# radio communication

October 1975

## SPACE-AGE TELECOMMS 10 YEARS ON

This year the Post Office earth station at Goonhilly Downs, near Land's End, celebrated 10 years' of commercial operation.

Today there are almost 90 earth stations modelled on the Goonhilly pattern transmitting and receiving signals via seven Series IV Intelsat satellites in "parked" orbit some 22,300 miles above the earth. Each of these double-decker-bus-sized satellites is capable of relaying 5,000 telephone calls simultaneously, and some 8½ million calls a year are handled by the three saucer-shaped aerials at Goonhilly.

The photograph shows Mr G. Banner, head of the Goonhilly earth station, holding a small-scale model of a Series IV Intelsat satellite against a background of one of the Goonhilly aerials.

*A Post Office photograph*

journal of the Radio Society of Great Britain

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# AMATEUR RADIO BULK BUYING GROUP

TELEPHONE NO: 01-669 6701 (9am to 6pm, 1pm Sat)

## 'STEREOCODE'

**ALL PARTS are available for this project as described in last month's "RadCom":**
**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.**

## OTHER 'RADCOM' DESIGNS

### 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.**
**2mV.F.O. Kit. Kit price £36.50.**
**VHF Communications Edn. 1/71, 85p extra.**
**Components for H.F. 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—**£40.00** (Add 55p if hi-speed i.c.s. required for operation up to 30MHz).

## Catronics

### A DIGITAL FREQUENCY METER WITH BUILT IN PRESCALER

Enabling frequencies up to over 150MHz to be read directly. Using the new model DFM4 from Catronics Ltd., it is now possible to measure frequencies on all bands from 160m to 2m without any range switching, input level control adjustment or other operation. Additionally a low frequency position may be switched to, enabling audio frequencies and I.F.s to be read directly. This is a 7-digit model with 4-speed time base having gate times of 10S, 1S, 100mS, and 10mS with built in automatic memory. The instrument is housed in an attractive two-tone metal cabinet approx. 9in × 3¼in × 6¼in. **Write for full specification details.**
Price **£120** (+ insured post—£1.00). Delivery—approx.—2-3 weeks.
Normal H.F. versions (40MHz max.) now in stock—5 digit model DFM2, **£80**; 7 digit model with i.c. memory **£95.**

## 150MHz PRESCALER FOR D.F.M.s

This unique unit will extend the frequency range of any 15MHz Digital Frequency Meter to read up to 150MHz, enabling it to read VHF converter crystal frequencies and 4m & 2m transmit frequencies directly. Specification as follows: Single input socket and a switch allows 50Hz to 20MHz at better than 50mV sensitivity or 10MHz (at 50mV) to 150MHz (at approx. 100mV) high impedance to give TTL compatible output. Two versions available:
**PCB Module** approx. 3·5" × 1·8" requiring 5V (stabilised at 160mA and 9–12V at 10mA with full connection instructions.
**Complete Boxed Unit.** with switch, input and output sockets and regulator requiring 9–12V at 200mA. (All power supply requirements are −ve earth)
**PRICES: PCB Module—£25; Boxed Unit—£37.50 (Add 25p p & p)**

## 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 now available—kits of parts for regulator for operation on 9 to 20 volt supplies, **£1.60.**
**Complete Boxed Unit with battery, £12.50.**

*ALL CATRONICS PRODUCTS ARE AVAILABLE FROM:*

**AMATEUR RADIO BULK BUYING GROUP**

**NEW enlarged 3rd edition of our Data-Catalogue now available—30p plus large 9½p SAE.**

## IGNITION SUPPRESSION COMPONENTS

We have the widest range of suppressors available as follows:
Screened Plug Supressors (essential for VHF), straight or angled—**£1.20.** Plug in Distributor Suppressor—**55p.** 1μF Capacitor, available with normal push fit lucar connector, large lucar or fully insulated with wire connections, **37p.** 2μF, normal or large lucar connector, **52p.** 2·5μF Coax type, **£1.63.** 0·5μF Coax type, **£1.03.** 3μF Capacitor for Lucas ACR alternator, **£1.43.** 3A Chokes, **65p.** 7A Chokes, **£1.00.** Solid Copper Stranded Ignition Cable, **7p per ft.** Connectors, **18p for 6.**

## JAYBEAM AERIALS

We generally have the full range of "Jaybeam" aerials in stock for both 50 & 75 ohms (state which required) at the following prices, inclusive of VAT:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 4M 4Y | £9.69 | Mobile | HO | £2.63 | Phasing | PHM/2C | £4.06 |
| 2M 5Y | £6.15 | | HM | £3.13 | Harnesses | PMH2/2 | £5.63 |
| 8Y | £8.00 | | ¼ Whip | £9.56 | | PMH2/70 | £4.69 |
| 10Y | £15.75 | 70CMS | D8 | £12.88 | MASTS, etc./SPM | | £8.00 |
| PBM14 | £24.00 | | PBM18 | £15.63 | | PME | £1.38 |
| 5XY | £11.75 | | MBM48 | £17.38 | | SVMK | £3.13 |
| 8XY | £14.63 | | MBM68 | £20.13 | ROTATORS Auto | | £46.88 |
| 10XY | £20.19 | | MBM88 | £23.13 | | Multi | £53.13 |
| D5 | £11.25 | | 12XY | £23.75 | | Cable | 24p/yd. |
| D8 | £15.00 | | | | | | |
| XD | £8.25 | | | | | | |
| UGP | £5.94 | | | | | | |

**Add CARRIAGE** as follows: Harnesses, Halos & UGP, 50p. Rotators and all other aerials: To: UK Mainland only, £1.00, Isle of Wight, £1.50, N. Ireland, £2.00, Elsewhere, at cost.

## SEMICONDUCTORS (SL600, CMOS etc.)

The following is a selection from our range of brand new semiconductors—all carrying full manufacturer's warranty:
**BC213**, 23p; **BF224**, 28p; **BF244**, 34p; **BF245A**, 69p; **BF245C**, 69p; **LM309K**, £2.16; **LM380**, £1.26; **SL610, 611, 612**, £2.20; **SL613**, £3.85; **SL620, 621**, £3.30; **SL622**, £8.30; **SL623**, £6.13; **SL624**, £3.10; **SL630**, £2.05; **SL640, 641**, £3.65; **SN72741P**, 49p; **TIS88A**, 36p; **2N3819**, 39p; **2N3866**, £1.08; **40673**, 61p; **CMOS 4000**, 25p; **4001**, 25p; **4002**, 25p; **4007**, 25p, **4009**, 62p; **4011**, 25p; **4012**, 25p; **4013**, 62p; **4016**, 65p; **4017**, £1.73; **4020**, £1.93; **4023**, 25p; **4027**, 93p; **4033**, £2.75; **4049**, 57p; **4050**, 57p; **4053**, £1.88; **4055**, £1.15; **4069**, 40p; **4510**, £2.07; **4511**, £2.24; **4520**, £2.30; **4528**, £1.29.
The above is a selection from our wide range—full details in our price list.

## VHF COMMUNICATIONS

The following PCB's are available from stock in the U.K.:

| *Title* | *Designation* | *Issue* | *Price* |
|---|---|---|---|
| **2M SSB/FM TRANSCEIVER** | | | |
| Transceive Board | DC6HL001 | 2/72 | **£4.30** |
| Local Oscillator Module | DC6HL003 | 2/72 | **£2.35** |
| FM I.F. Strip | DC6HL007 | 3/72 | **£2.60** |
| **25W 2M LINEAR AMPLIFIER** | DC6HL009 | 2/73 | **£2.87** |
| **28/144MHz TRANSVERTER** | DJ6ZZ001 | 4/69 | **£3.90** |
| **28/432MHz TRANSMIT CONV.** | DJ6ZZ002 | 2/71 | **£4.30** |
| **SPEECH PROCESSOR** | DJ4BG006 | 1/71 | **£1.82** |

Individual back issues of the magazine describing the above (and other) projects are available at 90p each (post free).

Magazine subscription rates are as follows:
1970, 1971—£2.60 per year, 1972, 1973, 1974—£3.00 per year, 1975—£3.30.
Plastic binder to hold 12 editions (3 volumes)—£1.35

SPECIAL OFFERS: Vols 1970-1971 with free binder—£8.15.
Vols 1972-1974 with free binder—£8.55.
Vols 1970-1975 with two binders—£17.00.

All above magazine prices are post free.

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# radio communication

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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 • •

# 2m—AM/FM/SSB/CW—Transceiver TS-700

The standard by which others are judged

With the TS-700 TRIO inaugurated a new era of VHF radio communication for 2m operators all over the world. It also marks the end of the time, when 2m operators had to be satisfied with a few fixed-channel frequencies for local QSOs. As far as technical perfection, performance, operating convenience and production quality are concerned, this Top-of-the-Line 2m transceiver can challenge all including the best of big shortwave transceivers. Shortly after being introduced on the communication equipment market, the TS-700 attracted the attention of hams who demanded the very best and has now become one of the most popular 2m-transceivers so far. And these are the reasons:

**Almost unlimited operational Variety**—a highly valuable feature, considering the very few 2m-fixed channel frequencies available and the permanently congested repeater stations. The TS-700 offers choice of RX and TX operation an 22 Simplex crystal frequencies by means of selective heterodyne switching circuit between 144 and 146MHz or transceive operation with continuous tuning throughout the entire 2m-band with the aid of a built-in highly stable VFO, Moreover, the TS-700 features fixed channel operation via repeater stations with 600 kHz TX/RX-channel frequency shift. Repeater activation is accomplished by the built-in 1750Hz tuning fork call signal generator. Provision of USB/LSB, CW, AM and FM modes make the TS-700 a universal type transceiver which will show its uncompelled advantages when conventional fixed-channel units fail.

**State-of-the-Art Circuitry**—The TS-700 is equipped with the latest and most advanced type of semiconductors, especially selected for utmost reliability and superior performance. This pertains in particular to the driver and final transmitter stage with the new MOTOROLA RF power transistors 2N5642, permitting hours of TX operation with full output which means 10 watts in SSB, CW and FM or 3 watts, respectively in the AM mode. If you need more power, just connect a 2m linear amplifier. All necessary connections for antenna, ALC etc., are provided. The receiver section employs high-gain low-noise dual-gate MOSFETs in all critical RF circuits to improve spurious rejection and cross modulation characteristics.

**Highly-stable VFO**—Like all other TRIO top-class radio amateur equipment the TS-700 also features a MOSFET-ytpe fully encapsulated VFO, tuning over a 1MHz bandwidth. The dual-tuning mechanism with integrated bandspread and one-knob operation simplifies coarse and fine tuning by means of two vernier dial scales: one covering a 1MHz range per knob turn with 100kHz division, the other 100kHz with 1kHz division. Dial accuracy is assured by a built-in 1MHz crystal marker generator for easy and precise calibration.

**Choice of Fixed-station or mobile Use**—The TS-700 is equipped with built-in power supplies for fixed-station use working with 100/240V AC 50 to 60Hz line voltage and for mobile operation with 12—13·8V DC. All supply voltages are fully stabilized and filtered.

**Plenty of Extras**—Noise Blanker for effective suppression of pulse-type interference; Receiver Incremental Tuning (RIT); transmitter driver and final tuning; illuminated multi-function metering; continuously adjustable Squelch for FM reception; RF gain control; built-in speaker; jacks for microphone, headphone, key, additional speaker and linear amplifier. A PTT microphone is supplied as standard accessory.

**Optional Accessories** (not shown)
**Bandpass Filter BPF-2**
2m bandpass filter with 145MHz centre frequency, compatible with all TRIO 2m-transceivers. Bandpass frequency 144—146MHz; stop band attenuation 90dB; insertion losses less than 1·5 dB; input and output impedance 50 ohms; rated power handling capacity 50 watts.

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**Sole Importers,**
**Lowe Electronics**
**119 Cavendish Road,**
**Matlock, Derbyshire,**
**Tel: Matlock 2817/2430.**

TRIO

# LOWE ELECTRONICS


PRICES (excl. VAT) LINER 2-£145 R115E-£21.

## BELCOM
## Liner 2 RII5E

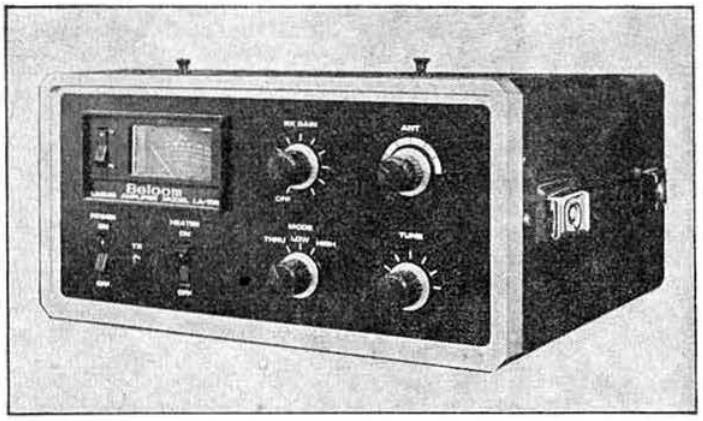
The brilliantly conceived and designed Liner 2 has revolutionised 2m sideband and is responsible for the enormous increase in activity. It combines the advantages of switched channels with direct frequency readout (e.g. Channel 20 is 145·20MHz) with the ability to tune between channels with the VXO. In addition the provision of R.I.T. which enables the Rx. to be tuned to a kHz or two either side of the Tx. frequency is a useful feature. The VXO gives, as one would expect, crystal stability which, coupled with an extremely effective noise blanker makes mobile operation a delight without detracting from its use (with an AC psu) as a base station.

The matching power supply unit R115E is a new uprated design which provides a fully regulated low ripple 13·5Vdc supply at 3-4 amps. Acting also as a base stand for the Liner 2, the two units combine to make a first class home station.

The Liner 2 comes to you complete with matching microphone, mobile mounting bracket with all fixing screws, spare power leads and fuses.

If you want to operate SSB on 2m, there is no better value than the Liner.

## BELCOM
## LA106 2 metre Linear
### High Power, High Performance, Modest Cost




| | |
|---|---|
| Frequency Range: | 144-146MHz |
| Modes: | SSB, FM, CW, AM |
| Input Power: | 180W pep |
| Drive Power: | 10W |
| Receiver preamplifier | adjustable gain up to 10 dB |
| Accessory Supply: | 13V 2·5A regulated |
| Power Supply: | 120/140V AC 50Hz |
| Dimensions (mms) | 315 × 148 × 280 |
| Weight | 12 kgs |

A reasonably priced, compact, high peformance linear for 2m SSB/FM/CW operation. 10W of drive for more than 180W input gives your signal the extra kick to get it out of the noise. Built-in receive preamplifier with adjustable RF gain and using helical filters for extra selectivity and reduced intermod. from out of band signals. Built-in regulated 13V. 2·5A power supply for Liner 2 or any similar drive unit.

The LA106 will of course match any rig such as the TS700, FT220, IC210, in any mode, FM, AM, CW, or SSB, provided that the drive power is around the 10 watt level. Using a rugged valve in the PA allows you to get away with occasional misuse (just try a high power solid state amplifier into an unmatched load!) and gives very low intermod. products.

**PRICE (excl. VAT) £165.**

### SECOND HAND GEAR

| | | | |
|---|---|---|---|
| FR400 SDX | £175 | Europa | £70 |
| TS900 plus psu | £420 | EC10 Mk II | £75 |
| SE600 | £425 | Liner 2 | £125 |
| IC210 | £150 | TS510 | £175 |
| LA2 2m linear | £105 | FR50B | £60 |
| YC355 counter | £60 | FL50 B | £60 |
| FT200 plus psu | £200 | KW1000 | £140 |

### SECOND HAND EQUIPMENT

**SELLING!**
All secondhand gear sold by a dealer carries 25% VAT on the full selling price. Why not eliminate this by letting us collect and sell your equipment quickly on commission.

**BUYING?**
By eliminating the dealer, you do not pay VAT on the purchase but you have our assurance that any equipment which we sell on commission has been thoroughly checked and aligned in our workshops and will carry our *12 month warranty*.
Contact us for details of current stocks.

### REPEATER NEWS

After much head scratching and deep discussion it has been decided that the Matlock repeater on R6¾ will be a broadband linear device. Since coverage of the Matlock Area has to be largely in a North/South direction due to the Derwent Valley, the repeater will favour these directions.

In order to ensure that the repeater would be ultra-reliable, it was designed to eliminate as many electronic devices as possible so that maintenance would hardly ever be needed. To meet these requirements, i.e., full band coverage if necessary, no maintenance, linear operation and directional coverage, an enormous amount of highly technical development work has been undertaken. The final design consists of two 14 element cross polarised Yagis mounted back to back with a short length of low loss feeder connecting them together. This gives an overall gain of 28-30dB in the North-South direction and of course, will accept any mode of operation. The system is working quite well but with such a high gain, isolation between input and output has to be carefully maintained or the system will go into uncontrolled oscillation. On one occasion, when propagation conditions were good, the signal from G3ZYC set up such a strong feedback that the front elements of the South facing array melted.

Fortunately, being close to the Rolls-Royce aero engine plant at Derby, we have been able to replace these elements by ones machined from RB211 turbine blades which although glowing red hot, will allow the system to keep operating. Obviously, anyone attempting to duplicate such a repeater should beware of standing in front of the aerials to avoid radiation burns.

It should be noted that the normal 600kHz split between input and output frequencies is not necessary on this repeater. When using 144·2 as the input frequency access is by Leonid ping.

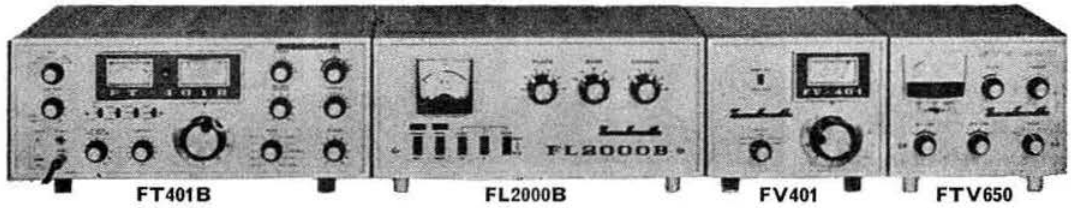
Anyone visiting the Matlock area should look out for the array which in on Goon Low at ZN99X.

There is no truth in the rumour that any amateur suspected of having a sense of humour will have his licence revoked.

73G3PCY

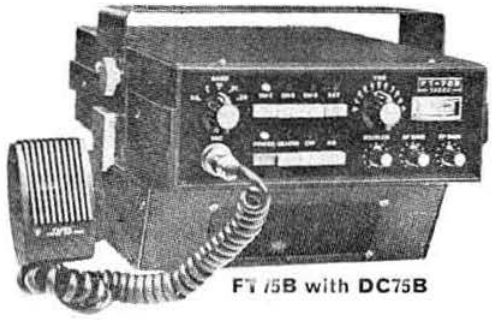
# YAESU MUSEN

## FOR H.F. EQUIPMENT



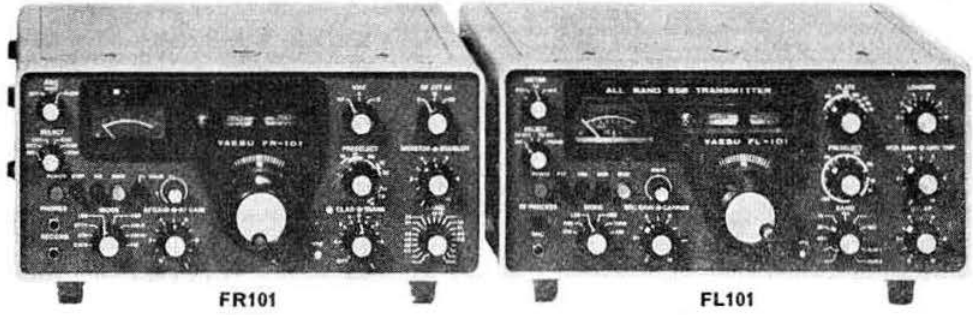

The FT401(B) and its accessories are depicted above, this installation provides an uncompromising approach to the home station. The FT401(B) can itself run over 500Ws PIP but when used as an exciter for the FL2000B and coupled to the FV401 external VFO (for split frequency working) provides a base station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


FT 75B with DC75B

The FT75B which along with the FT-101 have been responsible for the upsurge of H.F. mobile operation around the world. On each band, 80 through to 10, there are 3 VXO controlled channels, as well as provision for external VFO operation. The FT75B is all solid state except the driver and final stages which run at 120W PIP. Included is an excellent noise blanker and squelch circuit for quiet channel monitoring.

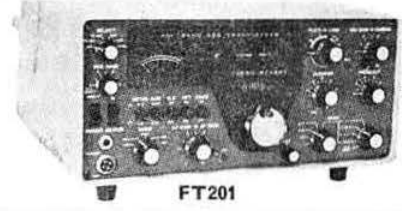
Accessories include the FV50C VFO, VC75 microphone, compressor and VOX unit, the FP75B AC power supply and the DC75B 12V supply (as illustrated).




The FR-101 is an advanced receiver offering in the de luxe version coverage from 1·5MHz, including all major SW broadcast and HF amateur bands (23 in all), 4m, to 144MHz. AM, FM, SSB, and CW are all catered for each with a separate crystal filter. Transceive operation with the FL or FT-101 is possible and digital versions of both the standard or deluxe model are now available.

The FL-101 is the ideal companion to the FR-101 itself forming a superb base station. Operation on 160 through to 10m (and on two ancillary bands) using SSB, AM, CW or FSK is possible, with the added bonus of an optional in-built processor (RFP101) being available at a moderate cost.

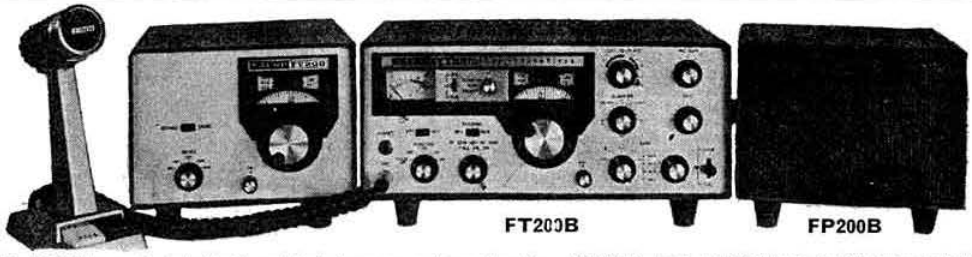
The FT201 features 10-80m operation with the ability to run from in-built mains or 12V supplies. It is constructed using plug-in modules as made famous in the FT-101. Of special interest to those contemplating the use of an FT201 with a VHF transverter is the use of 9MHz as the IF frequency and that full AM operation is possible (optional AM filter XF90B). For the CW enthusiast a 600Hz filter (XF90C) is available and AGC is switchable to suit this mode.


FT201

# YAESU MUSEN

## FOR H.F. EQUIPMENT

YAESU



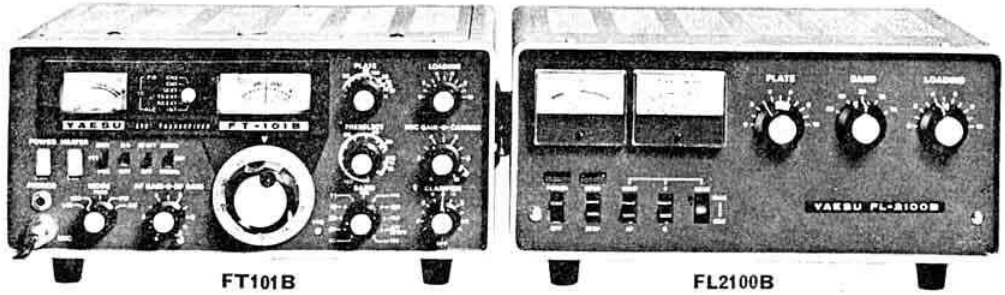
FT200B FP200B

YD844
FV200
FT200B
FP200B

The FT200B is one of today's "best buys". Its features compare favourably with markedly more expensive units. 200W 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.

FP501 FT501

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.




FT101B FL2100B

The FT101B is except for driver and PA, fully solid state using reliable and serviceable "computer type" plug-in modules. All that is needed for instant "on the air" operation from 160 through 10m is either 12V DC or 234V AC and, of course, an antenna.

The FL2100B features operation 80 through to 10m using two rugged 572B carbon plate tubes, in class "B" grounded grid circuits, with individually tuned input coils for each band, and bifilar wound ferrite filament chokes.

YAESU

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# YAESU MUSEN

## FOR V.H.F. EQUIPMENT

**NEW! TWO METRE—FT221**

The FT221 is the eagerly awaited multi mode (AM, FM, USB, LSB, CW) 2m transceiver offering super stable phase locked VFO or 11 crystal controlled channels from 144 to 148MHz, repeater up and down shifts (600kHz) with tone burst (at the flick of a switch), small size (11½" × 5" × 8"), mains or 12V (3A) operation, excellent selectivity (SSB 2·4kHz with 1·7 : 1 shape factor and for FM the optimum 12kHz), serviceable plug-in boards, high sensitivity, clean transmitter spectrum, front panel adjustable VOX and mic. gain, 100kHz crystal calibrator, a sensitive squelch (0·3μV), clarifier offering IRT and IRT with ITT (makes FSK easy), switchable "S" and centre zero tuning meter, Noise blanker, etc., etc.

FT224

FT221

**24 CHANNEL FM ON TWO**

The FT224 is an advanced Solid State transceiver featuring 10W output with a 23 channel flexibility (excluding priority channel) all on one complete package. The FT224 includes a built-in tone burst for repeater actuation. Automatic high VSWR protection of the final transistor and reverse power line polarity protection are included. The wireless comes complete with built-in speaker, mobile, mounting brackets and dynamic microphone.

**THE VERSATILE ONE—SIGMASIZER 80R**

The Sigmasizer 80R offers 80 (25kHz increments) channels on 2m. The received frequency is always indicated on the dial, either transceive (simplex) or for repeaters, the transmitter is automatically shifted down 600kHz. When the receiver is tuned to repeater input channel, the transmitter is automatically shifted upwards thus offering full, simplex, normal repeater or inverse repeater. The built-in tone burst fuctions only in repeater mode. A further channel may be programmed for instant selection of a local net or RAEN frequency. Automatic final protection, 10W of RF and a generous 2W of audio are available from the unit which draws only 2·2A on 12V DC.

SIG. 80R

FT2 AUTO

**AUTO-TUNING TRANSCEIVER FT2 AUTO**

The FT2 Auto is a unique concept in 2 metres FM transceivers. The "Auto scan" circuit monitors, in turn, each of the 8 channels every ½ second, automatically locking upon receipt of a signal. Push buttons, enable elimination of undesired or occupied channels, on Auto mode, or selection of that frequency on manual mode. A priority circuit may be activated to check your local net or RAEN frequency every two seconds. To transmit on a channel being received a momentary pressing of the P.T.T. locks the transmitter to the receiver.

**NEW! FOUR METRES — FTC212**

The FTC212 is a 4m, 12 channel, FM, 10W output, transceiver. It offers the best in modern VHF design. The low image response, single conversion receiver uses a Mosfet RF stage coupled via a 2-section helical filter to FET mixer, which is driven by (as in the transmitter) a low noise FET crystal oscillator. The 10·7MHz IF is processed by a crystal filter and then two isolated ceramic filters for unrivalled stop-band performance. Two IC limiters feed the separate IC discriminator. Automatic final protection (AFP) is provided along with RF sensing LED transmitter indicator. Mic., accessories and three channels are supplied.

FTC212

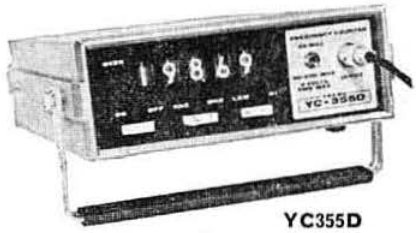
FT620B

**UHF EXCITER—FT620B**

The FT620B features full 1kHz resolution VFO coverage across 50-54MHz in eight ranges, SSB (selectable), AM, CW (build your own FM modulator), four crystal controlled channels in each band segment, receiver clarifier, noise blanker, built-in AC and 12V DC power supplies, mic. supplied. The exceedingly low level of spurious emissions and the 50MHz output makes this unit highly suitable for use as a drive source transverting to 4, 2, or 70cm, and/or parametrically up converting to 70 or 23cm.

# YAESU MUSEN

**FOR TEST GEAR**




**YC355D**

**KNOW YOUR FREQUENCY WITH A YC355D**

The YC355 series counters are available in two models. The basic counts to 35MHz and the "D" to 200 or over. The YC355D outlines the advanced IC techniques and the dual range system provides an accurate eight digit read-out using only five tubes ensuring minimum cost with maximum performance. Built-in AC and DC power supplies enable complete portability, and the use of epoxy circuit boards ensures reliable operation for years to come.

**KNOW YOUR POWER**
**NEW POWERMETER AND DUMMY LOAD YP150**

The YP150 is a combined, fan cooled 50 ohm dummy load, and power meter. The frequency range is 1·8 to 200MHz (V.S.W.R. 1·2 : 1 at 145MHz) scaled to 6, 30 and 150W (accuracy better than 10% FSD) styled to match the 101 range.

**YP150**


**YO100**

**KNOW YOUR SIGNAL IS CLEAN WITH A YO100**

The YO100, the multi-purpose monitor scope, offers the facilities of monitoring the transmitted signal (through line) 1·8 to 50MHz on power levels from 10 to 500 watts. The IF of the receiver or transceiver can be monitored (3·18MHz standard, 455kHz or 9MHz options). AF and RF trapexoidul patterns can be displayed. The unit facilitates RTTY tuning, built-in 1·5 to 1·9kHz oscillators are suitable for Post Office two tone output measurements.

## YAESU MUSEN

**THE FINEST RANGE OF AMATEUR RADIO EQUIPMENT**
**IN THE WORLD**
**WILL BE ON DISPLAY AT THE**

## NATIONAL RADIO & ELECTRONICS EXHIBITION

**GRANBY HALLS, LEICESTER**
**THURS, FRI, SAT—30, 31 OCTOBER, 1 NOVEMBER 1975**

**YAESU MUSEN AUTHORISED UK DISTRIBUTORS**

AMATEUR ELECTRONICS UK

SOUTH MIDLANDS COMMUNICATIONS LTD

WESTERN ELECTRONICS (UK) LTD

# FAST MAIL ORDER SERVICE

**Your South Eastern Yaesu Stockist**

**BY 'PHONE** *Simply telephone your Barclaycard or Access No. for immediate despatch* **Tel. 03 704 6835**
**BY POST** *State clearly your requirements enclosing cheque or postal order*
**CALLERS** *You are always welcome to come and inspect the equipment in our showroom*
**FOR ALL ENQUIRIES** *PLEASE ENCLOSE STAMPED ADDRESSED ENVELOPE*

# ATTRACTIVE CREDIT TERMS!

With the falling £1 and rising prices credit is even more attractive. Below are a few examples. If you are thinking of purchasing equipment on credit terms then drop us a line or telephone for further details.

| | DEPOSIT | 12 MONTHS | 18 MONTHS | 24 MONTHS |
|---|---|---|---|---|
| FT101B | £137.50 | £26.58 | £18.94 | £15.13 |
| FR101D | £137.50 | £26.58 | £18.94 | £15.13 |
| QR666 | £54.50 | £10.44 | £7.44 | £5.94 |
| KENKP202 | £34.62 | £6.59 | £4.75 | £3.84 |
| TH3 | £41.85 | £8.22 | £5.91 | £4.76 |
| LINER-2 | £61.25 | £11.60 | £8.27 | £6.60 |

(Note: The above credit is subject to acceptance)

**BELOW ARE JUST A FEW OF THE LINES WE HANDLE—SEND SAE FOR COMPLETE PRICE LISTS**

**YAESU EQUIPMENT (ex VAT)**

| | | |
|---|---|---|
| FT101B 160–10m tcvr. 240V/12V | £330.00 | (n/c) |
| FR101D 160–2m rx 240V/12V | £330.00 | (n/c) |
| SP101 matching speaker | £13.00 | (1.00) |
| FV101 remote vfo | £48.00 | (1.00) |
| FT401B | £307.00 | (n/c) |
| SP401 matching speaker | £13.00 | (1.00) |
| FT200 80–10m transceiver | £170.00 | (n/c) |
| FP200 matching spkr./AC supply | £44.00 | (1.00) |
| FT221 2m SSB/FM tcvr. 240/12V | £318.00 | (n/c) |
| FT224 2m FM tcvr. 24ch. toneburst | £130.00 | (n/c) |
| FP2 matching AC/charger supply | £38.00 | (1.00) |
| YC355D 200MHz counter 240/12V | £125.00 | (n/c) |
| YO100 monitor scope (superb)! | £93.00 | (1.00) |
| FT2 Auto | £205.00 | (n/c) |
| Sigmasizer (80 channel) | £190.00 | (n/c) |

**JAYBEAM VHF ANTENNAS (inc VAT)**

| | | |
|---|---|---|
| 4m 4 element yagi | £9.68 | (1.00) |
| 5Y/2m 5 element yagi | £6.12 | (75p) |
| 8Y/2m 8 element yagi | £8.00 | (75p) |
| 10Y/2m 10 element yagi | £15.75 | (1.00) |
| PBM14/2m parabeam | £24.00 | (1.25) |
| D5/2m 5 over 5 | £11.25 | (1.00) |
| D8/2m 8 over 8 | £15.00 | (1.00) |
| 5XY/2m crossed yagi | £11.75 | (1.00) |
| 8XY/2m crossed yagi | £14.62 | (1.00) |
| 10XY/2m crossed yagi | £20.18 | (1.25) |
| Q4/2m 4 element quad, NEW | £12.00 | (1.00) |
| Q6/2m 6 element quad, NEW | £16.00 | (1.00) |
| XD/2m crossed dipole | £8.25 | (75p) |
| UGP/2m ground plane | £5.93 | (75p) |
| HM/2m Halo with mast | £3.12 | (50p) |
| D8/70cm 8 over 8 | £12.87 | (1.00) |
| PBM18/70cm parabeam | £15.62 | (1.00) |
| MBM48/70cm, NEW | £17.37 | (1.25) |
| MBM88/70cm, NEW | £23.12 | (1.50) |
| 12XY/70cm crossed yagi | £23.75 | (1.00) |

Full range of phasing harnesses and brackets stocked. SAE for full details.

**SPECIAL SIGNAL PUNCHING PACKAGE**

Technical Associates Advanced speech compressor with variable compression, decay time and noise gate provides the most economical way of increasing talk power WITHOUT ANY DISTORTION. Still offered at **£28.15** (50p) it's a bargain with the famous Shure **444** mic at **£41** the two units, it's unbeatable! Order yours now and save money.

**BANTEX WHIPS—G-WHIPS—TAVASU WHIPS — ELECTRONIC DEVELOPMENTS — Mobile Antennas Ex stock — VHF 2 and 4m whips Ex stock**

## Special discounts on ex demonstration items (inc vat)

| | | |
|---|---|---|
| Swan VOX unit | £19.00 | (list £31) |
| Matric AF speech processor (USA) | £12.50 | |
| Slinky compact dipole (USA) | £12.50 | |
| DX Engineering clipper for Drake TR3/4 | £36.00 | |
| Yaesu YC355 counter 35MHz | £89.00 | |
| Swan remote vfo | £98.00 | (list £123) |
| Swan 700cx/ss16 700w trcvr. | £369.00 | (list £543) |
| Swan AC psu chassis for above | £45.00 | (list £73) |
| Yaesu FT75B | £157.50 | |
| AC matching psu for above | £39.50 | |
| DC matching psu for above | £45.00 | |

Please note we only have one each of the above items.

**FM 2 METRE MONITOR RECEIVERS** (EX VAT)

| | | |
|---|---|---|
| Lowe 2m 6 channel monitor receiver (less xtals) | £19.95 | |
| Lowe 2m fitted 6 xtals | £29.37 | |
| Channel xtals | £2.32 | |
| Belcom AMR-104 auto scanning 2m rx 240V AC/12V with 3 channels | £65.00 | |
| Marine version fitted 8 channels | £86.00 | |

**SOLID STATE MODULES**—EX STOCK

**TRIO PRODUCTS** (Inc vat)

| | | |
|---|---|---|
| QR666 receiver 160–10m plus general coverage 240V AC/12V Send for full gen. | £162.50 | (n/c) |
| Matching calibrator | £10.95 | (25p) |
| FM adaptor | £26.50 | (25p) |
| HC-2 Ham Clock | £11.88 | (50p) |

**SECONDHAND TESTED ITEMS**

Prices ex VAT.

| | |
|---|---|
| HA350 80–10m rx | £65.00 |
| CR70A General cov. | £23.00 |
| FR50B 80–10m, very good | £67.00 |
| 9R59DS very good | £40.00 |
| 9R59D | £30.00 |
| FL50 tx 80–10m matches FR50B almost new, and bargain at | £67.00 |
| Liner-2 ssb 2m transceiver from | £100.00 |
| HW717 receiver | £23.00 |
| CP202 hand held | £60.00 |

**ROTATORS**

| | | |
|---|---|---|
| AR30 | £31.25 | (1.00) |
| AR33 | £45.95 | (1.00) |
| AR40 | £37.50 | (1.00) |
| CDE44 | £75.00 | (1.25) |
| Ham M | £112.50 | (1.50) |
| Stolle 2010 | £46.75 | (1.00) |
| Stolle 2030 | £52.95 | (1.00) |
| 5 core control cable | 18p yd | (1p) |

**AERIAL FEEDERS**

| | | |
|---|---|---|
| 50 ohm UR43 yd | 18p | (1p) |
| 50 ohm UR67/RG8U yd | 36p | (2p) |
| 75 ohm standard yd | 10p | (1p) |
| 75 ohm UHF low loss yd | 14p | (1p) |
| 300 ohm feeder yd | 8p | (1p) |

**MICROWAVE MODULES (inc VAT)**

| | | |
|---|---|---|
| NEW! 70cm transverter | £77.50 | (50p) |
| 2m converter 2–4/4–6/28–30 | £18.90 | (25p) |
| 4m converters 28–28·7 | £18.90 | (25p) |
| 70cm converters 28–30/144–146 | £22.60 | (25p) |
| 2m dual o/p pre amp | £11.30 | (25p) |
| 1,296MHz converters 28–20 | £31.30 | (25p) |
| 2m converter 28–30/116 osc o/p | £19.90 | (25p) |

**2M VHF HAND PORTABLES** (Inc vat)

| | | |
|---|---|---|
| Ken KP202 2W o/p 145/145·5 six channel | £94.05 | (75p) |
| Ken KP202 as above with 1750Hz tone | £100.62 | (75p) |
| Base charger units 240V AC | £11.00 | (50p) |
| Leather case | £4.69 | (50p) |
| 6" helical whip | £5.31 | (15p) |
| Extra channels (30% discount if purchased with KP202) | £3.75 | (10p) |
| Set 10 Eveready Ni-cads | £9.72 | (50p) |

**HY-GAIN ANTENNAS (inc VAT)**

| | | |
|---|---|---|
| 12AVQ 10–20m vertical | £31.88 | (1.00) |
| 14AVQ 10–40m vertical | £45.00 | (1.00) |
| 18AVT 10–80m vertical | £65.00 | (1.25) |
| TH3 jnr 600W 3 element beam | £92.50 | (1.50) |
| TH3 Mk 3 2kW 3 element beam | £124.85 | (2.00) |

G-whips mobile antennas—ex. stock
VHF 2 & 4 metre whips—ex. stock

**MINI-PRODUCTS COMPACT BEAMS**

| | | |
|---|---|---|
| HQ-1 hybrid quad 10–15–20m | £69.95 | (1.50) |
| B24 2 element yagi 10–15–20m | £57.50 | (1.50) |
| RK3 reflector element for B24 | £33.75 | (1.00) |
| C4 vertical 10–15–20m | £33.75 | (1.00) |

**2 METRE SSB (inc VAT)**

| | | |
|---|---|---|
| Liner-2 2m ssb transceiver | £181.25 | (n/c) |
| Matching PSU | £26.25 | (75p) |

**MICROPHONES**

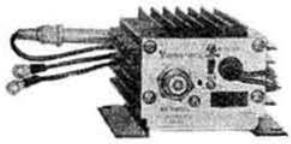
| | | |
|---|---|---|
| Shure 201 | £7.40 | (30p) |
| Shure 444 | £16.25 | (50p) |
| Yaesu YD844 | £18.66 | (50p) |

# WATERS & STANTON ELECTRONICS

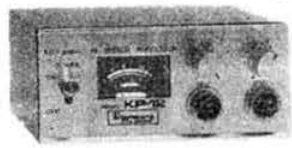
## HOCKLEY AUDIO - SPA ROAD - HOCKLEY - ESSEX

**HIRE PURCHASE** PRICES INCLUDE VAT (unless stated) **9-5.30 pm Early closing WEDNESDAY** **Tel: 03-704 6835** **TRADE-INs**

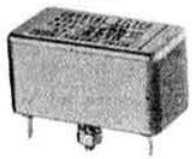
# SMC South Midlands



**144MHz LINEARS RFL**
RF sensing, switchable drop out time SSB, AM, FM, CW, 12VDC. 10W drive, 80t 10W output.
RFA-10-100-HBX (001) **£95**



**RF SPEECH PROCESSOR KP12A**
Audio to audio, via 10·7MHz, mains powered, illuminated meter, FT-101, FT2 plugs suitable all phone modes superb on FM.
**EX STOCK IN TOTTON**
£11 p & p 40p (+25% VAT)



## LOW PRICE CRYSTALS AND CRYSTAL FILTERS

**INSURED P & P 37p. VAT RATE 25%**

Individually supplies with ± 6dB. (25dB.) 60dB bandwidths, ripple factor and insertion loss.

**9MHz**

| | | |
|---|---|---|
| YF90M600 | 600Hz | **£13.00** |
| YF90F2·4 | 2·4kHz | **£11.00** |
| YF90F12 | 12kHz | **£13.00** |
| Carrier crystals HC18/U each | | **£1.50** |

**10·7MHz**

| | | |
|---|---|---|
| YF107M600 | 600Hz | **£13.00** |
| YF107M2·4 | 2·4kHz | **£12.00** |
| YF107M12 | 12kHz | **£12.00** |
| Carrier crystals HC18/U each | | **£1.50** |

**FT-2F** (52MHz Rx, 6MHz Tx). **£3.50** or **£2.00** each.
144 (·15, ·25, ·36, ·48, ·60, ·70, ·80)
145 (·08, ·09, ·68, ·84, ·90)

**SIMPLEX**
S (0, 12, 16, 20, 21, 22, 23, 24)

**DUPLEX** (Normal repeater)
R (0, 1, 2, 3, 4, 5, 6, (7), (8), 9)

**INVERSE REPEATER**
IR (0, 1, 2, 3, 4, 5, 6, (7), 8, 9) Rx
IR (0, (1), (2), (3), (4), (5), (6), (7), (8), (9)) Tx

FT2—Channel crystals, **£2.20** each
8 (·15, ·175, 15, ·175, ·225, ·25, ·5, ·575)
**TRIO** 9300, **£3.50** pair, **£2.00** each
Simplex and Duplex.

**FT-2FB** (14MHz Rx, 18MHz Tx). **£3.50** pair or **£2.00** each.
144 (·15, ·20, ·30, ·36, ·40, ·50, ·60, ·70)
145 (·09, ·32, ·44, ·51, ·90)

**SIMPLEX**
S (0, (12) (16), (20), 21, (22), 23, 24)

**DUPLEX** (Normal repeater)
R (0, 1, 2, 3, 4, 5, 6, (7), (8), (9))

**INVERSE DUPLEX**
IR (0, 1, 2, (3), 4, 5, 6, 7, 8, 9) Rx
IR (0, (1), (2), (3), (4), (5), (6), (7), (8), (9)) Tx
**C145A and C826MB, £3.50** pair **£2.00** each
S (20, 21, (22), 23, 24)
R ((5), 6, 7)
**FT-200—10A, 10C, 100 at £2.20** each.

**Special Offer** (for MORSE MEN)
145.125T 12MHz HC25/U, only **£1**

**SUB STANDARDS**
100 kHz HC13/U, **£2.50**. 1MHz HC6/U, **£4.50**
8MHz HC25/U, **£2** each
144·48 S20, S23, S24
12MHz HC6/U (**£2.20**), HC25/U (**£2**)
144·48, S0, S2, S21, S22, S23
C430, only **£3.50** pair
433 (·10, ·15, ·20)
Pye Pocket Phones
433·20, **£4.50** paid

**CONVERTOR CRYSTALS, £2** each
33·666 (2m), 42·00 (4m), 50·5MHz (70cm)

## THE KP202 THE HANDHELD

Two watts of RF output and ½ watt of audio makes this with its immunity to image problems, I.F. breakthrough, undoubtedly one of the "Best Buys" today. Its performance rivals many a mobile or base installation (at half the price). Supplied complete with six channels S0, S20, and any four S21, S22, R5, R6, R7. Only **£75.00.**

With the KP202 comes a telescopic whip, leather carrying handle/whip case, "F" type connector, and two dummy batteries. Accessories include: internal tone burst unit **£5.50.** Flexible helical stubby antenna (£4.25), leather case (**£3.75**) spare "F" connectors (**25p**) spare telescopic whip (**£1.70**) F to UHF adaptors (55p), set of Ni Cads (**£8.50**, 8% VAT only), battery charger and base master (illustrated **£8.80**) spare battery hods, etc.

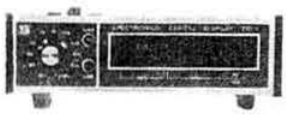
**MAGNUM TWO CONVERTER** (Electronic Development.) Uses H.F. Transceivers P.S.U. and ½ watt on 28MHz for up to 100w output. Supplied completed with relays and 11-pin plug for instant operation. Microwave Modules receiver converter **£88.00**

**BELCOM LINER TWO.** 12v DC for 10w P.E.P. on Two. Coverage of 240kHz in 24, 10kHz. VXO channels, **£145.00.** Preamp for Liner II, **£3.75.** R115 Mains PSU, **£21.**

**NEW from U.S.A.**

**SOMMER GENERATORS—** (8% VAT)

| | | | | |
|---|---|---|---|---|
| GA123M5 1000w 230v AC | **£135.00** | GA303M5 2400w 230v AC at £215.00 | (T.O.S.) | **NEW from SMC** |
| GA203M5 1600w 230v AC at £155.00 | (T.O.S.) | GA403M5 3200w 230v AC | **£320.00** | |
| Readout unit for FT101, etc | **£155.00** | | | |



Digital readout to .. 100Hz for your FT-101 (B), FT-401 (B), etc., 21 IC's 76 diodes provide a most worthwhile accessory.
**£100** (+ VAT). Carriage paid

**NICKLE CADMIUM BATTERIES, THIS MONTH POST FREE and only 8% VAT "AA" size (HP7, etc.) 450mA hours set of 10 for TR2200, C146A, KP202, etc., only £8.50.**

**MICROWAVE MODULES** (all 28-30MHz i.f., others to order) p & p 30p (+ 25% VAT)

| | | | | | |
|---|---|---|---|---|---|
| 70MHz Converter | **£15.20** | 144MHz Converter | **£15.20** | 144MHz Pre amp 2 outs | **£9.00** |
| 70MHz Converter—LO | **£16.30** | 144MHz Converter—LO | **£16.30** | 432MHz Converter | **£18.10** |
| 432MHz Transverter | **£62.00** | | | | |
| 1.296MHz Converter | **£24.00** | | | | |

**SECONDHAND PRICE LIST—PHONE 04216 4930 FOR LATEST** (+25% VAT)

Buy it with Access

**PLEASE NOTE—THESE PRICES *DO NOT* INCLUDE VAT (25% or 8%)**

Terms:—Cash with order or credit card holders just 'phone in for, if possible, same day despatch. Immediate H.P. available for card owners for amounts up to £150.00. Holders of current U.K. callsigns (where references have been provided) can be speedily cleared, or normal H.P. at competitive rates is available.

BARCLAYCARD

# Communications Ltd

YAESU

## S.M.C. — SOLE SINGLE-STOP SOURCE

### TELOMASTS (England & Wales, carriage £1.50) (+8% VAT)

Galvanized steel Telescopic 10ft. section with or without rigging.

30ft.—**£15.00** (T.O.S.) 40ft.—**£20.00** 50ft.—**£25.00**

With rigging kits:

30ft.—**£29.00** (T.O.S.) 40ft.—**£39.00** 50ft.—**£49.00**

### HAMTOWERS (Carriage extra)

Galvanized lattice 10ft. sections, 30ft. height with climbing steps on one face.

From: **£105.50** (+ 8% VAT)

### VERSATOWERS (Carriage paid, England & Wales)

*Illustrated right.* Tiltover Telescopic post mounted ex-stock. The tilting action allows ease of maintenance and changes of antennas. The relatively low weight eases installation problems. From: **£172.25** (+ 8% VAT)

### ALIMASTS (Carriage paid, England & Wales)

A/Alloy Telescopic 1·5, 2, 3 metre sections, 6-21 metres from **£11.60** for 6m to **£38.00** for 21m. (+ 8% VAT)

**SWR 10**

**NEW, Low Price, Range of SWR/Power Meters** (p & p 37p) 8% VAT

**SWR10.** SWR Bridge (50 ohm/75 ohm) 1 to 3 : 1 at ±10% accuracy over 1·5 to 160MHz **£6.30**

**SWR20.** SWR field strength and Power Meter 1 to 3 : 1 at 10% accuracy over 1·5 to 160MHz (50 ohm)
Power 10 and 100W F.S.D. **£9.90**

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

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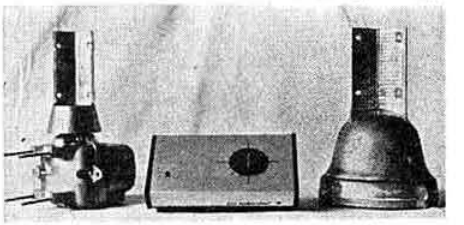

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- Antenna impedance:
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  with very good cross modulation stability
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- Modern 2 stage AGC prevents cross modulation
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  0.5kHz at 6dB (CW)
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# NEC CQ-110

- Frequency ranges: 1.5– 2.0MHz–160m
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  7.0– 7.5MHz– 40m
  14.0–14.5MHz– 20m
  21.0–21.5MHz– 15m
  27.0–27.5MHz– 11m
  28.0–28.5MHz– 10m A
  28.5–29.0MHz– 10m B
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- Dimensions: 330 × 153 × 322 mm
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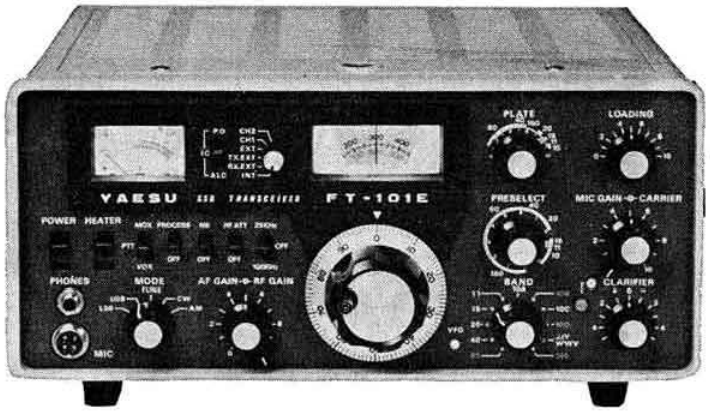


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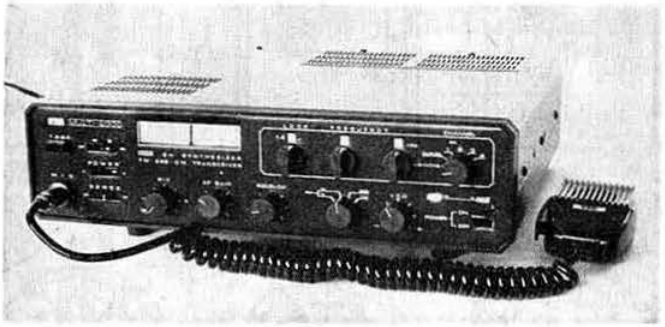

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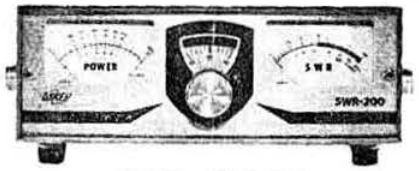


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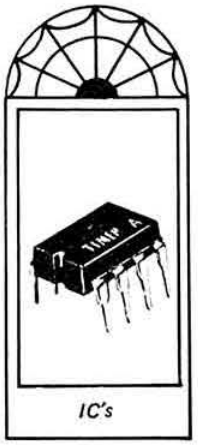
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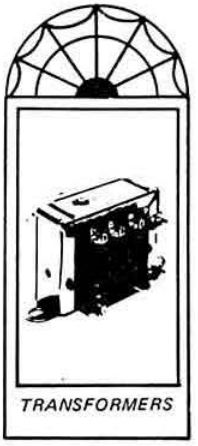
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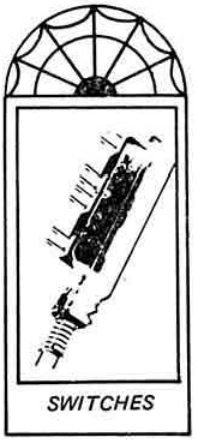
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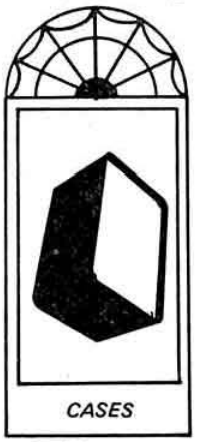
TOOLS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**EDITOR**
A. W. Hutchinson

## *CQ de RSGB*

### Value Added Tax and the radio amateur

ONE of the bombshells of the last budget was the imposition of a 25 per cent rate of VAT on radio and television sets, etc. The draft details indicated a very wide coverage and it was thought at RSGB HQ that the Chancellor of the Exchequer was so anxious to catch television and hi-fi enthusiasts that the poor radio amateur had been hit by the fall-out. But not so—correspondence with the Treasury and HM Customs & Excise has indicated quite clearly that the intention is to catch the radio amateur at the higher rate. To quote: "*In considering the liability of amateur radio equipment, Customs have taken account of the fact that the use of such equipment is governed by Home Office licensing procedure under which provision is made for the use of such equipment in times of emergency, and they do not dispute that there may be educational value in obtaining an amateur radio licence and operating an amateur radio station. But their considered view is that the activities of ham radio operators are essentially of a recreational nature . . .*"

A meeting took place between HM Customs & Excise and the President, Treasurer and General Manager of the Society on 21 August, and although a number of points were pressed strongly the view taken was that "if a radio amateur could use it then it should be taxed at the higher rate". The idea that amateur radio is an élite hobby forming a useful nucleus of the country's radio reserves appears to be nothing more than a myth. Although Japanese equipment was not mentioned, one could not help feeling that maybe Customs had noticed how much Japanese equipment radio amateurs had purchased.

Reference was made at the meeting to the joint announcement by the Electronic Components Board and Customs & Excise regarding components to be taxed at the lower rate. Among these were microwave products, but upon the Society noting this with approval Customs responded by saying that now they realized that the components could be used by radio amateurs they would have to reconsider taxing them at the higher rate.

It is hoped that a list of items taxed at the lower VAT rate (probably a very short one but almost certainly including test equipment) can be agreed between the Society and Customs in the next two or three weeks. Details will be published as soon as possible but otherwise this is a very sorry tale.

*J. O. Brown, G3DVV*
*Honorary Treasurer*

# CURRENT COMMENT

## Subscriptions and other financial problems

AT the next Annual General Meeting the Society will be asked to pass a Special Resolution altering the clause in our Articles of Association, which at the moment restricts the subscriptions to a £6 limit, and replace it with new wording that allows the Council to decide the subscription without having the formality of an extraordinary general meeting. This suggestion came from the Department of Trade and Industry and the exact wording has already been approved by them, but of course the approval of the members is also required.

The question which will inevitably arise will be: how much is the subscription going to be? At the time of writing this article the meeting of Council to finalize the proposal is still awaited, but I show below a few figures to indicate the effect of inflation which has hit our Society in just the same way as every other organization and individual in this country has been affected.

| | Year ended 30 June | | | |
|---|---|---|---|---|
| **Description** | **1972** | **1973** | **1974** | **1975** |
| Telephone, postage, printing and stationery | 5,000 | 6,000 | 5,500 | 6,500 |
| Staff remuneration | 21,000 | 21,000 | 25,000 | 34,000 |
| Cost of *Radio Communication* | 33,000 | 36,000 | 36,000 | 51,000 |

The net result is that we have overspent our income in the year ended 30 June 1975 by approximately £18,000. After setting off against this amount the VAT refund of £5,000, we are still left with the worst year in our history.

Meanwhile costs continue to escalate and, whatever the rate of subscription, we are going to have another deficiency in the year ending 30 June 1976. One reason for this lies in the accounting treatment of subscriptions in that credit is only taken for that part of the subscription which relates to the year. For instance, a subscription received in May is allocated two-twelfths to the current year and ten-twelfths to the following year. So even a subscription increase to £10 (as suggested to me by some members!) coming into force on 1 January 1976 (this will be the starting date for the new subscription whatever figure is decided upon) will still lead to a deficiency for the current year of approximately £4,000 (and this is based on a 10 per cent inflation rate). So in the year ending 30 June 1977 the Society will be seeking to cover that year's expenses and to recoup some of the deficiencies in the previous two years.

To recapitulate, the year ending 30 June 1977 should see the following points covered.

| **Description** | **Amount** |
|---|---|
| Shortfall in 1975 | 13,000 |
| Shortfall in 1976 (say) | 10,000 |
| Administration expenses including *Radio Communication* 1977 (say) | 183,000 |
| | 206,000 |
| *Less:* Non-subscription income | 55,000 |
| | £151,000 |

That appears to indicate a subscription of approximately £8 (remember that Customs & Excise take some of that) but as yet nothing has been finalized and there is time for discussion by members now and at the Annual General Meeting.

J. O. Brown, G3DVV
Honorary Treasurer

# QTC AMATEUR RADIO NEWS

## Additions to publications list

The following are again available from RSGB Publications (Sales):

*Radio Amateur World Atlas.* Contains detailed maps showing prefixes, time zones, amateur radio boundaries and polar projections. A *must* for the keen dxer. Price £1.44 including postage and packing.

*Radio Amateur Operators Handbook.* Published by Data Publications Ltd, this book is a practical operational aid containing much useful information. Price 85p including postage and packing.

## 1976 Call Book

The 1976 edition of the *RSGB Amateur Radio Call Book* will be published at the end of this month at a cover price of £1.20, plus a charge for postage and packing of 27p.

Enclosed in this issue is a special offer by *Ham Radio Magazine* of a free copy of the *Call Book* with every subscription for that magazine received or renewed before 1 November. The call books will be dispatched from RSGB HQ as soon as received from the printers.

## RSGB President 1976

At its meeting on 15 September the RSGB Council unanimously elected Dr E. J. Allaway, MB, ChB, MRCS, LRCP, G3FKM, to be the Society's President during 1976. Dr Allaway, who is this year's Executive Vice-President, has been a Council member since 1970 and the contributor of *The Month on the Air* since 1966.

## Taking your rig abroad?

Referring to the information on page 524 of the July issue of *Radio Communication* and following correspondence with the AA, please note that there is now a charge of £2.50 for the carnet. The remainder of the information continues to be correct.

The AA has confirmed that a different document, the *Acquit-a-Caution*, is a customs document accepted by the French authorities only and is good for one entry and exit only. It can be used for equipment sufficiently valuable or unusual as to be inadmissible in the ordinary way as personal effects. The charge is the same as for the carnet.

Whatever equipment is taken abroad it is unwise to assume that membership of the EEC provides a dispensation for not observing the correct customs procedures.

## Facts and figures

The Home Office advises that the following numbers of amateur licences were in force at 31 May 1975:

| | | | |
|---|---|---|---|
| Class A | 15,488 | Class B/M | 1,730 |
| Class B | 5,276 | Television | 289 |
| Class A/M | 3,627 | | |

The callsign record received from the Home Office dated 8 August 1975 gives the latest callsigns issued in the G4 and G8 series as G4EFZ and G8KKG respectively.

At the end of July 1975 RSGB membership totalled 18,516 made up of 15,576 UK corporate, 1,113 UK associate and 1,827 overseas members.

## Interference Survey

The Interference Committee wishes to thank members who returned the Interference Survey Forms, enclosed in the May issue, for their assistance and comments. The results are being analysed, but evaluation will take some time. It is hoped that the findings will be explained in a *Radio Communication* article in 1976.

## The GM3OXX portable 3cm tx/rx

The author has advised us of the following corrections which should be made to this article published in the June issue:
Fig 5. IC1. R4 should be connected directly to Pin 4, and C7 from Pin 4 to ground.
Fig 7(b). IC1. Junction of C10 and D1 to Pin 3, and Pin 4 to ground. The connection on Pin 1 should be reconnected to Pin 2, and Pin 1 left unconnected.

## Home Office participation at Leicester Exhibition

One of the main exhibits on the Home Office stand at the Amateur Radio Retailers Exhibition at Leicester at the end of this month will be a demonstration of the use of filters to overcome interference to television caused by the high-level field of nearby amateur transmitters.

The Home Office also hopes to provide facilities for visitors to have their own aerial filters aligned using a spectrum analyser and signal generators. For practical reasons only filters terminated in BNC or RECMF (Belling-Lee) connectors can be accepted.

The value of this facility will depend on the use made of it, and visitors are encouraged to take this opportunity to have their filters aligned.

## Transport to Leicester Exhibition

The Northumbria Radio Club is organizing transport to the Amateur Radio Retailers Association Exhibition at Leicester on 30 October. It is anticipated that the bus will leave Morpeth at 8am, Newcastle-upon-Tyne at 9am, and will arrive in Leicester at 12.30pm. Departure from the exhibition will be at 5pm, with a refreshment halt at Wetherby, and arrival back at Newcastle at 11.30pm and at Morpeth at midnight.

Anyone interested in joining this party should contact Mr W. Ricalton, G4ADD, 4 South Road, Longhorsley, Morpeth, Northumberland. Tel: Longhorsley 259.

## New owners for Jaybeam Ltd

The share capital of Jaybeam Ltd has been transferred to Jones Stroud Ltd of Nottingham; and consequently the group of companies is now a subsidiary of Jones Stroud (Holdings) Ltd.

## RSGB LECTURE

**Tuesday 4 November 1975**

**Amateur radio satellites**

by P. Gowen, G3IOR

*supported by members of AMSAT-UK*

**Institution of Electrical Engineers**
**Savoy Place, London WC2**

Buffet tea: 6pm — Lecture: 6.30pm

Mr Bill Sykes, G2HCG has resigned as chairman and has retired from the board of directors; however, he will remain with the company in the capacity of technical consultant. Mr Don Sumner (previously managing director) has been appointed chief consultant of the Jaybeam group of companies.

The company will continue to trade under the name Jaybeam Ltd at Moulton Park Industrial Estate, Northampton; and, it is stressed, will not be affected in any way by these moves. All divisions within the group will continue to trade normally.

## Telecom 75

Through the courtesy of M M. Mili, Secretary-General of the International Telecommunication Union, stand space has been made available to the IARU at the Telecom 75 exhibition in Geneva between 2 and 8 October. The stand will be constructed and manned by members of the CERN (European organization for nuclear research) radio club, with assistance from the IARC, USKA and Region 1 IARU. The purpose of the stand is to bring to the notice of the many professional visitors to the exhibition the work and value of the amateur service. During this period considerable activity may be expected from 4U1ITU, the station of the IARC located in the headquarters building of the ITU.


**Ted Robinson, F8RU, operating 4U1ITU in the ITU building at Geneva on 144MHz ssb. The equipment comprises an FT101 driving a Europa B transverter feeding aerials located on the roof of the five-storey building. The transverter was a recent gift from Solid State Modules to the ITU**

# Digital frequency readout for the KW2000A

by G. N. FARE, G3OGQ*

THERE is no doubt that if a rig is to reflect the "state of the art" then it has got to incorporate digital frequency readout. A glance at the advertisements for the more expensive transceivers will show how true this is.

There are many advantages to be gained from such a feature, for example the ease by which a frequency can be read, the accuracy of indication (which is not affected by the linearity of the vfo) and the automatic switching of frequency indication when incremental tuning is in use.

Fortunately the availability of integrated circuits at reasonable prices makes it a fairly easy task to add this feature to a transceiver, in this case the KW2000A. The existing vfo dial, which is calibrated 0 to 200, is replaced by a three-digit readout giving the same indications to the nearest kilohertz. The display fits neatly in place of the existing dial and, if anything, improves the overall appearance.

The complete counter can be accommodated within the cabinet except for the clock which is built in a separate box mounted on the back of the cabinet. No "surgery" is required and the transceiver can be restored to its original condition very quickly without leaving any trace. The total cost should not exceed £20 and could be less with some judicious shopping.

## Some design considerations

The readout samples the vfo frequency of 2·700 to 2·500MHz and displays the digits 000 to 200. A study of the block diagram of the transceiver will show that the vfo frequency increases as the signal frequency decreases and vice versa. The counter must therefore subtract. By far the easiest way of achieving this is to use Nixie tubes and to connect them in reverse so that, for example, 9 is displayed instead of 0, and 8 instead of 1, etc.

If an accuracy of ±5kHz is sufficient the clock can be triggered by the mains frequency, but if greater accuracy is required the use of the crystal-controlled clock is essential. Of course as in all digital indications the maximum accuracy can only be ±1 of the least significant digit, in this case ±1kHz. This is entirely adequate for all practical purposes.

## Circuit

The circuit (Figs 1 and 2) follows well-established lines in the main, and is borrowed from several sources [1], the main criterion being to keep the number of components to a minimum and also therefore the cost and power requirements. Only 22 ICs are required, and power is taken from the existing power pack.

### Crystal clock

The clock produces an output at 50Hz and has an output waveform ideal for driving a 7490. The oscillator is somewhat unusual in that all four sections of a 7400 quad NAND gate are connected in series and held in a quasi-linear state by dc feedback around the first three sections. Positive feedback from the output via the crystal defines the frequency, and the capacitor across the output damps out any tendency to ring at the crystal overtones. Starting is aided by the 100Ω resistor in the 5V line. The 100kHz output is first divided by 1,000 in the three 7490s and then by two in one half of the 7474.

G1 (half IC14) is not strictly necessary, but it is included so that testing can be carried out by connecting 6·3V at 50Hz to its input. Its function is to roughly shape this ac waveform so as to make it more acceptable to the 7490. If G1 is dispensed with, G2 can be combined with IC13 by using a 74132 quad two-input Schmitt trigger.

### Counter and display

The operation of the counter is as follows. The 50Hz input drives a 7490 connected in the square-wave output mode. The 5Hz square wave is used to open gate G2 to the rf input from the 7413 (IC16) for alternate intervals of 100ms. The store and reset pulses are obtained from the C and D outputs of IC10 and extracted by gates G3 and G4 (IC15) when these are opened by the output of IC10 inverted by I1. The store and reset pulses are now negative-going and are changed to positive-going by inverters I2 and I3 respectively. The output from G2 is divided by 100 by IC11 and IC12, these being cleared at the appropriate time by the reset pulse to give a defined start to the count.

The interface amplifier uses a BCY70 with a 7413 Schmitt trigger, and owes its design to G4ADC [2]. This amplifier has proved to be very stable, cheap and easy to build.

The counters, stores and decoders are standard circuits and the only departures from normal are the connections to the display tubes. Fig 3 shows these connections for tens and units which have the effect of reversing the counting as already described. The connections to the hundreds display tube change an incoming 7, 6 or 5 to 0, 1 or 2 respectively.

## Accuracy of existing crystal oscillator

In order to ensure an accurate display, it is desirable to check the frequencies of the crystals in the existing crystal oscillator. In the author's case, all the crystals were within a few hundred hertz of their nominal frequencies, which confirms the results obtained in the equipment review [3].

It is highly unlikely that all crystals are off frequency to the same extent and the first check should be to see how closely each one comes to the nominal frequency.

Select any band and, using the built-in crystal calibrator, zero beat the vfo and set the cursor to zero. Change the band and note if the vfo dial has to be moved in order to maintain zero beat. Repeat this for all bands. If all bands zero beat very closely then it is quite likely that all crystals are correct as it would be a difficult exercise for the manufacturer to offset them to the same extent. However, a check can be made on any suspect crystal with a frequency meter or counter.

* Cobblestones, Walton Old Hall, Walton, Warrington, Cheshire.

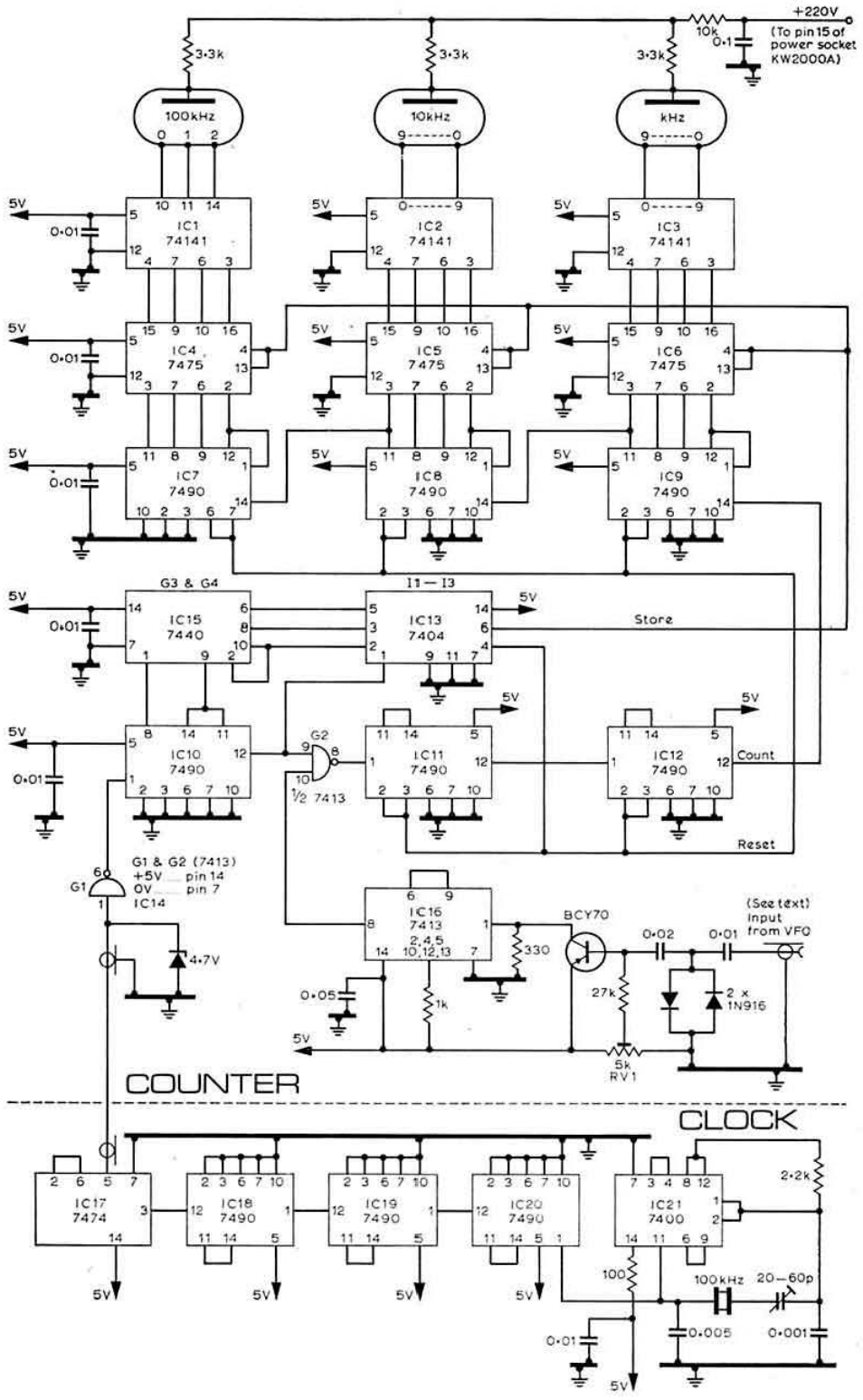



**Fig 1. Clock and counter circuit**

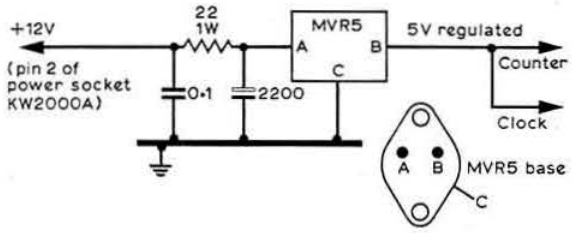



**Fig 2. Voltage regulator circuit**

If any crystal is off frequency, it should be quite possible to trim it with a series or parallel capacitor as necessary until it zero beats with the rest.

## Components

Do not take the quality of the ICs for granted, as some "duds" are bound to filter through. For example, out of 20 ICs purchased recently by the author, three proved to be defective.

The ICs used in this circuit can be roughly checked by measuring their current consumption. A trial 5V should be applied to each ic with all other connections except 0V left open. The current taken should then be measured, and this should be within 50 per cent or so of the currents shown in the following table.

| IC | Current (mA) | IC | Current (mA) |
|---|---|---|---|
| 7400 | 12 | 7474 | 17 |
| 7404 | 18 | 7475 | 32 |
| 7413 | 18 | 7490 | 32 |
| 7440 | 12 | 74141 | 21 |

## Construction

In order to keep the unit small enough to be fitted within the case of the KW2000A, the whole of the circuit except the display tubes and the clock is built on one piece of plain Veroboard measuring 5in by 4in. The use of copper-clad Veroboard is not recommended because very few connections follow a straight line between the ICs. Holders were used for all ICs but these are not absolutely essential and may be dispensed with. However, their use does facilitate the changing of an ic should it subsequently prove to be faulty.

Wiring up was carried out using 10A fuse wire fitted with

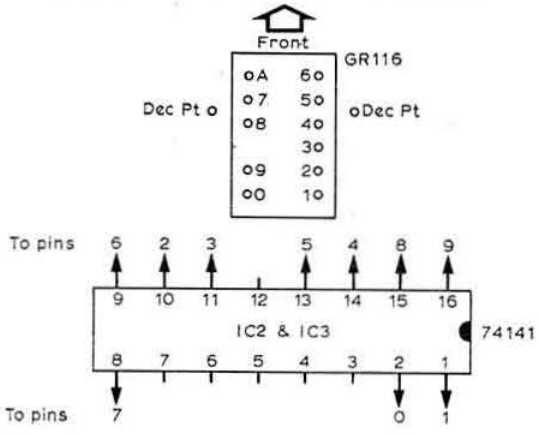



**Fig 3. Connections to display tubes**

pvc sleeving where necessary, and the use of a pair of fine tweezers made the job very much easier. A piece of 15A fuse wire runs up the left-hand side between Veropins to form a 5V dc busbar and a similar wire on the right forms an 0V busbar. No economies with bypass capacitors should be made. The very nature of this project creates pulses which will render the receiver quite useless if these components are omitted.

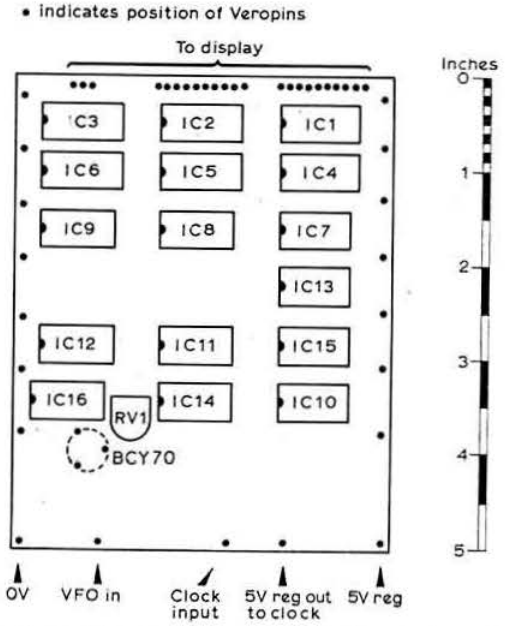



**Fig 4. Layout of components on 0·1in Veroboard, viewed from top**

First of all fit the ICs (or the ic holders if these are being used) to the board using the layout shown in Fig 4, noting that the 74141s and 7475s have 16 pins. All the rest have 14 pins. The notch should be on the left, looking at the board from the component side. A little judicious bending of the pins will hold these in place until wires are soldered to them.

Wire up the +5V dc lines to each ic and then the 0V connections. When this is completed the wiring between ICs can be carried out, starting at the top and working downwards. Where wires cross, slip on a pvc sleeve to prevent shorting. It is also a good idea to use different colours of sleeving to identify the +5V and 0V lines, the store, count and reset lines, and the lines taking rf. This is a considerable help when "trouble shooting" later on.

When the board is completely wired, check the whole of the wiring again, particularly making sure that no adjacent wires are shorting out and that no odd blobs of solder etc are causing shorts. There is not much room and a shorted wire could have disastrous (and expensive) results.

The board will fit into a 5 by 4 by 1½in aluminium box with lid (available from Electrovalue). Before inserting the board fit the voltage regulator to the bottom of the box, thus utilizing the box as a heat sink. The 2,000μF smoothing capacitor should be mounted on the side of the box with its positive terminal connected to a 1,000pF feed-through

capacitor running into the box. Two feed-through capacitors should also be fitted to the rear of the box to accept the 12V positive dc and the 5V regulated supply to the clock.

The box fits in position above the vox section at the rear and is held in place by an existing bolt on the side of the pa compartment. Check that the bottom of the box clears the valves underneath. In the author's case it was necessary to lower the voltage regulator tube by ¼in. This was done by packing down the valve holder with washers.

The display tubes should now be wired in. This is done using a piece of copper-clad Veroboard measuring 2in by ¾in with saw cuts made across the copper between the tubes. The 3·3kΩ and 10kΩ resistors are soldered to the Veroboard and a wire is taken to the 220V positive line on the input socket of the KW2000A (pin 15).

The wiring between the display board and the counter should be shielded, and for this purpose 25-core 7/0·01mm shielded wire (obtainable from Doram) was used. This cable passes through a hole at the front of the box and is soldered to the appropriate Veropins. The shield is earthed to the box with a clip which also anchors the cable.

The cost of the clock may be kept down by using the existing 100kHz crystal (X14) from the transceiver. If this is done, V22 (6BA6) will become redundant and may be removed if desired. Its removal will unbalance the heater line which is wired in a series-parallel arrangement across the 12V supply, but this situation can be remedied by wiring a 22Ω 2W resistor across the heater connections.

The crystal is mounted in a B7G holder inside a 2oz tobacco tin and the ICs are mounted on a piece of plain Veroboard measuring 3¾in by 1¼in (see Fig 5). A feed-through capacitor is mounted on one end for the 5V input from the counter box and a phone-socket is fitted for connection of the screened cable to the counter. Wiring is carried out in the same manner as the counter and should present no difficulties. The completed box is then screwed to the rear of the KW2000A cabinet.

## Power supply modifications

A modification must be made to the power unit. The display requires 5V regulated dc at about 200mA, and this is obtained from the 12V relay supplies. Unfortunately this supply is negative-going and it is therefore necessary to reverse D13 and D14 together with C7 and C8. The easiest way to reverse the polarity of the diodes is to unsolder and transpose the two wires connected to them at the end nearest the chassis. The capacitors are unsoldered and then reconnected with opposite polarity. This modification does not seem to affect the working of the relays.

## Testing

This is best accomplished by laying the circuit boards on the bench, connecting the two power and earth leads to the boxes and 220V to the display.

Check first of all the operation of the voltage regulator. The voltage on the positive busbar should be exactly 5V. Check the voltage at each ic. The display should show a steady blank-9-9, this being the reset value. If the display shows other numbers or no numbers at all, proceed as follows:

1. Check the presence of ht voltage at the current-limiting resistors of the display tubes.

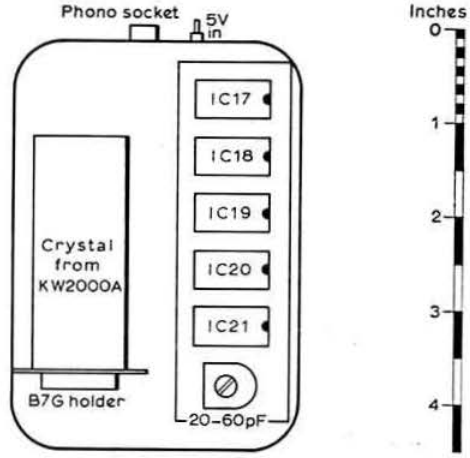



**Fig 5. Layout of components in the 50Hz crystal clock**

2. If this voltage is present, connect one of the display tube digit leads to earth. This should produce a figure. Check each tube this way.

3. If there is an indication on the display, the pulse generator should be checked. Earth the store input (pin 6 of IC13) and leave the reset input open. The display should now show the reset value (blank-9-9).

4. Earth the reset input (pins 2 and 3 of IC9) and connect the count input (pin 14 of IC9) to the store input (pin 6 of IC13). The display should start to count down at 5Hz intervals when the store input is removed from earth and stop when this is replaced. Make sure that the count is correct and in the proper sequence. If counting does not take place, the pulses can be traced from G1 to the count output by means of headphones, and the fault should be easily traced. Of course, if there is no output from G1 the clock is at fault.

5. If the clock is suspected, it can be substituted by disconnecting the screened cable from it and applying 6·3V ac (obtained from any convenient valve) to G1. The display should work normally if this is done but its accuracy will depend on the accuracy of the mains frequency. The clock output may be checked with a pair of headphones applied to pin 12 of each 7490 in succession and pin 5 of the 7474. The oscillator can be made to zero beat with the 200kHz signal from Radio 2 by adjusting the trimmer capacitor. The setting of the trimmer capacitor may, however, affect the stability of the circuit and should be set in the position which ensures starting every time. This should coincide with zero beat at 100kHz.

After testing, restore the original connections.

The only remaining item to check is the interface amplifier, and a connection to the vfo must be made. This connection should be at a low-impedance point, a suitable point being the cathode of the oscillator triode of V11 (ECF82). The easiest way to make this connection is to wind a piece of wire around pin 8 and re-insert the valve in its holder. A piece of coaxial cable should be used with the braid earthed to a convenient bolt near the valve holder. After making the connection, rotate RV1 until the display indicates the vfo frequency. If this does not happen the fault must lie in the amplifier or in G2 (IC14).

The display should now change when the tuning knob is rotated but it will be found impossible to set the display to 000, this being due to the capacitance of the coaxial cable connected to the counter. The padding capacitor in the vfo must therefore be adjusted. The tuning knob is first turned anti-clockwise as far as it will go, and then a probe is inserted through the hole in the top of the vfo and the Philips capacitor rotated anti-clockwise until the display reads 000.

### Fitting the display

The display is fitted in place of the existing dial bezel. The indicator drum is first moved inwards by slackening the two bolts at the hub, afterwards re-tightening. The four bolts holding the box to the chassis should then be slackened, allowing the box to tilt backwards.

The screw on the front of the bezel should be taken out, allowing the movable cursor to be removed and the bezel taken off. Finally, the assembly containing the display tubes with their Veroboard base and attached cable should be carefully fed through the hole from the back of the panel.

The box containing the display was actually a plastic box measuring about 2in by 2in by ¾in which originally contained a pick-up cartridge. The display assembly is pressed tight into the box and in the author's case it is held in position by rubber bands which pass round the display tubes and through the panel, these being anchored to convenient bolts.

### Use with other transceivers

The same unit may be used with other transceivers or receivers but can only be used without modification if the vfo frequency has zeroes for the tens and units digits. If this is not the case the display will always indicate a constant offset. If the operator is not prepared to do some mental arithmetic each time he takes a reading the unit will have to be modified.

There are several ways of doing this. One method is to change the logic between the counter ICs and the stores by means of inverters [1], and although this is not quite as complicated as it sounds, a much easier way is to incorporate a crystal-controlled frequency changer to bring the vfo frequency to a multiple of 100kHz.

### Conclusion

A digital display of this type is not a mere ornament. The frequency displayed is the actual frequency being received or transmitted and any drifting of the vfo will be indicated. Changing sidebands will change the indicated frequency and the use of incremental tuning is made very much easier by the display indicating the offset and automatically changing when switched from transmit to receive or vice versa. Having fitted this display, the author wonders how he managed without it before.

### References


[1] "Signal frequency meter", G. Lomas, *Wireless World* November 1974.

[2] "Technical Topics", Pat Hawker, G3VA, *Radio Communication* October 1974.

[3] "The KW Electronics KW2000A" (equipment review), P. Simpson, G3GGK, and B. Armstrong, G3EDD, *RSGB Bulletin* July 1967. □


# RAE COURSES 1975-6

The following list gives details of RAE courses which commenced in September but were received too late for inclusion in the lists published in the August and September issues.

**Addlestone.** St Paul's Centre, School Lane, Addlestone, Surrey. Tutor, C. Duckling. Tuesdays, 7-9pm. Fee £4.50.

**Birkenhead.** Birkenhead Technical College, Borough Road, Birkenhead. Tutor, L. Roberts, G3EGX. Thursdays, 6.30-9pm.

**Burton-on-Trent.** The Forest of Needwood High School, Rolleston-on-Dove, Burton-on-Trent. Tutor, D. Reynolds. Tuesdays, 7.30-9.30pm, commenced 16 September. Fee £3.35 approx. Details from J. Smith, tel Burton-on-Trent 812333.

**Bury.** Bury & Rossendale Radio Society, Mosses Community Centre, Cecil Street, Bury. Tutor, F. S. C. Burnett, G3RSM. Tuesdays, 7-9pm, commenced 16 September. Details from J. Marrow, tel Tottington 4434.

**Derby.** Allestree Adult Centre, Allestree, Derby. Tutor, R. I. Buckby, G3VGW. Tuesdays, 7-9pm. Details from the principal at the centre.

**Glasgow.** Glasgow College of Nautical Studies, 2 Thistle Street, Glasgow C5. Tuesdays and Thursdays, 7-9.30pm, commenced 9 September. Includes morse instruction.

**Kirkcaldy.** Kirkcaldy Technical College, St Brycedale Avenue, Kirkcaldy KY1 1EX. Mondays and Tuesdays. Includes morse instruction. Details from the principal or GM8FXZ.

**Leeds.** Airedale and Wharfedale College of Further Education, Calverley Lane, Horsforth, nr Leeds. Tutors, R. Short, G3YEE, and G. Denby, G3FCW. Also morse and amateur radio practice classes. Details from G3YEE, tel Bradford 664220.

**Lincoln.** Lincoln College of Technology, Cathedral Street, Lincoln LN2 5HQ. Details from the registrar.

**Newcastle-upon-Tyne.** Gosforth Secondary School, Gosforth, Newcastle-upon-Tyne. Tutor, D. R. Loveday, G3FPE. Tuesdays, 7-9pm. Details from the principal of the Gosforth Adult Association at the school, or from G3FPE, tel Newcastle-upon-Tyne 668439.

# NEW PRODUCTS

### Hilomasts

Clarbrook Engineering Co Ltd have supplied masts and towers of various types to professional users for a number of years and are now entering the amateur radio market with a range of products designed to appeal to these users. The NH series of pneumatic masts is aimed at the amateur operator and can be extended to full height with the use of an ordinary car foot-pump. Also available are Hilotowers, a range of telescopic towers, and Hilomasts, which are guyed alloy masts. A range of accessories is manufactured and of particular interest is the one-way guy adapter.

Full information and prices are available from Clarbrook Engineering Co Ltd, Jutsums Lane, Romford RM7 0ER. Telephone Romford 65173, contact Mr Clark.

### Mini blow-torch

A precision instrument is now available which is said to be suitable for work not normally associated with a blow torch. Deriving its fuel from a 35gm butane cylinder, having a life of five to six hours, the torch has a pin point flame of up to 3,500°F. The unit is complete with a detachable solder pencil.

The price for a single unit is £5.60 plus carriage and VAT. Full information may be obtained from Longs Ltd, Hanworth Lane Trading Estate, Chertsey, Surrey KT16 9LZ. Telephone Chertsey 61241.

# The three-element Zygi beam aerial

by Z. T. CHOWANIEC, G3PTN*

## Introduction

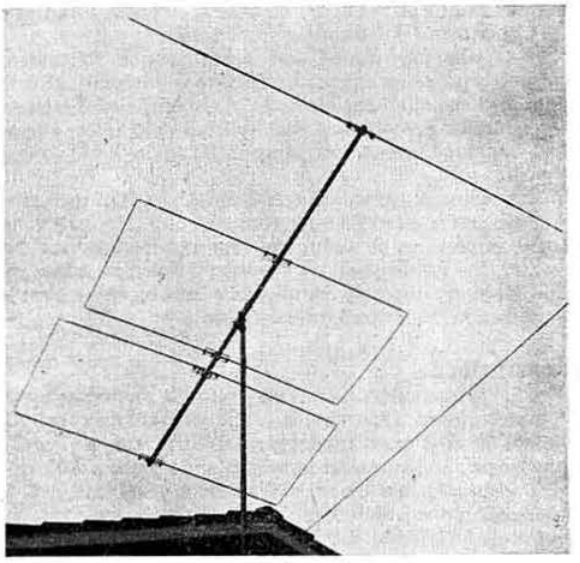
The two-element version of the beam was described in the July 1973 issue of *Radio Communication*. At that time experiments were in progress with a third element, the aim being to design an array which would have, in addition to all the advantages of the Zygi beam, a high back-to-front ratio and increased forward gain. This was achieved and over the last two years the design has been finalized. It is felt that it will be of interest to first offer a brief reminder of the concept of the Zygi beam, as from the letters received by the author it is evident that certain aspects of it are not understood by some radio amateurs. At the same time it should be noted that the main advantage of using an end-fire phased array is a lower radiation angle for a given height compared with a Yagi aerial.

The Zygi beam is an arrangement complying with the usual rules governing both phased and parasitic arrays. With a phased two-element end-fire beam, the direction of the maximum radiation is always from the element in which the current leads to the element in which the current lags, the actual length of the elements being relatively unimportant as current phase shift is determined mainly by the phasing line. There is, however, electromagnetic coupling (due to spacing) and by choosing certain element lengths, directivity and gain can be improved. With a parasitic two-element beam, on the other hand, the spacing of the elements is the main factor determining whether the parasitic element is a director or reflector and the frequency that element is tuned to. At a certain spacing the director has to be tuned to a lower frequency, ie it must be longer than the driven element, and this explains why the Zygi beam has its unusual configuration.

## The third element

First experiments were made indoors with a fixed-direction three-element phased array, and by careful adjustment of the phasing a back-to-front ratio of 15-20dB was obtained on low radiation-angle signals. The procedure was subsequently repeated with an outside rotary beam. It was then that the problems appeared. Adjustment of the phasing between the elements was far too critical and there seemed to be a limit to back-to-front discrimination. This was somewhat to be expected and the author turned to the other possible solution: combining a phased array with a parasitic one. It became apparent immediately that this was the correct approach, not only from the electrical point of view but also the mechanical one.

When the Zygi beam was used with a parasitic director, gain improved appreciably with a moderate back-to-front ratio of about 15dB. The Zygi beam and an added reflector,



**The completed aerial in position**

however, gave not only an improvement in gain but for the first time a really good back-to-front ratio. At that point, two interesting facts emerged. The author expected that the feed impedance of the beam would be reduced when the parasitic element was introduced but found that the beam behaved in that respect as if it was still a three-element phased array. The input impedance increased to 65Ω and

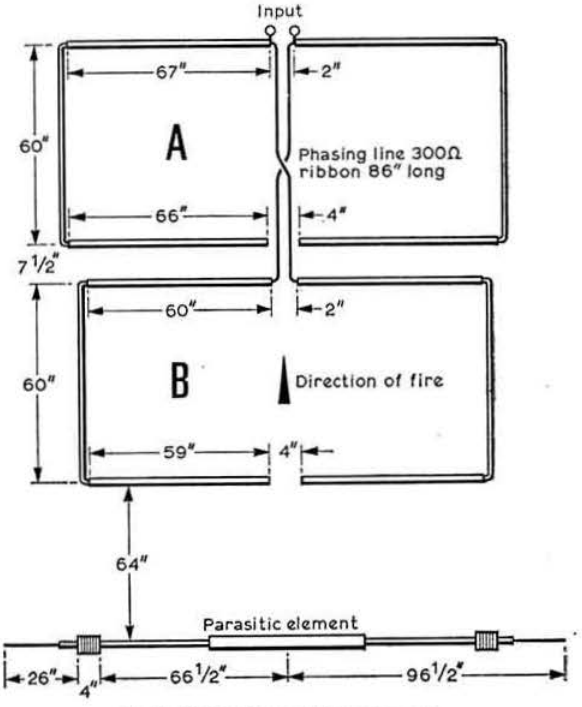



**Fig 1. Dimensions of the elements**

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the bandwidth of the aerial improved, resulting in an swr no higher than 1·5:1 throughout the band.

The author also found that it was possible to control separately to some extent the back-to-front ratios of low and high radiation-angle signals. Adjustment of the parasitic reflector gave the best back-to-front ratio at low angles and slight adjustment of element B reduced high-angle signals.

The next step was to reduce the physical size of the parasitic element so as to keep the construction as simple and as small as possible. It was found that end loading was the answer, and it was possible to shorten the element considerably with no noticeable detrimental effects on input impedance, bandwidth or back-to-front ratio.

## Construction

The finalized configuration is shown in the photograph and the dimensions are given in Fig 1. The details of the construction of the Zygi beam are not given as these remain virtually unchanged, and constructors who wish to build a complete three-element beam are referred to the original article. One change is in the length of element B, which is shortened by 3in as it was found that with most insulators it was not possible to resonate it to 15·5MHz. The author also now uses Perspex insulators on both the input and high-voltage ends of the elements and 1⅛in car-exhaust clamps with saddles instead of U-bolts. The boom of the beam has to be extended to 16ft 2in (Fig 2).

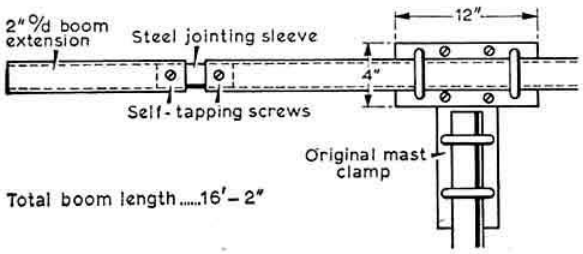



**Fig 2. Details of the boom extension. Due to the increased boom length it is necessary to make a new mast clamp which should be moved towards the centre of the boom in order to obtain a balanced weight distribution**

The details of the parasitic element construction are given in Figs 3 and 4. If the 16ft span of the reflector is not acceptable, it is possible to use a centre-loaded element with 11ft span but the back-to-front ratio will decrease to about 15dB and the forward gain will also suffer. The overall performance, however, will still be better than that of a two-element beam. Due to the increase of the input impedance it is preferable to use 75Ω coaxial cable, but if the length of the feeder is not in excess of 1λ, 50Ω cable is acceptable, remembering that at resonance the swr will be about 1·3:1. Losses can be ignored with that length.

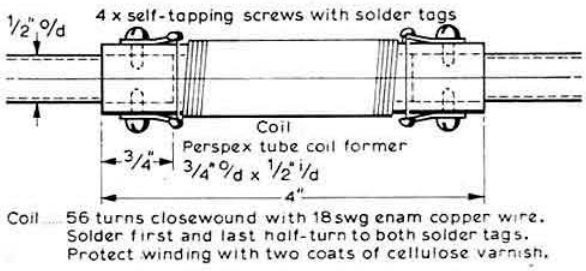



**Fig 4. Details of the end-loading coils**

The beam is fed via a 1:1 75Ω balun transformer. Alternatively, advantage can be taken of the 16ft 2in boom to form the so-called "bazooka", thus avoiding the need for the transformer (Fig 5).

## Adjustment

After the Zygi beam has been adjusted for best performance as outlined in the original article, the boom should be extended and the parasitic element attached. The help of a local station should then be enlisted, and adjustment for the best back-to-front ratio made by sliding the end piece in or out ¼in at a time. A horizontally-polarized ground-wave signal must be used—the results will be misleading with a vertically-polarized signal.

Once the optimum point has been found, the parasitic element is not altered any more. Element B is then adjusted to a slightly lower frequency, approximately 15·350MHz, by extending its sides 1in all round. This should result in further improvement of the back-to-front ratio, which on the ground-wave signal should be better than about 20dB. Finally, the resonance of the beam is checked by plotting an swr curve, and if necessary brought back to the desired point by slight adjustment of element A.

If when receiving signals the back-to-front ratio appears low, it is most probably due to the proximity of a multiband dipole or telephone wires etc. The author estimates that the back-to-front ratio of the three-element Zygi beam is better than 20dB with most signals. It must be borne in mind that there are a number of factors influencing back-to-front ratio and the aerial should be evaluated over a period of time. Ground-wave signals should not be used for other than adjustment purposes. Forward gain will be 2–3dB better than the two-element beam (approximately 6dB total) and the swr 1·5:1 at band edges (1·1:1 at resonance).

Fig 6 is the polar diagram of the three-element beam (with full-size reflector) in use at G3UCV, the slight distortion being caused by the presence of nearby objects.

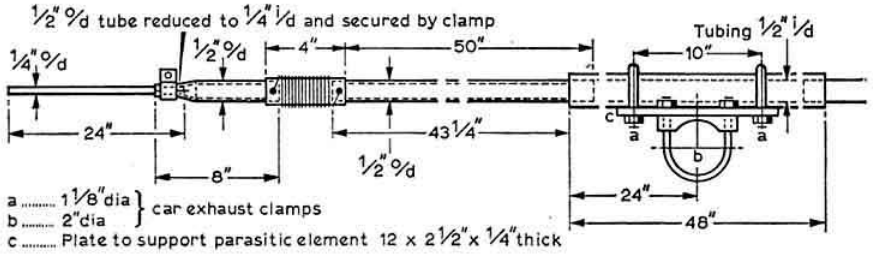



**Fig 3. Details of the parasitic element, which should be resonant at 13·6MHz. The gdo should not be coupled to the end-loading coils but instead to the centre of the dipole**

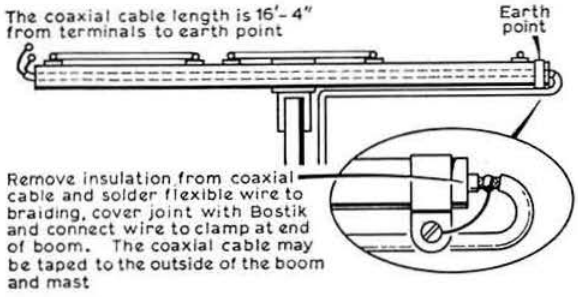



**Fig 5. Details of a coaxial "bazooka" using the boom as a sleeve**

### Evaluation

A number of dx contacts were made and comparison reports obtained for the Zygi beam at 34ft and a full-size three-element Yagi at 60ft. All reports indicated that there was no difference in signal strength.

### Conclusion

An increase in feed impedance and bandwidth (together with an improvement of the back-to-front ratio and angle of radiation) of the Zygi beam will equally apply to beam aerials using straight-element construction of the usual dimensions. The author considers that the complication of two split dipoles and phasing line in a three-element beam is a small price to pay for those benefits.

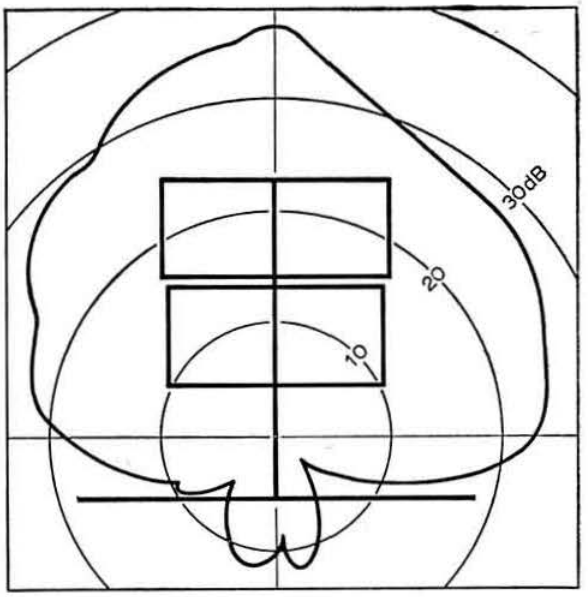



**Fig 6. Polar diagram of the beam in position, as measured by G3UCV**

The author would like to thank G3UCV and G2UZ for their help with adjustment and evaluation of the beam. □

## MISCELLANY

### Band plans and operating courtesy

All the band plans used by most radio amateurs throughout the world have been agreed internationally by the International Amateur Radio Union. These hf, vhf and uhf band plans were designed for orderly operation and the maximum utilization of the space available. It is universally accepted practice now to avoid mixing different modes of transmission in one part of a band whenever possible, as the use of, for example, ssb in the cw section of a band is discourteous to cw operators.

Operating continuously on any of the calling channels is also discourteous, and more so if the mode in use is not the one recognized for that particular frequency. On vhf and uhf especially, there are a number of calling channels on each band for different modes. Please make sure you know what these special calling frequencies are and avoid using them except for their specific allocation.

### Isle of Wight home for wireless museum

The Vintage Wireless Museum of the Wireless Preservation Society has been moved to the Isle of Wight, from its former location in South Lincolnshire, and is to be established in Arreton Manor, home of Count and Countess Slade de Pomeroy. This old manor house, which is open to the public throughout the year, already houses a folk museum, exhibition of domestic and agricultural by-gones, and a superb collection of dolls, dolls' houses and toys.

The Wireless Preservation Society, established a few years ago, is exclusively devoted to the collection, preservation and restoration of wireless, electronic and sound-reproducing equipment including television receivers for purely cultural, educational and historical purposes. It is an entirely non-profit-making organization, and all its officers are honorary.

Further information can be obtained by ringing the hon secretary and curator, Mr D. Byrne, G3KPO, at Shanklin (098 386) 2586.

## Catalogue received

### Heathkit catalogue

The new Heathkit catalogue is now available and contains full details of probably the world's largest range of electronic kits. New models include a digital multimeter, two 5MHz oscilloscopes and a calibrator, a series of digital and analogue power supplies and a solid-state conversion kit for valve-type VTVMs.

Copies of the catalogue may be obtained from Heath (Gloucester) Ltd, Bristol Road, Gloucester GL2 6EE, (enclosing a 10p stamp for return postage), or by personal callers at the London Heathkit Centre, 233 Tottenham Court Road, London W1P 9AE.

# A 160m ssb transmitter using active and passive phasing techniques

by T. MATTHEWS, G3RGC*

THE author, like many other operators, owns a transceiver covering 80–10m only and it was decided that a transmitter for top band was needed. Various circuits examined used expensive crystal or mechanical filters. Those using phase-shifting techniques seemed to be quite complex to adjust, particularly with regard to the rf section.

It was thought, however, that modern ic and semiconductor technology ought to offer a satisfactory solution. References [1] and [2] to digitally-generated single sideband were utilized in the construction of a broadband rf phase-shift network.

## Principle

A Vackar vfo employing a fet drives a monostable switch. The negative-going output pulses trigger a dual J–K flip-flop, and outputs from this device give the required 90° phase shift for a pair of double-balanced modulators.

The microphone amplifier output is fed into a conventional af phase-shifting network, also with 90° quadrature output. Active-impedance transformers are used to drive the balanced modulators with the required af phases.

The outputs of the modulators are combined and coupled to the input of the pa stage [3].

The block diagram of the unit is shown in Fig 1.

## The digital rf phase shifter

The circuit is shown in Fig 2. The vfo runs on a frequency of 7·2–8MHz, which when passed through the two following stages is divided by four, giving a 1·8–2MHz square-wave output.

61 Sandringham Road, Cleethorpes, Lincs.

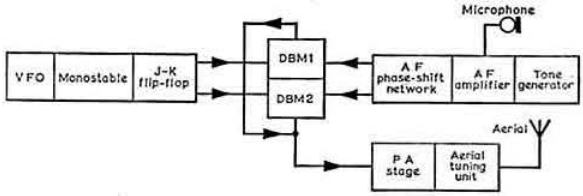



**Fig 1. Block diagram of the unit**

Ensure that the vfo is on the correct frequency by adjusting the core of L1. The rms voltage to pin 5 of IC1 should be not less than 1·3V. The value of C1 should lie between 10pF and 56pF to give correct operation of the monostable, indicated by square pulses at about 2MHz from the J–K flip-flop outputs on pins 7 and 3. If an oscilloscope is not available strong odd harmonics of 2MHz (6MHz, 10MHz, 14MHz etc) can be heard on a general-coverage receiver when its input is held near to pin 7 or pin 3 of IC2. All wiring should be kept short as in good rf practice.

## The audio amplifier and tone generator

An integrated circuit is used to perform these two functions. The audio amplifier employs part of a CA3035, the output of which is transformer coupled to the passive audio phase-shift network. The circuit along with that of the tone generator is shown in Fig 3. The tone generator is a twin-T sine-wave oscillator which can be keyed for cw work. Its main use, however, is for tuning up and in the adjustment for sideband suppression.

## The voltage amplifiers

Two fet devices were selected for similar characteristics by placing in the test circuit shown in Fig 4.

Those drawing 0·8–1·2mA were chosen. The output impedance of the audio phase-shift network requires the use of a fet. The balanced modulators, however, have a low-impedance input, thus precluding the use of RC coupling from the voltage amplifiers. Transistors (BC108A) were used in place of the more conventional transformers because of their low cost. All wiring should be kept short using screened cable where necessary.

Originally sideband selection was performed by switching the inputs to the FETs. Due to the effect on sideband suppression, presumably by capacitive coupling in the change-over switch, it was decided to work lsb only, as is common practice on 160m.

The circuit is shown in Fig 5.

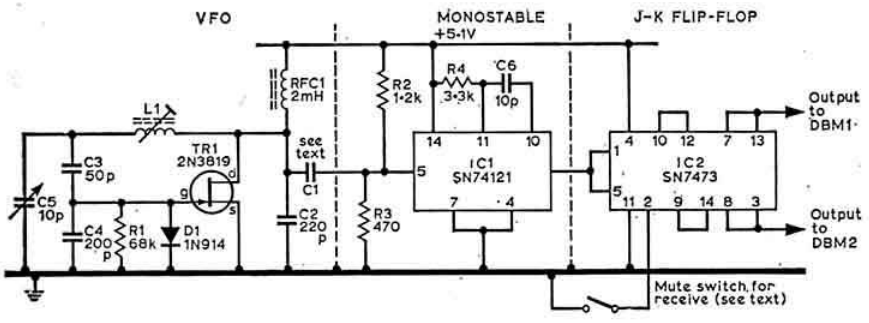



**Fig 2. The digital rf phase shifter**

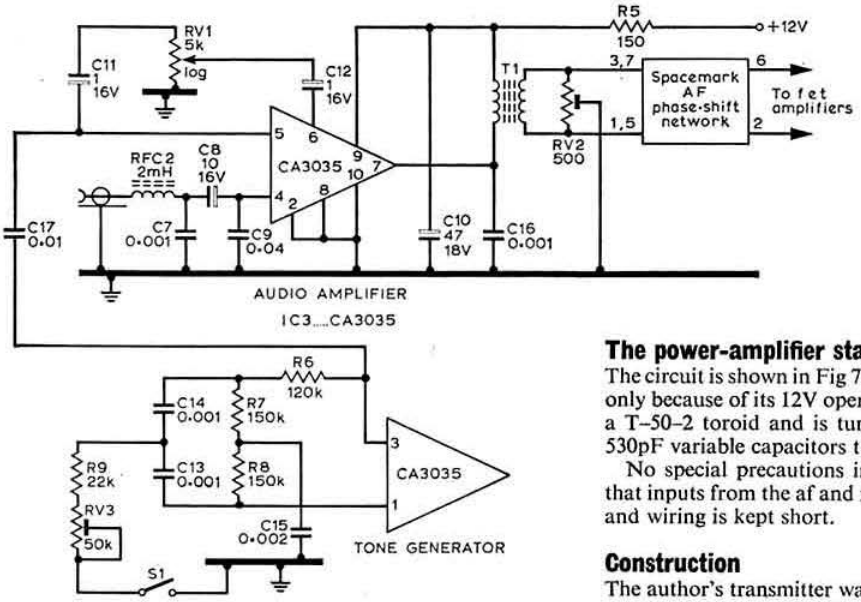



Fig 3. The audio amplifier and tone generator

## The double-balanced modulators

The circuit is shown in Fig 6. The outputs of the voltage amplifiers are connected to the signal input pins of the DBMs. The rf phase-shifter outputs are resistively tapped to give 200mV rms at the carrier input pins. Carrier suppression was found to be adequate without any additional balancing components.

The outputs from the two DBMs are combined and filtered with a parallel-tuned circuit to remove harmonics before feeding to the pa stage. The 250pF capacitor in the output is a postage-stamp trimmer fitted with a knob.

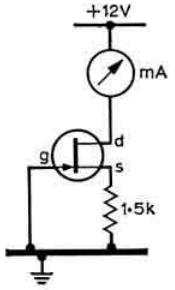



Fig 4. The test circuit for FETs

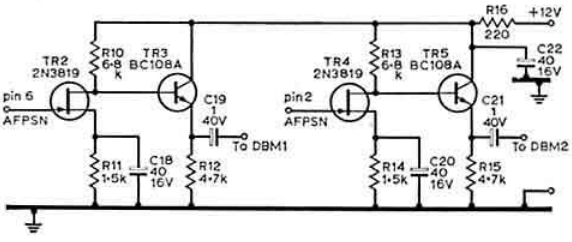



Fig 5. The voltage amplifiers

## The power-amplifier stage

The circuit is shown in Fig 7. This differs from the original [3] only because of its 12V operation. The tank coil is wound on a T–50–2 toroid and is tuned by miniature solid-dielectric 530pF variable capacitors to make the transmitter compact.

No special precautions in layout are necessary provided that inputs from the af and rf components are well separated and wiring is kept short.

## Construction

The author's transmitter was built in a small box measuring 7 by 4 by 2½in. All circuits were constructed on Veroboard. The vfo with its associated components, the balanced modulators and the voltage amplifiers are on one board. The audio amplifier and the phase-shift network are on another board. The board carrying the pa was mounted on the opposite side of the chassis, well away from the vfo and audio input.

## Setting up

Apply 12V dc to the vfo and balanced modulator board only. Ensure that the vfo is operating correctly as previously described. Calibrate the vfo for operation in the 1·8–2MHz band.

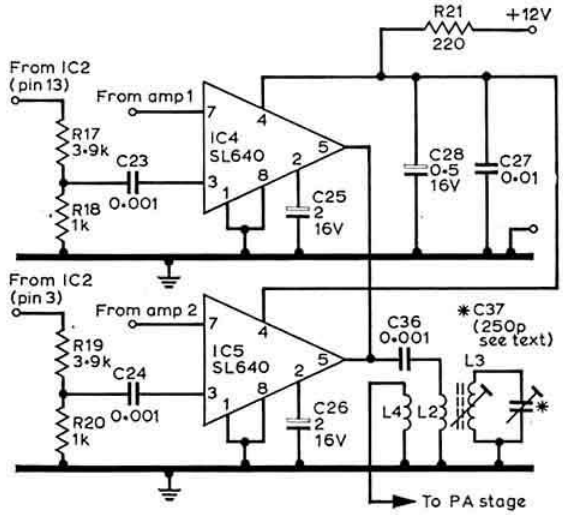



Fig 6. The double-balanced modulators

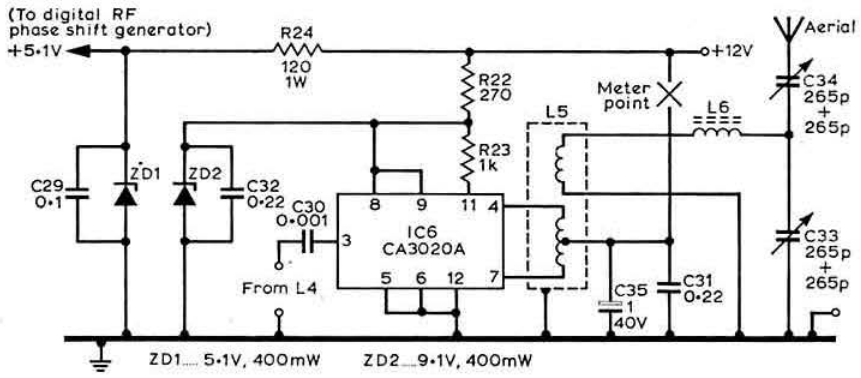



**Fig 7. The pa stage**

Connect a lead from a receiver to the pa input link winding to monitor the slight carrier leak and tune for maximum output on the receiver S-meter with C37.

Apply power to the audio amplifier and voltage amplifiers. Switch on the tone generator, increase the af gain and adjust trimpot RV2 to give ac voltages at pins 3, 7 and 1, 5 of the Spacemark psn in the ratio 2:7 respectively. Check the inputs to the balanced modulators and re-adjust RV2 to give equal ac voltages. If the FETs have been selected correctly very little re-adjustment will be required.

Monitor the rf output from the pa input link on a receiver. A strong 1kHz tone should be heard on the lf side of the weak carrier and a very much weaker tone hf of the carrier if the audio is phased correctly. If not, reverse the input connections to the voltage amplifiers and re-adjust RV2 to give equal ac inputs to the DBMs as before. Adjust RV2 to give minimum output of the unwanted upper 1kHz sideband, this corresponding to maximum output of lsb. With careful adjustment 40dB sideband suppression was achieved with carrier 50dB down on the wanted lsb at maximum output from the balanced modulators.

Switch off the tone generator. Apply ht to the pa stage with a 1W 50Ω dummy load across the output link winding. Switch on the tone generator. The quiescent current should rise from 25mA to about 150mA as RV1 is turned up, with about 1W output measured across the load.

If all is well connect up the output matching circuit and tune for maximum rf output in the normal way.

No details of change-over are given as this is a matter for personal choice. The vfo can be muted as shown in Fig 2.

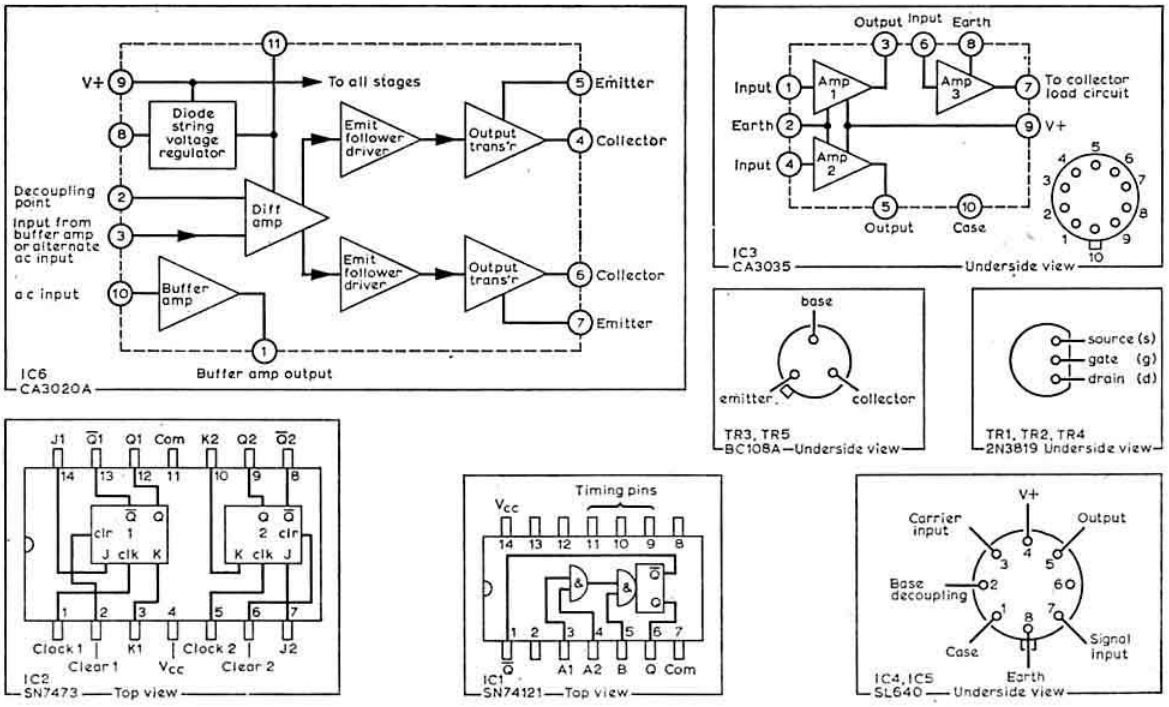



**Fig 8. Pin connections and functions**

## Components list

| | | | |
|---|---|---|---|
| **C1** | See text | **R1** | 68kΩ |
| **C2** | 220pF silver mica | **R2** | 1·2kΩ |
| **C3** | 50pF silver mica | **R3** | 470Ω |
| **C4** | 200pF silver mica | **R4** | 3·3kΩ |
| **C5** | 10pF air-spaced variable | **R5** | 150Ω |
| | | **R6** | 120kΩ |
| **C6** | 10pF ceramic | **R7, 8** | 150kΩ |
| **C7, 13, 14, 16, 23, 24, 30, 36** | 0·001μF Mylar | **R9** | 22kΩ |
| | | **R10, 13** | 6·8kΩ |
| | | **R11, 14** | 1·5kΩ |
| **C8** | 10μF 16V | **R12, 15** | 4·7kΩ |
| **C9** | 0·04μF Mylar | **R16, 21** | 220Ω |
| **C10** | 47μF 18V | **R17, 19** | 3·9kΩ |
| **C11, 12** | 1μF 16V | **R18, 20, 23** | 1kΩ |
| **C15** | 0·002μF Mylar | **R22** | 270Ω |
| **C17** | 0·01μF Mylar | All above resistors are ¼W | |
| **C18, 20, 22** | 40μF 16V | **R24** | 120Ω 1W |
| **C19, 21, 35** | 1μF 40V | **RV1** | 5kΩ log pot |
| **C25, 26** | 2μF 16V | **RV2** | 500Ω trimpot |
| **C27** | 0·01μF ceramic | **RV3** | 50kΩ preset |
| **C28** | 0·5μF 16V | | |
| **C29** | 0·1μF polyester | | |
| **C31, 32** | 0·22μF polyester | **TR1, 2, 4** | 2N3819 |
| **C33, 34** | Miniature 265 + 265pF variable solid dielectric (Ambit International) | **TR3, 5** | BC108A |
| | | **IC1** | SN74121 |
| | | **IC2** | SN7473 |
| | | **IC3** | CA3035 |
| | | **IC4, 5** | SL640 or double-balanced modulators from J. Birkett |
| **C37** | 250pF postage-stamp trimmer, see text) | **IC6** | CA3020A |

**ZD1** 5·1V 400mW zener diode
**ZD2** 9·1V 400mW zener diode
**D1** 1N914 or similar silicon diode

**L1** 27t 26swg on $\frac{7}{16}$in dia former with slug
**L2** 4t 28swg on earthy end of L3
**L3** 40t 36swg on $\frac{1}{4}$in dia former with slug
**L4** 8t 28swg on earthy end of L3
**L5** See reference [3]
**L6** 60t 28swg on T-50-2 toroid core

**T1** 4:1 interstage transformer
**Audio phase-shift network** (Spacemark Ltd)
**RFC1, RFC2** 2mH miniature iron-cored chokes
**S1** SPST switch

## Operation

The equipment has been used with an internal atu and has proved satisfactory for local contacts using a short wire loaded against a mediocre earth. Reports on speech quality, carrier and sideband suppression have been favourable. The simplicity of adjustment has convinced the author that there is a future for phasing rigs and that the principles could be extended to other bands.

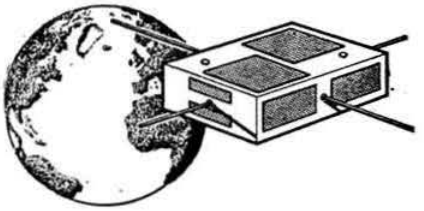

## Acknowledgements

The author wishes to thank G3HTI for reading and correcting the script and G3YOM for advice on the pa stage.


## References


[1] "Single-sideband suppressed-carrier operation", A. J. Turner, *Wireless World* September 1973, pp453–455.
[2] "Technical Topics", *Radio Communication* December 1971, p842.
[3] "160m ssb transceiver for portable operation", K. S. Beddoe, G3YOM, *Radio Communication* October 1973, pp686–689. □


# OSCAR NEWS



## Operating schedules

**Oscar 6.** Evenings: Monday, Thursday, Saturday. Morning: Sunday. Period: 114·994min. Increment: 28·74° per orbit.
**Oscar 7.** Even days of the year, mode B; odd days of the year, mode A. Wednesdays: experimental use only. Period: 114·944min. Increment: 28·73° per orbit.

## Oscar nets

| | Time (ut) | Frequency (MHz) | Control |
|---|---|---|---|
| Sundays | 0915 | 3·780 | G3RWL |
| | 1000 | 7·060 | G3RWL |
| | 1830 | 144·280 | G8CSI |
| | 1800 | 14·280 | W3ZM and others (international net). |

## Oscar tests

With the agreement of AMSAT, the Hungarian Radio Amateur Society will carry out satellite home-sound broadcast tests as follows:

| Date | Satellite | Orbit No | Time (ut) | Mode |
|---|---|---|---|---|
| **Using A3H (ssb with full carrier)** | | | | |
| 5 October | Oscar 6 | 13,582 | 0800-0810 | |
| 8 October | Oscar 7 | 4,092 | 0810-0820 | A |
| 8 October | Oscar 7 | 4,098 | 1915-1925 | A |
| **Using fm** | | | | |
| 15 October | Oscar 7 | 4,180 | 0845-0855 | B |
| 15 October | Oscar 7 | 4,185 | 1756-1806 | B |

The ground transmitter is located at the Technical University of Budapest and uses the call HG5BME. The radiated transmission will include the callsign and the objects of the tests, and the frequencies used will be in the centre of the telephony portion of the satellite bands.

Reports are requested, including tape recordings, and will be confirmed by QSL card. They should be sent to Dr A. Gschwindt, HG5BME, Radio Club of the Technical University of Budapest, Goldman Gyorgy 3, H-1111 Budapest, Hungary.

## Orbit predictions

A computer listing suitable for both Oscar 6 and 7 is now available from WB5CBC. This consists of a print-out generated for the user's QTH and showing time, azimuth angle, elevation angle and range, all at 1min intervals. A complete table is printed out for every possible equatorial crossing at increments of 1°. The complete document has between 60 and 110 pages with 66 lines per page. The only external information needed to make use of the print-out is the time and longitude crossing of a reference orbit.

The following information is required for a print-out to be prepared: name and mailing address; location for which the print-out is desired (if less than 10,000 population, state latitude and longitude). This should be sent with a remittance of $3.25 for surface mail or $4.50 for airmail to W. Johnston, WB5CBC, 1808 Pomona Drive, Las Cruces, New Mexico 88001, USA. □

# A wavemeter for vhf and uhf

W. H. BOND, G3XGP*

WHILE at the lower end of the amateur spectrum of frequencies there are very many simple ways of determining one's operating frequency and the presence of harmonics (including the use of an absorption wavemeter, gdo and frequency meter), on vhf and especially uhf this measurement becomes increasingly difficult. A pre-scaler for the frequency meter is expensive especially if the 70cm band is to be covered, and generally frequency is determined by accurate determination of the crystal frequency and subsequent multiplier chain, using lower-frequency techniques; by an accurately-calibrated receiver and interpolation from beacons; or by microscopic measurement of the length of a Lecher wire at resonance. Only the Lecher wire is capable of giving accurate measurements of the fundamental frequency and harmonics—unless a spectrum analyser is available. The object of this article is to draw attention to a simple instrument, which, though difficult to construct, reveals with the minimum of additional instruments and with reasonable accuracy by dead-reckoning methods not only the operating frequency but also the presence of other components to a frequency of well over 1GHz.

The instrument is a tunable $\lambda/4$ line, more familiarly known as a stub. At resonance this represents a very high impedance to the applied frequency, and a very low impedance to harmonics except the odd harmonics. If this stub is fed by a suitable coupling, and the voltage developed is measured via another coupling, then as the resonant frequency is varied a sharp rise in voltage will be shown at points of resonance. The variation in resonance is obtained by altering the length of the inner conductor, and the voltage across the stub in the output link is measured on a suitable high-impedance fet or valve voltmeter, or a dc-connected oscilloscope, though even a 20kΩ/V meter may be used. If the length of the inner conductor is accurately known, 2,952 divided by this length in inches gives the resonant frequency in megahertz. The input and output impedances with the recommended dimensions approximate to 75Ω and in an emergency may be used as a filter to eliminate the second harmonic, though odd harmonics will get through.

## Description

This is detailed in Fig 1. The outer tube has a nominal diameter of 1in and is 23in long. The internal conductor is 24in long with ¼in external diameter. It slides in a 1in bush, bored to clearance fit, the distal end being supported by a star-shaped piece of Perspex sliding in the outer tube. At the end nearest the bush, coaxial sockets are fixed on the outer tube as close as is practical with small identical coupling loops, the length of which is not very material. The

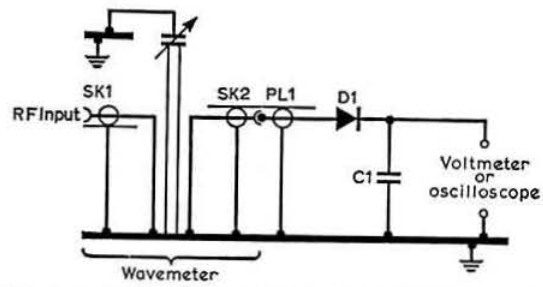



**Fig 1. Circuit diagram of the wavemeter. The vhf diode is an HP5280 and the bypass capacitor a 1,000pF Mullard Hi-K ceramic**

coaxial plug on the output contains a Schottky barrier diode and a tiny bypass capacitor. The inner conductor is calibrated in inches with ⅛in subdivisions.

## Construction

While this unit can be made on the kitchen table, workshop facilities make construction very much easier, and there are few radio clubs without an amateur owning a small lathe who is willing to help. Start with the bush, which should be turned down to a tight push-fit in the copper tube, using a piece of round brass of about 1½in length by 1¼in diameter, and leaving a flange 1⅛in diameter by $\frac{1}{16}$in so that just 1in of the bush projects into the outer tube. The bush is now bored with a C or D drill, depending on the exact diameter of the inner conductor, and reamered to an exact sliding fit on the conductor: the closer this fit is the better, for with care the need for a Perspex support at the far end is avoidable, with considerable improvement in the accuracy of the meter. However, even with simple equipment, a loose fit in the bush and a Perspex support, results will be adequate for most purposes.

Having prepared the tube, the bush and the inner conductor, the mounting of the coaxial sockets and the input and output loops must next be tackled. The length of the loops is not critical, but the shorter they are the higher the frequency to which the meter operates, so the sockets should be mounted as close to the bush as practical. Although the tube may be very thin it is possible to drill it with a No 44 drill and tap it 6BA. This is the simplest way of mounting the sockets, but care is required. Alternatively, a 6BA clearance drill No 33 may be used and the sockets secured by nut and bolt. In either case the centre pin of the socket must be shortened to ⅛in. In the prototype, lengths of wire were soldered to the centre pin, these wires being inserted through holes bored in the bush and finally soldered in place. On the other hand, if nut-and-bolt techniques are used, the centre pin and the outer tube should be connected by a ⅛in length of wire or even a solder tag. The length of these loops is not important where the primary purpose of the unit is frequency recognition, but they should be about 2in if the unit is to be used as a high-$Q$ break.

The next step is to clean the tube for a distance of 1in with fine emery paper and cover this area with flux. Heat the bush in a blowlamp (the Ronson Blow Torch is excellent for this purpose) and thinly tin the bush. Before the heated bush is inserted in the tube, insert thermosetting plugs into the sockets to prevent distortion and wrap the coaxial plug area in a wet flannel. Now insert the bush and sweat it in, running

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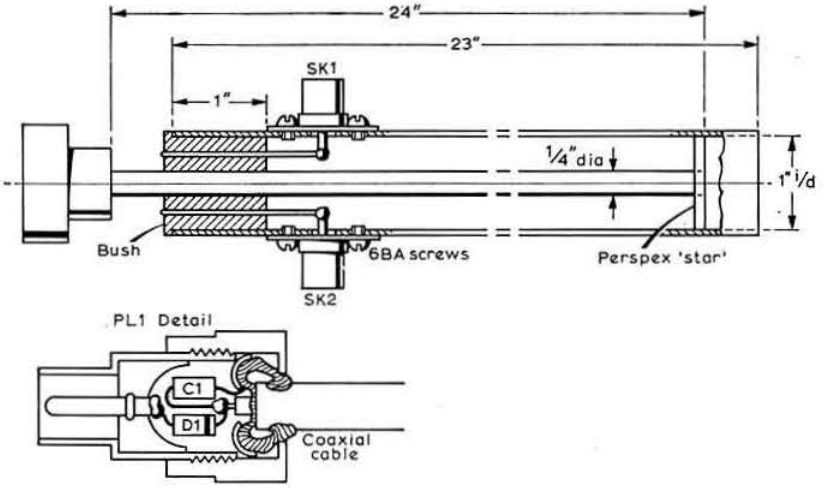



**Fig 2. Constructional details of the wavemeter and coaxial plug**

solder in under the flange but making sure that the socket area is kept as cool as possible, for the plastic in these sockets melts only too easily. Allow the unit to cool, insert the centre conductor and attach a suitable knob to complete the wavemeter.

Now calibrate the internal length of the inner conductor using suitable file marks and punch dots. For the highest possible frequency response the Schottky diode and bypass capacitor must be fitted inside the coaxial plug in the output leading to the voltage meter or the oscilloscope. Lead lengths of both diode and capacitor must be as short as practical, and the smallest possible capacitor used, the earthy lead of the capacitor being trapped with the outer braid of the coaxial lead to the meter: Fig 2.

## Usage and calibration

Calibration with a very minor error is possible, especially if no support at the far end is required, using the formula 2,952 divided by the length of the internal conductor in inches to give the frequency in megahertz. It is understood that the Post Office offers a calibration service for these devices and others for those who require total accuracy, so this unit becomes valuable well into the gigahertz region. The Schottky diodes recommended have a response to well above 10GHz and furthermore have a reverse breakdown voltage of 70V so that damage to the diode is very unlikely indeed, even with powers at the legal limit.

In use, the output from the wavemeter should be connected to high-impedance voltage-recording equipment (either an oscilloscope or voltmeter), the higher the input impedance and detectable frequency the better. The input is linked to the 2m pa tank coil or any other suitable point by a single-turn loop—the transmitter or other device must be loaded by a suitable aerial or dummy load.

Starting with the inner conductor fully introduced, corresponding to a resonant frequency of about 100MHz, slowly withdraw the inner conductor. As the length of the inner conductor comes down to 20·5in the voltage on the output will begin to rise, reaching a peak at the transmitted frequency; make a note of this reading for this is the fundamental against which harmonics and spurii are measured. Slowly withdraw the inner conductor further, and as other frequencies appear they will be shown by a rise in voltage on the output, which should be measured by suitable adjustment of the range of the meter used and related to the fundamental frequency either by ABAC nomograms or by the formula: change (dB) = 20 log $V_1$/20 log $V_2$. These other frequencies may be defined by reference to the length of the inner conductor provided by previous calibration and using the formula suggested.

The author has found this instrument quite invaluable, and of greater merit than simple spectrum analysers in determining the harmonic component of a transmitter. It is not pretended that it supersedes the Lecher wire, but it is a much more compact bench instrument which is easily manipulated and which readily reveals the presence of unwanted frequencies. It should not be used as the only load for a transmitter if the output is not to be rapidly destroyed, and should only be used with a pick-up loop, although in an emergency and if accurately resonated it may be used as a filter to eliminate even harmonics. Properly constructed, ie with the correct siting of the input and output loops and the shortest practical inner-conductor length, it will resonate to 2·0GHz and will give all the answers provided by a considerably more expensive spectrum analyser. Construction, it is admitted, is not easy, but once made it becomes a quite invaluable part of one's equipment and is an essential for every vhf and uhf experimenter's shack. □

## INTERFERENCE

**The principles agreed between the RSGB and the Post Office—and published in the May 1975 issue of *Radio Communication*—on the investigation of cases of interference continue to be the basis of agreement with the Directorate of Radio Technology of the Home Office.**

**Members are advised that instructions to close down while a case is dealt with are to be given *in writing* by the authorized officer and are operative from the day on which the instructions are first received, notwithstanding that they are given verbally. Members are asked to advise the Society if written confirmation is not forthcoming, so that the matter may be taken up on their behalf.**

# TECHNICAL TOPICS

by PAT HAWKER, G3VA

THIS month we plunge straight into a varied selection of topics—the dominant theme being the traditional one of how to get good performance at reasonably low cost; plus a subsidiary concern with what can be done with the latest semiconductor devices to appear on the market.

## Commercial vhf trends

An article in *Electronic Design* (21 June 1975) surveys the land-mobile radio designs now current in the USA, underlining trends which are equally of interest to the amateur, both for fixed and mobile operation. Among the trends highlighted are:

Frequency stability improving over the past 20 years from about 100 parts/million to around 2ppm (0·0002 per cent), representing rather better than 300Hz at 144MHz.

Receiver selectivity improving from about −60dB at ±120kHz to around −100dB at ±30kHz, but without affecting voice bandwidth characteristics.

Receiver spurious products typically dropping from −20dB to −100dB and the number of spurii almost halved by moving from double to single conversion.

The use of five or more high-Q circuits—miniature-cavity filters—combined with the use of FETs in front-ends providing basic receiver intermodulation rejection figures of 80dB compared with 60dB a decade ago. Even greater ip attenuation is sometimes obtained at base stations by using large-cavity filters or quartz-crystal filters at the *inputs* to receivers. Transmitter-generated IPs may be reduced by use of cavity filters and ferrite circulators.

Performance of hand-held and portable units may now approach that of vehicle-mounted units except for the lower power outputs. Solid-state mobile units are now marketed with up to 110W output. An 18oz hand-held fm unit provides 5W output at vhf (frequency stability 0·0005 per cent using temperature-compensated crystal modules).

While the requirements of commercial and amateur stations are by no means identical, all these trends, with their important improvements to dynamic range, are worthy of consideration by amateurs as well as professionals.

## 144MHz converter by PA0GVK

Some useful-looking ideas turn up in a general-purpose converter for 144MHz described by G. J. H. van Kleef, PA0GVK, in *Electron* (August 1975) and featuring a two-transistor oscillator chain and a double-balanced mixer using four HP2800 hot-carrier (Schottky) diodes: Fig 1. While the noise factor could undoubtedly be improved by adding an rf stage, if this is done some care should be taken not to nullify the good dynamic range of the unit.

The Butler overtone oscillator circuit uses a 4·6MHz crystal working on its fifth overtone (23MHz) which is then multiplied up using the second transistor of the Butler circuit. The i.f. of 6 to 8MHz was selected by PA0GVK to suit the bandspread on his main receiver but the oscillator chain could be adapted for other i.f. ranges. Although the unit is described as a "simple converter" one has the impression that some care will be needed in construction and setting up. Winding details of trifilar toroidal transformers for double-balanced diode mixers have been given many times elsewhere (eg *Amateur Radio Techniques*) but it is known that many constructors tend to ignore or get wrong the winding and connection of this component, so take care.

## G3OTK vlf balanced mixer for ssb generation

Previous items on the G3OTK phasing-type vlf ssb generator with filtered output on 10·7MHz (phasing network, *TT* March 1975; general outline *TT* June, 1975) have provided virtually all the information needed to build one of these low-cost exciters, with the exception of the low-frequency balanced ic mixers which require no external trimming to achieve good carrier suppression. As mentioned in June, basic details of this stage were due to be published elsewhere,

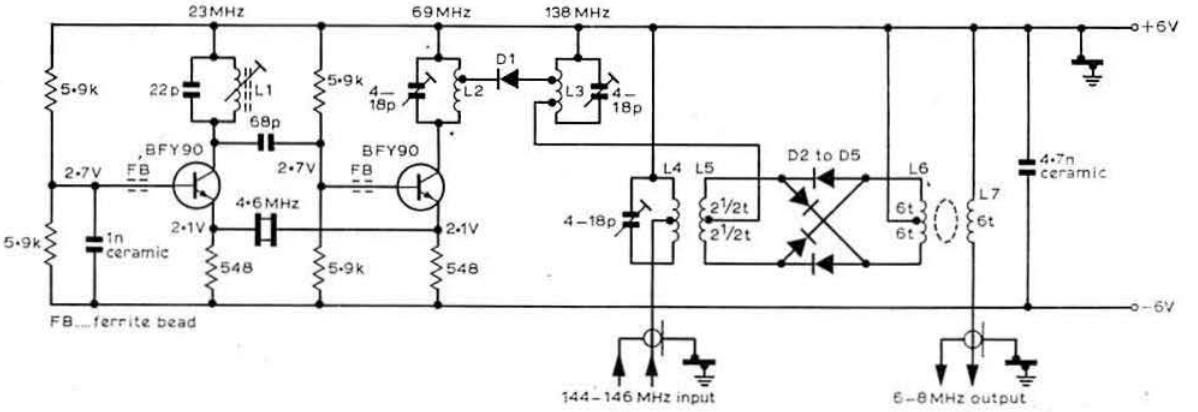



**Fig 1. 144MHz converter described by PA0GVK in *Electron*. L1 to resonate at 23MHz; L2 8 turns, 5mm diameter, 20mm long with tap at 1½ turns; L3 5 turns, 5mm diameter, 16mm long with taps at 1½ and 2½ turns; L4 and L5 5 turns, 5mm dia, 10mm centre tapped; L6 and L7 6 turns, trifilar wound on 6mm toroid. D1 to D5 hot-carrier diodes type HP2800. Voltages shown on diagram are with oscillator working**

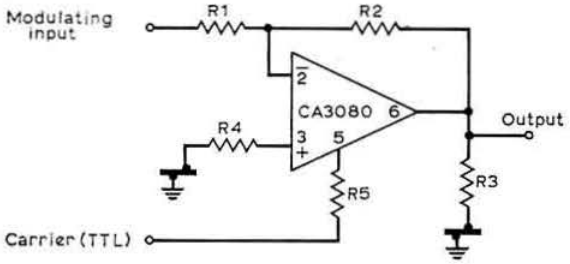



**Fig 2. Basic vlf double-balanced mixer as used by G3OTK**

and can in fact now be found on page 11 of *Electronic Engineering*, August 1975.

This means that it is now possible to provide here a brief outline of its operation together with a detailed diagram of how it fits into the scheme of things, together with first mention of a useful bonus for cw operation. The exciter has been in use for several months as the heart of a 1·8MHz transmitter operated as a fixed and portable station by J. H. Stock, G3PKS, and the object of many encouraging reports. Since no sharp top-cut filter is fitted, the quality of this transmitter is not the standard "communications" quality associated with ssb transmitters (but note that filters are recommended on crowded bands to minimize bandwidth) and as a result more than one report has included the highest praise that can be given to ssb: "it sounds just like a.m."!

With reference to Fig 2, the operation of the mixer can be summarized as follows: when no bias current flows into pin 5 of the CA3080 operational transconductance amplifier, that is to say the carrier is at a ttl logic zero, all pins appear as open circuits and the output is simply an attenuated version of the input. But when bias current flows, ie the carrier is at a ttl logic "one", the circuit operation becomes that of an inverting amplifier although calculation of the output voltage is complicated by the current drive nature of the output of the amplifier. This kind of operation, G3OTK points out, switching between inverting and non-inverting is just what is required for a double-balanced mixer.

Carrier balance is inherent, being chiefly dependent upon amplifier offsets; in practice it is about 45dB down on peak output. It should be noted that while conventional ic mixers may have *typical* values of 40dB carrier suppression, the guaranteed figure is often less than 20dB so that trimming potentiometers must normally be included in any design. Conventional ic mixers also have a spread in conversion gain in the region of 2 to 1; this means that in a phasing exciter, and more particularly in a third-method exciter, careful balancing is needed when the mixer outputs are summed. The CA3080 is no exception and has a wide spread in characteristics; but in this case affecting the mutual conductance between input and output. In the mixer circuit shown, the use of feedback reduces the conversion gain spread to about ±0·2dB so that it is hardly necessary to balance the mixer gains.

G3OTK adds that when the circuit was devised he felt that he understood its operation fully; but it was not until he keyed the carrier insertion for cw operation (see Fig 3) that he discovered a bonus in the form of inherent shaping of the rise and fall times of the keyed output due to the charging of the coupling capacitor by the carrier insertion current. The

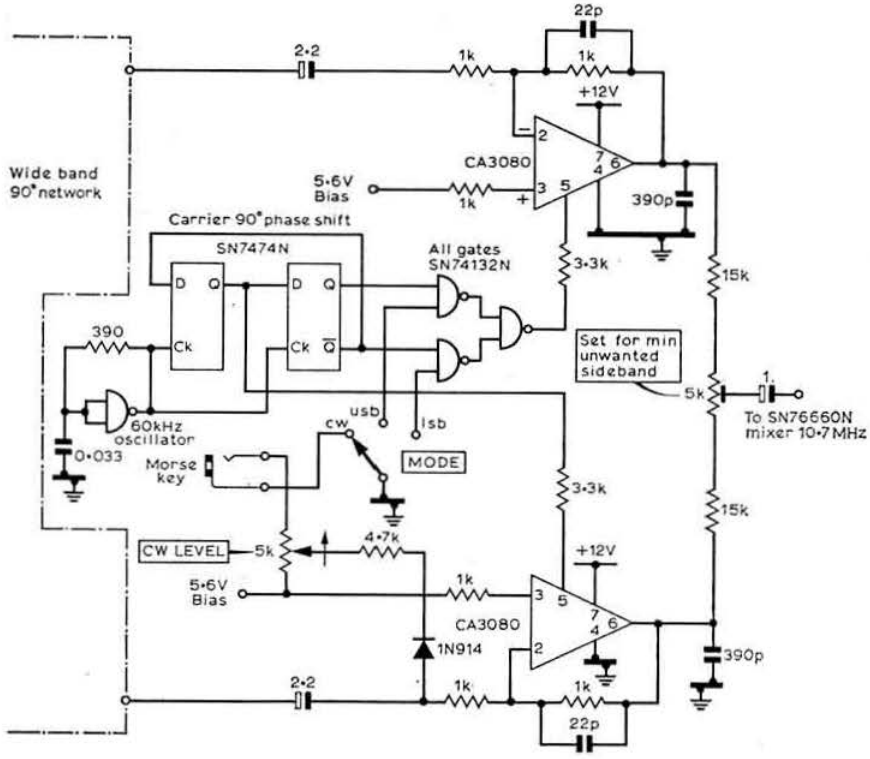



**Fig 3. Details of how the two double-balanced mixers are used in the 15kHz phasing-type ssb generator showing mode selection**

degree of shaping can be adjusted by changing the coupling capacitor value.

## Extreme low-angle sites

A number of times, over the years, we have referred to the growing interest in extreme low-angle radiation on hf—right down to about 1°, far below the 8–10° that is normally regarded as about the lowest vertical radiation angle which is likely to be achieved from land sites. Some of these notes can be found in *Amateur Radio Techniques*, including the suggestions that have been put forward that significant radiation and reception at such low angles might result in much greater ability to work at frequencies well above the classical muf and also to avoid many of the worst effects of normal ionospheric disturbances. Of course this is largely speculation and many amateurs would be very satisfied if they could get down to the 5–10° level.

It is normally accepted that significant radiation at very low angles (forget those radiation patterns drawn over perfect earth!) can be achieved only by: (a) using the sea as a ground plane in conjunction with vertically-polarized aerials; (b) using similar aerials in conjunction with very large ground mats (for example one Australian array used some 25 miles of wire in an earth mat for just one sector or direction); and (c) very high aerials at sites several thousands of feet above sea level.

Then in April 1970 in *Wireless World* Les Moxon, G6XN, reported that by very carefully choosing sites with sloping ground reaching down to the sea or alternatively with specified conditions to break up the Fresnel zones he was able with portable 1W ssb equipment, and using modest inverted-V dipoles with a maximum height of only 20 to 25ft, consistently to work Australia, the result of utilizing radiation angles which were probably between 5 and 10° or less.

Aspects of this technique turn up again in a short paper "Radar and communications antenna-siting for low-angle radiation at high frequencies" by H. G. Booker and Cullen M. Crain (*IEEE Trans on Ant & Prop*, July 1975), though it seems a pity that no acknowledgement is made to the prior work of G6XN. The abstract of this new paper is as follows:

"It is sometimes assumed that, in order to obtain good low-angle radio transmission and reception at hf, one must use vertical polarization and have an extensive horizontal highly-conducting foreground, such as an ocean surface or an enormous ground screen. It is shown that, in the absence of such a surface, use may be made of inland sites having a sloping foreground combined with distant level terrain. The latter can be a fresh-water surface. The angle of slope of inland sites should be about four times the minimum angle of elevation for which coverage is required. Coverage down to 1° therefore requires a slope of about 1 in 14. At a wavelength of 15m, an aerial with a phase centre about 30m above the local terrain must be erected about 1·5km up the slope from the location where the terrain becomes level. The sloping and local level terrain must be flat to an accuracy of better than about 20m, and the level terrain, or fresh-water surface, must extend to a distance of about 15km. All linear proportions scale proportionately to the wavelength."

The paper notes that a fresh-water lake is not a direct substitute for sea water as its conductivity is much lower, but that it can be used in this application. At these special sites, both vertical and horizontal polarization may be used, so that they constitute perhaps the *only* way of achieving really low vertical angles without sea water plus vertical polarization, or very high sites.

## D-mos dual-gate FETs

We have referred before to the double-diffusion or d-mos technology which provides fet devices capable of good operation in the vhf region, combining bipolar speed and noise figures with mos linearity and input leakage.

One of the few firms making these devices—Signetics—has recently announced two new dual-gate devices, the SD306 and SD305, specifically intended for the front-ends of vhf receivers and converters. The SD306 provides 20dB power gain as an rf amplifier at 200MHz with a claimed noise figure of 2·8dB. The makers say that the cross-modulation performance is superior to conventional dual-gate mosfet devices and small-signal bipolar transistors, with 480mV of interfering signal having to be applied at gate 1 for one per cent distortion. The SD305 is a mixer, providing a typical conversion gain of 17dB at 200MHz. With rf and oscillator signals fed to separate gates, with both similarly biased, there is some 20dB isolation between the two gates. Both devices have an agc range of about 50dB at 200MHz.

If the maker's performance figures can be achieved, these devices should be useful for a modern front-end. The quoted 100-up price in the USA is 70c, so that even allowing for the difference in small quantities, exchange rates, VAT and everything else, the cost should not be prohibitive.

Incidentally an experimental gallium-arsenide fet device made at the Institut für Halbleitertechnik in Aachen, West Germany, provides 10W output at 18GHz!

## TTL oscillator

A free-running, adjustable square-wave RC generator can be constructed from three of the four gates of an SN7403 device according to a short item by S. V. Kartalopoulos in *Electronic Design* 12, 7 June 1975. The repetition rate can cover from a few hertz up to over 1MHz with rise and fall times of the pulses measured in nanoseconds. The open-collector gate is capable of directly driving a small loudspeaker of the type used in pocket transistor radios (or can be used to drive a light-emitting diode when this is connected in series with a suitable resistor of about 220Ω). Fig 5(a) shows a possible application as a low-cost square-wave test generator or (b) as a circuit tester. It can be used with minor modifications as a code-practice oscillator.

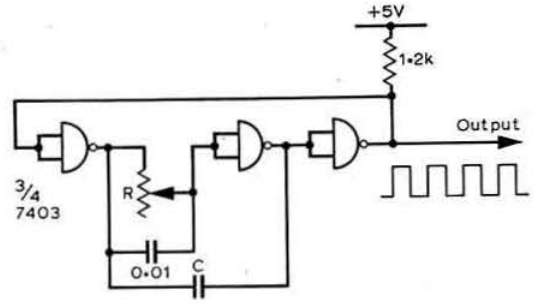



**Fig 4. How three gates of an SN7403 integrated circuit can be used to form a free-running, adjustable square-wave generator**

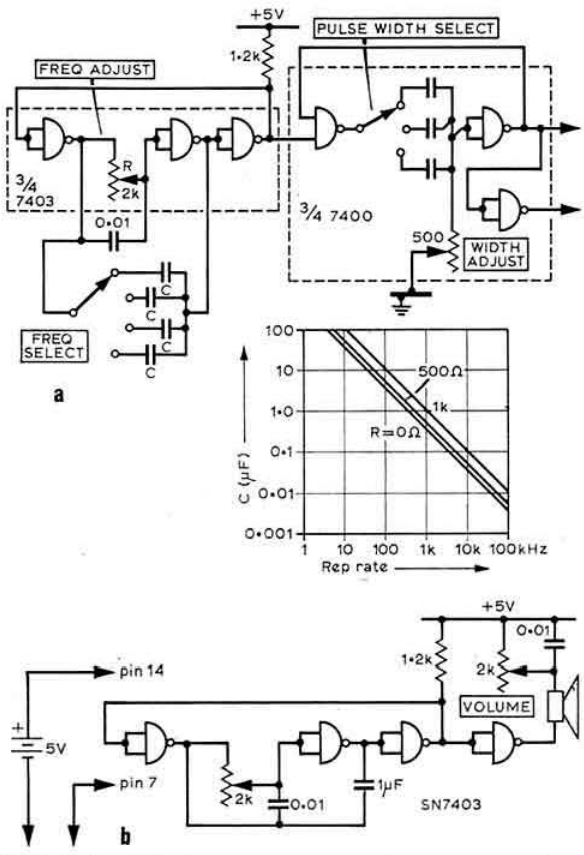



**Fig 5. (a) A practical square-wave generator can cover a 4:1 range with a variable resistor (R) of 2kΩ value. Frequencies from less than 1kHz to over 1MHz are obtained by changes in the value of the capacitor C. (b) An arrangement using the generator as a circuit tester**

## Variable-voltage power supplies

John Roscoe, G4QK, is wryly amused that each time the idea of a variable power supply using tetrode or triode power valves in combined regulator/rectifier arrangements turns up, it gets progressively more complicated and expensive. He is particularly puzzled at the "refinements" in the PA0DXR circuit (*TT* July 1975) as he can see no advantage over the various arrangements described in *Amateur Radio Techniques* (5th edition pp208, 209 and 215).

Why, he asks, run the valve as a tetrode rather than triode-connected? Why dc on grid 2? Why extra smoothing on grid 1? With so many diodes, he points out, you could run the valve as a conventional series-dropping regulator.

"As far as I am concerned it started with a pair of KT63s from a damaged pre-war 5in television set: about 1949 and published in *Short Wave Magazine*. Later it turned up in *Wireless World* with a separate rectifier for the grid 1 supply, giving a sharper cut-off."

Perhaps PA0DXR just cannot bring himself to apply ac and rac to the electrodes of his QQE-06/40. But it is nice to have this confirmation that you can save money by consulting *ART*!

## Matched tuning diodes

William Poel, of Ambit, draws attention to two new Motorola varicaps, types MVAM1 and MVAM2, which are designed to provide the wide capacitance variation with close tracking needed to tune medium-wave broadcast receivers. The MVAM1 has three sections for oscillator, mixer, rf stage, matched within $\pm 1\frac{1}{2}$ per cent over the entire *C-V* curve. With suitable biasing a tuning range of the order of 20 to 500pF is possible. The MVAM2 has two sections to a slightly lower specification.

Although intended primarily for mf applications he has found they work happily to about 29MHz and suggests they should find many amateur applications in electronic tuning and pre-set tuning of receivers, synthesizer or heterodyne VFOs, tunable i.f. strips and the like, liberating the constructor from many of the problems of mechanical tuning.

In his belief that *TT* readers can help get these devices better known, he is prepared to return their money (less postage and packing) to the first 10 customers for an MVAM2 who state their intended application and mention *TT*. Normal cost for one-offs is MVAM2 £1.05; MVAM1 £2.75. Write to him at Ambit, 37 High Street, Brentwood, Essex CM14 4RH. And if the idea is novel and works well, do not forget to let *TT* readers know about it!

## More on the PALO

Last month's notes on G3ULR's PAL delay line oscillators were written before I had the chance to check out the prototype oscillator with an 8-digit frequency counter built by Ian Lever, G8CPJ. These tests resulted in several encouraging conclusions and observations.:

(1) Short-term stability, checked at the low-frequency end of the range, is of a very high order, typically better than 1Hz over 5min, achieved on a unit having no form of temperature compensation and not specially constructed to achieve high stability.

(2) When the oscillator unit is keyed, there is for a given ambient temperature a keying stability which appears to be of the order of 10Hz or better, shifting by about 50Hz or so when the key is held down for some minutes. The keying characteristics seem extremely good, without the distinctive build-up lag of a crystal and with no detectable chirp.

(3) Long-term stability, in the sense of checking the frequency when switching on for short periods over a matter of some days, seems to be better than about 0·25kHz and is almost certainly directly related to temperature changes.

It must be appreciated that no claim is made that the above represents a full appraisal of the oscillator under all conditions of "pulling" but it does indicate the sort of results that can be achieved even without compensation. There are, as we indicated last month, still some problems involving the elimination (or minimization) of channel jumping, and it has also been found that under some circumstances there is output on more than one channel simultaneously, with one or other channel dominant. It is also clear that on some frequencies "jumping" or the production of a comb of frequencies is very unlikely. G3ULR has in fact carried out a good deal of investigation into the whys and wherefores of this problem. Altogether this seems a most promising development, with at least a possibility that it may lead to simple variable oscillators as good as, or possibly in many ways better than, a run-of-the-mill crystal oscillator. The possibilities for hf and vhf applications seem very bright. □

# FOUR-TWO-SEVENTY

by MARTIN DANN, G3NHE*

## DX news

Jon Krestin, G8JZD, of London, is keeping his fingers crossed in the hope that the Bulgarian station he worked on 2m ssb on 27 July is genuine. At 2217gmt he established contact with LZ2RA in Varna (ND51g) on the coast of the Black Sea. Reports were 56 out and 52 in, the signal peaking with the beam in the expected south-easterly direction. The band at the time was open to Scandinavia, but nevertheless Jon heard several other G stations calling and working the LZ, although all at modest signal levels.

G8JZW runs a much-modified Liner 2 into a 5-el beam 40ft above the ground, and it would seem that his 350ft asl location is a good one, having produced 14 countries for Jon in his first six weeks on the band. He now anxiously awaits the arrival of a QSL card from Bulgaria!

At the time of writing, the G3XDY/G3ZSS/G4CVI Scottish trip has run into generator problems, as well as having the weather and conditions turn sour on them. However, the early part of their trip produced good signals from the expedition on 2m, 4m and 70cm.

GM8BKE reports that SK6AB is keen to work stations in GM and G on 70cm, and is usually on 432·15MHz after 2300gmt. SK6AB normally runs 600W of ssb into *eight* 46-el Multibeams on top of a five-storey block of flats in Göteburg, although during the July contest when they were worked by many UK stations on 70cm they were only running 20W.

Chris is himself keen to work more G stations on 70cm, and would be happy to arrange skeds between 2200 and 2300gmt on 432·16MHz ssb. He has already had several contacts with G3BW in Cumbria and has heard G8EPG in Sheffield, so it looks as though the path from Glasgow to G is feasible.

GC3YIZ is delighted to report on a couple of meteor scatter successes during the Perseids shower at the beginning of August. The first was with DK6ASA on 12 August, and reports exchanged were 26 out and 28 in.The following day brought a contact with SM7FJE (26 out, 27 in) and both contacts took place half an hour either side of midnight.

We were pleased to hear that GM3JFG is active again on 2m from his new QTH in Ross and Cromarty. In company with other far northern GMs, he monitors the cw calling channel, 144·05MHz, nightly around 2130. Also active, this time on ssb, is GM3PIL from the rare county of Nairn, and his favoured frequency is 144·218MHz.

## Four metres

G4CDF of Scunthorpe is a welcome newcomer to 4m, and despite starting with only 400mW of ssb/cw to a 2-el quad, has already been having considerable success. Taking full advantage of the good conditions at the end of August, Mike worked as far as GM3JNW in Duns, and in the opposite direction made it with G3LVP in Benfleet.

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

GM3JNW has been giving several stations Berwickshire contacts on 70MHz, using a borrowed Europa to a 4-el beam, and it is hoped that Harry's excursion on to this band will be more than just a temporary one.

When beaming north it is worth checking 70·26 and 70·32MHz carefully for cw from GM4CXP near Kelso. Derrick runs 50W to a crystal-controlled tx on those frequencies, and is keen to work stations south of the border. He is active on Sunday mornings, as well as most evenings during the week.

G3VVT in Kendal in the Lake District has experienced several cases of tvi to uhf tv sets while using 4m, and in all these cases the trouble has seemed to be associated with rf getting into the set via the coaxial braid. A simple braid-breaker proved to be the answer, and Bob hopes that this solution might prove similarly helpful to others suffering similar problems.

## Two metres

Gordon Morse, GM8EIR, tells of an unusual opening on 2m on the night of 11 August. The band suddenly opened up at 1930gmt, staying that way until after midnight, during weather and barometric conditions not normally associated with good tropospheric propagation. Gordon noted the total lack of QSB on all signals and the very limited coverage of the opening, being between locator squares YQ, YP and ZP in Scotland, and squares CM, CN, DM, DN, EM and EN across the North Sea. The lift appeared to catch most people unawares, and GM8EIR reports that only a handful of stations in the Dundee area were active. He feels that not enough study is made of this type of ducting, and thinks that many amateurs would like to know more about the causes of such phenomena.

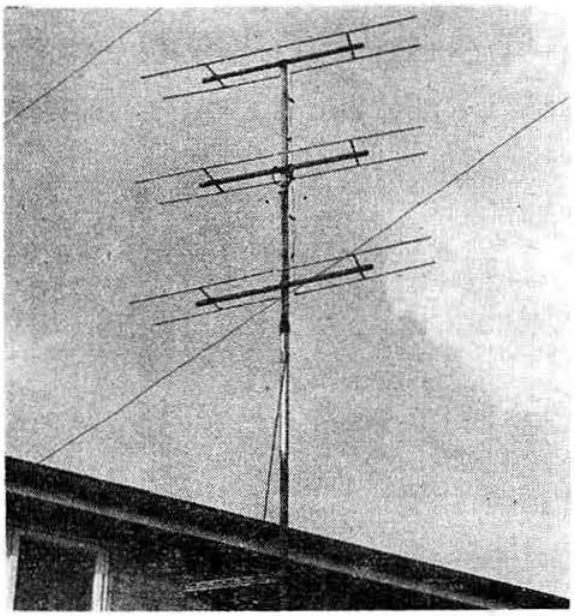
Those who are confined to the use of modest equipment might be interested to learn that during the opening on 11 August GM8EIR worked 12 Dutch and five German stations with just 8W of a.m. to an 8-el Yagi.

G5BM of Marshfield in Avon was among those who had a good deal of success during the July lifts on 2m, but he wishes more stations who are able would make use of cw.

## The German scene

Stuart Phillips, G8HQA, is currently residing in West Germany near Munchen Gladbach (QRA DL62c) using the call DA4BM, and he sends us his views on the use of 2m in DL. Stuart finds that activity is very high, rather as though there was a contest taking place all day every day. The popularity of fm in that country is a natural consequence of the large number of repeaters on the band, few of which have time limits or require tones every time access is required. Despite this, Stuart finds that the six repeaters he can work through under normal conditions are generally well and sensibly used.

DA4BM also finds that ssb activity is high in West Germany, and it is noticeable that operation is spread evenly between 144·25MHz and 144·45MHz; German amateurs find



**The home-built 12-el colinear stack 2m beam of G5BM. The 300Ω open wire line between the elements is matched to the 80Ω coaxial feeder by a 4 :1 balun**

it difficult to understand the odd compulsion UK amateurs have to cluster round a calling channel.

Stuart would like it to be known that he and DC9KU (near Aachen, QRA DK11b) are looking towards the UK every night at 10pm for at least 15min, usually longer. The frequency used is around 144·26MHz, allowing for QRM, and at least one station is active without fail. So far they have made contact with at least one UK station every night, and Stuart mentions G8BQX and G4CDN as two stations always audible over there. Both the German stations are happy to QSL, and cards for DA4BM can go either via DARC or via G8HQA, marked for DA4BM.

## FM channel

Victor Budas, GM3VTB, has instigated a 70cm fm group which has resulted in an upsurge of activity on this band in the Glasgow area. There are several base stations and numerous hand-portables all on 433·2MHz simplex, and a listening watch will be kept on this frequency especially for mobile stations.

Since the publication of the *GB3LO Without Tears* information sheet, several new facilities have been added to the London repeater, and a supplement (provisionally entitled *GB3LO, What You Hear and Why*) should be available by the time this appears. It can be obtained by sending a large sae plus 7p to Richard Street, UK FM Group (London), Code 12, 3 White Ledges, London W13 8JB. Copies of *GB3LO Without Tears* are still available, price 5p, from the same address, marking the envelope code 11 (or code 23 if both publications are required).

Probably the only active /MM 2m station off the east coast, G2BCX/MM operates 10W of vfo-controlled fm between Lowestoft and Caister about every three weeks throughout the year. Fred finds that he is able to work down into Kent and Essex under normal conditions, and has worked seven European countries direct. He has also worked through three German, two Danish, the London and the Malvern repeaters. The gear used from the boat, which is a Frith 2, is an IC210 with preamp and a 3-el colinear aerial.

The West Suffolk FM Group have submitted proposals to the RSGB for a 70cm fm repeater to cover the west Suffolk/north-east Essex area. The callsign GB3WS is tentatively suggested and attempts are being made to secure a site in Sudbury.

Despite the setback of the Home Office decision to reject the Kent repeater proposal, the Kent Repeater Group has decided to press on with the project, while urging the RSGB to press for a reconsideration of this rejection. The group base their case on their findings that the nearest repeater to the Kent site, GB3LO, is unusable from 99 per cent of the proposed coverage area.

## Beacon news

Users of 2m will be relieved to hear the familiar sound of the Wrotham beacon, GB3VHF, back on 144·15MHz after the rebuilding of the oscillator chain by G3COJ. A 72MHz crystal is now used instead of the original 4MHz rock, and this appears to have solved the problem of spurious emissions.

## Contest comment

The Newquay and District ARS are very much in favour of the idea of a contest in which only contacts over 200km would count for points. Secretary Bryan Pearce, G8GOR, explains that they feel that such a contest would give stations in areas like their own, away from centres of activity, a better chance of competing on equal terms with stations in high-activity areas who can normally pile up points by working large numbers of locals. The Newquay club are also happy with the proposal to bring VHF NFD forward to July,

Bryan Pearce adds that members of his club are always looking for contacts with stations who care to turn their beams towards Cornwall. The club net is held on 144·468MHz a.m. each evening at 6pm, all callers being welcome.

## Awards

**70MHz Transmitting:** No 116 to G(W)2AMV/P and No 117 to G2AMV for operation from Basil O'Brien's former Birkenhead QTH.

**144MHz Transmitting:** No 452 to G8DET and No 453 to G(W)2AMV/P.

**144MHz Senior Receiving:** No 3 to Mike Allmark, BRS35217, a rarity indeed.

**432MHz Transmitting:** Certificate 112 to GW8FQF for operation from a sea-level location on the North Wales coast.

**Finally,** we cannot allow the decision of Mike Dormer, G3DAH, to relinquish the compilation of the "VHF Bands" feature in *Short Wave Magazine* to pass without a word of appreciation for Mike's considerable contribution to the vhf/uhf scene. Few will fail to recognize the value of this contribution, and we can only hope that he will now be able to devote even more time to his activities on the vhf/uhf bands.

The deadline for the November issue is 8 October, and items for the December issue should reach G3NHE by 5 November.

# MICROWAVES

by DAIN EVANS, G3RPE*

## Microwave round table

The fourth microwave round table will be held on 2 November at the IBA Engineering Centre, Crawley Court, five miles NW of Winchester, about a mile from the A272 road. The main topic for discussion will be "Microwave dx".

## The 1·3GHz band

There has been much discussion within the VHF Contests Committee on whether or not northern stations participating in VHF NFD were handicapped by the inclusion of the 1·3GHz band in this contest. To provide more information on what could be achieved with up-to-date equipment, G5HD and G3WDG operated this band from a series of "portable" sites in schedules with a number of fixed stations.

The equipment used was 40W p.e.p. ssb or cw to two G3JVL loop-Yagis, with the receiver a G8ARM ring mixer preceded by a two-stage BFR90 preamplifier. The sites were: Clee Hill, Shropshire; Knighton, Powys; Millom, Cumbria; Scares, Mull of Galloway; Langholm, Borders; 25km SW Durham, and Wrexham. The other stations involved were G3MCS, High Wycombe; G4BEL, Cambridge; G3ZYC, Matlock; G3NHE, Sheffield; G3JVL, Hayling Is, G3KMS; Bolton; G3DY, Peterborough; G3LQR, Suffolk; G8BYV, Norfolk, and G3HCW in Yorkshire. Most of these stations used equipment of similar standard to G3WDG. The method of operating was first to try to contact on 432MHz and then, if successful, to move up to 1·3GHz.

Detailed presentation of the results achieved would take too much space, but the bare bones are that out of 49 attempted contacts over paths of 80 to 490km in length, 42 resulted in two-way contacts, two in one-way contacts and five were completely unsuccessful. The breakdown in terms of path length expressed as number of full contacts/number attempted is as follows: 0–100km, 2/2; 100–200km, 17/18, 200–300km, 14/16; 300–400km, 6/7 and 400–500km, 3/6.

A point made by G3WDG with the benefit of hindsight is that they might well have been more successful if they had arranged to operate directly on 1·3GHz: many tests that might have been successful could not be made because of failure to contact on 432MHz. Support for this view comes from G8HND in Portsmouth who copied S3-S5 signals on 1·3GHz at distances of 400–500km on three occasions when the corresponding 432MHz signals were barely audible or unheard. Perhaps to emphasize the point about conditions, late one night when there *was* an opening, G3WDG worked PA0DBQ and PA0VV at 580km, PA0MJK at 681km and DC9BY at 780km from GM.

## The 10GHz band

Propagation by super-refraction continues to produce startling results, although there have been a number of failures which emphasize that all the factors involved are not fully understood. In a most interesting test lasting 24h over 12/13 June, G8BCH transmitted from a fixed site 80m asl on the Isle of Portland to the GW4BRS group 8m asl at Beesands in Devon. The signal level was measured at intervals of down to 15min, and these values are shown in Fig 1. The signals were detected for a total of 18h out of the 24h period, being completely absent only from about 0300 to 0900 in the morning. They peaked to a value of 50dB above noise at 1730, which is in line with the results of other tests. What is really surprising is the second peak which started at 2200, reached a maximum at 2400 and fell away at 0200. Bang go some more theories.

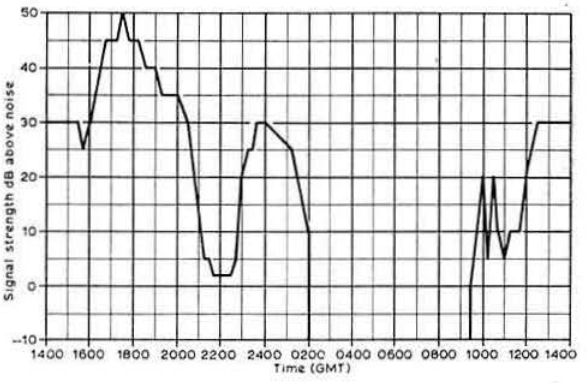



**Fig 1. The signal/noise ratio of 10GHz signals over a 93km path monitored over a 24h period**

A most interesting feature of these results is that the propagation conditions at 1400 on the two days appeared to be identical, one of the first indications of the reproducibility of duct formation under similar weather conditions. The GW4BRS group later had a 275km contact with G3JHM sited about 15m asl near Beachy Head. This is the second longest contact made by UK amateurs—and the signal strength was estimated to be 20dB above noise.

The main points of the other news are: G3JHM operating from the Cherbourg Peninsular heard GB3IOW, and then worked G3VPF; on 3 August PA0KKZ worked G8APP to make the first G/PA0 contact on the band; G3PQR and PA0DBQ are reported to be exchanging signals from their home stations; there are at least six PA0 stations almost ready to go, and a letter from DC3ZU suggests a build-up of activity in Germany.

## The 24GHz band

On 18 August G3BNL and G3EEZ had a 97km contact across Cardigan Bay from Mynedd Prescelly to Rhiw on the Lleyn Peninsular to better significantly their existing world record. Contact was maintained for two hours, a feature being very rapid scintillation of the signals between S2 and S8 sounding almost like a buzz.

Before operating on this band it is necessary to get permission from the Home Office for each and every site; for this test, permission took about three months to come through.

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

# THE MONTH ON THE AIR

by JOHN ALLAWAY, G3FKM*

A number of articles have appeared in the recent past in *CQ* magazine and the *West Coast DX Bulletin* concerning the relation between measured solar activity and dx propagation on the hf bands, especially 14, 21 and 28MHz. The 2·800GHz component of the sun's radiation is measured as an indication of solar flux, and the higher that this is in intensity the better conditions may in general be expected to be. However, magnetic activity also has to be taken into account as too much is likely to cause disturbances, and below-average conditions may then be a result. It is understood that WWV now transmits data referring to both these measurements at 18min past each hour—the figures given referring to the previous 24h, and the "A" number being the magnetic activity. In general if the flux number exceeds 20 and the "A" number is less than 10 good propagation may be expected, and vice versa. It seems that there may be a fairly regular cycle of 21-24 days in levels, and those readers who are able to copy the relevant information from WWV daily may find it possible with a little practice to forecast forthcoming good openings.

## DX news

Since 6 June 1975 stations in Brazil have been using a new scheme of prefixes. Each state now has its own prefix, as follows: PY1—Rio de Janeiro, PP1—Espirito Santo, PY2—Sao Paulo, PP2—Goias, PT2—Distrito Federal, PY3—Rio Grande do Sul, PY4—Minas Gerais, PY5—Parana, PP5—Santa Catarina, PY6—Bahia, PP6—Sergipe, PY7—Pernambuco, PP7—Alagoas, PR7—Paraiba, PS7—Rio Grande do Norte, PT7—Ceara, PY8—Para, PP8—Amazonas, PR8—Maranhao, PS8—Piaul, PT8—Acre, PU8—Amapa, PV8—Roraima, PW8—Randonia, PY9—Mato Grosso, PY0—Fernando de Noronha, Atol Rocas, St Peter and Paul Rocks, Trindade Is. A suffix commencing with a "Z" indicates a foreign visitor (eg PY1ZAA).

Stations in the Republic of Singapore used the 9V0 prefix during August to mark the tenth anniversary of the formation of their state. 9V1SH will be active throughout the winter between 3·775 and 3·800MHz and also 7·000 and 7·025MHz daily from 2230 to 2400. He hopes to frequent 28·550-28·600MHz at weekends between 1000 and 1300, and is willing to arrange schedules.

VR1AT expects to become VR8A on 1 January 1976 when the Ellice Is become independent from the Gilbert group and are re-named Tuvalu. VR1AA is back on the Gilbert Is.

UK1PAA is located on Franz Josef Land and has been worked on 14MHz ssb. UK1PAB is on Novaya Zemlya and has been active on the cw section of the same band.

Three stations seem to be active in Tonga: A35AF (who now asks for QSLs via WA4NRE), A35AG (QSL to W6KNC) and A35AK (QSL to W6KLI, Box 182, La Puente, Cal, 91747, USA).

SV4IFT was on the air from the Thessaloniki International Fair during the period 31 August to 14 September. QSLs go to RAUNG, PO Box 483, Thessaloniki, Greece. A commemorative diploma will be supplied if 10 IRCs are included.

According to *West Coast DX Bulletin* Bougainville is likely to secede from Papua New Guinea a few weeks before the latter country becomes independent. Another area contemplating similar action is Cabinda which is physically separated from Angola by part of Zaire.

XE stations used the 6D prefix to mark the occasion of the 7th Pan American Sports.

A group of VQ9 amateurs, which will include VQ9D, VQ9M and VQ9BP, hopes to visit Aldabra Is, possibly in September or October.

Jacques Feyssac, XT2AA, is active again and has resumed his schedules with W1AM (his QSL manager). The latter may be able to help in fixing specific schedules but Jacques does not appreciate pile-ups.

Alex Mootoo, 3B8DA, is presently on Rodriguez Is as 3B9DA and has been worked on 14MHz cw. The Northern California DX Foundation has despatched a Swan 500CX to him by air, but final delivery to the island depends on irregular sea schedules and the equipment may be delayed for some time. When it does arrive Alex will have ssb available. Increased activity from Diego Garcia in the Chagos Is is likely, and there is a possibility that some of the USA amateurs at the base may take part in the CQ WW DX contests.

The June issue of *QST* listed 414 holders of the 5BDXCC Award, including the following British callsigns: (35) G3HCT, (42) G3FKM, (107) G3KDB, (118) G3NLY, (129) G3TXF, (207) G3UML, (294) G3TJW, (321) GI3OQR, (362) G2MI, (368) GM3CFS, (372) G2TA, (396) G2BOZ, and (412) G3RUV.

The VERON HQ station PA0AA holds the special callsign PI50ARU for use in contests only—QSLs should be sent to PA0AA.

There are rumours that an expedition to Malpelo Is may be undertaken in the not-too-distant future, and that W7MPZ (who was an operator with the Serrana Bank expedition in June) may be helping with the planning.

*Bulletin No 549* from ARRL announces that with effect from 1 July 1975 Sikkim and Blenheim Reef were deleted from the ARRL Countries List. Contacts with Sikkim after that date count as credit for India.

## Contests

**The CQ WW DX Contests**

0000 25 October to 2400 26 October (phone).
0000 29 November to 2400 30 November (cw).
All bands 1·8 to 28MHz. Exchanges consist of RS/T plus *CQ* zone number (UK is in zone 14). Three points are gained for contacts with other continents, and one for contacts with one's own. Stations in own country may only be worked for multiplier credit and attract no QSO points. The multiplier is the total number of zones and DXCC and DARC countries

* 10 Knightlow Road, Birmingham B17 8QB.

worked on each band added together. Final score is arrived at by multiplying the total of QSO points by this figure. In the case of single-band entries the score is the multipliers worked on that band multiplied by the QSO points. There are three categories of entrant: (a) single-operator single- or all-band, (b) multi-operator single-transmitter (all-band), and (c) multi-transmitter multi-operator. In category (c) several transmitters may operate simultaneously but only one signal may be radiated on each band. Entrants should use separate log sheets for each band and follow the layout of the official log form with 40 QSOs per sheet. Log and summary sheets may be obtained from *CQ* by sending IRCs and a large self-addressed envelope A very few summary and log sheets *may* be available from G3FKM but at the time of writing they were still awaited from the USA Logs should be posted to CQ WW DX Contest Committee, 14 Vanderventer Av, Port Washington, LI, NY 11050, USA. Phone logs must be postmarked no later than 1 December, and cw logs before 15 January 1976.

**The OK DX Contest**

0000-2400 9 November.

1·8 to 28MHz, both phone and cw but no cross-band/cross-mode contacts allowed. Exchanges consist of RS/T followed by ITU zone number (British Isles = 27). Contacts with OK count three points, with others one point. Own country may only be worked for multiplier credit and not for QSO points. The multiplier is the number of ITU zones on each band added together. Entries may be single-operator all-band or single-band, or multi-operator multi-band. A separate log should be kept for each band and should record date and time, station worked, numbers sent and received, points claimed, and indicate if new multiplier. A summary sheet showing how score was arrived at and a declaration that the station was operated in accordance with the contest rules and amateur regulations should be signed and included. Logs should be submitted before 31 December to Central Radio Club, PO Box 69, 113 27 Praha 1, Czechoslovakia.

## Awards

**The Maple Leaf Award**

This consists of a flag parchment diploma plus maple leaf lapel badge, and may be acquired by working (or hearing) and confirming Canadian prefixes since 1 January 1965. Class 1 is for 30 different prefixes, Class 2 for 25, and Class 3 for 15. QSLs must be held, and a certified list plus 10 IRCs sent to the address below.

**The 1976 Olympics Award**

For certified log data of contacts with each call area XJ1-XJ8, plus XN1 and XN2 (10 in all) between 1 September 1975 and 31 July 1976. XJ0 or CZ20 may be used for a missing prefix.

**The World 1976 Olympics Award**

Work or hear stations in 50 countries competing in the games. One must be an XJ or an XN. A special seal will be added if CZ20 is listed.

For these last two awards the fee is seven IRCs. Applications should go to G. Hammond, VE3LSS, 155 Maitland Av S, Listowel, Ont, Canada, N4W 2M4.

## Band reports

Many thanks to the following who supplied information for this section: DA2WW, Gs 3HB, 4RZ, 5JL and 3UOL, BRSs 17567, 17991 and 35608. and As 8428, 8713 and 8849.

## QTH Corner

| | |
|---|---|
| **DA2 QSL Bureau** | Cpl Hall, DA2WN, J Troop, 21 Sig Regt (AS), RAF Gutersloh, BFPO 47. |
| **KJ6CF** | via WA6QFO, 15861 Rose Lane, Westminster, Cal, 92683, USA. |
| **VS5JS** | via JA2KLT, 204 Gonaka, Shnozuka, Kozakai, Hoigun, Aichi 441-01, Japan. |
| **XW8HP** | via JA3VLD, Kazuhiro Hata, 689 Ishino Bettsyo, Miki, Hyogo, Japan. |
| **ZC4GH** | G. M. M. Head, 33 SW, Ayios Nikolaos, BFPO 53. |
| **3B9DA** | Alex Mootoo, 39 Brown Sequard Av, Vacoas, Mauritius. |
| **9V0SN** | via G3VAO, c/o RSGB QSL Bureau. |

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

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Stations listed in italics were using cw.

**3·5MHz. 0400** *LU1CAH, DJ3KR/OA4, PJ3AK, ZP5AL.* **0600** *ZLs.*

**7MHz. 0000** *EP, HK, HP, JW, JX, KG4, OA.* **0100** *CE.* **0200** *ZS6.* **0500** *ZL1–ZL4.* **0600** *FP0YY* (QSL to K9OTB), *K6OU/KL7*, VK, *W6, W7.* **2000** *JA2CG, ZL.* **2300** *ZD8TM, 9M2AX.*

**14MHz. 0000** HC8GI. **0500** ST2SA. **0600** KH6GKD/KB6, VR1PE, VS5DB. **0700** *F6DTZ/FO8*, KB6CU, KJ6CF, KS6s ET, FF, FK. **0800** KM6EA, EB, KH6INV/KS6, VR1AT, 5W1AB, AU, *3D2AJ.* **1400** *FB8ZF*, KC6MW. **1500** VS5DB, JS, *9M2, 9N1AC.* **1600** VU7GV. **1700** HS1AKT, *3B9DA*, 9M8VLC. **2000** LU2DZ/SU. **2100** VP8. **2200** XT2AA. **2300** W7MPZ/HK0, ZL4BX.

**21MHz. 1300** *A9XU, 5R8AL.* **1400** *ZE, 5T5, 5Z4.* **1600** *CE, C9M, 9M8HG.* **1900** *OE5CA/YK, ZD8.*

**28MHz. 1300** ZE, ZS3AW. **1500** 9J2. **1600** *FH8CY*, ZD7FT, *5T5ZR.* **1800** LU, PY.

Very many thanks to the authors of the following for information taken from their publications: the **29 DX Club Newsletter** (*VK6WA*), the **DXers Magazine** (*W4BPD*), **Long Skip** (*VE1AL/3*), the **West Coast DX Bulletin** (*WA6AUD*), **DX'press** (*PA0TO*), the **Ex-G Radio Club Bulletin** (*W3HQO*), and **DX News Sheet** (*Geoff Watts*).

Please send all items for the **November** issue **to reach G3FKM** no later than **8 October** and for **December** by **5 November.** □

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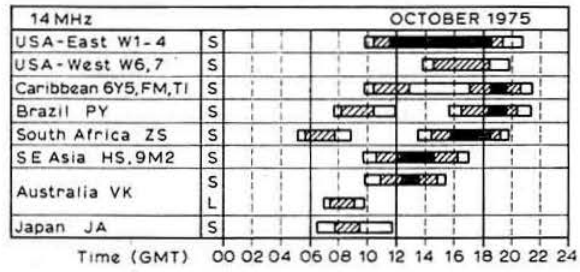
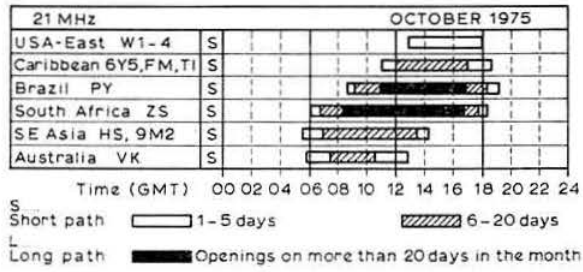
## Propagation Predictions

**Conditions on the hf bands are at their best during October and November. As we are at present in the declining path of the sun-spot cycle no real improvement will be noticed on 28MHz. Only on favourable days will Africa be heard on 28MHz between about**



1300 and 1630gmt. The best time for traffic with South Africa will be about 1430 to 1530gmt. There is a possibility of short-skip traffic on 28 as well as **21MHz** under favourable conditions. After a long summer break South America and Africa will certainly be heard on 21MHz, but western North America and Japan will not come through.

In contrast to 21MHz all continents should be heard on **14MHz**, but the shorter days mean that towards the end of the month the band will close from between 1930 and 2030gmt. In the coming months dx will not be interrupted by European QRM as much as it was during the summer. Contacts with Australia on this band will improve considerably this month, and contact with KH6 should be possible on favourable days between 1640 and 1800gmt via the direct and between 0530 and 0730gmt via the indirect path.

**7MHz** will be the main carrier of dx after 2000gmt. Eastern North America will be heard on this band from about 2030gmt. During the latter half of the night, traffic with North America will be interrupted as frequencies will be too low. Basically dx on this band and on **3·5MHz** will always be possible if the greater part of the path lies in darkness. This is most important for 3·5MHz. This band will be interrupted repeatedly by the dead zone during the latter half of the night.

The provisional sunspot number for August from the Swiss Federal Observatory was 39·3. Solar activity during the first part of the month was high, and on 7 and 8 August the daily number was 104 and 102 respectively. The Telecommunications Sciences Centre at Boulder notes that during the month MUFs were somewhat above normal, but predicts normal seasonal MUFs during the coming period. The predicted smoothed monthly numbers for December 1975, and January and February 1976 are 10, 9 and 8 respectively.

# OBITUARIES

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

**Mr A. Cooper, G3VVQ**
Alan Cooper died on 5 August. He was formerly the chairman of the Bury and Rossendale Radio Society and was for some time an RAE course lecturer, both at the club and at Bury Technical College. He was a strong believer in home construction and had made several rigs, including a top band mobile station.

**Mr T. Davies, GW3TLW**
Tudor Davies died on 8 August. He operated mainly on 160 and 80m cw and a.m., using home-built equipment.

**Mr R. A. Norrington, G3IUD**
Mike Norrington died on 11 August, aged 59. He had an enviable record in satellite working and was recently experimenting with microwaves.

**Mr R. L. Patrick, G3OLI**
Ray Patrick died on 5 August, aged 30. He obtained his licence at the age of 14 and he was one of the first amateurs to obtain WAC on 160m. He was a top band cw-only enthusiast and helped in many NFDs in Bristol.

**Mr R. Powis, G3WNJ**
Reg Powis died on 26 August. He was an active member of the Royal Naval Amateur Radio Society and was also often to be heard on the RAIBC nets.

Donations to RAIBC *in memorium* would be appreciated by his family.

**Mr S. S. M. Ramsay, GM4HR**
Sid Ramsay died on 13 August, aged 64. He was the keeper of the Angus beacon, GB3ANG, and he was well known on the hf and vhf bands.

We have also been advised of the deaths of:

**Mr R. Green, G3APH/SU1KG**
**Mr M. H. Schradsky, W0CND**

# Special event stations

**ZS4OIL, October**
SASOL, the South African oil-from-coal plant, is celebrating its 25th anniversary this year, and to coincide with the October celebrations ZS4OIL will be operational on 10-80m ssb/cw and on 2m fm. If possible, contacts will also be made via Oscar 7. All contacts will be confirmed by full-colour fold-out QSL cards.

**GB2NM, 12 October**
The Chichester & D ARC will be active from the former QTH of the late Gerry Marcuse, G2NM, on 12 October. Operation will be on 80m and 2m using the callsign GB2NM.

**VS6AJ, 18-19 October**
The Hong Kong ARTS will operate JOTA station VS6AJ on Hong Kong's famous Peak on 18-19 October.

Later, from 0900gmt 6 December to 0859gmt 7 December as many VS6 stations as possible will take part in the annual Hong Kong activity day, giving dx operators a chance to obtain the Hong Kong Firecracker Award.

# YOUR OPINION

**Further "Bulletin" reflections**
The Editor
*Radio Communication*

Sir—I cannot remember ever having read seven pages of such pleasurably nostalgic writing as Pat Hawker's "*Bulletin* reflections" in the July issue. His account was a long one—I wish it could have been much longer—and in it there is plenty that should stimulate the interest of our younger members and give them confidence in the future of the Society.

As one who has been a member for 53 years, I belong to the dwindling group who witnessed the creation of the *Bulletin*. Before 1925 the only amateur radio reading matter available was to be found in *QST*, and we began to dream of a journal of somewhat similar character of our own. It was in April of that momentous year 1925 that the IARU was formed—by the initiative of the ARRL—and I still have vivid memories of the exciting pioneer enthusiasm that we saw to be spreading throughout the world of amateur radio. I am inclined to think this awareness must have been a major contributory factor in the realization of our dream. It gave an impetus to the idea that had been gaining force in the preceding months. At one of the Society's monthly meetings, held at the IEE (it must have been late in 1924), Bevan Swift asked for volunteers who would write something for our journal if it were eventually to be produced. I remember standing up to be counted, together with some eight or ten other members.

Personally, I have throughout the years been concerned about the quality of technical writing in our publications, and when I was a Council member I strongly urged that the Society should depart from its then policy of expecting its members to contribute to the *Bulletin* without any thought of payment. I felt that by offering a reasonable payment for contributions the standard would be improved and that good material would find its way into the *Bulletin* instead of being lucratively tempted away towards other publications. Moreover our contributing members would benefit by the enhanced amount of money circulating in amateur circles.

This question of to pay or not to pay was in its time a serious matter for the welfare of the *Bulletin*, and the decision to pay was not made hurriedly. The notion that amateurs would for ever be willing to do anything for nothing—the pleasantly sentimental concept of "ham spirit", which certainly had its value—was not discarded without some tinges of regret, but in my opinion the policy of payment for contributions has been fully justified by the ever-heightening standard of our publications.

Pat Hawker did not touch on this subject in his story. Indeed much had to be omitted to afford space for other vitally interesting matters, but perhaps he would be happy to accept this brief reference as a worthwhile addendum.

Stan Lewer, G6LJ
(President, 1947)

# CONTEST NEWS

## BERU 1975 results

"Conditions excellent. A most enjoyable contest—why scrap it?"—G2QT. This summed up entrants' comments on this year's BERU Contest. Following the unabated decline in entries during recent years, the Contests Committee had decided that BERU 1975 would be the last under the present rules. However, a burst of exceptional conditions and more extensive publicity combined to produce a total entry higher than for many years.

Top honours go this year to Yuri Blanarovich, VE3BMV, with 3,971 points from 410 contacts. In second place overall and leading the UK is Al Slater, G3FXB, only 26 points behind. In fact, only 60 points separated the top four positions—the most closely-fought BERU ever!

In the receiving section, Eric Howell, BRS24775, emerges again this year in the top position with 3,300 points, followed by Ron Thomas, BRS15822, with 2,500 points.

In marked contrast to recent years, the contest fortunately took place in a spell of relatively favourable conditions. The bulk of traffic was as usual on 20m and many UK stations were surprised to find the long path open to VK/ZL in the early hours of Sunday morning, to provide some relief from the rather slow going on the lf bands.

The committee was delighted to receive a great deal of comment with logs. Much of this was prompted by the announced intention of a rule change. Hardly any entrants were in favour of any major changes being made to the basic format of the contest and the overwhelming feeling was for a cw-only contest. Indeed, this opinion was expressed so strongly that the committee has decided to reconsider its decision and to continue the contest in broadly its present form.

Some changes are, however, considered appropriate. There is considerable feeling among participants that the name "BERU", although having very strong traditional ties, does nothing to encourage activity from the newer Commonwealth countries and a change to a more descriptive title would be welcomed. There is also a general demand for a longer contest of 36 or 48 hours, possibly with a rest period. These and other suggestions will be considered and the rules for the 1976 contest published shortly.

The committee would like to express its thanks to John Tutton, VK3ZC, and to Eric Trebilcock, BCRS195, who undertook publicity of BERU in Australia and arranged collection and dispatch in bulk of the logs. This accounted for the large entry and activity from VK this year. We are also indebted to the ARRL and *CQ* magazine for their assistance with publicity. Finally, our thanks to G5YN, GW3SYL, VE3BR, VE3EK, VE7BBD and 5Z4LW for their useful check logs.

*D.J.A.*

### TRANSMITTING

| Posn | Callsign | Points | 3·5MHz | 7MHz | 14MHz | 21MHz | 28MHz |
|---|---|---|---|---|---|---|---|
| 1 | VE3BMV | 3,971 | 606 | 1,337 | 1,731 | 297 | |
| 2 | G3FXB | 3,945 | 348 | 928 | 1,861 | 708 | 100 |
| 3 | VE1CD | 3,933 | 650 | 1,314 | 1,750 | 219 | |
| 4 | G5WP | 3,911 | 485 | 600 | 1,986 | 790 | 50 |
| 5 | G3MXJ | 3,769 | 345 | 825 | 1,716 | 783 | 100 |
| 6 | VE3KZ | 3,712 | 749 | 1,109 | 1,368 | 486 | |
| 7 | VE7UZ | 3,617 | 658 | 1,018 | 1,386 | 555 | |
| 8 | VO1KE | 3,533 | 745 | 742 | 1,423 | 623 | |
| 9 | VE2NV | 3,498 | | | | | |
| 10 | VE7CC | 3,353 | 458 | 610 | 1,720 | 565 | |
| 11 | 9H1CH | 3,341 | 280 | 475 | 1,338 | 1,158 | 90 |
| 12 | G6CJ | 3,323 | 400 | 850 | 1,518 | 480 | 75 |
| 13 | 9H1CG | 3,094 | 273 | 456 | 1,225 | 1,090 | 50 |
| 14 | VE2WW | 3,019 | 518 | 941 | 1,385 | 175 | |
| 15 | ZD7PS | 2,923 | 130 | 505 | 1,075 | 1,005 | 208 |
| 16 | VK3MR | 2,902 | 430 | 1,178 | 1,129 | 165 | |
| 17 | G5RI | 2,855 | 345 | 730 | 1,280 | 500 | |
| 18 | VE3EUP | 2,804 | 499 | 459 | 1,511 | 335 | |
| 19 | 9J2BO | 2,773 | | 125 | 1,450 | 900 | 298 |
| 20 | ZL4CP | 2,763 | 513 | 970 | 1,100 | 180 | |
| 21 | G2QT | 2,726 | 258 | 670 | 1,275 | 448 | 75 |
| 22 | VS5MC | 2,725 | 140 | 505 | 1,565 | 465 | 50 |
| 23 | VK2BPN | 2,520 | 315 | 900 | 1,165 | 110 | |
| 24 | G4CNY | 2,470 | 165 | 355 | 1,500 | 425 | 25 |
| 25 | VE3BWY | 2,456 | 390 | 665 | 1,176 | 225 | |
| 26 | G3IAS | 2,365 | 335 | 280 | 1,125 | 585 | 40 |
| 27 | VE2WA | 2,338 | 323 | 620 | 1,125 | 270 | |
| 28 | VE3AKG | 2,290 | | | | | |
| 29 | VK4XA | 2,256 | 435 | 808 | 898 | 115 | |
| 30 | VE3BBH | 2,187 | 327 | 485 | 1,125 | 250 | |
| 31 | G3IGW | 2,115 | 200 | 635 | 850 | 405 | 25 |
| 32 | G3ESF | 1,998 | 285 | 398 | 1,080 | 235 | |
| | VE3AU | 1,998 | 368 | 530 | 890 | 210 | |
| 34 | 9G1GE | 1,996 | | 300 | 731 | 940 | 25 |
| 35 | GM3CFS | 1,955 | 235 | 390 | 1,030 | 300 | |
| 36 | G3TVW | 1,948 | 175 | 430 | 948 | 355 | 40 |
| 37 | ZL1HV | 1,770 | 455 | 400 | 815 | 100 | |
| 38 | VK7CH | 1,728 | 430 | 515 | 783 | | |
| 39 | VE5RA | 1,604 | | | 1,604 | | |
| 40 | VE1EK | 1,593 | 303 | 420 | 870 | | |
| 41 | G3KSH | 1,510 | 175 | 275 | 650 | 370 | 40 |
| 42 | G3VDL | 1,495 | 190 | 260 | 653 | 410 | |
| 43 | VK3ZC | 1,470 | 440 | 545 | 460 | 25 | |
| 44 | VK7BC | 1,465 | 225 | 385 | 705 | 150 | |
| 45 | G3JKY | 1,460 | 75 | 335 | 715 | 260 | 75 |
| 46 | G3NKQ | 1,435 | | 395 | 740 | 300 | |
| 47 | G3GC | 1,430 | 125 | 375 | 705 | 225 | |
| 48 | G5MY | 1,380 | 165 | 230 | 810 | 175 | |
| 49 | VP8NT | 1,375 | | 275 | 715 | 385 | |
| 50 | G3VW | 1,353 | 25 | 245 | 708 | 375 | |
| 51 | VK6RU | 1,350 | 100 | 175 | 760 | 315 | |
| 52 | VK2BJL | 1,319 | 300 | 814 | 205 | | |
| 53 | G3RUG | 1,309 | | | 1,309 | | |
| 54 | G3JBR/A | 1,303 | | | 813 | 490 | |
| 55 | VE3HUM | 1,292 | | | 1,292 | | |
| 56 | 9J2CL | 1,275 | | | 495 | 500 | 280 |
| 57 | G3TR | 1,265 | | | 1,265 | | |
| 58 | VK2VN | 1,240 | | 550 | 640 | 50 | |
| 59 | G3EBH | 1,180 | 15 | 175 | 690 | 275 | 25 |
| 60 | VE3EJK | 1,175 | | 420 | 705 | 50 | |
| 61 | G3JZG | 1,105 | | 65 | 665 | 375 | |
| 62 | G3ZDD | 1,090 | 175 | 225 | 440 | 250 | |
| 63 | G2HLU | 1,075 | 25 | 175 | 665 | 210 | |
| 64 | G5VU | 1,070 | 100 | 205 | 565 | 175 | 25 |
| 65 | VE7AZG | 1,045 | 100 | 275 | 520 | 150 | |
| 66 | VE2AYY | 1,028 | | 340 | 688 | | |
| 67 | G5DF | 1,013 | 50 | 125 | 688 | 150 | |
| 68 | VK5BO | 1,005 | | | 1,005 | | |
| 69 | G8QZ | 975 | 200 | 250 | 400 | 125 | |
| 70 | G2AJB | 970 | | 290 | 405 | 275 | |
| 71 | G3NKS | 935 | 75 | 25 | 660 | 175 | |
| 72 | G4BWP | 855 | 15 | 25 | 575 | 215 | 25 |
| | G3UYM | 855 | | 150 | 525 | 180 | |
| | G5ND | 855 | | | 855 | | |
| 75 | G3VDW | 840 | | | 840 | | |
| 76 | GM4GK | 835 | 25 | | 560 | 250 | |
| 77 | VK2NS | 821 | 100 | 190 | 456 | 75 | |
| 78 | G3GNS | 820 | 75 | 465 | 145 | 135 | |
| 79 | VK4KX | 795 | | 795 | | | |
| 80 | VP2MJ | 780 | | | 780 | | |
| 81 | VK7RY | 775 | 685 | 90 | | | |
| 82 | VE4MF | 741 | | | 741 | | |
| 83 | G3DOT | 651 | 15 | 75 | 446 | 115 | |
| 84 | VE7ACZ | 650 | | | 650 | | |
| 85 | VK4MY | 645 | | | 645 | | |
| | G3KAA | 645 | | 140 | 280 | 225 | |
| 87 | VK2IV | 638 | | 165 | 473 | | |
| 88 | VK3XB | 635 | 635 | | | | |
| 89 | G8DI | 605 | 25 | | 505 | 75 | |
| 90 | G6GH | 575 | | | 475 | 100 | |
| 91 | G6NK | 567 | | | 492 | 75 | |
| 92 | GM3WRN | 560 | | | 435 | 125 | |
| | VJ5KJ | 560 | | | | | |
| 94 | VK5KL | 550 | 250 | | 200 | 100 | |
| 95 | ZE3JO | 513 | | | | 513 | |
| 96 | VK2HC | 505 | 100 | 75 | 280 | 50 | |
| 97 | VK3YD | 445 | | 280 | 115 | 50 | |
| 98 | G8KU | 430 | | | | 430 | |
| 99 | G3KMA | 420 | | 420 | | | |
| 100 | CY6AVO | 375 | | | 375 | | |
| | G3COJ | 375 | | 225 | 150 | | |
| 102 | VK4AK | 330 | | | 330 | | |
| 103 | VE3BVD | 320 | 165 | 155 | | | |
| 104 | VK5RG | 255 | 75 | | 180 | | |
| 105 | VK5KO | 240 | 100 | 115 | | 25 | |
| 106 | VK2HW | 215 | | 50 | 165 | | |
| 107 | G3CWL | 190 | | | 100 | 75 | 15 |
| 108 | ZC4RH | 125 | | | 125 | | |
| 109 | VK3RJ | 100 | | | | 100 | |
| 110 | G8PG | 75 | | | 75 | | |
| 111 | G2BLA | 50 | | | 25 | 25 | |
| 112 | VK5HO | 25 | | 25 | | | |

### 14MHz single band

| Posn | Callsign | Points | Posn | Callsign | Points |
|---|---|---|---|---|---|
| 1 | VE5RA | 1,604 | 8 | VP2MJ | 780 |
| 2 | G3RUG | 1,309 | 9 | VE4MF | 741 |
| 3 | VE3HUM | 1,292 | 10 | VE7ACZ | 650 |
| 4 | G3TR | 1,265 | 11 | VK4MY | 645 |
| 5 | VK5BO | 1,005 | 12 | CY6AVO | 375 |
| 6 | G5ND | 855 | 13 | VK4AK | 330 |
| 7 | G3VDW | 840 | 14 | ZC4RH | 125 |

**RECEIVING**

| Posn | Station | Points | Posn | Station | Points |
|---|---|---|---|---|---|
| 1 | BRS24775 | 3,300 | 3 | BCRS195 | 1,675 |
| 2 | BRS15822 | 2,500 | 4 | A8312 | 1,575 |

**TROPHY WINNERS**

**VE3BMV** Senior Rose Bowl
**G3FXB** Col Thomas Rose Bowl and Junior Rose Bowl
**BRS24775** Receiving Rose Bowl

## Jubilee VHF/UHF Contest results

Eighty entries were submitted, which is only three more than 1974 and very disappointing considering the excellent conditions. The standard of logs was poor with few entrants declaring their zone in the "section entered" space. Conditions were exceptionally good and the large amount of Continental activity will probably mean that VHF NFD will be moved to this date in 1976, especially as the traditional September date is now a 2m only event in Europe.

The conditions on 2m were excellent from the commencement of the contest but it was not until 2200 on the Saturday evening that the skip began to open up to 750km+, with many contestants working OZ, SM and DL with a sprinkling of SP, LA and DM. However, the best dx fell to G3SOU/P who worked SM5BMK at a distance of 1,430km. These marvellous conditions lasted all through the small hours of Sunday morning and it was not until 0700 that propagation began to revert to normality. The lift appeared to favour stations located in central and southern England and Wales.

Band conditions on 70cm were similar to 2m but there is some evidence that this band opened up and closed earlier than the 2m band. The best 70cm dx was worked by G3ULT/P who contacted SM6PF at a distance of 1,159km. However, in spite of the excellent conditions only two stations managed 100 QSOs on this band and only 40 per cent of these contacts were UK stations, which suggests a low level of activity in this country.

The leading station on 4m was G3FDW/P by a considerable margin of points. Unfortunately the excellent conditions gave a dx potential to the other bands that cannot be emulated on 4m, thus depressing activity and interest. Bearing in mind the increasing activity on 2m and 70cm, there is a case for reassessing the 4m multiplier.

A good entry was received from the listeners and it is encouraging to see new people coming along to push Terry Cooper, BRS28005, and Rod Thomas, BRS15882, off the top positions. However, these two stations set the highest standard when submitting their accurate logs. This cannot be said for the enthusiastic pack chasing their heels. It is obvious that many listeners have not read the rules, and there were infringements of the 1-in-20 rule, repeated callsigns, no QTH and even no report. If logs are so inaccurate again any future adjudicator may refuse to accept them as an entry.

*M.T.D.*

| Posn | Callsign | 70MHz | 144MHz | 432MHz | Total |
|---|---|---|---|---|---|
| 1 | G3PMH/A | 572 | 6,594 | 6,810 | 13,976 |
| 2 | G3XDY/P | 552 | 5,070 | 8,175 | 13,797 |
| 3 | G3SOU/P | 532 | 5,358 | 2,410 | 8,300 |
| 4 | G8BQX/P | | 8,061 | | 8,061 |
| 5 | G3ULT/P | 213 | 4,859 | 2,900 | 7,972 |
| 6 | GW3OXD/P | 32 | 7,269 | | 7,301 |
| 7 | G3NHE | 424 | 1,160 | 5,630 | 7,214 |
| 8 | G4ALE/P | 120 | 5,614 | 1,045 | 6,779 |
| 9 | G2SU/P | 332 | 3,503 | 2,935 | 6,770 |
| 10 | G3ZIG/P | 156 | 3,633 | 2,240 | 6,029 |
| 11 | G3JEQ/P | | 5,996 | | 5,996 |
| 12 | G3WIR/P | | 4,048 | 1,620 | 5,668 |
| 13 | G4ARD/P | 48 | 2,173 | 3,290 | 5,511 |
| 14 | G8ABZ/P | | 5,456 | | 5,456 |
| 15 | G3AMW/P | 202 | 3,235 | 1,975 | 5,412 |
| 16 | GW3ONP/P | 792 | 4,215 | 225 | 5,232 |
| 17 | G4BPO | | 5,172 | | 5,172 |
| 18 | G3PFM/P | 30 | 3,968 | 1,035 | 5,033 |
| 19 | G3ISO/P | 12 | 4,052 | 855 | 4,919 |
| 20 | G3FEC/A | 402 | 2,825 | 1,465 | 4,692 |
| 21 | G3WOS/P | 420 | 674 | 3,550 | 4,644 |
| 22 | G8IWD/P | | 4,466 | | 4,466 |
| 23 | G3XDY | 398 | 1,560 | 2,490 | 4,448 |
| 24 | G4AGE | | | | 4,275 |
| 25 | GD3FLH/P | | 4,152 | | 4,152 |
| 26 | G8GCP/P | | 3,776 | 205 | 3,981 |
| 27 | G3XTT/P | | 3,601 | 80 | 3,681 |
| 28 | G4DZO/P | 414 | 2,924 | 295 | 3,633 |
| 29 | GC3XQM/P | | 3,516 | | 3,516 |
| 30 | G3WKS/P | 422 | 1,708 | 1,285 | 3,415 |
| 31 | G3FDW/P | 1,250 | 2,029 | | 3,279 |
| 32 | G4CDF | | 3,269 | | 3,269 |
| 33 | G8IYI/P | | 2,582 | | 2,582 |
| 34 | G8BMP/P | | 2,479 | | 2,479 |
| 35 | G4BWG | 106 | 2,324 | | 2,430 |
| 36 | G8HHI | | 2,115 | | 2,115 |
| 37 | GC3FHN | 132 | 1,661 | 265 | 2,058 |
| 38 | G3FPK | | 2,031 | | 2,031 |
| 39 | G8JET/P | | 1,988 | | 1,988 |
| 40 | G8ETB | | 1,844 | | 1,844 |
| 41 | G3VEE/P | 4 | 1,750 | 5 | 1,759 |
| 42 | G4AEZ | 122 | 941 | 635 | 1,698 |
| 43 | G8FVZ | | 1,581 | | 1,581 |
| 44 | G4DLB | | 810 | 755 | 1,565 |
| 45 | G4ADV/P | | 1,557 | | 1,557 |
| | G8JYR/P | | 1,557 | | 1,557 |
| 47 | G4CRC/P | | 1,218 | 335 | 1,553 |
| 48 | G3HRS/P | | 1,512 | | 1,512 |
| 49 | G4CIK | | 1,494 | | 1,494 |
| 50 | G8IZN | | 1,407 | | 1,407 |
| 51 | G8FBL | | 1,363 | | 1,363 |
| 52 | G8IZU | | 1,349 | | 1,349 |
| 53 | G8FCV/A | | 1,265 | | 1,265 |
| 54 | G8FUL | | 1,207 | | 1,207 |
| 55 | G4APJ/P | | 1,100 | | 1,100 |
| 56 | G4DWZ | | 1,072 | | 1,072 |
| 57 | G3HOX/A | | 1,000 | | 1,000 |
| 58 | G3JVJ | | 996 | | 996 |
| 59 | G8DCA | | 348 | 585 | 933 |
| 60 | GM3ITZ/P | 48 | 873 | | 921 |
| 61 | G4BMO | 182 | 696 | | 878 |
| 62 | G3WOA/A | | 870 | | 870 |
| 63 | G4BBA | | 819 | | 819 |
| 64 | GM3ZYS/P | | 781 | | 781 |
| 65 | G8BKR | | 748 | 25 | 773 |
| 66 | GI8HXY | | 740 | | 740 |
| 67 | G8JAY/P | | 727 | | 727 |
| 68 | GM3PXK | | 688 | | 688 |
| 69 | GM8ILE | | 662 | | 662 |
| 70 | G3ZKA/P | 608 | | | 608 |
| 71 | GW6TM | | 605 | | 605 |
| 72 | G8IUT | | 586 | | 586 |
| 73 | GI3JLA | 14 | 364 | 45 | 423 |
| 74 | G5UM | 372 | | | 372 |
| 75 | G8IQL/A | | 365 | | 365 |
| 76 | G8ASX/A | | 341 | | 341 |
| 77 | GW8HVP | | 334 | | 334 |
| 78 | GM8AKB/A | | 315 | | 315 |
| 79 | G3XFW | | 191 | | 191 |
| 80 | G8FDL/P | | 54 | | 54 |

Check log received from GM8IZH/P

**LISTENERS' SECTION**

| | | | | | |
|---|---|---|---|---|---|
| 1 | BRS34348 | | 1,524 | 1,415 | 2,939 |
| 2 | BRS15822 | 94 | 1,402 | 360 | 1,856 |
| 3 | BRS28005 | | 1,268 | 235 | 1,503 |
| 4 | A8398 | | 1,395 | | 1,395 |
| 5 | A8597 | | 878 | | 878 |
| 6 | A8696 | | 772 | | 772 |
| 7 | BRS31038 | | 669 | | 669 |
| 8 | BRS34740 | | 518 | | 518 |
| 9 | A8882/A | | 0 | | 0 |

## 1975 Summer 1·8MHz Contest results

The common theme in the comments made by most of the 34 entrants was the difficulties caused by the very high levels of static that persisted during the whole of the contest period. In some cases the static build-up on aerial tuning units was so great that entrants had to close down for periods and a few were not able to finish the contest.

For those who were prepared to battle the QRN there were plenty of contacts to be made, and a number of entrants topped the 100 QSO mark. There were a number of overseas stations active but to the regret of the HF Contests Committee only two sent in logs. Possibly due to the high noise levels, there were a number of inaccuracies in many of the logs and it has been necessary to adjust (downwards) over half of the claimed scores.

The winner, by a very narrow margin, was G3POI with a checked score of 483 points. His single-operator entry included a bonus of 39 counties/countries and 97 contacts. The runner-up, G3MXJ, who had 100 contacts, made 479 points with a bonus of 37 counties/countries. Third was the Echelford ARS entry, G3UES/P, with G3KKQ as the main operator. Echelford, operating from Esher Common in Surrey, made 91 contacts for a score of 445 points. The

overseas winner was OK2PAW with 97 points, closely followed by OK2PGF with 93 points.

From entrants' comments it seems that the earlier timing suits the majority, and this will be adopted for the 1976 event. A number of stations used the old county code, while others who are now in the Greater London area used the code for their old counties. The committee has not penalized these entrants this time, but those who sent SRY and ESX etc instead of the proper London code are warned that the committee may not be so generous in future top band contests.

In conclusion, the committee wishes to thank those who sent comments on the rules and the stations that sent in check logs.

**UK SECTION**

| Posn | Callsign | Points | Posn | Callsign | Points |
|---|---|---|---|---|---|
| 1 | G3POI | 483 | 17 | GI3JEX | 310 |
| 2 | G3MXJ | 479 | 18 | G4APR/P | 309 |
| 3 | G3UES/P* | 445 | 19 | G3DJX | 304 |
| 4 | G8ZK* | 443 | 20 | G4BWP | 290 |
| 5 | G3XEP | 440 | 21 | G3XNS | 279 |
| 6 | G3UBR | 438 | 22 | G3GC | 277 |
| 7 | G3SVW/A | 425 | 23 | G3USE/A | 256 |
| 8 | G3TIR | 417 | 24 | G4AOS | 255 |
| 9 | G3RPB | 410 | 25 | G3WRA | 249 |
| 10 | GM3YOR | 408 | 26 | G4CSC | 212 |
| 11 | G3SYM | 387 | 27 | G4CRC/P* | 209 |
| 12 | G3SJE | 381 | 28 | G4CCQ* | 206 |
| 13 | G3BFP | 376 | 29 | G4CNY | 202 |
| 14 | G4BXT | 368 | 30 | G3WQK* | 165 |
| 15 | G3YMC | 362 | 31 | G4DRS | 97 |
| 16 | G4BOU | 343 | 32 | G4DZY/P* | 65 |

**OVERSEAS SECTION**

| Posn | Callsign | Points |
|---|---|---|
| 1 | OK2PAW | 97 |
| 2 | OK2PGF | 93 |

*Multi-operator entry

Check logs were received from G5OJ, GW3JI, G6LX

## Dartford Heath DF Qualifying Round results

Eleven teams competed in this event, which was held on one of the hottest days of this very hot summer! The cost of travelling was kept uppermost in the organizers' minds, and the "A" station was about 12 miles by road from the start, and the "B" station about nine. The start was a car park adjacent to the A2, just south of Gravesend.

The "A" station, G4BDF, was manned at very short notice by Phil Woolf, G4EGU, (who only received his A licence a few days before), ably assisted by Grahame Marsh, G8KEW. They were situated on the banks of the Creek at Dartford Marshes, just before the Darenth joins the Thames. The station presented no real problems to the competitors but apparently one found himself on the Crayford side of the river, which meant retracing his steps a distance of about seven miles!

Station B did pose more problems because, though nearer to the start, it was much better concealed in a small strip of woodland, the undergrowth being of a particularly vicious Kentish type, guaranteed to inflict maximum injury to anyone not minding his own business. This station was manned by Arthur Butcher, G3KPJ, with assistant Adrian Field, G8CPM.

By 1600, of the 11 hunters eight had found station B and the remaining three had found station A; therefore an extension of 15min was announced which proved sufficient to get the necessary two qualifiers for the final.

The returning hot and weary competitors seemed to appreciate the cup of tea awaiting them at the rendezvous!

Messrs Butson and Bristow having already qualified for the final, Messrs Hudson and Easterbrook now qualify, subject to confirmation. Thanks must be extended to the operating crews, the ladies for the catering arrangements and to all those who did their bit behind the scenes.

| | | | Time of arrival | |
|---|---|---|---|---|
| Posn | Name | Club | Station A | Station B |
| 1 | I. Butson | Chelmsford | 1601 | 1503 |
| 2 | B. Bristow | Oxford | 1615 | 1529 |
| 3 | P. Hudson | Dartford Heath | 1616 | 1517 |
| 4 | M. Easterbrook | Dartford Heath | 1620 | 1534 |
| 5 | J. R. Vickers | Stratford-on-Avon | 1630 | 1532 |
| 6 | A. Newman | Salisbury | 1632 | 1504 |
| 7 | G. Reason | Banbury | 1634 | 1531 |
| 8 | T. Gage | Oxford | 1455 | 1635 |
| 9 | D. Newman | Slade | 1637 | 1542 |
| 10 | P. Woollett | Dartford Heath | 1532 | 1638 |
| 11 | C. McEwen | Chelmsford | 1530 | — |

## 1975 Second 1·8MHz Contest rules

**1. Rules.** The General Rules for RSGB HF Contests, published in the January 1975 issue of *Radio Communication*, will apply.

**2. When.** From 2100gmt 8 November 1975 to 0200gmt 9 November 1975.

**3. Eligible entrants.** This contest is open to all amateurs licensed to use 1·8MHz. There will be two sections, *both being single operator only:*

(a) British Isles stations (all G prefixes)
(b) Overseas stations (including EI). Overseas entrants do not need to be RSGB members.

**4. Contacts.** CW (A1) only in the 1·8-2·0MHz band. County/region code letters, as published in the January 1975 issue and amended in the February 1975 issue of *Radio Communication*, must be sent after the report/serial number group by all British Isles stations, eg for a contact with Surrey, 579001 SRY. Note that these are the new *three*-letter codes.

**5. Scoring.**

**(a) British Isles section.** Three points for each contact, with a bonus of five points for the first contact with each new British Isles county/region, and for the first contact with each new country outside the British Isles.

**(b) Overseas section.** Overseas stations may claim points only for contacts with stations in the British Isles (not EI), and will score three points for each contact plus a bonus of five points for each new British Isles county/region.

**6. Logs.** Column (5) should be headed "Code Rcvd". Columns (6) and (7) should be left blank. Entries *must* be addressed to: HF Contests Committee, c/o A. V. H. Davis, G3MGL, 41 Gainsborough Road, Crawley, Sussex RH10 5LD.

**7. Awards.** The Victor Desmond Trophy will be awarded to the winning station in the British Isles section. The Maitland Trophy will be awarded to the Scottish member with the highest aggregate number of points in this contest, combined with the First 1·8MHz Contest 1976. Certificates of Merit will be awarded to the second and third placed entrants in the British Isles section.

Certificates of Merit will be awarded to the first three stations in the overseas section, and to the leading station in each overseas country.

**8. Under-18 Awards.** An additional Certificate of Merit will be awarded to the highest-placed entrant in each section whose 18th birthday falls on or after 10 November 1975. Entrants wishing to compete for these awards should write "Under 18" and their date of birth at the top of the cover sheet. Entries will only be eligible for these awards where operation has taken place under the entrant's own callsign, and from the "main address" as stated on the station licence.

## Contests calendar

| | |
|---|---|
| **5-6 October** | —RSGB UHF Open and SWL (Rules in May issue) |
| **12 October** | —21–28MHz Telephony (Rules in May issue) |
| **18-19 October** | —7MHz CW (Rules in June issue) |
| **25-26 October** | —CQ WW DX Contest (Phone) |
| **26 October** | —70MHz Fixed (Rules in July issue) |
| **1-2 November** | —144MHz CW (Rules in September issue) |
| **1-2 November** | —7MHz Phone (Rules in June issue) |
| **8-9 November** | —2nd 1·8MHz (Rules in October issue) |
| **16 November** | —432MHz Open (Rules in September issue) |
| **29-30 November** | —CQ WW DX Contest (CW) |
| **7 December** | —144MHz Fixed (Rules in September issue) |

## Looking ahead

**11 October**—SSTV Convention, Aston University, Birmingham.
**30 Oct-1 Nov**—Amateur Radio Retailers Association Exhibition, Granby Halls, Leicester.
**4 November**—RSGB lecture at IEE, Savoy Place, London.
**5 December**—RSGB AGM, Royal Society of Arts, John Adam Street, Adelphi, London WC2.

# PUBLICATIONS OBTAINABLE FROM RSGB

*(Prices include new postage charges from 29 September, packing, and VAT where applicable)*

## RSGB PUBLICATIONS

### Technical books

| | |
|---|---|
| Amateur Radio Awards | £1·69 |
| Amateur Radio Techniques (5th ed.) | £2·52 |
| Guide to Amateur Radio (16th ed.) | £1·14 |
| Morse Code for the Radio Amateur | 45p |
| NBFM Manual | £1·14 |
| RSGB Amateur Radio Call Book 1975 | £1·27 |
| Radio Amateurs' Examination Manual | £1·11 |
| Radio Amateurs' Examination Revision Notes | 51p |
| Radio Communication Handbook (Out of print) | |
| Radio Data Reference Book (3rd ed.) | £1·32 |
| Service Valve and Semiconductor Equivalents | 45p |
| Teleprinter Handbook | £5·74 |
| Test Equipment for the Radio Amateur | £2·29 |
| TVI Manual | £1·05 |
| VHF/UHF Manual (Out of print) | |
| World at their Fingertips (Paperback) | 99p |
| " " " (De-Luxe) | £1·60 |

### Log books

| | |
|---|---|
| Standard Log | 96p |
| Receiving Station Log | £1·20 |
| Mobile Mini-Log | 80p |
| De-Luxe Log | £2·44 |

### Maps and charts

| | |
|---|---|
| Countries List/HF Awards List | 20p |
| Great Circle DX Map (in tube) | 94p |
| QRA Locator Map (Western Europe) (in tube) | 84p |
| QRA Locator Map (Western Europe) (on card) | 38p |
| RSGB Amateur Radio Prefixes (World) Map | 53p |

### Members' sundries

| | |
|---|---|
| Callsign lapel badge (5 weeks' delivery) | £1·10 |
| Lapel badge (RSGB or RAEN emblem, pin fitting) | 40p |
| Tie (Maroon or Blue) | £1·45 |
| *Radio Communication* Easi-binder | £1·75 |
| *Ham Radio* magazine binder | £1·75 |
| Car window sticker (RSGB or RAEN) (self-adhesive) | 19p |
| Members' headed notepaper (50 sheets) quarto | 61p |
| " " " " " octavo | 41p |
| *Radio Communication* bound volumes, 1971-4 **(Each)** | £3·75 |
| *Radio Communication* back issues | 58p |

**POSTAL TERMS:** Cash with order. Stamps and book tokens cannot be accepted. Cheques and postal orders should be crossed and made payable to "Radio Society of Great Britain".

Giro A/C No 533 5256.

Please write your name and address clearly on the order, and use the latest price list when making out the remittance.

**COUNTER SERVICE**

Items listed above are obtainable, less postage and packing, at RSGB Headquarters between 9.15am and 5.15pm, Monday to Friday.

**ORDER FROM:**

**RSGB Publications (Sales),**
**35 Doughty Street,**
**London WC1N 2AE**
**Telephone 01-837 8688**

## OTHER PUBLICATIONS

### American Radio Relay League

| | |
|---|---|
| Antenna Book (13th ed.) | £2·39 |
| Course in Radio Fundamentals | £1·61 |
| FM and Repeaters for the Radio Amateur | £1·89 |
| Hints and Kinks | £1.29 |
| Radio Amateurs' Handbook (Paperback) | £3·99 |
| Radio Amateur's Handbook (Hardback) (Out of print) | |
| Radio Amateur's Operating Manual | £1·26 |
| Single Sideband for the Radio Amateur | £1·92 |
| Specialized Communication Techniques | £1·90 |
| Understanding Amateur Radio | £1·60 |
| VHF Manual | £2·59 |

### CQ (Cowan Publishing Corporation)

| | |
|---|---|
| DX Handbook | £2·39 |
| Shop and Shack Shortcuts | £2·04 |

### Radio Amateur Callbook Inc

| | |
|---|---|
| American Callbook (USA listings) 1975 | £6·30 |
| American Callbook (DX listings) 1975 | £5·70 |
| World Atlas (Amateur radio prefixes) | £1·48 |

### Radio Publications Inc

| | |
|---|---|
| Beam Antenna Handbook | £2·92 |
| Better Short Wave Reception (3rd ed.) | £2·40 |
| Cubical Quad Antennas | £2·40 |
| Simple, Low-cost Wire Antennas | £2·92 |

### "73 Magazine" publication

SSTV Handbook (Price to be announced)

### Miscellaneous

| | |
|---|---|
| Basic Electricity | £2·34 |
| Basic Theory & Application of Transistors | £1·40 |
| Transistor, Audio and Radio Circuits (out of stock) | |
| Radio Amateur Operators Handbook | 88p |

## MORSE INSTRUCTION AIDS

| | |
|---|---|
| G3HSC Rhythm Method of Morse Tuition— | |
| Complete Course (two 3-speed lp records and one ep record plus books) | £4·95† |
| Beginner's Course (one 3-speed lp record and one ep record plus book) | £3·65† |
| Beginner's lp (0-15 wpm) plus book | £3·05† |
| Advanced lp (9-42 wpm) plus book | £3·05† |
| Three-speed simulated PO test 7in ds ep record | £1·00† |

† *Overseas orders: add £1.*

## MAGAZINE SUBSCRIPTIONS

| | |
|---|---|
| *QST* (including ARRL membership) (Per annum) | £4·60 |
| *CQ* (Per annum) | £3·75 |

Subscriptions for the magazines listed above should be sent to RSGB, 35 Doughty Street, London WC1N 2AE.

*Ham Radio* (Per annum) (Includes air delivery) £4·80
Subscriptions and changes of address for *Ham Radio Magazine* should be sent to: Ham Radio Magazine (UK), PO Box 63, Harrow, Middlesex HA3 6HS.

# MEMBERS' ADS

These subsidized flat-rate advertisements are accepted as a service to members of RSGB. They must be submitted on the Members' Ads order form printed in each issue of *Radio Communication*, or on a postcard similarly laid out. Each **must** be accompanied by a **recent** *Radio Communication* wrapper addressed to the advertiser, as proof of membership, and a remittance by postal order or cheque for 50p (stamps not accepted). They will not be acknowledged. Those not clearly worded or punctuated will be returned. No correspondence concerning this service can be entered into.

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

Trade or business advertisements, even from members, will not be accepted for Members' Ads but should be submitted as classified or display advertisements in the usual way.

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.

Members are advised to enclose a stamped addressed envelope when replying to advertisements.

**Post to: MEMBERS' ADS, "RADIO COMMUNICATION", 35 DOUGHTY STREET, LONDON WC1N 2AE**

## FOR SALE

**Eddystone 840 rx,** clean, unmodded, £40. Pye Vanguard with full-length cable, controls, circuit diags, £10. G8IZW, 51 Silecroft Road, Luton. Tel Luton 27906.

**Hudson FM120 base station** with tone burst and xtals for R7, approx 100W i/p, £45. Hudson FM208 wkg on 2m, £12.50. Homebrew 4m transverter, 40673 front-end, 6–40 pa, approx 60W o/p, i.f. 28·8–29·5, £25. Sentinel 2m converter, 27·9–29·9, £10 ono. Marsh, 8 Cerise Rd, London SE15. Tel 01-732 0668.

**Mains transformer,** outputs 425–0–425V 200mA, 6·3V 4A, 6·3V 2A, 5V 3A, buyer collects, £3.25. 10-way Ledex with xtal holders, £1.50 plus carr. *Wanted:* High-band rf board for Cambridge. G8JNI. Tel Godalming 22834.

**Liner 2 vhf ssb tx/rx,** vgc (mint), **£130.** *Wanted:* Cheap top band rx or tx/rx. Dave, 81 Parkhill Avenue, Crumpsall, Manchester 8.

**Nixie tubes,** similar GN4, 50p; bases, 5p; plus 11p stamps per order. Creed 7B, £10. *Wanted:* Creed 7ERP, 54RP, 75RP, also information on Advance sig gen type D1 for purchase or loan—prompt return. G8GYC, QTHR. Tel Kingsley 88123.

**Telrex 3-el optimum-spaced 20m beam,** superb, current price over £250, £140. Unused Labgear quad, wide-spaced glass-fibred bamboos, three-band, cost £90, £55. Pair quad X-castings, £5. Alloy tube, 54ft of 1in dia, £12. 72ft of ⅜in dia, £12. G3NUG, QTHR. Tel Radlett 4435.

**Coutant stabilized dual output psu** set 10V-20V and 24V-34V at 0·5A, £9. Fi-Cord 101 Swiss miniature tape recorder, £4. 4X250Bs, unused, £2. QQV06/40A ptfe bases, 50p. Low-band Storno fm Viscount tx pc strip, £3. 3CX100A5, £1. 1kΩ 10-turn pots, 50p. 60·75MHz HC18U xtal, 50p. All carriage extra. G8ENI, QTHR. Tel Cheslyn Hay 415374.

**Must be seen!** 2W atu for lf bands only, switched/tapped posns, integral swr/power meter, £15, offers. Geloso vfo/pa, 807 pa, five-band cw rig, not in cabinet, £10. G4CJY, QTHR. Tel 0494 444417.

**9MHz ssb i.f. strip,** two KVG XF9A filters with carrier xtals, £30. Jaybeam 8Y/2m, new, £5. Organ rocker stop switches, 12 in-line, two, £3 each. Set 12 organ tone generators, seven octaves, £10. G3LWT, QTHR. Tel Broughton (Hants) 446.

**Yaesu FT-101** with top band. Weston, 43 Pearce Avenue, Parkstone, Dorset. Tel Parkstone 745848.

**Pye Vanguard,** tunable rx, xtal-controlled tx, working on 2m, £36. Telford bandpass filter, vgc, £5. 8MHz xtals, £1. 300V 300mA transformer, £5.50. Acos mic, £1. All plus postage. G8JKA, 95 Agnew Road, Fleetwood, Lancs. Tel 4094 after 6pm.

**Racal RA17 Mk2,** like new, two spare vfo units, no cabinet, best sensible offer. Marconi TF958 vtvm, with manual, like new, £10 ono. Buyer collects or arrange transport both items. *Wanted:* 250W/500W/1,000W Bird Model 43 wattmeter elements. G3RNV.

**RCA conduction-cooled beam tetrodes type 8828W,** 200W anode dissipation up to 500MHz, tested and working, £1.50. Also 4X150D, used but working, £1. Plessey SL621C agc generators, new, £1. G4AEZ, QTHR. Tel 01-366 7166 evenings.

**Sentinel 2m converter,** i.f. 28–30MHz, £10. Dash Ranger 4m, unmodified, complete with handbook and 12·7MHz xtal, £6 plus carriage. David Shirley, "St Michael", North Down Road, Braunton, Devon. Tel Barnstable 4132 office hours.

**Xtals:** 10·0000, 24·196, 24·246MHz, all HC18/U, £1.90 each. 35·5000, 38·6667 MHz, both HC6/U, £2.40 each. SAE all enquiries please. C. M. Pegrum, Dept of Physics, The University, Lancaster. Tel Lancaster 65201 ext 4180.

**BC221-AE,** clean cond and good working order, with charts, phones and power supply, £25 plus carriage. G3NGD, 28 Barton Road, Urmston, Manchester. Tel 061-748 2238.

**Trio TS510,** with psu, good cond, £150. HP23B ac psu, unused, £45. HP13B dc psu, unused, £55. BC221 with charts, mains powered, £25. HM15 swr bridge, £8. G3YQO, QTHR. Tel 01-202 6577 ext 207.

**Hewlett-Packard vhf sig gen model 608D,** 10-420MHz. HRO-M, eight coils, psu, modded. Cambridge dynamometer, 300V 30V. New member. SAE only why. BR35577, 125 Monklands, Letchworth, Herts SG6 4XE.

**Quantity of Creed 6S4 and 6S5 automatic transmitters,** seven unit, second-hand, £7 each. Tel 01-657 6337 or 01-769 6362.

**KW2000A** with ac and dc psu, £130. G4ASB, QTHR. Tel 0332 74479.

**FT2F,** 12 channels inc S0, S20, S21, S22, S23, S24, R5, R6, R7, a.m./fm rx modification, external tone burst unit, handbook, good cond, £90. G8ANU, QTHR. Tel Stafford 52693.

**HRO b/s coils** 40m, 20m, 15m, 10m, £2.50. G/C coils 50-100kHz, 100-200kHz, 180-430kHz, 480-960kHz, 7-14·7MHz, £1. Class D wavemeter, £5. No 7 calibrator, £3. G4CSC, QTHR.

**Eddystone 888A,** vgc, £45. FT220 xtals, 8·125, 8·175, R5, R7, £3 the pair. Kokusai filter MF455-10, £6. Tel Emsworth 6177.

**Microwave Modules Mk2 a.m. tx,** xtals fitted 145·0, 145·720, 145·946, also matching rx, both brand new, hardly used, £50 ono. G3RFE, QTHR.

**Strumech 40ft wall-mounted Versatower,** £150 ono. G3JUY, QTHR. Tel Mansfield 21183.

**KW202** with matching spkr, mint cond, new valves fitted, £140. P. Herring, 34 Woodlands Road, Romford, Essex. Tel 47998.

**TH3 Mk3,** one year's use, £75, no offers. KW 75Ω lpf, £3, carriage extra. G4BMX, QTHR or tel 045-388 3808.

**Microwave Modules 2m mosfet converter,** 28–30MHz i.f., 116MHz local osc output, mint cond, hardly used, £15 ono. G3OQT, 7 Willowbrook, Bunbury, Cheshire. Tel Bunbury 260708.

**Solid State Modules ssb generator** less xtals and filter (accepts KVG filter), £10. BC221 with charts and power unit, £12. Steel cabinet 26in high, 18in deep, 21in wide, needs re-spray, £1. Taylor 500μA meter 6in by 5in, £1. G3PHJ, QTHR.

**KW77 triple conversion rx** with matching speaker and manual, £60 ovno. G3YSY, QTHR. Tel Chesterfield 75944.

**FT2FB Mk2,** FP2AC and batteries fitted, preamp, narrow filter, automatic toneburst, xtals 145·150/750, 145·175/775, 145·000, 145·500, 145·525, complete with box, mic, instructions and mobile bracket, £100 ono. Melvin D. Walmsley, G4DMW, ex-G8GXB, QTHR. Tel 01-834 6487.

**Mosley TA-33JR beam** plus 32ft (three sections) aluminium alloy mast on site near Maidenhead, £25. Reversible motor and control gear available if required (price negotiable). G6GF, QTHR. Tel Littlewick Green (062882) 2729.

**Storno Viscount CQM19,** xtalled and working 145MHz, spare valves, £28. consider exchange for uhf 70cm and tv beams or working rotator. EI5CD, QTHR.

**Liner 2,** good cond, £120. Would welcome exchange with cash adjustment for FT101, FT201 or similar tx/rx. Must have 12/240V operation. G3XHY, tel 0632 679106.

**No 10 xtal calibrator,** £2. Jason Band 2 tuner, £2. 70 valves, ex-equipment, £2.50. MW valve portable RXs, 75p each. Meters, £1 each. *Wanted:* Info on Chapman S6BS rx, to borrow. G8KDL, 4 Tudor House, Parson Street, London NW4 1TN. Tel 01-203 3138.

**Pye PTC114 tx,** two xtals, 3–20 pa, £7. Power supply, £3. 50W tx, G3RKK design, 80/40/20, 6146 pa, UM3, two 6L6s, £15. Power supply,

£5. 160/80m tx, RSGB *Handbook* design, TT11 pa, N78 internal power, £12. G3UJK, QTHR. Tel 0494 25491.

**Storno Viscount** with control box/spkr/mic, all cables inc 10ft UR43 with plug (you supply car and 2m whip), xtalled and working R7, very clean cond, free extra top cover (save unbolting), £36. Xtals S20, £5 pair. G8JNS, tel 01-733 3995 after 6pm.

**Redifon R50M rx,** 13kHz-32MHz, S-meter, eight-gang tuning, complete with psu and spkr in exc cond, £55 ono. Contact Chris after 6pm at 10 Parkhill Road, Sidcup. Tel 01-300 0564.

**Free to collector,** standard 19in rack cabinet 5ft tall, 2ft deep, with door, fitted 5A mains filter, APT psu model 506, 200–500V o/p 350mA, 6·3V 10A, £10. AC mains stabilizer 240V ± one per cent o/p for 240V ± 20 per cent i/p, 200VA, £10. Cathodeon C-932 Staticon, £3. G8CHE, QTHR.

**Europa 2m transverter,** £50. 9R59DS rx, works, £25. Tech TE20D sig gen as new, £10. MFJ ssb audio filter, £5. APN-1 scanning rx, 38–1,000MHz, £40. Write with sae. Lovell, 40 Vine Street, Kersal, Salford, Manchester M70 PG.

**Trio 9R59DS rx,** SP5DS spkr, Joystick aerial with Joymatch, £40. Prefer buyer collect. G3WYU, 35 St Augustine's Park, Ramsgate, Kent.

**Property of late G6XH.** Oscilloscope CT52, £10 ono. FT243 xtals (100), £2.50. 50 xtals coils for 2m, £2.50. Tuning units TU5B, £1. AE c/o switch type 78A 24V, £1. Slow motion dial (new) CR100, DRGW-6366, £1. RF units type 24/27, £2. Absorption wavemeter, £11. 110W amp with psu, £1. Various resistors, capacitors, transformers, meters, power supplies. Offers invited, prefer buyers collect. Tel Worthing 42358.

**Stolle automatic rotator** and control box (requires five-core cable) as new, £27. Chimney lashing kit, poles etc also available, Gordon, 1 Clifton Hill, Bristol BS8 1BN. Tel 34644.

**HA600,** exc cond, £40. AR88LF with S-meter, £32. CR150, reasonable cond, £15. Ekco r/t, £4. Marked, tested AC128s, 10p. Tested BFY51S, 8p. Valves EF80, EF50, EF45, 6J6, 6CH6, many others, 15p. N. Hammersley, 5 Rymers Green, Formby, Liverpool. Tel Formby 75988.

**Quantity of radio transmitting and receiving,** hi-fi, tv, electronic and electrical components and equipment for sale. Many interesting items. Send large sae for full list. Callers welcome but by appointment only. B. M. Sandall, Amber Croft, Higham, Derby DE5 6EH.

**Yaesu remote vfo FV-101,** as new, £25. Jaybeam 70cm Multibeam, used but ok, £6. Heathkit counter IB101 and prescaler IB102, factory-built, £80. Tubular telescopic mast 40ft, used, £20. Prefer buyer collects. G2BVN, QTHR.

**Brand-new unboxed Mustang,** 2kW 3-el beam, £65. FT101 Mk2 with 160m, cw filter and spare valves, £360. FL2000B linear with spare valve, £150. FV101, £45. EK9X keyer, £8. Metrosound ST20 stereo amp, £18. All open to offers and in good cond. *Wanted:* SSTV gear. Chris Page, "Tatworth", Station Road, North Chailey, Lewes, Sussex. Tel Newick 2394.

**Liner 2 tx/rx,** £125. Liner linear, 40W output, £35. Murphy stabilized 12V 4A psu, £10. Lowe tune-up tone pulser, £2. Poulter, 279 Aragon Road, Morden, Surrey. Tel 01-337 0117.

**32ft tower,** £35. B44, £5. RA17 2nd vfo, £5. RA71 i.f. strip, £7. Burndept BC255 aircraft tx/rx, £7. 5BP1, £2. 4EP1, £2. UM3, £2.50. DT1. £1.50. Two KT88s, £1. Pye base rx, xtal on 70·26, £4. Carriage extra. G8AAY, QTHR.

**18AVT,** £27. Xtal cal No 10, £3. Burns lpf FL2, £4. Airflow 26BT blower, £3. SSM 9MHz ssb gen using XF9A, comp with two-tone osc, p/p, £20.Write/phone for details. G3GMY, 5 Silvercliffe Gardens, New Barnet, Herts. Tel 01-449 7203.

**Pye six-channel dash Cambridge,** a.m./fm, very good cond, xtals for 144·48, 145·0, S20, S22, 145·8, R7 and R4, R6 as extra, SSM PA3 preamp in rx, Ambit "maxi" discriminator, Burns tone gen for repeater operation, with mains stabilized psu, halo and ground plane. Sensible offers please for this complete am/f.m. mobile or fixed 2m station. P. I. Martin, G4AZC, 12 St Catherine's Road, Bitterne Park, Southampton, Hampshire.

**Redifon GR286 Mk3,** 28-channel marine vhf with RC91 remote control box, £60. GR286 "private" deck a.m./fm tx/rx, handbook, £22. Standard Electrik (Denmark) 10-channel marine vhf, 25kHz, 12V dc, splash-proof case, £40 ono. G3JMJ, QTHR. Tel 073-271 3467.

**FM Pye Bantam,** three channels, comp with mic, battery pack and carrying case, xtalled for 145·500MHz, £35. G8IQT, QTHR. Tel Grimsby 70011.

**10GHz wavemeter,** BTH X-band cavity type, £6 each or offer for lot. G8ISC, QTHR. Tel Great Missenden 3460.

**German wartime rx RS1/20,** a.m./fm 400–800MHz, rf sensitivity at 450MHz 10μV for s/n of 10dB, mix/osc, four IFTs, two af, psu (230V ac), heard OH on 70cm, £110. 1,000 pre-war broadcaster and trader service sheets, *IEE Journals* 1962–74, offers. G3CTR, QTHR. Tel 01-237 4604.

**HRO,** 10 coil packs inc four bandspread, psu, manual, £20. B44 tunable rx and tx xtals, £5. Pye Ranger tx/rx, 144·700, mobile mount, £5. G3VFI, QTHR. Tel Fareham 80120.

**Emsac 2m 10W a.m./fm/cw tx**—needs slight attention. Ficord professional portable tape recorder—tape transmission system requires attention. TW 2m Communicator in perfect working order. CT84 oscilloscope, needs mod to power pack only. Tel 0843 31069 (Kent) evenings.

**Heathkit SB401,** comp with all xtals, SB302 comp with all xtals, a.m. and cw filters, 2m converter, £250. G3NQT, QTHR. Tel 01-508 2397.

**Technical Associates audio compressor,** unused, £20. Heathkit HM2102 power/swr meter, factory-aligned, £8. SWR50 power swr meter, boxed as new, £10. G8FRE, QTHR. Tel 894 1244.

**FT101B,** April 1975, £350. FT2F, a.m./fm, 18 xtals, £95. No offers. Tel 061-761 2952.

**Derelict Fidelity Popular tape recorder** (portable). G3WJK, QTHR. Tel 01-300 1608.

**Drake R-4A,** exc, £125. AR22R aerial rotator (one year old), £20. *Wanted* 70cm linear. McHenry, 2 Park Town, Oxford. Tel 0865 56321.

**IC22 2m mobile tx/rx,** two months old, cost £159. channels S0, S20, S22, S24, R6, R7, offers. Evans, tel Harpenden 61265.

**Manuals TF801/A, SX115, AR88D,** £2.50 each, plus postage. *Wanted:* BC348, model "E", "M", "P" or "Q", must be in first-class cond. Also US Army manual for any model of this rx. Valves 6AJ5, 6AK6, 6BH6, must be new and unused. G3GUU, QTHR.

**Receivers:** Trio JR310, £50. Trio 500S, £40. Eddystone 640, £20. Heath tx 100U, £25. Good clean units. Shack clearance, other items available, telephone for details. Buyers collect for cash. G8FSZ, QTHR. Tel Byfleet 48307 after 7pm.

**Potted regulator,** 6–24V, 0–2A limit, data, £2. Red/green two-lamp push-button, £1. British Standards electrical subject index for sorting magazine articles, £1. Pre-determining decade counter, £1. Post free. Mann, 45 Old School Lane, Milton, Cambridge.

**Trio TS520**—an opportunity to save all that VAT, my 520 is as new and del can be arranged. Heath vvm IM29E, new last March, £18. G2KF, QTHR. Tel Par 2337.

**Yaesu FT200,** exc cond, complete with psu, spkr, mic and blower, £150. Vibroplex Lightning bug key, immac, £8. Trap dipole, £2. (IOW traps). G3ZZD. Tel Tunbridge Wells 34117.

**Liner 2 tx/rx,** mint cond, unmodified, £130. G3ZJO, QTHR. Tel 0604 36050 office hours.

**TW Communicator:** 2m, mic, four xtals, £30; 4m, mic, 18 xtals, £40. G3RWM, QTHR.

**SSB tx 160/80,** £15. 240 to 115V 3kW, £12. BCC221 req xtal, £10. Precision-made heavy-duty sliding brackets, take AR88, teleprinter, etc, £6 pair. Xtal cal No 10, £2. VHF/UHF sig gen, £2. VCR97, £1. Transistor tester, £3. Mullard C/R bridge, £2. Spkr in box. £1. Leak hi-fi o/p trans for pair EL34s, £2; for pair EL84s, £2. Kit for TL12+, £6. KW lpf, £1.50. Aerial relay, mains, £1. Imhoff cabinet frame, £1. 115V 1,725 rpm motor, £2. 10kΩ 50W pot, £1. Leak cross-over unit, £1. PCR3 rx, £2. Parmeko transformers, chokes: 1,400V 250mA with 780V 300mA, £5. 100V line, 100W, 11·5kΩ pri, £2. 6·3V 5A, 6·00V 5A, 5·00V 2A, 48V 830mA, 230V 64mA, £2. 10V 2A, 350V 30mA, £1. Swinging 17·5H 100mA, 4·0H 200mA, £2; 1H 700mA, £2; 20H 160mA, £1; 11H 200mA, £1.50. AM/FM chassis, £2. G3MOU. Tel 01-570 6181.

## WANTED

**Split stator capacitor** 250 + 250pF, tx spacing, for atu Z-match into HW100, SB200. Good price paid for right capacitor or 500pF which can be split. GI6VU, QTHR.

**BC221** with charts and manual if possible. Will collect reasonable distance. Also Medco lpf 75Ω and two 5,000pF mica capacitors, 2kV wkg. G3CPM, QTHR. Tel Broadway 2753 (Worcs) evenings.

**75Ω aerial dummy load,** 220W p.e.p. G3PXJ, QTHR.

**T-4XB/C,** MN4/2000, KW107/109, W-4, KW103, compact mains working top-band tx. Turvey, 2 Knowles Street, Wednesbury, West Midlands WS10 9HN.

**Seavoice or similar vhf radiotelephone** wanted for fitting to boat. Must be in perfect working order and as new. Donn, 119 Higher Lane, Whitefield, Manchester. Tel 061-833 0606 or 061-766 2411.

**Will exchange 18 pound notes in mint cond** for one used KW Z-match. G3VRU, QTHR.

**TX/RX, preferably KW2000,** and KW107 or similar atu, good cond. G4LY, QTHR. Tel East Bridgford 349 evenings.

**40/60ft mast Versatower or similar,** also Ham 90 rotator and KW107 atu. Lee, 106 Harrowdene Road, Wembley. Tel 01-904 2104.

**Barlow-Wadley XCR-30 rx,** also KW EZ-match. Cash purchase subject inspection. G6GF, QTHR. Tel Littlewick Green (062-882) 2729.

**Drake T-4XB or T-4B tx.** Must be in good cond and comp with manual and psu. G4AFQ, QTHR. Tel Ashford (Middlesex) 54307 after 6.30pm.

**Pair of 4X250Bs, 4CX250Bs or 4X150Bs** with bases or chimneys and spare valves if possible. 240V/1·5kV or 2kV 400mA (approx) transformer, preferably with 6V 5·2A (min) winding. Please quote overall dimensions of transformer. *Radio Communication Handbook*, 4th ed, 1968. J. A. Young, Zoar, Wadbister, Girlsta, Shetland Isles ZE2 9SQ.

**Eddystone 850/4 or similar modern lf rx,** also lf adaptor for R206. Passfield, 30 Greenleaf Close, Tulse Hill, London SW2. Tel 01-674 5825.

**Homely lodgings required by amateur,** convenient by LTE to employment in Holborn. Bed-sit with cooking facilities or breakfast and evening meal. Weekdays only, commute home weekends. *For sale:* Labgear LG300 tx less mod/psu, £10 ono. G6ZH, QTHR. Tel 01-405 3434 ext 7679.

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**Yaesu FLDX400** also Atlas 180. FT101 available for disposal when above equipment acquired. G3ZTK, QTHR.

**Xtal-mixer vfo,** 3·5MHz to 28MHz. Output minimum 3W. Commercially built preferred but would consider homebrew if expertly made and finished. G3GNM, QTHR. Tel 01-907 3733.

**Exchange Liner 2,** only eight months old, unmod, for similar value KW hf bands tx/rx with ac/dc PSUs and manual. Prefer collect mid-southern England for mutual demo. G3CVB, 31 Elms Way, Bournemouth BH6 3HU. Tel 48248.

**KW E-Zee match,** Olympic Z-match (500W) or similar. Eddystone EC10. 2m converter, 4-6MHz. Wide-spaced variable capacitors ex-TU5B (140pF). Will collect reasonable distance. GW3DSV, QTHR.

**MSK5 electronic keyer** in good cond. G4BEU, 1 Mayton Avenue, Frettenham, Norwich NR12 7LH.

**AT5 etc** for top band mobile (or similar). G4DES, QTHR.

**Gen cov portable rx,** also 20/15/10 converter, i.f. not important. G3VXS, QTHR.

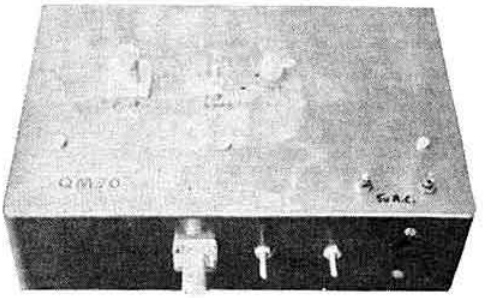
**Linear:** FL2500, FL2000/B, KW1000 or similar, good working order essential. G4DCI, QTHR. Tel Nottingham 231430.

**Elan beam.** Akai amplifier 5200 or 5500. *For sale:* Hygain 18AVT/WB, £34 carr paid UK. 8 Heythrop Drive, Middlesbrough.

# QM70 DON'T KEEP UP WITH THE TIMES—WE KEEP AHEAD OF THEM


**28/432 SOLID STATE TRANSVERTER**

This is a new model now rated at 10W rms output under linear conditions. Two receiver RF stages into a MOS fet mixer. Two independent IF outputs fitted as standard. Transmit section utilises all silicon compliment, stripline PA circuitry. Internal AE c/o relay built in, metered RF output and LEDs for tx/rx condition. BNC aerial socket. Supplied complete with harness for connection to your hf ssb transceiver. All this in ONE box. Use it portable, mobile or fixed. **£83.25.**




**432 VALVE LINEAR AMPLIFIER**

Designed for ssb, fm, am, video etc. Cavity tuned design featuring 50W output. Housed in a strong but attractively styled die-cast box and supplied less psu and blower. Requires 5v AC floating earth and up to 1kV at 100mA. **£34.50.**

## 2FM70

This is the latest addition to our amateur range, the QM70 2FM70. Connected in the aerial lead of your 2m FM transceiver it will give you instant 70cm operation. A 2m/70cm switch is fitted so that change over from one band to the other is by a single flick of a switch. No awkward fumbling with plugs and sockets, this unit is contained all in one box, measuring only 180 × 105 × 35mm and constructed from heavy gauge aluminium. A LED is used to show 70cm operation and all RF switching is effected by an automatic sensing circuit, thus eliminating the need for switching supplies from the transceiver. This must be the answer for those wishing to qsy to 70cm simplex and repeater operation on a limited budget. **£50.00.** Send sae for complete details.

**28/144 SOLID STATE TRANSVERTER**

Receiver utilizes 2 RF fets and MOS fet mixer together with 2 independent IF outputs fitted as standard. Transmitter utilizes all silicon compliment resulting in a clean signal free from spurri. Operates from 12v (negative earth), so is thus portable and mobile and can be used to drive a QQV06-40A linear amplifier to full output. Can be quite easily modified to comply with RSGB qrp contest rules. RF output is 2W under linear conditions. SO239 aerial socket. RF power output meter and LEDs to indicate rx/tx states. Supplied complete with harness for connection to your hf ssb transceiver. **£51.75.** Housed in same style cabinet as 28/432 transverter.

ALL PRICES INCLUDE CARRIAGE AND VAT

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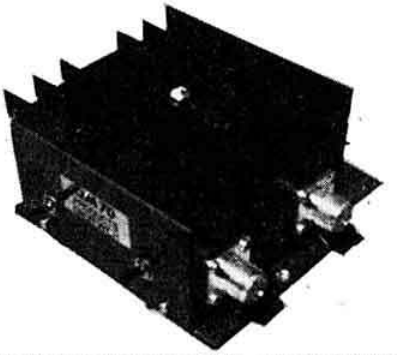

**144PA50**

All solid state 12v operated 2m linear amplifier. Just connect in the aerial line and to a source of 12v and leave the rest to the built-in RF sensing aerial c/o relay. 10W input produces 50W output at 13·8v. Accepts SSB, FM, AM and CW with switchable hang time for ssb operation. Can be switched off for "straight through" operation. SO239 sockets for both RF input and output. Supplied complete with approx. 2m of heavy duty cable. Size 100 × 110 × 75mm. **£50.00**

**AGENTS Chris Goadby, G8HVV, 0444 7 2893 (evenings and weekends only).**
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**CRAYFORD ELECTRONICS, 32 Iron Mill Lane, Crayford, Kent.**

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**QM70 PRODUCTS, 10 Pilgrim Rd., Droitwich, Worcs. WR9 8QA**

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**Printed circuit boards from Pye R/T equipment, with circuits.** All transistor, all in good used condition, unless otherwise stated.

**10·7MHz I.F.** board **£2.15**
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**455kHz block filters** 25kHz chann. spacing, low impedance **£2.05**
25kHz chann. spacing, high impedance **85p**
**455kHz A.M. I.F.** board (ex AM25B) **£1.25**
**455kHz A.M. I.F.** board ex AM10, AM25T **£1.80**
**Squelch boards** (ex Cambridge) AM **40p** (ex AM25T) **50p**
(ex AM25B) Type A or B, **17p**. 2 for **30p**
**Mic. amplifier** board ex AM25B **95p** ex AM25T **95p**
**Mod. output** board ex AM25B or T **50p**
**Rx Audio** board ex AM25B **50p**; ex AM10 **£1.70**; ex AM25T **50p**
**6kHz Audio block filter** ex AM25B **30p**
**AGC Assembly** ex AM25B **30p**
**Mic. preamp** board, 2 transistor, emitter follower output **60p**
**Modulation transformers** with connection data
p.p. NKT404/PC28/OC35 to QQV03—10 **£1.45**. Driver to suit **40p**.
—20a, **£1.45**. Driver to suit, **40p**.
**Audio Transformers** 6AQ5 to 3Ω & 10Ω, pp NKT404 to 3Ω, small or large. Drivers to suit, small or large. **40p** ea, any 2 for **70p**, 3 for **£1.00**.
**Lt Choke** 3A 0·1 Ω, for psu or hash filter, **40p** each, 3 for **£1.00**.
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**Rectifier** plug in valve replacement stack of silicon diodes, full wave 2·6kV p.i.v. at 400mA. Int. oct. base, wired as 5U4, easily moded. **90p**
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ditto, 6 way (2 pins at rt. angles) male or female **17p**
**Toggle switches**, SP biased off **17p**
**Crystals** HC6U: 12·700MHz, 11·155MHz **60p**
HC6U for 2m Tx 9·0656, 9·0688, 9·0719MHz **£1.70**
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NE555 Timer for tone-burst gen. or time-out indicator **75p**
**Relays** 12V 2 pole co 6A contacts, ex-Cambridge **30p**
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Type 2400 ex AM25, please specify coil/contacts required **30p**
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Input 12V DC, output 265V 150mA (Cambridge) **£2.05**
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10, 20, 25, 100, 250, 500, 1·5k, 2k, 2·5k, **35p** each, any 4 for **£1.**
**Air spaced Trimmers** (ex) small: 2–20pf, 2·4–30pf, large: 10pf, 25pf **17p**
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**Beehive trimmers** 2–8pf **5p**
**Tetfer trimmers** 2–10pF, multiturn, OK for UHF. **70p**
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**Other Pye coils and transformers also available**

**10·7 IFT** (valve type) 2½" × ½" square double tuned **25p**; 2 for **40p**; 6 for **£1.00**
**Modulator kit** for QQV03–20a. Includes all necessary components; ready assembled pc boards, driver and output transformers, power transistors (with mtg. kits) circuit and connection details; also suitable for QQV03–10, for 12V working, bargain price **£2.95**
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**Rotary Converters** 12V DC to 320V 160mA DC **£1.70**
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**STC AM661 mobiles**, hi-band, 6-channel, 12½kHz, complete, **£54.00**

Unless stated otherwise, components are ex-equipment, in good condition, your satisfaction guaranteed. Wherever possible, full supporting data is given. Prices quoted are inclusive of UK post & packing & VAT at 25%

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★ **Simply connect in series with your microphone lead. Needs no internal connections to your transmitter. Push-to-talk facilities are retained.**


*See Rad Comm (August 1974) and S.W. Mag (July 1975) for reviews of this equipment.*

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**FOR A TRIAL PERIOD WE WILL ABSORB THE WHOLE OF THE INCREASE IN VAT OURSELVES.**

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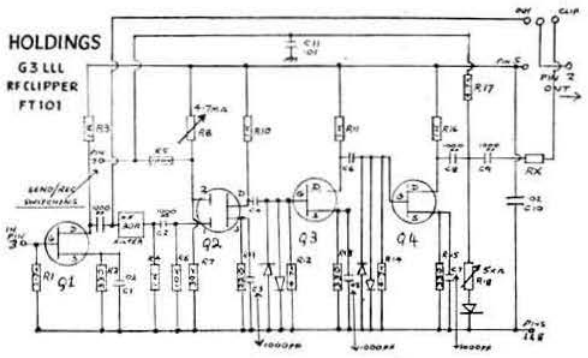
**HOW'S IT WORK?** — On transmit the double side band suppressed carrier signal from the FT101 is applied to Q1 amplifier slightly and then converted to SSB by the SSB filter. As with any SSB signal each voice frequency then represents one (and only one), radio frequency, and this signal is further amplified by Q2 and Q3. As the mic gain is advanced the signal eventually becomes strong enough for the peaks to be clipped by the second set of clipping diodes. Q3 has a gain of about 10dB so that if the mic gain is advanced to give a total of around 20dBs of clipping this is shared by the two sets of diodes ensuring that neither of the stages can be overloaded. Q4 provides isolation from the clipping diodes, and passes the signal back to the transmitter via the output control.

On receive the signal path is the same, but the gain is reduced and the output control is disconnected. This is achieved by wiring the clipper to the FT101 TX/RX switching circuits resulting in 13 volts being applied to pin 7 in the transmit mode only. The fact that the diodes are in circuit on receive does not matter, as only a colossal local signal could cause them to clip. As they are after the SSB filter, this does not matter, and as the extra gain is provided within the automatic gain control circuit loop, this works better with the clipper in position, and the FT101 has less tendency to overload on strong local signals.

The clipper was originally designed to go with the FT101 Mark 2 which was rather short of receive gain, and here the improvement on receive is extremely noticeable. Several users have commented that they would consider the unit worth the cost for the improved receive performance alone when used with this model. The FT101B has of course improved gain and selectivity when compared with the Mark 2 and here the difference in receive performance is less noticeable. It is still worth while however, when one considers that hardly any extra components are used in achieving it, and that the overload problem is reduced.

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G3LLL's RF Clipper for FT101 Mark 1, Mark 2 or B) state which) **£45.00**
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Special 444 mic with normal/DX switch wired with plug *only* for FT101 **£15.00**

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**G8QS**

**432MHz SSB Transverter.** 28–30MHz IF, 2·5 watts (typically 3W) of low distortion SSB. Low noise receiver N.F. Typ. 3·5dB all levels compatible with FT101 or similar. Specified with 13·8v DC supply. Consumption 1·2 amp. Price **£56** + VAT.

**Liner 2 Owners.** The above transverter can be fitted with 403.6MHz injection and VXO. For use with the Liner 2 28·5MHz IF system. Price **£63** + VAT.

**Linear Amplifier 432–10.** Designed for use with above transverters 2·5W drive 10W out. Price **£22.50** + VAT.

**Linear Amplifier** 432–25–10dB. 2-stage linear full 25W PEP from transverter 2·5W PEP. 13·8v supply. **£50** + VAT.

**Linear Amplifier** 432–25 10W in 25W out, 13·8v with 4W in and optimized at this level. Output exceeds 15W PEP. **£33** + VAT.

**Liner Linear 40.** 40W O/P for 10W drive. Designed for use with the Liner 2 Mk 2 version with improved spec. **£35.50** + VAT.

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**Preamp. PA1.** 50Ω in/out. Mosfet >15dB gain at 144MHz with 2·5dB N.F. **£4** + VAT.

**Preamp. Lin.** Liner 2 preamp. specially matched >15dB gain at 144MHz with 2·5dB N.F. **£4** + VAT.

New items expected to be in production by the time this advert appears. SAE with enquiries.

**2 metre 10W Transverter.** 28–30MHz IF.

**Converters** using signetics D-MOS enhancement mode. Mosfets. These will have better X-MOD and noise figures. From development tests these converters will be vastly superior to most others.

**Transistors VHF and UHF. VAT included**

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| | | | |
|---|---|---|---|
| **UHF** | BLY38, **£3.00** | BFW16, **£0.75** | 2N5915, **£6.80** |
| **CTC** | B3-12, **£4.72** | B12-12, **£6.38** | B25-12, **£12.56** |
| | B40-12, **£15.56** | C1-12, **£3.72** | C3-12, **£5.45** |
| | C12-12, **£8.17** | C25-12, **£16.89** | C30-12, **£21.01** |
| | C40-12, **£27.39** | | |

**Components. VAT included**

Mul. film trimmers. 7·5mm, 15pf and 22pf, **£0.12** each.
JFD microwave silica glass, 1–14pf, **£0.50.**

Die cast box 4½ × 6½ × 2, **£1.95.**

Die cast box 4½ × 7½ × 2, **£2.10.** Eddystone 6827P.

**NOTE.** All our products are designed to commercial practice, nothing is run above maker's specification. We do not indulge in specmanship. Nothing leaves unless it meets specification.

**Postage**—Transverters, Convertors, Linears, £0.80; Transistors, Preamps, £0.25. Minimum order £1.50.

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# MICROWAVE MODULES LIMITED

## 144MHz Mosfet Converters

**UPDATED SPECIFICATION**

The overwhelming response to the introduction of our 144MHz SSB receiver converter has indicated the requirement for a tightly specified converter for use with modern highly accurate 28-30MHz receivers. To this end we have now standardised the design of our 28-30MHz Converter using a zener-stabilised 116MHz crystal oscillator, giving a typical read-out error of better than 1kHz. The converter is now available in the two versions, with and without the local oscillator output facility.

**MMC144/28** Price **£18.90** inc. VAT

**MMC144/28 LO** (with 116MHz output) Price **£19.90** inc. VAT

**SPECIFICATION**

Noise figure: 2·5dB max. Gain: 27dB typ.
Image rejection: 65dB typ.
Crystal oscillator: 116MHz (zenered)
Frequency error at 144MHz: 3kHz max.
Power supply: 35mA at 12 volts.
116MHz o/p power: 5mW min (LO o/p version)

We have extended our popular range of single conversion converters to include the following I.F.s:
9–11, 12–14, 14–16, 18–20, 24–26, 28–30MHz. Price **£18.90** inc. VAT

**144MHz DOUBLE CONVERSION MOSFET CONVERTER**

I.F.s available ex-stock: 2–4, 4–6MHz. Price **£18.90** inc. VAT
This unit was developed to meet the heavy demand for a converter suitable for use with receivers having better performance at lower frequencies. It uses two dual-gate mosfet mixers, both fed from the output of a 70 or 71MHz crystal oscillator. Selectivity is obtained at the first I.F. in the 74MHz range, thereby overcoming the usual problems associated with low-I.F. single conversion converters.

**144MHz DUAL OUTPUT PREAMPLIFIER**

This two-stage mosfet preamplifier has two separate isolated outputs, for feeding two receivers, for example. The gain is 18dB, and the noise figure is 2·5dB. The noise figure is individually optimised on each unit using our new automatic noise measuring equipment. Price **£11.30** inc. VAT

**70MHz MOSFET CONVERTER**

I.F.s available: 4–4·7, 14–14·7, 18–18·7, 28–28·7MHz. Price **£18.90** inc. VAT

**70MHz CONVERTER FOR SSB**

I.F. 28–28·7 with 42MHz osc. output (similar to 144MHz version above)
Price **£19.90** inc. VAT

**SOCKETS**

All our equipment (apart from 1,296MHz) is fitted with Belling-Lee sockets. Optionally all equipment can be supplied from stock fitted with BNC sockets (50 or 75 ohms). Extra charge **£1.00** inc. VAT

**432MHz POWER SOURCE**

A simple and efficient method of producing power is provided by the use of our MMV432 varactor tripler. This unit, when driven by a 144MHz transmitter (AM, FM, or CW), converts this power with high efficiency to 432MHz. A pi-network in cascade with an L-network matches the input impedance to the low impedance of the diode. A similar circuit is used as the output network to provide optimum filtering of harmonics.
Spectrum analysis of other varactor tripler designs leaves us in no doubt that our unique design concept alone achieves the necessary high degree of unwanted harmonic rejection as specified below.

**MMV432** Price **£21.90** inc. VAT

**MMV432 SPECIFICATION**

Output Power at 432MHz: 14 watts typical (for 20 watts drive at 144MHz)
Bandwidth: 430–440MHz at −1dB
Typical Harmonic Performance:

| | |
|---|---|
| Fundamental | −30dB |
| 288MHz | −50dB |
| 576MHz | −40dB |
| Others | −60dB |

**432MHz MOSFET CONVERTER**

I.F.s available ex-stock 14–16, 18–20, 24–26, 28–30, 144–146MHz
Price **£22.50** inc. VAT

This unit uses a dual-gate mosfet mixer for excellent strong-signal performance preceded by two BFY90 transistor RF stages for high sensitivity. All UHF tuned circuits are printed using Microstrip technology, and a crystal in the 100MHz region is used in the oscillator chain to overcome unwanted beats in the tuning range.

**1,296MHz CONVERTER**

This converter has been developed using an extension of the microstrip techniques that have been well proven in our 70cm converter design. Two versions of the design are available using either a 96MHz or 105·666MHz crystal to produce I.F.s of 144–146MHz or 28–30MHz respectively, corresponding to the 1,296–1,298MHz band. We are using crystals of a very tight tolerance to minimize the offset that would otherwise be very noticeable when using a high-performance 28–30MHz tunable receiver. The multiplier chain uses three BFY90 transistors and the mixer is fabricated using a pair of MA 4882 Schottky diodes in a balanced hybrid ring configuration. The I.F. head amplifier uses a selected low noise dual-gate mosfet to give an overall noise figure which is typically better than 8·5dB, and a gain of 25dB. Microstrip UHF circuitry ensures repeatability of this high performance design. The unit is housed in the same small die-cast box as the rest of our range of converters and is fitted with 50 ohm BNC connectors for optimum UHF performance. The converter operates from a nominal 12V supply and is available in negative earth version only. Price **£29.90** inc. VAT

**1,296MHz VARACTOR TRIPLER**

Maximum input power at 432MHz: 24 watts. Typical output power (at maximum input): 14 watts Price **£31.30** inc. VAT

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**We have just been appointed as exclusive UK representative for KLM Electronics of California. See their exciting range of VHF/UHF Power Amplifiers at the Leicester Exhibition, 30th and 31st October and 1st November.**

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**EUROPA B** A highly developed unit, in production now for about three years and in use in over fifty different countries.
Plugs into the accessory socket of Yaesu/Sommerkamp equipment.
Our NEW power supply CPS10 makes the Europa compatible with any normal HF gear. We can supply the Europa with switched crystals if your equipment does not cover the whole of 10 metres.

**THE EUROPA B gives you:**

- ★ Highest transmit power, 200W input. 50% efficient. Adequate for OSCAR work.
- ★ Highest receive sensitivity available—2dB N.F.
- ★ Cleanest output spectrum available.
- ★ Transmits any modes with a drive power of 200mW.
- ★ Crystal used is very high stability and close tolerance, 5ppm, unit.
- ★ Size: 9" × 4" front panel, 4½" deep.
- ★ Low price, £109.37 complete to plug in. Ex stock. Price less valves (2 × QQV03/10 and 1 × QQV06/40A) £92.75.

The Europa Tank Circuit has been designed to enable you to use devo 3/20A valves in the PA if you wish, at the same input as a devo 6/40A.


NEW! We now have in stock a complete AC PSU for the Europa, Type CPS10. This supplies all the voltages to power the Europa or the Europa B. It also contains a 50 ohm adjustable dummy load and change over relay to reduce the 10 metre output power to a level for driving the Europa.
This makes the Europa B compatible with HF equipment without transverter output sockets with NO modifications.
Size: Same as the Europa B. Price £50.00. Ex stock.

VHF CONVERTERS—2 METRES, 4 METRES, 70CM, SATELLITE BAND, MARINE BAND and many others from stock. Other frequencies to order—please enquire.

**SENTINEL DUAL GATE MOSFET 2 METRE or 4 METRE CONVERTERS**

- ★ N.F.—2dB. Gain 30dB. Supply 9-15V.
- ★ No oscillator frequency multiplication.
- ★ Crystals used are very high tolerance (5 ppm).
- ★ High signal protection and overvoltage and reverse voltage protection diodes are built in.
- ★ 2 metre I.F.s 28–30MHz, 2–4MHz, 4–6MHz. 4 metre I.F. 28–28·7MHz.
- ★ Size: 2½" × 1½" × 3" long except the 2–4MHz and 4–6MHz which are double conversion and 4" long.
- ★ Price only £18.75 delivered from stock.

**SENTINEL X DUAL GATE MOSFET 2 METRE CONVERTER**

A de luxe version of our Sentinel converter, containing a mains power supply or external battery operation. It has front panel RF gain control. Technical data is the same as the Sentinel. Size: 5" × 1½" front panel, 4" deep. Stock I.F.s 2–4MHz, 4–6MHz, 28–30MHz. Price: £24.37.

**THE SENTINEL 2 METRE CONVERTER KIT, 28–30MHz** Ex stock.

The kit is supplied with printed circuit board drilled and all coils mounted to make assembly so simple. All components, metalwork, nuts and bolts etc are supplied. Performance data is the same as our Sentinel converters. Price: £12.74. IF it doesn't work, send it back with £2.30 and we will fix it for you.

THE SENTINEL MF DUAL GATE MOSFET 2 METRE TO MEDIUM WAVE CONVERTER in two switched bands. Price: £23.44.

**UHF CONVERTERS**

**SM 70 FET CONVERTER**

- ★ I.F. output 144–146MHz. Noise figure 3·5dB, Gain 30dB.
- ★ Size: 5" × 2" × 1½".
- ★ By using the SM70 with your 2 metre receiver you can get excellent 70cms receiving performance for only £18.75. Ex stock.

**PRE-AMPLIFIERS** 2 metres, 4 metres, 70cms, Satellite Band, Marine Band etc from stock. Other frequencies to order.

**SENTINEL LOW NOISE FET PRE-AMPLIFIER**—Ex stock. If you want the ultimate in 2 metres sensitivity and selectivity:

- ★ Built in a box which matches our converters.
- ★ Isolated supply lines make it compatible with any existing polarity.
- ★ Low noise figure—1dB. Gain—18dB.
- ★ High selectivity tuned circuits. Price: £8.52.

**THE PA3 DUAL GATE MOSFET PRE-AMPLIFIER** Ex stock

- ★ Small (about one cubic inch) printed circuit board pre-amplifier developed to fit inside transceivers where it can be wired into the receiver aerial lead after the c/o relay.
- ★ Low noise figure—2dB. Gain—18dB. Price £6.87. Supplied with fitting data.

**SM 71 70CM PRE-AMPLIFIER** Ex stock. A selected 2 stage FET pre-amplifier.

- ★ Noise figure—3·5dB. Gain—18dB.
- ★ Size: 2½" × 4" × 1½"
- ★ Price: £11.25.

As a result of a professional contract to manufacture pre-amplifiers near 70MHz we can now offer 4 metre Sentinel Pre-amplifiers from stock. Price: £8.52.

**All the prices include 25% VAT and British Isles delivery. We can give same day COD service (£50 limit) or ACCESS or BARCLAYCARD delivery or HP. If you want any detailed information or help we are a telephone or letter away so do not hesitate to ask us.**

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# P.M. ELECTRONIC SERVICES

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**PRICES : (a) £2·00 (b) and (c) £2·50**

**AVAILABILITY :** (a) and (c) Stock items, normally available by return (we have over 3,000 items in stock). (b) Four weeks normally but it is quite possible we could be able to supply from stock.

| CRYSTAL FREQUENCY RANGE USE (Tx or Rx) and HOLDER / OUTPUT FREQUENCY | 4 MHz-TX-HC6/U | 6 MHz-TX-HC25/U | 8 MHz-TX-HC6/U | 10 MHz-RX-HC6/U | 11 MHz-RX-HC25/U | 14 MHz-RX-HC25/U | 18 MHz-TX-HC25/U | 36 MHz-TX-HC6 & 25/U | 44 MHz-RX-HC6/U | 44 MHz-RX-HC25/U | 48 MHz-TX-HC6 & 25/U | 52 MHz-RX-HC25/U | 72 MHz-RX-HC25/U |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 144·030 ... | b | b | b | b | b | b | b | b | b | b | b | b | c |
| 144·4/433·2 ... | a | b | a | b | b | b | b | b | b | b | b | b | c |
| 144·480 ... | b | b | b | b | b | b | b | b | b | b | b | b | c |
| 144·600 ... | b | b | b | b | b | b | b | b | b | b | b | b | c |
| 144·700 ... | b | b | b | b | b | b | b | b | b | b | b | b | c |
| 145·000 ... | a | a | a | a | a | a | a | b | a | a | a | a | b |
| 145·050/R2T ... | a | b | a | a | b | b | b | b | b | b | b | b | b |
| 145·075/R3T ... | a | a | a | a | b | b | b | a | b | b | b | b | b |
| 145·100/R4T ... | a | a | a | a | b | b | b | a | b | b | b | b | b |
| 145·125/R5T ... | a | a | a | a | b | b | a | a | b | b | b | a | b |
| 145·150/R6T ... | a | a | a | a | b | b | a | a | b | b | b | a | b |
| 145·175/R7T ... | a | a | a | a | b | b | a | a | b | b | b | a | b |
| 145·200 R8T ... | a | a | a | a | b | b | a | a | b | b | b | a | b |
| 145·300 ... | b | b | b | b | b | b | a | a | b | b | b | a | b |
| 145·350 ... | b | b | b | b | b | b | b | a | b | b | b | b | c |
| 145·400 ... | b | a | b | b | b | b | a | a | b | b | b | a | b |
| 145·500/S20 ... | a | a | a | a | a | a | a | a | a | a | a | a | c |
| 145·525/S21 ... | a | a | a | a | a | b | a | a | b | a | b | a | b |
| 145·550/S22 ... | a | a | a | a | a | b | a | a | b | a | b | a | b |
| 145·575/S23 ... | a | a | a | a | b | a | a | a | b | a | b | a | b |
| 145·600/S24 ... | a | a | a | a | a | b | a | a | b | a | b | a | b |
| 145·650/R2R ... | b | b | b | b | a | b | a | b | b | a | b | a | b |
| 145·675/R3R ... | b | b | b | b | a | b | a | b | b | a | b | a | b |
| 145·700/R4R ... | b | b | b | b | a | b | a | b | b | a | b | a | b |
| 145·725/R5R ... | b | b | b | b | a | b | a | b | b | a | b | a | b |
| 145·750/R6R ... | b | b | b | b | a | b | a | b | b | a | b | a | b |
| 145·775/R7R ... | b | b | b | b | a | b | a | b | b | a | b | a | b |
| 145·800/R8R ... | a | a | a | a | a | a | a | b | a | a | b | a | c |
| 145·950 ... | a | b | a | a | b | b | b | b | a | b | b | b | b |

**N.B.** Frequencies as listed above but in alternative holders are available as per code (b).

**ORDERING.** All we require to know is (1) Output frequency, (2) Crystal frequency range, (3) The Holder and, (4 Either the Load Capicitance (pfd) or equipment. The exact crystal frequency is not essential, though it would be of assistance to quote it if known.

**4m. CRYSTALS for 70, 26 MHz — HC6/U**

TX 8·7825 MHz and RX 29·7800 MHz ... ... at **£2·00** (a) each
RX 6·7466 MHz ... ... ... ... ... ... at **£2·50** (c) each

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**V.A.T.** Despite the fact that some of our competitors have been charging other rates than those laid down by the Controller of VAT at the Head Office of H.M. Customs & Excise, we can assure our customers that the correct rate for all amateur crystals is 25%. However we have been given the concession that crystals for use as frequency standards in test equipment e.g. 100 kHz, 1 MHz, 5 MHz, 10 MHz and 10·7 MHz are chargeable as from 1/9/75 at the rate of 8%. We hope that unethical action of others has not caused too much inconvenience during recent months.

**4m. CRYSTALS FOR 70, 26 MHz—HC6/U**

TX 8·7825 MHz and RX 29·7800 MHz ... ... ... at **£2·00** (a) each
RX 6·7466 MHz ... ... ... ... ... at **£2·50** (c) each

**70 cm. CRYSTALS FOR SIMPLEX AND REPEATER CHANNELS**

PYE POCKETFONE (PF1) } TX and RX Crystals } TX and RX Crystals
PYE UHF CAMBRIDGE (U10B) } for 433·2 MHz and } for other channels
PYE UHF BASE STATION (U450) } GB3PY, etc., each (a) **£2·00** } **£2·50** (b)

STORNO CQL 662—433·2 MHz and GB3PY, **£2·50** (c) other channels **£2·50**(b)

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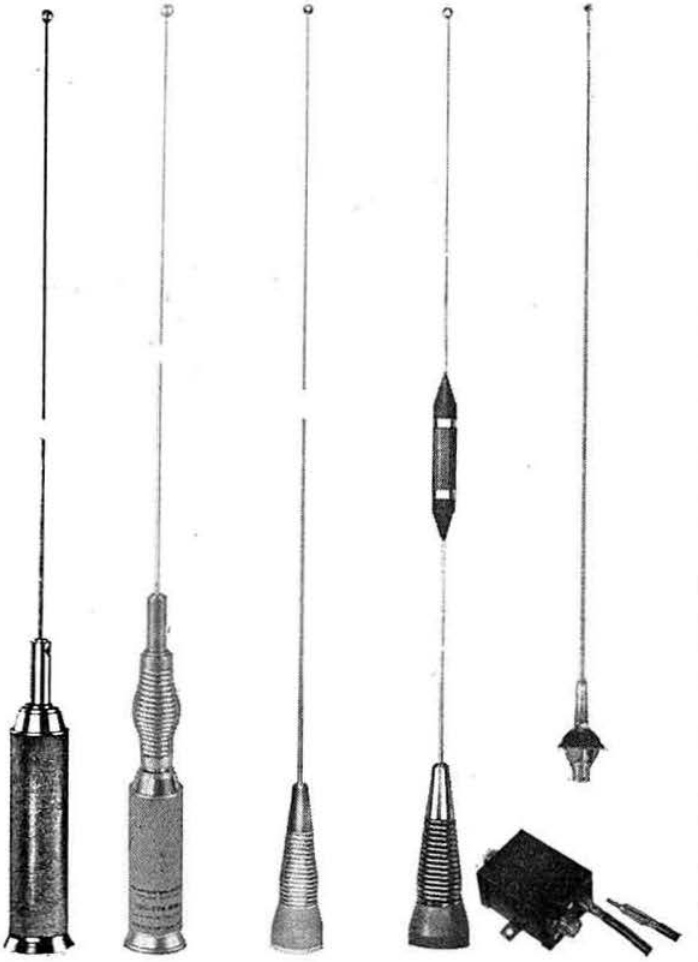

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Date .....

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