk3, £18. CD513, £12. All ono. *Wanted*: Marine bands rxs. Hentall, 11 Union Street, Barnet. Tel 01-440 3534.

**1.4MHz ssb xtal filter**, Cathodeon BP4706/1, unused, £5. Miniature programming panel, 8 by 20, XY matrix with 24 diode pins, £5. Philips LBB5007/42 27MHz paging tx, as new, with antenna, £28. All post inc. G3YLQ, QTHR. Tel Luton 25595.

**10W of fm on 2m**, 8 out of 12ch fitted on this Denshi Kyokuto FM144-105A tx/rx, only a year old, worth £140 plus free ground plane antenna for personal call (selling for mortgage). G8KXP, QTHR. Tel 01-432 3436 office hours.

**JR599 rx**, 80-10m plus 2m, £150. CT378A 0.5-250MHz a.m. generator, calibrated, £45. AR22R rotator, £15. 25kHz fm 10-7 xtal filters, good used cond, £1 each. Eddystone ET8800 uhf mobile r/t moded for 70cm, £45. G8FZH, QTHR.

**Drake R4B**, MS4 spkr, 160m, £200. Icom IC21XT 2m fm 6ch tone-burst, mains 12V dc. KP202, 6ch, nicads, case, 20hrs use, £80. Marconi tx/rx H4000, ssb, 1-6-15MHz, mains 12V dc, £60. *Wanted*: 3TF7 for Collins R390. G3RCE, QTHR.

#### WANTED

**Pye Europa**, unmod, reasonable cond, good price given, G3CPG, QTHR. Tel 06845 2279.

**18AVT vertical antenna or similar**. G3YSG, 13 Cambridge Square, Wyton, Huntingdon, Cambs PE17 2JB. Tel 0480 51788.

**Meters**, rf 1A maximum. G4DRW, QTHR. Tel York 792662 after 5pm.

**Tx and psu** that will cover top band and if possible 80m, unable to collect. G6XJ, QTHR.

**Microwave Modules converter**, 28-30MHz i.f. o/p, neg earth. KW Vespa. For sale: Heathkit SW717 rx, fb swl. Walker, 16 Himley Road, Clayton, Manchester M11 4JF.

**Prop pitch motors**, any cond, state price. G3AXP, QTHR.  
**4CX300A air system socket**. 5A Variac. G4AEQ, QTHR. Tel 061 790 2662.

**Linear 10-80 with psu**, KW, Heath, Yaesu etc. G3HHD, Skirt Bank, Nether Siltan, Thirsk YO7 2LL.

**Beg or borrow** copy of circuit diagram for Cossor model 2000 scope, immediate return after copying. HQ1 Minibeam. Bauer or similar keying paddle. G3KNG, QTHR. Tel 09074 3134.

**KW1000 linear amp**, or equivalent, in mint cond, on exchange basis, for as new Eddystone gc rx model EC10A2. G4CMN, QTHR.

**Help!** Specifications of semiconductors and ics, Philco 14714356, 6812, 6809, 6815A, 6811, BTC 920CDC, F 21218, 749, ITT 956, M 1/272077C, 952, A 1127, 2051, AK/G ITT 001, Technitrol 1632, 5490, D7006. Will refund postage. G3YAO, QTHR.

**FV101 Mk2 vfo**. KW107 antenna tuning unit. G3XSI, QTHR.

**Drake L4B linear amp**. G3FXB, QTHR. Tel 040 376 342.

**Urgently required for purchase**, January and March 1972 issues of *RadCom* (green covers). Following hf gear: KW E-ze match, swr meter, lpf or why? P. I. Martin, G4AZC, 47 Rumsfield Road, Broadstairs, Kent. Tel 0843 20593.

**TH3 Jr TR1 band beam**, must be in good cond. G3LMH, QTHR. Tel 0962 881644.

**Murphy Rambler MR965**. Telecom TRT/2. Hudson FM208 hb. GU3HKV, 13 Clos du Murier, S.S., Guernsey, C.I. Tel 0481 47278, 6-7pm.

**TS184**, any cond. Thermocouples for TS118 a/p. G8AEN, QTHR.  
**Trio TX599**, or Viceroy Mk3A or A, would consider any other tx. 50Ω lpf, swr bridge, dummy load, 2m antenna. All items must be fb cond. All letters answered. G3WXT, QTHR.

**Marconi Marine morse key**. Exchange Heathkit amateur band rx HR10B with HRA10-1 xtal calibrator, exc cond, for Eddystone 850/4 rx, 10-600kHz, or Eddystone 770R vhf rx, plus cash adjustment. Robert Williamson, G13RNY, 13 Avonmore, Antrim Road, Ballymena, Co Antrim, N Ireland. Tel 41468.

**All Catholic amateurs**—join KSC net Monday, Wednesday, Friday, 7.45am to 8am, 3-685MHz to 3-695MHz, Saturday 11am same frequency. Listen for G3AKG, G3DSI, G4DIO, G3TLC, G3DAV, G4CCM, GM4DNM etc. Particulars G3AKG, QTHR.

**Eddystone 770R**, mint cond. P/X new radio cassette recorders, choice Bush, Murphy, Winthronics or new radios, I.D. Electronics or Wien digital clock radio Prinzsound. L. D. Ireland, 16 Cathebedron Road, Carnhell Green, Camborne, Cornwall TR14 0NA. Tel Praze 236.

**Linear amp**, hf, h/b or why? Up to £40 offered. KW p.e.p. meter. Macklin. Tel 01-890 7161 ext 24.

**Three Electronics wideband couplers**, type WBC for 1-8MHz, your price paid. GM3IAA, QTHR.

**For Northampton Radio Club**, transverters for 2 and 4m, Europa or similar commercial units preferred. G8GHZ, QTHR. Tel 0604 61794.

**HRO bandspread coil packs**, 3-5, 7-0, 28MHz. C. R. H. George, 8 Bellevue Lane, Emsworth, Hants PO10 7PX. Tel 3876.

**Active vhf amateur** seeks accommodation within reach of London, share in flat, bedsit etc, good vhf location essential. Responsible professional person. G8HAL/G4FRX, QTHR. Tel 01-602 5855.

**Help please**, has anyone an audio output transformer type 3A452 push pull, to replace the one burned out in my Hallicrafters S36 rx, stamped on transformer case is part no 55C019G, your price paid. G3SMY, QTHR.

**G8 going G4 requires Yaesu FT101**, FT101B or Sommerkamp FT250, must be reasonable, can collect up to 130 miles from Blackpool. Tel 0253 61916 5.30-6.30pm weekdays only.

**5FP7 long persistence tube** with deflection coils and focus magnet if possible. Colin Sykes, 15 Hereford Street, Oldham OL9 7SA. Tel 061 633 2306.

**KW2000B**, preferably with remote vfo, similar tx/rx considered. G3REP, QTHR. Tel 0242 28054.

**18AVT WB 10-80m vertical antenna**, in good cond. G3HAS, QTHR.

**Any uhf equipment**, from Pocketphones to base stations inc RCA pa modules etc. Bracknell UHF Repeater Group, c/o G8JWD, QTHR.

**Oscilloscope**, general purpose single or double beam, price up to £50. G3SUX, QTHR. Tel 01-656 9054.

**Heathkit DX40**, DX60 with vfo or Hallicrafters HT40, Viking, Elco, KW, Panda or Geloso. KW77 SX-111 or 888A, will collect. Harrison, 30 Highview Road, Farnborough, Hants GU14 7PU.

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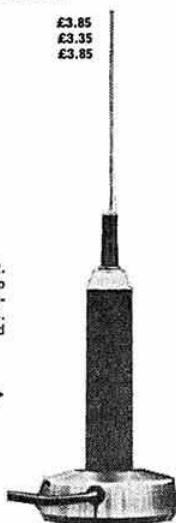
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ASPE667, easily adapt-  
able for use with other  
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with 10' RG-58U cable  
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OUTPUT FREQUENCY															
144-030	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144-4/433-2	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144-480	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144-600	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
144-700	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-000/SO	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-050/R2T	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-075/R3T	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-100/R4T	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-125/R5T	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-150/R6T	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-175/R7T	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-200/R8T	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-300/S12	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-350/S14	b	b	c	b	b	b	b	b	b	c	c	c	b	b	b
145-400/S16	b	b	b	b	b	b	b	b	b	b	b	b	b	b	b
145-500/S20	a	a	a	a	a	a	a	a	a	a	a	a	a	a	a
145-525/S21	a	a	a	a	c	a	a	a	a	a	a	a	a	a	a
145-550/S22	a	a	a	a	c	a	a	a	a	a	a	a	a	a	a
145-575/S23	a	a	a	a	c	a	a	a	a	a	a	a	a	a	a
145-600/S24	a	a	a	a	c	a	a	a	a	a	a	a	a	a	a
145-650/R2R	b	b	b	a	b	b	a	b	b	a	b	a	b	a	b
145-675/R3R	b	b	b	a	b	b	a	b	b	a	b	a	b	a	b
145-700/R4R	b	b	b	a	b	b	a	b	b	a	b	a	b	a	b
145-725/R5R	b	b	b	a	b	b	a	b	b	a	b	a	b	a	b
145-750/R6R	b	b	b	a	b	b	a	b	b	a	b	a	b	a	b
145-775/R7R	b	b	b	a	b	b	a	b	b	a	b	a	b	a	b
145-800/R8R	a	a	a	a	a	a	a	a	a	a	a	a	a	a	c
145-95	a	a	a	a	a	a	a	a	a	a	a	a	a	a	b

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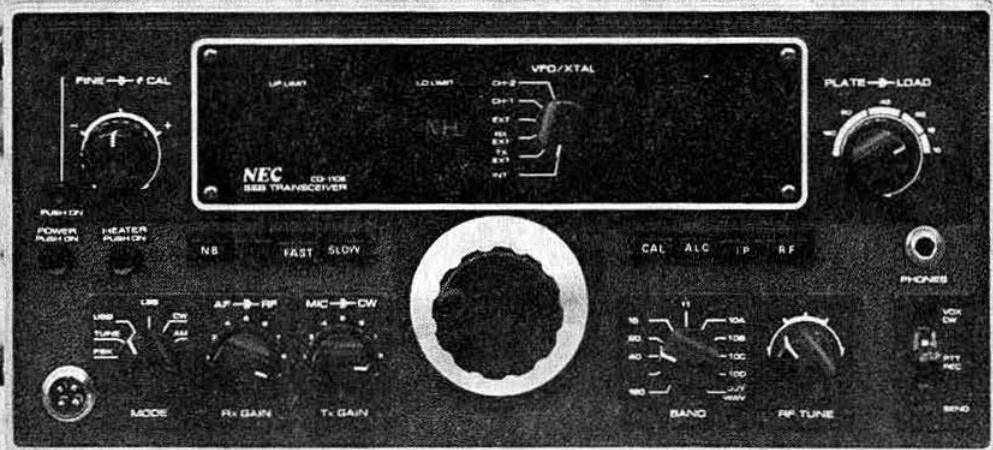
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Data sheet for UC/1 available free on request. Also available: Frequency-agile Audio Filter Model FL1; Universal RF Speech Clipper; details on request, or refer to our advertisement in the December issue.

- Gives complete no-gap coverage from 90kHz to 30MHz, in thirty switched 1MHz bands.
- Also operates as a 2-metre converter with receivers covering 28-30MHz.
- Two separate outputs are provided, one for 144-145MHz and the other for 28-29MHz receivers.
- No receiver modifications are required. Model UC1 simply connects in series with the aerial feeder.

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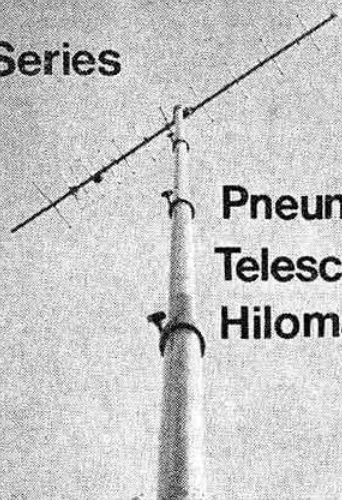
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# DON'T SAY CONVERTERS—SAY QM70

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## NO PRICE INCREASE ON CONVERTERS

### THEN LOOK BELOW:

**1296/28 CONVERTER:** 105.66MHz crystal oscillator. Hybrid ring mixer utilising schottky diodes. Dual gate MOSFET head amplifier. All UHF and SHF circuits use printed striplines. 25dB gain. 3dB noise. 23-30MHz I.F. £24.00

**432/28 CONVERTER:** 101MHz crystal oscillator. Two RF stages in cascade using printed stripline tuned circuits before AND after each stage. Dual gate MOSFET mixer for excellent cross modulation immunity. Gain = 30dB. Noise = 3.5dB. 23-30MHz I.F. £19.50

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All converters are fitted with BNC sockets as standard and operate from 9-15V negative earth. W2 are not aware of any other equipment in the same class.

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**QM70 ELECTRONICS LTD**, Severnside South, Bewdley,  
Worcestershire DY12 2DX, England. Tel. Bewdley (0299 400070)

So you want to get on to 70cm FM without the expense of purchasing another transceiver and you already own a 2m FM crystal controlled transceiver (TR7203, FT224, IC22 etc) ?

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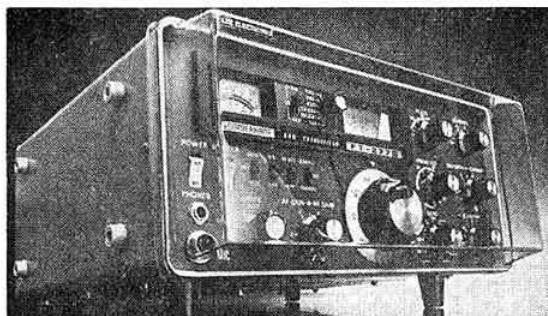
## THE COBRA

This unit is designed to be used in conjunction with a 2m fm transceiver to allow the operator access to the 70cm band in both simplex and repeater modes. The normal functions of the 2m transceiver are retained and 70cm operation may be achieved by the simple flick of a switch. 70cm received signals are converted down in a linear manner to the 2m band. 2m transmit signal is tripled in frequency to the 70cm band. Because the COBRA has its own built-in audio stages, frequency deviation on 70cm is pre-set from within the COBRA thus avoiding the necessity of any adjustments to the 2m transceiver.

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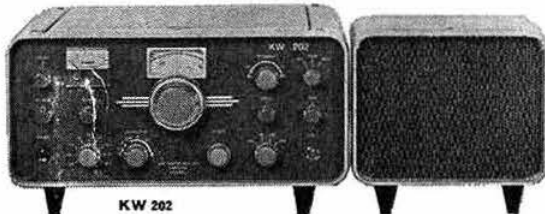
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	7.	4-000 to 20-999MHz	30ppm
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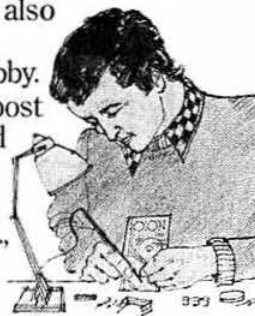
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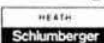
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LM58H

See our advertisements on p 80 January (2m) and p 153 February (70cm). Any of these can be supplied for use in the Glider, Marine, Aircraft or PMR bands. We can provide suitable cutting information. As previously mentioned all piece parts are available separately, and the following is a short list of the more common items:

All items normally grey, black to order.

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U58 (hinge H or screw S) 420-480MHz	£2.80
A58D (hinge H or screw S) 420-480MHz	£6.36

Carriage extra, bases 20p, short rods 70p, LM58 £1.60 (up to 5 items). VAT NOT INCLUDED PLEASE ADD 12 1/2%

We will be at many of this year's mobile rallies so collect your aerials and save carriage charges.

Current developments, hopefully available within a few months include mobile and fixed 23cm aerials and high gain low radiation angle base station colinears for 2m and 70cm.

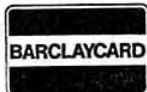
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**Greenpar (GE300015) Chassis Lead Terminations** (These are the units which bolt on to the chassis, the lead is secured by screw cap, and the inner of the coax passes through the chassis), 30p each, 4 for £1.00.  
**PL259 Plugs (PTFE)** Brand new, packed with reducers, 65p each or 5 for £3.00.  
**SO239 Sockets (PTFE)** Brand new, (4 hole fixing type) 50p each or 5 for £2.25.

## VALVES

**QVQV3/20A** (ex equipment) £3.00.  
**QVQV3/10** (ex equipment) 75p or 2 for £1.20.  
**2C39A** (ex equipment) £1.00 each.  
**DET-22** (ex equipment) 2 for £1.00.  
**6BH6** (ex equipment) 2 for 50p.

## TRANSISTORS

**OC200 Transistors**, 6 for 50p.  
**PNP Audio Type TOS Transistors**, 12 for 25p.  
**BFY51 Transistors**, 4 for 60p.  
**BYX38/300 Stud Rectifiers**, 300V at 2-5A, 4 for 60p.  
**BCY72 Transistors**, 4 for 50p.  
**BSX20**, (VHF osc/mult.), 3 for 50p.  
**BC108** (metal can) 4 for 50p.  
**PBC 108** (plastic BC 108) 5 for 50p.  
**BF152** (UHF amp/mixer) 3 for 50p.  
**2N3819 Fet**, 3 for 60p.  
**BC148 NPN SILICON** 4 for 50p.  
**BC158 PNP SILICON** 4 for 50p.  
**BAY31 Signal Diodes** 10 for 35p.  
**BA121 Varicap Diodes**, 4 for 50p.  
**2N3055 TYPE Transistors**, OK, but unmarked, 5 for £1.00.

**DIECAST BOXES**. We still stock these but, owing to frequent price rises from our suppliers, and costly postal charges, it has been found impossible to publish up-to-date prices on these items. Please ring, or write (with SAE), for latest mail-order prices.

## 4MHz XTAL PACKS

(10 assorted xtls between 4MHz and 5MHz), our selection only. £1.00 Pack.

**ALU-SOL ALUMINIUM SOLDER** (made by Multicore) Solders Aluminium to itself or Copper, Brass, Steel, Nickel or Tinplate, 16SWG with multicore flux, with instructions, approx. 1m coil 40p pack. Large reel £2.75.

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Standard Model £4.50.  
Skirted Model £4.95.  
Spare Nozzles 60p each.

## ALL BELOW—ADD 8% VAT

### MULTICORE SOLDER

Size 5 Savbit, 18SWG in alloy dispenser 32p.  
Size C1SAV18 Savbit, 18SWG 56p.  
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1Kg. (1-1lb) 60/40, 20SWG on Plastic Reel, £3.00.  
**WELLER TCP2 and PU20 PSU**. Temperature controlled soldering iron, with matching Power Supply Unit, containing sponge and spring stand. £27.00.  
**SPARE TIPS** (for TCP2). Three types available: TYPE CC7 (Standard). TYPE K7 (Long fine tip), TYPE P7 (Very fine tip) £1.00 each.  
**WELLER W60D** Mains operated temperature control soldering iron. £13.80.  
**SPARE TIPS** (for W60D). Two types available. TYPE CC7 (W60D) Standard, TYPE AAT (W60D) Finer tip. £1.15 each.  
**MAINS ISOLATION TRANSFORMERS**. Tapped mains input, 240V at 3A + 12V at 500mA output. New, boxed, made by Gardners. £12.00.

**WE NOW STOCK WELLER SOLDERING EQUIPMENT** (including the famous TCP1).  
**& SPIRALUX Tools** for the Electronics enthusiast... SAE for list.

**SPERRY 7-SEGMENT P.G.D. DISPLAYS**, digit height 0.3in red, with decimal points, 150V to 200V (nominal 180V) operation. These are high-volt industrial type, and therefore brighter than normal displays. All brand new. AT THE BARGAIN PRICE OF 50p PER DIGIT TYPE. 332 (two digits in one unit) £1.00 each, (sorry no single digit available.)  
**SUPER SERVISOL (SWITCH CLEANER)** 65p can.  
**SUPER FREEZIT (FREEZER)** 65p can.  
**HEAVY DUTY RELAYS**, 24V DC operated (will work on 18V) 3 heavy duty make contacts (around 10A rating) + 4 change over contacts + 1 break contact. New, complete with mounting bracket (ideal for switching HT on Linears). Many uses for this high quality unit. £1.50 each.

## ALL BELOW—ADD 12 1/2% VAT

**VARICAP TUNERS** Mullard Type ELC1043/05 Brand New, £4.40.  
TV plugs (metal type) 5 for 50p.  
TV sockets (metal type) 4 for 50p.  
TV line connectors (back-to-back skt) 4 for 50p.  
3 pin Din plugs, 4 for 50p.  
3 pin Line Sockets, 15p each.  
Din 6 pin Right Angled Plugs, 20p each.  
Din Sockets 5 pin, 270 deg. 4 for 50p.  
Din Speaker Sktn. 2 pin, 4 for 30p.  
Miniature earphones with min. Jack plug. 2 for 60p.  
1 Meg. lin pots 1/2" plastic spindle, 2 for 50p.  
50kohm lin pots, 1/2" plastic spindle, 40p each.  
**TWIN IF CANS**, approx. 1" x 1/2" x 1" high, around 3-5 to 5MHz, 2 separate transformers in one can, internally screened, 5 for 50p.

## ELECTROLYTIC CAPACITORS

**Dubillier Electrolytics**, 50µF, 450V, 2 for 50p.  
**Dubillier Electrolytics**, 100µF, 275V, 2 for 50p.  
**Plessey Electrolytics**, 470µF, 63V, 3 for 50p.  
**CC Electrolytics**, 1000µF, 30V, 3 for 60p.  
**Plessey Electrolytics**, 1000µF, 180V, 40p each, (3 for £1.00).  
**Dubillier Electrolytics**, 5000mfd at 35V, 50p each.  
**Dubillier Electrolytics**, 5000µF at 50V, 80p each.  
**ITT Electrolytics**, 6800mfd at 25V, high grade, screw terminals, with mounting clips, 50p each.  
**Plessey Electrolytics**, 10,000mfd at 63V, 75p each.  
**Plessey Cathodray Capacitors**, 0.04µF at 12-5kV DC. Screw terminals, £1.50 each.

A LARGE RANGE OF CAPACITORS AVAILABLE AT BARGAIN PRICES, SAE FOR LIST.

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**FULL MONEY-BACK GUARANTEE ON ALL ITEMS**

## NEW ITEMS THIS MONTH:

**ULTRA CUB FM** hand portables low band 25kHz channel spacing with helical antenna 1 watt RF output good condition untested, complete with leather case. £35.00 each. HP1FM Bantams low band FM two only, very good cond. less leather case two only £35.00 each

**EIGHT TRACK CAR TAPE PLAYERS** made by famous manufacturer output 4½ watts per channel less speakers Brand New no manufacturers guarantee at this silly price only £16.00 in original boxes. A few used but tested ones at £6.50, p/p 90p

**TRANSMITTER MULTIPLIER DRIVER BOARDS** low band approx 80MHz 250 mw output, size 6" x 1½" new with circuit £4.00 each.

**ARMED MODULATION METERS** type 210A 3-300MHz AM/FM very good condition £90.00 prefer buyer to collect by arrangement.

**PYE MONITOR RECEIVER** type R17FM, FM High band single channel, main input, 12½kHz channel spacing in own cabinet as new working OK Westminster type PCBs. £65.00

**MINIATURE ROTARY SWITCHES** 1" spindle approx 1" dia. 3 pole 11 way. make before break new 40p each. 3 pole 3 way (with off position) fitted with earth ring break before make 20p each.

**BNC 50 ohm sockets** single hole fixing 50p.

**BNC 50 ohm sockets** single hole fixing cable entry type 60p.

**PL259 plugs** 50p reducers 15p. SO239 sockets flange fixing with tapped holes 50p all with PTFE insulation.

**HC25/U** or style "K" crystal holders P.C. mounting or chassis mounting 12p each

**HP5082-2800** Hot carrier diodes new supply of this popular item 70p each.

**ST210 TRANSISTOR** FT 850MHz, HFE 20, VCE12, 200mw, TO18 can. OK Tx driver etc. 15p each.

**250pF COMPRESSION TRIMMERS** 10p each.

**FAIRCHILD DIGITAL CLOCK MODULE** type FCS100 with 0-8" display compact size 3½" x 1½" x 1" max depth. red filter, requires only a case—main transformer with a 12V ct sec. & a few push switches, facilities include: 50/60Hz, a.m./p.m. indicators, buffered output for alarm or radio drive 59 minute sleep timer 9 minute snooze alarm, 12/14 Hr switchable, alarm settable up to 24Hrs, etc. etc. can be run from external t.a.c. osc. if required our special price £11.75 each data sheet supplied, data sheet separate 20p inc. post.

**FM RADIO FRONT END TUNER** units 88-108MHz with 10-7 MHz I.F. output & fitted with A.M. gang, capacitor, FET RF amp, npn mixer, separate osc. AFC & AGC inputs, geared tuning band new with circuit requires 9-12V DC. BARGAIN ONLY £3.30 each.

**TBA641/A12 AUDIO AMP IC**, gives 2 watts output into 4 ohms with 9 volt supply (ideal for use with the CA-3089E FM IC we advertise) or for your home brew portable/mobile rig. £1.25 each data supplied.

**741 OP AMPS**, 8 pin DIL 35p each, 2 for 56p.

**10.7MHz CRYSTAL FILTERS** 25kHz channel spacing 445/LQU/909B ideal for FM Rx & replacement for PYE W15U Westminster etc. ex-equipment £2.50 each.

**50ohm BNC PLUGS** 50p each, 50 ohm BNC PLUGS for miniature co-ax 50p each, 50 ohm BNC right angle adaptors 60p each, 50 ohm BNC sockets flange-fixing (few only) 55p each, SO239 UHF sockets 50p each.

**IC SOCKETS** 8 pin DIL 10p each, 14 pin DIL 15p each, 16 pin DIL 16p each.

**SLIDE SWITCHES** 2pco 3 for 17p.

1" dia. solder in feed through glass insulators (silver plated) 100 for 60p.

**3 GANG TUNING CAP.** 365 pF per section direct drive 90p each.

1000 pF 500V feed through capacitors 1" dia. solder in type 10 for 15p.

**TUBULAR CERAMIC TRIMMERS** solder in type 1-6 of 8p each 10 for 70p.

150 MFD 16v electrolytic capacitors special offer 100 for £1.00.

0.1 MFD 400V capacitors P.C. mounting long leads special offer 100 for 90p.

**FND 507 LED displays** 1" characters common anode right hand decimal point. FND 500 LED displays 1" characters common cathode right hand decimal point. New

supply of this popular LED but sorry for price increase £1.25 ea.

2N3055 RCA new 50p each.

## ITEMS FOR FREQUENCY COUNTER FEATURED IN MARCH 1976 R.C.:

**MAINS TRANSFORMER** 240-250V input-outputs 250V @ 50 mA, 6-3V @ 1A, and 9V @ 1A. We had this item specially made £5.50.

**DECADE COUNTER PCB**, Made to suit our miniature ITT Nixie tubes (ITT5853S) suitable for use with 18 way 0-1" pitch edge connector if required, ready drilled and tinned to take SN7490, 7475 and 74141, 75p each set of five £3.40. 2" pitch edge connector to suit above PCB. 60p.

**MINIATURE NIXIE TUBES** ITT-5853S to suit the above decade boards left and right hand decimal points, 1" characters, envelope size only 7/8" x 7/16" new and unused with data sheet 60p each, five for £2.50, ten for £4.50.

**HC6/U CATHODEON** Crystal Ovens MCO-2M 45p.

10,000mfd 16V electrolytic 35p.

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SN7400 15p.

SN7413 35p.

SN7473 22p.

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SN74121 38p.

SN74141 75p.

SN74196 £1.40.

NE529K £1.45.

MC10116 62p.

MC16131 £1.60.

UA7805 5V regulator TO3 case £1.60.

**W30AM PYE WESTMINSTERS** 6 channel "P" band 79-101MHz. 25kHz channel spacing power output 30 watts plus; all solid state except for output stage which uses a QQ206-40, complete with all control equipment and in very good condition P.A. facility also fitted. All tested before despatch ONLY £60.00 + £2.00 P.P.

**EARNEST TURNER** precision edge-wise meters 100 microamp FSD small type display area 1½" x 1½", make nice "S" meter etc. scaled 0-100 new, boxed £2.50.

**10.7MHz RADIOTELEPHONE MARKER OSCILLATORS** size 3½" x 1½" x 1½" ready to use complete with internal battery, brand new stock £10.00 each.

**MINIATURE OXLEY PTFE** feed through insulators "drill 1/32" hole and push in" 50 for 75p.

**FERRITE RINGS** 9/16" dia. 7/16" int. dia. 3/16" thick 10p each. No gen.

**FERRITE BEADS** similar to FX1115 4 for 10p.

**10.230MHz HC6/U CRYSTALS** second conversion crystal 10.7MHz to 470kHz new £1.25.

**HC6/U CRYSTAL HOLDERS** mounted polythene P.C. or chassis mounting 10p each.

**FT243 CRYSTAL HOLDERS** chassis mounting 8p each.

**CRYSTAL FILTERS**

ITT 10.7MHz filters 50kHz channel spacing type 445/LQU/901A new £2.25.

ITT 10.7MHz CRYSTAL FILTERS 445/LQU/901N 25kHz channel spacing imp. 2-5k. new £4.00 each.

**MULLARD I.F. FILTERS** LP1175/2 ± 7kHz @ 6dB 80p. each with connecting data. 470kHz.

**10.7MHz** transistor IFTs single tuned approx 1" sq. 10p each.

**455-470kHz** transistor IFTs single tuned approx 1" sq. 10p each.

**COILS** 5mm dia. 18mm high with 10mm sq. base as used in PYE Rx RF boards these have coils wound on them which can be removed, complete with core 5p each.

**RF CHOKES** 17 microhenry, 22 microhenry, 100 microhenry 12p each, 10 microhenry 12p, 15 microhenry 12p.

**REED RELAYS** 14 pin DIL. Made by ASTRALUX, typed 121A-3, 5V 10mA coil res. 500 ohms, contacts rated 10 watts, normally open 45p each or 10 for £3.00.

**TAD100 A.M. RADIO IC**, £1.90.

**LEDs** TL209, 0.1 dia. FLV152 0.2 dia 18p each (no clips).

**ZENER DIODES** 400mV BZX88 or equivalent in, the

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**MINIATURE SEMI-AIRSPACED TRIMMERS**, similar to Mullard 808 series, 2-25pF 10mm dia x 7mm high three pin fixing, PC mounting 6p each, 10 for 50p, 100 for £3.75, box of 900 for £27.00.

**PLASTIC SEMI-AIRSPACED TRIMMERS** 7mm dia. 1-10pF similar to Mullard type 803 series 6p each or £5.00 per 100. 1-160F same price.

**CERAMIC 10mm dia.** x 6mm high, VHF/UHF type 2-8pF 3-10pF, and 10-40pF, all 6p each.

**3-9pF CERAMIC TRIMMERS** 6mm dia. 6p each.

**CERAMIC** miniature compression type 8mm x 13mm 10-40pF, 6p each.

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**NIXIE TUBES** similar to Mullard ZM1080, side viewing with wire end character height 1" only amber ones left. (No decimal point). Brand new 60p each, 10 for £4.50.

25 for £10.00, 100 for £30.00.

**NIXIE TUBES**

**ITT GN-9A** 1" characters (no decimal point) side viewing size 1½" x 1½" clear.

**7 SEGMENT LED DISPLAYS** forward voltage 1-7V @ 2-20mA/segment ideal for making digital voltmeters frequency counters, clocks etc. types available.

**FND357** (red) right hand decimal point 1" character, common cathode £1.05 each, 6 for £5.50.

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**AMPS** contains two NEC µPC1001H2 audio ICs plus 30 capacitors, 30 resistors, 4 transistors, on PC board 4½" x 1½" approx. 3½ watts RMS per channel @ 12 VDC supply. These have been removed from new units by the manufacturer and are not faulty in any way. Price £1.60 each or two for £3.00 you could not buy the capacitors for this price with circuit.

**ELECTRONICS SLOW MOTION DIALS** type "SMD2" 6-1 and 36-1 reduction drive with clear moulded front size 6½" x 4" supplied with two pointers and two scales, ideal for VFOs Rxs etc. £4.50.

**SEMICONDUCATORS**

Transistors

CIL108 plastic version of BC108 10p each, 10 for 90p.

NK7233D, 2G339, BC172, BC172A, BC172C, all 10p each 2N4381 P channel FET 15p.

BFY90 £1.00.

**VHF POWER TRANSISTOR** marked SRF1117 (Motorola) capstan type 300 mW in at 145MHz gave 2½ watts output. Max output 3 watts, only £1.00 each two for £1.75, four for £3.00.

**VHF/UHF** power transistor Texas type R2206 £2.00.

**VHF/UHF** power transistor Mullard type BLY38 £2.00.

**VHF/UHF** power transistor R.C.A. type 2N3375 £2.00.

61389 (2N5914) VHF power 2 watt output 470MHz, 5 watt output 145MHz, capstan type £2.00.

**BF180 VHF/UHF** transistors 20p each, 10 for £1.75.

**BF166 VHF** transistors (replacements for W15AM Westminster RF front end) 15p each, 10 for £1.25.

Diodes

1N4148 general purpose silicon 4p, 1N54A Germanium general purpose 4p.

U14582/2 general purpose silicon 3p, 100 £2.00.

1N4002 rectifier 100 pV @ 1 amp. 6p, 4 for 21p.

1N4005 rectifier 600pV @ 1 amp. 10p, 4 for 36p.

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BY126 rectifier 400pV @ 1 amp. 10p.

IN4001, 1/2/3/4 rectifier diodes. (Special offer). Full spec. marked, not rejects. 25 for 75p. State which required.

**CA3089E** 16 pin DIL. FM I.F. amp. Ideal for 10.7MHz FM I.F. amps in domestic Hi-Fi tuners and communications equipment, limiting sensitivity 12 microvolts. Internal squelch circuit and audio pre-amp + AGC, AFC, and "S" meter outputs supplied complete with data sheet, brand new unused our price ONLY £2.00 each.

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