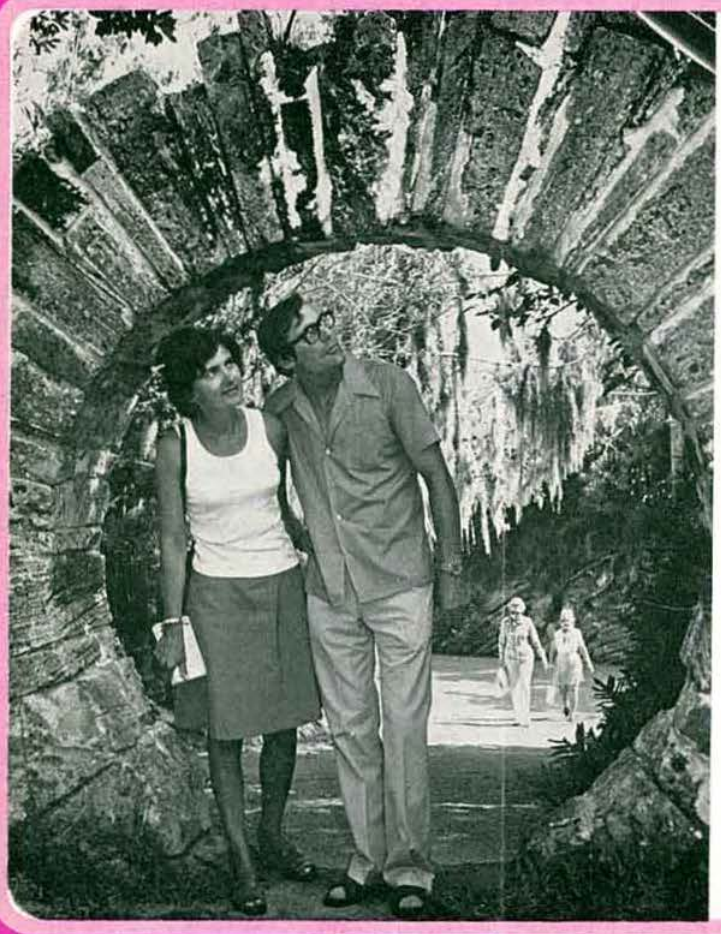
radio communication

December 1975



BERMUDA AMATEUR RADIO CONTEST

The UK winners of the 1975 Bermuda Amateur Radio Contest were Mr O. S. Chilvers and Mr Barry Marshall. Their awards were presented to them in Bermuda on 16 October.

Mr and Mrs Chilvers are seen here looking through a Bermuda moongate during their visit to the island.

Photo: *Bermuda News Bureau*

journal of the Radio Society of Great Britain

Two new products from Catronics

NEW 180MHz DFM

VHF DIGITAL FREQUENCY METER—Model DFM 5
The new updated version of the Catronics Frequency Meter now with extended frequency range up to 200MHz with a restyled cabinet and front panel.

- ★ Full 7 digit display.
- ★ I.C. memory giving a "non-blinking" display.
- ★ Automatic suppressed zeros on 3 leading digits to reduce power consumption.
- ★ TTL and ECL i.c.s. used to give good reliability.
- ★ 10MHz master oscillator for high accuracy.
- ★ 12V (−ve earth) dc input socket fitted.
- ★ 210–260V mains psu fitted. (Size: 8½" × 7" × 3" (approx.))

Price: £130.00 (incl. VAT). Delivery: up to 2 weeks
(Add £1.00 for insured post)

New low-cost miniature
REPEATER ACCESS TONE GENERATOR

MODEL RATG 1

A miniature version of the famous Catronics Tone Burst Oscillator is now available. The printed circuit board is a mere 1·7" × 1·1" (approx.) making it one of the smallest generators available. Power supply requirement is 8–15 volts at less than 5mA, making it particularly suitable for portable and mobile transmitters.

Price: £4.90 (inc. VAT). Delivery: ex stock.

CRYSTAL CALIBRATOR

Catronics model M6 giving outputs at 1MHz, 200kHz, 100kHz, 50kHz and 25kHz at the flick of a switch, with harmonics audible up to 2m band. 6 volt supply. Complete PCB module, accurately set to frequency and switch assembly—**£8.90.** Also available—kits of parts for regulator for operation on 9 to 20 volt supplies, **£1.60.**

Complete Boxed Unit with battery, £12.60 (+50p post).

AVAILABLE FROM

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THE SEASON'S GREETINGS TO ALL OUR MANY FRIENDS

NEW enlarged edition of our Data-Catalogue now available — 30p plus large 11p SAE

COMPONENTS FOR RADCOM DESIGNS

G6CJ STEREOCODE (Sept '75)
PCB, £2.90; Metal Cabinet, £1.55; 2P Socket, 25p; 3P Socket, 50p.
MiniKit 1 (containing all the above), £5.15; MiniKit 2 (all semiconductors), £5.40; MiniKit 3 (all Rs. & Cs.), £6.75.
SPECIAL PRICE FOR COMPLETE KIT, £17.00.

G3ZVC SSB TCVR (Sept. '74)
Complete kit with 8-pole filter, **£73.10** or with 6-pole filter (NOT recommended for HF band use), **£61.00.**

Add-on units also available: **2m Preamplifier Kit. Price £5.05. 12V to 6V Regulator/1W Audio Amplifier Kit. Price £7.65. 2m VFO Kit. Kit price £36.50. VHF Communications Edn. 1/71, 85p extra. Components for HF band preselector**—ask for details.

G3TDZ 2m TX/RX (Jan. '73)
RX—£21.20; TX—£10.50 (State Xtal frequency required). **MOD—£3.80** (transformer and board not available).

G3XGP Mini D.F.M. (Jun. '73)
Special price for complete kit with 1MHz clock modification—**£41.00** (Add 55p if hi-speed ics required for operation up to 30MHz).

And **MICROWAVE MODULES** converters etc.

NEW RESISTOR AND CAPACITOR PACKS

As it is now becoming increasingly difficult to buy resistors and capacitors, ARBBG is introducing a range of components as follows:

RESISTORS: "⅛W" carbon film resistor—7·5 mm × 2·5 mm. The Mullard CR25 series of resistors will dissipate up to ⅛W without overheating. These are higher stability than normal carbon composition resistors. Standard E12 values available 1Ω to 1MΩ at ±5% tolerance, 1·2MΩ to 10MΩ at ±10% tolerance. In order to keep prices down, they are only available in packs of 10 of any one value. **PRICE: 20p per pack of 10 resistors.**

CAPACITORS: Miniature plate ceramic capacitors. Standard E12 values, 1·8pF to 4700pF, 10000pF, 22000pF.

PRICE: To be announced.

NEW EXPERIMENTERS' P.C.B's.

We are extending our range of PCBs available and will soon be able to offer prototype boards to your own design at an attractive price.

The first of a series of "Experimenters" boards is now available for the: **PA0KSB PLL VFO described in Technical Topics (July '75 RadCom). Price £1.40**

This will be followed by a board for an FM IF strip. More details later.

We are also agents for **Mini-Beam** HF aerials, and **Jaybeam** VHF aerials. Write for free Price List (SAE please). **All prices include VAT at current rates.** Please note that our minimum UK post & packing charge, except where indicated, is 20p. Export orders welcome—write for export price list.
Cheques and P'O.s should be crossed and made payable to "Amateur Radio Bulk Buying Group" or pay by **GIRO**—Account no. 31 523 4008.

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radio communication

Volume 51 No 12 **December 1975** Price 40p

CONTENTS

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

ABC
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Advertising, other than Members' Ads, should be sent to the above address marked for the attention of Mr C. C. Lindsay. Tel 01-837 8688 (or 01-686 5839, advertising only).

A • •

The 2m Transverter TV502 is here
The TS520 system is complete

The TS520 System
TRIO have now completed the first stage of the total system concept for amateur radio equipment. With the TS520 and its associated accessories, the amateur radio operator can assemble a station to suit any or all requirements for his hobby enjoyment. All modes and all bands, fixed and mobile/portable are provided by the TS520 system.

SSB/CW Transceiver TS-520
A real "compact"; powerful, rugged and reliable. It has everything which otherwise is available only as an accessory at extra cost: built-in power supply for fixed-station use, transistorized DC/AC power converter for mobile operation, loudspeaker, fixed-channel provisions, VOX control, etc. And these are the TS-520's special features in short format:

Versatile Transmit- and Receive Operations—USB, LSB and CW on all radio amateur bands from 80m to 10m, and—with the aid of the 2m-Transverter TV-502—also on the VHF-band from 144 to 145·7MHz, as well as fixed frequency operation on four channels. The TS-520 also allows reception of WWV stations on 10MHz for dial calibration. By adding the External VFO-520 (optional) the TS-520 demonstrates utmost versatility: independent RX- and TX operation with different frequencies, transcieve operation with slightly variable RX frequency by means of the built-in RIT circuit (Receiver Incremental Tuning) plus fixed channel operation totalling nine different combinations.

Advanced Circuitry—With the exception of the transmitter driver and final stage which are equipped with blower-cooled vacuum valves of type 12BY7A and 2 x S2001 the TS-520 is fully transistorized. The semiconductor complement consists of 44 transistors, 18 FETs, 1 IC and 84 diodes. The reliability and stability of this circuit has been substantiated by numerous contests and during rugged mobile operation.

Outstanding Receive and Transmit Performance—The transmitter section of the TS-520 features separate driver, plate and final tuning, a 2-stage ALC circuit for local and DX operation, thus assuring undistorted clearly legible TX signals even after hours of continuous operation. Provision for linear amplifiers, such as ALC input, antenna relay switching output, etc., are available and ready for use. Dual-gate MOSFETs are employed in all critical receiver circuits to improve the input sensitivity, cross-modulation response and spurious rejection. An 8-pole SSB crystal filter in the IF amplifier provides exceptional selectivity and stability. An optional 500Hz CW filter is available as an accessory and can be installed at any time. The switch-selectable time constant of the AGC assures perfect reception of SSB and CW signals.

Precision-type VFO—a feature of all TRIO transceivers, transmitters and receivers also contributes to the supreme performance of the TS-520. The VFO is fully encapsulated and is controlled by a meshedgear dial drive (reduction ratio 4:1). Dial accuracy is better than ±1kHz, frequency drift will not exceed ±100Hz per hour. Dial calibration is accomplished by means of a built-in 25kHz crystal marker oscillator.

Built-in Power Supplies—for fixed station use with 120/240 VAC 50-60Hz line voltage or for mobile operation with 12-13·8 VDC by means of the built-in DC/AC converter.

Loaded with Extra Features: threshold-type RF gain control; semi-break-in circuit with sidetone; VOX/PTT/MOX-control; RIT; TUNE switch; LED function indicators for RIT, VFO and FIX channel operation; WWV receive pushbutton; 4-position fixed channel selector switch; built-in 25kHz crystal marker oscillator; two-stage AGC; multi-function meter; terminals for optional accessories such as: 2m-Transverter TV-502, External VFO-520, External Speaker SP-520, linear amplifier, headphone, microphone and key.

Optional Accessories
External VFO-520
Developed exclusively for the TS-520, this external VFO fulfils the same functions as a separate transceiver due to its numerous cross-operation and split frequency features. Design and specs of the VFO-520 are identical to those of the TS-520's built-in VFO. It operates on oscillator frequencies between 4·9 and 5·5MHz. Remote control and power supply are furnished by the TS-520 by means of a special interconnecting cable. In conjunction with the transceiver the VFO-520 provides a total of nine different operating modes, including RX or TX operation with continuously tunable frequencies and fixed-channel operation.

2 m Transverter TV-502
This new addition to the TS-520 accessory line extends the transceiver's scope of application to include the 2m-VHF range which is becoming more popular every day. The TV-502 transverts the 10m-band to 144-145·7MHz for SSB and CW operation. By installing an optional 39MHz crystal, the TV-502 will also cover the range between 145·0 and 146·0MHz, thus making the entire 2m band available for the shortwave radio amateur. The unit features preselector tuning on the antenna side and IF tuning by means of a multi-gang capacitor, utilizing the TS-520's ALC meter for tuning control. The TV-502's transmitter is controlled by the ALC voltage supplied by the transceiver and provides 10 watts RF output power. The highly sensitive receiver section responds to input signals of less than 0·3μV. Like the TS-520, this transverter can also be used for fixed or mobile stations, operating either from 120/240 VAC, 50-60Hz line voltage, or 12-13·8 VDC supplied by a car battery.

External Speaker SP-520
Styled to match the TS-520 accessory line, this 5in-speaker will greatly improve the readibility of RX signals, especially in DX operation. Voice coil impedance is 8 ohms, frequency response from 100 to 5,000Hz.

CW Crystal Filter YG-3395 C (not shown)
8-pole crystal filter for CW operation with 500Hz bandwidth at —6dB and 1·5kHz at —60dB, respectively.

Sole Importers
Lowe Electronics
Cavendish Road
Matlock Derbyshire
Tel: Matlock 2817/2430

TRIO

LOWE ELECTRONICS

TRIO

TS700

SPECIFICATION

FREQUENCY RANGE	144-146MHz	STABILITY	Better than 200Hz in any 30 min. period after warm-up
MODES	usb, lsb, cw, am, fm	REPEATER SHIFT	Standard 600kHz transmit downshift provided
VFO COVERAGE	144-145 and 145-146MHz	CALIBRATOR	Built-in 1MHz Calibration points
CRYSTAL CONTROL	22 Channel capability	DIAL READOUT	To better than 1kHz all modes
POWER OUTPUT	10W minimum	R.I.T.	4kHz shift of receiver with respect to transmit frequency
ANTENNA IMPEDANCE	50 ohms	NOISE BLANKER	Advanced circuitry noise blanker for noise free mobile or fixed operation
CARRIER SUPPRESSION	50dB		
SIDEBAND SUPPRESSION	Greater than 40dB		
SPURIOUS RADIATION	Better than −60dB down in all modes	ALC INPUT	Socket provided for ALC input from linear
DEVIATION	± 10kHz or ± 3kHz	AUX RELAY	Socket provided for switching external linear
REPEATER TONE	1750Hz Tuning Fork Oscillator	POWER REQUIREMENTS	120/240V 50/60Hz ac 12-16V dc negative earth
IF	10·7MHz for ssb, am, cw, single Conversion. 10·7MHz and 455kHz for fm, double Conversion	CONSUMPTION	Receive 45 watts ac 800 ma dc Transmit 95 watts ac 4A dc
SENSITIVITY	0·5µ for 10dB S + N/N		
IMAGE REJECTION	Greater than 60dB		
IF REJECTION	Greater than 60dB		
IF SHAPE FACTOR	Better than 2·1 all modes	DIMENSIONS (mm)	278 wide × 124 high × 320 deep
AF OUTPUT	Greater than 2W into 8 ohms	WEIGHT	11kg 24·2 lb

From the specification, it is obvious that the TS700 is an entirely new concept in two metre equipment. What is not obvious is the attention to detail which makes the TS700 such an outstanding performer. Take the fact that the driver and Pa transistors run from a 20V supply to give very linear operation and low intermod products. This supply comes from a patented TRIO inverter which runs even when on a 12V dc supply. Take the fact that you can peak all the 144MHz receive and transmit tuned circuits by a single knob on the front panel thus giving optimum gain on receive and very low spurious outputs on transmit; no broadband compromises in TRIO equipment.

There is so much more to say about the TS700. Why not call or send for details to find out why you must not consider any other two metre equipment until you have seen the TRIO TS700.

£300.00 (VAT EXCL.)

We all wish you a very Happy Christmas and a Prosperous New Year

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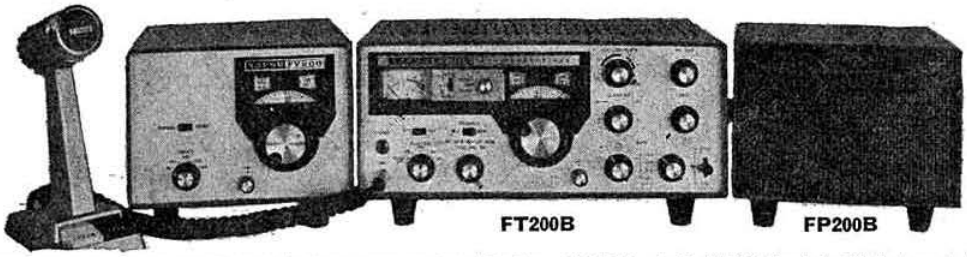
South Midlands

Take this opportunity of wishing you

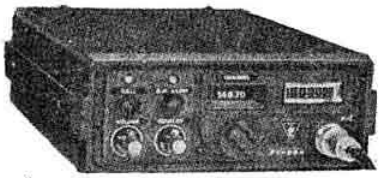
GOOD NEWS! LOWER YAESU PRICES!

As a result of negotiations with Yaesu Musen, and the slight recovery of the pound, we are able to reverse the upward spiral in prices. Contact SMC, SMC agents or SMC appointed distributors for details



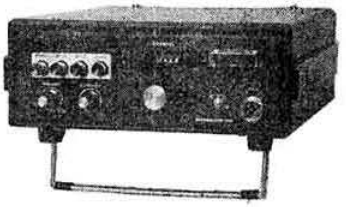
YD844
FV200
FT200B
FP200B

The FT200B is one of today's "best buys". Its features compare favourably with markedly more expensive units. 260W PIP (SSB/CW), 75W (AM), 1kHz read out on all bands, 3·5–4 to 28·5–29MHz (3 optional 10m crystals available), sensitivity 0·5μV for 10dB s/(s + n), selectivity 2·3kHz (6dB), 4kHz (60dB), 1·75 : 1 shape factor, solid state gear driven FET VFO with excellent linearity, 100kHz calibrator, VOX/PTT, clarifier (±5kHz) break in CW keying and sidetone monitor. The pre-mix oscillator gives superb signal handling and low noise capability of a single superhet whilst at the same time retaining a 9MHz IF, with high image rejection and single range VFO stability.



YAESU FOR TWO METRES

FT224 (ill. left) 24 channels
SIG 80R (ill. right) 80 channels
FT2 AUTO Unique auto tuning
FT221 "Facillime princeps wireless"
Please write for further details.



EXTENDED RANGE OF METERS

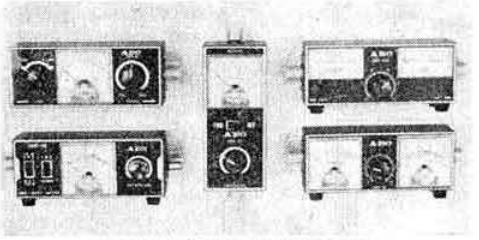
SWR10 (T.L.H.) (50/75 ohm) SWR only (±10% over 1 to 3 : 1) 1·5 to 160MHz T.O.S.

SWR20 (B.L.H.) (50 ohm) Power 10 and 100W FSD (±10%) Field strength and S.W.R. (±10% over 1 to 3 : 1) 1·5 to 160MHz **£9.90**

SWR40 (centre) (50/75 ohm) Field strength and SWR(±10% over 1 to 3 : 1) 1·5 to 160MHz **£7.80**

SWR50 A (T.R.H.) (50/75 ohm) Power to 1KW (±20% FSD) S.W.R. (±5% over 1 to 3 : 1) 3·5 to 160MHz **£9.60**

SWR50 (B.R.H.) As SWR50A (300μA) but 100μA movements **£11.20**

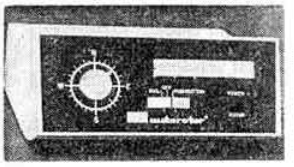


CUSH CRAFT RANGE

S.M.C. proudly introduce into the U.K. the CUSH CRAFT range which includes the world's most popular F.M. vertical antenna. (Carriage paid but plus VAT 25%).

RINGO RANGER 144MHz (illustrated left)
6dB over ½λ whip, uses 3 × ¼λ in phase and ¼λ stub. Ultra low angle radiation (approx. 10ft high) **£15.60**

Also:
ASQ1 2m squalo ½ horizontal, roof mounting **£10.50**
ASQ22 stacked squalo **£20.00**
ABW144 2m clover leaf (big wheel) horizontal omnidirectional 1dB gain over dipole **£12.00**
ABW125 stacking kit for above gives 4dB gain **£7.30**
AR2 2m Ringo vertical 3·4dB **£10.30**



ROTATORS

First time shown the control unit of the AR33. The deluxe version of the AR40 with a redesigned smart control unit incorporating 5 preset pushbutton positions and dial control. S.M.C. as main distributors also has the largest range of CDE rotators, in fact, over a 1,000 ex stock with spares, guarantee, and service at your disposal. See right hand page for details.

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For items sent by Securicor paid Barclay card or Access or cash with order and despatched the same day if humanly possible. (Yaesu sets sent by Securicor or small items post free of charge U.K. mainland.) Other items if under 50 lb weight and under 5ft length can be sent 24 hours by Securicor at cost. H.P. terms available.

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a Merry Christmas and Happy New Year

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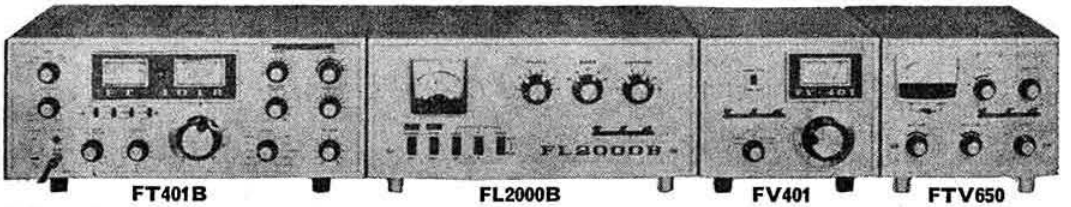


FT401B FL2000B FV401 FTV650

The FT401(B) and its accessories are depicted above, this installation provides an uncompromising approach to the home station. The FT401(B) can itself run over 500Ws PIP but when used as an exciter for the FL2000B and coupled to the FV401 external VFO (for split frequency working) provides a base station with the ultimate in DX appeal.

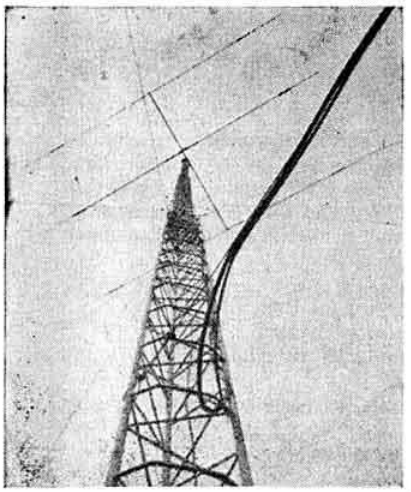
The FTV650 is a 6m transverter eminently suitable for modifications to the 70MHz band. 100W PIP (SSB), 50W (CW), 40W (AM/FM).

FP501 FT501

FT501 — LOWER PRICES!

Phone for details

The digital FT501 (80-10m) is an engineered blend of old and new techniques: valve front end and PA (for dynamic range and low intermodulation) and solid state devices (for high component density with exceptional reliability) combined with separate, shaped, crystal filters for upper and lower sideband (to avoid carrier shift) (1·6 : 1 shape factor!) and the optional CW filter (and switchable AVC). It offers to the discerning user a high power (500W PIP) yet compact home station.



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Versatowers (right), teletowers (left), Alimasts, Hamtowers, Telomasts are all available from S.M.C. who hold the largest stocks in the U.K. S.M.C. also design and manufacture commercial antennas and masts, supplying all leading U.K. communication companies, Crown agents, Government departments, and exporting to nearly 100 countries including the Antarctic.

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Send for free stock/price list of the largest range in the U.K. or for any specific technical data you require.

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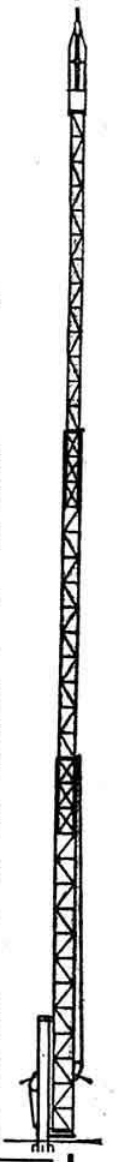
AR40 for Medium VHF small HF beams £30.00
AR33 de luxe version of AR40 £37.65
CD44 for large VHF, medium HF band £60.00
Ham II for large arrays .. £90.00
Control Cable:
5 core for AR30/40 .. .. 18p/yd
8 core for CD44/HII 27p/yd



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● Solid State 160 thru 10 Metre Transceiver

The world's number one transceiver now offers even more value and performance in one, compact, thirty pound package. An effective RF Speech Processor is a built-in integral part of this exciting transceiver. Now you can realize that extra talk power to cut through the pile ups—without the addition of a linear amplifier. Except for the final and driver stages, the FT-101E/EE features the latest in solid state technology, incorporating time proven, plug-in "computer type" modules for unparalleled reliability and serviceability. New lever type switches offer easier operation. Here is a complete radio station designed to go anywhere—ideal for today's active amateur. Just add an antenna and 12 volt DC or 100-234 volts AC for instant operation on 160 thru 10m. The FT-101E/EE is another step forward in amateur communications from the world's leader in communications equipment. YAESU—The Radio Company.

E MODEL WITH R.F. PROCESSOR
EE MODEL LESS R.F. PROCESSOR

Features

* Built-in AC and DC power supplies
* Built-in RF-speech Processor for increased talk power (E model only)
* 260 Watts PEP SSB, 180 Watts CW, and 850 Watts AM.
* Factory sealed, solid state VFO for optimum stability and accurate 1kHz readout
* Effective Noise Blanker, threshold adjustable, for elimination of noise spikes
* Built-in, fully adjustable VOX
* Automatic break-in CW operation with sidetone
* Selectable 25kHz and 100kHz calibrator
* ±5kHz receiver clarifier w/separate ON/OFF switch
* Built-in WWV/JJY reception
* Heater switch to shut off final tubes for conservation of current drain
* Reliable easy to operate lever switch
* Adjustable carrier level for tune-up and novice operation
* Built-in speaker
* High-Q, permeability tuned, RF stages to provide the performance required even in base station operation
* Includes dynamic, hand-held type microphone
* Indicator lights for interval VFO and clarifier operation
* Eight pole SSB filter for unparalleled selectivity on today's crowded bands
* All mode operation—SSB, CW and AM
* Built-in internal crystal control provision and Dual VFO adaptor
* Complete line of compatible acce ssories for flexible station design

IN THE YAESU MUSEN SUCCESS STORY

READ ON FOR THE MAIN THEME

Alignment Lines in Fukushima Factory

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This operates for about 6 months on one battery (provided). Ideal Christmas present for the shack or XYL. Available in red, blue, orange, ivory and brown: list your choice in order of preference.

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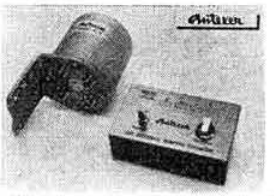

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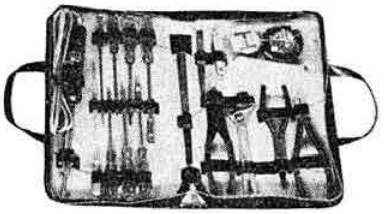

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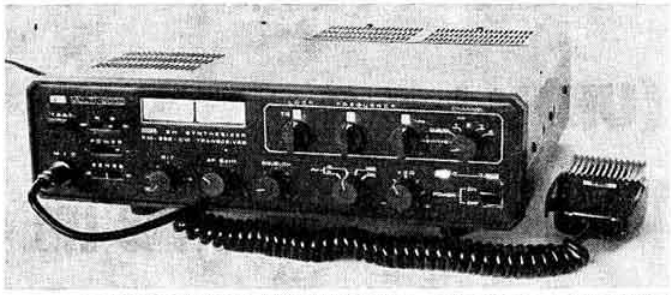

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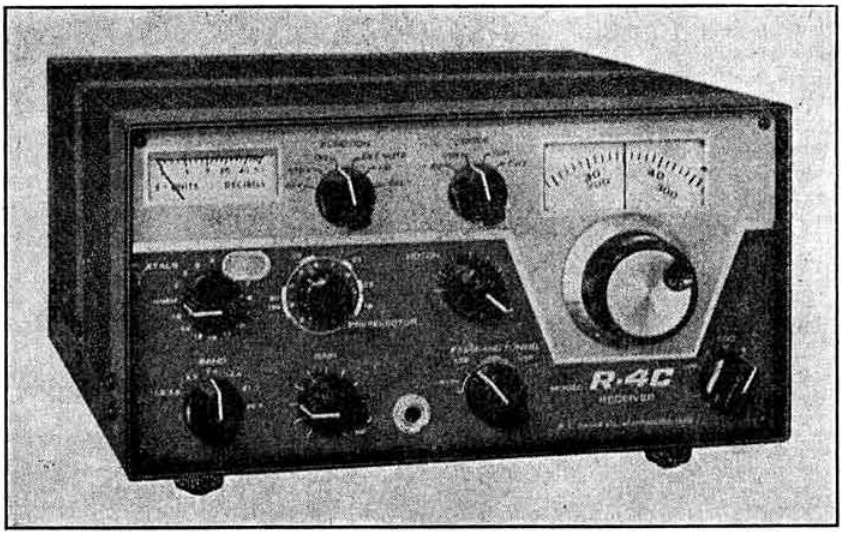

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GENERAL MANAGER AND SECRETARY
G. R. Jessop, CEng, MIERE, G6JP

EDITOR
A. W. Hutchinson

A seasonal message from the President

Time, it is said, is relative, and in this context it seems unbelievable that almost a year has passed since the memorable evening in Cardiff Castle when I had the great honour of being installed as the 41st President of the Society and the first President from Wales.

During my year of office I have had the pleasure of attending a number of Society functions, and social occasions and meetings of RSGB groups and affiliated societies. At all of these I have had extended to me a degree of kindness and courtesy which leaves me with many treasured memories.

Looking back on these experiences, and with a background of many years of Society service in various capacities, I feel I can say without fear of contradiction that the standard of enthusiasm for the Society, and particularly its international position, has never been higher. Indeed, direct evidence of this is available from the fact that there has been a very significant increase in membership during the year.

This year has proved a difficult one financially for the Society due to the problem of raging inflation, but changes which are contemplated, plus the fact that increased income should be available next year when the new editions of the *VHF/UHF Manual* and of the *Radio Communication Handbook* are on sale, should provide some easement.

I feel that I cannot let this opportunity pass without recording my gratitude to the many Society members who give so much of their spare time and energies to the tasks of manning committees, operating the representation scheme and carrying out work which is essential to the operation of membership services afforded by the Society.

To all members and their families I would like to wish a very happy Christmas, and a New Year which will bring us all a new sense of stability and an enhanced enjoyment of the many facets of the unique hobby which we call amateur radio.

Cyril H. Parsons, GW8NP

QTC AMATEUR RADIO NEWS

Increase in radio transmitting licence fees

The following is the text of a notice issued by the Home Office:

"The Wireless Telegraphy (General Licence Charges) (Amendment) Regulations 1975 have been laid before Parliament to apply from 1 December 1975 an 'across-the-board' increase of 60 per cent to all fees for standard radio licences, except broadcast receiving licences. Fees for standard radio licences have remained unchanged since 1968.

"Standard-form licences are specified in the Schedule to the Wireless Telegraphy (General Licence Charges) Regulations 1968. They include licences which authorize the transmission and reception of radio by ships, aircraft, mobile radiotelephones, radio-microphones, radio-paging devices, radars, radio beacons, radio amateurs and model control apparatus.

"Licences which are not in standard form are specially issued as required and fees for these will also be increased by 60 per cent.

"The increases are now necessary because the income from fees is no longer sufficient to cover the cost of licensing and administering the particular uses of radio".

As a result, the cost of an Amateur Radio Transmitting Licence will increase from £3 to £4.80.

Aerial and mast planning problems

Would all members who have appealed against refusal of planning consent for an aerial or mast, or against an unacceptable condition in a planning consent for an aerial or mast, please notify the general manager at RSGB headquarters. Information is required for a research project which will assist other members when faced with similar problems, and it is essential that it is obtained from both successful and unsuccessful applicants.

As a first step, all that is required is the name, callsign and address of the member, who will then be contacted by those undertaking this research.

RSGB lecture at the IEE

The Society lecture presentation at the IEE on 4 November attracted more than 100 members and guests. The speakers comprised members of AMSAT-UK, including Pat Gowen, G3IOR; Brian Bower, G3COJ; Martin Sweeting, G3YJO; and David Walland.

The development of the Oscar series of satellites was explained with the aid of many slides. G3COJ dealt with the operating characteristics of Mode B of Oscar 7, while David Walland described the various aids that are now available to assist in tracking. The development of the command station at the University of Surrey was described by G3YJO.

The Faraday Room at the IEE was filled for the occasion and the speakers are congratulated on an excellent presentation.

QSL Bureau

Because of the large number of unclaimed QSL cards held by the sub-manager for the G4DAA-G4DZZ series, members are advised that all cards remaining unclaimed at the end of 1975 will be destroyed. These cards can be collected by forwarding stamped self-addressed envelopes of suitable size to: Mr D. Buckley, 16 Wood Ride, Petts Wood, Orpington, Kent BR5 1PX.

Electronic calculators and the RAE

The City & Guilds of London Institute has decided that commencing this month, the use of pocket electronic calculators, in addition to slide rules and mathematical tables, will be permitted in their examinations. The character of set questions will not be altered because of this change but, as before, it may be specified within the content of a particular question that no aid to calculation is to be used and that all the working steps for the solution are to be shown.

This change was notified in a circular letter received at RSGB headquarters on 22 October, and was applicable to the RAE held on 1 December. Details were included in GB2RS broadcasts up to that date.

RSGB contest log sheets

The Society now issues one form of double-sided contest log sheet suitable for both hf and vhf/uhf contests. Small quantities of this log sheet may be obtained from contest adjudicators by sending them a large stamped self-addressed envelope.

In addition to this free issue of small quantities, larger quantities at 100 for 60p, including postage and packing, may be purchased from RSGB headquarters. This may be of assistance to clubs and societies.

Leicester exhibition

Once again the Society is indebted to the Mobile & Exhibition Committee members, and others, who organized and served on the Society's stand at the ARRA exhibition at Leicester. The Society would especially like to thank Norman Miller, G3MVV; John Hitchins, G8FBN; Phil Norris, G3ICI, and Willie McClintock, G3VPK, of the committee; and Robin Hewes, G3TDR; David Smith, G4DAX, Mr and Mrs Thomas, G3PSM; Ron Broadbent, G3AAJ, and Lionel Rose, G8FZP, who also assisted.

International Amateur Radio Club

The AGM of the IARC was held in Geneva on 7 October when new officers were elected and a new constitution was adopted. The new officers are: president, R. C. Kirby, W0LCT; vice-presidents: E. Robinson, F8RU, and R. F. Stevens, G2BVN; secretary: J. Rutkowski; treasurer: L. Jarrett, HB9AMS. Dick Kirby is the director, and Jerzy Rutkowski a counsellor, of the International Radio Consultative Committee (CCIR).

Following unsatisfactory operation of the equipment at 4U1ITU by visitors, a new policy and general regulations governing station operation are to be put into operation.

New members of the IARC will be welcomed, and a life membership is offered until 1 July 1976 for 50 Swiss francs. Membership applications should be sent to the Treasurer, IARC, Box 6, 1211 Geneva 20, Switzerland. It is hoped that a newsletter will be published twice a year for IARC members.

New prefixes

The ITU announces that in accordance with the Radio Regulations the callsign series D2A-D3Z has been allocated provisionally to Angola.

Oscar predictions

New orbit books for 1976 listing all AMSAT Oscar 6 and 7 orbits are available from Skip Reyman, W6PAJ, PO Box 374, San Dimas, California 91773, USA. The cost is $3, or 20 IRCs, post paid.

A hybrid ring converter for 70cm

by L. WILLIAMS, G8AVX*

THE converter to be described is built round a hybrid ring mixer using hot-carrier diodes. The hybrid ring mixer is commonly used for frequency conversion at frequencies above 1GHz where its dimensions become practical.

This type of mixer has many properties which render it attractive to the home constructor. It is simple to make, and its wideband characteristics make local oscillator injection much easier than in the case of cavity mixers, and also render tuning devices and precision construction unnecessary. When used with hot-carrier or Schottky diodes, which may now be obtained at reasonable cost, excellent performance combining low mixer noise, cross-modulation and conversion loss may be anticipated.

The principal obstacle in realizing the potential of this circuit on 432MHz is simply physical size. A conventional hybrid ring with air dielectric for 432MHz would be more than 300mm in diameter. The solution is to fold the ring in such a way as to make its dimensions more acceptable without prejudicing its desirable characteristics.

Since not all readers will be familiar with the hybrid ring mixer principle, it will be briefly described. The hybrid ring is a transmission line in the form of a closed ring $3\lambda/2$ in circumference, with four ports, each separated by $\lambda/4$. Mixer diodes are connected to two ports located $\lambda/4$ on each side of the local oscillator port; the signal is injected into the remaining port which is $\lambda/2$ from the local oscillator port and $\lambda/4$ and $3\lambda/4$ respectively from the two mixers.

The mixers are thus fed in phase by the local oscillator and in antiphase by the signal, as in some other types of lower frequency balanced mixer. This arrangement has the further advantage of providing a considerable degree of isolation between signal and local oscillator circuits.

In home construction the transmission line is usually an air-spaced strip line, suitable low-loss uhf dielectric materials being difficult to obtain and expensive.

Folded hybrid ring mixer

The ring (Fig 1) is folded into four parallel $\lambda/4$ sections, plus a $\lambda/2$ section which is folded and bent to close the ring. By these means the ring is reduced to a manageable rectangle and the mixer ports which are electrically $\lambda/2$ apart are brought into close physical proximity. Screens between adjacent legs of the folded ring are necessary.

The ring may be cut from any suitable light-gauge sheet metal: brass, copper or aluminium. Holes of 10mm diameter are drilled to form the inside radius of all bends and are then connected by shears or fretsaw. The ring is finished by filing to size.

The prototype ring was made from double-sided $\frac{1}{32}$in pcb with the copper on both sides connected at each port so that no potential difference existed between the upper and lower conductors. The board was therefore not used as a dielectric.

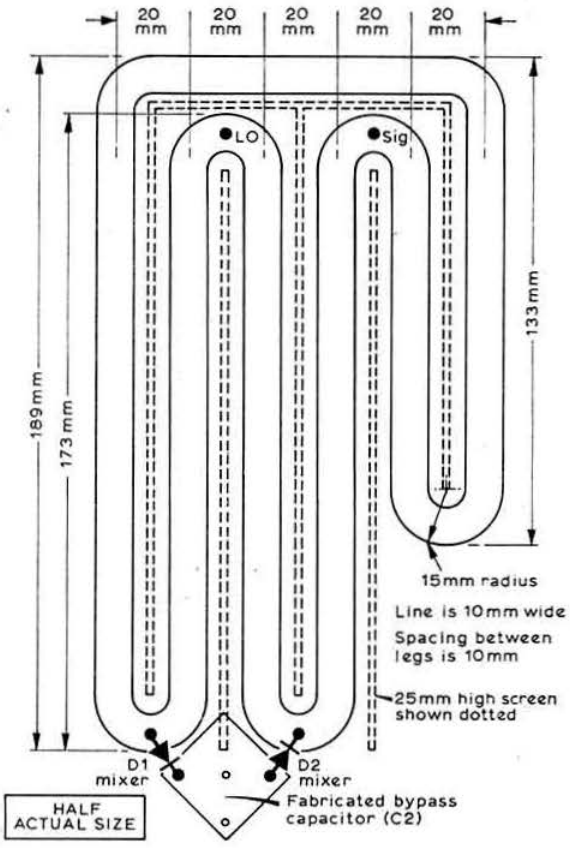


Fig 1. Folded hybrid ring mixer for 432MHz

Holes are drilled at the port positions and the ring is mounted 10mm above an earth plane, which may be sheet metal or copper laminate.

In the prototype, coaxial sockets were used for the signal and local oscillator ports and small stand-offs elsewhere.

Screens 25mm high are fixed to the earth plane between the adjacent legs of the folded ring. A specially-fabricated signal-frequency bypass capacitor for the mixers is made by fixing a 25mm square of single-sided $\frac{1}{32}$in pcb to the earth plane with a thin film of epoxy resin. This capacitor has a value of approximately 40pF.

The inter-line screen is undercut so that it may be positioned to allow minimum connection lengths to the mixer diodes. Motorola MBD102 diodes in miniature plastic "L packs" were used in the prototype; these are supplied with leads about 4mm long and were soldered between the ring and the bypass capacitor. Other types of uhf hot-carrier diode mixer in glass or strip-line packages would be equally suitable.

The hybrid ring mixer may be used as it stands by connecting an aerial and a local oscillator to the appropriate ports and taking the i.f. from the bypass capacitor. When the i.f. signal is fed direct from the mixer into a very good communications receiver quite acceptable results will be obtained, although the lack of gain will be apparent.

* 25 Streetsbrook Road, Shirley, Solihull, West Midlands.

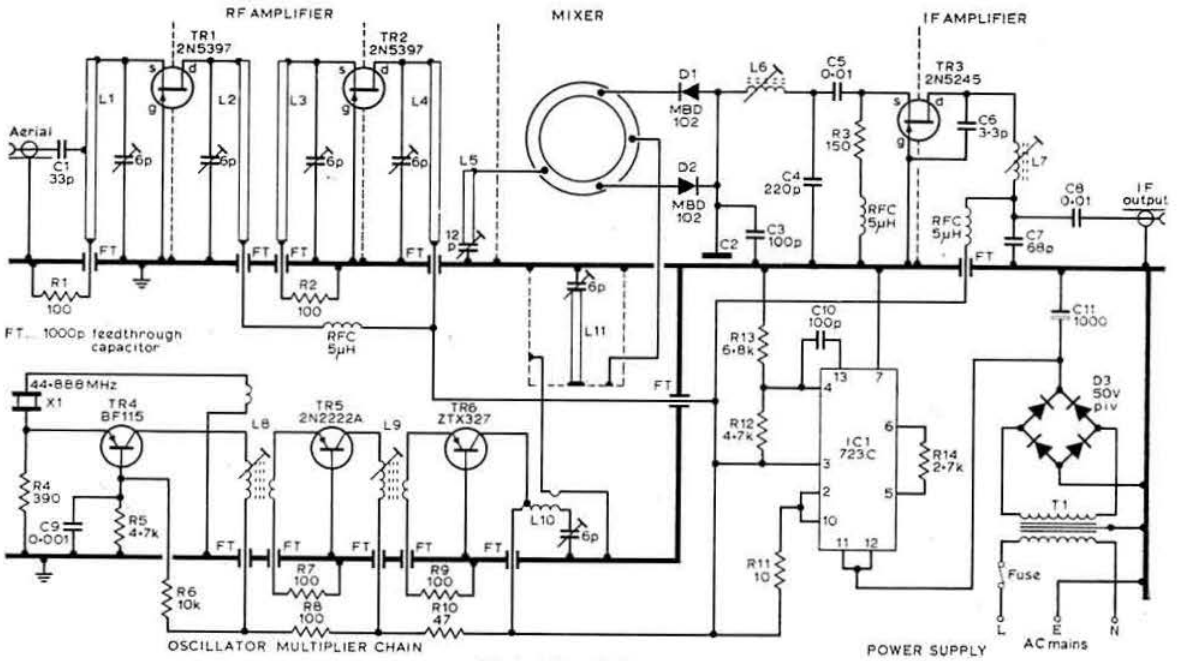


Fig 2. Circuit diagram

I.F. amplifier

In the prototype an i.f. amplifier using a low-cost 2N5245 fet is employed after the mixer: see Fig 2. Because the low noise factor of the mixer makes very weak signals readable given sufficient gain, and because little selectivity is obtained before second conversion, the noise factor and cross-modulation performance of this first i.f. stage is important.

The i.f. impedance of the mixer is low and the grounded-gate configuration is the most suitable for direct connection to it. In practice a pi-network was used to provide a slight impedance change combined with an extra i.f. tuned circuit and low-pass filter function. The fabricated capacitor is padded to the required value by adding a silver mica type in parallel. The circuits shown are designed for an i.f. of 28-30MHz, but may be easily modified for other frequencies.

The first pi-circuit will have very flat tuning and is not at all critical. The drain circuit is matched to a 75Ω output by another pi-network, this time designed for a loaded Q of about 15. It is important that this i.f. output is terminated in the correct impedance or the required bandwidth will not be obtained. The published design procedures for pi-networks [1, 2] may be used to design networks for other intermediate frequencies or impedances if required.

The i.f. amplifier shown provides about 12dB voltage gain and makes the converter much less dependent upon the tunable i.f. performance. It is especially desirable if the converter is located some distance from the tunable i.f.

Local oscillator

The local oscillator used in the prototype has a 44·888MHz overtone crystal oscillator, followed by two grounded-base tripler stages. This arrangement has the merit of simplicity. Other crystal frequencies and multiplication factors are of course possible. There are, however, two important differences between the hybrid ring and bipolar/fet mixers in respect of local oscillator injection.

Crystal oscillator multiplier chains have outputs at other multiples of the starting frequency as well as the desired injection frequency. With narrow-band mixers this is of less consequence, but the hybrid ring mixer has little discrimination against these unwanted injection frequencies. If inadequate pre-mixer selectivity is present, strong out-of-band signals, for example uhf tv, will mix with higher injection harmonics, resulting in products falling within the desired i.f. band. To prevent this a high-Q filter is interposed between the output of the multiplier chain and the mixer. In the prototype this is a $\lambda/4$ line with the input and output loose-coupled by short loops on opposite sides of the line. The tuning of this line is very sharp and if a piston trimmer having a finer adjustment thread than the Mullard type used in the prototype is available it should be used.

The other important requirement of the hybrid ring is mixer drive power. Reference to Fig 3 shows that although drive level is not at all critical 1-10mW per diode will be required for the best performance. This is quite a high power when compared to the requirements of a fet or bipolar transistor mixer. As a rough guide, allowing for the final tripler efficiency, filter and coupling losses, the final tripler must be driven to approximately 100mW dc collector input. It is common practice to use tv front-end transistors such as the BF180 as the final stage of oscillator chains for uhf converters. These are not suitable at the level required for hot-carrier diodes. Their forward agc characteristic results in increased collector current causing reduced gain.

A low-cost plastic uhf power amplifier type, the Ferranti ZTX327, gave excellent results in the prototype when driven to about 8mA collector current.

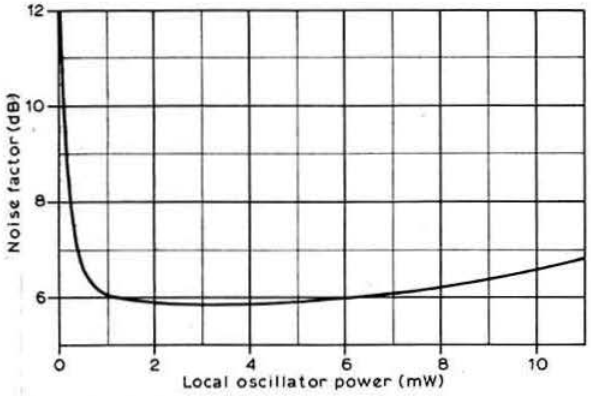


Fig 3. Noise factor v local oscillator power for typical uhf hot-carrier diode mixer

The collector current may be monitored by a voltmeter across the emitter resistor. A temporary Lecher line strung across the shack makes an excellent absorption wavemeter for selecting the desired harmonic from each stage when tuning up the oscillator multiplier chain. For an injection frequency of 404MHz the nodal points will be 371mm apart.

RF amplifier

Although the hot-carrier diodes give the mixer a very low noise factor (typically 6dB), it will benefit from a low-noise rf amplifier. A pre-mixer gain of not more than 20dB is desirable, and if the already good mixer performance is to be enhanced very good amplifier devices are required. FETs were preferred to bipolar devices due to their better cross-modulation performance. Two stages operating in grounded-gate configuration were used for simplicity in preference to a single grounded-source stage. This would have provided sufficient gain but would have required neutralization, which can be very critical to adjust for optimum noise and gain performance.

Unfortunately devices characterized for noise factor and gain at 432MHz are not cheap. The prototype used the 2N5397, which has typically 10dB gain and 3dB noise factor in the circuit given. Other types have been substituted with success. The cheaper 2N4416 works well with a slight reduction in gain, and so does the low-cost 2N5245, with, however, a noticeable reduction in gain and increase in noise factor.

The tuned circuits in the rf amplifier are simple lengths of 14swg copper wire bent as required. L2 and L3 (also L4 and L5) are parallel spaced 12mm apart. The FETs are fitted in holes in the interstage screens so that good screening between the source and drain circuits is obtained. The gate and case terminals are soldered direct to the screen with lead lengths not exceeding 1mm.

No adjustment of the rf amplifier is required other than to peak all the tuned lines for maximum signal output.

Construction

Although all the sections described were built into a single structure, each was built as a separate circuit with coaxial sockets for the signal terminals, inter-section connections being made with short coaxial links. If desired the sections may be permanently wired together and the expense of plugs and sockets avoided. The modular section arrangement has, however, much to recommend it. For example, the rf stages may be removed and the aerial feeder connected direct to the mixer when an aerial preamplifier is used.

A second oscillator multiplier chain allows an instant band change (there is no mixer tuning to adjust). Thus the converter can be rapidly switched to tv, satellites, or the French 70cm band. For the experimenter, comparisons may be readily made by plugging in experimental sections or taking signals out for other converters. If it is required to experiment with mixer injection, tv aerial attenuator pads may be inserted between the oscillator and mixer without disturbing the circuit.

The converter is designed to operate from a 12V negative-earth system and is therefore suitable for operations from a vehicle battery. The total current drain of approximately 50mA makes operation from dry batteries rather expensive. A mains psu for fixed-station operation is therefore included in the assembly. This psu uses the 723 ic regulator which gives excellent regulation at load currents up to 65mA with a minimum of external components and at a modest cost.

Since the sections in the converter are independent their physical locations are not critical and no precise dimensions need be maintained. The only important features are adequate screening and filtering of the supply input to each section. The two cylindrical feed-through capacitors in the psu side

Components list

R1, 2, 7, 8, 9	100Ω	**C9**	0·001μF	ceramic disc
R3	150Ω	**C10**	100pF	polystyrene
R4	390Ω	**C11**	1,000μF	25V electrolytic
R5, 12	4·7kΩ	**FT**	1,000pF	feed-through (discoidal for rf amplifier)
R6	10kΩ			
R10	47Ω	**Trimmers**		
R11	10Ω		6pF	Mullard ceramic tubular except that for L5, which is 12pF
R13	6·8kΩ			
R14	2·7kΩ			

All resistors are ¼W.

C1	33pF	silver mica	**TR1, 2**	2N5397
C2	40pF	see text	**TR3**	2N5245
C3	100pF	silver mica	**TR4**	BF115
C4	220pF	silver mica	**TR5**	2N2222A
C5, 8	0·01μF	ceramic disc	**TR6**	ZTX327
C6	3·3pF	ceramic tube		
C7	68pF	silver mica	**IC1**	723C ic regulator

D1, 2	MBD102 hot-carrier diodes
D3	50V piv rectifier bridge
X1	44·888MHz 3rd overtone series-resonant
T1	mains transformer, 15V 75mA secondary
L1, 3	40mm 14swg
L2, 4	30mm 14swg
L5	25mm 14swg
L6	7t 20swg close-wound on 7mm former
L7	34swg close-wound, winding length 8mm, on 7mm former
L8	12t 34swg close-wound on 7mm former. 3½t 34swg coupling to TR5 close to cold end. 1½t thin bell wire wound over for crystal feedback
L9	7t 22swg, spaced own diameter on 7mm former. 2t thin bell wire coupling
L10	2t 20swg 12mm long, 5mm i.d. Coupling 1t thin bell wire at cold end. Collector tapping at ½t
L11	12mm wide strip 90mm long in 25mm square. Trough line with 15mm long coupling loops
RFC	5μH (Radiospares 1A tv choke)

screens are professional pi-section filters but ordinary 1,000pF feed-through capacitors will be adequate.

The prototype is housed in a large die-cast box, although an inverted aluminium chassis or any other shallow metal box will serve equally well.

All the components used are available from the usual mail-order houses except the MBD102, which was obtained from Jermyn Industries, and the 2N5397, which is available from Siliconix distributors.

All metalwork and assembly can be carried out with the normal hand tools found in any amateur workshop. Almost all the prototype was made from copper laminate off-cuts, cut with a small hacksaw and soldered together.

No special test instruments are required for setting up. Some form of absorption wavemeter for setting up the oscillator multiplier chain will be helpful, but if one is not available a signal should be found on the band and all trimmers adjusted for maximum S-meter reading. Provided the inter-stage screening is adequate that is all that is required to obtain a very high performance.

Conclusion

The prototype has been used for over a year under various conditions at the author's QTH, which is in line-of-sight with Sutton Coldfield, 10km away. It is the only converter tested on this site which is completely free of tv cross-modulation effects. The noise factor has not been measured but it is sufficiently low to make externally-generated noise the limiting factor on most very weak signals when the converter is used with a tunable i.f. having an s/n ratio of 10dB at 2μV.

References

[1] *Radio Data Reference Book*, RSGB, pp27-31.

[2] *Radio Communication Handbook*, RSGB, p6.41 to p6.42.

Ham-M operation for the blind

by T. G. MAIN-BAILLIE, ZE4JS*

TWO years ago, ZE1DO (a blind operator) moved to a new home, and the previous strong-arm method of beam rotation was no longer possible. He had bought a Ham-M Series 5 and intended to operate this by timing. Obviously, this would have been most inaccurate and a method of indicating the motor bearing by sound had to be found.

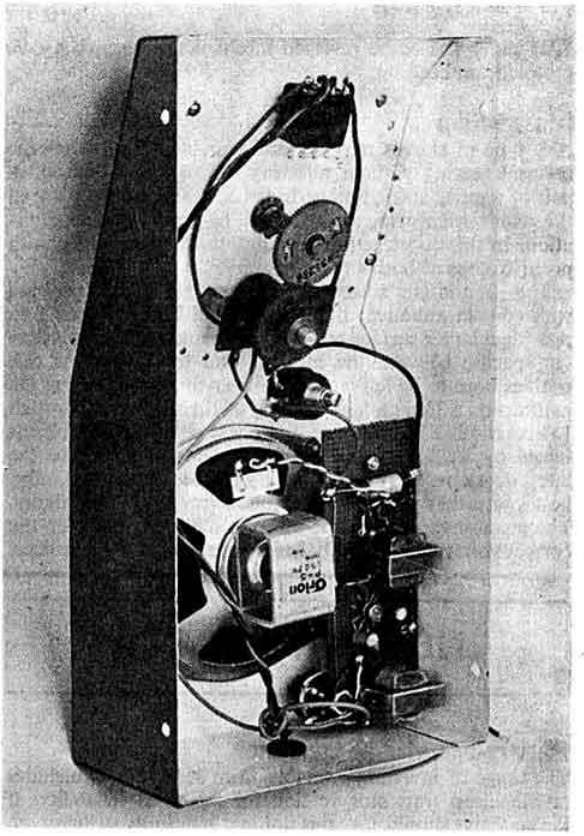
The author, also a Ham-M owner, considered injecting an audio tone into the circuit, but this idea was rejected since a tone is already present in the form of an ac ripple. The possibility of ruining a brand-new rotator by altering the internal circuits caused the author to devise the unit described below.

This unit has the following advantages:

1. It is simple to construct and use.
2. Normal visual operation is available at the flick of a switch.
3. It requires only two connections to the control unit connection strip.
4. It is more accurate than the meter indication.
5. The beam heading may be found by rotating the knob for a null in noise or by turning the beam/motor to a pre-set bearing.
6. The unit is self-powered.
7. The rotator re-sale value is not reduced by modifications.

Two disadvantages are that an additional connection is required for the earth return from the motor to the audio, and also that the audio output is not a pleasing sound.

* 45 Spruit Road, Hatfield, Salisbury, Rhodesia.



Circuit description (Fig 1)

The visual indicator is of the balance bridge type and the audio unit works on the same principle. When the bridge is balanced a voltage null occurs but in the unbalanced state a ripple voltage is present. This ripple voltage is stepped up by T1 and amplified by the ic. The diode noise limiter is useful when RV1/RV2 are completely unbalanced. The position of

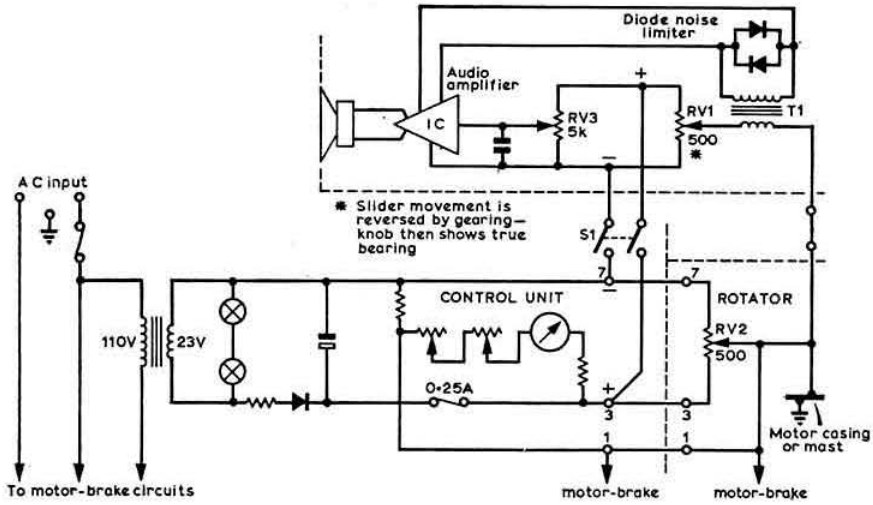


Fig 1. Circuit of the unit, showing connections to control unit and rotator

RV1 slider has to be reversed mechanically to give a true motor/beam heading.

Construction

Any type of chassis may be used provided it supports the reversal gearing without allowing slippage or backlash. A pair of receiver string tuning drums could be used in place of the gears with a string arranged in a figure-of-eight configuration. In this construction the knob must be provided with positive stops at both ends of its travel.

The $\frac{1}{8}$in and $\frac{1}{4}$in ball-bearing markers are fixed in position with contact adhesive; the holes should be countersunk to provide a larger surface area. There should be no more than $\frac{1}{4}$in spacing between the markers and the pointer as this enables both to be felt with one finger-tip. By arranging the markers on a $2\frac{1}{2}$in radius a spacing of $\frac{3}{8}$in is achieved for each 15° rotation. The amplifier was constructed from a circuit issued by RCA with an experimental kit of ICs. Since the latest developments are not available in the author's country, he suggests that a constructor chooses from local availability. The greatest care should be taken in adjusting RV3 for the correct voltage and polarity before connecting the amplifier.

Before calibrating the dial, it is necessary to centralize the movement of RV1 slider. This is done by measuring the centre resistance (250Ω). Make a pencil mark through the highest mesh points of the gears and carefully fit the knob so that the pointer is in the vertical position (north). The knob will now travel to south by equal amounts. Switch in the audio unit, select the indicate position on the control unit and rotate the knob to find the null. This should be positive and sharp. If the null is not complete, reduce the voltage to the amplifier by making small adjustments to RV3. Rotate the motor and repeat this procedure in a south position to obtain the best results throughout 360°. Once a reliable null has been achieved, the marker positions may be made by switching from visual to audio at each 15° rotation. During this operation the mains input should be kept as stable as possible.

Conclusion

ZE1DO has used this method for the last two years with no sign of distress from the excellent CDR rotator. He is able to set his bearings as accurately as any sighted operator.

Acknowledgements are due to ZE1DO for his patience, ZE1DT and ZE1BP. The photography was by T. Compton.

NEW PRODUCTS

Battery-operated ac generator

The range of inverters available from Jermyn now includes an all-silicon transistor version for increased reliability. If the ac mains should fail, this unit automatically switches the load to the inverter which can be run for up to three hours from a car battery. When the ac mains supply is restored the load is switched back to the normal supply and the unit then acts as a battery charger in readiness for the next period of use.

Two versions are available depending on the size of the load, ie 150W running from one 12V battery and a 300W version supplied by two 12V batteries in series. The inverter can be used in normal circumstances to power household equipment from a car battery. Size 10in by 8in by 8in, and weight 20lb. Further information can be obtained from Jermyn Manufacturing, Sevenoaks, Kent; telephone Sevenoaks 50144.

Frequency counter

The latest counter from the Rex Corporation range, the model TC-530, covers from 10Hz to 470MHz. The unit incorporates a five-unit Nixie tube display with kHz/MHz switch and over-range indicator. By a gate-change, eight-unit readout capacity is available. Both ac and dc (12-14V) power sources may be used and appropriate cables are provided. The unit is lightweight (2·5kg) and would seem to be very suitable for use in either hf or vhf applications. Further information can be obtained from Western Electronics (UK) Ltd, 1-3 West Park Road, Southampton, Hants.

MICROWAVES ~~~~~~~~ by DAIN EVANS, G3RPE*

Microstrip splitters and combiners

A common use for power splitters/combiners is in feeding more than one aerial from a single cable. The design and construction of a coaxial type is described in the December 1974 *Microwaves*. Given below are the corresponding microstrip versions used by G3WDG.

The design of a two-way splitter for 1·3GHz is shown in Fig 1. The single 50Ω input is connected via a type N connector to an arbitrary length of 50Ω impedance line. This divides into two lengths of 70Ω line, each being electrically λ/4 long, to the ends of which 50Ω cables are attached to feed the aerials. These cables can be of any length provided that they are the same, and preferably are taken from the same batch. The unit is made from double-clad board, the lower cladding of which is left complete. The upper cladding is partially removed to leave the lines surrounded by a gap of 6mm except at the ends of the lines where pads are left to facilitate soldering the cables. The top and bottom cladding are connected by drilling holes about $\frac{1}{10}$in diameter in the positions shown, passing through wires and soldering as illustrated by Fig 1d.

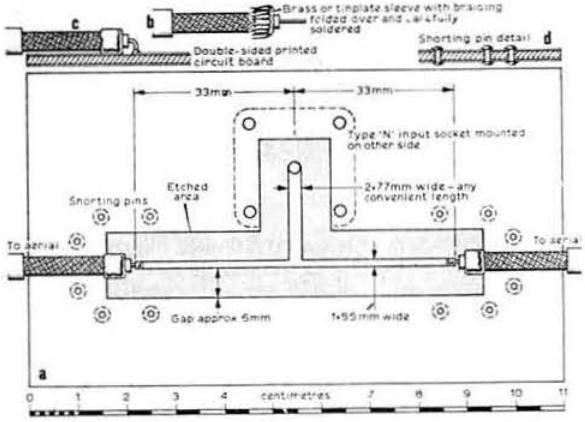


Fig 1. Design and construction of a two-way splitter for a 50Ω system. The board is assumed to have a dielectric constant of 5·0 and a thickness of $\frac{1}{16}$in

The design of a board for a four-way 50Ω splitter for 1·3GHz is shown in Fig 2. In this case, the lines all have the same impedance and therefore the same width. For a 70Ω system, the input line should of course be designed for this impedance, the output lines being of 100Ω impedance for the two-way splitter and 70Ω impedance for the four-way.

The dimensions of the lines given in Figs 1 and 2 are appropriate for boards having a dielectric constant of 5·0 and a thickness of $\frac{1}{16}$in, which values are typical of many common glass fibre boards. The dielectric constant can be checked quite simply by measuring the capacitance of a reasonably large area and calculating from the equation

$$\varepsilon = \frac{113\,C\,t}{A}$$

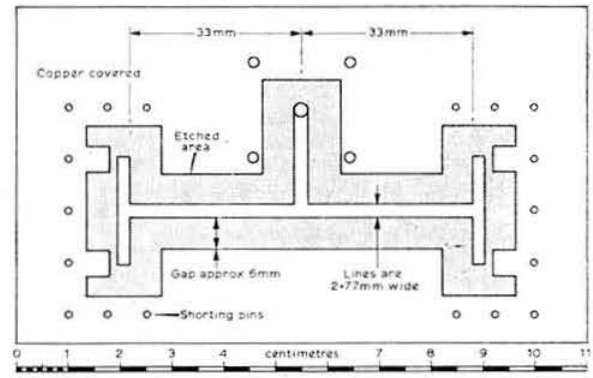


Fig 2. The corresponding board for a four-way splitter

where ε = dielectric constant, C = capacitance in picofarads, t = thickness in millimetres, and A = area in square millimetres.

The width of the line required to produce a given impedance is given by the following equation:

$$\log w = 0{\cdot}8736 + \log t - 0{\cdot}004992\,Z\sqrt{\varepsilon + 1{\cdot}41}$$

where w = width in millimetres, and Z = impedance.

The lengths of the lines also depend on the dielectric constant of the board and, of course, the frequency of operation. Their physical length is obtained by multiplying the value of λ/4 in air by the velocity factor of the particular board. This factor is given by the equation:

$$v = \frac{1}{\sqrt{(0{\cdot}475\varepsilon + 0{\cdot}670)}}$$

The impedance of the line being fairly dependent on its width means that this has to be controlled within quite tight limits. For example, as the width is reduced from 2·8 to 2·6mm then the impedance typically will change from 47Ω to 52Ω. The method used by G3WDG is to cut masking strips from standard pvc tape (eg Lassovic) and these are simply pressed on to the board. Large areas can be reliably masked by model aircraft dope which later can be removed by thinners (amyl acetate).

The coaxial cables, which preferably are of a fairly low-loss type such as UR43, are joined to the board by the method shown in Figs 1b and 1c. The outermost protective covering of the cable is removed for about 1in and a thin-wall sleeve which is a close fit on the braided outer is slid on. The braid is then folded back over the top and soldered to the board, taking great care not to overheat the cable dielectric.

A practical method for waterproofing the unit which has already withstood the elements for a year is to clamp the board to the bottom of a metal box, and mount the input socket on the outside with the inner connector passing through holes in the box and the board to meet the input line. The aerial cables pass through tight-fitting rubber grommets set in the sides of the box. A close-fitting lid is sealed with pvc tape, and all the joints covered with polyurethane varnish applied as an aerosol spray. The same varnish may also be applied to protect the internal soldered joints.

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

TECHNICAL TOPICS

by PAT HAWKER, G3VA

THE need to economize in space (for the reasons that the Honorary Treasurer has made only too clear!) means that it is difficult to avoid holding over some items, and our apologies to those readers who may be waiting for follow-ups on various topics; and also, of course, to those who have been kind enough to comment. Because of the old joke we hesitate to wish a Merry Christmas and Happy New Year to all our regular readers—but why not?

G3YMC 1·8MHz converter

There are many currently-used receivers and transceivers which do not incorporate any facilities for the 1·8MHz band, and the question often arises of how to design a simple converter, capable of giving the standard of good performance needed by 1·8MHz long-distance enthusiasts and yet compact and easy to build in a few hours.

David W. Sergeant, G3YMC, who is extremely keen on 1·8MHz dx, recently acquired an FT201 transceiver and so came up against this problem. He spent a weekend digging energetically into his well-filled junk box and came up with the design shown in Fig 1 (which by coincidence has something in common with the 144MHz converter built by PA0GVK and described in the October *TT*). The use of a 5·5MHz crystal makes it possible to translate the 1·8MHz band to either 7·3–7·5MHz or 3·7–3·5MHz. G3YMC did not find i.f. breakthrough on 7·3–7·5MHz any problem, but should it be then of course it is possible to use 3·7–3·5MHz, though this conversion has the disadvantages of having the main receiver tuning backwards and also transposing the sidebands.

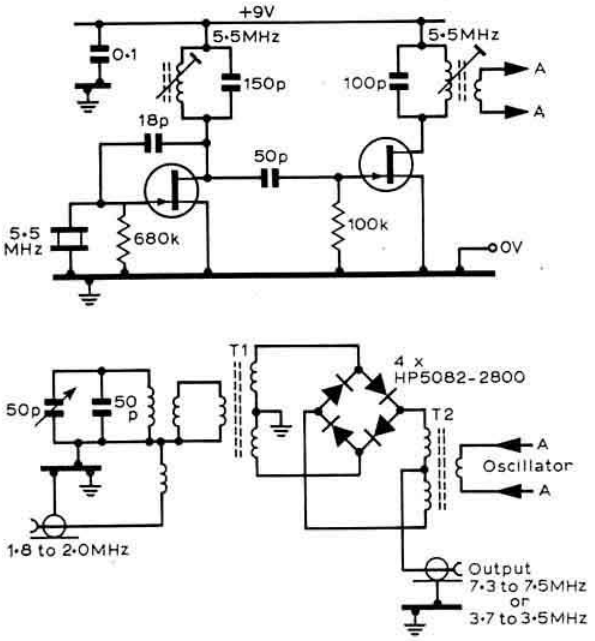


Fig 1. G3YMC's high-performance 1·8MHz converter for use with receivers and transceivers covering amateur bands from 3·5MHz upwards

T1 and T2 for the double-balanced mixer are wideband ferrite transformers or ferrite toroids using bifilar or trifilar winding techniques. G3YMC suggests that the secondaries can be 10 turns bifilar wound or as much in fact as can be wound on; connect the start of one section to the end of the other and use this as the centre tap. The primaries or link couplings can be four or five turns. Details of how all these can be wound in trifilar form have been given previously (for example, *ART*). The FETs for the oscillator section can be UC734, 2N3819 etc, but not switching-type devices. The mixer diodes are preferably Schottky diodes such as the HP5082–2800 commonly advertised for this application, although I feel that at 1·8MHz conventional germanium diodes, selected for matching, would probably prove quite satisfactory. The whole unit can mounted in a small screened box, such as a tobacco tin, with screened coaxial connectors for input and output; it is important to ensure earth continuity since otherwise i.f. breakthrough will be considerable.

With suitable crystal(s) and tuned circuits, of course, the same form of converter could be used for almost any required band in the mf or hf range.

Having so successfully solved the problem of receiving 1·8MHz on his transceiver, G3YMC is now looking into the question of transmission.

Intermodulation of transceivers and receivers

Perhaps the best way of assessing the practical performance of any amateur receiver is to try it out on 7MHz in the early evening. If at the low-frequency end the little groups of cw stations valiantly working between the broadcast intruders can be decently sorted out, then almost certainly the receiver has reasonably good cross-modulation and intermodulation characteristics. On the other hand, if, as unfortunately is frequently the case, it all sounds a horrible mess then a first resort may be to try a simple rf attenuator directly at the aerial input to the receiver, as described several times in *TT* and *ART*.

It is well recognized that in the above test the average valve receiver with one of the better variable-mu rf valves is likely to emerge rather better than the majority of semiconductor designs, though of course it is today *possible* (though difficult and expensive) to achieve extremely good dynamic range with advanced all-semiconductor techniques.

In *CQ-DL*, and recently republished in *Old Man* No 9, 1975, Hellmut Schmuecker, DK5ML, has presented a composite diagram based on detailed intermodulation measurements of six current transceivers which were subjected to a wide range of inputs at 7·2 and 7·2307MHz: see Fig 2. The input levels are indicated on the horizontal axis and the vertical axis shows the intermodulation products in terms of decibels difference (the greater the difference the more linear the system). Since we are not in any position to check the accuracy of these measurements (although it is clear from

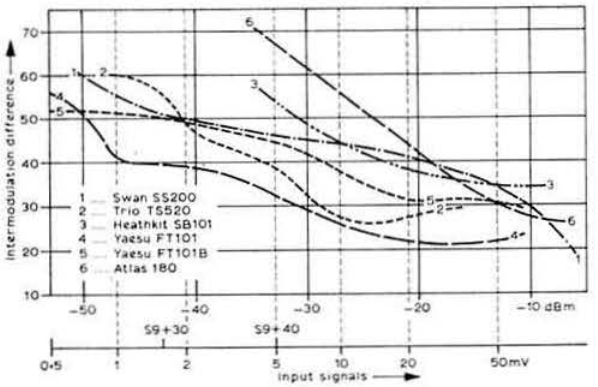


Fig 2. Intermodulation performance curves measured by DK5ML on six popular transceivers

DK5ML's article that he was using a full range of measuring equipment) his results are presented here without comment.

Also on this topic, Jan Martin Noeding, LA8AK (ex-G5BFV), notes that in *TT* for August 1969, Al Slater, G3FXB, indicated a method of decreasing the intermodulation distortion of the Heathkit SB301, which has a 6AU6 as the rf stage. LA8AK writes:

"Examining the agc circuit used in some of the Heath equipment discloses that the value of the grid return resistance via the agc circuit is relatively high. Reducing this resistance may make the effect of grid current less important and thus improve imd caused by non-linear operation. In some of the company's transceivers even higher-value resistors are used, and agc is applied to sharp-cutoff valves such as the 6AU6.

"The best solution would be to change this valve for a 6HS6, 6BZ6 or EF89, but it is much easier to use a 6BA6 which can be directly substituted as it has the same base connections as the 6AU6.

"It also seems likely that further improvements to the agc arrangement would be quite easy, and I am looking into this question."

Transequatorial off-beam signals

When last year *TT* contained considerable comment on signals deviating from great circle paths, attention was drawn (October 1974, pp686–7) to a paper being prepared at the Max Planck Institute in West Germany for *CQ-DL* on the findings that hf signals from Tsumeb in South-West Africa could deviate by up to ± 50° from the true great circle path. The two experimental stations concerned are almost exactly due north and south of each other and separated by 7,915km.

This paper, by Prof W. Dieminger, DL6DS, and Dr J. Röttger, DJ3KR, duly appeared in *CQ-DL*, No 2 and 3, 1975, and DJ3KR has now let me have an English translation. To pick out just a few points, it shows how after-dark signals, travelling in chordal hop fashion over north-south paths in the period of a few hours after sunset, may often show the same type of flutter fading more commonly associated with signals arriving in Europe from the west coast of the USA. Detailed studies using rotary beams have shown that the flutter fading is brought about by multi-path reception associated with night-time equatorial spread-F conditions. It is now generally agreed that these conditions cause the remarkable transequatorial type of propagation at frequencies above the muf. They have shown convincingly that the flutter comes from the simultaneous presence of signals that have travelled over the true great circle path and those that have been delayed by coming over other paths, with up to ±50° deviations.

The authors also report that some amateur radio contacts between Europe and South Africa (or USA and South America) can be carried out with beams pointing 30–50° west of the correct great circle bearing *at times when great circle propagation is no longer possible*, confirming the views of a number of those who commented on this subject in *TT* last year.

The paper gives an explanation of how wave-like structures occur in the equatorial ionosphere in the form of *travelling ionospheric disturbances*, giving rise to strong electron density irregularities and closely associated with atmospheric gravity waves, producing effects comparable with the breaking up of ocean waves.

Although these topics are highly esoteric they do have very practical implications for radio amateurs, and it is extremely welcome to find DL6DS and DJ3KR illustrating so clearly that amateur hf operation can and does contribute to the greater understanding of all these fascinating spread-F effects.

VHF mobile

Recently we mentioned an American review of professional vhf mobile radio developments during the past few years (*TT*, October). This month it is possible to come a little nearer home and draw attention to a very detailed survey entitled "Mobile vhf and uhf radio systems in the UK"; this is by D. A. S. Drybrough, G8HEV, and appears in *IEE Reviews*, Vol 122, No 10R, October 1975 (a special issue of *Proc IEE*). It traces the development, current practice and possible future trends over the whole field of private and public-service mobile operation. For example, a detailed table lists all the frequencies used, including channel widths and the paired channels for various types of services, typical ranges with fm and a.m. systems (showing significant advantages to fm despite its vulnerability to flutter losses). For the future still narrower bands are forecast (aided by phase-locking techniques) together with a continued search for improving reception in the presence of interference and fading.

Among all the data is an interesting table of the signal losses that can be expected from large obstructions in the propagation path, showing how these vary at different frequencies: Table 1.

Table 1. Propagation losses from large obstructions

	$H/(\sqrt{d})$:	12	24	36	48	72	120
Additional loss (dB):	80MHz	3·5	5·5	7·5	10	12·5	17
	125MHz	4	6·5	9	11·5	14	19
	170MHz	4·5	7·5	10	13	16	20·5
	460MHz	6·5	11·5	14	16·5	20	24·5

where H is height above line-of-sight path (in metres); d is distance to obstruction from nearest terminal (km)

In *VHF Communications*, Vol 7, No 3, 1975, T. Bittan, DJ0BQ/G3JVQ, reports some of his findings on aerials used for mobile telecommunications. He may set a few dovecots fluttering with some interesting conclusions on the advantages of horizontal polarization, and intends to follow this up with designs in future issues for circularly-polarized

omnidirectional mobile aerials. Conventional vertically-polarized mobile aerials, he suggests, can result in signal fluctuations of more than 70dB due to multi-path propagation effects while a vehicle is in motion. At high speeds he also found that the $\lambda/4$ whip gives significantly better performance than the $5\lambda/8$ whip, mainly due to additional bending caused by the extra length. He believes that for mobile applications, the field strength of a horizontally-polarized signal is usually far more constant than with a vertically-polarized one, due to less attenuation of the direct wave (vertically-polarized signals are particularly subject to attenuation by trees), and because fewer multiple reflections are present. Further, radiation characteristics do not vary as much as with vertical whips so long as the horizontally-polarized aerials are at least $\lambda/2$ above the car roof. If it were not for repeaters, apparently, he would have everyone using halos; but as things are, the best of both worlds seems to be found in circular polarization (or perhaps diversity techniques).

Battery consumption saving

When using hand-held and other battery-operated equipment over extended periods of time it is clearly desirable to keep consumption to the minimum possible that allows the system to function without significant loss of efficiency. One technique that for some years has been fairly widely used in professional equipments is the use of a low duty cycle during stand-by operation of the receiver, automatically switching the equipment to normal receive conditions when a signal appears. In other words this means that the muted receiver "listens" for perhaps 10 per cent of the total time, taking a brief "look" at the frequency every few seconds. If the squelch or muting circuit then indicates that there is a signal coming in, the interrupt condition is disabled and the receiver stays on until perhaps 10s after the signal has gone, when the sampling process is restarted.

A number of suitable "battery saver" circuits that accomplish this sampling process have been described: for example, one by Dr D. A. Tong, G8ENN, was given in *Wireless World*, March 1972, pp124–5; another by Intech Inc in *Electronic Design*; and the latest by John Rumsey, ZL2TNK, and Peter Williams, ZL2ARW, in *Break-In*, August 1975. This one is basically similar to the G8ENN design but uses rather less components. The New Zealand design was intended for use with a specific group-project walkie-talkie but there is no reason why it should not be used, possibly with minor modifications, for other equipments. The circuit details are given in Fig 3.

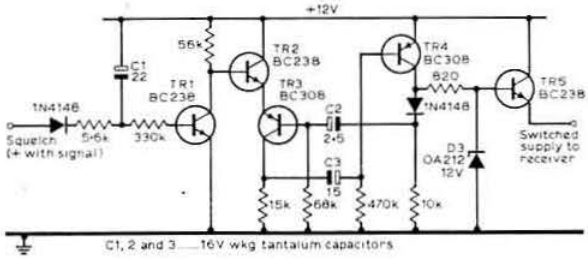


Fig 3. A battery-saver device can reduce the consumption of walkie-talkie and hand-held equipment during standby by a factor of 10 by using an astable multivibrator to switch the receiver off except for brief "sampling" periods every few seconds. When the presence of a signal is detected by the receiver's squelch or muting circuits the receiver remains "on"

All these systems depend on an astable multivibrator to provide the basic 1:10 duty cycle and use this to control a transistor power switch which interrupts the power to the active devices in the receiver.

In operation the receiver is held on either initially or after transmission for about 25s before the sampling cycle begins. The following notes on circuit operations and necessary precautions are based directly on the *Break-In* article.

When the receiver is switched on, C1 is initially discharged but then charges slowly through the 330kΩ resistor and the base-emitter junction of TR1, holding TR1 on which in turn forces TR2 off. Eventually C1 becomes fully charged, so that base current ceases to flow in TR1, turning this transistor off and causing TR2 to switch on, which in turn works through the system until TR5 is turned on, so providing power for the receiver. If during the sample listening period there is a signal present, the squelch circuit in the equipment provides an input voltage to D1. This causes current to flow through D1 and the 5·6kΩ resistor, so that base current flows in TR1, turning TR2 off and holding the receiver on. When the signal disappears, however, C1 again charges through the 330kΩ resistor and the original cycle of events re-occurs. TR5 acts not only as a switch but, in conjunction with D3, as a voltage regulator.

The authors state that it is important to use high-gain transistors throughout since low-gain types (eg BC237, BC307, BC212) do not switch effectively and can give rise to unpleasant noises from the receiver as it switches. It is suggested that tantalum capacitors should be used for C1, 2 and 3; they are smaller and have lower leakage. Since the sampling time and duty cycle is affected by both capacitor values and transistor gains some experimentation may be needed, especially with C3, to get the desired results. The original unit was built on a piece of paxolin less than 1in square with 0·1W resistors, and was able to fit into quite a compact walkie-talkie.

The current drawn in this particular unit with the mute closed is normally 40mA, but with the battery saver in operation the average current drops to 4mA, thus providing a very worthwhile extension of battery life, particularly where the equipment is required to operate for extended periods on stand-by.

On the subject of battery economy, it is interesting to note that the range of Varta batteries, made in Germany, now includes a miniature sealed Ni-Cd 9V battery, type TR7/8. It is the same size as the well-known PP3 transistor battery, with similar connections, but can be recharged some hundreds of times (provided care is taken). The capacity is 90mAh; unfortunately details of the price are lacking: obviously Ni-Cd units are expensive compared with primary cells but for anyone using a lot of batteries it should work out cheaper in the long run.

DJ2LR aerial matching unit

In this era of compact hf transceivers, the "travelling" station operated from hotel rooms, temporary accommodation and the like, has become a much more practical and effective means of communication—though of course there is nothing new about "suitcase" sets. The weak spot in such stations is usually the restrictions on the aerial and the consequent problem of effectively transferring as much of the power as possible out of the transceiver and into the

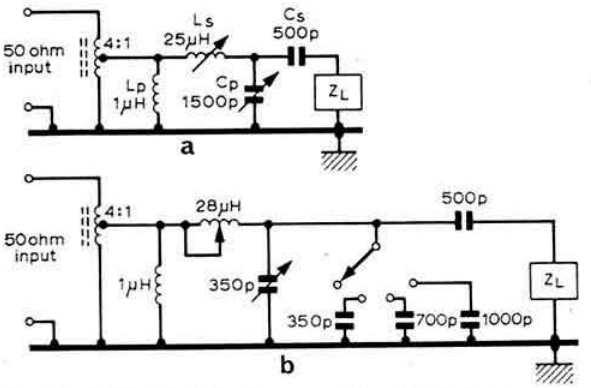


Fig 4. (a) DJ2LR's wide-range matching network for matching almost any voltage-fed aerial between 1·8 and 30MHz. However, the need for a high-voltage, high-capacitance variable capacitor tends to limit its use. (b) A lower-cost version intended for amateur applications. Capacitors are all high-voltage transmitting types, typically 3kV mica or as appropriate to transmitter power

aerial; this may be just a short wire or whip used on all bands. There are of course plenty of established matching techniques, though not all of them are simple to adjust "on location" on different bands without ambiguous settings and multiple controls, or are capable of providing reasonable attenuation of harmonics.

An arrangement that seems to avoid most of the common problems has been described recently by Ulrich Rohde, DJ2LR/W2, in several versions (*QST*, December 1974, pp48–52; *Electronic Design*, No 19, 13 September 1975, p96). Basically this is a form of the well-known L network, but so arranged that it is capable of matching effectively into end-fed wire or whip aerials throughout the range 1·8 to 30MHz: Fig 4. It has only two adjustable controls, a variable capacitor and a variable inductor. The key to achieving a very wide range of output impedances is first to transform the 50Ω output of the transceiver down to 12·5Ω, using a wideband transformer or auto-transformer. For high power, DJ2LR has described a 4:1 ferrite auto-transformer (the original used three stacked toroid cores, Indiana General type F568-1) constructed as in Fig 5. Unless, however, you have the cores in your junk box this is fairly expensive. In a lower-cost version, suitable for use to 150W on the amateur bands, he uses a pot-core transformer with an air gap, the windings consisting of two parallel 50Ω coaxial cables with Teflon insulation. He also replaces the high-capacitance high-voltage variable capacitor with a smaller-value variable plus switched high-voltage mica fixed capacitors.

The 1μH coil plays an important role on the lower frequency bands but has little effect on the higher bands; it is described as consisting of about five turns at 8 turns/in of B & W type 3018 inductor.

When using electrically short aerials with their low radiation resistance, the earth series resistance represents a source of significant loss, and a low-resistance earth connection or radial system is needed to prevent the overall efficiency from falling to an extremely low figure. DJ2LR mentions, for example, the use of the air conditioning systems as "earth" when operating from motels; this point is often overlooked when using short whip aerials.

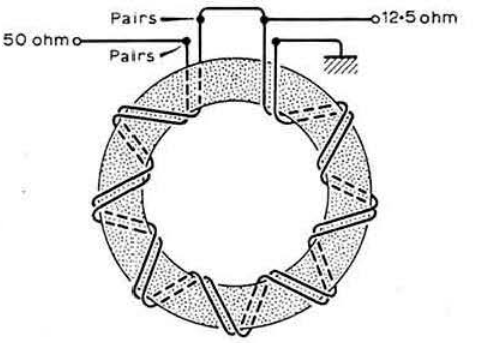


Fig 5. One technique for constructing the 4:1 wideband ferrite auto-transformer. In the original this used three stacked cores with each core covered with two layers of glass-cloth insulation tape (3M No 27). The stack should then be covered with another layer of tape and the windings consist of a twisted pair of No 14 Teflon-covered wire (characteristic impedance 25Ω) winding the twisted pair on the core for a total of eight turns. In a lower-power unit, a pot-core transformer with an air gap was used with the windings consisting of two parallel 50Ω coaxial cables with Teflon insulation

A whip aerial typically has a capacitance of approximately 8pF/m, and the 500pF series capacitance has little effect on such aerials; on the other hand it does appreciably reduce the capacitive or inductive component when using longer-aerials. The design of Fig 4(b) is stated to match loads on 1·8MHz from 5 to 600Ω resistive, and from 200Ω capacitive to 500Ω inductive; the more elaborate unit of Fig 4(a) will cope with 5Ω to 5kΩ resistive and with reactive components from 2kΩ capacitive to 2kΩ inductive. Matching ranges will be greater on the higher-frequency bands.

Matching units of this type can often be adjusted quite accurately by using small light bulbs in the aerial, but for those who seek a more elegant method the following notes come from the *QST* article:

"Using the coupler is fairly simple. Insert an indicator between the transmitter and the coupler. Connect the aerial to the output of the coupler and adjust the inductor and parallel capacitor until the reverse-power reading is a minimum. Start with the inductor first, beginning with minimum inductance. Increase the inductance until the first dip is found. The shunt capacitors should then be adjusted until the dip in the reverse-power reading gets deeper. The roller inductor may have to be adjusted again. Since the coupler gives only one minimum reading, it is very convenient to use."

Feedback

Alan Collinson points out that in the diagram for the comparators suitable for providing audible output from digital instruments (September *TT*, p692, Fig 8) the hex inverter package referred to as an SN7409 should have been marked SN7404.

G3ULR mentions that the PALO of Fig 5 of September *TT* shows a 100kΩ gate leak. In practice the original prototype did not include this component and subsequent checks have indicated that when this is included the range and performance is reduced significantly, the drain current being 1·7mA with no resistor and 0·08mA with the resistor. He has also developed a further variant—the PALGO—which it is hoped to outline in a later issue. □

FOUR-TWO-SEVENTY

by MARTIN DANN, G3NHE*

October opening

After every big lift there are those who apply the superlative "best ever", and for many newcomers to the band it often is just that. However, after the opening at the end of October it is difficult to find anyone not agreeing that it was an exceptional event. One factor contributing to this was the increased activity from the more distant areas of Europe, even, to a lesser extent, on uhf. Several stations worked OK1KIR/P on 432MHz (a few also managing to work the same station on 1·3GHz), and many UK stations made it with HB9AMH/P on those two bands.

Interesting though the happenings on uhf were, the really sensational dx was worked on 144MHz. G3DAO (Selsey) found that the lift started on the evening of Friday 24 October and faded out during the afternoon of Wednesday 29 October. Peter was understandably delighted to work, for his best dx, UP2PN in KP10f, at 559 both ways, and he almost made it with UP2PCO, but the QSB prevented completion of the contact. As well as the UP, Peter worked stations in F, HB, ON, DL, DM, OK, SP, OZ and SM, all on 144MHz cw.

CW helped G3WSN (Chelmsford) to a fair share of the dx on 144MHz, and featuring prominently in Keith's list are OH0NC (JU70d) and UQ2GDA (KQ63f), plus a string of SPs. Keith also heard UC2ABN in NN18, but no contact resulted. Among the other dx worked on 144MHz by G3WSN were 30 SMs, four LAs and an OK. UQ2GDA was also worked further inland by G3SEK in Oxfordshire.

The opening caused Dennis Boniface (ex G8IBB) to be grateful that he had made the effort and obtained his G4DSC call, for after several hours of patient waiting his modest power penetrated the QRM and raised SP5JC in KM56f on 144MHz cw. Although Dennis was able to hear HB9AMH/P on 432MHz, his success on that band was confined to a few West German stations.

G3IOI of Wickford in Essex could not have had a more encouraging introduction to vhf. He had just completed work on a DL6HA design transistor transverter for 144MHz when the fun started, and with just 100–200mW to a home-made 4-el quad, Ray put both ssb and cw into G, F, D, ON, PA and SM; this despite the fact that the new transverter was unboxed and hanging in the wiring.

G3EHM (Stoke-on-Trent) found that on 432MHz the opening started on Saturday 25 October and ended around 1430gmt the following Wednesday. Ken heard HB9AMH/P (DH66C), but the queue for him was so long that he gave up and went to bed. However, G3EHM did manage to work ON, F, LX, DJ and DM on this band.

Viewing the lift from much further east, DL7QY (Berlin) thinks we experienced the conditions of the century, at least on 144MHz, 432MHz and 1·3GHz, although the height of the inversion (600–1,000m) meant that the opening did not extend to 2·4GHz. On 144MHz Claus worked 21 countries, including UC, UP and YU, his best dx being EI9Q and GI3RXV to the west and UC2ABN (QRA square NN) to the east. On 432MHz DL7QY worked DL, DM, G, GM, GW, PA, ON, F, HB, OE, SP, OZ, SM and OK, best dx being GW8AWS/P and GM3ZSS to the west and SP9FG (square JJ) to the east.

A glowing tribute to the fine traffic discipline shown by UK amateurs on 144MHz during the opening comes from SM7AED, who was most impressed by the way that, despite the inevitable "pile-up" on his frequency, the QRM ceased when the Swedish station was attempting to work a more distant caller. Together with his son SM7FJE, Arne worked some 200 stations in the British Isles, including Jersey and Guernsey. They also worked into UB5, SP, OE, OK, HB, F, EI, GW and GM, as well as G and GC. YO and HG were heard but not worked. Arne comments that during openings of this kind he attempts to keep exchanges to a minimum, cutting out most of the usual niceties, and hopes he is not thought too brusque because of this. His aim is to give as many stations as possible the chance to work him while it is possible, many of whom will be working SM for the first time, but Arne is always interested to learn of the station's details from the QSL card.

Of all the dx worked on 144MHz by GM8FFX, near Aberdeen, Graham found the two-way a.m. contact with SP9BNP (59 both ways) the most interesting. The real action from Aberdeen, however; was on 432MHz, and with the help of G3ZSS, who is currently staying at the GM8FFX QTH, a couple of "firsts" may well have been achieved. Graham's contact with HB9AMH/P on 26 October would appear to be the first GM/HB on this band, and Peter, signing GM3ZSS/A, used cw to raise SP6BPR (IL76h) at 1930gmt on 28 October for a first GM/SP contact on 432MHz.

We think that the contacts between GD2HDZ and HB9-AMH/P on 432MHz and 1·3GHz are also first GD/HB, as is the GI/HB contact on 432MHz between the same HB9 and GI8HXY. For that last piece of information we are indebted to Harold Meerza, BRS34348, who resisted the temptation of searching for the rarer Continental dx and concentrated on collecting sufficient counties for his 432MHz senior listening award. The result is that, at the time of writing, Harold required just one card to complete that claim.

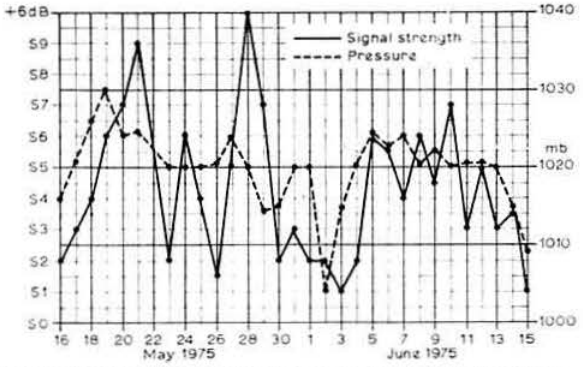
Meteor scatter

As well as his successes during the tropo opening in October, G3WSN also put the Orionid shower to good use, working, on 21 October, I4XCC, and SM2CKR on the following day. Keith failed to complete a QSO with SM4DHN, and heard three "pings" from UA3TCF (WQ14a) at a QRB of 2,950km. Keith comments that the shower did not produce many bursts, but lots of "pings".

VHF/UHF records

An overwhelming modesty seems to be pervading the ranks of the vhf dx men, and few have so far been willing to admit to working any dx beyond the previously-published records (*FMD*, October 1974). However, some interesting comment has been received from Harry Wilson, EI2W, who, although regrettably QRT since 1969, did much pioneering vhf work

* 49 Windermere Court, North Anston, Sheffield S31 7GJ.



Graph showing relationship between signal strength of the 70MHz beacon GB3SU and barometric pressure. Readings taken each evening at 1900gmt by G3HBG, Godstone, Surrey

in the 'fifties and 'sixties. Harry points out one or two inaccuracies in the records which will be corrected before they are published again, and also mentions that his best dx on the 6m band was not the Mexican station XE1PFE (this being the only Europe/Mexico contact on vhf) but one of his Californian contacts, possibly W6FZA, at a distance of over 6,000 miles. EI2W wonders whether the G5BY/ZS1P contact was on 6m, as stated, or on the old 5m band.

Harry Wilson has forwarded a list of EI "firsts" for the 50, 70, 144 and 432MHz bands and, of the 27 listed, EI2W was responsible for 25 and EI8G the other two. Unfortunately there is not room to reproduce the list here, but it has been filed for future reference.

As a final comment, EI2W urges that special care be taken when claiming meteor-scatter contacts, as mistakes are so easily made. He cites several examples of incorrect claims concerning his own m-s activity, including one station who reported excellent reception at a time when Harry was busy rebuilding his transmitter!

G3COJ may have established a new UK, if not European, record for 432MHz with his contact with SM5DSN on 7 July 1975, the distance being 910 miles. Brian suspects, however, that this might have been bettered; if so we should be pleased to hear of it.

Both G8DET and G8FSL have kindly supplied the answer to the query from G4BPY concerning the QRB of his contact with LZ1AB, arriving quite independently at the same result of 1,360 miles. This just betters the existing record of 1,350 miles, held by G3DAO, although we understand that there were some GW/LZ contacts during the sporadic-E openings this year which could extend the UK record even further.

Contest comment

After a run of bad luck, the VHF Contests Committee struck a vein of excellent conditions for the 70MHz Fixed Station Contest on 26 October. Although there may have been a slight decline in conditions during the contest period, and a tendency to run out of stations to work towards the end (suggesting that 6h was just about right?), propagation was still way above average at the close and there can be few with cause for complaint on this score. Serial numbers in the fifties were being passed by leading stations towards the end.

The Monday evening following the 4m event saw the first leg of the 432MHz cumulatives, with conditions remaining superb, although the north of the country seemed to be favoured as far as Continental dx was concerned. Good signals were heard from east and south-east Germany and from south-eastern France, as well as from the nearer Continentals, and some high serial numbers were heard being given towards the end of the 2h session.

The following week's 432MHz cumulative period was remarkable only by its extreme contrast with the first session. Conditions were right back to normal, and this, combined with the usual reduction in activity following a big opening, made the two hours rather hard going.

Conditions for the 144MHz cw contest on 1 November were also very ordinary, but activity seemed to be reasonable, and a few Continentals were workable from favoured sites.

Four metre band plan

The VHF Committee have had their attention drawn to the fact that in several parts of the country there is a growing interest in fm transmission on the 4m band. One reason for this appears to be the advantage that fm transmissions have where tvi and audio breakthrough present problems; another reason is the availability of suitable equipment. The VHF Committee intend, therefore, to propose the following addition to the 4m band plan. Three fm simplex frequencies are suggested—70·475, 70·5 and 70·525MHz. The centre frequency of 70·5MHz would be the fm calling channel, and those on either side working channels. Those familiar with the existing 4m band plan will be aware that 70·6MHz is an rtty frequency, so it would be inappropriate to have 70·55 MHz as an fm simplex channel. Instead 70·475MHz has been chosen, which fits in well with the commonly-used fm channel on 70·48MHz. Comments on these suggestions (via RSGB HQ) would be appreciated by the VHF Committee.

FMD Awards

The vhf awards manager has asked us to remind members that when dx is worked through a repeater (as during the October lift), it cannot be claimed for FMD Award purposes. After all, what is being worked is not the dx accessing the repeater, but the repeater itself.

This month's FMD Awards are:

144MHz transmitting: No 459 to ON8IW—this follows the award to SM7FJE last month, and it is pleasing to see these two enthusiastic overseas members rewarded for their efforts.

144MHz senior transmitting: No 80 to G3FPK of Purley.

Miscellany

GM8BDX, GM4CXP and GM3JNW intend to activate the Border region over the Christmas/New Year period on 2m, 4m and 70cm. Operation will be from both fixed and portable locations, and the group would welcome skeds, requests for which should be sent to GM8BDX, QTHR.

Those who have missed the callsign G3MOT on the vhf bands will have to resort to the hf bands to work Colin—at least, until July 1976. He is currently using the callsign A4XGD from Oman; just a little too far for 2m.

A meeting of all known repeater groups, organized by the VHF Committee, was held at Brunel University on 18 October. This meeting proved to be most useful and informative, and a full report appears on page 933 of this issue.

Ironically, a month which has provided more than usual amounts of news has coincided with a month when we are restricted to two pages, so much material has had to be left out. This we hope to include next month.

Finally, news, views and comments for inclusion in the January issue should reach G3NHE by 3 December, and for the February issue by 7 January. □

THE MONTH ON THE AIR

by JOHN ALLAWAY, G3FKM*

ONCE again Christmas is nearly with us, and your scribe would like to take this opportunity to wish all readers season's greetings, and a very happy and successful 1976. Their support during 1975 has been much appreciated and may this continue in spite of the present curtailment in the space allocated to *MOTA*!

DX news

A9XBD is active on the island of Bahrain on 14 and 21MHz looking for UK contacts—in particular GC. Schedules may be arranged between 1200 and 2300 by writing to the address in *QTH Corner*. Geoff is mainly on ssb running 1kW input, and points out that of the 14 Bahrain licensees only six are active, mostly on cw. Two IRCs are requested for direct QSLs, otherwise cards go via the bureau.

Information has been received from VS9MB that the station will close down in mid-January as the current equipment is due to be returned to the manufacturer who loaned it. It is believed that operations would have continued until the end of February had equipment been available. At the time of writing VS9MB was being heard in Europe between 3·793 and 3·798MHz at around 2200.

The *West Coast DX Bulletin* contains news that W3ACE recently visited Iraq and while there discussed the possibilities of obtaining an amateur licence. It seems that his application was rejected; nevertheless it is felt that the climate of opinion in YI is changing and that signals may be heard from there in the not-too-distant future.

Horatio Torres, ex-CR5AJ, is now in Macao using the callsign CR9AJ. He has been reported on 21MHz ssb and is asking for QSLs to PO Box 798, Macao. The ITU has allocated the prefix block C8A-C9Z to Mozambique, and D2A-D3Z to Angola.

Papua New Guinea became independent on 15 September and contacts after that date will count as those with a new country. DXCC credit will be given with effect from 1 January 1976. Both Papua and New Guinea will be deleted from the DXCC list wef 31 December.

VE3MR, VE3MJ, VE3GMT and VE1AA were active from Sable Is and St Paul Island during late October. Both islands are off the coast of eastern Canada, and it is believed that both will count for DXCC credit. This is because the islands are administered by the Canadian Dept of Transport and their status is similar to that of Kingman Reef. QSLs for contacts with both expeditions should be sent via VE3GMT.

FR7GL will be on Glorioso Is for two months, commencing about 20 November. FB8ZG is active on 21MHz ssb and said to be looking for contacts with the USA and Canada at 1300 daily around 14·225MHz. He also keeps a schedule with F8RV daily at 1100 on 21·250MHz. FB8YC is on the air often from Adelie Land at around 0700 between 14·100 and 14·120MHz. He asks for QSLs via F8MD.

QSL cards for VP2LL, VP2SQ and 8R1CB should now be sent via W2MIG. VP8OB (S Georgia) has been worked on 14·330MHz around 1900—his QSL manager is G4DIF (see *QTH Corner*). Alex Mootoo, 3B8DA, has now left Rodriguez Is, and expects to visit St Brandon Is (3B7) during February or March. 9Q5SW is JA1AFI, who has a transmitter with 200W output to a ground-plane aerial. QSLs should be sent to JA8JN.

HC8RG (who was formerly DK6EB and HC2PP) keeps a schedule with friends in Germany at 2200 each Wednesday on 14·200MHz. Since 15 October EA5ES/9 has been using the new callsign EA9FG from the Spanish Sahara. Those wishing for a contact with Rwanda might like to know that 9X5KE meets W4IN daily at 1900 on 21·385MHz and they then move to 14·290MHz. SV0WKK, who is located in Crete, is often to be found on Mondays at 1930 around 14·225MHz.

Dxpeditions

Iris and Lloyd Colvin, W6KG and W6DOD, have made plans to be on the air from Funafuti, Tuvalu, on 1 January, when the former Ellice Islands become independent. Their callsigns will be VR8B and VR8C, and their operating frequencies will be: 3·505, 3·795, 7·005, 7·095, 14·050, 14·195, 21·050, 21·255, 28·050 and 28·550MHz. They will mostly listen 5kHz higher. Prior to 1 January they will operate as VR1Z. This will be a YASME Foundation expedition, and QSLs and donations should be sent to the address in *QTH Corner*.

EA8CR's hoped-for visit to Equatorial Guinea in October did not take place. However, it is hoped that he will be there late in November, and that together with OH2WW he will continue to Annobon Is.

Northern California DX Foundation

This is the foundation which organized the expedition to Kingman Reef last year. Since then it has sent a KWM-2 to OH0MA, a tri-band beam to CR9AK, a Swan 500CX to 3B8DA, provided QSLs for SV1GA/A, OH0AM, JY8BH and others, and co-operated with AMSAT in the construction of a portable communication system for dxpeditions and educational use. Any amateur in a rare or semi-rare location will be helped, and the foundation is interested in hearing which countries are still in demand—including some of the Caribbean islands and the islands in the Indian Ocean. A possible "new country" expedition to take place in 1976 is being worked on at the moment. W6MAV (Donald Schliesser, PO Box 717, Oakland, Cal, 94604, USA) is president and would like to hear from anyone interested in giving support or with useful ideas.

"Amateur radio awards"

Readers interested in operating awards are recommended to buy a copy of this publication, which contains full details of a large number of certificates issued by national societies throughout the world. Countries lists, prefix maps and other useful data are also included. The book is available from HQ, price £1.69, postage and packing included.

* 10 Knightlow Road, Birmingham B17 8QB.

Contests

Results of the **1974 OK DX Contest** have been received from OK3BG and include the following UK entrants (single operator): All bands—**G3SXW** (8,450 points), G3ESF (6,817), G3TXF (3,152) and G8VF (1,150). On 7MHz **G3OCA** scored 90 points, and on 14MHz **G6NK** 81 points. **GW3INW** was also listed with 3,344 points on all bands, and **GW4CYD** with 1,045 on 14MHz.

Spanish Contest

2000 13 December to 2000 14 December.

CW only. 3·5 to 28MHz. Contacts with Spanish stations count one point, and the multiplier is the total number of Spanish call districts (EA1-EA9) worked on each band added together. Same station may be worked on each band for credit. Exchange RST and serial number (from 001). Include summary sheet with log and give name and address in block letters. Post before 14 January to URE Concurso International, PO Box 220, Madrid 4, Spain.

The **DL AGCW Summer QRP Contest 1975**—despite low sunspot numbers this contest produced high activity and record scores—also the first-ever win by a W, this being WB9LGZ/9 with 12,908 points. A first-class effort put GW4DOO in second place with 10,976, achieved with 9W and 5W, crystal controlled, to a 66ft Zepp. G3IGU was third, and G3DNF fourth (the latter being 21MHz leader). GWPG/P was ninth, G3NEO 10th, G3UYM 17th, G3RJV/P 20th, and G3BJF 21st. The next contest takes place on 17/18 January and rules are obtainable from G8PG, QTHR —sae please.

Pacific DX Net 8th Birthday Party

0000–2359 3 January.

On 3·5 to 28MHz ssb only. Non-members give RS/country/name. Each contact counts two points. Score is total QSO points multiplied by sum of countries/USA states/Canadian provinces worked. Likely frequencies to be used are 3·665, 7·065, 14·165, 14·265, 21·265 and 28·265MHz. Logs go to Ed de Young, VK4ABA, PO Box 98, Newstead, Queensland, 4006, Australia, before 1 March.

Results of the **1975 ARRL DX Contests** are as follows:

Phone section

G2QT	37,962 points	G3UJE (Multi-op)	560,472 points
G5BJM	20,160 points		
G4BBA	3,213 points	G3RCV (Multi-op)	173,052 points
G3TJW (Multi-op)	1,115,940 points	G4ALE (Multi-op)	94,878 points
G3UBR (Multi-op)	739,332 points		

Phone section (high band)

G3SWX	3,186 points	**GW4CYD**	2,805 points

CW section (all band)

G3MXJ	233,358 points	G3ESF	86,292 points
G2QT	157,248 points	G3IAS	60,291 points
GI6YM (Multi-op)	149,625 points	**GI3JEX**	39,273 points
G3KDB	103,680 points	**GW3SYL**	38,064 points

CW section (low band)

G2RO	13,230 points	**GM3BKC**	810 points

CW section (high band)

G3FXB	188,811 points	G3TXF	49,368 points
G5ANW	88,110 points	G6NK	5,733 points
G3SXW	67,169 points	G3CWL	810 points

Congratulations to certificate winners (listed in bold type), and to **G3MXJ** for winning the Society's Braaten Trophy (for the second year) and **GI3JEX** who won the Milne Trophy.

QTH Corner

A9XBD	G. R. Smith, Cable & Wireless, PO Box 14, Bahrain.
GB2BP	c/o Telecomms, BP, Dyce, Aberdeen.
HC8RG	G. Ruebsam, Isla Santa Cruz, Galapagos Is.
VP8OB	via G4DIF, 22 Denton Av, Leeds, LS8 1LE.
W6OAL/VQ9	Patron 4, FPO, San Francisco, Cal, 96601, USA.
VR8B	YASME Foundation, PO Box 2025, Castro Valley, Cal, 94546, USA.
VX9A	via VE3GMT, 82 Acton Avenue, Downsview, Ont, N3H 4H1 Canada.
VY0A	via VE3MJ, 305 Rosemary Road, Toronto, Ont, M5P 3E4 Canada.

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

"DX News-Sheet"

Much of the information included in *MOTA* is derived from this excellent weekly news-sheet, published by Geoff Watts (62 Belmore Rd, Norwich, NR7 0PU). However, many items of dx interest are announced at short notice and can only appear in a weekly publication. Your scribe would like to suggest a year's subscription to *DX News-Sheet* as an excellent Christmas gift. Ten issues sent to UK, Europe, the Far East and Oceania will cost £1; to Africa, Asia, and North and South America the same sum will cover 11 weekly issues. Currency restrictions in Eastern Europe make it difficult for amateurs in these countries to subscribe and it is suggested that those with friends there take out gift subscriptions.

Band reports

Many thanks to the following for submitting logs: Gs 2BUJ, 2HKU, 3HB, 4RZ, 5JL, 5LR, 6GH, 3NKQ, 3ORP, 3RHL, 3YBH, GW4BLE, GM4CHX, G4CLN, DA2WN, BRSs 17567, 31301, and As 8312 and 8713.

Stations listed in italics were using cw.

1·8MHz. 0000 VE3BWY, *W3AU, W8LRL, K9MBS.* **0100** *VE3EK, W1BB, WA4RGH, W9UCW.* **0200** *EA8CR, KP4AN.*

3·5MHz. 0600 VP2LCX, ZLs. **1600** W7SFA. **1700** CN8HD, VS6DO. **1900** AP2KS, UM8MAS. **2000** A4XGC, JA1JRK. **2100** JA2KLT. **2200** FY0BHI, VE1XU/SU. **2300** VS9MB, VU2GDG.

7MHz. 0100 EP2TW. **0500** *PJ8YFQ, VP5TI.* **0600** COs, LUs, VKs, ZLs, 6D1SA. **0700** HK0BKX, JXs, VP9s, W7ZMD, 9Y4LA. **1500** JAs, VU2GDG. **2300** EA9EV, FY0BHI.

14MHz. 0700 HZ1SH (PO Box 2108, Jedda), P29JS, TR8BJ. **0800** FK8CJ, 3D2AJ. **0900** WA6LRG/KB6, YJ8s AN, CS. **1000** VR1AA, VR4DX. **1100** KX6BU, P29PN. **1200** KG6SW, VK9XI. **1400** DK5KC/ET3. **1500** HS5BF, VK9XK, VU7GV, 3B9DA, 5B4CD (QSL to SM5EIE). **1600** ST2SA, ZS2MI. **1700** JY8XHK (G3XHK), *KH6s, KL7s,* W6/W7s. **1800** W6OAL/VQ9. **1900** KH6s, KL7s. **2000** VP8s.

21MHz. 0800 CR9AJ, *JAs,* 9N1MM. **0900** *FB8ZF,* P29AJ, *ZLs,* 9G1LZ. **1100** VK6s, 4W1AF, 9J1IBO. **1200** *FR7AI/J.* **1300** VS9MPH, YB0AJ/3, ZD8AA. **1400** A9XBD, *FR7AFG,* VS9MB, ZD7SD, 5X5NK. **1500** FH8CY, HK0BKX, HR6SWA, OE2SCL/YK, *5R8AL.* **1700** OC4A (Peru), VP8s, W6-W0s, XEs, 7P8AC. **1800** VP8HA. **1900** VX9A.

28MHz. 1100 JY9CS, ZD7, 6W8, 7Q7. **1200** A6XB, PZ, TJ1EZ. **1400** FH8CY, ZS, 5B4, 5N2. **1500** C9, LU, TR8, VP8HZ, 5T5, 9Q5. **1600** LU, PY. **1700** CX. **1800** CE7.

Andrew Pomfret, G3LZZ (currently 9G1LZ), and Alan Taylor, G3DME, (right) were unable to be present at the 1974 AGM to receive the Wortley Talbot and Founders Trophy respectively but are shown here with their well-deserved awards

Your scribe would like to express his thanks to the authors of the following news sources for items extracted: **Long Skip** (*VE1AL/3*), the **West Coast DX Bulletin** (*WA6AUD*), **DX'press** (*PA0TO*). the **Ex-G Radio Club Bulletin** (*W3HQO*), **DX News Sheet** (*Geoff Watts*), the **29 DX Club Newsletter** (*VK6WA*), and the **DXers Magazine** (*W4BPD*).

Please send all items for **January** issue to **reach G3FKM** no later than **3 December,** and for **February** by **7 January.** □

Propagation Predictions

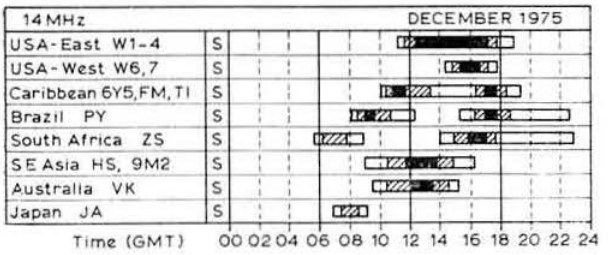
During December and January, short days mean shorter hours on the hf bands. At the present low level of solar activity, **28MHz** will be open only seldom between 1000 and 1430gmt to Africa and 1045 to 1130 to South America. Contacts on **21MHz** are only certain with South America and Africa, and the early sunset will cause dx traffic on 21MHz to cease about 1700gmt.

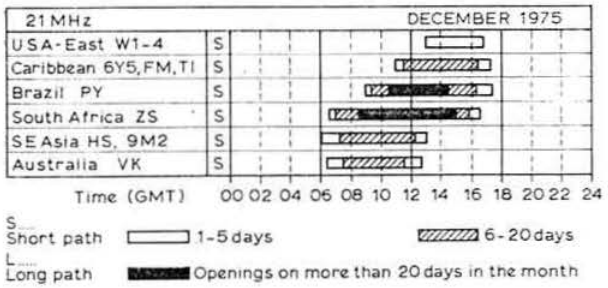
In contrast to 21MHz, all continents will be open to traffic on **14MHz**. Because of the shorter days the time for dx possibilities will be brief and will cease about 1900gmt: there will be a good chance of WAC on 14MHz between 0700 and 1300gmt. There will be opportunity of dx via the indirect path; traffic with South America and East Asia should be specially favoured before noon, and during the early evening South America and South Africa should be heard. Between 1630 and 1800gmt, traffic with KH6 should be possible via the indirect path.

After 1900gmt, **7MHz** will be the main carrier of dx. From about 1930gmt eastern North America will be heard, as will South America from about 2030gmt. Traffic on this band will be interrupted during the latter half of the night, sometimes even before midnight, because of low frequencies.

The **3·5MHz** band will give better opportunities than 7MHz for dx with North America in the latter half of the night. Relatively good conditions can be expected on this band. During the latter half of the night and sometimes before midnight this band will be interrupted by the dead zone.

The provisional sunspot number for October 1975 from the Zurich solar observatory was 9·0 with little solar activity at any time during the month. The Telecommunications Services Centre at Boulder reports conditions during the latter half of the month as being good for the season and position on the sunspot cycle. Boulder also reports a decreasing solar flux and sporadic auroral activity in high latitudes. Predicted smoothed sunspot numbers for February, March and April are 8, 7 and 6 respectively.





S.... Short path ▭ 1-5 days ▨ 6-20 days

L.... Long path ■ Openings on more than 20 days in the month

Society prizes and trophies

The Society's Technical & Publications Committee has recommended that the following awards and trophies should be presented for the period July 1974-June 1975:

Norman Keith Adams Prize to Mr T. Robinson, BSc, G3WUX, for the article "Use of amateur transmitting equipment by blind people";

Bevan Swift Memorial Prize to Mr Sven Weber, G8ACC, for the series "Diodes, diodes and diodes—and some experiments with them";

Wortley-Talbot Trophy to Mr J. P. Martinez, G3PLX, for his work on polyphase ssb generation;

Ostermeyer Trophy to Mr A. Langton, BRS33382, for "A digital frequency display unit".

Courtenay Price Trophy to Mr G. Burt, GM3OXX, for his work in the microwave field.

OBITUARIES

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

Mr N. Baxter, G3TNB
Norman Baxter died on 7 September. He had been inactive for some years, but he recently returned to hf operation and was in the process of completely updating his station.

Mr W. H. Bendall, BRS20662
Bill Bendall died recently, in his eighties. He was a keen swl and specialized in the use of HRO receivers.

Mr J. E. Church, G2BMC
Eddie Church died recently. Hé had been interested in vhf since the days of 5m, and he was operating on 2m earlier this year. He also took part in organizing and operating a Jamboree-on-the-Air station each year.

Lt Col A. C. Dunn, G2ACD
Arthur Dunn died on 20 October. He was one of the group of East Yorkshire members who took part in all Society activities between the wars, particularly NFD. His experience during the North Sea floods of January 1953 led him to become a founder member of RAEN (Raynet) and later its controller, and his "early warning" nets down the East Coast during flood alerts set the pattern for the later official warning service. He was also a former GB2RS newsreader and a prominent member of the Sheffield ARC.

Mr D. Outram, G3HJM
Donald ("Pop") Outram died on 6 October, aged 75. He was a very active member of the British Rail ARS.

Mr G. Ralph, G3NNU
Gordon Ralph died on 16 October, aged 41. Until recently he was an active member of the MSV Raynet Group. His special interests were rtty and mobile operation.

Mr J. R. Witty, G5WQ
Reg Witty died in July. He was an FOC and a keen cw operator on all bands.

Looking ahead

5 December—RSGB AGM, Royal Society of Arts, John Adam Street, Adelphi, London WC2.

1976

23 January—RSGB Presidential Installation, Executive Suite, Warwickshire CC Ground, Edgbaston.

25 April—Northern Radio Societies Association Convention, Belle Vue, Manchester.

8-9 May—National VHF/UHF Conference, Brunel University, Uxbridge, Middlesex.

1976 mobile rallies calendar

23 May—Northern Mobile Rally, Victoria Park Hall, Keighley, Yorkshire.

Repeater group meeting

by R. F. STEVENS, G2BVN

IN view of the completely incorrect rumours and comments concerned with the operation of vhf and uhf repeaters, the Society issued an invitation to all repeater groups to attend a meeting at Brunel University, Hillingdon, Middlesex, on Saturday 18 October. The meeting was chaired by the President, Cyril Parsons, GW8NP, who was supported by the Executive Vice-President, John Allaway, G3FKM; the acting chairman of the VHF Committee, Richard Baker, G3USB; the regional representative for Region 19, David Smith, G4DAX; Roy Stevens, G2BVN, Telecomms Liaison Officer, and RSGB staff members George Jessop, G6JP, and David Evans, G3OUF, who was responsible for the organization leading to the meeting.

Report of the meeting

The President opened the meeting at 1400 by welcoming visitors and outlining the points to be discussed. The general manager then detailed the administrative procedure connected with repeater applications insofar as Society HQ is concerned. Up to the time of the meeting 41 repeater applications had been dealt with and this necessitated compiling a separate dossier on each repeater in order to be able to deal with enquiries from the Home Office and from the group concerned.

Before dealing with the Home Office policy concerning repeaters, G2BVN made some general comments concerning the status of the amateur service, particularly in view of the pressure on frequency allocations that will be experienced in connection with WARC 1979, and the need for all connected with repeaters to adopt a completely responsible attitude, particularly when on the air. The present Home Office structure was outlined and while there had been delay in licensing that was frustrating to constructional groups it was not anticipated that there would be any speedy improvement in the position. The Society, by agreement with the Home Office, was responsible for the initial negotiations with repeater groups and the collection of the information required by the Home Office for a licence application. While there had been a considerable measure of agreement between the Home Office and the Society there was still a small number of points where discussion was still taking place. The repeater groups had been asked at the time of the initial invitation to submit questions to which they wished to receive replies from the Home Office. These questions had been collated and submitted to the administration for a reply before the meeting. Before dealing with the matters of detail contained in the questions the chairman asked that G3USB should first deal with the function of the VHF Committee in repeater planning.

Richard Baker outlined the various matters in repeater applications that needed to be checked before submission to the Home Office. The technical specifications for vhf and uhf repeaters had been established and individual group specifications must be in conformity with these. Groups usually indicated a preferred IARU channel, and it was necessary to ensure that this conformed to an overall national pattern. The question of uhf channels was still under discussion, particularly the desirability of adhering to the Warsaw Conference recommendations.

The next item was the consideration of points raised with the Home Office and these are given below. After a period during which questions from the floor were answered, the meeting adjourned for tea.

After the break G3USB outlined the Society's proposal to create a repeater working group. This would be directly responsible to the VHF Committee and it was hoped that it would be representative of repeater activities, both geographically and technically. There was a considerable amount of discussion concerning the membership of the working group and the method by which members should be elected. It was eventually agreed that each repeater group present should nominate six groups, excluding itself, which it would like to see supply representatives to sit on the working group. The ballot resulted in the following groups being asked to supply a person for the repeater working group: Pye, UK FM Group (London), Bristol Channel, UK FM Group (Southern), Corby, Mid-Severn, Ipswich, Birmingham, Dunstable Downs. It is recognized that this number exceeds the six originally requested but the number of votes for the latter groups was so close that the meeting felt it desirable to include them.

A date has already been set for the first meeting of this working group, and its primary task will be to prepare an overall plan for vhf and uhf repeaters in the UK.

In closing the meeting at 1800 the President expressed the view that the meeting had been very worthwhile as a means of creating co-operation among repeater groups, and as a forum for discussion of mutual problems.

Questions submitted to the Home Office

1. *Will the Home Office state their policy concerning the application of the 100-mile spacing criteria for 144MHz repeaters?*
"The 100-mile separation principle was proposed by ourselves and accepted by the Society because it seemed to fit the situation of reasonable coverage with no possibility of linking the repeaters; it is a basic rule as a starter for applications and is not inflexible. For example, where a range of high mountains divides two large populated areas we are prepared to consider an application. However, it must be stressed that we continue to look upon the 100-mile rule as one of the basic requirements."

2. *What is the policy concerning separation for uhf repeaters?*
"So far as uhf repeaters are concerned, it appears from our conversations that the Society has a different approach. We had assumed, and we thought the Society assumed, that the ground rules would be similar to both types of repeater. However, the position is not unnegotiable."

3. *Will use of a repeater be allowed for emergency purposes or training by Raynet?*
"We see no reason why the Radio Amateur Emergency Network should not use repeaters if this is what the Society wishes. However, we do *not* consider there should be any system affording RAEN priority; and we hope that the RAEN organization will bear in mind that in a disaster situation a repeater would be a probable victim."

4. *Will remote control of repeaters be allowed for close-down purposes?*
"We are prepared to consider a landline system, but a radio link is not acceptable."

5. *Will the Home Office permit the use of a "touch-tone" system designed to obtain information from a repeater, or multi-mode operation or linear repeaters for two-band or in-band operation?*
"It should be borne in mind that as opposed to normal main station or mobile applications, a repeater application requires a complicated procedure, through an intergovernmental committee, and once the parameters are proposed and accepted it can only operate under those conditions, therefore it is not possible to say at short notice and with limited information whether certain specified additional facilities can be hung on to a repeater. This does not mean that consideration will not be given to additional facilities but it does mean that a reasoned case must be submitted for them with full technical details."

6. *Will the licence require to be amended so as to dispense with the need for a separate letter of authority to operate hand-held transceivers?*
"A review of the amateur licence is to be undertaken when staffing time permits and this is one of the aspects that will be considered. Plainly, there are some aspects of amateur licences that need reviewing, and we hope to get to them in the near future."

The Home Office has also stated that unless a repeater specification shows otherwise, it is assumed that the equipment will operate 24h a day. Planned maintenance and servicing periods should be notified to the RSGB for transmission to the Home Office. In the case of a probable long-period shutdown due to equipment failure the Society should be notified.

Conclusion

The Home Office regards the RSGB as the representative body for negotiation in all matters affecting the amateur service, and looks to the Society to provide an overall plan for the installation and operation of repeaters and the subsequent monitoring of their operation. The Society fully intends to adopt these responsibilities and expects co-operation from all repeater users. □

VHF NFD 1975 RESULTS

WINNER: March & District RAS

RUNNER-UP: University College of North Wales ARS and South Manchester RC

BAND WINNERS

70MHz	G3FDW/P	Westmorland & Fylde VHF Group
144MHz	G8BQX/P	Southdown RS
432MHz	GW3UHF/P	South Manchester RC and UCNW ARS
1·3GHz	G3WDG/P	Southampton RSGB Group

EACH year when the mud has dried and the dust has settled, it is usual at the next club meeting to take a long hard look at their group's performance during VHF NFD. After it has finally been agreed who is to accept the responsibility for signing the 427 declaration, and after the last-minute amendments to the carefully(?) transcribed logs have been made, the serious business of deciding what went wrong begins. This year's contest eliminated some of the unknowns from the usual equation and consequently many groups must be a lot closer to answering this enigma.

For the first time on record, not only were the propagation conditions on all bands practically uniform throughout the country, but contestants' opinions were generally in agreement. The tables for 1975 thus truly reflect station performance and the merits of the site, divorced from uncertainties caused by local openings and frequency-selective propagation.

The weather in most counties south of the Pennines was kind with no rain at all; temperatures were pleasantly high during the daytime and fell little through the hours of darkness. In the north, however, several stations reported that they were operating in mist and low cloud for part of the contest, and temperatures were decidedly lower than in the south. The climatic conditions did not aid long-distance contacts on any band along an east—west path. Except for a few stations favourably situated on the south-east coast, hardly any were able to claim many points from Continental dx. A slight lift did occur during the early hours of Sunday, and this produced some good QSOs between Scotland and southern counties on 70MHz and 144MHz until the daytime temperatures began to stabilize around mid-morning. For the remainder of the contest no group reported other than average conditions.

70MHz

The overwhelming majority of 70MHz stations is now equipped with sideband, and those groups who had had no experience of the band, since last year were surprised to see how much it had changed. A few groups attempted to work up their score using a.m. and cw, but right from the start it was obvious that they were fighting a losing battle. It was not that 70MHz operators of sideband transceivers showed any marked reluctance to work cross mode—indeed, they were far more tolerant to mixed-mode working than were their fellow operators on 144MHz—but rather it was the fundamental difficulty of netting an independently-tuned vfo with the precision required that put the a.m. operator at such a serious disadvantage.

The band leaders managed to maintain their averages very well, but even the busiest stations noticed a steep falling-off in their rate of working by the Sunday afternoon. It was the more unfortunate, therefore, that so many groups were not able to work cross mode off their own channel as this would have been a benefit to all concerned. No records were broken during the contest and all those who were equipped with sideband and, to a lesser extent, cw, ended the event reasonably content with their final score.

It has become very apparent that the scoring potential of each band is becoming unbalanced. Northern stations, who rely upon the 70MHz band to give them a sporting chance of getting into the top 10, are beginning to feel the strong challenge of 1·3GHz in the south. The committee acknowledges this handicap, but with the 1·3GHz population in the north growing rapidly it is felt that an increase in the 70MHz multiplier would be more beneficial than declaring the overall winner from three bands out of the four.

144MHz

As in previous years, the number of entries received for this band dominated the contest. This is a great pity because the band could afford to lose half its population to the other bands without diminishing its scoring potential. This year, the total number of entries was only four less than in the record year of 1972, and with the solid blanket of QRM covering the sideband channels, dx stations were not being heard until the band quietened down later in the contest. Many contestants are asking if anything can be done to reduce the bedlam and are suggesting the return of a low maximum power limit rule.

The tremendous increase in the QRM in recent years is not entirely due to the greater number of stations now active on the band. Nor is it solely due to the fact that more stations are using higher power and bigger aerials. Much of the trouble can be laid at the door of commercial equipment with only a few hundred kilohertz of tuning range.

The committee is watching current trends very carefully, and it is becoming very evident that some changes will have to be made to the VHF NFD rules if only to restore the balance of activity on all four bands. The contest is for clubs and small groups: it is also a multi-band event in which single-band entries have been accepted to stimulate activity. The time has now come when it is neither desirable nor necessary to encourage 144MHz activity, and any changes in the rules for 1976 are likely to take this into account by devaluing the band multiplier and by accepting single-band entries on 70MHz, 432MHz and 1·3GHz only.

In general, operating standards were quite high and the quality of the transmissions more acceptable than their strength. In spite of the QRM, average scores are still mounting and logs are getting longer. This year saw another increase, but it is a sobering thought to realize that this increase comes from more bread-and-butter QSOs rather than from any improvement in the best dx distances.

Most of the complaints about poor-quality signals came from the owners of long-suffering receivers with early stages which had given up under the impact of between 5 and 10kW erp originating within line-of-sight distance. There were, however, two or three stations against which the committee has recorded a black mark for future reference. These were against groups whose operators suffered from over-enthusiasm rather than from faulty equipment, and although a few penalty points have been extracted on this occasion, the adjudicators will not be so lenient next time.

432MHz

While the leading scores on the 432MHz band might seem to indicate that the band is holding up quite well with the technical progress of the other bands, the average number of QSOs made by the top 10

Some of the UCNWARS/SMRC group after VHF NFD: Sid Jones, G3ZLL, G4BRT, GW4BGD, G8DRE, G8GSS, G8JHV. Photo: *G4AJW*

stations has, in fact, been falling steadily since 1971. There are, however, encouraging signs in this year's results that the decline is being arrested, but it is too early to be sure.

The steady transition to sideband QSOs is as relentless on 432MHz as it was a few years ago on 144MHz. It has not yet reached the stage when 95 per cent of all contacts are in this mode, but the day is not far hence. Newcomers to the band may have been surprised to find that the first few hours of this year's contest made just as many demands upon the operators and equipment as did the lower frequencies, but even the band's most devoted followers will admit that were it not for time spent on 1·3GHz contacts, operators would have exhausted the possibilities long before the end of the contest. There is still plenty of room for a lot more stations and the committee will have to give very serious consideration to any new rules or ideas which will attract more activity.

Operating standards were high and few stations complained of interference from maladjusted transmitters. A few 144MHz stations had strong third harmonics which might have caused trouble locally, but as most of the activity was crammed into the frequencies below 432·4MHz, they aroused no serious comment.

1·3GHz

It is still not quite true to claim that 1·3GHz has graduated into being a communications band able to stand up without the aid of 432MHz. Techniques are getting better every year, and more stations are equipping themselves well enough to make a worthwhile contribution to the overall score. The leaders in the band table all made more than 30 contacts, and several actually found 1·3GHz more profitable than 144MHz. Signal reports were occasionally one or two S-points up on the 432 MHz signals over the same path, but on the longer distance contacts the QSB often made it necessary to ask for a succession of repeats.

As might be expected from a band which relies less upon the commercial black box than does 70MHz, 144MHz and 432MHz, the sideband mode is not universal. Quite a high proportion of contacts were made on cw; some under conditions that were so difficult that sideband was impossible. Operating techniques proved to be more demanding than many stations believed were necessary, and it is certain that some scores would have been higher if more attention had been paid to aerial alignment before the event. For the first time during VHF NFD, a significant number of stations on 1·3GHz were using sufficient aerial gain and output power to take advantage of tropospheric scatter.

The bulk of 1·3GHz activity remains concentrated in southern counties, but the committee is quite convinced that high scores from as far north as southern Scotland will be possible as soon as the activity level in northern counties improves sufficiently to support even a modest number of QSOs.

Conclusions

The last of the September VHF NFDs closed on a quiet note with few highlights upon which to comment. Most contestants thoroughly enjoyed the major vhf/uhf event of the year, and groups are already beginning to make their plans for July 1976. The committee gratefully acknowledges all the comments and helpful suggestions made on the cover sheets, and while it will not be possible to please everyone they will receive due consideration before the rules for next year go into print.

Operating techniques and general behaviour on all bands during the contest were, as always, of a high standard. There were a few black spots about which the committee received very strong comment, but immediate investigation led the adjudicators to believe the troubles were due more to over-enthusiasm than to any deliberate disregard of the vhf operator's code.

Finally, a word about the logs themselves. The committee is quite prepared to accept logs which have been photocopied from the original, but please remember that letters and numbers which have been over-written cannot be read clearly. Corrections should always be re-written adjacent to the error, not over it.

G2HIF

OVERALL RESULTS

Posn	Club/Group	Points	70MHz	144MHz	432MHz	1·3GHz
1	March & DRAS	11,214	G3VCV	G3PMH	G4BEL	G4BEL
2	UCNW ARS & South Manchester RC	10,789	GW4BUC	GW3UCB	GW3UHF	GW3UHF
3	Southampton RSGB Gp	10,046	G4EJP	G8FAB	G5HD	G3WDG
4	Cray Valley RC	9,315	G3TAA	G8FCV	G8AYN	G3RCV
5	Albright & Wilson ARS/Caesaromagus Gp	8,697	GW3UEY	GW3OXD	GW3SLJ	GW3SLJ
6	Plymouth RC	8,556	G3KFN	G8FDK	G3PRC	G3PRC
7	Harwell ARC	7,588	G3SJP	G3PIA	G3NNG	G3NNG
8	Bournemouth and Poole VHF Gp	7,059	G3ZXD	G3PMF	G3OBD	G3OBD
9	Westmorland and Fylde VHF Gp	6,953	G3FDW	G3SEK	G8GIW	—
10	Stockport RS	6,867	G3ZOD	G6UQ	G8BCG	G8BCG
11	Surrey Radio Contact Club	6,727	G3KGA	G3ODY	G8TB	G8TB
12	South Dorset RS	6,441	G3VPF	G3SDS	G3EGV	G3EGV
13	Southdown ARS	6,407	G3WQK	G8BQX	G3YYF	G3YYF
14	Addiscombe ARC	5,984	G3WRR	G4ALE	G4CDY	G3SJX
15	Crawley ARC	5,775	G3TR	G3WSC	G3GRO	G3GRO
16	Horsham ARC	5,580	G3NPF	G3TNO	G3WZT	G3WZT
17	Leicester RS	5,513	G3ZJE	G3LRS	G3TQF	G8BMF
18	West Kent ARS	5,200	G3WKS	G4BKG	G4BOO	G4BOO
19	Ipswich RC	5,103	G4DKX	G4BPO	G4CFI	G4CFI
20	Assn of Sheffield ARCs	5,068	G3RKL	G3PHO	G3UOS	G3UOS
21	North Liverpool RC	5,044	—	—	G3JQA	G3JQA
22	Worthing ARC	4,950	G3YHM	G3WOR	G8GCP	G8GCP
23	Mafia CG	4,883	GI3RXV	GI6YM	GI3VPK	GI3FFF
24	Oxford Univ RS	4,880	GC3YGF	GC3OUR	GC4ASV	—
25	Reading ARC	4,627	G4BLT	G4CCC	G3ULT	G3ULT
26	Crystal Palace & DRC	4,415	G3OOU	G3VCP	G3FZL	G3FZL
27	Scunthorpe ARC	4,351	G4EFV	G4CDF	G4CDF	—
28	Salop ARS	4,347	G4AZS	G3SRT	G4AZV	G3UQH
29	Hereford CG	4,198	GW4CNY	GW3WRA	—	—
30	Southgate RC	4,126	G3SFG	G3ZVW	G4AEZ	—
31	Grafton RC	4,122	G3ZKE	G3AFT	G4DWZ	G4DWZ
32	Maidenhead DARC	3,852	G4ALG	G3WKX	G3VCT	G3VCT
33	Sutton & Cheam RS	3,776	G3LCH	G4BOX	G4CQR	G4ADM
34	South Birmingham RC	3,739	G6KI	G3OHM	G8GDZ	G8GDZ
35	Verulam ARC	3,717	G3JKB	G3VER	G3LXP	G3LXP
36	Farnborough & DRS / Nottingham ARC	3,651 / 3,651	G3XCH / G3TVY	G4EFY / G3EKW	G4DKN / G8IUT	G4DKN / G8IUT
38	Pennine VHF Gp	3,597	G3VVT	G4DPZ	—	—
39	Norfolk VHF Gp	3,527	G3ZIG	G8AUN	G4BEW	—
40	Harrow & Burnham Beeches	3,489	G3KRT	G8JMR	G3WIR	—
41	Doncaster Coll of Tech	3,484	G4BZD	G3UER	G3WHL	G3WHL
42	Lichfield ARS	3,482	—	GW3WAS	—	—
43	Clifton ARC	3,461	G3WMR	G3GHN	G3RQZ	G3RQZ
44	Brinkley CG	3,450	G3VEH	G3SZY	—	—
45	Newquay & DARS	3,388	G4ADV	G3XC	G2BHW	—
46	Bristol CG	3,318	G3SXY	G6YB	G8BXJ	G8BXJ
47	Bracknell ARC	3,309	G4BRA	G4DDK	G4DDL	—
48	Chichester DARC	3,283	G3IZD	G2DSP	G3ISO	—
49	Echelford ARS	3,232	G3TDR	G3UES	G2HDJ	—
50	Ayrshire ARG	3,167	GM3WIL	GM3KJF	—	—
51	Guildford & DRS	3,154	G3PJX	G6GS	G3TLM	—
52	Bedford VHF/UHF Gp	3,152	G4BCS	G8IAO	G8FMG	G3WTP
53	Hemel Hempstead Gp	3,113	—	G3UZF	G3RXQ	—
54	Sutton Coldfield RS	3,068	G3LNN	G3RSC	G8AVH	—
55	Dunstable Downs RC	3,045	G4DDC	G8DDC	G4ARD	G4ARD
56	Sheffield VHF Gp	2,939	—	G8EQD	G8EPG	G4BCQ
57	Fulford & DARS	2,933	G3OZE	G3XLH	G5KC	—
58	G3TAL *et al*	2,929	G3TAL	G3SHK	G8CLY	—
59	Swindon & DARC and Plessey Semiconductors VHF Gp	2,877	—	GW3FEC	—	—
60	Northern Heights VHF Gp	2,876	G3UGF	G2SU	G3UI	G3TQA
61	Hull & DARS	2,843	G8PQY	G3AMW	G8GBY	—
62	G8CGB; G8BCP; G8JBZ	2,842	—	EI2VET	—	—
63	IOM ARS	2,796	GD4BEG	GD3FLH	—	—
64	Luton VHF Gp / Great Lumley ARES	2,680 / 2,680	G3WOS / G4CJG	G8CDL / G8GUP	G8ATD / G4CJG	G8ATD / —
66	Kingston & DARS	2,640	G3KIN	G8KIN	G3ZYS	—
67	Wulfrun CG	2,584	GW3ONP	GW8IZS	—	—
68	Harrow RS	2,466	G3MLS	G3EFX	—	—
69	Yeovil ARC	2,416	—	G3CMH	G8AFA	G8AFA
70	Colne & Nelson VHF Gp	2,407	—	G3UEU	—	—
71	Mid-Sussex ARS	2,329	G3RXJ	G3ZMS	G3WPO	—
72	Havering ARC	2,253	—	G8HRC	G3TPJ	—
73	Glenrothes & DARC / ATV ARS	2,244 / 2,244	GM3YOR / G3GGL	GM3OLK / G4ATV	GM8HEY / —	— / —
75	Cardiff & Newport	2,186	—	GW5BI	—	—
76	Gizmo CG	2,124	—	GW4CTF	—	—
77	Border ARS	2,096	GM3JNW	GM8IIO	GM4CXP	—
78	Pembroke CG	2,088	—	GW3XJQ	—	—
79	491 ATC	2,047	G3PUV	G8ELO	G3PUV	—
80	Ron and friends	2,015	—	G3UUT	—	—
81	Nunsfield House Community Assn ARG	1,925	G3EEO	G8KGC	G3ZBI	G3ZBI
82	West Dorset ARG	1,918	—	G8IWD	—	—
83	Banbury ARS	1,903	—	G4COA	G3LTN	G3LTN
84	Cheltenham ARS	1,851	G3MOE	G5BK	—	—

Members of Torbay ARS on Haldon Moor near Teignmouth at the end of a good VHF NFD

Posn	Club/Group	Points	70MHz	144MHz	432MHz	1·3GHz
85	Mansfield ARS ..	1,818	G4AAH	G3GQC	—	—
86	Torbay ARS ..	1,768	G3LHJ	G3NJA	—	—
87	05 Gp	1,746	—	G3VZV	G3ZFP	—
88	Burndept RC.. ..	1,742	G4EGU	G3XPU	G8AMZ	—
	Reigate ATS ..	1,742	G3YQW	G8HQJ	G3REI	—
90	Rugby ATS	1,649	—	GW8DLX	—	—
91	Shefford & DARS ..	1,627	G4DRS	G3FJE	G4BWP	—
92	Milton Keynes DRS	1,613	G4AFN	G8JYW	G8IVK	G4AFN
93	Guernsey RES ..	1,606	GC4ASO	GC3HFN	GC3YIZ	—
94	Wessex ARG ..	1,562	G3RZV	G3NIL	G3FVU	G3FVU
95	R & P CG	1,559	—	G3JEQ	—	—
96	Woodmansterne ..	1,558	G3KTA	G3RJW	G4CEQ	—
97	Lothians RS ..	1,508	GM4BYF	GM3HAM	GM4DIJ	—
98	Coventry ARS ..	1,506	G2ASF	G8APB	G2ASF	—
99	Mid Cheshire ARC	1,495	GW4CAX	GW3ZTT	—	—
100	G3UDA	1,395	—	G3UDA	—	—
101	Chippenham & DARC	1,390	G3UFW	G3VRE	—	—
102	M. J. Adcock *et al* ..	1,357	—	G8CMU	G3JKX	—
103	Bury & Rossendale RS	1,337	GM4AOS	GM3BRS	—	—
104	Derby & DARS ..	1,324	—	G2DJ	—	—
105	Dial House RS ..	1,286	—	G3WDH	—	—
106	Preston ARS ..	1,281	—	G3KUE	—	—
107	J. Worth	1,224	G3ZKA	—	—	—
108	Corby Tech Coll ARG	1,198	—	G3MQV	G3MQV	—
109	Taunton & DARC ..	1,170	—	G3XZW	G8JXK	—
110	Greater Peterborough ARC	1,137	—	G4EHW	—	—
111	UK FM Gp (Northern)	1,134	—	G8KFM	—	—
112	Norweb Electricity ARC and Manchester & DARS	1,076	—	G3HOX	G8FDL	—
113	Lincoln Shortwave Club	1,069	—	G3IXH	—	—
114	Melton Mowbray Radio CG	1,012	—	G4ASE	—	—
115	Kidderminster & D VHF/UHF Gp ..	944	—	G8EPR	—	—
116	G4EDW	935	—	G4EDW	—	—
117	C. A. Lancaster ..	931	—	G8HDR	—	—
118	Stroud & DARS ..	914	—	G3EKD	—	—
119	Hillingdon UHF CG	877	—	G3WCB	G3WDX	—
120	V. G. Whitehead ..	869	—	G4DQV	—	—
121	Scarborough ARS ..	868	—	G4BP	—	—
122	Farrell Leon P. ..	860	—	GM8BOW	GM8BOW	—
123	Carlisle & DARS ..	848	—	GM8DVD	—	—
124	N. Sanderson ..	840	—	GM8GFF	—	—
125	Jersey ARS	815	—	GC3DVC	—	—
126	R. S. Scott	765	—	GM4EGE	—	—
127	P. Bagshaw	750	G3NEO	—	—	—
128	J. D. Goodman ..	687	—	G3WOA	—	—
129	P. T. Gaskin	668	—	—	G8AYY	G8AYY
130	C. G. Elliott	665	—	—	—	G8ADP
131	Peterborough RES ..	636	—	G3DQW	—	—
132	Harlow Gp	633	—	G8AJR	—	—
133	Fareham & DARC ..	632	—	G3VEF	—	—
134	Essex Nomads ..	560	G3PGN	—	—	—
135	Rainworth Scout Gp	557	—	G8GFC	G8EHX	—
136	North West ARC ..	474	GI3KVD	GI4DBB	—	—
137	Tonbridge School ARS	431	—	G4AJS	—	—
138	Nailsworth DARC ..	411	—	G8BEL	—	—
139	G. W. Rolland ..	409	—	G8AKB	—	—
140	G3CDG	388	G3CDG	—	—	—
141	C. Jones	330	—	GM8FGD	—	—
142	B. W. Godwin ..	275	—	G8AOL/MA	—	—

Because of lack of space, the individual band results have been held over until next month.

OTHER CONTEST NEWS

DF Final Contest results

On Sunday 21 September, 17 competitors who had previously qualified to take part assembled on Upper Broadheath Common near Worcester for the National Final DF Contest. Unfortunately at the start of the competition only two of the three stations to be located were audible, as the transmitter at station B was still some distance from the aerial when the time came for the first transmission.

In accordance with the rules, an approximate bearing was given for that station, and most competitors set off in the direction of stations B and C, which were situated relatively close together and some 13½ miles from the start in a quarry on Bredon Hill. Station A was 14 miles to the west, hidden in Slade Wood near Pershore, giving most competitors a long walk unless they were sufficiently confident to attempt the drive up the only track capable of taking a motor vehicle.

Ten teams managed to find all three stations; most of them were convinced that the winner had the luck of the devil and a following wind, but this was a not-undeserved day out for Brian Bristow, and everything fell at his feet including the trophy and the first prize. Bill North did well to take second place 11min later.

After the conclusion of the event, the trophy and prizes were kindly presented by Miss Findlay. Doug Findlay, who was a welcome visitor, acted as umpire. The contest was organized by the Slade Radio Society, and thanks were extended to the transmitter crews G3JZF, G3VFV, G3UMK, G4BRT, G8HBE, G8JEP and the organizer and honorary secretary, J. E. Drakeley.

Posn	Name	Club	Time of arrival Station A	Station B	Station C
1	B. Bristow	Oxford	1526	1421	1449
2	W. North	Chilterns	1537	1410	1449
3	M. Hawkins	Chelmsford	1413	1516	1541
4	W. L. Pechey	Chelmsford	1617	1421	1505
5	P. Tyler	Chilterns	1617½	1513	1421
6	J. McBurney	South Manchester	1617½	1535	1450
7	A. Butcher	Chelmsford	1620	1449	1530
8	B. J. Mahoney	Rugby	1433	1624	1555
9	E. L. Mollart	Oxford	1629½	1533	1426
10	T. Gage	Chilterns	1630	1518	1421
11	I. Butson	Chelmsford	1420	—	1529
12	G. A. Whenham	Coventry	1413	1530½	—
13	D. Holland	South Manchester	—	1458	1552
14	P. Hudson	Dartford	—	1449	1553
15	P. Woollett	Dartford	—	1531	1557
16	M. Easterbrook	Dartford	1629	1459	—
17	D. E. Newman	Rugby	—	—	1438

Affiliated Societies Contest 1976 rules

The rules of this contest have been changed radically. It was felt that for the majority of entrants the event had ceased to be a club contest. Typically the club call would be used at the QTH of their member who had the biggest 160m aerial, and the station would be operated by the two most dedicated cw operators available. Nobody else would get a look-in, except maybe for a spell of check-logging.

In the new contest all members of affiliated societies holding Class A licences may take an active part. Some clubs may be at a disadvantage, eg university radio clubs, but these apart there are few who cannot get five members on 80m cw. The honours in this contest will go to the club having members prepared to have a go, even though they may feel that as individuals their contest capability is limited.

Club secretaries are asked to send in as many entries as they can raise from their members and include constructive suggestions for improvements to the rules.

1. The General Rules for HF Contests to be published in the January 1976 issue of *Radio Communication* will apply.

2. The contest is between groups of stations, each group representing an affiliated society or club. Each is encouraged to enter as many stations as it can but the result will be determined by the aggregate scores of the five highest-scoring stations in each club.

3. Eligible entrants.

(a) Paid-up members of paid-up affiliated societies. Entrants need not be RSGB members.

(b) Each station may be single-operator or multi-operator but no operator may use more than one callsign during the period of the contest.

(c) All stations representing a club are to be operated within 25 miles of the normal club meeting place.

(d) No station may represent more than one club.

4. Contacts. CW (A1) in the 3·5–3·8MHz band. Entrants are requested to confine their operations to frequencies between 3·510MHz and 3·590MHz.

5. Exchanges. Exchange RST, serial number commencing with 001 and AFS. Stations active during the contest period but not submitting an entry are requested not to send AFS.

6. Scoring. Five points for each contact. A bonus of five points may be claimed for AFS received but will not be granted if unconfirmed by an entry.

7. Logs. Column 5 to be headed "AFS received".

8. When. 1400–1800gmt Sunday 11 January 1976.

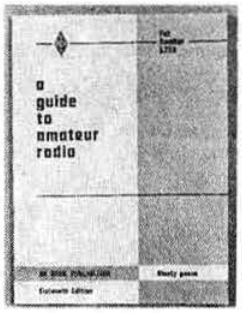
9. Entries. Each entry from a competing station shall conform to Rule 8 of the general rules. All entries from one affiliated society are to be sent in one package to the RSGB HF Contests Committee, c/o A. M. Smith, 21 Hamsey Green Gardens, Warlingham, Surrey CR3 9RS, accompanied by a declaration by an officer of the affiliated society that each entrant is a member of that society. Entries must be postmarked not later than 26 January 1976.

10. Awards. The Edgware Trophy will be awarded to the affiliated society whose five highest-scoring members have the highest aggregate. A certificate will be awarded to the station having the highest individual score.

Contests calendar

1975	
7 December	144MHz Fixed (Rules in September issue)
1976	
11 January	Affiliated Societies (Rules in December issue)
18 January	70MHz CW
7-8 February	ARRL DX Phone
8 February	432MHz Open
14-15 February	First 1·8MHz
21-22 February	ARRL DX CW
6-7 March	144MHz Open & Listeners
6-7 March	ARRL DX Phone
13-14 March	Commonwealth (Rules in November issue)
20-21 March	ARRL DX CW
3-4 April	70MHz Open
11 April	3·5MHz LP
24-25 April	1·3GHz Open
24-25 April	Bermuda Phone
1-2 May	432MHz Open & Listeners
8-9 May	Bermuda CW
29-30 May	144MHz Portable
12-13 June	HF NFD
19-20 June	Microwave
26-27 June	Summer 1·8MHz
3-4 July	VHF NFD & Listeners
18 July	3·5MHz FD
25 July	144MHz QRP
7-8 August	70MHz Portable & Listeners
4-5 September	144MHz Open & Listeners
4-5 September	SSB FD
2-3 October	UHF/SHF
9-10 October	21/28MHz
16-17 October	7MHz CW
24 October	70MHz Fixed
Oct-Nov	432MHz Cumulatives
6-7 November	144MHz CW
6-7 November	7MHz Phone
13-14 November	Second 1·8MHz
5 December	144MHz Fixed

A SELECTION OF RSGB PUBLICATIONS



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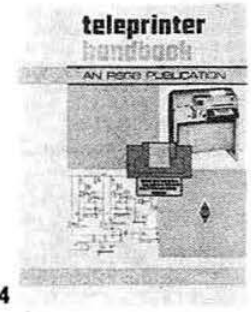

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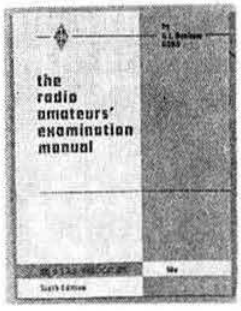

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The closing date for each issue is the 1st of the preceding month, but no guarantee of inclusion in a specific issue can be given. Valid advertisements not published in the issue following receipt will be held over until the next issue.

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.

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

SSM Europa 2, and SSM heater transformer for same, vgc, little used, £62. D. Widdowson, 221 Park Road, Merseyside L37 6EW. Tel Formby 75220.

Axial blowers, Papst 220V 50Hz, 4·7in by 4·7in by 1·5in, powerful, silent, £1.25. Mains radio interference filters 250V ac 10A, £1 each or pair in screened box, £2.50. Hi-ripple capacitors: 50,000/50V, 30p. 21,000/25V, 15,000/50V, 50p. SAE list. Postage extra. G3YLQ, QTHR. Tel Luton 25595.

FT101B, FV101B, SP101B, purchased July this year, absolutely as new, sell complete or will split, offers. Owner going vhf, so will consider a deal with TS700. Tel 049-555 7450.

Yaesu FV200, remote vfo for FT200, connection lead and handbook, provision for four xtal-controlled channels, no xtals supplied, £37.50. Dispatch by Securicor. GW4CPZ, QTHR. Tel Cwmbran 67457 evenings only.

TR44, as new with 90ft control cable, all complete, £45. HQ1 mini beam with 90ft RG8U, £45. Would exchange HQ1 for mint 18AVT/WB. SAE please with full details. GM4AGS, QTHR.

Yaesu FT101 tx/rx, as new, only used as standby rig, complete with mic and handbook, ssb and cw 600Hz filters, really exc amateur station, £285. G3WY, QTHR. Tel Evesham 45497.

Yaesu FTDX560 and matching spkr with top band and cw filter, immaculate, £250. Oscilloscope dc-4MHz ± 1dB, £25. G4BVQ, QTHR. Tel 061-236 5866 during day.

DJ4BG clipper, May 72 *Rad Com* design, complete low-Z matching mic, calibrated 0–18dB clipping, output lead, stereo jack plug suiting Yaesu 401 etc, £11. FT241A xtals, channel 324 450kHz, channel 327 455kHz, 60p each. Plessey SL610C, SL621C, £1 each. 640C, 641C, £1.75 each. G3IZJ, QTHR.

HW32A tx/rx plus GH–12A mic, ac psu, xtal calibrator and SP–5D spkr, £70. Codar AT5 tx, £12. Both perfect, please apply after 10 November. G4AQJ, QTHR. Tel 0682 68510.

RTTY Creed 7E with silence cover, £25. Terminal unit TTU2125/2295/2975 with afsko, £65. Monitor scope, Solartron, £40. The lot, £110. *Wanted:* 12AVQ or 14AVQ. G3YYD, QTHR. Tel Garston (Herts) 73371 after 1830.

Hamgear PM2 preselector with built-in 1MHz crystal calibrator, £7. G whip 80/160 mobile aerial, less base mount, £6. Large roller coaster coil, £4. Joymatch 3A atu, £2. *Wanted:* Codar T28 rx. Original AR88 matching spkr, mint cond. Richardson, 2 Edna Road, Maidstone, Kent.

Few 10GHz WG16 three-port circulators, spec unknown but retunable, £8 each. 5GHz coaxial isolators, £5. HA600 rx, £40. 4m hand-portable tx/rx plus nicads, £30. GM8BKE, QTHR.

Collins 455Z19 mechanical filter, complete with lsb crystal, £12.50. *Wanted:* Fingering strip or rings suitable for 2C39 base connections. G3WZT, QTHR. Tel Partridge Green 710565.

Heathkit bridge C3U, 240V, vtvm IM-11, sig gen IG-102, Capacitester IT-22, probe 309-CU, 110V transformer supplied, £40. Codar AT5, T28, ac/dc supplies, £25. Four 6JS6, four 6HF5, £6. All ono. G5ND, QTHR. Tel Blackpool 64508 evenings or weekends.

Mosley Atlas aerial, 40–10m trap vertical, c/w radials, base etc, £20 ono. Possible del arranged. G3XLL, QTHR. Tel Norwich 48685.

Shack clearance, all gear in mint cond. FR50B, includes atu, headphones, £50. CR70A with preselector, £32. SAE for other items which include Tech-books, BIET course, RAE model answers, etc. R. Pennington, 61 Langley Drive, Crawley.

Liner 2 ssb tx/rx, six months old, mint cond, hardly used, also 14V 3A stabilizer (requires 17 to 24V dc input), £130. G4DQG, 378 Hungerford Road, Crewe, Cheshire.

Eagle vom K1400, as new, prods and manual, £19. G6OP, QTHR. Tel Bristol 43516.

Tower, 32ft Heathkit, £45. G3LIS, 46 Black Moss Lane, Ormskirk, Lancs. Tel Ormskirk 77960.

Must sell 13A scope, complete, £25. Also BC221 with stab psu and charts, £20. Heath IO-12 scope, £15. Marconi Marine linear, two 4–400s, £35. Trans, 2·5 × 2·5 at 1A for linear, £20. Buyer inspects and collects. G3NAC. Tel 0954 60584 (Cambridge area).

No 10 xtal cal, 500kHz–10MHz, £2. TE16A sig gen, 400kHz–30MHz, £6. 12 spkrs, all sorts, £2. 15 ex-equip transformers, mains, af, unmarked, £1.75. *Wanted:* Info on Chapman S6BS rx and BC625A tx, borrow. Steve, G8KDL. Tel 01-203 3138.

2m tx/rx, tunable rx, xtal-controlled tx with xtal for 145MHz, 5W dc input, solid state, requires 12V dc, £30. 70cm converter as December *Rad Com*, £6. 144/432 valve triple amp, £2. G4AWL, QTHR.

New RCA 6JS6C, £2.50p each. 6BZ6, 6CB6, 6U8A, 12AU7A, EF184, all 45p each. 7360, £4. Mod transformer Woden UM1, £2. G4BYA, 12 Shepherds Mount, Compton, Newbury RG16 0QZ. Tel Compton Berks 379.

Nagard DT103 scope, complete, basically working, with psu, long-persistence double-beam tube, ideal sstv etc, buyer collects, £7 ono. G8IMR, QTHR.

QRP HW7 tx/rx and ac psu, both mint cond, £35 the pair. Prefer buyer collects. E. H. Peck, 165 Little Breach, Chichester, Sussex.

Two 18AVT/WB verticals, 10m–160m omnidirectional, offers. Also pair of Howland West 6 stereo spkrs, offers. RF field indicator, £3. *Wanted:* 70cm converter, 144–146 i.f. A8398 and G4CBZ. Tel Bedford 52944.

Liner 2, as new, £120. FT2F, 12 channels incl 145·00, S19, S20, S21, S22, S23, R5, R6, R7, tone burst, mobile mount, £95. Cossor 1045K scope with handbook, £10. G3YNC, QTHR. Tel 01-521 3008.

FTDX401, immaculate, £235. Liner 2 (preamp), recently professionally re-aligned, £125. *Wanted:* FT101B. G3RWF, 55 Fox's Covert, Fenny Drayton, Nuneaton. Tel Atherstone 4161.

BC221 frequency meter with cal charts, psu and headphones, £25 ono. G3SUY, c/o 3 Lovatt Close, Edgware, London. Tel 01-958 9786.

JR310, as new, with full 28–30 top band and cal, £75. SSM 144 28–30 converter, £10. Pye 144 Vanguard, complete, rx unconverted, £10. The lot, £90. Galaxy 5 Mk2 400W hf, £150. G8GHZ, QTHR. Tel Northampton 61794 (home) or Northampton 34833, ext 5314 (office).

TA32jnr beam, £25 ono. 1kW swr meter, £10. 80m trap dipole, £8. A. Rudge, 98 Kingscourt Lane, Rodborough, Stroud, Glos. Tel Stroud 2189.

Barlow Wadley XCR30, mint cond, little used, £105, including Securicor delivery. Tel Dartmouth 2583.

Heathkit HW12 80m tx/rx, plus ac psu, spkr, mic, mobile mount, £75 ono. G4DMS, QTHR. Tel Towcester 50632.

Superb Telrex Monarch 3-el optimum-spaced 20m beam, 26ft boom, current price over £250, £140. Unused Labgear quad, wide-spaced glass fibred bamboos, three-band, cost over £90, £55. G3NUG, QTHR. Tel Radlett 4435.

Geloso G4/215 rx, 80–10m plus 26–28MHz i.f. for accompanying 2m converter, mint cond, £60 ono. G3XEF, 34 Clifton Park Road, Clifton, Bristol. Tel 0272 38070 evenings.

Trio JR500S, 10 to 160, £40. HRO, seven coils, psu and spkr, £15. BC312N, working order, case rough, £8. Buyers collect. Smith, 19 Hyde Road, Kenilworth, Warks. Tel 54609.

Yaesu Musen FR101S, brand new, under 20h use, £235 ovno. Also Mosley TD3jr trap dipole, £6. 4 Durrants Drive, Croxley Green, Rickmansworth, Herts. Tel Watford 21056.

Garex tx/rx, a.m./fm, tone bursts, six-channel capability, complete with two crystals, £70 ono. G8CGX, QTHR. Tel Toddington 3740.

TC9 a.m./fm tx, three months old, plus CR100 rx and 2–4MHz converter, complete with leads, mic, spkr, circuit diagrams, £80 the lot. Buyer collects. K. Hardman, MoD Hostel, Boscombe Down, Salisbury, Wilts. Tel Amesbury 3331 ext 2435 8am to 4.30pm.

Multi vfo for vhf, 44MHz receive out, 12MHz transmit out, freq drift 300Hz/h or less, 12V operate, £40. Calculator, Prinztronic MC99, 8/16 digit, large readout, with memory, mains or rechargeable batteries, £30. GW4AMV, QTHR. Tel 0222 387076.

Lafayette three-channel 2W walkie-talkie with squelch, call tone, range boost, 28·5, supplied with carrying case and handbook, £16. G3ZDV, QTHR.

Exams shortly—cannot complete *PE* keyboard synthesizer: envelope shapers, hold and modulation amps completed, all parts for finalizing include 49-note mounted keyboard, keying contacts, all electronics and mounting boards, cost around £130, £85, no offers. G4DHF/G8HAE, QTHR.

Trio 9R59DS gc rx, also spkr in cabinet, mint cond, £40. 201 Lordship Road, London N16. Tel 01-802 2815.

KW2000B, ac psu, spkr, 444 mic, £220. G3GGK, QTHR. Tel Madingley 374.

QTH for sale. Ready-made large radio/workroom over garage reached through third bedroom, attractive detached four-bedroom house with character on high ground back of Brighton, hf aerial size garden, offers. G3WXG, QTHR. Tel Brighton 553150.

KW110 Q-multiplier with info booklet, offers. G4MU, QTHR.

QSY sale. Drake R4C/MS4, £275. SB400, £75. SB300/CWF working, needs attention, £45. (Or SB400/300, £100). KW107, £37.50. MSK5 keyer £17.50. EK108 keyer, £15. TE7-01 aerial bridge, £12.50. Cossor 1052 scope, £20. MFJ CWF2, £5. Much more. G3LNC, QTHR. Tel 0582 65114.

Heathkit HW32A 20m ssb tx/rx, HP23 ac psu, mic and spkr, good cond, complete station, £80. Also Heathkit a.m./fm tuner AFM1, £5. Chris Heavens, 40 Beech Road, Clanfield, Hants. Tel Horndean 591871 after 5.30pm.

TCS rx, mains psu, £8. 19 set rx, mains psu, £5. RF24 unit, modified 14–21–28, £2. Crystal calibrator No 10 with handbook, original packing, unused, £5. Carriage extra or collect. G3JFC, QTHR. Tel Crayford (Kent) 22489.

Joystick aerial, £5. Really hefty auto-transformer 230/115V, 3kVA, £3. High-quality universal multimatch push/pull audio output transformer with substantial laminations, £3. G3KUF, 21 Beechwood Road, Easton-in-Gordano, Bristol. Tel 0272 296538 daytime or 0275 813648 evenings and weekends.

FT200, as new, plus FP200 matching spkr/psu, all extra xtals fitted, Europa transverter, 6-over-6 slot-fed aerial, £270. G8GTY, QTHR. Tel Chesterfield 75944.

Trio 9R-59DS, mint cond, stabilizer fitted, £45. Panda Cub tx in good working order, £20 ono. G3YEK, QTHR.

Good vhf QTH, end of terrace, three bed, two rec, kitchen, bath, sep wc, full c/h, garage, aerial 8-el XY may be inc, located nr Crystal Palace. G8HAX, QTHR. Tel 01-653 6306.

Liner 2, 100 to 330, nearest £115. Carriage extra. G. E. Twiss, tel 061-483 2188 day time.

Class D wavemeter Mk 2, complete with built-in psu for ac mains, £6. *Wanted:* AR88D, BC342 or HRO, fb cond essential, mains psu where required. Also Bauer keying paddle. All letters answered. G3WXT, QTHR.

Heath HW202 tx/rx, tone burst, ac psu, mobile mount and aerial. 144 28–30 Microwave converter, URM67 cables, 8-el crossed Yagi beam, complete fm station, new cond, £170 ono or exchange SB200 linear. Tel 027-582 2725.

DX100U with SB10U, cw/a.m./ssb with connecting cables, working, vgc, buyer collect, £45. G4BCY, QTHR. Tel Headley Down 2121 after 7pm.

KW2000A with ac psu, less mic, prefer inspection and collection, £85. New Morganite gold-flashed resistors, approx 8W 100Ω, two for 50p. Marconi 100kHz B7G xtals, £1. Stabilized psu, three separate outputs, +5V to +16V, −7V to −11V, 18V to 24V at ¼A, £6. All carriage extra. G8ENI, QTHR. Tel Cheslyn Hay 415374.

Geloso G209R amateur bands rx and G212 tx, prefer sell as one unit but will split. Offers to G3WMU, tel Brighton 688105 daytime or 65704 evenings.

Liner 2, with PA3 pre-amp, good cond, £125. G8ANU, QTHR. Tel Stafford 52693.

Liner 2 plus PA3 preamp, R115E mains psu, £135. DX100U tx, £35 ono. G8FLA, QTHR. Tel 01-449 0460 evenings.

Collins 75A4 rx, three mechanical filters, vernier knob, matching spkr, £220. 32S1 tx and psu, £210. Will del 50 miles. G3VXZ, QTHR. Tel Maidenhead 27350.

FT220 vhf tx/rx, ssb, cw, fm, vox, sidetone, repeater shift, tone burst, mains or 12V, £230 ono. G4BYS/A. Tel Bath 29017.

Few left ex-a/c TXs, xtal con, 250W cw mod ssb, lin pair 4X150s in final, £15. Also AD94 rx, six band 150kHz to 19MHz, original cond, no mods, xtal oven, £30. G3IUL, QTHR.

Brand-new components. Resistors 47–1MΩ 17 values. Capacitors 0·5pF–100μF 15 values. 20 each value per 10p pack plus 9p p and p. Set of resistors, £1.60. Capacitors, £1.40. Orders over £1 post free. SAE for list. All proceeds to South Dorset Radio Society funds. G3VPF, QTHR.

RTTY station. Teleprinter, reperforator, auto-tr 44 perforator, ic ST6/ST5 tu, plus spares and paper, £100. Trio 9R-59DS, 2m converter, Q-multiplier, atu, spkr, mains filter and almost-complete fec, £60. R. Looker, 91 Station Road, Amersham, Bucks. Tel Amersham 21187 evenings.

Yaesu YC305 frequency counter 5Hz to 30MHz, suitable ac mains or 12V dc operation, as new in manufacturer's carton, complete with manual, only £75. G3VNP, QTHR.

Liner 2 ssb tx/rx, was higher band but professionally converted to current segment, fitted Burns preamp, cared for, going 70cm fm, £110. Adrian Andrews, 72 Monks Walk, Buntingford, Herts. Tel Royston (0763) 71085.

Sentinel 2m converter, i.f. 2–4MHz, hardly used, £11. G3ZJJ, QTHR.

G8AEV tx, a.m., three xtals, complete in chassis with aerial c/o relay, £18. Sentinel mf converter, £15. Solid State Modules mf-160m converter, £4. Sentinel dual-gate 2m converter, 4–6MHz, £9. £40 for the lot. G4DOV, QTHR. Tel Walsall 27738.

TW 4m tx 50W cw/a.m., int psu, £25. TW 4m Nuvistor conv, int psu, exc cond, £6. G5RS, 20 Hedgeway, Guildford.

Europa 2m transverter, fitted coaxial relay, £45. QM70 1W 70cm transverter, £30. Creed 75 teleprinter with tape punch, £40. Garex 2m a.m./fm mobile tx/rx, £25. G8ADM, QTHR. Tel Andover (0264) 61345 (office).

Westminster W15AM, latest GPO spec, 12·5kHz, high band 148–174MHz, offers please. Tel 0454 415185 after 7pm.

Brand-new set of 144MHz modules by J.H. Associates for 10W fm transceiver, incl 11 xtals, cost £94, offered for £70. Microwave Modules 144MHz tx, hardly used, £20. G3SJI, QTHR. Tel Bristol 623321.

Avo Model 9 Mk2, mint cond, virtually unused, £40. Avo 8, used but in good order, £32. Now using digitals. Prefer buyer collects. If by post allow £1 UK postage. Audio power monitor Marconi TF340, direct measurements 1mW to 50W, switched internal load, 2·5 to 20kΩ, ideal professional audio designer or keen amateur. £12 plus £1 UK postage. S. Bennett, 45 Green Lane, Purley, Surrey. Tel 01-660 2896.

Heathkit linear amp, 2kW, model SB200, good working order, £200 ono. Tel Great Easton 235.

HP175A dc-50MHz scope with dual trace and sweep delay plug-ins, complete with manuals, £175. Liner 2 and psu, £125. Can del both London area. Letters only. G8CPB, QTHR.

HRO, four gc coil packs plus 160m bandspread, 19in rack psu, £12, buyer collect. *Wanted: Rad Comms,* Jan 1972 to April 1974 inc. G3ZOM, QTHR.

FT2FB, mint cond, fitted usual channels including R5, 6, 7, S20, 21, 22 and 23, £95 ono. Hawker, 7 Strode Gardens, Alveston, Avon BS12 2PL.

EC10, slightly marked cabinet, £50. Almost complete G2DAF linear in professional steel cabinet, £50. Plated brass chassis, two 4CX250B bases, £14. Two very powerful fans, mains, £11. Offers considered. Michael Taylor, PO Box 49, Aberdeen. Tel 0224 53553 daytime.

Marine vhf r/t, 10W, fully solid-state, fitted channels 6, 8, 9, 10, 12, 14, 16, 18, 20, 21, 26, 27, handbook, sae full details, £60. Redifon GR286 "Private" decks, a.m./fm, suitable for conversion to 144MHz, £22. All carriage paid. G3JMJ, QTHR. Tel 073 271 3467.

KW Vanguard tx, 160m–10m a.m./cw, 50W/10W input, good cond, £10. TE16 gdo working but no coils, £2 ono. R. Hammond, Tel Swanley 64356 weekends only.

FRDX400 complete with 2m and 6m converters, cw and wideband a.m. filters, fm unit, notch filter etc, selling due to purchase of FR101, immaculate cond, including numerous spare new valves and Securicor delivery, £165. G4BVH, QTHR. Tel Brighton (0273) 504634.

Liner 2, just been re-aligned under guarantee, fitted with PA3 pre-amp, £125, or will exchange for good hf bands rx or tx/rx with cw filter fitted, but this not essential. Cash adjustment either way. G5YV, QTHR. Tel Morley (0532) 537412.

HRO-MX, seven coils, home-made psu, £10, carriage extra. Second world war German equipment. Various vintage items. Old books from 1914. Valve collection, over 300 from 1913 to 1940. Large amount vintage valve literature. Offers. SAE please. G5WW, QTHR.

FT101. 10–160m, vgc, little used, £250 ono. Dr King, Pleamore Cross Cottage, Wellington, Somerset. Tel 3383 evenings.

Complete 2m fm mobile station. FT2FB, fitted preamp and 11 channels including S20, 21, 22, 23, BC, PI, MH, LO, SN, 48, 60, 145, GB3GW, plus HA202 40W amp, £125, may split. Tony, 7 Strode Gardens, Alveston, Thornbury, Bristol BS12 2PL.

Radiotelephone type W15AM, 12·5kHz channel spacing, suit taxi, approx 170MHz, £65 ono. G4CJZ c/o G4BNN, QTHR.

Heath ssb tx/rx HW32A, mic and spkr, £55. HP23 psu, £20. HP13 dc 12V psu, £25. All as new with handbooks, cables, guarantee. G3HHZ, Kemble Wick, Cirencester.

Mullard 5–10 amp. Spkrs. Mics. Meters. UM2 modulation transformer. Table-top cabinet. Valves. Relays. AC-DC mains units. Heater transformers. Books. Service sheets. Early components. Copper wire. Test equipment. Slow-motion dials. 78rpm records. Chokes. Megger hand generator. G3DFS, QTHR.

Give-away prices. New a.m. modulator of recent German make, up to 45W audio, less three EC92s and two EL34s, only £3 post paid. New valves ECC808, ECLL800 and TT21. Erland Belrup, Hjortshög 4540, S-260 34 Mörarp, Sweden.

432MHz linear, QQV03-20A, 15W p.e.p. rf approx for 1W drive, integral ac psu with output to power transistor transverter, fully metered, £20. Buyer collects. J. H. Quarmby, 46 Quebec Drive, Kesgrave, Ipswich IP5 7HP. Tel 0473 643484 during office hours.

Good vhf location. Three bed, two recep, centrally-heated semi, garage, shack, 40ft tower, rotator, 2m quad, offers around £18,000. G8FQC, 25 Laurie Crescent, Bristol BS9 4SZ. Tel 0272 48383.

Bedford "Brigand" Campervan, blue, 1973, road taxed, exc cond, 50,000 miles, extras fitted including mobile aerial mount, tx/rx mounting desk, mw/lw radio, dual batteries, £1,400 ono. Returning VK2IK Jan/Feb. A. J. Brown, 5 Rogers Close, Old Coulsdon, Surrey CR3 1JA. Tel Downland 55909.

G3IMX triband quad, £20. Buyer collects. Many 2m and 4m xtals, 7·791 to 8·104MHz FT243 and 10XJ types, 75p each. List available. G. Elliott, "Oatlands", Southend Road, Howe Green, Chelmsford. Tel 0245-71604.

Channel Master rotator, exc cond, 20m cable alignment bearings, £28. 14-el Parabeam, unused, part assembled, 5m low-loss coaxial cable, £18.50, buyer collects. *Wanted:* R1475 power-pack, manual. *CQ* Feb 1957, *QST* Aug 1970. G3GUU, QTHR.

Yaesu FRDX400S, 160 to 10, 4m, 2m, £170. Prefer buyer collect. G3OPM, QTHR.

KW Vespa Mk2 tx, matching psu, 180W 160–10m, £75. Also 4m Pye base station, £25. Trans UM2, £2. Buyer collects. G3RYF, QTHR. Tel 01-539 1468.

Lafayette HA700, £15. M/M 2m converter, 2–4MHz i.f., £13. Homebrew 2m preamp in Eddystone box, £3.50. 2m 8-el Yagi, £3.50. Two 12·5ft by 2in aluminium poles with joiner, rotational guy assembly, £8. I. Hubbard, 36 Brewery Lane, Formby, Liverpool. Tel Formby 76597.

HA202, professionally built, good cond, fitted 50Ω BNC connectors, 40W output into 50Ω load. G4CJZ c/o G4BNN, QTHR.

FR50B rx, 10–80m, good cond, £55. Unused single-channel radio control, tx/rx complete with two servos, £20 ono. 14 Westhill Road, Kings Norton, Birimingham B38 8RX. Tel 021-459 2527 evenings.

KW Vanguard tx with low-pass filter, 10–160. Two G2DAF type RXs. Test gear including O–12–U 6in scope, IM-13U vvm with 309-CU probe. Many other items, send sae for list. G3RWY, QTHR.

Teleprinter Creed 7B, clean, £15. Pye Ranger, a.m., suitable for mod to 2m, with xtals, £8. Class D wavemeter, mains operated, £5. G3NMZ, QTHR. Tel Luton (0582) 591749.

Pye 2m base station, fm/a.m., 8MHz vxo, 6–40 pa, JR310 front panel, covers 200kHz to 300kHz, "rock" solid on tx, ideal for S20 to S24 or R2 to R7, mic included, £25. Could del reasonable distance. *Wanted:* Chimney for 4X250B. D. Crompton, "Hill Top", North Road, Carnforth, Lancs.

Mosley TA32jr with mast, adapter, as new. Hallicrafter S20R rx with S-meter and handbook, buyers collect. Mullard DG7-5 crt, ASB8 unmodded. Back issues *SWM*. Offers with sae. G2HKU, QTHR. Tel Minster (Sheppey) 873100.

Cossor 339 scope manual, 90p. 8ft telescopic whip, £1.80. British Standards electrical subject index for sorting magazine articles, £1. Red/green two-lamp pushbutton, £1. Predetermining decade counter, £1. 25/100μs delay line, 50p. G8ABR, QTHR.

For 2m. Murphy Liner linear, 40W output, £25. Complete 2m station, TW3 tx, psu, converter 28–30MHz, xtals, mic, £40 the lot. TW70 432MHz converter, 14–18MHz, £10. Lowe tune-up tone pulser module, £1.50. Poulter, 279 Aragon Road, Morden, Surrey. Tel 01-337 0117.

Trio JR310 rx, narrow ssb filter, 29·7–30MHz on extra range, SP5D spkr, £65. Microwave Modules 2m converter, 28–30MHz i.f., £13. Both exc. HC6/U xtals, 8·018, 8·021, 8·047, 8·070MHz, £1. Sinclair 3000 stereo amp, £22. G8FIH, QTHR. Tel 01-841 6425.

Tape recorder deck, unused, three-speed, reel-to-reel, 5½in spool capacity, three-digit resetable counter, 240V ac motor, £6, or exchange for cassette tape recorder. Prefer buyer collects, after 4pm. R. Barns, 97 Ringmer Road, Worthing, Sussex BN13 1DU.

FT2FB, HA202, fitted 48, 60, 145·00, GB3GW, BC/PI, MH/LO, SN, S20, 21, 22, 23, preamp, little used, £125 ono. HP possible. Tel 0454 415185 after 7pm.

Telford TC7 Mk2, £40. G8AEV Mk2 conv, £7. Or £45 pair. Liner 2, fitted PA3, cables, mic, mobile mount, plus R-112 ac psu, £130. All vgc. GW8GAV, QTHR.

Technical Associates audio compressor, mint, £20. Almost-completed linear amp using pair of 4CX250Bs along with matching psu, £30. *Wanted:* Heathkit SB200. GM4ASY, QTHR. Tel Bishopton 2941.

"Callbuoy" solid-state hand-portable distress rt, suit yachtsman or mod to top band, £15. *Wanted:* Modern fm rt, damaged or not working would do. Adamson, Woodend, Victoria Road, Kingsdown, Deal, Kent CT14 8DY. Tel Deal 3788.

KW103 meter, 52Ω, mint, £10. Electrostatic voltmeter, 2·5kV, 3½in diam, £1.50. HC6U xtal 1MHz, £1. HC18U xtal, 7·520MHz, (160m conv 401 etc), £1. All carriage extra. G2CST, 5 The Ashes, Glossop, Derbys. Tel Glossop 61062.

Marconi TF1104/1 alignment scope, £70. 10–15V at 10A dc stabilized psu, current protected, £18. Advance MT140A constant-voltage transformer, 150W, £10. VHF power meter, £5. 0–20V at 10A ac-dc continuously-variable psu, metered dc, £12.50. Six-way coaxial switch, £30. G4DDM, QTHR. Tel 049481 (Penn) 4483.

Heathkit SB301 with spare valves, 2m conv, manual, £75. Microwave Modules 70cm converter, 28–30MHz i.f., £15. 10-el 2m J-beam, £8. 8-el 2m J-beam with 40ft low-loss coaxial cable, £5. DL6SW 2m conv, 28–30MHz i.f., £5. Stab psu, 15–30V 2A, £10. G8AMP, QTHR.

Collins ssb mechanical filter F250A67, £7. AM10D Cambridge without rx front end, otherwise ok, £18. Goodmans Axiom 301, 20W 12in hi-fi spkr with ARU172 acoustic vent, offers. *Wanted:* Sommerkamp FL100B/FL200B tx. G8CXK, 13 North Hill Close, Sileby, Leics. Tel 050-981 2433.

FT220, £200. 12-channel mobile tx/rx, nine channels fitted, repeaters etc, built from J. H. modules, £75. 40W mobile linear, £27. G8BZN, QTHR. Tel 0455 (Hinckley) 35621.

Property of late G3TNB. FT101, perfect, £250. 30ft professional lattice tower plus base, £65. Hustler vertical aerial, 10–80m plus 85ft 50Ω cable, £25. Telequipment S32 scope, DC-10MHz 100mV/cm, £40. Stacks other gear, tel requirements. G3HVA, QTHR. Tadley 4445.

Marconi CR150 rx, 2–60MHz, vgc, handbook, some spare valves, £60 ono. Pye Cambridge, suit 4m, vgc, £28. G3YDY, 43 Keene Way, Chelmsford CM2 8NT. Tel 62493.

SSM Europa, 2m, £55. Also identical homebrew 4m version, £20. AR22 Rotator, £20. Also some junk. GM4DGT, QTHR. Tel Stirling 3171 ext 2737 daytime.

WANTED

Bird 43 Thruline, and inserts for 2m and 70cm. G4CXJ, QTHR. Tel Witney 2573.

Cash waiting for good cond Multi-2000 or FT220, must be mint, all replies answered. Tel 0454 415185 (Bristol) after 7pm.

HF three-band beam, TH3, TA33, Mustang or similar. G4DWD (ex G8EHV, QTHR). Tel Leeds 68480.

Help and information about alternative energy sources such as source of economical solar cells, wind generator design. Copies of articles appreciated. Details of any organized clubs or organizations. D. Walsh, Ballylynch, Carrick-on-Suir, Co Tipperary, Ireland.

Instruction book and/or instructions to convert a Pye Ranger to 2m. Also any information on Bendix rx type RA-10FA. Will return within days, postage paid both ways. Tel Yoxall 472054, will accept reversed charges.

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AR22 rotator, Akai 5200 or 5500 amp. *For sale: Bulls* in binders 1960–1972, £13 plus carriage. 8 Heythrop Drive, Middlesbrough.

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CRT type 93D for Cossor 1059 oscilloscope. G3ZVT, QTHR.

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Collins S-line. 75S3-B rx, 32S3 tx plus psu, SM3 mic, must be in fb cond, no mods, good price paid. 25A Marshall Road, Mapperley, Notts NG3 6HS. Tel 0602 54047.
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RCA 7094 valve. G3QD, QTHR. Tel Nottingham 257197.
Yaesu FL2100B, must be mint. G4DYY, 11 Heath Lane, West Bromwich, B71 2BD. Tel 021-588 2043.
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Woden UM1 or UM0 modulation transformer, good cond please. G3NMJ, QTHR. Tel Bexhill 215556.
Would like to correspond with British or other amateurs relative exchange data, parts procurement, experience. Geo W. Smith Jr, W5HIP, Route 1, Box 137, Pottsboro, Texas, 75076, USA.
Mk 1 or 2 Vespa tx, must be fb cond. G4CNA, QTHR. Tel Droitwich 2087.
Exchange Yaesu FR50B for best 2m fm rig offered, with cash adjustment. GW4CSY, QTHR.
Commercial 2m Parabeam. GM8HSY, QTHR. Tel Falkirk 23860.
KW2000A with ac psu. G4CJF, 6 Gloucester Crescent, Melton Mowbray, Leics LE13 0AQ. Tel 3547 after 13 December.

Handbook for FM10D or FM10B Pye Cambridge. Mitchell, 9 Oakthorpe Road, Palmers Green, London N13 5HY.
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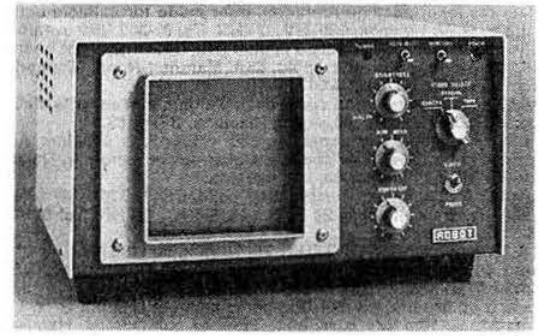

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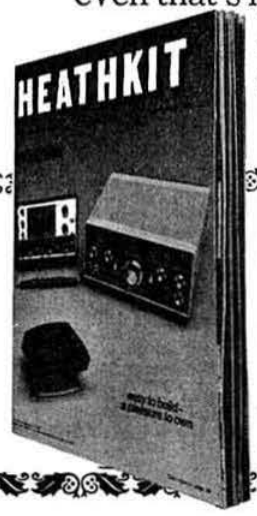

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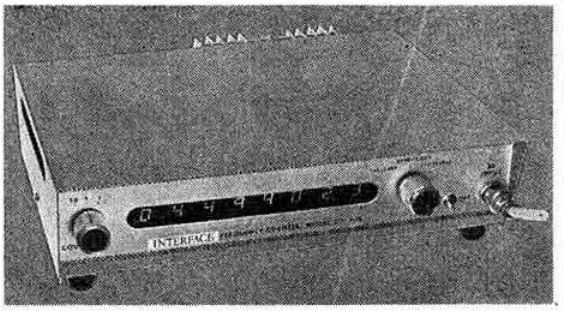
The PD301 (left) and CFM-K2 (right)



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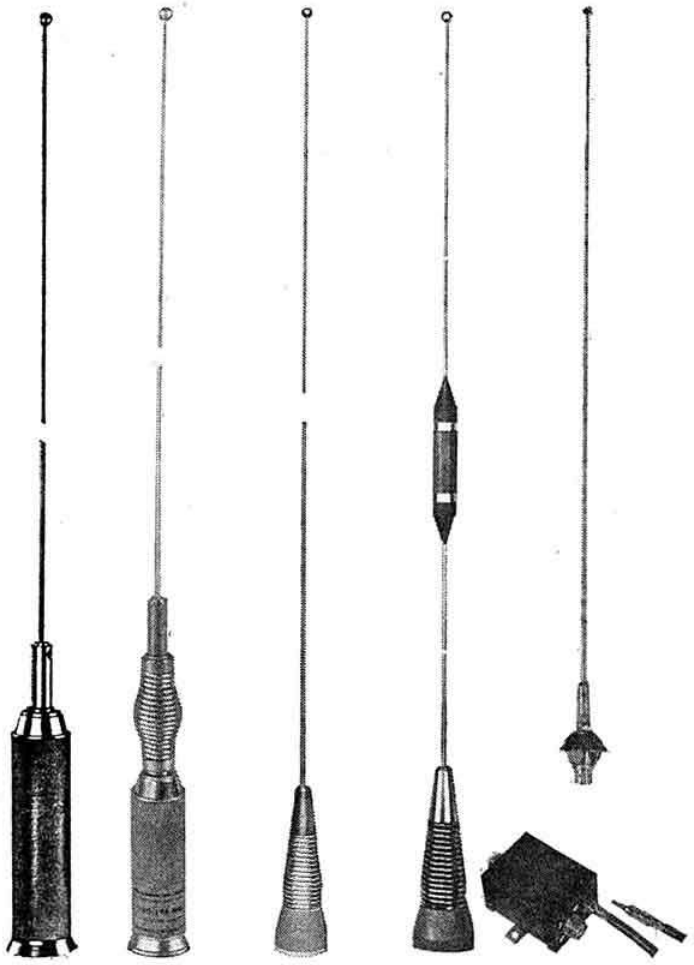

ASP629 ¼W 3dB Gain 130-174MHz, DC Grounded

ASP393

ASP677 ¼W 3dB Gain 140-174MHz

ASPE667 5dB Gain Collinear 425-440MHz Complete with 17' of RG580 and PL259 plug

ASP749UK ¼W Disguise Ant. 3dB Gain, 144-174MHz. Complete with cables, plug, and splitter for car radio

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QM70 PRODUCTS

2FM70: This small unit obviates the need for the expense of a second transceiver or the complexity of numerous add on units with multiple connecting leads. By simply inserting the unit in the antenna lead of your 2m FM transceiver you are ready for operation on either 2m or 70cm AT THE FLICK OF A SWITCH. The 2FM70 has its own 70cm to 2m receive converter built in and all switching is carried out within the unit. Size 105mm × 40mm × 180mm. Weight 450 grams. Supplied complete with power cord and mobile mounting bracket. **£58.00.**

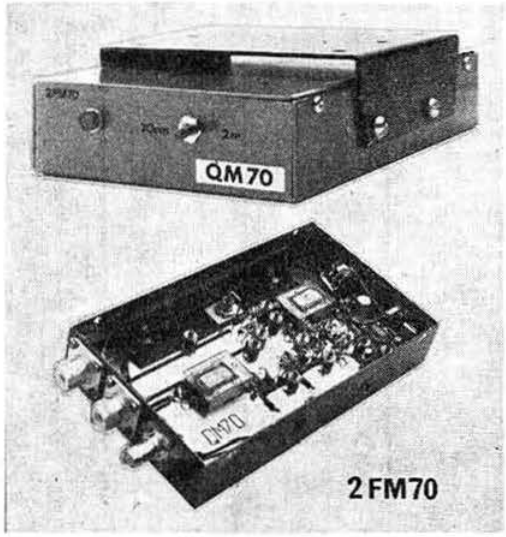

Photo: R. Tuff, G4DCT

28/432MHz 10W output Transverter: This new version of our already highly successful transverter is now conservatively rated at 10 watts rms (real watts). Simply connect to your 10m ssb transceiver for ssb operation on 70cm. Inbuilt receiver uses 2 RF stages and MOSfet mixer for excellent gain and noise figure. Two IF outputs supplied as standard. The transmit chain also uses all solid state components giving a clean and linear output. We have now been manufacturing 70cm ssb transverters for over 2 years. Who else has this kind of experience? Fitted with RF power output meter, LEDs for rx and tx states, inbuilt antenna change over relay and a full **10 WATTS RMS OUTPUT. £96.00.**

432 VLA: Fully compatible with our 28/432 transverter providing up to 50W RMS OUTPUT. Linear biased for ssb, fm, am, cw or even video. **£42.00.**

144PA50: All solid state 50W RMS OUTPUT linear amplifier. 12v operation and RF sensing switch mean that you only need to connect this unit in your 2m antenna line and stand a source of 12v DC for 50W RMS OUTPUT. Accepts ssb, fm, am, cw with switchable hang time for ssb operation. Supplied complete with DC power cord and fitted SO239 sockets, **£55.**

28/144 High Power Transverter: A 10m to 2m hybrid transverter offering up to 200W pep input. Excellent FET converter for receive with 2 IF outputs as standard. Master oscillator is doubly stabilised and the PA is very well ventilated. Takes all drive and switching from your 10m ssb transceiver. Fully metered, SO239 antenna socket and a soundly engineered construction. Complete with harness and plugs for your 10m ssb prime mover. For transceivers with 6·3v heater we fit the necessary transformer for no extra charge. **£111.00.**

All UHF units have BNC sockets, all VHF units have SO239 sockets. 12 months guarantee on all units, all prices include VAT and carriage to UK mainland. ALL UNITS ARE AIR TESTED BEFORE DESPATCH.

Send S.A.E. for full detailed literature of all products.

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Lee Electronics; Crayford Electronics; D. P. Hobbs Ltd.
Chris G8HVV (qthr). Tel. 0444 7 2893 (evenings and weekends only)

Please note our new address:

QM70 PRODUCTS

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C&C electronics

10 West Park London SE9 4RQ
Telephone 01-852 9397

PRICE NEWS

Due to your support over the last few months enabling us to purchase in greater quantities and in order to offset recent increases in VAT we have decreased many of our basic prices. In order to do this we regret that we can no longer offer the 10% quantity discount on our stock crystal range. However, we believe that to the majority of our customers we will be offering better value.

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Holders available: HC6/U, HC18/U and HC25/U.
Frequency range: 1·5-21MHz Fundamental (please state required input capacity)
21-105MHz Overtone.
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Price: 2-105MHz. **£2.61** less 5% for 5 or more. 1·5-2MHz **£3.25.**
Please note crystals under 4MHz only available in HC6/U.

CRYSTALS IN POPULAR FREQUENCIES

We have now added many of the IARU recommended 70cm channels to our stock list together with two additional 2 metre repeater channels and 145·8MHz.

TRANSMIT CRYSTALS (MHz) in HC6/U Price **£1.75**

S20	S21	S22	S23	R3	R4	R5	R6	R7
145·500	145·525	145·550	145·575	145·075	145·100	145·125	145·150	145·17
4·0416	4·0423	4·0430	4·0437	4·0298	4·0305	4·0312	4·0319	4·0326
8·0833	8·0847	8·0861	8·0875	8·0597	8·0611	8·0625	8·0638	8·0652
RU1		SU20	SU22	GB3PY				
144·342	144·400	144·500	144·520	—	145·000	145·800	70·260	
433·025	433·200	433·500	433·550	431·350				
8·0189	8·0222	8·0277	8·0287	7·9879	8·0555	8·1000	8·7825	
12·0284	12·0333	12·0416	12·0430	11·9819	4·0277	4·0500		

RECEIVE CRYSTALS (MHz) in HC6/U Price **£1.75.** 44MHz range also in HC25/U. Price **£2.10**

S20	S21	S22	S23	R3	R4	R5	R6	R7
145·500	145·525	145·550	145·575	145·675	145·700	145·725	145·750	145·775
10·3603	10·3621	10·3639	10·3657	10·3728	10·3746	10·3764	10·3782	10·3800
44·9333	44·9416	44·9500	44·9583	44·9916	45·0000	45·0083	45·0166	45·0250
RU1		SU20	SU22	GB3PY				
434·625	433·20	433·500	433·550	433·350	145·000	145·800		
30·2803	30·1785	30·2000	30·2035	30·1892	10·3246 44·7666	10·3817 45·0333	29·7800	

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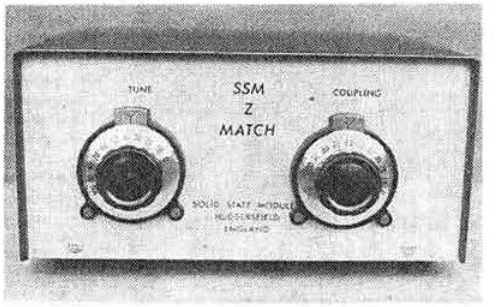

NEW! S.S.M. Z match.
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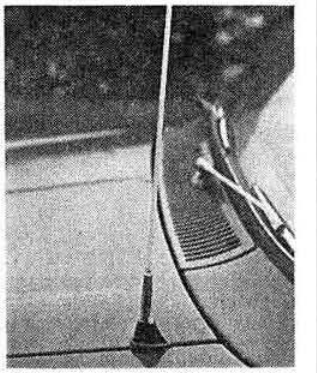

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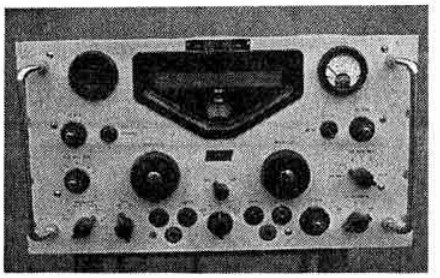

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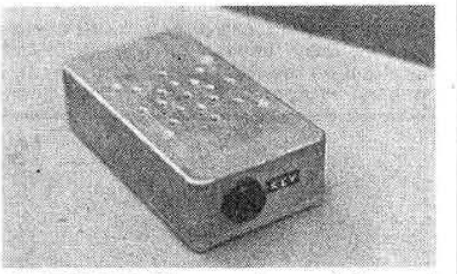

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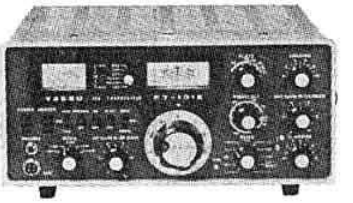

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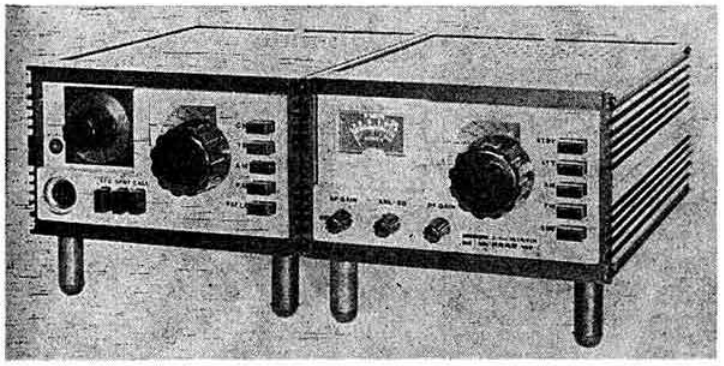

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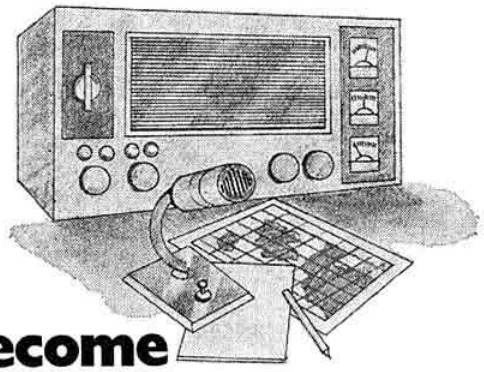

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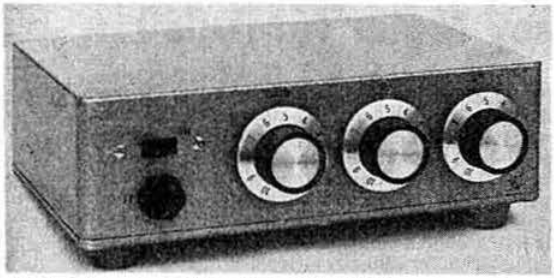

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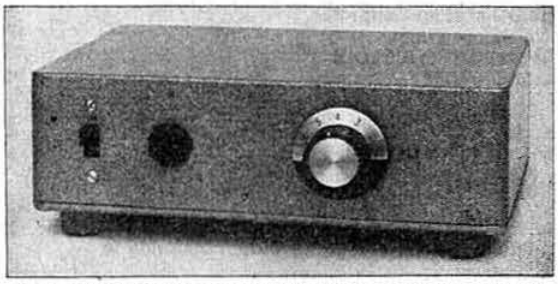

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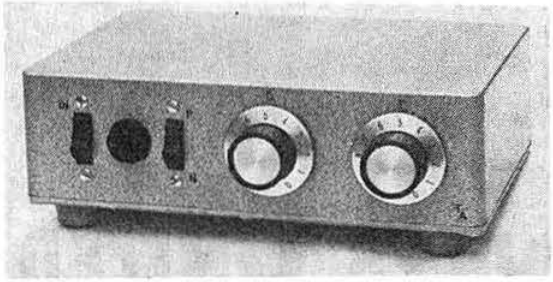

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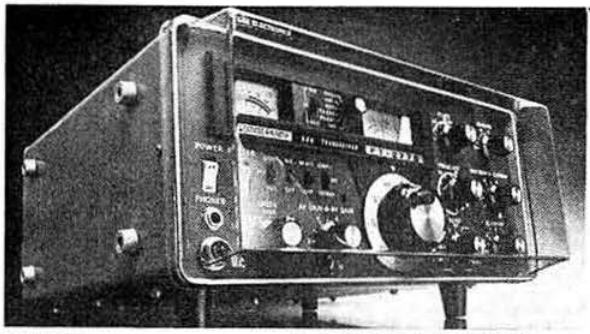

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10·7MHz CRYSTAL FILTERS made by ITT, type 455/LQU/901N, ±10kHz at 1·5dB. stop band attenuation 80dB at 21kHz (25kHz channel spacing), Imp. 2·5k in par. 25pF. new **£4.00** each. Size 1¼" × 1" × ¾".

10·7MHz CRYSTAL FILTER ITT 923K, ±6kHz at 6dB stop band attenuation, 55dB at 20kHz. Imp. 910 ohm in par. with 20pf (20kHz channel spacing). Size 1½" × ¾" × ¾" new **£4.00** each.

10·7MHz CRYSTAL FILTER made by Toyocom type 10M-5B-1, ±7½kHz at 6dB, 12kHz ± at 60dB, ripple less than 2dB, insertion loss less than 5dB, supplied complete with miniature input and output matching transformers, circuit diagram and data, imp. 3k ohm. Size ¾" long, ⅝" high × ½" deep. **£4.00** each.

HI-FI TUNER BOARDS complete with Mullard modules LP1186 varicap tuner front end, LP1185 10·7MHz FM I.F. amp, LP1186 A.M. I.F. amp, plus Motorola stereo IC MMCI310P. The board is complete except for A.M. MW/LW osc. coil A.M. ae. coil & A.M. tuning capacitor, FM section complete except for tuning pot for varicaps, this will make an ideal basis for a FM tuner covering 88-108MHz with stereo output, power requirements 15·5 volts & 12 volts stabilized. These are brand new & unused supplied with circuit & double gang tuning capacitor for the A.M. section. **£10.00.**

REVCO HIGH GAIN AERIALS for 145MHz mobile, hinge mount, 3dB gain, **£6.50** each.

UR43 COAX CABLE to suit above aerials, **12p** metre, 50Ω.

UR57 heavy duty CO-AX **25p** per metre + 60p per 25 metres and under for post. (75 ohm).

ELECTRONIQUES SLOW MOTION DIALS type SMD2 MK3. 6-1 and 36-1 reduction with clear moulded front size 6½" × 4" supplied with two pointers and spare scale, ideal for VFOs, receivers etc. **£4.70** sorry for increase.

EDGEWISE METERS 100 microamp FSD display area 1¼" × 5/16", depth from mounting flange 1, ⅜", scale calibrated 0-100, made by Ernest Turner and not to be confused with cheap tuning meters. New boxed bargain at **£2.00.**

18pf MULLARD TUBULAR TRIMMERS 12p each, 6 for **60p,** 10 for **85p.**

CERAMIC TRIMMERS, ¾" dia. VHF/UHF type 2-8fp 4-20pf, 10-40pf, **6p** each.

CERAMIC TRIMMER ½" dia. 7-35pf **6p** each.

MULLARD SEMI AIRSPACED TRIMMERS 1·4-5·5pf, 2-10pf and 2-22pf, all at **8p** each.

MULLARD FILM DIELECTRIC TRIMMER 7-100pf 7/16" × ½" **20p** each. (P.C. mounting).

MINIATURE OXLEY AIR SPACED TRIMMERS 1-10pf ¾" sq. **18p** each 10 for **£1.40.**

1000PF 500 v w feedthrough capacitors (solder in type) ¼" hole fixing 10p for 10, **30p** for 20. Bag of 1000 for **£9.00.**

ELECTROLYTICS (all axial leads unless stated)
10mf 40V, 10/350V, 22/25V, 22/40V, 47/16V, 47/25V, 47/35V, 100/10V, 100/12V, 100/25V 100/40V, all @ **10p** each or **70p** per 10.
220/25V, 330/25V, 470/25V, 640/25V, 1000/10V all @ **12p** each or **80p** per 10.
1000/40V. 3300/25V, @ **15p** each or **£1.00** per 10.
4700/40V, 10,000/16V both can types 1⅝" × 2½", **40p** each. Please note the above capacitors are fresh stocks and have been manufactured within the last twelve months.

MULLARD CAN TYPES 2500/40V, & 4000/40V **40p** each or **£3.00** per 10.

700 MFD 200 vw Electrolytics ideal to put in series for linear PSU etc, new recent manufacture **£1.65** per ten, p/p **30p** per ten.

JACKSON 3 gang 500pf **TUNING CAPACITORS 75p** each.

RCA VHF/UHF POWER TRANSISTOR marked 61387 this is a selected version of an RCA 40941, 1 watt output at 400MHz (10dB gain) with 28 volts on collector 1 watt output at 175MHz (17dB gain), OK for 70cm capstan type construction. **£1.50** each.

RCA VHF/UHF POWER TRANSISTOR marked 61389 this is a selected version of an RCA 2N5914, 2 watt output at 470MHz (7dB gain) with 12 volts on collector, requires 0·4 watt drive for full output, 1 watt of drive will give 5 watts RF output at 145MHz. **£2.00** each, capstan type construction.

BLY36 RF VHF power transistors 12V DC 13 watts, RF output at 175MHz for 4 watts drive, with copy of circuit, **£2.57** each brand new unused.

BA111 VARICAP DIODES 23p each.

HP 5082-2800 HOT CARRIER DIODES ideal for UHF/VHF mixer etc. **60p** each or 4 for **£2.00.**

COLOUR TV CRYSTALS 4433·618kHz HC6/U wire ended new 35p each.

PYE BOOT MOUNT RANGER control boxes less cable and microphone, used condition, **£1.00** each. Post **50p.**

MINIATURE OXLEY PTFE F/T INSULATORS "drill 3/32" hole & push in", 50 for **75p.**

FERRITE RINGS 9/16" dia. 7/16" internal dia. × 3/16" thick **10p** each.

POLAR CERAMIC STAND OFF INSULATOR 4 on metal plate ¾" × ½" × 2" **10p.**

FIBREGLASS P.C. BOARD one size only 8" × 5" 1/16" thick, single sided **40p.**

MAINS TRANSFORMER, 250V primary; secondary 0/19/25/30/40/50V @ 1 amp, **£2.50.**

We hold a large stock of ITT STARPHONE spares P.C.Boards, Coils etc. Send us your wants, we may be able to help. S.A.E. please.

SILVER ZINC RECHARGEABLE BATTERY type ST12B160 to suit the ITT SF UHF portable Starphone. 160 m/aH 12 volt, new price **£2.00** each, 2 for **£3.75.**

CHARGER UNIT to hold one of the above batteries requires approx 28 volts DC at 40 m/a. **£2.25.**

MINIATURE SPCO TOGGLE SWITCH ½" dia × ½" long ex-new equipment **40p** each, two for **75p.**

MIXED BAG of transistor I.F. transformers, coils in cans etc, OK for rewinding all new & unused @ 50 for **£1.00.**

TRANSISTOR I.F. TRANSFORMERS set of three 470kHz 1st double tuned, with circuit **50p** set.

59 Waverley Road, The Kent, Rugby, Warwickshire.

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