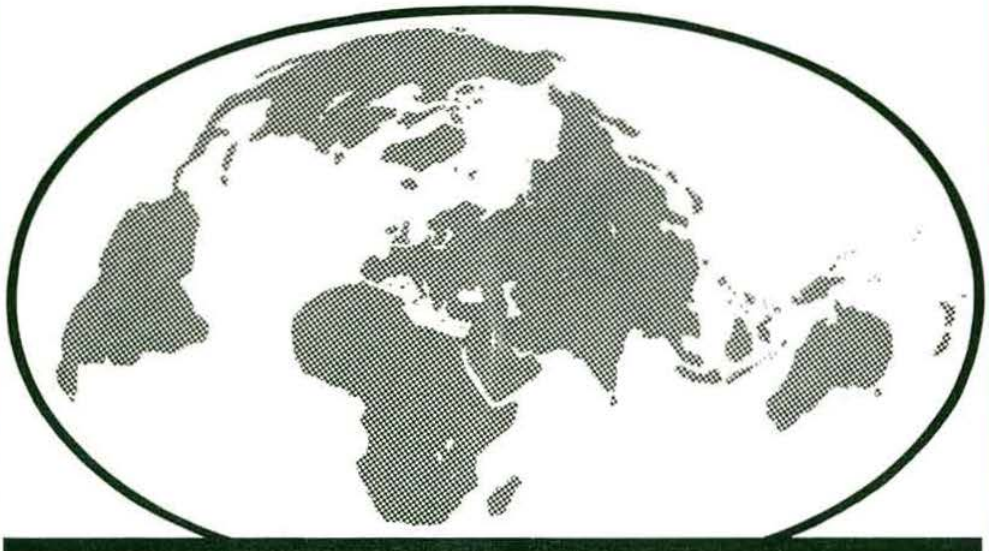
# radio communication

April 1975

1925 .. .– .–. ..– 1975



**international amateur radio union**

journal of the Radio Society of Great Britain

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All components for this project are now generally in stock. PC Board, **£1.90** CRO71-8A Toroids, **160** MD108 Ring Mixer, **£5.90** Filter, **£24.00.**

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Reprint of article (Sept. 74) **20p**

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**G3TDZ 2m TX/RX** (Jan. 73)—Reprint 20p plus large SAE. Kits available as follows: **RX—£15.50**; **TX—£8.10** (State Xtal frequency required: 72·625, 72·675, 72·75MHz) **MOD—£3.00** (transformer and board not available).

**G3XGP MINI D.F.M.** (June 1973)—Reprint 20p plus large SAE. Complete kit for 1MHz clock version with 30MHz input i.c.s, **£39.45.**

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## ADD-ON UNITS FOR G3ZVC TCVR

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Designed to provide a front end preselector for the G3ZVC (and other equipment which require some front end gain at a low noise figure, together with good RF selectivity). The preamplifier uses a protected dual gate FET and operates from a 12V supply, —ve earth.

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**12V to 6V Regulator and 1W Audio Amplifier Kit (by ARBBG)**
This module is designed to provide a stable 6V supply for the G3ZVC transceiver board from 10-15V supplies and a versatile 1W + audio amplifier to boost the audio output available.

The amplifier consists of a 'flat' audio response transistor amplifier, driving a limited response IC power amplifier.

Polarity diode protection is applied to the regulator and thus to the 'ZVC unit.
PCB size: 3·4" × 1·8" **Kit price £6.00**

**2m V.F.O. Kit (by DJ5HD-VHF Communications, Edition 1/71)**
This V.F.O. is of the mixer type, having a VFO tuning 11 to 13MHz and a crystal oscillator on 62MHz. The 135-137MHz output is fed into the MD108 mixer stage on the G3ZVC board. It is designed for operation on 12V supply. **Kit price: £31.60**
**VHF Communications Ed 1/71 75p extra**

**H.F. Band Preselector (from data supplied by G3ZVC)**
Top capacity coupled, double tuned circuits requiring 2 coils per segment 10/15/20m, 40/80m, 160m plus a 2 gang variable capacitor. R.F. Amplifier and pre-driver for 12BY7A etc., may be added by 1 coil per segment plus extra gang tuning capacitor each. (i.e. Complete R.F. Amp + Preselector + Pre-driver for 6 bands requires 12 coils and 4 gang capacitor.

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# radio communication

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# South Midlands

## 24 HOUR SECURICOR SERVICE FROM SMC

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**FV200**
**FT200**
**FP200**

The FT200 is still without doubt one of the "best buys" available. Compare its features with similarly priced units. SPECIFICATION: 260W P.I.P. SSB/CW; 75W AM 1kHz readout on all bands 3·5–4·28·5–29MHz (3 optional 10m crystals available). Stability: 100Hz 30 min after warm up. Sensitivity: 0·5μV 10dBS/S + N. Selectivity 2·3kHz (6dB) 4kHz (60dB). Solid state FET VFO with excellent linearity (like all Yaesu VFO's). 25/100kHz calibrator. VOX/PTT. Clarifier ±5kHz. Break in CW keying.

**FT201 from £290**

The newest of the Yaesu transceiver on offer the FT201. The FT201 features 80-10m operation and the ability to run from the mains or a 12V supply. It is constructed using plug-in modules as made famous in the FT101. Of special interest to those contemplating using the 201 as a prime mover for VHF use, is the use of 9mHz as the IF frequency and that full AM operation is possible (the optional AM filter being available). For the CW enthusiasts a 600Hz filter is available with AGC characteristics to suit the mode. Write for full specifications.

**YC355D**

The YC355 series counters are available in two models. The base 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 8 digit readout using only 5 tubes but of course minimum cost with maximum performance. Built-in AC and DC power supplies enable complete portability and double sided epoxy circuit boards ensures reliable operation for years to come.

**YC355 £104**
**YC355D £125**

**FL101 £265**
**FR101S £245**
**FR101D £330**
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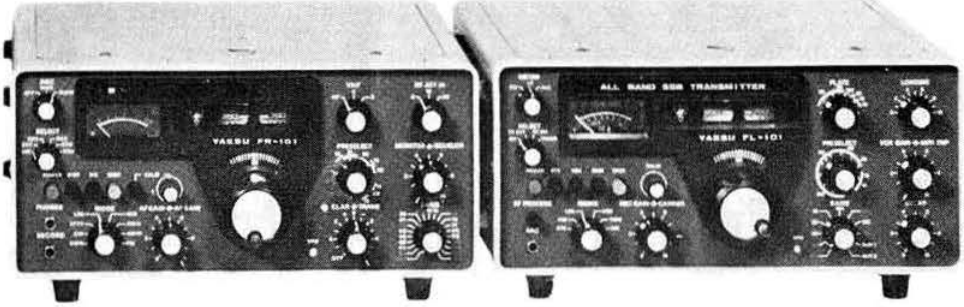
**FR101SD £330**
**FR101DD £430**
**COMING**



The FR101 is an advanced receiver offering in the deluxe version, coverage from 1·5MHz including all SW broadcast and HF amateur bands (23 in all) to 144MHz. AM, FM, SSB CW are catered for, each with a separate crystal filter. Transceive operation with the FL or FT101.

The FL101 is the ideal companion to the FR101 thus forming a superb base station. Operation on 160 through 10m using SSB, AM, CW or RSK is offered, with the added bonus of an option inbuilt RF speech processor being available at moderate cost.

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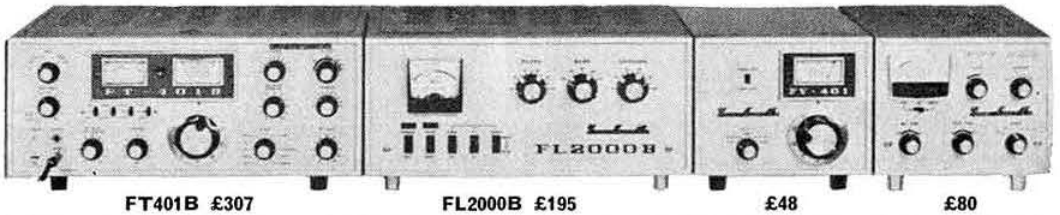


**FT401B £307** **FL2000B £195** **£48** **£80**

The FT401B and its accessories are shown above, and provide an uncomprising approach to the home station. The FT401B itself runs 500W P.I.P. but when throttled back to drive the FL2000B and coupled with the FV401 external V.FO. provides the base stations with ultimate DX appeal.

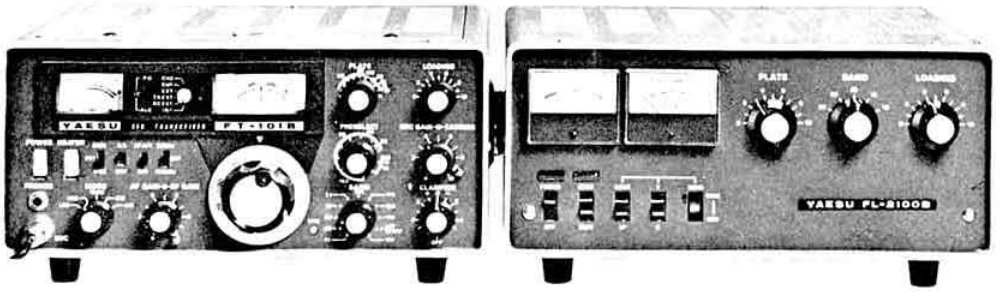
The unit nestling on the end is the FTV650. a 6m transverter which we can provide electrically modified for 70MHz, 100W P.I.P., 50W CW, 40W FM/AM **£80.00**.

**FT620 50-52 MHz £175, 50-54 MHz £180**

The FT620 features full 1kHz resolution VFO coverage across 50-54MHz in 8 ranges, SSB (selectable) AM or CW (build your own FM modulator) 4 crystal controlled channels in each band segment, receiver offset clarifier, noise blanker, built-in AC and 12V DC power supplies, mic supplied, optional AM filter (**£16**) and crystal calibrator(**£9.50**). 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 70cms, and/or parametrically up converting to 70 or 23. For use on 70cms, we are pleased to announce the Microwave Modules transverter is now available for use with a 50MHz I.F., **£62.00**.

**FT224 £130**

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.
S.M.C. models come fitted with 145·00, 145·50 and 145·55MHz as standard.



**FT101B £330**
**FL2100B £195**
**Ex-Stock in Totton**

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, or 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.

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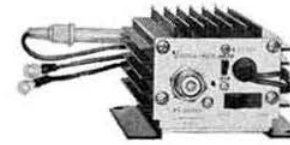

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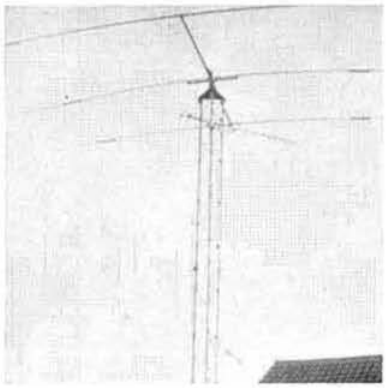

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**PHASING HARNESS 70cms**

| | | |
|---|---|---|
| PMH2/70 | 2 way harness | £3.30 |
| PMH4/70 | 4 way harness | £3.85 |

## LOOK— NEW!

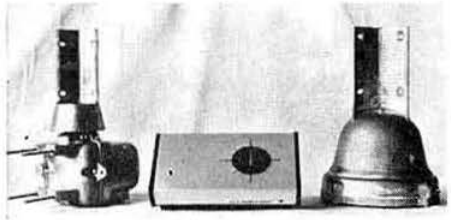
**NEW LOW PRICE SWR/POWER METERS** (p & p 30p)
**SWR10** Reflectometer, single meter, accuracy quoted ±5% .. .. .. .. **£6.30**
**SWR50** Calibrated for 50 and 75 ohm line, power meter (±15%) and SWR (±5%) .. .. .. .. .. **£11.20**

## CDE ROTATORS EX STOCK (IN TOTTON) FOR FAST DELIVERY

THE NEW CONTROL UNIT FOR THE CD44 AND HAM 2

Carriage (B.R.S.) Free. Securicor delivery 60p extra
ALL ROTATORS SUPPLIED COMPLETE WITH APPROPRIATE CONTROL BOX AND INSTRUCTIONS

| | |
|---|---|
| AR30 for Stereo and small VHF beams | £25.00 |
| AR40 for Medium VHF Small HF beams | £30.00 |
| CD44 Arrays up to 2½ sq. ft. of wind area | £60.00 |
| Ham II Arrays up to 7½ sq. ft. of wind area | £90.00 |
| Control Cable 5 core for AR30/AR40 | at 18p/m |
| Control Cable 8 core for CD44/HAM II | at 26p/m |



THE NEW SILENT CONTROL UNIT WITH AN AR30 and 40

**MOSLEY TRI BAND (10-15-20m) BEAMS (carriage £1.75)**
TA33 Jnr E 3 ele 200W RMS **£45.00** TA32 Jnr E 2 ele 300W AM **£32.00** Mustang 3 ele 2kW PIP **£60.00** Mustang 2 ele 1kW AM **£48.00**

**BANTEX** FIBREGLASS, STAINLESS STEEL VHF/UHF MOBILE ANTENNAS (Carriage 75p)
**B5** ⅝ Wave 144MHz, **£5.00** **B5U** ⅝ Wave 432MHz **£5.00** Magnetic Base Mount, **£7.50** Note: deduct 50p from price of
**BGA** ¼ Wave 144MHz **£6.60** **70½** Wave 70MHz **£3.00** Trunk LIP Mount **£5.10** aerial if standard base not required

**G WHIPS. The British Mobile HF Antennas Range** (Carriage 75p)
Tribander—10, 15, 20 .. **£12.30** LF40m, LF80m or LF160m **£4.10** Flexiwhip 10m with base **£9.50** F15, F20, F40, F80 or F160m **£4.25**
Multimobile "71", 10, 15, 20 **£14.30** MM40, MM30 or MM160 **£4.10** Basemounts .. .. **£1.85** Telescopic Whips for Coils **£1.10**

**R.F. CABLES** (Carriage up to 20m, 40p; over, 50p; less for lighter cables)
50 ohm RG8U/UR67 .. 33p/m 75 ohm UR39 .. .. 25p/m 75 ohm Flat twin .. 6p/m 75 ohm BICC 2378 .. 22p/m
75 ohm UR57 .. .. 33p/m 75 ohm Economy .. 10p/m 300 ohm Ribbon .. .. 6p/m 50 ohm UR43/UR76 .. 15p/m

**COAX PLUGS** (p and p extra)
PL259 **42p**; Reducers **12p**; PL259A **54p**; UHF Angle **90p**; 50239 **33p**; VHF back to back **66p**; BNC plugs **42p**; N plugs **83p**

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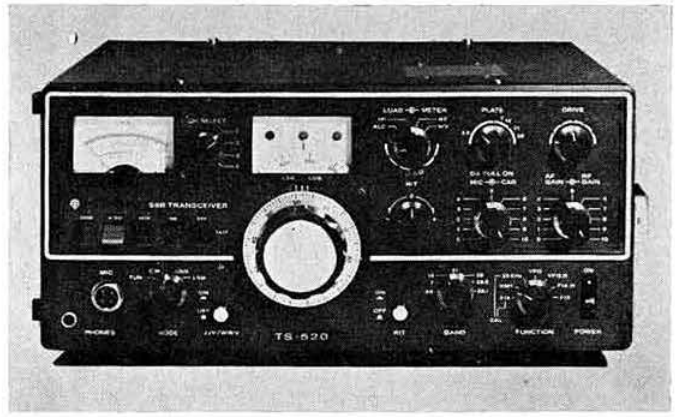
# LOWE ELECTRONICS

## TRIO
## TS520




The TS520—latest in the new TRIO line of superior amateur radio equipment. Its styling and finish put all other rigs in the shade; and it is not just pretty—the front panel is a die casting giving unheard of strength and stability.

All semiconductor except for driver and PA, the TS520 is at home mobile, portable or fixed station thanks to built-in AC power supply and 12V inverter. Blower cooled 6146's for long life and exceptional linearity.

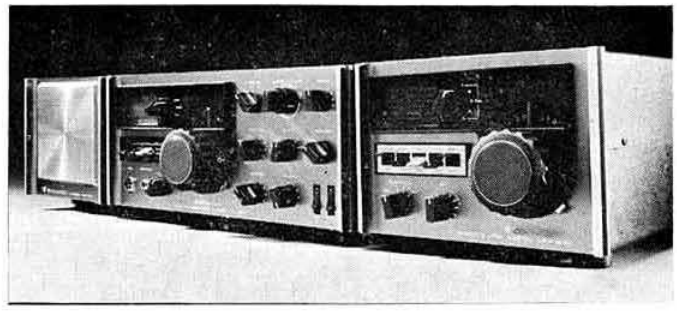
*TRIO exclusive. Built-in speech compression for that extra DX punch—without distortion, due to amplified ALC system.

### FEATURES

*R.I.T. ★ NOISE BLANKER ★ AMPLIFIED 2 SPEED AGC ★ 25kHz CALIBRATOR ★ BLOWER COOLED PA ★ FIXED CHANNEL OPERATION ★ 4 FUNCTION METERING ★ AMPLIFIED ALC ★ BUILT IN SPEECH COMPRESSION ★ LED INDICATORS FOR FIX, VFO, RIT ★ LOW POWER TUNE UP FOR LONG PA LIFE ★ TRANSVERTER OUTPUTS (MATCHING TRANSVERTER IN STOCK) ★ 12V dc/240V ac OPERATION ★ MATCHING SPEAKER AND VFO AVAILABLE ★*

OBTAINABLE ONLY FROM LOWE ELECTRONICS **PRICE £290 (VAT EXCL)**

## TRIO
## TS900



This is probably the finest amateur transceiver ever made. Professional design and construction make the TS900 a joy to own and use.

As QST (July 1973) said "This device has to be the pace-setter for the 1970's".

Full coverage 80-10; superb stability and selectivity; all mode operations including RTTY (crystal controlled RTTY shift built-in); all solid state except driver and PA; DC power supply and external VFO both available.

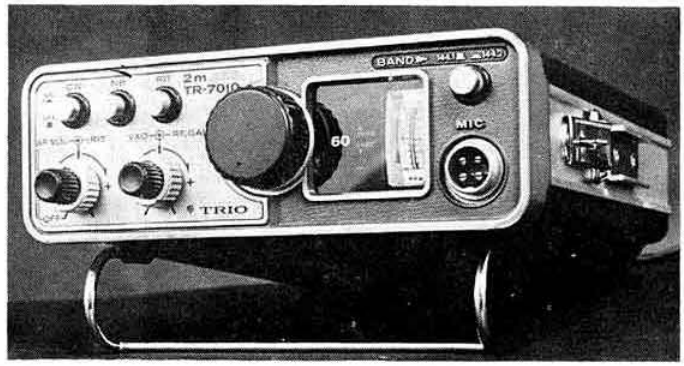
*300W pep ★ All Modes ★ Separate USB/LSB Filters ★ 500Hz cw Filter Option ★ Four Function Metering ★ Two speed AGC ★ Noise Blanker ★ 0·1 Micro Volt Sensitivity (ARRL Measurements) ★ Blower cooled pa ★ Crystal controlled rtty generation ★ VOX ★ Break in cw ★ ac psu ★ dc psu ★*

Write or phone for full specification and the reasons why the TS900 is the ultimate transceiver.

OBTAINABLE ONLY FROM LOWE ELECTRONICS **PRICE £480 (VAT EXCL).**

# LOWE ELECTRONICS

## TRIO
## TR7010




Following the worldwide success of the TS700, Trio have taken the TS700 basic design and packaged it for 2 metre SSB mobile use.

The TR7010 sets new standards in receiver sensitivity and low spurious emission on transmit. Operating CW and SSB from 144·1-144·3MHz, the TR7010 covers all CW, SSB and beacon activity. 40 5kHz channels plus VXO and RIT provide continuous coverage. 8 extra channels can be used, without retuning, in the range 144-145MHz by fitting auxiliary crystals.

Single conversion using an IF of 10·7MHz with a superb crystal filter provides outstanding selectivity. Wide range amplified AGC and newly developed FET devices in RF amplifier and mixer stages allow maximum sensitivity to be used with freedom from overload due to adjacent signals.

Single conversion transmitter with new fully balanced mixer system generates a beautifully clean signal with crisp audio quality.

The first lucky owners are on two metres right now. Listen to the signal and make up your own mind. Why not send for full details of the all new TR7010 right now.

**Price £165 (VAT excl)**

## TRIO
## TR2200G

The world's most popular 2 metre handy transceiver now comes complete with tuning fork controlled repeater access tone and facilities for 12 channels. With the advent of repeater operation in this country, it is now possible to work long distances with low power equipment and the sudden popularity of portable 2 metre equipment testifies to this fact. The TRIO TR2200G is a high performance transceiver with features not found in other rigs. Supplied with 3 channels fitted:—

145·50 Simplex
145·55 Simplex
145·175/775 Duplex

Most other I.A.R.U. channels available. **PRICE £80 (VAT excl)**

**SPECIFICATION**

*TRANSMITTER*

| | |
|---|---|
| *Frequency range* | 144–146MHz |
| *Emission* | *F3* |
| *Output power* | *1W* |
| *Freq mult* | *X12* |
| *Antenna impedance* | *50Ω* |

*RECEIVER*

*Sensitivity* Less than 1μV for 20dB S/N

*Intermediate frequencies* 10·7MHz and 455kHz

*AF output* 0·5W

*Power source* 10·4–15·2Vdc negative earth (8 × UM3 batteries or optional NiCad pack)

*Power consumption* 450mA TX 55mA RX

*Supplied complete with 3 channels, charger for NiCads, external dc lead, carrying case, shoulder strap, microphone, two battery carriers.*

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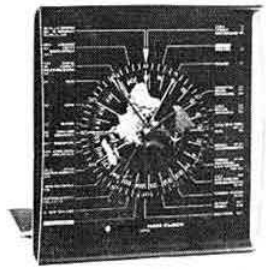
**73 from BILL G3UBO/VE8DP, ALAN G3MME, JOHN G3PCY/5N2AAC, IAN G3ZYC**

# LOWE ELECTRONICS

## TRIO FOR STATION ACCESSORIES



### HAM CLOCK

Have you ever wondered why the amateurs in Hong Kong are not replying? Maybe it's because they're in bed and you forgot just how many hours time difference there is! The TRIO HC2 Ham Clock is a 24 hour battery powered (up to 1 year on a single HP2) clock which gives instant readout of the time anywhere in the world. Beautifully styled so that you won't know whether to keep it in the shack or out in the home, it is a real asset to the DX chaser. At only **£11** (VAT exc.) it is incredibly good value.

### LOW PASS FILTER LF30

You know how difficult it has been in recent years to obtain a good low pass filter. Now the TRIO LF30 fills this need. The specification tells its own story.

| | |
|---|---|
| POWER HANDLING | 1 kW |
| CUT OFF FREQUENCY | 30MHz |
| STOP BAND ATTENUATION | 90dB |
| INSERTION LOSS | 1·5dB at 30MHz |
| IMPEDANCE | 50-100 ohms |
| CONNECTORS | SO239/PL259 |
| DIMENSIONS (mm) | 224 × 50 × 40 |

**PRICE £9 (VAT exc.)**

### BAND PASS FILTER BPF2

This is a specially designed band pass filter centred on 145MHz and is intended to be used between your 2 metre equipment and the antenna. Eliminate those out of band sproggies from your transverter in one easy move.

| | |
|---|---|
| POWER HANDLING | 50W continuous |
| PASS BAND | 144-146MHz |
| STOP BAND ATTENUATION | 90dB |
| INSERTION LOSS | 1·5dB |
| IMPEDANCE | 50 ohms |
| CONNECTORS | SO239/PL259 |
| DIMENSIONS (mm) | |

**PRICE: £8 (VAT exc.)**

### MC50 MICROPHONE

Matching microphone for all TRIO equipment. Contemporary styling and dual function construction allows use as hand or stand microphone. Dual impedance 600Ω/50kΩ and two coiled cords give complete versatility. Built-in locking PTT switch. The TRIO MC50 is an attractive addition to any station and its performance is superb.

| | |
|---|---|
| POLAR PATTERN | Cardiod |
| FREQUENCY RESPONSE | 300Hz-9kHz |
| SENSITIVITY | —56dB at 50kΩ<br>—76dB at 600Ω |

(which really means that it will drive any transmitter that we've tried it on)

**PRICE: £18 (VAT exc.)**

### MC10 MICROPHONE

Superb hand microphone matching all TRIO equipment. Press to talk or VOX operation. Supplied complete with coiled cord and 4 pin plug.

**PRICE: £6.30 (VAT exc.)**


### VFO30G
### MATCHING VFO FOR TR7200G

Gives full band 144-146MHz coverage on transmit and receive with built-in repeater shift. Centre zero tuning meter provided for accurate receiver netting. Low frequency heterodyne type vfo for stable operation over long operating periods.

**PRICE: £55 (VAT exc.)**

# LOWE ELECTRONICS

**We always have a large stock of excellent fully tested and guaranteed second hand equipment. The following list is a small selection of the items available at the time of compiling the list.**

## RECEIVERS

| | | |
|---|---|---|
| **Collins 51J3** | Simply the best | **£200** |
| **Yaesu FRsdx400** | 160 — 10 + 4m 2m | **£135** |
| **Trio JR599 Custom Special** | | **£132** |
| **Davco DR3** | Almost pocket size but what performance | **£100** |
| **Sommerkamp FR100B** | Old Soldiers never die | **£80** |
| **Eddystone EA12** | Finest dial drive in the business | **£120** |
| **Trio JR310]** | Why Oh why did they stop making this 1st class Rx. | **£70** |
| **Yaesu FR50B** | Same goes for this one | **£65** |
| **Trio JR500** | | **£45** |
| **Eddystone 888A** | See above | **£45** |
| **Trio 9R59DS** | Long standing general coverage favourite | **£40** |
| **Yaesu FR101** | | **£280** |

## TRANSCEIVERS

| | | |
|---|---|---|
| **Yaesu FT501D** | At this price it's worth buying as a digital readout receiver! | **£295** |
| **KW2000B** | If you must have 160 metres | **£185** |
| **KW2000A** | Older but some prefer it 'cos of the power supply | **£165** |
| **Sommerkamp FT500** | No linear needed with this rig. No shack heating either | **£175** |
| **Ten-Tec Argonaut** | O.K. so I was wrong. This rig really performs despite the domestic styling | **£130** |
| **Ten-Tec 100W Linear** | (yes, transistor) | **£35** |
| **Liner 2** | The rig that started it all | **£110** |
| **Yaesu FT2F** | Another example of the early model being preferred to it's successor | **£65** |
| **Multi 2000** | Good practice for a safe breaker | **£170** |
| **TW Communicator 160** | Would you believe AM? | **£25** |
| **Trio TR2200** | Small enough to hide in your handbag ducky | **£55** |
| **Heath HW32** | The incomparable single band doorstop | **£55** |
| **National NCX-5** | Most under-rated rig on the market. Still top quality | **£160** |

## SUNDRIES or if you prefer it *ODDS AND S . . . DS*

| | | |
|---|---|---|
| **Europa** | No, not the Lotus type | **£55** |
| **Yaesu FP2 with Ni-cad. battery pack** | | **£35** |
| **Spacemark SSM-1 Monitor as new** | | **£120** |
| **Russian CI-16 Double Beam Scope** | (pity about the red trace) | **£40** |

**Above prices include VAT but not carriage. Securicor will bring your new toy to your door safely and quickly but it'll cost you £2.20.**

QUOTE OF THE MONTH (or "for heaven's sake get on frequency!")
"SURELY IN VAIN THE NET IS SPREAD" Proverbs 17. supplied by Dick Winters, Melton Mowbray

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## MR. S. HASEGAWA PRESIDENT
## THE WARRANTY ON EVERY

### The Incomparable Deluxe FT-101B

This fine selection of YAESU HF Band Transceivers must commence with the ubiquitous FT101B—the definitive unit in the mobile/fixed field.

### Economical Mobile/Base Station FT-201

Fresh on the scene is the FT201 which is setting new standards in its price range and has aroused much interest and some very flattering reports.

## *GIVE AS GOOD AS YOU GET—*

**FULL DEMONSTRATION FACILITIES—**

A COUPLE OF STAMPS (WE'LL PROVIDE THE ENVELOPE) WILL BRING YOU DETAILS OF ANY ITEM — PLEASE STATE SPECIFIC EQUIPMENT IN WHICH YOU ARE INTERESTED

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Study these and the total YAESU story in the **FULL** glossy catalogue—See below.

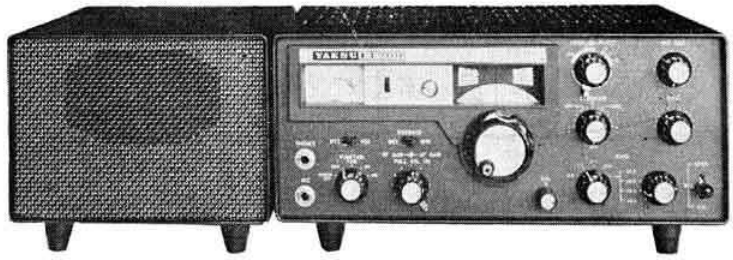
## High Power Base Station FT-401B ★

**The very latest version of the famous FT401. Immensely popular with many operators for its exceptional specification and powerful signal.**

★ *Latest Model!*

## Low Cost Base Station FT-200

**What can we say about the FT200? This has been a best-seller from the start—small wonder with such an exceptional specification at such a modest price.**



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**BY**

# YAESU MUSEN

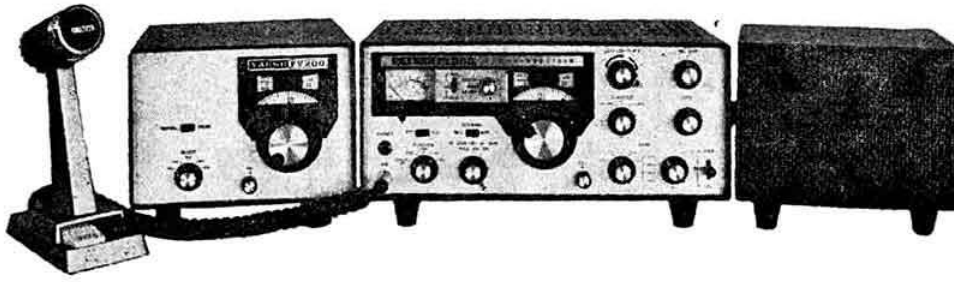
YAESU

It's worth remembering that when you deal with WESTERN ELECTRONICS you have the best after-sales service in the country. We have the best equipped service department in the country in our trade and provide free collection and re-delivery on all warranty work. It's all part of our service!

**PRICE INCREASES ARE ON THE WAY FROM YAESU! BUY NOW!**

## IT'S REALLY RELIABLE AND THE BEST BUY IN BRITAIN . . . THE FT200

**YD844** **FV200** **FT200 (£183.60)** + **FP200 (£48.60)** **PRICES inc. VAT**



FOR
260w. p.e.p.
10-80m.
SSB-CW-AM
1KHz READOUT
CLARIFIER
100KHz
CALIBRATOR

**THE FT200** is without doubt one of the "best buys" available. Compare its features with similarly priced units and kits. SPECIFICATION: 260W p.e.p., i/p SSB/CW. 75W AM 1kHz readout on all bands 3·5–4, 7–7·5, 14–14·5, 21–21·5, 28·5–29MHz (3 optional crystals available for 28–28·5, 29–29·5 and 29·5–30MHz, Stability: 100Hz 30mins after warm-up. Sensitivity: 0·5μV 10dBS/S + N. Selectivity: 2·3kHz (6dB), 4kHz (60dB). Clarifier ±5kHz. Break-in CW keying. You will pay more for a kit with less power, only 5kHz readout and no receiver incremental tuning (Clarifier control). These prices only apply whilst current stocks last. Three extra crystals fitted for full 10m coverage COST **£8.10** inc VAT.

*REMEMBER!:* We have the experience and first introduced the "Yaesu" brand name to you in August 1970 by "Western Electronics", started by our managing director, Hal Perkins, G3NMH.

*SERVICE:* We do all labour FREE on warranty claims.

*SERVICE DEPARTMENT:* Our staff are trained! We have staff with experience in precision electrical measurements to ministry EQD release and BS9000 requirements. Ours is no "Amateur set-up"! We are prepared to undertake the test and calibration of test equipment itself.

*WARRANTY POLICY:* We maintain the manufacturer's full warranty and more besides.

*SPARES:* We carry an extensive range of Yaesu spares to ensure you get a good after-sales service.

*COLLECTION:* In the unlikely event of your having faulty equipment, all you have to do is phone/write us and we will collect by SECURICOR AT OUR EXPENSE and return the unit to you AT OUR EXPENSE.

*DELIVERY:* We deliver within 24hrs of receipt of order of items which are in stock. This is the fastest delivery service in the country and costs £1 per parcel only! 48hr. service to Scotland and remote places. This service is limited to parcels less than 6' long and 50lb weight.

**JUST PHONE YOUR ORDER IN**! NO LETTER WRITING — NO MONEY REQUIRED — JUST QUOTE YOUR ACCESS CARD OR BARCLAYCARD NUMBER AND **WE DESPATCH THE GOODS**

This service will be available to callers, mail and telephone customers; just another part of the finest service available to the UK Amateurs. We hope you'll give it a try! We'll despatch your order the same day if humanly possible by whatever means you wish. You may order anything which we sell by this high speed service, including used equipment, up to the limit of your Access or Barclaycard.

# Electronics (UK) ltd

## the VHF/UHF PAGE

**SSB/FM TRANSCEIVERS**

**NEW!** **YAESU FT-221.** This is a new 2m SSB/FM transceiver to replace the FT-220 which is now sold out and no further supplies will be available. Please do not send to us for details yet as they are not off the 'Secret' List!

**FDK** **MULTI-2000.** We have new supplies of this fine unit pictured below. All units have 1750Hz tone burst built-in.

## the FDK Multi 2000
## 2m. SSB/FM/CW TRANSCEIVER


**2m SSB/FM and CW Synthesised 200 Ch. AC/DC 10W o/p (SAE for details please)**

The **WESTERN ELECTRONICS MULTI-2000** has the following features

**1. DUPLEX OPERATION ON ALL CHANNELS**
**2. NARROW FM FILTERS FITTED AS STANDARD** **(£291.6** inc VAT)

So no matter on what frequency a repeater comes up, the Multi-2000 will tune it because don't forget that it has VXO control; i.e., you are not limited to 10kHz steps, the VXO allows you to tune *any* frequency. There is a 9-pin socket on the rear to permit switching an external linear relay. All our models are marked "DUPLEX" instead of "I" on the channel switch shown in the above picture. FREE delivery by Securicor.

**BRAUN** SE600 DIGITAL (the "Rolls Royce" unit!) **£970.90** inc VAT/Carr.
**SSB TRANSCEIVER** LINER 2. 144·1–·34MHz. **£156.60** inc VAT/Carr.
**FM TRANSCEIVERS** YAESU and STANDARD.

**ANTENNAS:** BANTEX
J BEAM
NEWTRONICS

**TOWERS:** VERSATOWER
HAMTOWER
TELETOWER

**MASTS:** TELOMASTS
ALIMASTS

**ROTORS:** CDE

**THE OSKER SWR200 POWER METER**

Features: Switchable for 52 or 75 ohm systems. Each instrument is individually calibrated. Four ranges: 0-2, 0-20, 0-200 and 0-2kW, 3-200MHz. Excellent Styling.

Price: **£22.68** inc VAT

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**VHF-UHF FET's** type BF 256A 800MHz @ **25p** each. 5 for **£1.10.**
**BB121A TUNING VARACTORS 15p** each.
**DUAL GATE MOS FET's 40601** @ **50p,** 40603 @ **50p,** 40673 @ **55p,** MEM 616 (40673) @ **50p.**
**2N 3375 VHF 7 Watt R.F. TRANSISTORS** @ **£2.16** each.
**MOS P CHANNEL FET's** 20 for **50p** with circuits.
**PLASTIC NPN-PNP MIXED TRANSISTORS** 85% Good 50 for **50p.**
**76550 (TAA550) VOLTAGE STABILISER I.C.** For Vari-Cap Tuners @ **10p** each.
**25 PLASTIC BC 107 NPN TRANSISTORS** 85% Good @ **50p.**
·01μf, ·02μf **50v.w. DISC CERAMICS 15p** doz.
**MATCHED QUAD DIODES** like CV 2279 **50p** the four.
**MULLARD C280** ·1μf 400v.w. @ **20p** doz, ·47μf 400v.w. @ 6 for **15p.**
**BY 103 1300 PIV 1Amp SILICON DIODES** @ **15p** each.
**METAL TO18 TRANSISTORS** Similar to BC 107/8/9. Untested extremely good buy. 25 for **50p.**
**SUB-MINIATURE CERAMIC TRIMMERS** 4·7 to 20pF @ 3 for **10p.**
**75 MULLARD C280 CAPACITORS** Assorted @ **80p.**
**WIRE ENDED 1000μf 30v.w. CONDENSERS** @ **15p** each.
**LARGE PACKET OF MICA WASHERS** for Semiconductors TO3, BD131, Bushes etc @ **30p.**
**BF 271 1GHz RF TRANSISTORS** @ **15p** each.
**TEXAS THYRISTORS TIC 45** 60 PIV 600mA @ **15p** each.
**20 BRANDED AC 128 TRANSISTORS** @ **50p.**
**D.C. MOVING IRON CHARGER TYPE METERS** 0-2, 0-3, 0-5Amps. All at **60p** each.
**UHF STRIP LINE 2 GHz TRANSISTORS** like BFR90 @ **£3.**
**SANYO 15 Watt AUDIO MODULE** with data @ **£3.**
**5 ASSORTED UNMARKED GOOD TRIACS** For **80p.**
**1N 4007 1000 PIV 1 Amp SILICON DIODES** 16 for **£1.00.**
**COMPRESSION TRIMMERS** 10pf, 30pf, 50pf, 1000pf. All at **5p** each.
**SUB-MINIATURE ROTARY SWITCHES** Small Spindle 2 Pole 5 way 2 Bank @ **22p,** 1 Pole 6 Way @ **15p.**
**1000pf 500v.w. TUBULAR CERAMICS 15p** doz.
**GOLD BONDED DIODES £3** per 1000.
**STC 1 Watt ZENERS** 3·3, 3·6, 4·3, 13, 16, 18, 20, 24, 30 Volt. All at **15p** each. 3 for **35p.**
**365pf 3 Gang TUNING CAPACITORS** size 2¾ × 1⅜ × 1⅜ @ **66p.**
**1 Watt AUDIO I.C.** type TAA 611B with data @ **65p** each.
**BRANDED TRANSISTORS** BC 107, BC 308, BC 177, 2N 706, 2N 706A, BSY 95A, BC 213L, BC 214L, Lockfit types BC 147, BC 148, BC 149, BF 194, BF 195, BF 196, BF 197 All at 6 for **50p.**
**50 ASSORTED MULLARD CAPACITORS** Consisting of 10 × ·01μf, 1 × ·015μf, 2 × ·022μf, 2 × ·033μf, 2 × ·047μf 10 × ·1μf, 1 × 1μf, 10 × ·22μf 2 × ·33μf, 8 × ·47μf, 2 × ·68μf. The 50 for **80p.**
**UNMARKED BC 109 TRANSISTORS 10p** each. 6 for **50p.**
**THYRISTORS** 100 PIV 10 amp @ **25p,** 400 PIV 10 amp @ **50p,** 800 PIV 10 amp @ 60p.
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**6 PLASTIC NPN POWER TRANSISTORS** Untested for **50p.**
**TRANSISTORS SIMILAR TO 2N 2926G 10p** each. 5 for **40p.**
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**X BAND DETECTOR DIODES** Similar to SIM 2 @ **15p,** 1N 23 @ **25p.**
**X BAND PIN DIODE** Type MA 4571-A1 @ **50p** each.
**UNMARKED 10 Watt ZENERS** 12, 13, 15, 16, 18, 20 Volts. All at **22p** each.
**MOTOROLA TUNING VARACTORS** Type MV 1636 200MHz, 24 to 30pf @ **30p** each.
**UNMARKED VHF-UHF SIGNAL NPN TRANSISTORS 40p** doz.
**2000μf 30v.w. CONDENSER** sixe 2¾ × 1" at **15p** each.
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**400 PIV 10 amp SILICON BRIDGES** @ **83p** each.
**SOLDER-IN FEED THRO'S** 1pf, 2pf, 10pf, 15pf, 18pf, 22pf, 22pf, 300pf, All at **15p** doz.
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**GRADED TO18 NPN SILICON TRANSISTORS** For General Purpose use in Gain Groups of Up to 80 5 for **12p,** 80 to 200 5 for **20p,** 200 to 400 5 for **25p.** 400 up, 5 for **30p.**
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**JAPAN TRANSISTOR KIT** consisting of 3 × 2SA49, 3 × 2SA52, 3 × 2SA53, 3 × 2SB56 The 12 for **42p.**
**TEXAS HIGH SPEED DIODES** Type 1N 3881R 400 PIV 6 amp @ **20p.**
**MULLARD OP-AMPS TAA** 243 @ **30p** each.
**GENERAL PURPOSE HIGH GAIN PLASTIC NPN TRANSISTORS 40p** doz.
**ZN414 RADIO I.C.** with data @ **£1.20.**
**GERMANIUM DIODES** 1N 34A, OA 85, OA 91, OA 95, All **8p** each.
**AF 279 PNP STRIPLINE 800 MHz TRANSISTOR** @ **44p.**
**COLOUR T.V. CONVERGENCE POTS** 10 ohm, 50 ohm, 75 ohm, All at 10p ea.
**COLOUR DELAY LINE** Mullard type @ **40p.**
**MULLARD 10 Watt AUDIO AMPS** Type LP 1173 @ £2.16.
**25 PLASTIC BC 107 type TRANSISTORS** 85% Good **40p.**
**TEXAS BRIDGES 100 PIV 1 Amp** type 1B10J10 @ **22p** each.
**PRECISION ZENERS** 250mW 6·6 volt, 9.8 volt, 11·4 volt. All at **15p** each
**TANTALUM BEAD CONDENSERS** ·15μf 35 v.w., 1μf 35v.w., 2μf 25v.w., 2·2μf 35v.w. 4·7μf 35v.w., 5μf 25v.w., 6·8μf 25v.w., 6·8μf 35v.w., 10μf 16v.w., 15μf 10v.w., 20μf 6v.w., 22μf 16v.w., All at **8p** each.
**10·7MHz CERAMIC FILTERS** with data @ **27p.**
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**MULLARD TAA 242 OP-AMP** @ **30p.**
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**DISC CERAMICS** ·1μf 3v.w. @ **10p** doz, ·1μf 30v.w., **15p** doz.
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- ★ Displays SSB, AM and CW "Waveform"
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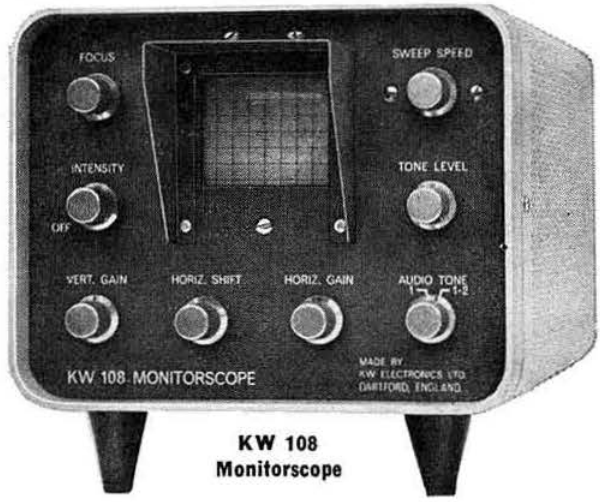


**KW 108 Monitorscope**


**KW 107 Antenna Tuning System**

**KW 107 ANTENNA TUNING SYSTEM**

The KW range of aerial matching units will ensure optimum power transfer from the PA stage to the antenna system

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- ★ Attractive "G" line case

The antenna tuner in the above unit can be purchased separately if you already have the KW 101/103, dummy load and antenna switch

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**THE GAREX Mk II TWOMOBILE FM/AM Tx-Rx**

Brief technical details:

**Tx Rx and PSU** for 12V DC input contained in one unit 12 × 4½ × 8" deep. **Tx** Transistorised crystal oscillator (8MHz), multipliers and modulator, quick-heat tetrodes YL1030 driver and PA. No standby current. 6 switched crystal positions (new feature). Fist mic. with press-to-talk. Switched AM or FM. Tone-burst generator—2 tones + off switch (new feature).

**Rx** Fully transistorised. Continuous tuning from 144 to 146MHz directly calibrated dial. VFO supplied from i.c. voltage regulator for improved stability under mobile conditions. 2 RF amplifiers, FET 1st mixer, 1st IF 10·7MHz, crystal controlled 2nd FET mixer, 2nd IF 455kHz, squelch, audio output to drive external 3Ω speaker. FM/AM reception selected by switch independent of Tx mode, utilising i.c. quadrature detector on FM.

35 transistors, 3 i.c's, 15 diodes. Floating supply for pos. or neg. earth.

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**Mod. and Driver Transformers** pp NKT404 to QQVO3-20A **£1.25 the two.** 2 sets for **£2.00** 6 sets for **£4.50.**

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**35p** each, any **2** for **60p, 4** for **£1.00, 8** for **£1.50.**

**Lt Choke** 3A 0·1Ω, for psu or hash filter, **2** for **50p, 5** for **£1.00.**

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

**FM AF** board provides audio for FMTx also Rx audio preamp, suitable valve or transistor Tx — New **£1.95** Good used **£1.00**

**10·7MHz I.F.** board — **£1.85**

**455kHz block filters** 25kHz chann. spacing, low impedance — **£1.75**
25kHz chann. spacing, high impedance — **70p**
12½kHz chann. spacing—details & prices on application

**455kHz AM I.F.** board (ex AM25B) — **£1.00**

**Squelch** boards (ex Cambridge) FM **85p** AM **35p**
(ex AM25T) **45p**
(ex AM25B) Type A or B, **15p** 2 for **25p**

**Mic. amplifier** board ex AM25B — **85p**
ex AM25T — **85p**

**Mod. output** board ex AM25B or T — **45p**

**Rx Audio** board ex AM25B — **45p**
ex AM10 — **£1.50**
ex AM25T — **45p**

**6kHz Audio block filter** ex AM25B — **25p**

**Mic. preamp** board, 2 transistor, emitter follower output — **60p**

**NOTE**—Apart from providing spares for the specific equipment, all the above boards are an ideal basis for home-brew equipment.

**Modulation transformers** with connection data
p.p. NKT404/OC28/OC35 to QQVO3-10 **£1.20** Driver to suit **40p**
Single EL84 to QQVO3-10 **£1.05**
p.p. EL91 to QQVO3-10, + 3Ω LS & 15Ω pub. address — **£1.05**
p.p. EL84 to QQVO3-20a ex-Murphy **£2.16**

**Camera video** board (Lynx) new — **£3.85**

**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. — **75p**

**Circuit breakers,** panel mounted, 0·3, 0·5, 1 and 2 amp (new) — **45p**

**Reed switch** S.P.C.O. 33mm × 5mm dia. (75mm over leads) 10VA rating **35p**
Reed relay coils to match above, 24V (2·5k res.) **20p** each **3** for **50p**
Low loss SP reed and 24V coil glass encap. OK for switching tuned circuits — **£1.00**

**Painton (min. Jones) connectors,** chassis mtg. 18 way male or female **30p**
ditto, 6 way (2 pins at rt. angles) — **15p**

**Toggle switches,** SP biased off — **15p**

**Crystals** HC6U: 12·700MHz B7G: 2·400MHz — **30p**

**Valves** (New or tested ex. equip.) EB91, EC91, ECC91, ECF80, ECH83, ECH34, 6AT6, 6BH6, 6BJ6, 6CB6, EZ81, EY81 **15p** each, any **4** for **50p**

**Transistors** (tested, with mtg. kits) NKT404 **15p** each, **4** for **50p**

**Integrated circuits** (new, full spec.)
723 voltage reg. TO5 metal case, 2/37V out at 150ma for 5/40V in — **80p**
SN76660 FM quadrature detector — **£1.25**
CD4001 AE quad. 2-input NOR gate for tone-burst gen. — **55p**
NE555 Timer for tone-burst gen. or time-out indicator — **85p**

**Relays** 12V 2 pole c.o. 6A contacts, ex-Cambridge — **20p**
Miniature 12V plastic cover 2PCO **30p**; 4PCO 35p
25 AMP 6V single make 6V double make 12V d/make, 12V s/make — **35p**
Type 2400 ex AM25, please specify coil/contacts required — **25p**

**Mains transformers** multitap prim. unless stated otherwise
HT Transf. 5 windings: 35v 0·2A, 75/115v 0·15A, 50v 0·5A, 150v 0·3A, 170/220v 0·3A (13lbs) — **£5.70**
(For quick heat QQZO6-40 Tx) 7 windings 232V, 276V (300ma); 60V, 50V (50ma) 2·1V 8A; 17·5V 1A; 12·6V 4A (11·5lb) — **£4.95**
170–0–170V 90ma, 50V 50ma, 6·3V 3·3a, 5V 2A (5·5lb) — **£1.95**
0–146–232V 160ma, 26·5V 1A, 13·9V 5A, 50V 50ma (10·5lb) — **£3.50**
Small 110V Pri. 30V 100ma sec. **40p** each, 2 for **75p** (series pri. for 240V)
230/240V Pri. 72V 40ma, 6·8V 10A, 6·3V 4·6A C core (7lb) — **£4.75**
200/250V Pri. 31·5–0–31·5V ¼A tapped 22, 24, 25·5, 28·5V — **£2.95**
Auto 20-10-0-100-190-230V 200VA — **£2.95**
345–0–345V 150mA, 5V 2A (P.O.F.) — **£4.75**
6·5–0–6·5V 2·3A, 6·5–0–6·5V 2·9A, 6·5–0–6·5V 4·25A, 6·5V 2·7A, 37V 30mA (P.O.F.) — **£4.75**
Charger transf. 240V in, 17·5V 1A out — **95p**

**HT chokes** 5H 80ma, 4H 240ma, 1H 240ma, 1·25H 350ma, 1·8H 125ma — **95p**
Top grade types: 9H 250ma 107Ω **£2.25,** 10H 20ma 100Ω **£1.35**
8H 240mA (P.O.F.) **£2.25**; 35H 25mA (P.O.F.) **£1.35**
**N.B.** P.O.F. = Potted, oil-filled.

**Toroidal inverter transformers** 12V DC input (with circuits)
265V at 150mA (Cambridge) 2·25" × 2" × 1·6" — **£1.70**
(6/12V & 12/24V versions also available same price)
Pye Continental type — **£2.80**
170/375V at 180mA (Vanguard) 2·75" × 2·5" × 2·5" — **£1.90**
(24V version, same price)

V double 390V at 200mA 2·9" × 2·5" × 2·5" — **£1.90**

V double 400V at 200mA and 250V at 150mA 3·5" × 2·75" × 2·25" — **£2.60**
(NB: both on same winding—so cannot be added to give 650V)

HT choke suitable for 2-3kHz inverters — **50p**

**Rectilinear pots** multiturn, preset, p.c. mtg. (new)
10, 20, 25, 100, 250, 500, 1·5k, 2k, 2·5k. **25p** each, any 5 for **£1.**

**Neons,** min. wire ended, **5p** ea., 12 for **50p.**

**Diodes** CS34-A — **35p**

**Air spaced Trimmers** (ex) small: 2–20pf, 2·4–30pf, large: 10pf, 25pf — **15p**
small 2–20pf with spindle ¼" × ¼" — **25p**

**Butterfly trimmers** large 2 × 17·5pf, 2 × 10pf — **70p**

**Beehive trimmers** 2–8pf **5p** 3–30pf (new) **8p**

**Tetfer trimmers** 2-10pf, multiturn, O.K. for U.H.F. — **60p**

**Tx Multiplier Transformer** for AM10, AM25B or T, High or Low Band — **30p**

**Other Pye coils and transformers also available**

**10·7 IFT** (valve type) 2½" × ½" square double tuned **20p**; 2 for **35p**; 8 for **£1.00**

**Coil formers,** ceramic, single hole fix 1½" × ¼", (with slug) 10 for **50p**

**Modulator kit** for QQVO3-20a. Includes **all** necessary components; ready assembled p.c. boards, driver and output transformers, power transistors (with mtg. kits) circuit and connection details; also suitable for QQVO3-10, for 12V working, bargain price — **£2.60**
**Type 2,** similar to above, but output transformer has additional 15Ω output winding for pub. address. — **£2.80**

**Rx audio kit** similar to above, but 3Ω output — **£1.20**

**Mobile PSU** 12V DC input (floating for + or — E) transistor inverter 170, 220 or 380V DC at 180mA output, fully smoothed, chassis section, self-contained, fully wired and tested, with circuit — **£4.85**
As above, but partly assembled (as cut out), complete with all components, circuit, finish-it-yourself — **£2.95**

**S.T.C. AM661 mobiles,** hiband, 6 channel, all solid state, 20W RF output, 12½kHz spec., complete with mike, lead and cradle, P.O.A.

**Ventilated steel cabinets** 12 × 12 × 18" high, with wall-fixing lugs, internal chassis frame 11½" × 11" × 13". New condition **£2.** Buyer inspect and collect by appointment.

**TW Phase II 2 metre Transverters** 10 metre input, built-in Rx conv. for 10 metre output. QQVO6-40a P.A. External condx. brand new, internally marked; with handbook; delivered price. — **£69.40**

**Pye Ranger spares** I.F.T's 10·7MHz, 2MHz, Noise lim. assy., Rx osc. mult. transformer: all at **30p**
Vibrator transformer 6/12V or 24V — **£1.50**
Inverter transformer (160/260V out for 12V in) — **£1.65**

**BNC 50ohm free sockets** (new) special offer — **12 for £1.30**

**Paper block capacitors** (Mfd/voltage) 0·5/400; 1/50C; 1·5/500; 2/350 at **54p**
8/60C; 8/800; 8/1000 at **£1.08**

**Walkie-talkie canvas satchel,** main compartment approx. 8½ × 7 × 2", plus mic/batt compartment approx. 7 × 5 × 1½" for Murphy Rover, (Bantam will fit) — **£1.80**

**Rotary Converters** 12v DC to 320v 160mA DC — **£1.50**

**Fist mike,** P.T.T., d.b. carbon insert, curly lead, octal plug, for Murphy, also BCC69, Reporter — **80p**

**Input transformer** for above mike — **35p**

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Unless stated otherwise, components are ex-equipment, in good condition, your satisfaction guaranteed. Wherever possible, full supporting data is given.

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**HA-202 2-M FM Amplifier**

Delivering 40 watts (nominal) out for just 10 watts in, the HA-202 needs only a 12 VDC supply. So you can easily use it in your car or boat. It features all solid-state design and is a perfect match for the HW-202 Transceiver. Kit: £42·50.

**HA-201 2-M Amplifier**

For both mobile and fixed station use from 12 to 16 VDC. The HA-201 operates from 1 to 3 watts FM input in the 144–146 MHz band, giving an 8 watt output for 1 watt input. Supplied in a robust metal case, it features all solid-state design on a single P.C. board. Kit: £16·50.

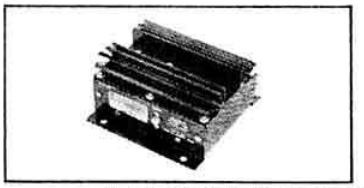
**HW-202 2-M FM Transceiver**

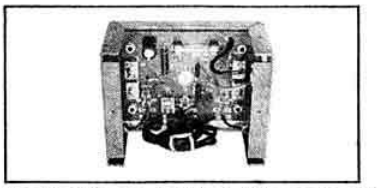
With all solid-state design, multi-channel capability, PTT mike and optional tone burst encoder. The HW-202 has 10 watt minimum output and is designed to operate into even an infinite VSWR without failure. Kit: £115·00.

**HM-2102 VHF Wattmeter**

With a built-in SWR bridge and 50 to 160 MHz range, the HM-2102 is the perfect tune-up tool for 2-M gear, and covers 2-way commercial, aircraft and amateur communications. Kit: £21·80.

All prices inclusive of V.A.T. at 8%.





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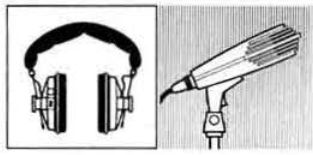

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**Membership rates: UK—£5.50, VAT included (Unlicensed members under 18 years of age—£2). Overseas—£5 (USA $12). Members are asked to notify changes of address without delay.**

# QTC AMATEUR RADIO NEWS

## M Mili to open IARU Region 1 conference

M M. Mili, Secretary-General of the International Telecommunication Union, has accepted an invitation to open the next conference of the Region 1 Division of the IARU in Warsaw on 14 April.

The 42 national societies of the Region 1 Division will be represented and, in addition, there will be officials present from Regions 2 and 3. The conference will last five days and a major item for discussion will be the 1979 World Administrative Radio Conference.

The International Telecommunication Union has its headquarters at Geneva and it is the specialized agency of the United Nations for telecommunications. It has 144 member countries.

## New IARU constitution

Last year the RSGB made a formal proposal through the *IARU Calendar* regarding a new constitution to replace the previous rules which had been in force for many years and did not reflect the present-day position, particularly the existence of the regional organizations. This alteration required the agreement of two-thirds of the entire membership, and IARU HQ has recently advised that the votes received show the necessary majority in favour of the new constitution. The architect of this was the late Win Dalmijn, PA0DD, who during his period of office on the executive committee of Region 1 made great efforts to ensure that a new constitution was both forward looking and acceptable to the membership of the IARU.

## Station inspections

It is strongly recommended that before admitting visitors into private premises for the purpose of a station inspection, or in the course of an interference investigation, credentials should be requested and checked. Post Office engineers always carry suitable identification.

If, following a station inspection or for any other reason, any restriction is placed upon normal operation then a request for this restriction to be confirmed in writing should be made.

It is considered unwise for comments to be made over the air which could enable a listener to establish when a house is likely to be unoccupied.

## Beacon stations

Two new stations are now operative as part of the IARU International Beacon Project, the chairman of which is Alan Taylor, G3DME. ZL2MHF is on 28,170kHz using a power of 90W to a vertical half-wave aerial. The location is Mount Climie (890m asl) near Wellington. The callsign is given in F1 every 10s. Reports should be sent to the Secretary, NZART Upper Hutt Branch 63 Inc, PO Box 40212, Upper Hutt, New Zealand.

The second station is operating on 28,160kHz with the call PY1CK from Rio de Janeiro. Reports should go to PO Box 1044, Rio de Janeiro. Alternatively, if desired, reports may be sent to G3DME, QTHR, for recording and onward transmission.

## Regional boundaries

At its meeting on 21 February, Council approved a recommendation of the Membership & Representation Committee that the proposed regions with the boundaries shown on the map loosely inserted in the October 1974 issue of *Radio Communication*, and defined on page 135 of the February 1975 issue, be adopted.

## /M—help required

The RSGB Mobile & Exhibition Committee is to undertake a survey concerning the effectiveness of the various communication modes when operating mobile, eg a.m., fm and ssb. It will be glad to have the co-operation of any mobile operators willing to assist in this project, and they are asked to write to RSGB headquarters marking the envelope "Mobile survey". It would be of assistance if they would indicate the bands and modes used when operating /M.

## Subscription renewal notices

In future, subscription renewal notices will be loosely inserted in *Radio Communication* instead of being posted separately. This will achieve a considerable saving in postage.

UK members whose subscriptions are due on 1 May 1975 will find a renewal notice in this issue of the journal. Overseas members whose subscriptions are due on 1 June 1975 will also find a renewal notice in this issue.

Members who pay by Banker's Order or Post Office Giro will also receive renewal notices but they need take no action *except to check immediately* that the correct amount will be paid on the due date.

Those members whose subscriptions are reduced or waived will also receive a renewal notice for the full amount, which they should return to the Society with a written request that the concession be renewed for a further year.

## PUBLICATIONS AND SUNDRIES

### Increases in postage costs

Following the recent substantial increases in postal charges, the prices shown on the inside back cover of the March issue of *Radio Communication* are no longer correct. Until a new price list is published, intending purchasers ordering any of the items listed should add 5 per cent of the price shown to their remittances.

In future, when the remittance included with an order is insufficient, a note will be sent to the intending purchaser advising him of this, and goods will be despatched only after the balance outstanding has been received. This will still apply even if the initial remittance covers part of the order.

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## HAM RADIO MAGAZINE

### Change of address

**Effective immediately all subscriptions and changes of address for HRM should be sent to:**

**Ham Radio Magazine (UK), PO Box 63, Harrow, Middlesex HA3 6HJ.**

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## The "Cadet" receiver

The author of "The Cadet. A direct conversion receiver for the novice", published in the October 1973 issue of *Radio Communication*, Mr J. Young, has received a number of letters from constructors who were unable to make the fet oscillators work. In each case the problem was an out-of-spec or dud fet, and he emphasizes that only branded devices from reputable manufacturers and suppliers should be used for all constructional projects.

He recommends that the components for this receiver and the "80m d-c receiver for the novice" (*Radio Communication* February 1975) should be purchased from the suppliers given at the end of the articles.

## QSL Bureau

Members are asked to note that the address of Mr D. Buckley, G3VLX, who handles cards for G4DAA-DZZ, was printed incorrectly in the March issue of *Radio Communication*. It should have read 16 Wood Ride, Petts Wood, Orpington, Kent BR5 1PX.

## Electronic engineers slide rule

In connection with the offer to RSGB members contained in the announcement on p207 of the March issue, Key Electronics advise that the special price will not apply after 30 April 1975.

# 21st National VHF Convention — 10-11 May 1975

The 21st VHF Convention is being held as before at the Winning Post Hotel, Whitton, Twickenham, Middlesex, on 10-11 May 1975. The Whitton Secondary School, with its splendid facilities, will be used again for a very comprehensive lecture programme, and the trade show with the usual attractions will once more fill the whole of the space available at the "Winning Post".

An overwhelming success with the ladies—and many OMs too—last year was the dinner and dancing on Saturday evening from 7.30pm to midnight, and so once more the "Phil Jennings Sound" will entertain during dinner and later provide lively music for dancing. For non-dancers the bar will be open and there is plenty of room away from the dance floor for discussion.

The principal guest of honour will be Mr Harold Haynes, G2ALH, Market Technical Manager, Mullard Ltd. He is very interested in amateur radio, especially in space communications, and of course his firm has provided support for amateur radio for very many years.

## Programme for Saturday

**1100** "Winning Post" convention area opens. Please bring a QSL card for reception. **Trade show** by exhibitors large and small. **RSGB bookstall** will be there, and also specialist groups. **Home-constructed equipment display**—with a prize for the best equipment, the 1962 VHF Committee Cup. **Bring and buy sale** organized by members of the Echelford club. Items will be placed on sale with 10 per cent of the sale price deducted towards the cost of running the convention. Labels should be prepared for each piece of equipment in advance and a complete list brought of all items for sale to assist the organizers in keeping control. There will also be a **raffle.**

**1200–1400** Lunch in hotel—snacks and sandwiches at bar.

*Lecture programme* (at nearby Whitton Secondary School —tickets via reception)

**1400–1430** *Opening remarks and a review of current events including the IARU Region 1 Conference*, by Geoff Stone, G3FZL, VHF Manager; Roy Stevens, G2BVN; Richard Baker, G3USB. The lecture session then divides into Streams "A" and "B".

**Lecture Stream "A" (VHF)**

**1440–1525** Short talk, then "open forum" on vhf/uhf/shf contests—your views, brickbats and bouquets invited, by VHF Contests Committee led by chairman Cliff Sharpe, G2HIF.

**1525–1545** Interval.

**1545–1630** *VHF tropospheric propagation*, by Ray Flavell, G3LTP, VHF dx working and the meteorological conditions responsible; the use of potential refractive index to analyse results.

**1630–1730** *Auroral vhf propagation*, by Charlie Newton, G2FKZ,—with a request for assistance in scientific observation.

**Lecture Stream "B" (Microwaves)**

**1440–1525** *23cm ssb*, by C. Suckling, G3WDG, and K. Hutchinson, G4ALN.

**1525–1545** Interval.

**1545–1620** *Assessment of equipment performance using simple techniques*, by Heath Rees, G3HWR.

**1620–1655** *Super-refraction on 10GHz*, by P. Schorah, GW3PPF.

**1655–1730** *Mixers and preamplifiers*, by P. Tunbridge, G8DEK.

*Then back at the "Winning Post"*

**Draw for the raffle,** followed at **1930** by **Convention Dinner** and **Presentations,** including the 1962 VHF Committee Cup (see above) and the Fraser Shepherd Prize for outstanding contribution to microwaves. This will be followed by **dancing** to "The Phil Jennings Sound" until midnight.

## Programme for Sunday

On Sunday the "Winning Post" only will be used.

**1030** Convention opens.

**1100–1300** *Amateur space communications*, organized by Pat Gowen, G3IOR, AMSAT representative, and others talking about Oscars 6 and 7 and results; plenty of time for discussion.

**1300–1400** Lunch.

**1400–1500** Informal discussion groups.

**1500** Close of convention.

## How to get tickets

The charges for tickets are as follows:

| | |
|---|---|
| Convention (both days) and dinner | **£3.00** |
| Dinner only (Saturday) | **£2.50** |
| Convention only (both days) | **75p** |
| Convention only (both days) for persons under 18 years of age | **50p** |

Please apply early; the dinner list will close on Wednesday 7 May. Send cash with sae now to RSGB, 35 Doughty Street, London WC1N 2AE, marking envelope "VHF Convention". If you are under 18 (admission only 50p) state date of birth.

## How to get there

**By car**

The Winning Post Hotel is on the northern side of the A316, Chertsey Road, at Whitton, Twickenham, Middlesex. Ordnance Survey Map 170 NGR 140½ 703½. As the A316 is a dual carriageway with few turning points, approach the main entrance of the hotel from the west end of A316—it terminates at the junction of A316 and A305—or enter via a minor road passing Whitton Station to back of hotel. Ample parking space is available at the hotel or in some adjacent roads, but *not* in the Chertsey Road or at Whitton Secondary School.

**By public transport**

Train to Whitton Station from Waterloo (Southern Region), approximately 20 minutes. 5 minutes' walk from station to hotel. No 203 bus passes Whitton Station.

As parking space tends to fill up with so many people attending the convention, pool your travel arrangements and save petrol or come by public transport—the train service is very good.

# A caption generator for sstv

by W. GIBSON, BSc, MInstP, and J. KIRKMAN, PhD, MIERE, G3RDI*

SLOW-scan television (sstv) using 120 lines per frame is becoming increasingly popular on the amateur bands, where the picture information is transmitted within a normal voice channel of approximately 3kHz. One of the attractive features of this system is that the pictures can be recorded on a standard cassette recorder and edited for replay or transmission at a later date.

The transmission of sstv pictures is accomplished by modulating an ssb transmitter with an audio frequency corresponding to the light intensity at a particular point of the picture. At the receiver, the ssb signal is demodulated in the normal manner and the resulting audio signal is further processed in a monitor to produce the picture on a long-persistence cathode-ray tube. Fig 1 shows the audio frequency range involved and the duration of both the luminance signal and the line and frame pulses. Table 1 gives the signal specifications. The luminance signal occupies the range of frequencies 1·5kHz to 2·3kHz and is followed by either a 5ms burst of 1·2kHz oscillation to provide line synchronization or a 30-60ms burst at this same frequency for frame synchronization. The results obtained with this narrow-band system can be remarkably good, considering the overcrowding of the frequency bands and the low power of the transmitters used.

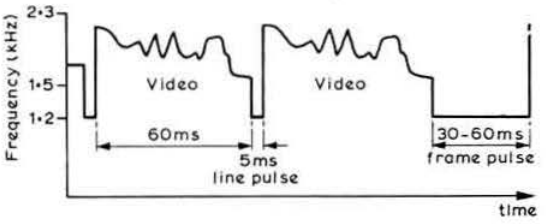


**Fig 1. The frequency range and pulse durations of a typical sstv signal**

At the present time the equipment used for the transmission of sstv is rather expensive and the cost, particularly of cameras, is inhibiting the growth of this fascinating aspect of communication. It is as well, therefore, to investigate alternative means of generating the sstv signal and, bearing in mind the low line and frame frequencies (15Hz and 0·14Hz), the possibility of mechanical rather than electronic scanning is worthy of consideration.

Furthermore, as a great many sstv transmissions are of captions or line drawings requiring the transmission of blacks or whites only, the full capabilities of cameras are not always employed. This article describes a simple mechanical method of generating sstv signals from captions.

* Sunderland Polytechnic, Department of Physical Sciences, Chester Road, Sunderland SR1 3SD.

**Table 1. Signal specifications**

| | |
|---|---|
| **Lines per frame** | 128 ± 8 |
| **Aspect ratio** | 1:1 |
| **Line frequency** | $(16\frac{2}{3} \pm 1)$Hz |
| **Frame speed** | 6·79 to 8·68s |
| **Line sync pulse** | 5ms |
| **Frame sync pulse** | 30-60ms |
| **Sync frequency** | 1,200Hz |
| **Black frequency** | 1,500Hz |
| **White frequency** | 2,300Hz |

## The system

From Table 1 it can be seen that, if the transmission of half tones is not required, the generator need only produce three frequencies, 2·3kHz (white), 1·5kHz (black) and 1·2kHz (sync pulses). The system is essentially a drum on which the picture information is carried. The drum rotates under a sensing device which traverses the length of the drum. Each revolution corresponds to one line. The surface of the drum is thus scanned and the output frequency of the generator is switched appropriately. In this generator the sensing device is a sliding pressure contact which rests on either the conducting surface of the rotating drum, when a frequency of 1·5kHz is generated, or letters made of insulating material attached to the surface of the drum, when a frequency of 2·3kHz is generated. Line and frame sync pulses are generated on separate slip rings. The system, Photo 1, is shown diagrammatically in Fig 2.

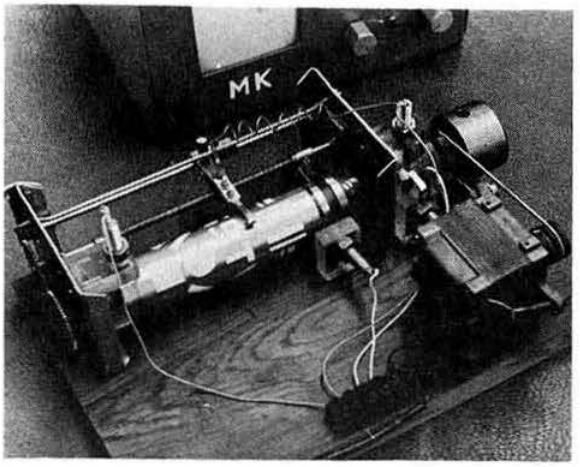


**Photo 1. The mechanical system with driving motor. A monitor photograph of the caption on the drum is shown in Photo 2**

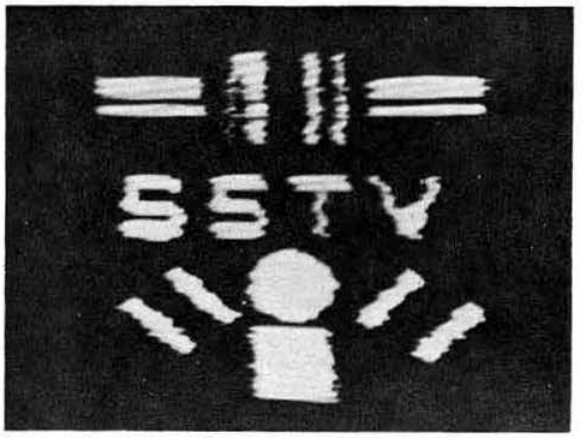


**Photo 2. A replay of a generated caption photographed from a monitor**

## Mechanical system

Not many of the dimensions of the unit are critical, so that there is plenty of scope for using material which is already to hand. Whatever its size, the drum must rotate at 1,000rpm and its circumference must equal its length if a 1:1 aspect ratio is to be maintained.

In this model the drum is a piece of brass tubing 1½in diameter and 5in long; at either end supports made of Perspex of the same diameter of the drum act as insulators, hold the drum on the ¼in shaft and carry the frame and line slip rings. Self-aligning plane bearings hold the drum in position between the 18 gauge aluminium end plates. These end plates measure 4in by 3in, are 8in apart and are fixed to a wooden baseboard.

The sliding contact is moved down the drum by a spring-loaded half-nut resting on a lead screw, made from a length of 0BA studding, which is driven at the same speed as the drum by Meccano gears (1¼in diameter, 57 teeth). The half-nut arrangement enables the contact to be disengaged from the lead screw and returned to the end of the drum for the caption to be re-scanned. At the end of the lead screw corresponding to the end of the frame the last 2in of thread is removed to allow the sliding contact to "idle" at the completion of each frame. The removal of ½in of thread at the other end of the lead screw means that both ends can be let into $\frac{3}{16}$in diameter holes in the end plates to form plane bearings. In this model pieces of ⅛in thickness brass sheet are added to give bigger bearing surfaces. The sliding contact, which is a flexible strip and contact from a relay, is carried on a brass arm screwed to the half-nut and its rear end is brazed to a 1in-long piece of tubing of a suitable diameter to slide along a $\frac{3}{16}$in guide rail parallel to the lead screw (see Fig 2(a) and Photo 1). The contact is loaded with about 60g (2oz) to reduce contact resistance and bounce.

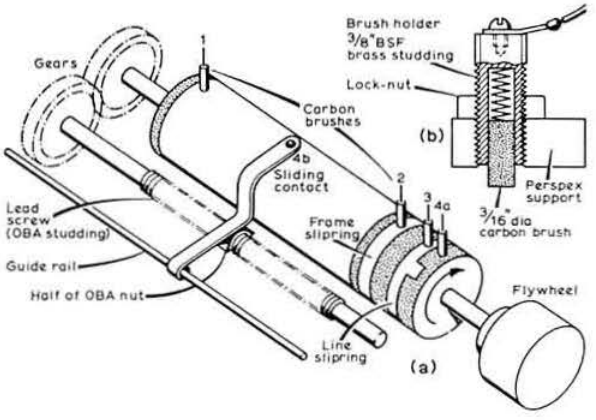


**Fig 2. (a) A diagrammatic view of the mechanical assembly showing the drive mechanism and electrical take-off points (b) Details of brush holder**

Other electrical contacts to the drum (1) and to the slip rings (2, 3, 4a) are made by $\frac{3}{16}$in diameter carbon brushes which are readily available. Brass holders screwed into Perspex blocks which are attached to either the end plates or the baseboard carry the spring-loaded brushes. See Fig 2(b).

The slip rings are made from the same stock as the drum. The line slip ring is cut from a ½in length which is reduced to a length of ¼in for all but a ⅛in section of the circumference. This means that contacts 3 and 4a in Fig 2 are shorted for less than 5ms with a brush diameter of $\frac{3}{16}$in. The frame slip ring is ¼in wide and is set $\frac{1}{16}$in from the beginning of the main drum.

The system is driven by a synchronous motor (from a tape recorder) using a belt and pulleys of those diameters which give a drum speed of 1,000rpm on load.

The caption is built up of ¾in letters cut from Fablon and attached to the drum after it has been cleaned with methylated spirits or acetone.

## Signal generator

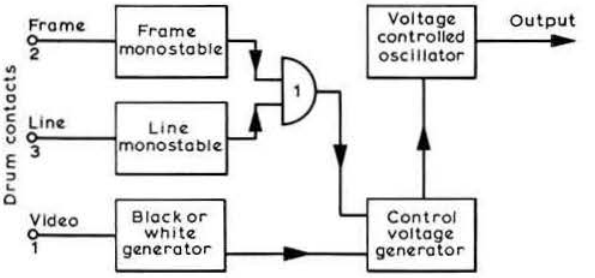


**Fig 3. Block diagram of the frequency generator**

The block diagram of Fig 3 shows the general system for converting the information from the drum contacts into the appropriate output frequency. One contact on the drum closes when a line sync pulse is required, a second contact is closed at the beginning of each frame and a third contact (video) is open when white is being scanned and closed for black. The closure of the line (or frame) contact triggers the line (or frame) monostable which then gives an output pulse of the appropriate duration. This pulse generates a control voltage which causes the vco to oscillate at 1·2kHz for the appropriate time whenever the line or frame scan is to be initiated. This voltage is independent of the video signal.

The black or white generator produces a "high" output voltage when black is scanned and a "low" output for white.

In the absence of a sync pulse this signal generates a voltage which causes the vco to oscillate at either 1·5kHz (black) or 2·3kHz (white).

Each circuit will now be considered in more detail.

## Voltage-controlled oscillator

Several integrated function generators are available at reasonable prices. The Signetics NE566 is specifically a function generator (vco), whereas this system uses the NE565 which is basically a phase-locked loop with access to its vco. Both generate a square wave with a 1:1 mark-space ratio and an amplitude of about 5V.

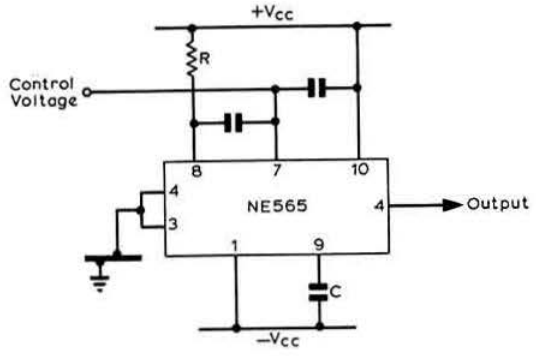


**Fig 4. Using the vco section of the Signetics NE565. The NE566 could be used with rearranged pin connections**

Fig 4 shows the general way in which the NE565 may be used as a vco; R and C determine the "centre frequency" which is given by $f_o = 0{\cdot}3/RC$. In this circuit R and C are chosen to be 3·3kΩ and 0·068μF respectively, giving a centre frequency of about 1·3kHz. This is generated with a voltage of 3·74V on pin 7 with $V_{cc} = +5V$ and $-V_{cc} = -5V$. These particular values of $V_{cc}$ and $-V_{cc}$ are less than those recommended for the NE565. However, satisfactory operation is not affected by these lower voltages which are chosen so as to be compatible with other integrated circuits from the 74 series ttl used elsewhere in the system.

The vco conversion gain $K_o$ (Hz/V) is given approximately by $8f_o/V$ where $V$ is the total supply voltage, so that with $f_o = 1{\cdot}3$kHz and $V = 10$V the value of $K_o$ is about 1kHz/V. Table 2 shows the actual output frequencies corresponding to various control voltages measured between common line and pin 7. It is important that the voltage source applied at pin 7 has a relatively low impedance since the current requirement at pin 7 is not negligible; a resistance of about 500Ω seen by pin 7 is suitable.

**Table 2. Actual output frequencies corresponding to control voltages measured between common line and pin 7**

| f (kHz) | Voltage |
|---|---|
| 2·3 | 2·87 |
| 1·5 | 3·60 |
| 1·2 | 3·87 |

$V_{cc} = 5V$, $-V_{cc} = -5V$

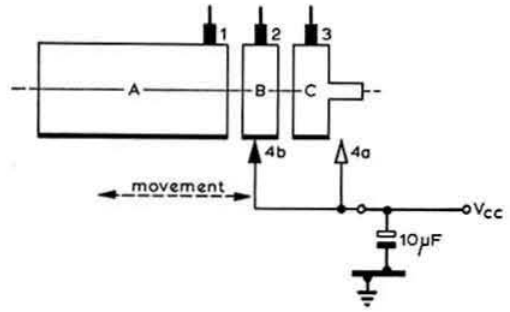


**Fig 5. The carbon brushes and sliding contact connections to slip rings and drum**

## Drum contacts

In Fig 5 A, B and C are the drum and slip rings and continuous rubbing contacts to them are made at points 1, 2 and 3. Contact 4a extends 5V to 3 via C once each revolution and this is used to generate the line sync pulse. The moving contact 4b extends 5V to 2 via B at the beginning of each frame scan and this generates the frame sync signal. During the scanning of the picture 4b extends 5V to contact 1 via A when black level is to be transmitted, while during the scanning of a white area 4b is insulated from A. Contact bounce at both 4a and 4b may well occur and methods to remove or reduce the effects of bounce by means of circuitry are described later. A 10μF decoupling capacitor reduces the noise on the +5V supply line which contact 4b would otherwise produce.

## Generation of line and frame sync signals

As was mentioned earlier, the line sync signal is a burst of 1·2kHz with a duration of 5ms while that for the frame sync is of the same frequency but lasts for at least 30ms. The problem, then, is one of generating the control voltage for the vco appropriate to 1·2kHz and having a duration of either 5ms or 30ms. Two monostable integrated circuits of type 74121 are used. Each of these is triggered by the application of 5V to pin 5 and the duration of the 5V output pulse at pin 6 is given by 0·7 RC. If this output is called Q its logical complement $\bar{Q}$ is available at pin 1. Fig 6 shows the circuits

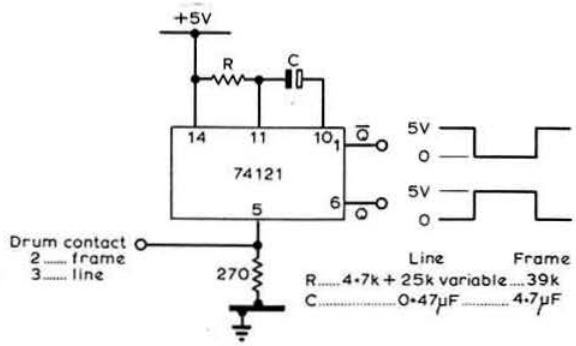


**Fig 6. Circuit details and output pulse of the 74121 monostable. For the frame circuit C is 4·7μF and R is 39kΩ; for the line circuit C is 0·47μF and R is 4·7kΩ in series with a 25kΩ variable resistor**

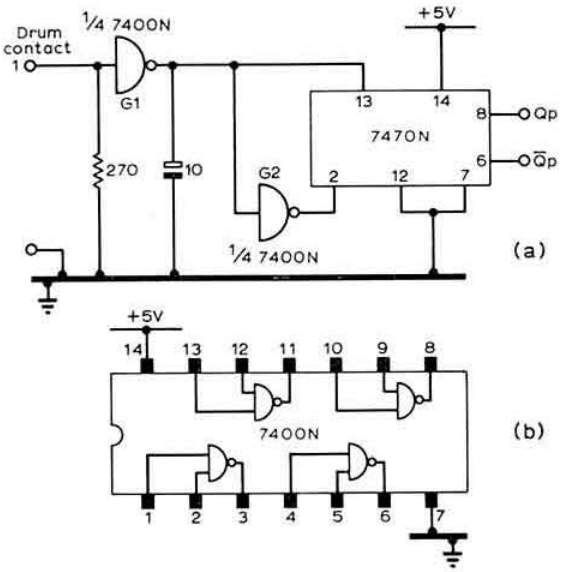


**Fig 7. (a) The 7470N bistable used as a black or white generator. The capacitor immediately after G1 reduces the effects due to contact bounce, its optimum value being determined experimentally. (b) Pin connections of the 7400N containing gates G1, G2 and G3**

which generate the frame and line sync pulses. Fine adjustment of the pulse duration in the case of the line sync is provided by making part of R variable. The duration of the frame sync burst is not critical, so no fine adjustment is necessary. The use of these monostables means that the timing of the frame (line) pulse commences the moment 4b touches B (4a touches C) and its duration is independent of both contact bounce and the variation of motor speed.

If the output pulse from the line monostable is called $Q_L$ and that from the frame monostable $Q_F$ ($Q = 5V$ is logical "1") then it is necessary to use a little combinational logic to generate a single logic function $Q_S$ of the appropriate duration from $Q_L$ and $Q_F$, which will cause the vco to generate 1·2kHz when it is required either for frame or line synchronization. Using switching algebra $Q_S = \overline{Q_L} + Q_F$. Then from de Morgan's rule $Q_L + Q_F = \overline{\bar{Q}_L \cdot \bar{Q}_F}$, which is the NAND logic function of $\bar{Q}_L$ and $\bar{Q}_F$. Thus $Q_S$ is generated by G3 (Fig 9).

## Generation of black and white picture signals

Contact bounce is only a problem during the transmission of black when 4b should be in continuous contact with A. The simplest way to deal with this is to use some logic elements and a capacitor. The system is shown in Fig 7(a). The 7470N is a bistable connected so that its output is 5V when the picture is black and gives a zero output when white is being scanned; each ¼ 7400N is used as a NOT (inverter)

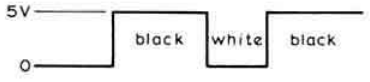


**Fig 8. Ideal output signal from contact 1 on the drum**

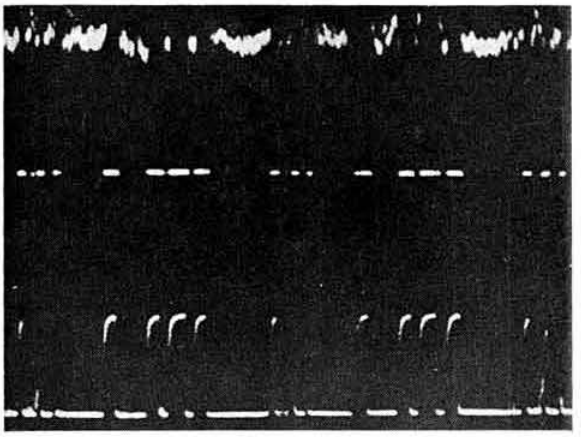

**Photo 3. (a) Upper trace shows a noisy black level (5V) with a noise-free white (0V) at the drum contact 1. The transition is too rapid to be seen. (b) Lower trace indicates the improvement due to the filter capacitor (10μF). Note that the signals are complementary**

gate. Ideally the signal from the drum contact should be as shown in Fig 8 but the effect of contact bounce results in the effect illustrated in Photo 3(a). The output from G1 shown in Photo 3(b) indicates how signal improvement is achieved by the action of the capacitor. The output resistance of G1 when in the "1" state is different from that when it is in the "0" state. This change of resistance means that the time constant is greater when the capacitor is charging than when it is discharging. Provided the bounce is of short enough duration the change in voltage at the input of G2 is not sufficient to cause the 7470N to switch. This effect is illustrated in Photos 4(a) and 4(b) which show the output of G1 and the corresponding output signal $Q_F$ obtained at pin 8 of the bistable. The actual value of the capacitor should be varied over a fairly wide range to determine its optimum value but 10μF is suggested. The output of G1 is applied to the preset input (pin 13) of the bistable and its complement to the

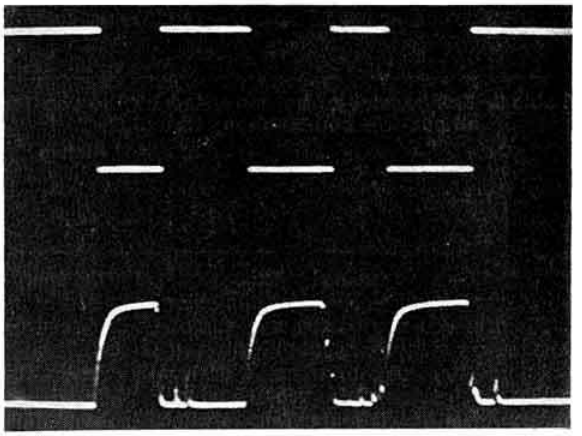

**Photo 4. (a) Upper trace shows the clean output of the 7470, which is scarcely affected by the noise on the input of G2 shown in the lower trace (b)**



C * *

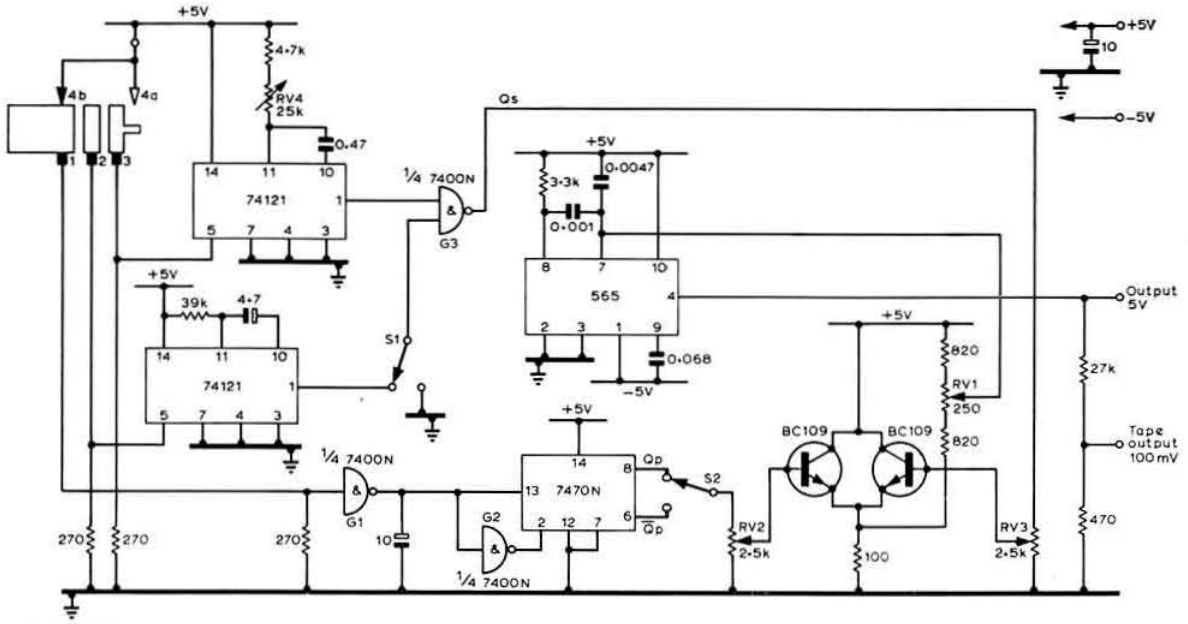


**Fig 9. The complete circuit of the caption generator. G1, G2 and G3 are contained in the 7400N chip shown in Fig 7(b)**

clear input (pin 2). The truth table for the 7470N with the clock input (pin 12) at earth is shown below:

| | Preset (13) | Clear (2) | Output (8) $Q_P$ |
|---|---|---|---|
| White | 1(5V) | 0 | 0 |
| Black | 0 | 1(5V) | 1(5V) |

The changeover switch S2 is included so that tone reversal can be achieved. In Fig 9 switch S2 is shown in the position which gives a white caption on a black background. The complement $\bar{Q}_P$ is available at pin 6 of the bistable and the other position of S2 gives a black picture on a white background.

## Control voltage generator

The frequencies to be generated by the vco for all possible combinations of the logic functions $Q_S$ and $Q_P$ are given in Table 3.

**Table 3. Frequencies to be generated by the vco for all possible combinations $Q_S$ and $Q_P$**

| $Q_S$ | $Q_P$ | f (kHz) | Picture |
|---|---|---|---|
| 0 | 0 | 2·3 | White |
| 0 | 1 | 1·5 | Black |
| 1 | 0 | 1·2 | Either |
| 1 | 1 | | |

$Q_S$ and $Q_P$ are combined together to generate the appropriate control voltage by means of a pair of npn transistors (BC109) in common emitter configuration, which can be seen in the complete circuit of Fig 9.

Before attempting to transmit or record pictures the output frequencies of the vco should be adjusted to the correct values. This is done as follows, with S2 in the position shown in Fig 9:

1. With the drum stationary, place 4b on a white area (insulated). This sets both $Q_S$ and $Q_P$ to "0". Adjust R1 to give 2·3kHz; the frequency should be independent of R2 and R3.
2. Place 4b on black. $Q_P$ is then "1". Adjust R2 to give 1·5kHz; this frequency should then be independent of R3 over most of its range.
3. Use S1 to earth one input of G3 so that $Q_S$ is "1". Adjust R3 to give 1·2kHz.
4. With the drum rotating, adjust R4 so that the line sync pulse triggers the line but not the frame.

## Recording of captions

The individual letters of the captions are cut from Fablon sheet. Naturally a reasonable number of letters is prepared beforehand. Even so, if each caption were to be prepared only when required to respond to a received message, rather a long delay would occur. To avoid this a selected range of captions is prepared before going on the air and these are recorded on loop tapes. A length of tape is cut so that it is just longer than the length required to give a playing time of the frame period (28in at $3\frac{3}{4}$ in/s). The ends are then spliced to give a continuous loop. The loops are numbered and their contents logged so that it is possible to give an immediate response (signal report, etc) and also to produce a variety of programmes by rearranging the order of presentation and re-recording on a standard cassette. Another interesting effect which can be achieved using these loops of tape on a twin-track recorder, is the switching from white-on-black to black-on-white at various points throughout the caption. Using the splice in the loop as a marker, one track is used to record a white-on-black caption while the same frame is recorded on the other track as black-on-white. Playing the loop continuously one can experiment with the best change-over points on these nearly synchronized pictures by switching from one track to another. This adds another variable to the programme which is finally recorded on a cassette.

As well as recorded programmes and individual loops, it is as well to have ready on the caption generator sections of messages which require the insertion of a callsign only. An obvious example is the answering of a CQ call. It has been found possible to assemble callsigns during the reception of CQ calls, attach them to the drum which is already carrying . . . de G3RDI and record on a loop for immediate transmission.

Using the caption generator a series of animated pictures has been made and it is hoped that this article may encourage others to introduce a touch of variety and humour into sstv at a reasonable cost.


## Acknowledgements

The authors would like to tender their thanks to Sunderland Polytechnic where the work was carried out, using the facilities of the Physics Division, and to acknowledge the work of Mr G. Percival who built the drum assembly. □


# Reduction of an in-band spurious emission in the Liner 2


by M. D. EVANS, G3NNE, and
A. K. WHATMORE, BSc, G8EQL*


WHEN used in the top end of the 2m band, the Liner 2 operates extremely well. However, now that the ssb calling channel has been moved to 144·2MHz, a number of Liner 2 owners, particularly those having linears, are aware of an in-band spurious emission which is considered to be of an unacceptably high level. This emission is at a detectable level when the Liner S-meter reads S9 or over. The effect of the modification described is to reduce the level of emission to negligible proportions.

The existing Liner circuitry mixes a 28MHz ssb signal with the output of a 116MHz oscillator. The third harmonic of the 28MHz signal, however, heterodynes with the second harmonic of the conversion oscillator to produce the unwanted signal. This differs in frequency from the wanted signal by an amount which varies with the frequency in use. It has three times the bandwidth of the wanted signal and, since it represents the difference rather than the sum of its constituents, it is inverted in relation to the latter signal.

The new unit, using a double-balanced ic mixer, reduces the unwanted signal by 15dB. One of the main attractions of this unit is that no spectrum analysis equipment is required for setting up. A further advantage is that operation can take place on any set, or sets, of channels by merely changing the second conversion oscillator crystal; *no further adjustment is necessary*. The authors' Liners are currently operating on 144·15–144·38 and 145·25–145·48MHz.

The only other modifications required are the addition of a 10kΩ resistor and an 82pF capacitor. The resistor is used to reduce the level into the first mixer, and as a result of this addition two Class A stages are required in order to recover the original signal level.

## Construction

The complete circuit, which is built on a double-sided printed circuit board, is shown in Fig 1. The pcb layout and etching pattern are shown in Fig 2, and the coupling details of L1 and L2 are shown in Fig 3.

## Installation

Before the new unit can be fitted, it is necessary to remove the existing unit and to drill the pa cover to allow adjustment of the unit when *in situ*.

The outside casing of the Liner may be withdrawn by removing the two Philips screws adjacent to the speaker grill and also the four self-tapping screws at the rear. With the microphone jack plug removed, the case will then slide off. The mixer unit is located at the rear of the Liner, above

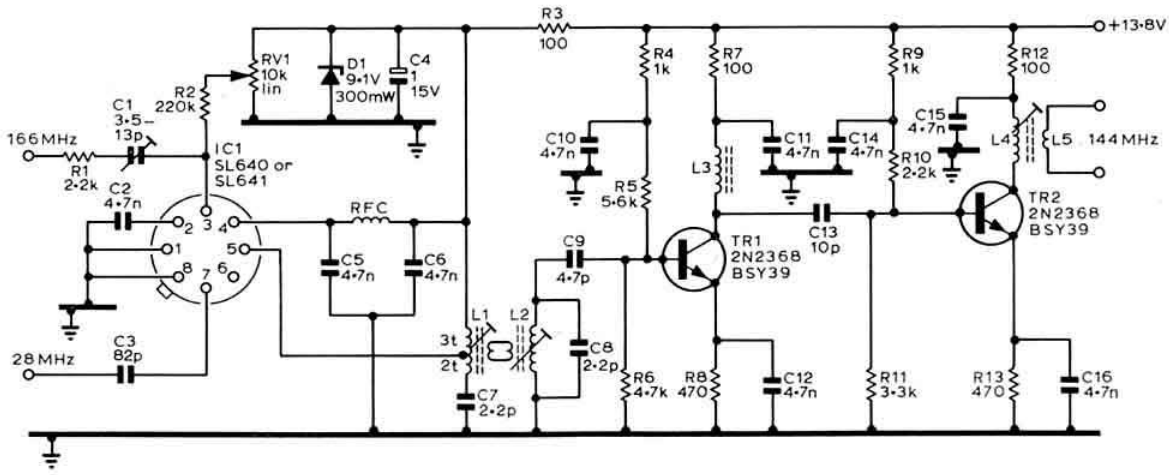


**Fig 1. Circuit diagram of the new mixer**


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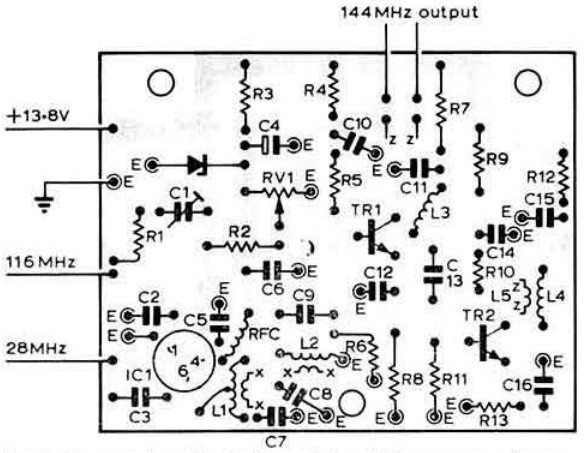



Printed circuit board is double-sided and the components are mounted on the copper side

E — indicates earth connection to copper ground-plane

**Fig 2. Board layout (full size)**

the 12V supply socket. The pa/driver cover may then be removed (four self-tapping screws, two at each end).

The original mixer board has four connectors: the two input frequencies, the output and supply. All four should be carefully unsoldered and, when the three retaining screws on the board have been removed, the board will lift out vertically. The new board should fit exactly in the vacant compartment. The layout of the new board is such that all the existing wiring will reach the connectors on it without modification. The 28MHz coaxial feed is the short coaxial lead coming from the edge of the main board. An 82pF capacitor should be connected between the output link L5 of the new board and the existing circuitry, as shown in Fig 4.

## Setting up

Initially, the extra 10kΩ resistor is omitted and RV1 adjusted to half way. At this stage there will be more than sufficient drive to the new unit, and adjustment of the ferrite cores will be simple. All cores are adjusted for maximum output, and the 10kΩ resistor is then fitted in the line between C30 and C31 (see Liner circuit diagram); it is best located where the coaxial feed leaves the board at C31. An output of 10–11W (slightly in excess of the original level) should now be obtained.

The location of the in-band spurious emission is dependent upon the channel selected. Assuming adjustment is carried out on 144·200MHz, the spurious emission will be found on approximately 145·400MHz. The spurious emission for any

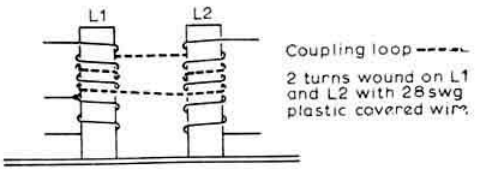



**Fig 3. Details of coupling of L1 and L2**

## Components list

| | | | |
|---|---|---|---|
| **R1, R10** | 2·2kΩ | **D1** | 9·1V 300mW |
| **R2** | 220kΩ | **TR1, TR2** | 2N2368 or BSY39 etc |
| **R3, R7, R12** | 100Ω | **IC1** | Plessey SL640 (SL641 also suitable) |
| **R4, R9** | 1kΩ | | |
| **R5** | 5·6kΩ | | |
| **R6** | 4·7kΩ | **L1** | 5t 22swg on 4mm former with ferrite core, tapped at 2t |
| **R8, R13** | 470Ω | **L2** | 5t 22swg on 4mm former with ferrite core |
| **R11** | 3·3kΩ | **L3, L4** | 4t 22swg on 4mm former with ferrite core |
| **RV1** | 10kΩ linear pot | **L5** | 2t 26swg plastic-covered interwound with L4 |
| **C1** | 3·5–13pF | **RFC** | 4t 28swg on ⅛in former |
| **C2, C5, C6, C10, C11, C12, C14, C15, C16** | 4·7nF | | |
| **C3** | 82pF | | |
| **C4** | 1μF 15V | | |
| **C7, C8** | 2·2pF | | |
| **C9** | 4·7pF | | |
| **C13** | 10pF | | |

other frequency can be calculated by subtracting the third harmonic of the appropriate 28MHz channel (p10, operator's manual) from 115·6 × 2 = 231·2. The spurious emission is tuned in on a second receiver, which should preferably have an S-meter. The transmitter is now operated using the test facility, and C1 adjusted in conjunction with RV1 for minimum spurious emission. A slight adjustment of L1 may also be necessary. It should be mentioned that in some cases there will be a disparity in the drive levels supplied by the test button on normal dynamic operations. In this case, the unit should be adjusted for minimum spurious emission under dynamic conditions. Final adjustment should be made with the pa cover in position. Some advantage can be gained by adjustment of the alc to bring the output back to its original level.

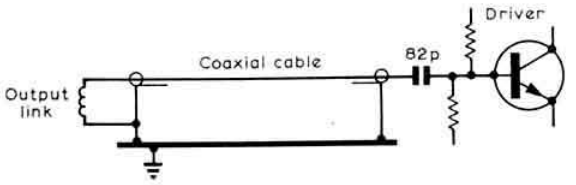



**Fig 4. Positioning of extra 82pF capacitor**

In one case after the addition of the unit, the test facility no longer produced the expected reading on the power meter, although under dynamic conditions the reading was normal. This is due to insufficient drive from the "unbalanced" modulator. This situation can be rectified by slight adjustment of the carrier crystal. It is recommended, however, that this is not done unless specifically required as this can result in an inferior ssb signal. Addition of the 10kΩ resistor may cause slight de-tuning of transformer T2. Normal receive sensitivity can be recovered by a small adjustment of the appropriate core.

This modification has been used by the authors now for several months, in both mobile and fixed stations, and they have found it entirely satisfactory. No subsequent re-tuning has been necessary and the unit has been entirely stable. □

*Attention is drawn to the fact that modifications may invalidate any existing guarantee—Ed.*

# Testing fall-out integrated circuits

by R. P. NORRIS, G3ZDN*

IT is now possible to buy packs of untested digital ICs (fall-outs) at very low prices compared to fully coded and working devices, and the author has found these to be a useful source of such circuits; not only for experimental work but also for permanent pieces of equipment. The commonly-available devices are the SN7400 range of ttl (transistor-transistor logic) circuits which are in 14- and 16-pin dual-in-line plastic packages, and the $\mu$A930 range of dtl (diode-transistor logic) circuits in 14- and 16-pin dual-in-line ceramic packages. They both use the same supply voltages and logic levels.

Simple GO/NO GO tests will usually show about 40 per cent of the circuits supplied to be completely working, although this figure becomes lower as the complexity of a device increases. In addition to these completely-working devices there are usually partly-functional devices, wrongly-coded devices and occasionally devices that can be repaired. The number of devices that are totally useless is likely to be less than 10 per cent.

If circuits are tested by soldering wires to the pins and performing the various functional tests, then a large amount of time is spent connecting and disconnecting wires. If a fairly large number of devices is to be tested, it is well worthwhile building a simple tester to perform tests quickly and efficiently.

As an example of the likely yield, the following survey was taken of a selection of packs of untested circuits. A total of 10 packs was included, which cost £5 and contained a total of 98 devices. A summary of the findings is given in Table 1, which lists the numbers of working and partly-working devices. In addition to these, three mis-coded devices were found: two fully-working SN7490s (both in a pack of SN7400s) and a fully-working SN7474 (in one of the packs of SN7440s) Ten of the SN7404s were in fact coded as the lower-power SN74L04 and all were working. For many purposes these two devices are interchangeable, caution being needed only when the SN7404 is to drive several other devices.

**Table 1. Results of using the tester**

| Marked type | Total number bought | Number working | Number partly working | Number of wrongly coded devices |
|---|---|---|---|---|
| SN7400N | 24 | 16 | 6 | 2 |
| SN7404N | 24 | 19 | 3 | — |
| SN7440N | 24 | 6 | 14 | 1 |
| SN7474N | 16 | 8 | 3 | — |
| SN7483N | 10 | 4 | — | — |

To summarize, the 98 untested devices yielded 56 fully-working devices and 26 partly-working devices. The cost of the fully-working devices alone, if bought at the normal retail price, comes to around £20, representing a saving of £15. The

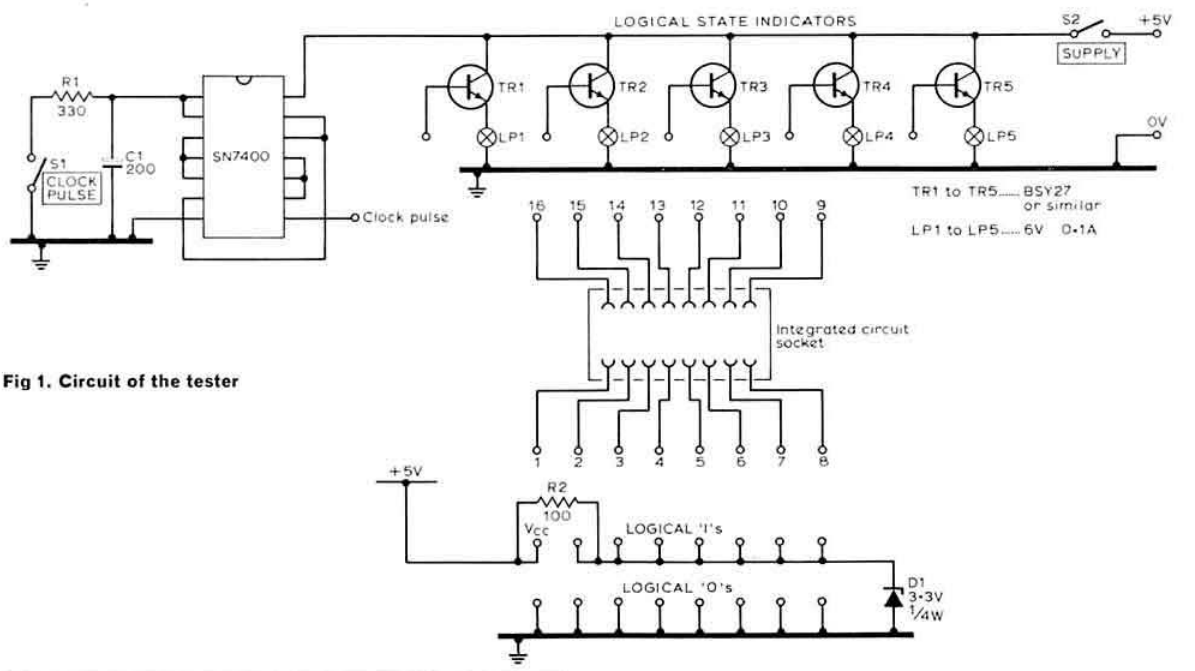



**Fig 1. Circuit of the tester**

* St Catharine's College, Cambridge CB2 1RL.

yield will sometimes be higher, sometimes lower. Occasionally there may be a bonanza, as recently when the author found three completely coded, working SN74150s (price £2.90 each) in a pack of SN7400s, but this is unusual.

## The integrated-circuit tester

This tester is specifically designed for testing SN7400 series ttl ICs and will also test the $\mu$A930 series dtl circuits. It therefore has a socket to accept 14- or 16-pin devices but sockets for other encapsulations could of course easily be incorporated if necessary. One purpose of the tester is to provide a stable mounting for the device to which connections can be readily and rapidly made. It also has sockets to provide the dc supply of +5V for which the devices are designed.

These devices, being digital, recognize only two types of signal: "high" (or logical "1"), and "low" (or logical "0"). A wire is "low" if it is carrying a voltage of less than +0·4V with respect to earth, and "high" if that voltage is greater than +2·4V with respect to earth. A fully-functional device should therefore treat anything up to +0·4V as logical "0" and anything above +2·4V as logical "1". In fact, this tester uses 0V and +3·3V as logical "0" and "1" respectively, so that the device is not tested at its specified limits. However, this looser specification is adequate for most purposes and only once in the author's experience has a fault in a piece of equipment been attributable to this discrepancy, out of hundreds of devices tested and used.

The tester, the circuit of which is given in Fig 1, therefore has a supply of logical "0" and logical "1" sockets. It also has a clock pulse circuit. This circuitry is necessary to provide a clean single rise or fall with no "spikes" and a short rise time, for use in testing shift registers and counters. The resistor-capacitor integrating circuit is used to remove the spikes from switch contact bounce. This is then followed by a series of NAND gates used as amplifiers to give the pulse a short rise time.

Finally, the tester contains five logical state indicators which show whether an output is at logical "0" or "1", the bulbs lighting for a logical "1". The circuit is simple, and although it gives no indication of the exact output voltage, each indicator draws about 1mA from the ic. This is considerably more than a normal load on an ic, so ensuring that the latter has a reasonably low output impedance. The reason for including five indicators is that many devices have four or five outputs, but very few have six or more.

It was found convenient to mount both the ic socket and the SN7400N (for the clock pulse circuit) on one piece of 0·1in matrix Veroboard, which is then mounted as shown in Fig 2. It may be found useful to mount both 14- and 16-pin dual-in-line sockets but the author found this unnecessary, 14-pin devices being inserted into the 16-pin socket, leaving the two end connectors in the socket unused. When doing this, however, one must remember that the pin numbers

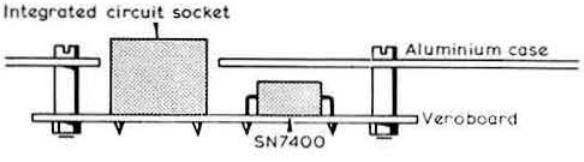



**Fig 2. Side view of the tester**

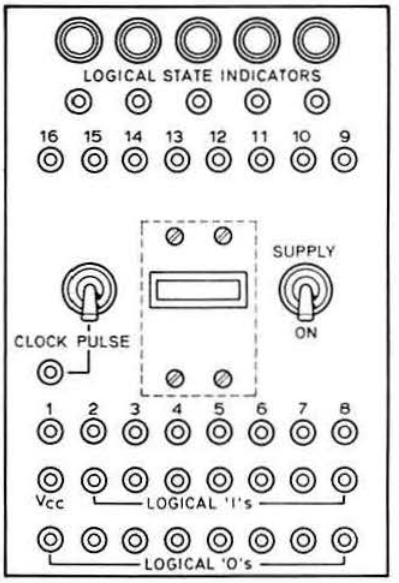



**Fig 3. Front view of the tester**

above 7 on the tester will be wrongly numbered and connections made accordingly. The whole tester may be mounted on the lid of a 6 by 4 by 2in aluminium box as shown in Fig 3.

It is a good idea to insert a test meter in the supply line to the ic under test to check that it is not drawing an excessive current, since devices can appear to be functional when tested but when run for some time overheat and break down.

## The testing sequence

The aim when testing is to reproduce as nearly as possible the conditions under which the ic will have to perform, ensuring that it performs correctly. In practice, a compromise must be struck between this and the time taken to test each device. The following sequence is that used by the author.

First, the $V_{cc}$ (positive supply) pin is connected to the $V_{cc}$ supply socket, the ground pin to a logical "0" socket and the outputs to logical state indicators. Various inputs are then fed in, depending upon the type of ic under test, and then the indicators are checked to see if they are giving the correct indication.

It is a feature of these integrated circuits that open-circuit inputs will assume a logical "1" state. It may therefore be decided, in order to save time, to leave an input open-circuit when a "1" is needed, rather than to connect it to a logical "1" socket. The author often does this but it does not detect a short circuit between the input pins, which may not be detected until a piece of equipment is built and all the circuits wired in. Some time may then be spent in detecting the fault and replacing the ic but the decision may be taken simply to accept this risk and save a great deal of time in testing the integrated circuits.

Suppose, for example, the device to be tested is an SN7400. This is a quadruple two-input NAND gate, meaning that there are four separate two-input NAND gates in one package. The output of a NAND gate should go "low" when both the inputs

are "high", and should go "high" when either or both of the inputs are "low", causing the appropriate indicator to light. In other words, testing an SN7400 consists of touching a wire connected to logical "0" to each input in turn, leaving the other inputs open-circuit and making sure that the appropriate bulb lights. It will be found that many devices will have just two or three gates working and so may be used as such, leaving any non-functional gates disconnected.

If it is decided to "play safe" and detect shorts between inputs, then instead of leaving the other inputs open-circuit, they should be connected to logical "1" and a test meter on its current range used for connecting inputs to logical "0". A short between two inputs will then reveal itself as a high reading on the test meter. Similar procedures may be used for other devices, bearing in mind the logic of the particular device under test.

Partly-functional devices may be marked as such by shortening the appropriate pins by about $\frac{1}{8}$in. This is sufficient to locate them easily, yet when the circuits are mounted on a printed circuit board, the inherent neatness of dual-in-line packages is not ruined, since the shortened leads cannot be seen from the top of the package.

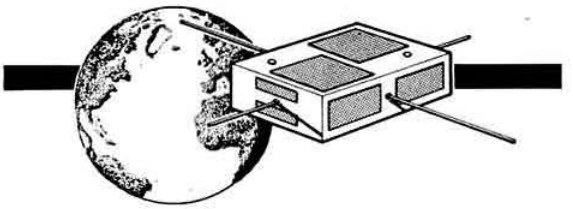
## Reclaiming "duds"

In the testing procedure outlined above, there will invariably be found devices that show no signs of working at all, or work in a totally unexpected way; for example, an SN7400 may show bistable properties. In the latter case, it is an easy matter to compare the result with the data sheets on other devices in the same series. In the example above the device may perform exactly as a fully-working SN7474, which is a dual type flip-flop. In this case it is not unreasonable to assume that the device is in fact a wrongly-coded SN7474 and to code it as such.

If the device does not work at all, it is often worthwhile trying the effect of applying the $V_{cc}$ and ground wires to a pair of pins which are the $V_{cc}$ and ground pins for another device, and seeing if it then performs any recognizable functions. This is facilitated by the fact that the majority of devices have the same $V_{cc}$ and ground connections. For example, most 14-pin devices have $V_{cc}$ and ground at pins 14 and 7 respectively; and those that do not have these connections have them instead either at pins 4 and 11, or at 5 and 10, respectively. A similar rule can be worked out for 16-pin devices. Incidentally, the best way to examine a device for other functions is to disconnect all pins apart from those connected to $V_{cc}$ and ground and measure the voltage to earth of each pin. If the $V_{cc}$ and ground are correctly connected, the outputs will be either at about 0V or greater than about 3V, whereas inputs will be somewhere in between, depending upon the resistance of the meter used. Experience enables one to rapidly distinguish between these. Once they are found, logical state indicators are connected to the ic outputs and the ic inputs in turn connected to logical "0" to find a recognizable function.

In the course of the above tests it may be found that there is a short between two pins that renders the device non-functional. In such a case, if the pins are adjacent, check that there is no metal bridge between them outside the package; this is often present if the pins have not been stamped out correctly and it may easily be removed.

For data on the SN7400 series a useful publication is the Texas Instruments *TTL Designers Handbook*, obtainable from Texas Instruments for £2. □



WITH effect from 1 March the use of descending passes of **Oscar 6** was withdrawn except for Sunday mornings. The spacecraft battery has apparently survived the long exposure to sunlight and with correct usage Oscar 6 is expected to be operational for a further period, which could be as long as a year. Use of Oscar 6 should be confined to ascending passes on Monday, Thursday and Saturday afternoons/evenings and descending passes on Sunday mornings.

A new, second style of official first-day cover commemorating the launch of **Oscar 7** has recently been announced by AMSAT, PO Box 27, Washington, DC 20044. These covers were postmarked at the launch site, Lompoc, California, on the day of the launch, and contain the "Progress in Electronics" commemorative stamp. The covers are available from AMSAT for $1 each (or 5 IRCs) and a business-size self-addressed envelope with an additional irc in lieu of postage.

## Reference orbits

| Date | Orbit No | Equatorial crossing ut | Equatorial crossing W | Mode |
|---|---|---|---|---|
| **Oscar 6** | | | | |
| 12 April | 11380 | 1108 | 217·1 | |
| 19 April | 11468 | 1147 | 227·0 | |
| 26 April | 11555 | 1032 | 208·2 | |
| **Oscar 7** | | | | |
| 12 April | 1851 | 1024 | 205·9 | mode B |
| 19 April | 1939 | 1059 | 214·7 | mode A |
| 26 April | 2027 | 1134 | 223·5 | mode B |

## AMSAT-UK

This organization has been formed to encourage participation in amateur space communication and to take part in the development of future satellites. *Oscar News* will be published at regular intervals and, in due course, a satellite users' handbook will be available. Full details of AMSAT-UK can be obtained by sending a 4in by 9in sae to G3WPO, QTHR.

## RTTY

A 17min contact between W2LFL and G8LT took place on 10 February during revolution 1093 of Oscar 7. The QSO occupied all the usable time on the Oscar 7 orbit and was continued via Oscar 6. Solid copy was obtained despite some ssb QRM. The speed used was 45·5baud and a shift of 170Hz. FSK was obtained by audio tones of 1kHz and 1,170kHz fed to the ssb exciter driving a Europa transverter at 60W. The receiver was a Drake R4C with a home-built ST-6tu driving a Creed 54 printer. The uplink aerial was a 10-element Yagi, with no elevation adjustment, with a tri-band beam used for receiving on 29·44MHz. It was noted that due to the doppler effect the receiver selectivity had to be kept moderately broad even though narrow shift was used. Thanks are due to Bill Browning, G2AOX, who worked out the figures for times and bearings followed by junior operator Robert. □

# Radio communications at frequencies below 10kHz

by R. LAPTHORN, BEng, G3XBM*

AT the ITU conference on frequency allocations in Geneva in 1959, the frequencies below 10kHz and above 40GHz were left unallocated. The upper limit was extended at a more recent conference on space communications to 275GHz but the lower end of the spectrum has still remained unallocated. Contrary to popular opinion, the extreme bottom end of the spectrum has definite practical applications in long-distance communications and navigation systems. Already operational in the 10 to 14kHz region is OMEGA, an extremely accurate long-distance hyperbolic navigation system enabling worldwide determination of position with remarkable accuracy. For a long time the vlf region between 14 and 30kHz has been used for worldwide long-distance communication with ships, and with submarines just beneath the surface. During the past decade or so, much work has been done to evolve a system capable of maintaining communication with deeply submerged submarines, and progressively lower frequencies have been considered to overcome the exponential attenuation with frequency (the skin effect). As the frequency is lowered the attenuation suffered by a signal passing through rock or seawater decreases. Another bonus gained by using extremely low frequencies (e.l.f.) is that the D layer and earth's surface form an imperfect waveguide and permit signals to propagate worldwide with extremely low attenuation. However, at such low frequencies the efficiencies of the transmitting aerials becomes very low unless colossal structures are erected. Furthermore, the available bandwidth becomes narrower, restricting the forms of modulation that can be transmitted.

In addition to submarine communication the e.l.f./vlf spectrum has also been investigated by national governments interested in nuclear bomb-proof communications between deeply-buried underground headquarters. At extremely low frequencies certain rock strata have propagation characteristics not unlike that of the ionospheric waveguide mentioned above, and an e.l.f. signal injected into such a layer would propagate for long distances with low attenuation. Little or no signal would escape from the underground rock waveguide, making the path extremely secure and unjammable. However, discontinuities in the rock structure (for example, faulting) act as partial shorts in the waveguide and would cause considerable signal attenuation. In practice such a system could only be used where the continuity of the rock strata between underground centres was guaranteed.

Papers have also been written describing communication through the earth or sea by means of dc signalling, although if information is to be passed then the frequency ceases to be dc. Similar systems at frequencies up to 3kHz have been described for emergency communications in mines and caves. Due to the aerial inefficiency, the main mode of communication ceases to be by radiation and relies instead on conduction and induction fields (earth mode communication).

Worldwide communication at e.l.f. depends on being able to inject sufficient radiated energy into the earth-ionosphere waveguide to provide enough detectable signal at the end of the path to decode the signal. Due to the inefficiency of the transmitting aerial, colossal powers are required to produce the one watt or so that is actually radiated. This rules out any hope of amateur worldwide dx communication at such frequencies, should an amateur band ever be allocated in the e.l.f. part of the spectrum. However, if the available power is more modest, say up to 100W, communication can be achieved at these frequencies over local distances by conduction or induction fields, and there is much scope for interesting experimental work. The case for a small amateur allocation at e.l.f. when this portion of the spectrum is divided up, possibly at the next ITU frequency allocating conference in 1979, is a fairly strong one and deserves some consideration.

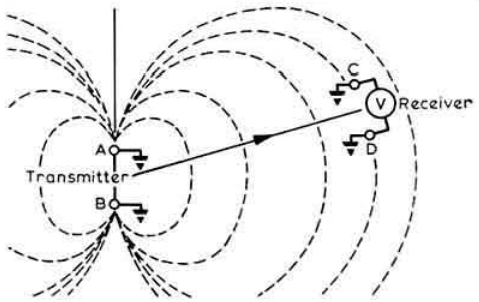



**Fig 1. Principle of short-range e.l.f. communication systems**

## An e.l.f. earth mode communication system

The principle involved in relatively short-range e.l.f. communication systems is remarkably simple and is illustrated in Fig 1. Current is injected into the earth or water at the transmitter terminals AB and the induced conduction and induction fields are detected at the receiver as a potential difference between two grounded electrodes CD. The received signal is a function of geometry, injected current from the transmitter and the characteristics of the conductive medium between all the terminals. When radiation is neglected, and this cannot be done when the power injected is very large as in the dx systems described earlier, then the received electric field can be expressed by:

$$E_{\text{Radial}} = \frac{Ib(\cos A)k_{\text{R}}}{3{\cdot}14r^3} \qquad (1)$$

$$E_{\text{Tangential}} = \frac{Ib(\sin A)k_{\text{T}}}{6{\cdot}28r^3} \qquad (2)$$

where $I$ is the current injected at the transmitter, $b$ is the distance between the transmitter electrodes, $r$ is the distance between transmitter and receiver, $k_{\text{R}}$ and $k_{\text{T}}$ are complex

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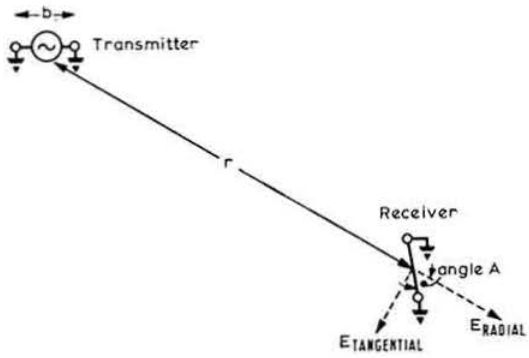


**Fig 2. Orientation of transmitter and receiver**

functions of the apparent resistivity and $A$ is the angle in Fig 2 between transmitter and receiver. $k_R$ and $k_T$ are dependent on many factors, including frequency, but at e.l.f. they approximate to the intrinsic resistivity of the medium. The intrinsic resistivity can vary widely, but some typical values are given below:

Seawater 0·25Ω/m
Clayey sand 50Ω/m
Limestone 5,000Ω/m

From equations (1) and (2) it can be clearly seen that the range of earth mode communication systems is severely limited by the inverse cube factor. Signals are therefore attenuated rapidly with distance and this puts practical limits on low-power systems, usually of the order of one or two miles.

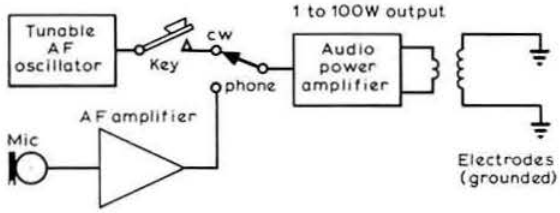


**Fig 3. E.L.F. earth mode transmitter**

A suitable transmitter is illustrated in Fig 3 and comprises an audio oscillator followed by an audio power amplifier suitably matched into the load presented by the two grounded "aerial" rods driven into the ground some distance apart. The receiver at its simplest is just a pair of headphones connected to two similar ground rods as far apart as possible. AC hum at 50Hz and its harmonics will almost certainly be a problem when the receiver earth rods are a moderate distance apart. A more sophisticated receiving station (Fig 4) would include narrow-band filters to reduce this problem and also cut down naturally-occurring wideband noise which is mainly of atmospheric origin. Typical noise sources are whistlers and tweeks, both generated by lightning discharges, and chorus, which is thought to be generated by electron movement along magnetic field lines.

The ultimate range will depend on the signal-to-noise ratio that is acceptable. Very slow information rates with extremely narrow band filters, such as resonant reeds, would significantly increase the range achievable. Even with bandwidths suitable for 12wpm cw, the range will still be very useful for local experiments. Phone can be used over much shorter but nonetheless useful distances, with signal-to-noise ratio again being the main constraint.

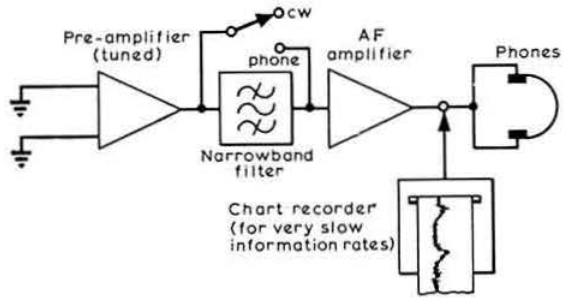


**Fig 4. E.L.F. earth mode receiver. More complex receivers might include non-linear processing to reduce non-Gaussian impulsive noise spikes**

The geometry of the transmitting and receiving "aerial" rods will depend on what other metal objects are buried nearby. Cables and metal pipes will cause the field patterns to become skewed and the received signal in urban areas will be almost incalculable because of this. In general, the size of the rods or earth terminals should be as great as possible and the separation of these at the transmitter end and at the receiver end respectively should be as far as possible. Using metal water pipes as one of the earth connections at each end of the link may help in some cases.

Interesting propagation tests could be carried out along a river or seacoast (Fig 5), attaching one of the transmitter and receiver "aerial" rods to a buoy in the water and burying the other rods at each end in the soil or sand. In the seacoast case especially, the propagation is similar to a lossy conductor and the achievable range may be surprising.

Other experiments could include the use of resonant loops at the receiver, instead of rods, to sense the induced field.

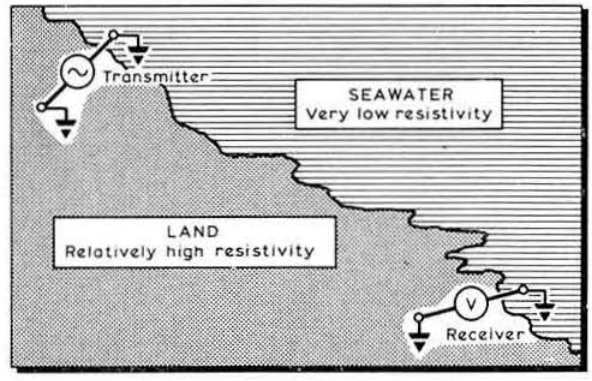


**Fig 5. Suggested seacoast e.l.f. communication experiment**

This technique is widely used to trace buried cables and piping. There are indeed many lines of experimentation possible.

## Licensing

At present the legality of such systems is a little unclear, but the Home Office will issue Testing and Development (Radiating) Licences in the G9 . . . series to those interested in serious experimental work. The use of earth mode communications at e.l.f. for non-experimental links is not covered by such licences. If sufficient people were interested, it might be possible to get an extension of the Amateur Sound A licence to cover a small section of the e.l.f. spectrum. Such official authorization might stimulate publication of results and activities by local groups and some interesting co-ordinated experimental work could result. Internationally, now is the time to give some thought to a possible application for an e.l.f. amateur band if this part of the spectrum should be allocated at the ITU conference in 1979.

## Conclusions

The spectrum below 10kHz is far from being a forgotten territory and is the centre of much attention in the communications world at the present time. Amateurs should not ignore its potential as an area for experimental work requiring little equipment to get started and presenting a subject with a difference to work on. The references below are recommended reading for all interested in the area of e.l.f./vlf communication and the first one listed in particular makes fascinating reading for those left who believe radio ends at the top end of long wave!


## Acknowledgements

The author wishes to thank Pye Telecommunications Ltd for the use of their library facilities and in particular Mrs Mavis Driver, librarian, for her help in locating many of the references.


## References


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# BOOK REVIEW

*THE RADIO AMATEUR'S HANDBOOK* (1975 edition) by the headquarters staff of the ARRL. 704 pages, copiously illustrated and with many tabulations. Obtainable from RSGB, 35 Doughty Street, London, WC1N 2AE. Price £4.50 (hardback) or £3.60 (paperback) inclusive of postage and packing.

The well-known *Handbook*, having passed the four and a half million mark in half a century, is issued several months earlier this year to make its appearance more closely related to the peak of amateur activity.

There are many revisions and new designs despite the very considerable changes in the contents in recent editions, and the newly-added material not only reflects modern technique, but impresses by its practicality.

There is an attractive solid-state rf preamplifier design for 10 and 15m, with a gain of about 14dB, which would revitalize the output from old receivers. Also included is an audio bandpass filter for cw or ssb, which is useful for hum and hiss rejection. It is of special interest to those who use hi-fi headphones, which have certain disadvantages when used in amateur communication work. The filter has been named the Crud-o-ject (Continuous Random Unwanted Disturbances) and the cw version has a centre frequency of 600Hz, an input and output impedance of 600Ω, insertion loss of about 2dB, and output power limited to some 24mW. The phone version has a pass-band of 355–2,530Hz at the 3dB points. It is a passive device, so it needs no batteries, and these filter circuits have many advantages.

A "receiving package" for cw bands from 160m to 15m is a solid-state receiver, consisting of a single-conversion tunable i.f. covering the lower portion of the 160m band, with converters for each additional band built in to the same package. Its small size, light weight and low power consumption make it an ideal portable receiver of quality. The use of separate converters for each band obviates complicated band switching, which is replaced by dc and 50Ω circuit switching.

A 160m amplifier for use with a 50–100W exciter for cw and ssb, fan-cooled, with 2,600V anode supply, will have a limited interest for British amateurs, and is in contra-distinction to a "direct conversion kilogram" for 20 and 40m, covering the reception of the cw portion of these bands. It is a companion to the 10W solid-state transmitter described in Chapter 6 (and in the 1974 edition). The receiving "kilogram" has a total power consumption of 0·6W and battery operation is practical; it has a size of only 6 by 7 by 3in and weighs 1kg, so it is attractive for portable work. A "circuit overview" of 11 lines, preceding a circuit description, is surely being self-critical to an unnecessary degree. The receiver looks a worthy mate for the advanced-design QRP transmitter in Chapter 6.

The rf speech clipper in the ssb transmission chapter is replaced by an audio speech processor which consists of a microphone preamplifier, high-pass filter, logarithmic amplifier, low-pass filter and a processed signal amplifier. The near elimination of hum, rf feedback and impedance matching problems by using audio processing instead of rf clipping makes this method more attractive, especially as it connects simply between microphone and transmitter input. Only a very small degree of distortion is the claim, together with ease of setting the proper level to the exciter, especially if the transmitter alc voltage can be monitored.

An outboard transverter for 1·8MHz is new. It is for owners of five-band transceivers and requires 1W of drive power at either 21 or 28MHz. The pa stage, a pair of 6146Bs operating in Class AB1, will deliver more than 100W p.e.p. output; an economy power supply to suit is described, and also details of the receiver operation.

Also new is a QRP ssb/cw transmitter for 80 or 20m. It is solid-state throughout and each version can deliver up to 9W p.e.p. into a 50Ω load. A regulated 12V dc supply of up to 2A is required.

A simple coupler for balanced lines is described, and a Unimatch, which is designed to couple energy from a 50Ω transmitter to any low-impedance load.

The treatment of ground-plane aerials has been revised, and a table of coil and dimension data is given. Limited-space aerials receive further attention, and there is a new short 20m 3-element Yagi and a 3-band quad, the latter being only 35ft above ground.

This publication continues to be a really practical encyclopaedia of amateur radio, and an inspiration to technically-minded people.

*T. P. A.*

# Taking the Radio Amateurs' Examination

by R. G. MARDEN, G3MWF*

AS yet another RAE approaches, hundreds of potential amateurs will be preparing for it, either studying at home or taking a course at a local educational establishment. What is often neglected, however, is *how* to take the examination, for it is not always realized that the wrong method of approach can lose those vital marks that could, in a borderline case, result in pass or failure.

Revision will be necessary and should start about a month before the examination date. One to two hours should be devoted to study each evening, according to how much the candidate knows. It is best, however, not to do any at all on the night before the examination. It is also a mistake to attempt any last-minute checks on the night, for if not enough has been absorbed by this time, eleventh-hour reminders will only confuse.

The candidate should arrive at the college or school at least 30 minutes before the examination is to take place. This allows time for finding the right classroom, settling nature's needs and seating oneself comfortably in plenty of time to receive pre-examination instructions and the paper itself. To arrive in a last-minute fluster could lessen the chance of passing. The candidate should have two pencils and two pens; it is most annoying to have a pencil break, and worse still if a pen runs out. An eraser and pencil sharpener are also useful, as is a straight-edge or rule, which will be found helpful for diagrams etc, especially if the candidate is not good at drawing freehand.

The paper is set by the City and Guilds of London Institute, and is split into two parts, lasting for three hours. A pass must be secured in both parts. The first part comprises two questions, both being compulsory, and the second part has eight questions, of which only six need be attempted. There thus are eight questions in all to be answered.

When the moment arrives for the paper to be handed out, the invigilator will probably place the paper face down on the desk and instruct the candidate to wait for his signal before turning it over; it is most unwise to attempt a peep, because one can immediately be disqualified as a result.

When the candidates are allowed to look at their papers the timing will begin, but it is important not to start straight away. Instead *at least* 10 to 15 minutes should be spent reading the paper through several times very carefully, taking special note of any instructions thereon.

As already stated, the two questions in Part One *must* be attempted. Out of the optional questions in Part Two the ones which can be most satisfactorily answered should be selected. They should then be placed in the order in which it is wished to attempt them, preferably the easiest first followed by the more difficult ones; it is not necessary to answer them in the order printed, as long as the answers are clearly numbered. To make a successful attempt at an easy question early on in the examination gives the candidate confidence and gets rid of the nerves and "butterflies".

On the assumption that 10 minutes are spent studying the paper, 170 minutes will be left for the examination. If 20 minutes are allowed for answering each of the eight questions and the candidate manages to finish them in this time, 10 minute's grace will remain at the end for reading the answers through and making any corrections that may be necessary.

The 20 minutes suggested for each answer is a rough guide as to how much should be written. For instance, in a question split into, say, four parts, it is obvious that the examiner only expects five minutes to be spent on each part, and this includes thinking time!

Written answers should not be over-elaborated and padded out—the point should be made as quickly as possible because there is no time to waste. It is a good idea, too, for the candidate to jot down some main points in the order in which it is thought they should come. The writing will then be easier and very little will be forgotten. If any rough notes are made, or if any figures are scribbled down while thinking about an answer, the paper supplied should be used, and not the candidate's own paper. In this way the candidate cannot be accused of referring to prepared notes, commonly called "cribs".

With answers involving calculations, it is wise to set out all the steps of the answers, including logarithms and antilogarithms, in detail. If the answer is wrong only through bad arithmetic, the examiner will then be able to judge whether the formula chosen was correct and if the right method was used to solve the problem. If the method is correct the candidate is unlikely to lose too many marks and, in fact, most of the marks possible for the problem may well be gained. For example, one of the questions may be worded:

3. The dc feed to a pa stage is 250V at 40mA. If the rf output is dissipated across a dummy load of 500Ω and a current of 0·1A is produced, find:
   (a) the power input;
   (b) the power output;
   (c) the efficiency of the stage;
   (d) the anode dissipation.

The answer should be set out similar to the following:

Qu. No 3. (a) Power input

$$W = IE = \frac{40 \times 250}{1000}$$

$$= \frac{100}{10} = \underline{\underline{10 \text{ watts}}}$$

(b) Power output

$$W = I^2R = 0{\cdot}1 \times 0{\cdot}1 \times 500$$
$$= 0{\cdot}01 \times 500 = \underline{\underline{5 \text{ watts}}}$$

(c) Efficiency

$$\frac{O/P}{I/P} \times 100 = \frac{5}{10} \times 100 = \underline{\underline{50\%}}$$

(d) Anode dissipation

$$I/P - O/P = 10 - 5 = \underline{\underline{5 \text{ watts}}}$$

Notice that the question number is clearly shown, followed

(*Continued on page 303*)

* 46 Highfield Road, London N21.

# TECHNICAL TOPICS

by PAT HAWKER, G3VA

A RECENT letter to the editor of *QST* from Dave Corry, WN7WPP, who had spent some time analysing all the articles on aerials to have appeared in that journal over the past 20 years, formulated a series of propositions that are not without general interest. They are:

(i) The number of articles and the amount of aerial experimentation follows the curve of sunspot maxima and minima.
(ii) Just when an aerial design seems to be completely exhausted, someone re-invents it more simply and cheaply and starts the whole thing going again.
(iii) Amateurs today are either generally richer or less inventive than 20 years ago.

Now he is wondering whether he will have to wait for more sunspots for the re-emergence of designs which are simple, cheap and ingenious.

Certainly even on this side of the Atlantic one can see what he means, though one hopes that if WN7WPP ever gets round to analysing *Radio Communication* he will find at least some evidence that amateur ingenuity is not dead yet, even if at times it seems a little sick.

E. M. Wagner, G3BID, noted our remarks in the December *TT* in questioning "Why is it that people spend a lot of time and effort developing novel ideas, prove to their own satisfaction that they really work and seem capable of providing either a new facility or a more elegant or more economic solution to a real problem, only to find that very few people appear interested".

G3BID believes the answer to this is not difficult to find. He writes: "To develop novel ideas and prove they work, involves only small expenditure and little capital. To convert them into marketable products involves considerable capital outlay and risk of loss. In other words it is a gamble. The British are normally willing gamblers but the odds must be reasonable.

"At present-day taxation this is not the case: if the entrepreneur takes up the novel idea and his company makes a profit, 52 per cent goes on Corporation Tax. If he makes a loss, he has the whole loss for himself (or company). The odds are heavily loaded against the entrepreneur.

"A similar situation exists in Australia and many other countries. The explanation of the problem experienced by VK3ACA is the rate of taxation."

Certainly this is one of the factors although I think not the only factor: the sheer size of modern industrial organizations and the complex committee/standardization/organization structures all combine to discourage innovation except in the most ponderous manner.

I well remember not so many years ago that a well-known government research establishment had the reputation of consistently blocking all ideas from the industry it was meant to assist. In this case taxation hardly entered into the question, but the result was almost always delay and frustration. The old adage has it that a camel is a horse designed by a committee. If you have a good idea, you have to accept that *you* will be the only person pressing it forward. And if you do try and develop and market it yourself, then G3BID's taxation comes along as Catch 22!

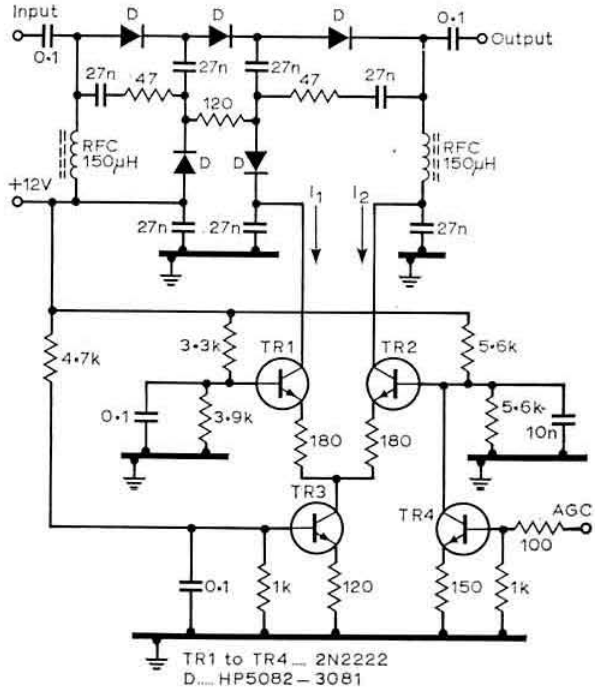


**Fig 1. Five p-i-n diodes in a double-T arrangement form an agc-controlled attenuator. The sum of the transistor collector currents are maintained constant to keep input and output impedances constant**

## Eight ways to better receivers

In *Electronics* (February 20, 1975), Ulrich L. Rohde, DJ2LR/W2, has an informative article on "Eight ways to better receiver design" which brings together a number of ideas apparently based on the design of the Rohde & Schwarz £10,000 EK56 receiver. The emphasis is on lower distortion (ie good linearity) and good image suppression. The eight suggestions are:

1. Set the i.f. higher than the receiver band to ease image rejection.
2. Use separate agc and amplification stages to allow more precise control of distortion.
3. Use rf power transistors with heavy feedback in push-pull arrangement to suppress distortion.
4. Use easier-to-match hot-carrier diodes in double-balanced high-level mixers.

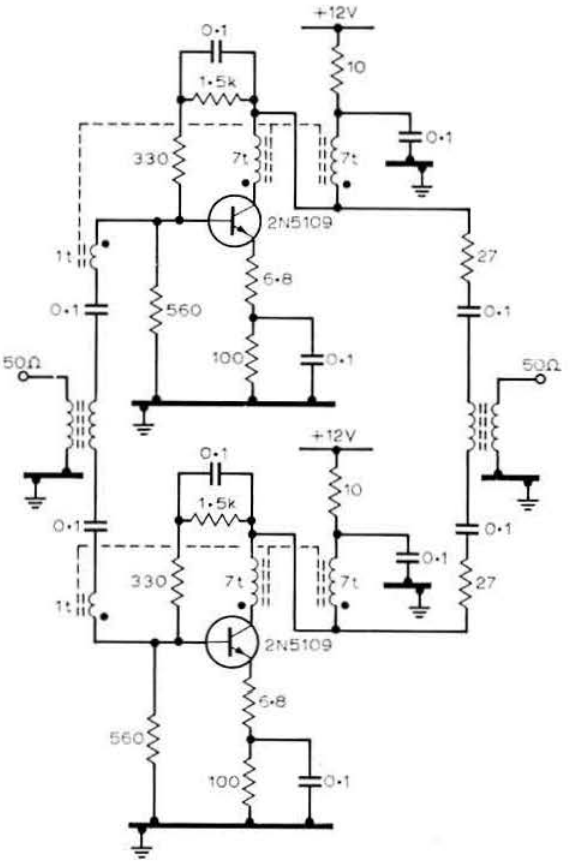


**Fig 2. Two high-power rf transistors used in an amplifier capable of better linearity than any normal valve amplifier. Feedback from the un-bypassed emitter resistors, collector-to-base resistors and collector-to-base transformer linearize the stage**

5. Use low-loss vhf crystal filters in i.f. stages for high selectivity and image suppression.
6. Use a double-conversion i.f. with fixed low-pass filters to give variable bandwidth and constant slope.
7. Consider the oscillator sideband noise in determining negative effects on receiver's dynamic range.
8. Use proper agc distribution in the receiver for widest possible dynamic range.

It is worth looking a little more closely at these eight points to see if we can discover to what extent they have a direct bearing on receivers that amateurs may want to design or build.

1. The technique of up-conversion in which the first i.f. for an hf receiver is above 30MHz has become almost standard practice for high-grade professional receivers by Racal, Marconi, Plessey, etc. However, if you do not need unbroken coverage (as in amateur-bands-only receivers), the first i.f. can be usefully around 9 or 10·7MHz (where roofing or ssb filters are available) to provide good image rejection without the problems of a vhf first i.f.

2. In practice this implies the use of an rf attenuator (eg diode, transistor or p-i-n diode type) to allow the early stages to be operated with fixed bias conditions optimized for linearity. A five-diode attenuator from the *Electronics* article is shown in Fig 1.

3. The search for maximum linearity and dynamic range in semiconductor rf amplifiers has been a long one; present-day thinking is divided between the use of power FETs and rf power bipolars. In absolute terms, as we indicated in the June 1974 *TT*, the edge at present seems to be with some power bipolars if one does not mind running what are essentially transmitting type transistors in the front end of the receiver. To quote DJ2LR:

"In most earlier receivers, only certain valves were considered linear enough for use in Class A rf front ends . . . today, high-power linear rf transistors are being produced, which, if run at high dc current and with substantial voltage and current feedback (which is not usually done), can give better linearity than any valve. Such a circuit, using highly-linear uhf power transistors, is shown in Fig 2. The amplifier, when designed in a push-pull arrangement, can provide almost 40dB more suppression of second-order distortion products than a single unbalanced stage . . ."

The author provides performance curves for this amplifier which are certainly impressive.

4. The type of push-pull mixer (Fig 3) with two bridge-connected sections using hot-carrier diodes described in the article is similar to the one noted in *TT*, September 1972, with resistors in series with the diode rings to improve dynamic range (at the cost of some increase in insertion loss). Other forms of high-performance mixers, such as the Rafuse mixer based on FETs, have been described in *TT*, but certainly few would quarrel with the value of hot-carrier diode mixers when preceded by a high-performance rf amplifier.

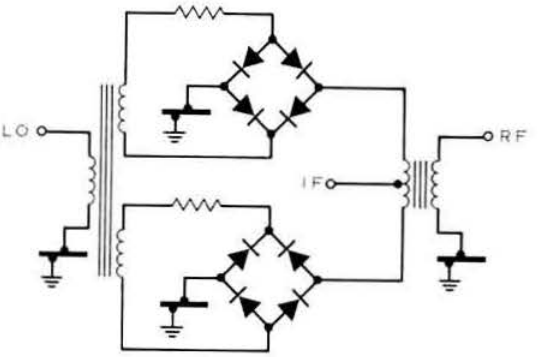


**Fig 3. Using hot-carrier diodes in double-balanced, high-level mixers. In some cases as many as 16 diodes per section, 64 diodes altogether, have been used. The resistors improve dynamic range but increase conversion loss from about 6·5 to 8dB. The hybrid transformer helps to suppress spurii**

5. It is interesting that the author notes that crystal filter matching transformers can introduce non-linearity if the iron in the i.f. transformer cores saturates.

6. The ingenious Rohde & Schwarz variable bandwidth selectivity filter based on the use of two identical low-pass filters is described in *TT*, December 1969, and in recent editions of *ART*.

7. The importance of oscillator sideband noise in setting a limit on the performance of high-grade receivers has been explained many times in *TT* and *ART*. The *Electronics*

article also notes that if a synthesizer is used for the local oscillator, spurious signals as well as oscillator noise must be avoided since such signals will similarly degrade performance.

8. The proper distribution of agc action between early stages and the later i.f. stages has long been recognized as an important factor in good receiver performance and this requirement suggests the value of the use of a separate rf attenuator in conjunction with agc loops in the i.f. stages.

There is little doubt that some at least of these eight points are useful when considering the design of any modern high-performance, all-semiconductor communications receiver, even if it is not intended to spend £10,000!

## NBFM crystal synthesizer

From Barry Priestley, G3JGO, comes an idea that would allow various crystals of odd frequencies to be used for vhf now that the supply of 8MHz crystals at surplus prices appears to be drying up, using integrated circuits as variable ratio dividers etc, as shown in Fig 4.

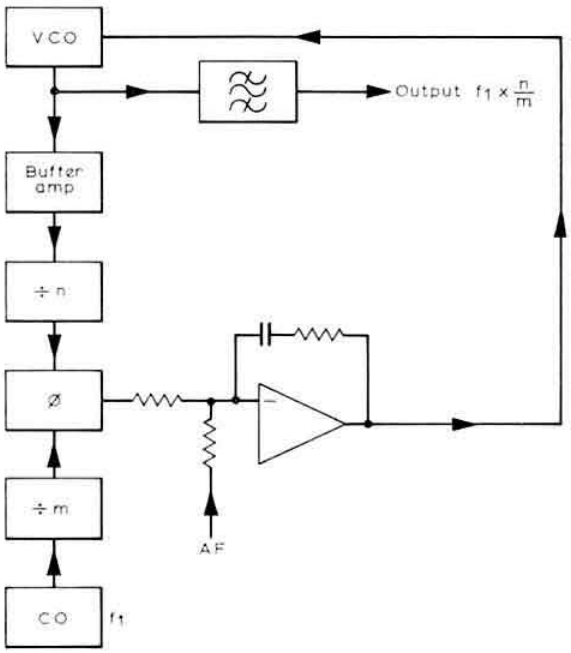


**Fig 4. System of crystal frequency translation suggested by G3JGO to allow the use of odd-frequency crystals for vhf operation. It also provides frequency-modulation facilities. The phase detector and loop filter can conveniently be the MC4044 and the variable divider the SN7490N**

For instance if $n$ is equal to 10 and $m$ to 7, then crystals on 5·6MHz can provide an 8MHz output. Further, if the phase-locked loop bandwidth is reduced to about 50Hz it is possible to frequency modulate the output without moving the centre frequency. This could thus be useful, even with $n = m$, for adding an fm capability to an ssb transmitter for transverting to 145MHz.

G3JGO lists some practical points to take note of. The voltage-controlled oscillator (vco) *must* be a "clean" LC oscillator; any attempt to use an RC oscillator based on a standard integrated circuit would be much too noisy as the loop bandwidth cannot be widened to clean up the output due to the 800kHz sidebands (using the above figures). For the same reason, a good buffer amplifier between the vco and the divider and a following bandpass filter are especially important since the sidebands will increase by 25dB in going from 8 to 144MHz. The phase detector working frequency should not be reduced much below 800kHz. The bandpass filter could consist of 10·7MHz IFTs with added capacitance. The dividers can be SN7490 ttl integrated circuits and an article in *Electronic Design* (12 April 1973) describes how the division ratios can be set from two to 10, although Table 1 gives the essential details.

**Table 1. SN7490N connection for reduced counts**

| Divisor | Input | Output | Link |
|---|---|---|---|
| 2 | 14 | 12 | 2–10, 6–10 |
| 3 | 14 | 9 | 9–3, 12–1 & 2, 6–10 |
| 4 | 14 | 9 | 12–1, 8–2, 6–10 |
| 5 | 1 | 11 | 2–10, 6–10 |
| 6 | 14 | 8 | 12–1, 2–10, 9–6, 8–7 |
| 7 | 14 | 11 | 12–1, 2–10, 9–6, 8–7 |
| 8 | 14 | 11 | 12–1, 11–2, 6–10 |
| 9 | 14 | 11 | 12–1, 1–2, 3–11, 6–10 |
| 10 | 14 | 11 | 12–1, 6–10, 2–10 |

## Cross modulators—a novel circuit technique

First, do not mix up a "cross modulator" with cross-modulation: what we are considering here is a special form of double-balanced modulator with applications parallel to those of the double-balanced ring modulator/mixer. The interest stems from a recent paper by Dr Zdenek Mack of the

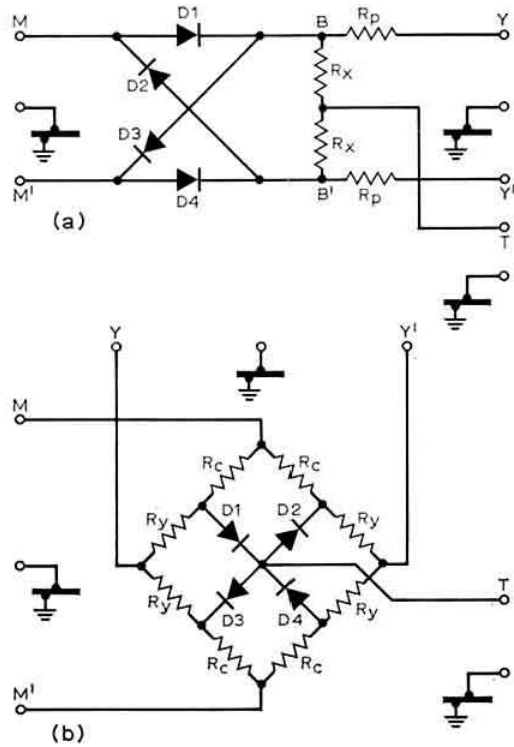


**Fig 5. (a) Transformerless ring modulator; (b) the basic cross modulator**

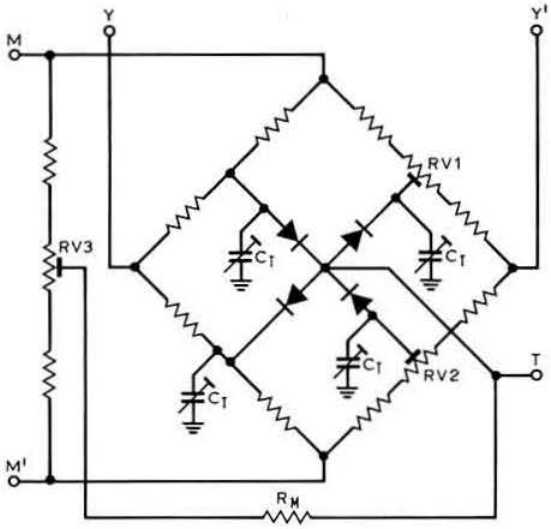


**Fig 6. Cross modulator with balancing elements which has been used for various applications between 10Hz and 1MHz**

Tesla Electronics Research Institute of Czechoslovakia; this presents a detailed comparison between the ring and the cross modulator, suggesting that the latter has some useful advantages ("Comparison of transformerless ring modulators and cross modulators", *The Radio and Electronic Engineer*, Vol 44, No 8, August 1974, pp407-413).

Mack lists three main factors which emerge from the comparison:

(a) From the point of view of transfer ratio and efficiency the modulators complement each other— the cross modulator is advantageous when the value of the load resistance is equal to or less than the modulating source resistance.

(b) The cross modulator has always better diode operating conditions.

(c) From the point of view of the switching signal the cross modulator can save a substantial amount of power.

He sums it up as: "Hence, the use of the cross modulator may provide either circuit simplification or parameter improvement".

Fig 5 shows the basic transformerless ring and cross modulators, while Fig 6 indicates how balance is achieved and is based on a proven arrangement. From the switching signal side, the modulator is balanced by pots RV1, RV2 (real components) and by capacitances $C_T$ (imaginary components), including semiconductor diode capacitances. From the modulating signal side, the modulator is balanced by pot RV3. At 38kHz (stereo decoder) the achieved suppression of carrier and its harmonic components was 60 to 80dB. The circuit is said to have been tested at frequencies from 10Hz to 1MHz.

## Trees as aerials

In *TT* (April 1974) attention was drawn to work by the US Army in using trees as hf aerials with encouraging results, particularly in conjunction with hf pack sets under jungle conditions. Several readers have recently drawn attention to a more detailed account of this investigation in *IEEE Trans on Ant & Prop*, January 1975, pp137-39. For example, rather more details are given on the "hemac" (hybrid electromagnetic coupler) which is fastened to the tree to provide coupling to the transmitter.

To quote the paper: "The tree trunk was used as a single-turn secondary winding in a resonant toroid-type transformer, wherein the primary winding was a flexible toroidal spiral wrapped around the tree trunk. When stretched out completely, the toroid becomes a 24ft long electrical wire antenna; when pushed together it becomes a coiled magnetic loop antenna of about 8in diameter". In other words one has a large floppy coil fastened around the trunk with a matching unit between the coil and the coaxial feeder to the transmitter.

It is shown in the paper how trees were tested on a 12W pack set on 4·65MHz over distances of a few miles in various conditions, including damp jungle conditions in the Panama Canal Zone. The various combinations such as whip-to-whip, tree-to-whip, tree-to-tree of transmitting and receiving aerials were tried. In addition some tests were made with 35W at mf, between 425 to 460kHz, over distances of 30 to 35 miles using very large oak trees.

The various results do seem to indicate quite clearly that trees can provide considerably better performance (by up to 20dB) than short whip aerials used in jungle conditions. The authors (Ikrath, Kennebeck and Hoverter) suggest that the superior performance of the trees is in a large part due to their ability to produce and to sense the dominant horizontal polarization, ie horizontal polarization has the greater survival role in the dominant vertically-structured roughness of terrain and vegetation.

So this is yet another indication that for communication in jungle or even wooded areas, vertical polarization is something to be avoided—a point that has been made a number of times in connection with hf and vhf operation and which turns up again in the next item. This conclusion may in the long term prove more useful than the information on the use of trees as aerials, fascinating though it would be to have a whole new family of certificates and awards for "Worked all British deciduous trees" or perhaps "The Oak and the Ash and the Bonny Ivy Tree Award".

## Skip away

Last month I rashly claimed the laws of hf propagation as one of the "unchanging restrictions" on hf radio communication. "How can you say that," I have been rather wickedly asked, "when you can now buy an aerial that eliminates skip distance?"

Sure enough a recent press release proudly announced: "New hf aerial from Racal eliminates skip distance". And if Racal can change the laws of propagation why cannot we?

To be fair, the text of the release explains that "the outstanding feature claimed by Racal engineers for this new aerial is its ability to overcome the skip-distance problem normally encountered with a wire dipole when operating at low power levels." Which is perhaps not quite the same thing as the headline.

The aerial apparently consists of a 1λ horizontal loop with the feature of being suspended from four glass fibre masts just 6ft off the ground. Naturally it puts most of its radiation up at a high angle. The idea, if not the details, is the same as for the W4NVK "high angle super-gain dipole" (some 7ft above ground) reprinted in *TT* in July 1972. So why did I not learn to write headlines like "new hf aerial eliminates skip distance"? Perhaps because it does not really

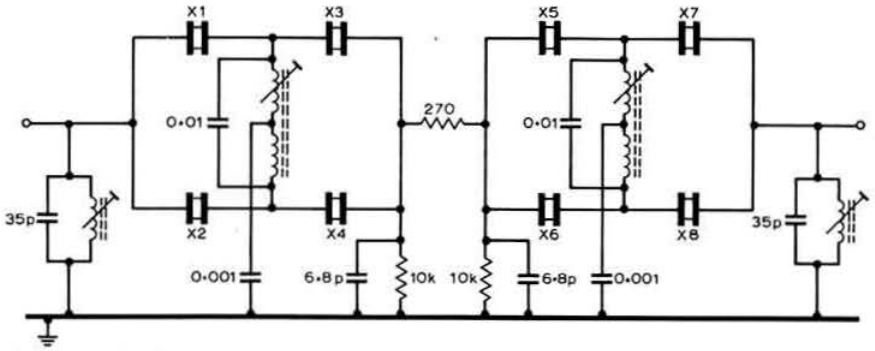


**Fig 7. Circuit details of the Cathodeon BP25 filter. Crystal frequencies measured by GW8JOJ: X1, 7, 3, 5 10·70105 MHz; X2 10·69212MHz; X8 10·69222MHz; X4 10·69243MHz; X6 10·69233MHz**

eliminate skip distance; perhaps because even in 1972 the idea was not new (Paul Sollom, G3BGL, wrote many years ago about tropical hf broadcasting arrays of similar intent). The Racal aerial is also much the same as the "G2PL Special" described in *TT* and *ART* several years ago, except that it is fed from 50Ω coaxial cable at one corner.

The press release claims "another outstanding advantage is its ability to radiate on the second harmonic of a given frequency *which cannot be done with a dipole*" (my italics). Please, then, would the Racal press office explain the sloping dipole shown in *TT* of July 1974 for 14, 21 and 28MHz? True, the loop does not need an atu. And apparently with the new aerial "erection amongst trees and shrubs *in no way* affects its communications performance". Umph, horizontal polarization helps but can you really erect this aerial under thick equatorial jungle cover and completely avoid affecting performance? I wonder.

I am sure the new aerial is useful and up to the high standard expected of Racal, but surely somebody in the publicity department is using a bit of poetic licence!

## Cathodeon BP25 crystal filters

Some firms (eg A. J. H. Electronics) are offering Cathodeon BP25 10·7MHz bandpass filters at attractive prices and Mike Cooper, GW8JOJ, feels that details of these filters are likely to be of interest to fellow constructors. After checking the frequency response he prized the lid off his unit and measured the frequencies of the crystals. He found that with his filter the pass band to 6dB points was 12kHz, but that the response between these points included variations of up to 15dB which might not be acceptable for some applications. Fig 7 shows details of the filter and Fig 8 the pass-band plot and measurement set-up.

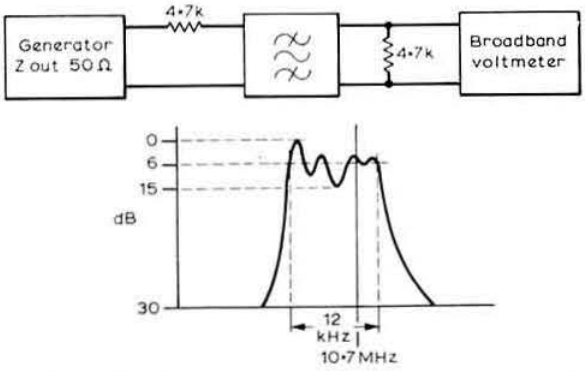


**Fig 8. Pass-band response and measuring arrangement used by GW8JOJ**

## The start of ssb

J. C. R. Oxenbury, G3LXZ, was interested to learn from *TT* (February) that the practical use of frequency modulation dates back to the experiments at W2AG on 112MHz in 1935. He wonders whether many amateurs realize that single-sideband techniques have been around even longer. Recently he was interested to come across a reference to "sidebands" in the January 1925 edition of the *Admiralty Handbook of Wireless Telegraphy* as follows: "It is interesting to note that by use of suitable filter circuits it is possible to eliminate the lower sideband and the pure carrier frequency component, and transmit speech on the upper sideband only. As this method has no immediate service application, the explanation is omitted."

In fact, ssb goes back virtually another decade (some of the early history is recounted in a famous ssb issue of *Proc IRE*, December 1956) to the very first transmission of speech across the Atlantic in 1915, when the long-wave transmitter aerial was deliberately tuned to emphasize one sideband. Furthermore, theory of ssb was well understood by 1922 when the first commercial circuit based on the principle was put into operation. The first public transatlantic phone circuit which opened in 1927 on 5,130m also used ssb, and during the 'thirties ssb was applied commercially to fixed hf point-to-point circuits with the problems of stability overcome by transmitting a pilot carrier.

For amateurs it is possible to pin-point very exactly the start of the swing to ssb: 21 September 1947, when W6VX, the station of the Department of Electrical Engineering at Stanford University, made a first contact on 3·5MHz, soon to be followed by 14MHz ssb transmissions from W0TQK and the "single-sideband telephony for amateurs" issue of *QST*, January 1948. Amateurs were thus not the first—but did play an important role in extending its use to general hf communication.

## Dental instruments and health hazards again

One of the features of writing for *Radio Communication* is that the readers represent many different professions and skills—so that loose ends and odd corners tend to get filled in. For instance, the recent references (*TT* October 1974, February 1975) to dental burs and forceps have resulted in comments from readers with good knowledge of the many instruments which are to be found in dental surgeries but which can also prove useful in amateur workshops.

Clive Elliott, BDS, G8ADP, feels that several misconceptions need to be cleaned up. He writes:

**Table 2. Cutting head diameters of round and rose head burs**

| Bur size | mm | in |
|---|---|---|
| 3/0 (½) | 0·60 | 0·024 |
| 2/0 | 0·70 | 0·028 |
| 0 | 0·080 | 0·031 |
| 1 | 0·090 | 0·035 |
| 2 | 1·00 | 0·039 |
| 3 | 1·20 | 0·047 |
| 4 | 1·40 | 0·055 |
| 5 | 1·60 | 0·063 |
| 6 | 1·85 | 0·073 |
| 7 | 2·10 | 0·083 |
| 8 | 2·30 | 0·091 |

"The varieties of dental drills are almost endless in the various configurations available, let alone the sizes for each and the material of construction, eg diamond, tungsten carbide and steel. However, the cheapest and probably most commonly used are steel, but these are certainly not "indestructable".

"The most useful for drilling printed-circuit boards are round or rose head burs, the various cutting head diameters being given in Table 2.

"Another variety (of many), which is very useful for cutting oval holes or long slits in PCBs, are burs having cylindrical cutting surfaces. These are called "flat fissure" or "square cone". The diameters are the same as for the rose head burs. Classification of bur numbers tends to be based on the ½ to 8 sizes as specified, but, as in the world of electronics, different manufacturers tend to produce numbers of their own to reduce the use of equivalents and substitutes."

G8ADP adds that when searching for temperature-dependent faults and without commercial aerosol "freezers", he finds ethyl chloride serves the purpose very well if used sparingly (go easy since this was once used for general anaesthetics!)

Steve Gilbert, BSc, MPS, G3OAG, (201 Upper Chorlton Rd, Whalley Range, Manchester 16) noted the reference to Spencer Wells forceps but suspects that many readers may have little idea of what these are. He writes: "Of course they are the greatest gadgets for putting nuts and screws in awkward corners, being virtually lockable pliers (Fig 9). If anyone is interested in a pair, I could supply them from my wholesalers, but they will be about £2 or so."

Reverting to a subject which was discussed in *TT* last year about the inhaling of noxious gases and fumes, G3OAG wonders about the quantities of flux and solder fumes which we inhale while working in confined spaces. "Perhaps" he suggests, "the medical term for amateurs will be 'rosin lung'."

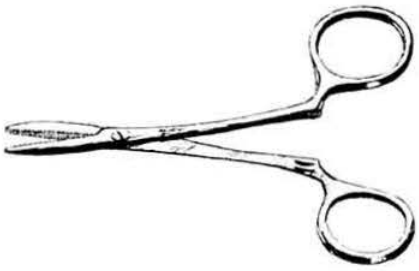

**Fig 9. Typical design of Spencer Wells dental forceps which are virtually lockable pliers and are available in 5, 6 and 7in sizes**

On the subject of potential health hazards, a note from Ian G. Mant, G8AVJ, draws attention to the fact that many of the silicon planar transistors (eg several in the BLX and BLY series of devices and others) incorporate beryllium oxide, the dust of which is toxic. These devices are entirely safe provided that they are not dismantled, physically damaged or broken. Manufacturers normally state that "care should be taken to ensure that all those who may handle, use or dispose of these devices are aware of their nature and of the necessary safety precautions: in particular they should never be thrown out with general industrial or domestic waste. Any damaged or broken devices must not be sent through the post." This question of beryllium oxide has been raised before in *Radio Communication* but there must be many people handling these devices who are not aware of the possible danger. G8AVJ also mentions that some TR cells, as used in microwave gear, contain traces of radioactive chemicals and suggests that they should be treated with similar respect.

## More diy power

The notes in the February *TT* on what we might need to fall back on for power if ever the lights go out in Europe brought forth several comments—including an unexpected one from C. R. Street, G8BNO. For he noted our remark about looking out for a windmill as an emergency shack and promptly sent along a list of 117 wind and watermills that are open to the public as part of the noble work of preservation and restoration done by The Society for the Protection of Ancient Buildings (Wind and Watermill Section), 55 Great Ormond Street, London WC1N 3JA. G8BNO draws attention to several of their publications, including *The story of Gibbons Mill* (37p plus 6p postage) by Paul Adorian, who was a leading light in Associated Rediffusion in the days of Television House; this booklet describes how a mill was converted in 1928 for power generation. Indeed, I seem to recall that as a youngster in West Somerset the electric power supply for the village of Porlock came from a waterwheel, or is that my imagination? Another publication is *Wind engines* by J. K. and H. Mayor (30p plus 7p).

Rather more closely connected with amateur radio, a note from Jack Hum, G5UM, recalled that in the 'twenties and 'thirties, the late Harold Merriman, G6GM, of Holsworthy, Devon, became a leading 160m enthusiast by building himself a large propeller and recovering an old Lucas car dynamo; he hoisted the lot up a pole and "got amps for nowt" to keep his low-tension accumulators charged. His brother George, then an active VS6 amateur, later brought him an American farm Windcharger which provided a little more output.

Adding to the list of possible sources of power, G3LXZ reminds us of the thermoelectric unit marketed by Milnes in the 'thirties which kept ht batteries charged from the gas by means of thermocouples. Gas and butane powered thermo-electric generators have been used more recently in the USA and the USSR. About a decade ago a "breakthrough" was claimed by Plessey for a range of 5 to 10W propane-fired generators based on an improved form of powdered-iron disilicides. The other then-promising system was the "fuel cell", a form of battery in which the chemicals can be replaced. In practice, however, these seem so far to have proved an extremely high-cost system.

# Building blocks for the novice

by SVEN WEBER, G8ACC*

## Diodes, diodes and diodes — and some experiments with them

### (Part 13)

### Varactors and parametric amplification

The capacitance curves given in Fig 91 in Part 12 last month are all markedly non-linear and this property can be used as an element in a circuit to modulate, demodulate and multiply frequency in a similar way to that described in Parts 9 and 10 of this series. This is non-linear reactance, rather than a resistance, however, and because of this, very little loss occurs.

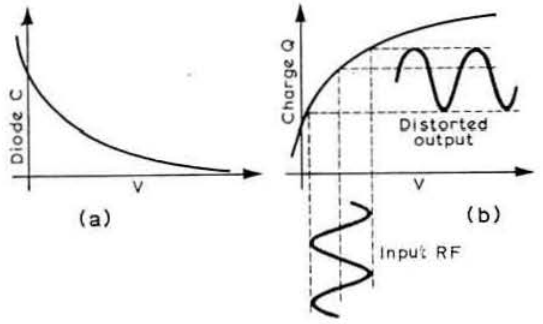


**Fig 92. (a) Capacitance and (b) charge variation against bias on diode. Note the distorted output in (b)**

The charge in a capacitor is equal to the capacitance multiplied by the voltage across the capacitor: $Q = CV$, and the capacitance/voltage curves in Fig 92 approximate very roughly to the reciprocal of the square root of the applied voltage. Combining $Q = CV$ and $C \propto 1/\sqrt{V}$, the charge on the capacitor can be seen to be proportional to the square root of the voltage. If an rf voltage is applied to a capacitative reactance which behaves in this manner, a heavily distorted charge, consisting mainly of the second harmonic of the input, is produced and can be tapped off using a tuned circuit. A diode used this way is called a varactor diode. This action can easily be demonstrated by using a zener diode as the non-linear element and a signal generator tuned to about 500kHz giving an output of about 0·25 to 0·5V rms.

In Fig 93(a) and (b) the circuit is in two halves: the left-hand part is tuned to 500kHz and the right-hand part to 1MHz. RF current is passed through the diode at 500kHz and, due to the non-linear reactance of the diode, a proportion of its second harmonic will (or should be) circulating in the right-hand part of the circuit. L1 and L2 are i.f.

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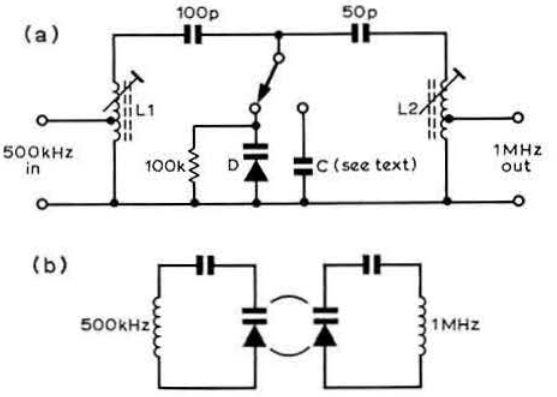


**Fig 93. (a) Circuit for demonstrating non-linear reactance effects. (b) The circuit broken down into its basic components**

transformer coils: L1 could be two coils in series (aiding), tuned to resonate at 500kHz with the diode in circuit, and L2 one coil tuned to resonate at 1MHz. Resonance can be measured across the complete coil with a low-capacitance, high-impedance rf probe. Having tuned each circuit, apply 500kHz to L1 and measure the output across L2. Tune this coil up very carefully (the resonance peak is very sharp). To prove this frequency has been produced by the diode and is not just generator harmonics slipping through, apply 1MHz from the generator to L1 and see how much of this gets through to the output. With any reasonable $Q$ in the coils, it will not be very much. Another proof would be to replace the diode with an equivalent capacitance; the output will go down to a very low proportion of the previous value.

Other harmonics can be produced in a similar way. The second harmonic can mix with the fundamental and produce the third, and the second can produce its own distorted charge for the fourth harmonic, although the output of the fourth harmonic is improved if the third is produced as well. In all these circuits for multipliers, current must be allowed to circulate through the diode at all the respective frequencies by circuits that are tuned to those frequencies. These circuits, excepting the output circuit, are called idlers. All tuned circuits have to be of the maximum unloaded $Q$ to minimize circuit loss and they can be considered either as parallel- or series-tuned, depending on which way one looks at them (Fig 94): the diode average capacitance (at a certain voltage) is in series with the tuning capacitance and both of these tune the coil. A properly-designed doubler of this kind, using

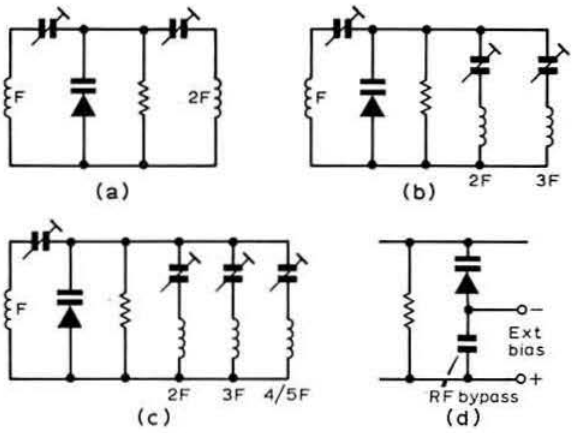


**Fig 94. Various varactor multipliers: doubling in (a), tripling in (b) and quadrupling or quintupling in (c). (d) shows a way of altering the bias to make the input rf lie along some other point of the curve and possibly to improve the effect**

a diode specifically meant for this function, can give an output of about 90 per cent of the input, the rest being dissipated in circuit resistances. This is a great deal more efficient than the non-linear resistance multipliers mentioned in Parts 9 and 10, and becomes more so as the frequency is increased until the state is reached where the diode losses become excessive. When multipliers of this sort were first used, some surprise was expressed that they could be fed with an a.m. input. This cannot normally be done with a frequency multiplier, at least to get a coherent output, but it seems that a non-linear reactance can demodulate at the input frequency and remodulate at the output frequency (with a little added harmonic distortion), to give an output which is at least intelligible. Some more information will be found in the June 1967 issue of *RSGB Bulletin* among other places.

Another use for varactor or charge-storage diodes is in parametric amplification. If a certain charge is fed into the diode capacitance at the crest of an rf half-cycle and then the capacitance is suddenly decreased, the voltage associated with this charge becomes larger: $Q = CV$. With $C$ reduced to half its original value, the voltage would double for the same charge (maybe this is the solution for the puzzle given at the end of Part 8). The potential energy of this charge, which is equivalent to $\frac{1}{2}CV^2$, would double as well. Obviously this would need some form of outside energy to make up the difference. If the capacitance is suddenly returned to its original value when the rf voltage becomes zero between its positive and negative half-cycles, no additional energy is needed because the pd across the capacitor is zero. Some energy has to be supplied to the circuit twice every cycle: rf energy at double the frequency. This rf energy, which is called the pump frequency energy, must also be in phase with the original frequency wave crests. Part of this pump frequency energy is transferred to the original frequency and amplifies it. The processs is called parametric amplification. As it stands, it would be quite difficult to carry out in practice because of the necessary phase relationship, but this relationship can be obtained simply by letting the pump frequency beat with the original frequency and providing an idler circuit for the beat frequency to circulate. See Figs 95(a) and (b).

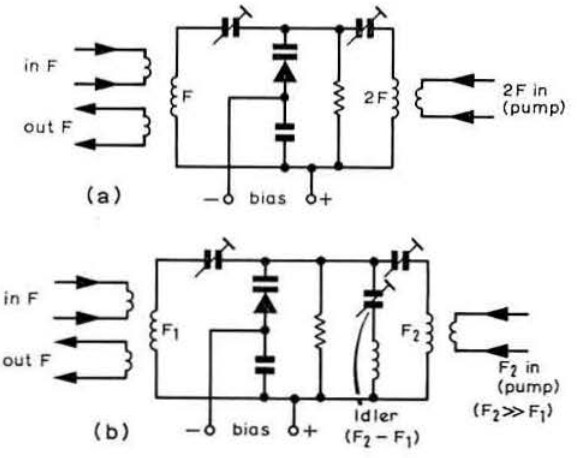


**Fig 95. (a) Basic series-tuned parametric amplifier. (b) Parametric amplifier with idler**

Of course, the idler circuit can provide a useful output of the difference frequency as a mixer, but care needs to be taken not to load the circuit too heavily. This method of amplication or mixing can, if done carefully, provide a really worthwhile gain and considerably less noise than most other methods but, as with all amplifiers, the parametric system can be considered to show negative resistance and can readily oscillate at the input or idler frequencies if given a chance: eg when the tuned circuit and diode losses are cancelled by this negative resistance. It thus seems to be a matter of balancing $Q$ values in the various circuits against each other to get the best results.

This negative resistance and amplification mentioned above has been obtained through energy supplied from an outside rf source. In Part 14 devices will be discussed that show negative resistance but do not need any source of energy apart from a simple dc bias. □

# BOOK REVIEW

The latest book from the ARRL is *Specialized Communication Techniques*, a 208-page soft-bound volume dealing with amateur television (high definition), slow-scan television, facsimile, radioteletype, space communication and advanced techniques, eg lasers. Not claiming to contain entirely new material, this book brings together a great deal of information that has appeared in *QST* and other ARRL publications on these relatively specialized aspects of amateur communication. Certainly the book contains sufficient information in each chapter to enable those interested to make a start and become familiar with the subject. Produced in the standard ARRL format, the text and diagrams are clear and, judging by previous experience, will certainly contain fewer errors than some current USA literature.

*Specialized Communication Techniques* is obtainable from the RSGB at a cover price of £1.60. Postage/packing is an additional 30p.

# FOUR-TWO-SEVENTY

by MARTIN DANN, G3NHE*

## CONVENTION '75

Bigger and better than ever before, that is what the 21st VHF/UHF Convention promises to be, and at only modestly increased charges. The venue, as before, is the Winning Post Hotel, Whitton, near Twickenham, and the date is the weekend of 10-11 May. The reason for the later date this year is to avoid a clash with the IARU Region 1 Conference in Warsaw at the beginning of April, and, in fact, the opening address on the Saturday will be a report by G3FZL and G2BVN on this conference.

Among the attractions at this year's convention will be a trade exhibition, a bring and buy stall, a constructor's competition (bring that latest piece of home-built gear), a raffle, a most interesting programme of lectures, and, of course, the convention dinner and dance on the Saturday evening.

The lecture programme will again be divided into two streams. Stream "A" will first receive a short talk on vhf/uhf/shf contests by the VHF Contests Committee; then, after a tea break, G2FKZ, G3LTP and, it is hoped, GM3SFH will discourse on scientific studies of vhf propagation. Stream "B" (Microwaves) will be chaired by Dr Dain Evans, G3RPE, and will start with a lecture on 23cm ssb: after the tea break there will be three lectures on the assessment of equipment performance using simple techniques.

Full details appear elsewhere in this issue.

### Anticyclone

The anticyclonic weather which lingered over north-western Europe at the beginning of February might not have produced any truly phenomenal dx, but the lift was notable for its consistency over a long period. For over a week propagation was excellent, right up to 23cm, and what made the good conditions more memorable was the length of time we had to wait for them.

It is interesting to look at an opening from the other end, as it were, and G3DAO passes on information from one of the operators of that well-known vhf station, SK6AB. SM6CEN found that conditions to the UK were best on the evening of Thursday 6 February, working many G stations at good signal strengths. SM6CEN bemoans the fact that the famous SK6AB aerial system was reduced to a single 20-el for 2m (from a 4 × 20-el co-linear for 2m and 4 × 46-el for 70cm) by high winds early in January. They were hoping to have the 70cm system back in operation in time for the e-m-e tests over the weekend of 22/23 February.

Another Swedish station who found conditions very much to his liking during the lift was RSGB member Arne Nilsson, SM7AED. He managed to work a few UK stations on 6/7 February from his home location, which is very poor for vhf, but at the weekend he drove to his summer house some 100km north of Trelleborg to take advantage of the excellent take-off towards the British Isles. Contacts were hard to come by at first, but as activity built up on the morning of Sunday 9 February, Arne was kept very busy, being in continual demand until he closed down in the evening. In all, SM7AED worked 89 different G stations, 17 GMs and 5 GWs.

9 February was the day of the portables, when the hilltops of the UK seemed to be liberally sprinkled with Liner 2s and the like. GM3COX and GM3VTB operated /P from XQ80d at around 1,600ft asl and worked many SM, OZ, PA0 and DL stations between 1130 and 1730gmt. Equipment used was a Liner 2 and an 11-el Yagi. They found the lift to be very localized, the target area being an arc between 85° and 110° at a distance of about 950km. GM8GDN also had a successful outing, using 10W of crystal-controlled fm from a site 750ft asl in Banffshire. He worked several Dutch stations and a couple of Danes, one of the PA0s being worked while '8GDN was mobile, using a $\frac{5}{8}\lambda$ whip.

### Beacon news

GI3TLT, as one of the GB3GI beacon keepers, was surprised to see the present frequency of this beacon quoted as 144·1325MHz in the February *Four-two-seventy*. Hugh Irvine wishes it to be made clear that the frequency of GB3GI is 144·137MHz, operating on F1 from its 600ft asl site near Ballynahinch, Co Down.

The Leicester Raynet Group were worried by the suggested mid-band beacon frequencies, and in particular the plan to shift GB3ANG to 144·95MHz, this being the group's main working channel. They have some 30 mobiles using this frequency daily, and re-crystalling costs would therefore be very high. In the opinion of the group's secretary, G8CAC, beacons should be kept at the low end of the band. He feels that what with beacons, guard channels, mobile channels, repeater input/output channels and the satellite band, 2m is cluttered enough, without the addition of another beacon allocation.

G8GVA is another who points out the use in the Midlands of frequencies in the middle of the 2m band for local nets, both fixed and mobile. He would much rather see the beacons kept together at the bottom of the band. G8HVB, however, has noticed that quite a few ssb operators seem to take little notice of the beacons around 144·15MHz, and wishes that sidebanders would make more use of the allocation above the calling channel.

The general opinion of stations as far removed as Scarborough and Southampton is that GB3SU is a much improved signal from its new site at Harpur Hill. It is also generally agreed that G3RKL is to be congratulated on providing such an excellent service on 4m.

Still with 4m, after some uncertainty there is now no doubt that the Crowborough beacon is back on the air. At G3NHE, the GB3SX signal is well above the noise at S3–4 under normal conditions, but please note that the beacon is on 70·685MHz, not the nominal frequency of 70·699MHz given in last month's list of vhf beacon stations.

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A late comment on the beacon frequency proposals from G3POI, who makes the point that should GB3DM move to the proposed new spot on 144·14MHz it will be on the same frequency as the German beacon DL0PL. As both beacons are useful indicators of conditions, and mutual interference is likely to occur when propagation is good, G3POI suggests 144·135MHz for the Durham beacon.

## Four metres

G3SLI, a former operator of ZB2VHF, has achieved useful results using nothing more than a 200mW a.m./fm hand-held transceiver in central London. He is active during his lunch hour, 1300 to 1400gmt, on weekdays.

When G3SLI left Gibraltar he left behind the FMD certificate for 4m that he had earned as the operator of ZB2VHF. The vhf awards manager has recently been happy to issue Ossie with a duplicate certificate, and at the same time has issued him with a certificate confirming that world record contact between ZB2VHF and GM3EGW.

To add to the growing list of GMs appearing on 4m, GM4BYF is now active on a.m. from Edinburgh. It is now well worth the while of stations south of the border to swing their beams northwards. Activity breeds activity, and the stirrings from Scotland bode well for the band.

## Contest comment

The subject that has recently attracted more comment than any other is that of contests, and just about every contest enthusiast we hear from has his own idea of what the VHF Contests Committee should be doing .While it is obviously impossible for any contests calendar to suit everybody, some common ground does emerge from the comment received, so it may be of value to summarize these views.

Several operators agree that separate ssb contests tend to be superfluous now that open contests are virtually ssb-only events, and there is a growing body of opinion that more single-mode events will have to be considered. G8HVB, for example, feels that separate fm/a.m. contests would be well worth holding, making a change from the points-piling sessions on ssb. He would, however, like to see some multi-mode events retained to promote cross-mode operation. G8GVA would also like to see multi-mode events retained, but accepts that these will increasingly become sideband-only affairs. His idea to overcome the problem is to offer an incentive multiplier, starting at unity for ssb and increasing to 1·4 for fm.

Both G3LVP and G3XBY, whose main interests are 4m, would prefer several short single-mode contests, including separare fm/a.m. events. G3XBY is one of several who make the point that there are no contests at the moment where a.m. or fm are really competitive modes.

G3DAO feels that there is far too little encouragement for cw, and was disppointed to find fewer 2m cw contests this year. He thinks that the desire to promote cross-mode operation by having multi-mode contests is all very well, providing cw is included in the reckoning, but all too often he finds that Class A sidebanders will not respond to a call on the key.

GD2HDZ would like to see more adventurous scoring systems being tried, such as a multiplier for counties and countries worked. In his opinion the existing scoring system has become stereotyped and is in need of a face-lift. Arthur would also like to see a power restriction imposed on portable stations and the division of all contests into fixed and portable sections. G3LCH, however, is happy with contests as they are and thinks that there were just about enough of them in 1974. He does feel though that there could be better planning, and that hf and vhf contests should not clash; many keen contest groups, says G3LCH, operate in both.

Finally, G8GHZ is in favour of multi-band events as a way of reducing the over-all number of contests, although when these have been tried in the past they have found very little favour.

## A contest alternative

Following on from the above comments on contests in general, response to the suggestion that an achievement table be run in this column to lighten the load of the VHF Contests Committee has been poor, and support for the idea minimal. It is not proposed, therefore, to proceed with the table at present.

It is clear from the comments that *have* been received (and we are grateful for these) that dropping the 70cm Cumulative Contest altogether would be very much resented, even though it is generally agreed that the total of three events in 1974 was excessive. On 4m, however, where activity already tends to be concentrated into Sunday morning sessions, several stations have expressed satisfaction that no 70MHz cumulative event appears in the 1975 contests calendar.

All relevant views and comments on contests will be passed on to the VHF Contests Committee, in fairness to whom it must be said that they have an impossible task in trying to please all the vhf fraternity all the time. No matter how many, or how few, contests are organized, of whatever type or on whatever band, the protests will reach a good 40dB over S9 from one quarter or another! By the same token, the only way the committee can discover whether anything needs changing is by the volume of the protest, or the number of suggestions it receives, which is why the back of the 427 vhf contest cover sheet is left blank for the use of entrants to make such comment as they feel is necessary.

## Band plans—and how to live with them

Some interesting comments were received from Barry Priestley, G3JGO, following the "Keep in lane" item in the February column. Barry feels that the old band plan had been around so long that it had become something of a sacred cow. It was designed to protect converters with a tunable local oscillator and an i.f. bandwidth of some 100kHz or more in the presence of strong local signals. In retrospect, G3JGO thinks that what should have happened was the development of good selective converters, with the band plan as a temporary solution. Unfortunately, what *has* happened is the development of high-gain semiconductor converters with no protection from strong local signals.

In Barry Priestley's experience, the essential for a good converter is a crystal filter after the first mixer and before most of the gain. He has found 21·4MHz a convenient frequency where amateur-band-only receivers are used, and points out that the filter need not be too narrow (say, 25 to 50kHz) because the final selectivity will be fixed by the hf receiver i.f. The local oscillator for such a converter is obviously more difficult to stabilize than a crystal, but even in the 'fifties, people managed to copy cw on seo-type converters. Since that time a lot of work has been done on mixers and phase-lock VFOs, so the necessary information and circuitry is available.

## Awards

The list from the vhf awards manager this month records only 2m certificates, as follows:

*144MHz Senior Transmitting:* to G8FNI/G4BYK certificate No 71, and to G3ZNZ certificate No 72.

*144MHz Ordinary Transmitting:* No 424 to G8EOJ; No 425 to G3IKO; No 427 to G8IQH (the first G8I – – to win the award); No 428 to GM8FVC/P and No 429 to G8DHD.

As well as earning the FMD 2m Senior award, Don Ormston, G4BYK, has achieved the PA25 award for contacts with 25 different Dutch stations on 2m, the vhf awards manager having been glad to countercheck this claim.

As we have mentioned before, at the end of the year the existing Scottish counties will disappear as far as RSGB awards are concerned, having ceased to exist for all other purposes in April 1975. The question of what replaces them has yet to be resolved, there being several schools of thought. Two suggestions were made by GM4CXP in *Your Opinion* last month, and it is clear that there is some opposition in Scotland to the adoption of the large regions, even though these would be the most administratively simple to use. Members' views on this problem, from both north and south of the border, would be appreciated.

## Repeater news

From Jan Hoek, PA0JNH, comes information of the current repeater situation in Holland. The only fm repeater operating in the country at present is PA0ALK on 145·2MHz (in) and 145·6MHz (out). This repeater will soon become PI3ALK, and all future repeaters will have this new prefix. A new repeater is expected to come into operation shortly from Groningen, in north-east Holland, signing PI3GRN; input and output frequencies will be 145·15 and 145·65MHz respectively. A total of 10 repeaters are planned but it will be some time before all these are in operation.

A linear repeater recently went into experimental service from Oosterbeek, near Arnhem (CL10h), under a provisional licence from the Dutch PTT. With the call PI3UHF, this device accepts signals on both 432·55MHz ±20kHz, and 1,296·2MHz ±8kHz. The output from both of these inputs is 145·45MHz ±20kHz. The transponder radiates a beacon on 145·45MHz, and should transmit its callsign, QTH and QRG, although at the time of writing it was only radiating plain carrier. The level of the beacon is 10dB below the maximum repeater output level of 20W. Reports will be welcome, and should be sent to PA0PVW, Taludweg 2, Oosterbeek, Holland.

Of more academic interest, unless one is planning a holiday on the island, is news from the Cyprus Amateur Radio Society of a 2m fm repeater now in operation on channel R6. It is located almost 6,000ft asl on a peak in the Troodos range, close to Mount Olympus, and runs an output power of 12·5W. The aerial is omni-directional, giving vertical polarization, and the device (callsign 5B4CY) is carrier activated.

## "Symphonie"

In December 1974, France and Germany jointly launched a communications satellite, known as "Symphonie", into an earth-synchronous orbit. This means that, unlike the Oscar satellites, "Symphonie" appears to be stationary from the point of view of an observer on earth. DARC and REF, the German and French national amateur radio societies, are attempting to obtain permission from their respective PTT authorities to use this satellite for amateur experiments. These would consist of listening tests on 4GHz; transmissions, on 6GHz, would be made from either the French or German space communication centres, the cw or rtty being sent by REF or DARC via the telephone network.

REF's vhf manager, F9QW, would like to know whether any amateurs in this country would be interested in participating in the design of the necessary receiving equipment, or would be likely to have 4GHz listening facilities in the near future. REF will provide further information if required.

## Technical tips

G3OIT passes on the solution to a problem he had with the Vanguard that he uses for 4m mobile operation, and which others may have experienced. The trouble manifested itself as a nasty burble on the modulation, caused by rf getting back into the audio stages. Decoupling the base/emitter junctions of the first audio amplifier and the agc clamp transistor improved matters, but it was not a complete cure. Many things were tried, without success, until Keith noticed that the foils leading to the bases of the transistors he had decoupled were pronouncedly "U" shaped, and he wondered whether they could be resonating with the decoupling capacitors. He therefore cut off the foils and replaced them with 68Ω carbon resistors: result—trouble cured. G3OIT suggests that owners of Vanguards and similar rigs suffering from feedback problems might well try this modification.

## Miscellany

SM7AED is looking for skeds with stations in GW or the highlands of Scotland during summer weekends, either via tropo or ms. Anyone interested should write to Arne Nilsson, Trumslagaregarten 3, 23100 Trelleborg, Sweden.

G8GHZ wonders whether some ssb operators are aware that there are other frequencies than 144·19, 144·2 and 144·21MHz. "Why always 'ten up' or 'ten down'?", he asks. He finds that some stations are quite amazed when a move of 60 or 80kHz higher than the calling frequency is suggested' even when adjacent channels are already occupied.

It might be worth taking a listen on 2m from time to time on 5 April, when a group of amateurs will be attempting an expedition with a difference. Starting from the top of Ben Nevis at midnight, they will try to scale, and operate from, the highest peaks of Scotland, England and Wales within a 24h period, spending about 30min on the air from each spot. The group, which includes GM8FVC, GM8IZH and G4BTW, expects to be on Sca Fell between 1100 and 1300gmt and on Snowdon around 2100gmt. Operation will be on ssb on 144·19MHz, using the call GB3UKP. Special QSL cards will be printed, and a certificate awarded to any station working all three peaks. GM8EUG will be portable in Kirkcudbrightshire to act as "mission control".

Late news from PA0JNH is that the beacon on the output channel of the Dutch linear repeater, PI3UHF, now carries the message, "PI3UHF CL$\phi$9b rx 432·55 1296·2". Jan also tells us that VERON has obtained permission to use the call PI50ARU from 1 April to 31 December this year. Also, all Amsterdam amateurs are allowed to use the prefix PA7 during 1975 to celebrate the city's 700th anniversary, and a special station, PA700ARU will be in operation.

**Finally** all items for the next issue to G3NHE by 9 April, and for the June issue by 4 May. □

# MICROWAVES

by DAIN EVANS, G3RPE*

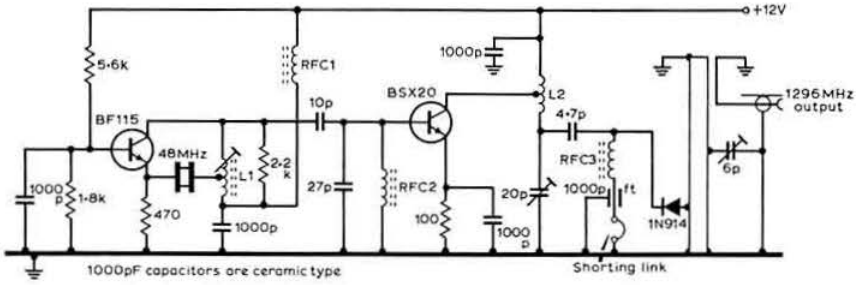


**Fig 1. Circuit of a 1,296MHz signal source**

**COIL DETAILS**

| | |
|---|---|
| **L1** | 12t 28g enam copper on ¼in former tapped 1t from cold end. |
| **L2** | 4t 18g copper ¼in id ⅝in long centre tapped. |
| **RFC1** | 4t |
| **RFC2** | 2½t 28g enam copper on FX1115 ferrite bead. |
| **RFC3** | 10t |

## A 10GHz expedition

Over the weekend 30 May-2 June, GM3OXX proposes to repeat his most successful expedition to the Isle of Man. This time there is expected to be some GI/EI 10GHz activity to coincide. For schedules, contact GM3OXX direct, QTHR.

## A 1,296MHz signal source

The unit due to G3WDG shown in Figs 1 and 2 is intended as a highly-transportable "minibeacon" for testing receivers and for aligning and comparing aerials. Even though the output power is probably only at the microwatt level, this is more than adequate: in fact, with a high-gain aerial, the best "dx" worked so far has been 21km at 569.

The unit is built on a piece of double-clad printed-circuit board which forms the lid of a standard diecast box. The crystal oscillator at 48MHz is followed by a BSX20 tripler to 144MHz, the output of which is fed to a 1N914 diode used as a ×9 multiplier. The harmonic at 1,296MHz is tuned by the λ/2 output line. The shorting link is removed to check the diode current, and this should be about 10mA.

With shortened output lines, it is probable that similar units could be used for 2,304MHz and higher frequencies.

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

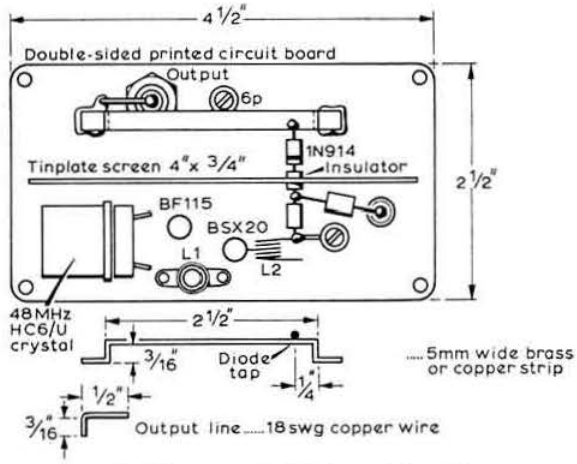


**Fig 2. Layout of the major components**

## A long-quad Yagi for 1,296MHz

The design of the long Yagi given in the January column, which has aroused much interest, should have been credited to Mike Walters, G3JVL. □

## Taking the RAE

(*Continued from page 291*)

by the lettered parts of the question (which are calculated in order) and that the answers are underlined and shown roughly in the same relative positions. Some people write the abbreviation, "Ans." after the result, instead of underlining. The candidate should not be concerned if the calculations take up more than one sheet of paper, as more paper can be obtained from the invigilator.

If it is necessary to draw a sketch or diagram, then it should be drawn clearly. Freehand work is acceptable but, although the candidate is not expected to be an artist, the examiner does not want to decipher a scribbled mess. In the case of a sketch, particular parts should be numbered so that they can be referred to later in the text or in a caption. With circuit diagrams it is best to give the component values next to the appropriate symbol. However, in any circuit and accompanying explanation, only about five minutes can be allocated for drawing.

A point often overlooked is that neatness and cleanliness on the answer sheet is relatively important; the examiner will not be impressed by blots, illegible writing, scribbled diagrams, etc. If a mistake *is* made it should be cleanly and boldly struck out with a single line. The examiner will then ignore it and not deduct marks. Marks can be lost by an untidy, dirty paper and, in an extreme case, the examiner is unlikely to show much interest in such an answer sheet; minimum marks could therefore be the result.

In conclusion, it must be remembered that if the advice offered in these notes is followed, it could just gain those vital marks: the difference between a pass and failure. On that note, the author wishes all entrants every success and hopes perhaps that he will work them on one of the bands one day.

# THE MONTH ON THE AIR

by JOHN ALLAWAY, G3FKM*

IMMIGRANTS and visitors to the USA are now able to take FCC examinations and receive FCC callsigns regardless of previous holding of a licence anywhere else, the type of visa they hold, or their age. The author looks forward to the time when the authorities in Britain adopt this enlightened approach.

The Society's hf awards manager, G5GH, has notified the fact that a batch of WAC certificates expected from the IARU has gone astray. They were intended for applicants who submitted claims in August and September 1974 and have been re-claimed.

Readers' attention is particularly drawn to the 80m Low Power Contest (see March *Radio Communication* for details). This takes place on 13 April and unfortunately received very little support in 1974 due to an unfortunate omission of advance publicity.

## Top band news

VK3CZ has kindly supplied a summary of his activity between 13 October and 2 February. During this period he found conditions very poor and noisy, and the only contact he had with Europe was with G3RBP/A at 1925 on 24 January. A G station was heard on 4 December at 1854, G3RBP/A at 1920 on 19 January, and G3ZEM (?) at 1945 on 25 January but no contacts resulted. Other Europeans heard include PA0HIP, OK30KPU and OE5KE.

The February issue of the W1BB *160 Meter DX Bulletin* reports a wonderful dx season, but the transatlantic tests were not a great success. The first (on 17 November) was almost a complete failure and the 2 December effort was good for E-W signals. The 12 January morning was extremely poor and even DHJ was not heard in the USA. W1BB is now on a trip to the South Pacific and has asked for mail to be withheld unless it is very urgent. Stew will not have 160m equipment with him.

The *DXers Magazine* reports that KH6CHC looks for Europeans in the "dx window" on Fridays between 1700 and 1745, Saturdays from 0745 to 0800, and 0830 to 0845, and Sundays from 0400 to 0415 and 0745 to 0845. He will be on 1,997kHz. (The "dx window" is the section 1,825 to 1,830kHz.)

G2CIL reports that WB8APH (who uses a 130ft vertical aerial with 200 radials) has worked EP2BQ to complete his 160m phone WAC. His country total is now 68.

## DX news

A new station should shortly be heard from Antarctica, namely VP8OB (ex-G4BNQ), Peter, who is based at South Georgia. QSLs go via G4DIF (see *QTH Corner*).

Richard Gemehl, F2QQ, has written to say that he is QSL manager for FG0ZZ/FS, FY0BHI, FY7AA, TU4AH, and TU2FC. He says that he has changed his address several times in the past few years and that cards sent to his *Callbook* QTH are being returned by the French Post Office. He now asks those who need cards to apply to him at his parents' address (see *QTH Corner*).

The latest bulletin from W2GHK lists the following stations who are currently active, and for whom DOTM acts as QSL manager: C6ANY/VP7NY, CN8HD, CR5SP, CX2CO, C21DC, C21DR, FM7WQ, HK0AI, HM1AJ, HP1IE, HS2AGP, I1MOL, I1RB, I1RBJ, JW1EE, KV4FZ, LA1H, OY7ML, P29JK/VK9JK, PA9AFZ, PJ7VL, PJ8GQN, PJ9GQN, PJ8HS, PJ9JR, PY2PA, PY2PE, VE8CV, VE8RCS, VK3BM, VK9XI, VK9XK, VK9XX, VK9XW, VP9GR, VS6DR, XE1IIJ, ZD8NC, ZS6IW, 4C5AA, 4C9AA, 6Y5RS, 8P6CW and 9Y4VT. A more detailed list may be obtained by sending a 4 by 9½in sae and an irc to Box 7388, Newark, NJ, 07107, USA.

Stations in Rome are presently using the IV0 prefix. This is to celebrate Holy Year. Anyone contacting nine IV0 stations and either HV1CN or HV3SJ may obtain an award by sending a certified list and 10 IRCs to ARI Award Manager, PO Box 361, I-00100 Rome, Italy.

Roy, G3ZMP, is at present 3D6AW and has a KW2000A, KW1000 and TA33Jr beam. His previous callsigns have been 9J2RA, VS4RB and 9M8RB.

Those looking for a contact with the Maldive Is may care to note that VS9MAS keeps a schedule with his QSL manager G3LQP on Mondays and Tuesdays at 1530 around 14,320kHz. Calls after this is finished may produce results. VQ9HCS on Astove Is likewise keeps an appointment with WA1HAA, who acts as his QSL manager, at 1715 on 21,355kHz on Mondays, Wednesdays and Fridays.

VR1AA should have left for leave in the UK in mid-March. He will return to VR1 in mid-July and will probably be there for another two years. Meanwhile VR1AR/A is on the air from Ellis Is and will be there until the autumn.

This year's SEANET Convention is scheduled to be held in Kuala Lumpur on 7, 8 and 9 November. Fuller details will be available later from the net which meets daily at 1200 on 14,320kHz.

Alex Moot, 3B8DA, will be going to St Brandon Is this spring to man the weather station for a period. The chief problem concerning 3B7DA operation is the fact that Alex's equipment weighs 300lb and he will be travelling there in a small boat.

There seems to be activity from Franz Josef Land in the form of UK1PAA. This is UW3HY and he has been noted on 7,023kHz and also around 0400, 0600, 1000, 1600 and 1800 on 14,030kHz and 14,180kHz.

Father Dave Reddy, K2BUI, should be back on Easter Is and using his former CE0AE call. During his previous spell of activity from the island he was sometimes to be found in the IYL SSB Net on 14,334kHz.

Friends of Bob, 5X5IU, will be interested to learn that he is now in Kuwait and has the callsign 9K2DR.

PA0HTR is the secretary of the GIGA radio club in the Netherlands and has notified G3FKM that the club's station will be on the air during the WPX Contest with the callsign PA5GIG-A, and the following weekend will be on

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**Roger, ST2AY (see text)**

all bands using cw. This is the first time the PA5 prefix has been used and it is hoped to use PA6 at a later date. The club's usual callsign is PA1ARS.

FG7AQ has a Kenwood TS520 and TH3 beam and inverted vee for 7MHz. He is looking for UK contacts. YN9JMP might be known to old-timers as XU2JM—he is an ex-missionary aged 76 and often on 14,040kHz. There is a Venezuelan cw net which operates on 7,040kHz on weekdays.

## Dxpeditions

The latest news from VS5MC is that he has hired a boat for his proposed trip to Amboyna Cay during the period 14 to 22 April. Operation from here should count as from Spratly Is for DXCC purposes.

## Odds and ends

G4DJC reports the receipt of QSLs for alleged 3·5MHz cw contacts. He normally operates on the hf bands on ssb only.

## Nigeria

Allen Papworth, G3WUW (26 Alexander Rd, Thatcham, Berks), has recently returned from Nigeria. He reports that the Nigerian Army Signals Corps now has a club station with a 400W ssb transmitter and a TH6 aerial. It is located at Apapa, near Lagos, and is being operated by 5N2ESH and Tom Gibson (ex-5Z4IP). The club meets on Thursday evenings and Saturday mornings and it is hoped to interest the soldiers in amateur radio. With this object in view the club would welcome any old books or magazines—transport can be arranged by Tom Gibson, IAL (Nigeria), Box 17, Ikeja, Lagos.

## News from overseas

Andrew Pomfret, 9G1LZ (ex-9Y4LZ, 7Q7LZ, G3LZZ), has written from Kumasi to say that he is using an FL400/FR400 combination and a TH3 beam at 40ft, with a trap dipole for 3·5 and 7MHz. He will be in Ghana until September. He is frequently on 21,205kHz at 1300 on weekdays looking for G3DME, and on 21MHz from 0930 on Sundays. He also uses 28,205kHz at 1230 on Sundays in the company of 9J2DT.

ST2AY (Roger Crofts, formerly GM3UPK, GW3UPK, G3UPK, ZD8AY and ZB2AY), says that he has been in Libya for two years but was unable to obtain a licence. He is looking for UK contacts on all bands from 1·8 to 28MHz until he leaves in November. Roger lists the first ever UK–ST 160m contacts as being made by G2PL, GM3YCB, GW3UCB, GC3ZEM/P and GD4BEG. At the time of writing he had not worked GI. He tries to be on 1,834kHz approximately each Wednesday at 2100 and often has G3LYW with him to assist.

In a letter to G2BOZ, 9V1OP says that he will be leaving Singapore in mid-March and returning to the USA. He should be W9JNH again by June and QSLs for any contacts he has made in the past eight years can be verified by writing to the address in *QTH Corner* after 1 June. Vic says that he has never used ssb on 3·5MHz and that a pirate has been using his call on that mode, although he has been active on the band on cw. After he leaves 9V1OK should be on the band around 2300 nightly.

G3VUQ left for VS6 on 27 February and will be sailing to 9V1, 9M2, 4S7, 8Q6, VQ9 and various East African ports in the wooden sloop *Princess of Kellett*. He has an FT101B on board and will operate on 7 to 28MHz as G3VUQ/MM.

## Awards

### The Hampshire County Award

The RNARS have revised the rules for this award which are now as follows. The award will be on a points basis, with one point for each different station worked in the county. Two points are gained by contacting G3BZU or GB3RN (if operating from Hampshire). The contacts must have taken place since 1 October 1960. There are three classes—UK, European and DX, and for first class 50, 20 and 15 points respectively are required, for second class 30, 15 and 10, and third class 20, 10 and 5 points. Endorsements for band/mode are available and listeners may apply. Application is by certified list of log data and QSLs held signed by the applicant and one other amateur. It should include 30p or five IRCs, but blind or paralysed applicants receive the award free. Send applications to F. D. Cawley, G2GM, Bay Sound, Gate Lane, Freshwater Bay, Isle of Wight.

### The PACC Award

Available to licensed amateurs who have worked at least 100 Netherlands stations since 31 May 1945. A list of QSLs and contact details certified by the awards manager of a national society (eg G5GH) plus seven IRCs should be sent to Traffic Bureau VERON, c/o PA0AAC, Postbox 1166, Arnhem, Holland. Stickers are available for 200 and 300 stations worked. Note that contacts made in the PACC Contest may be used as credits for this award if a log is submitted. If some QSLs are already to hand, contest QSOs may be claimed to make up the 100. In this case send the contest log, QSLs and five IRCs to the address above.

## Contests

### The Bermuda Contests

0001 19 April to 0200 20 April (phone).
0001 3 May to 0200 4 May (cw).
3·5 to 28 MHz. Exchanges consist of RS/T plus US state or Canadian province in the case of W and VE entrants, parish by Bermudian entrants, and RSGB county code by British entrants. Each contact must be complete and will count three

points. No cross-band or cross-mode contacts permitted and contestants are reminded of the rules governing operation on the 7MHz band (British stations may not work US or Canadian phone stations operating above 7,100kHz). The score is the number of QSO points multiplied by the total number of Bermuda stations worked on each band used. Any number of transmitters and receivers may be used but must be owned by the contestant, and only single-operator entries are accepted. A trophy will be awarded to the winners of each section (UK and North American) and a certificate sent to the top-scoring station in each W/VE call area and British Isles country prefix area. Round-trip air transportation and one week's accommodation at the Bermudiana Hotel will be provided for the two overall winners, who will be presented with their trophies at the Radio Society of Bermuda's banquet on 16 October. Logs must reach the Contest Committee, PO Box 275, Hamilton 5, Bermuda, not later than 30 June. Note that contest winners are ineligible for a period of two years. Operation from a club station location or the use of club equipment is prohibited. Official brochures may be obtained from G3LNS (QTHR) in exchange for an sae.

**The First Common Market DX Contest**
0001 12 April to 2400 13 April.
CW and phone, all bands 1·8 to 28MHz. Single- and multi-band single operator, and multi-band multi-operator sections. Exchange RS/T and serial QSO number (from 001). Each contact with a station within the EEC counts five points, with others three points. The multiplier for EEC entrants is the total DXCC countries worked on each band added together, for others each EEC prefix. Logs should show date, time, call, numbers exchanged, country (if new multiplier) and points claimed. Summary sheet should include the usual declaration that the station has been operated in accordance with amateur radio spirit and regulations. Excessive unmarked duplicate contacts may result in disqualification. Logs must arrive before 30 June at Contest Committee, UBA, c/o Timmerman Omer, ON5TO, Boterbekeweg 8, 8200 Brugge, Belgium.

**Y. A. Gagarin Cup Contest**
0000 to 2400 13 April.
CW only, 3·5 to 28MHz. Single-operator multi- or single-band, and multi-operator multiband categories. Call "CQ KG". QSO points are one for contacts with own continent, three with other continents. The multiplier is the number of ITU zones worked on each band added together, and stations should exchange RST and ITU zone number (British Isles = 27). Post logs before 30 April to RSF, Post Office Box 88, Moscow, USSR.

**The Helvetia XXII Contest**
1500 12 April to 1700 13 April.
Phone and cw, 1·8 to 28MHz. The same station may be worked on each band for QSO and multiplier credit but only on one mode. Exchange RS/T and serial QSO number (from 001). Swiss stations will indicate their canton. Each contact counts three points, and the multiplier is the sum of cantons worked on each band (maximum 22 per band). Indicate a canton in a separate log column the first time it is worked, and include a summary sheet showing scoring and other information. Include name and address in block letters and the usual signed declaration, and post to USKA Traffic Manager, HB9AHA, im Moos, 5707 Seengen, Switzerland, within 30 days.

## QTH Corner

| | |
|---|---|
| **F2QQ** | R. Gemehl, 52 rue de Saussure, 75017 Paris, France. |
| **FB8WD** | via F5QE, 14 R Lys, St-Germain-de-la-Grange, 78 Neauphie-Le-Chateau, France. |
| **HR6SWA** | via W8CNL, 120 Collier Av, Battle Creek, Mich, 49017, USA. |
| **JY9CS** | via K5OEA, C. E. Schaub, Box 300, Crowley, Texas, 76036, USA. |
| **JY9MS** | US Embassy, Amman, Jordan. |
| **JY9US** | via W3HLR, G. R. Thompson, US Information Agency FS, Washington, DC, 20547, USA. |
| **PJ8KI** | 161 Lothrop Rd, Groose Pointe Farms, Mich, 48236, USA. |
| **TR8BJ** | via DJ5DA, Bahnhofstr 12, 6996 Markelsheim Kr Mergentheim, W Germany. |
| **VP1PW** | Private Mailbag No 16, Belize City, Belize. |
| **VP2DM** | via WA1ABV, M. S. Pride, RFD5-Box 23, E. Hampton, Conn, 06424, USA. |
| **K2FJ/VP2D**<br>**VP2EEC** | K. Palmer, RD 3, E Aurora, NY, 14052, USA. |
| **VP2KC** | Box 70, Dominica. |
| **VP8OB** | via G4DIF, D. A. Banks, 22 Denton Av, Leeds, LS8 1LE. |
| **VR1AR/A** | W. Rapley, c/o PO Funafuti, Ellis Is, Pacific Ocean. |
| **VS9MAS** | via G3LQP, 56 Combe Rd, Tilehurst, Reading, Berks. |
| **WA1OGA/VQ9** | R. Wheeler, MCB 10, Alpha Co, APO, San Francisco, Cal, 96601, USA. |
| **XV5AA**<br>**XV5AB**<br>**XV5DA** | via W7PHO, 18549 Normandy Terrace SW, Seattle, Wash, 98166, USA. |
| **3D6AX** | via WA5IEV, 119 E. Oakridge Parkway, Metairie, La, 70005, USA. |
| **9K2DR** | PO Box 2, Kuwait, Arabian Gulf. |
| **9M8HG** | H. G. Gray, 165 Jalan Bunga Teratai, Kampong Gita, Malang Rd, Kuching, Sarawak, Malaysia. |
| **9V1OK** | (from 1 June) V. A. Woodling, 122 Mt. Aire Drive, E. Peoria, Ill, 61611, USA. |

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

**The PACC Contest**
1200 26 April to 1800 27 April.
1·8 to 28MHz, cw and phone but not cross-mode. Each QSO counts three points and each Netherlands station may be worked once on each band only—either on cw or phone. Exchanges consist of RS/T and serial number (from 001), and Netherlands stations indicate their province. The multiplier is the number of the latter worked on each band added together (maximum 72). Logs should show date and time, callsign, province (if multiplier), number sent and received, and points claimed. Enclose the usual signed declaration and post before 30 June to VERON, PACC Contest Committee, PO Box 1166, Arnhem, Netherlands. Listeners may enter and claim one point for each PA/PI/PE station logged regardless of band or mode. They should log date and time, station heard, code group given, band, station being worked and points. Note that contacts in this contest may be used as credits for the PACC Award, provided that a log is submitted (see *Awards*). In the 1974 contest **GM3KLA** (5,275 points) was the leading UK entry, with **G3ESF** (4,224), G8KP (4,026), G3VDW (1,964),

**INTERFERENCE PROBLEMS**

**Members accused of causing interference or who suffer interference from external sources are invited to seek the assistance of the Interference Committee in solving their problems.**

**Enquiries should be addressed to: The Chairman, Interference Committee, RSGB, 35 Doughty Street, London WC1N 2AE.**

GW3INW (1,575), G3MCA (315) and G4ACQ (104 points) also listed in the results.

## Band reports

All reporters have noted the poor conditions on the hf bands during the past month, but these have to some extent been compensated for by the amount of interesting dx which has been heard and worked on 1·8, 3·5, and 7MHz.

Very many thanks to the following for sending in logs from which this section has been compiled: G2CIL, G2HKU, G4RZ, G5JL, G6GH, G3s GVV, NKQ, ORP, SVL, BRSs 17567, 17991, 25429, 35608, and As 8312, 8428, 8713 and 8752.

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

**1·8MHz.** **0300** *EP2BQ*, *W6BYB/VE1*, *WB8APH*, *W9UCW*, **0500** *W1*, *W2*, *W3*, W2PV, *YV1OB*. **0600** *PY1RO*, *PT9DM*, *TI2CF*, VP2A, W2ANR. **0700** W2HCW, *ZL3RB*. **2200** *VS6DO*. **2300** *JY9FOC*, *KP4AN*, *KV4FZ*, *ST2AY*, *4X4NJ*.

**3·5MHz.** **0000** EA9EL, FG7AO, FM7WE, HZ1KE, UA9VH/JT1, VP2AC, VP2KX, YB0ABV, 4S7ZW. **0100** A2CCY, HR6SWA, 8R1AG. **0600** W4BRB/C6A, *KP4*, TI, XE1FFY. **0700** *VP2EH*, K6QHC, *YV*, ZL1-ZL4. **0800** EA8EX. **1600** A4XVB, EP2FR. **1700** HZ1KE, VS5MC, ZL3PC. **1800** EP2BQ. **1900** VK2AVA. **2000** A9XH, ZC4AK, 5U7AH, 9K2DR. **2100** DK6PN/A6, HS5ABD, *JA7WJU*, JA1JRK, JA8AA, TJ1EZ. **2200** FL8DN, OJ0MA, ST2AY, TA1s BW, HY, VP2D/K2FJ, VQ9M, W2s, W3s, 8Q6AB, 9M2s DQ, LN. **2300** A4XVB, AP2KS, CR7BB, HS4AFD, *OD5IH*, ST2SA, *VS5MC*, VS6DO, VU2GDG, XW8FA, ZS5LB, 4S7PB, *9V1SH*.

**7MHz.** **0000** *CX1BBL*, *FG7s AM*, *AQ*, *FY7AA*, *HKs*, *KG4BE*, *KZ5s*, *LUs*, *TA2DV*, *VP2s EEC*, *GFA*, *LAW*, *SAH*, *5T5CJ*, *7X4AN*. **0100** *EP2SN*, *UJ8s*. **0700** VK2s, VK3s, ZLs. **0800** FK8CS, *XP1AA*, *ZL2AIA*. **2100** *A9XU*, *CR6CK*, FY0BHI, *ST2AY*, *TJ1EZ*, *VKs*, *VP2LBD*, *VQ9M*, *ZB2A*. **2200** PYs, *VK6HD*, *ZD8TM*, *9Y5DS*. **2300** *CE2FG*, *CR4*, *FY0*, *HI*, *HK*, *KV4*, *PY*, *TU*, *YV*.

**14MHz.** **0800** A4XFV, HL9UF, JAs, KG6s, YJ8BL. **0900** C21NP, CR3AH, *FK8BX*, *JT1AN*, *KL7HMO*, *KX6BB*, VKs, ZLs, *F2EOD/5U7*. **1000** HLs, WB4LEE/KG6, VP8HZ, VS6HI. **1100** DU1NRS, KC4USN, VE3CUD/SU, VK6s. **1200** OA4ANR, P29FV, *SU1MI*, VKs. **1300** FY0BHI, VE8RCS. **1400** HZ1TA, P29CW, *VS5MC*, VU7GV, XV5AA, 9M2WLC, *9V1SH*. **1500** *HZ1SH*, ST2AY, *XE1FR*, XW8GV, 4W1GM. **1600** TR8SS, W6s, W7s, *9G1LZ*. **1700** G3VBK/MM (S. Indian Ocean), HR6SWA, VQ9GP, VUs, 3B8AX, 4S7SW (brother of 8Q6AC). **1800** *KH6IKJ*, *KH6CF*, *KL7HIK*, VE7s, VP5TF, WA1OCA/VQ9, ZEs, 5T5, 6Y5, 6W8, 8P6, 9J2. **1900** *FM7AQ*, TR8VE, W7s, 5N2ESH. **2000** C5AU, *KC4USG*, TUs, VP2s D, M, *VP8OA*, *XP1AA*. **2100** CE, CR4, OA, VP9, ZD7SD, *ZD8s DH*, *TM*. **2200** CE9AT (S. Shetlands), HC, HP, KC4USN, *LU1ZE*, OA, PY, YV, ZP. **2300** CX, LU, PY, ZP.

**21MHz.** **0900** CR6, VQ9HCS, ZD8RD, ZS6, 5N2ESH, 9G1. **1100** C5AG, OD, ZD7SD, 9J2. **1200** CR6, EL, OE5CA/YK, *5X5NK*. **1300** 3B8s. **1400** ZSs, 5B4. **1500** PY, PZ, W2POJ/VQ9, ZD9BT, 3B8CV. **1600** HC, KV4, KZ5, LU, ZD7, ZE, ZS, 9J2.

**28MHz.** No reports.

Very many thanks to all correspondents, and especially to the authors of the following for items obtained from their publications: **Long Skip** (*Nick Sawchuk*), the **West Coast DX Bulletin** (*WA6AUD*), **DX'press** (*PA0TO*), the **Ex-G Radio Club Bulletin** (*W3HQO*), **DX News Sheet** (*Geoff Watts*), **World Radio News**, the **29 DX Club Newsletter** (*VK6WA*), and the **DX'ers Magazine** (*W4BPD*).

Please send all items for **May** issue to **reach G3FKM** no later than **9 April,** and for **June** issue by **6 May.** □

## Propagation Predictions

The change from winter to summer conditions, which occurs during April, will lead to a worsening of already poor conditions on 21 and 28MHz, **28MHz** being of little use for dx. Short skip conditions will liven up this band as well as **21MHz** over distances of about 700–1,800km. Traffic with North America and Japan will be almost impossible. Traffic with Africa and South America will be possible for only very brief periods.

As the season advances, **14MHz** will remain open noticeably longer than in previous months. Traffic with Australia will become more and more difficult during the afternoon. Traffic with KH6 will be possible on days with above average MUFs between 1630 and 2100gmt on the direct, and between 0530 and 0700gmt via the indirect path. On the whole, chances for dx via the indirect path on 14MHz during April will be relatively poor.

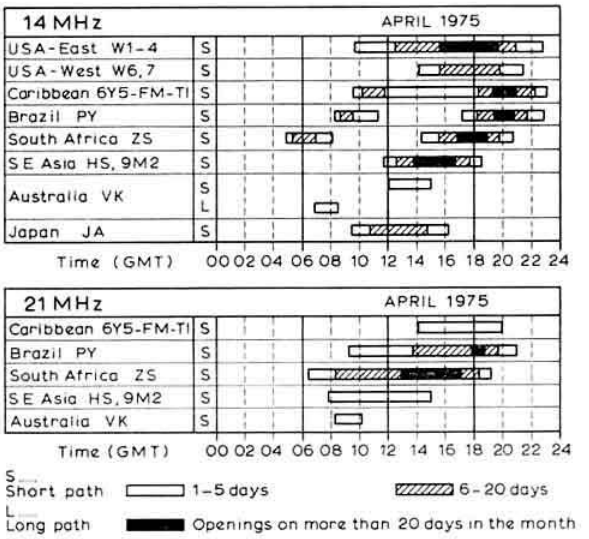
Shorter nights and rising F2 night frequencies will lead to an improvement in traffic with North America on **7MHz** during the second half of the night. Traffic with South America and South Africa will also improve as the month goes on. The F2 daytime frequencies are well below 7MHz, causing interruption of local traffic by the dead zone. On **3·5MHz** dx traffic will be possible if the whole of the path lies in darkness. This is even more important on this band than on 7MHz. The advancing summer and static will shorten the distances covered. Local traffic will seldom be interrupted by the dead zone.

The provisional sunspot number for February 1975 was 11·6, with a very low level of solar activity during the second half of the month. The predicted smoothed sunspot numbers from the Federal observatory for June, July and August are 19, 18 and 17 respectively.

The monthly definitive sunspot numbers for 1974 were:

| | | | | | |
|---|---|---|---|---|---|
| Jan | 27·6 | May | 39·5 | September | 40·2 |
| Feb | 26·0 | June | 36·0 | October | 47·1 |
| March | 21·3 | July | 55·8 | November | 25·0 |
| April | 40·3 | August | 33·6 | December | 20·5 |

The yearly mean was 34·5.



# COUNCIL PROCEEDINGS

A brief report of the Council meeting held in Cardiff on 17 January 1975

**Present:** Mr C. H. Parsons (*President, in the Chair*), Dr E. J. Allaway, Messrs R. J. Baker, P. Balestrini, J. O. Brown, D. Byrne, R. W. Fisher, W. J. Green, W. F. McGonigle, L. E. Newnham, D. M. Pratt, W. A. Scarr, A. W. Smith, R. F. Stevens, D. M. Thomas, F. C. Ward (*members of Council*), G. R. Jessop (*secretary*).

The retiring President welcomed the new President, Mr C. H. Parsons, who then took the Chair.

The new members of Council, Mr D. Pratt, G3KEP, and Mr D. M. Thomas, GW3RWX, were welcomed by the President.

Apologies were received from Messrs J. Petty and A. W. Hutchinson (*editor*).

**Identity cards in Northern Ireland**
Mr McGonigle reported that the issue of identity cards for mobile operation in Northern Ireland had been started. Some 35 cards were issued to members of the Belfast Society.

**General manager**
The President made a statement relating to the post of general manager and Mr Brown outlined the events that had taken place.

Mr D. A. Findlay resigned as general manager as from 31 December 1974, and was appointed subscriptions manager from 1 January 1975.

Mr G. R. Jessop resigned from Council and as Immediate Past-President on 2 January 1975 and was appointed temporary general manager for a period of three months to allow the post to be advertised in the Society's journal.

After these statements there was extensive discussion, following which the Council approved the arrangements which had been made.

**Election of Executive Vice-President**
The President called for nominations for the position of Executive Vice-President for 1975. Mr Stevens proposed, and Mr Brown seconded, Dr E. J. Allaway. There were no other proposals and Dr Allaway was unanimously elected.

**Membership and affiliation**
It was resolved:
(i) to approve the applications for membership, transfers and reinstatements and accordingly elect 94 new members;
(ii) to accept reduced subscriptions from nine members;
(iii) to waive the subscriptions of six members on the grounds of blindness or other disability;
(iv) to grant affiliation to: Rugby and District Amateur Radio and Electronics Club, Coventry Technical College Amateur Radio Society, and Ulster College Amateur Radio Club.
(v) to approve life membership to Mr S. A. Spencer, BRS28095.

**Committees for 1975**
Council approved the constitution of the various committees for 1975 as set out on page 309 of this issue.

**Honorary officers**
Council approved the appointment of honorary officers as set out on page 275 of this issue.

**Council election**
The President raised this subject because the disqualification of Mr Stone had caused very considerable disquiet among the membership.

During considerable discussion, all the known facts relating to this were stated and a proposed course of action approved.

**Society representatives on outside bodies**
Council approved the following Society representatives:

| | |
|---|---|
| CCIR Study Groups 5 and 6 | R. G. Flavell, G3LTP |
| CCIR UK GPC | R. F. Stevens, G2BVN |
| CCIR Study Group 8 | D. A. S. Drybrough, G8HEV |
| BSI Tel/25/1/2 | R. F. Stevens, G2BVN |
| BSI Tel/23/1,25/3,25/6 | D. A. S. Drybrough, G8HEV |
| BSI Tel 1/5,1/30,25/4,25/6 | R. S. Roberts, G6NR |
| RAE Advisory Committee | W. A. Scarr, G2WS |
| | L. E. Newnham, G6NZ |
| | R. J. Hughes, G3GVV |
| Frequency Advisory Committee | R. F. Stevens, G2BVN |

**Regional representatives**
Council agreed that the present regional representatives should continue in office until 30 June 1975, so as to enable the new arrangements caused by the county boundary changes to be completed.

**Committee minutes**
Council accepted the minutes of the following committee meetings: Raynet (26/10/74), HF Contests (7/11/74), Headquarters Location Working Party (14/11/74), Finance & Staff (14/11/74), Mobile & Exhibition (19/11/74), Education (7/12/74), VHF (18/12/74), Membership & Representation (18/11/74).

Mr Stevens drew attention to the retirement of Mr J. W. Mathews, G6LL, from the Technical & Publications Committee after serving for 40 years. It was agreed that the President should write a letter of appreciation.

# Election of Regional and Area Representatives 1975-7

The following nominations have been received:

**Region 1** Cheshire, Cumbria, Greater Manchester, Isle of Man, Lancashire, Merseyside.
**RR**—B. O'Brien, G2AMV.
**AR**—(Wirral) K. Birch, G2FDS.

**Region 2** All that part of Humberside north of River Humber, North Yorkshire, South Yorkshire, West Yorkshire.
**RR**—R. C. Andreang, G4CMT.
**AR**—(York) J. W. Thompson, G3WQM.

**Region 3** Hereford and Worcester, Salop, Staffordshire, Warwickshire, West Midlands.
**RR**—H. S. Pinchin, G3VPE.
**AR**—(Coventry) W. F. Misnerls-Hahn, G3UOL.

**Region 4** Derbyshire, all that part of Humberside south of River Humber, Leicestershire, Lincolnshire, Nottinghamshire.
**RR**—T. Darn, G3FGY.
**AR**—(*No nomination received*).

**Region 5** Bedfordshire, Cambridgeshire, Northamptonshire.
**RR**—P. F. Chilcott, G4BBA.
**AR**—(*No nomination received*).

**Region 6** Berkshire, Buckinghamshire, Oxfordshire.
**RR**—(*No nomination received*).
**AR**—(*No nomination received*).

**Region 7** Greater London south of River Thames, Surrey.
**RR**—A. H. Othen, G8FSZ.
**AR**—(Norwood & S. London) G. Cluer, G4AVV.

**Region 8** Kent, East Sussex, West Sussex.
**RR**—D. N. T. Williams, G3MDO.
**AR**—(*No nomination received*).

**Region 9** Cornwall, Devon.
**RR**—H. W. Leonard, G4UZ.
**AR**—(N. Devon) H. G. Hughes, G4CG; (Torquay) L. H. Webber, G3GDW.

**Region 10** Dyfed, Gwent, Mid Glamorgan, Powys, South Glamorgan, West Glamorgan.
**RR**—R. G. Barrett, GW8HEZ.
**AR**—(Cardiff) T. J. Brooke, GW3GHC.

**Region 11** (*No nomination received*).
**AR**—(*No nomination received*).

**Region 12** Grampian, Highlands, Orkneys, Shetlands, Tayside, Western Isles.

**RR**—F. Hall, GM8BZX.
—G. Knight, GM8FFX.
—G. Grant, GM3UKG.
—T. C. Wratten, GM4CAO.
**AR**—(Aberdeen) A. M. Allan, GM3ZBE.
—(Tayside) M. W. Bannerman, GM3ZXE.

**Region 13** Borders, Fife, Lothian.
**RR**—Rev S. J. Smith, GM4DNM.
**AR**—(Fife) D. W. Dalrymple, GM3OLK.

**Region 14** Central, Dumfries and Galloway, Strathclyde.
**RR**—A. J. Mitchell, GM3UDL.
**AR**—*(No nomination received)*.

**Region 15** Northern Ireland.
**RR**—H. J. Campbell, GI8FOK.
**AR**—(Bangor) H. M. Irvine, GI3TLT.
—(North Ulster) I. J. Kyle, GI8AYZ

**Region 16** Essex, Norfolk, Sussex.
**RR**—R. E. G. Kendall, G8BNE.
—G. B. Packer, G3UUS.
**AR**—(Norwich) J. M. Draper, G8BLO.
—(Chelmsford) K. A. Thompson, G3YNV.

**Region 17** Isle of Wight, Channel Islands, Dorset, Hampshire, Wiltshire.
**RR**—L. Hawkyard, G5HO.
**AR**—(Farnborough & District) D. N. Jones, G8IMX.

**Region 18** Cleveland, Durham, Northumberland, Tyne and Wear.
**RR**—*(No nomination received)*.
**AR**—*(No nomination received)*.

**Region 19** Greater London North of River Thames, Hertfordshire.
**RR**—*(No nomination received)*.
**AR**—(Acton & Chiswick) W. G. Dyer, G3GEH.
—(Edgware & D) A. J. Masson, G3PSP.

**Region 20** Avon, Gloucester, Somerset.
**RR**—G. Mather, G3GKA.
**AR**—(SE Somerset) C. J. W. Peakin, G8JFQ.

A ballot will be necessary for Regional Representatives in Regions 12 and 16, and corporate members resident in those regions are invited to vote for one of the candidates in their respective regions. Votes should be sent on a postcard in the following form addressed to: The General Manager, RSGB, 35 Doughty St, London WC1N 2AE, to arrive not later than Friday 18 April.

*Form of voting card*

**Election of Regional Representatives, 1975-7**

I, ....., being a fully paid up corporate member of the RSGB resident in Region ....., wish to record my vote in favour of

Mr .....

as Representative for Region .....

Signed .....

Callsign or BRS number .....

Address .....

.....

.....

In those regions for which no nomination has been received, RRs will be appointed by Council which will be pleased to consider any recommendations from members in those regions so that suitable appointments can be made. Any such recommendations should be received by 18 April.

# Committees of RSGB Council for 1975

(The President is an ex-officio member of all committees)

**Education:** G. L. Benbow, G3HB (corresponding); J. W. Hill, G3JIP; R. V. Hughes, G3GVV (corresponding); L. E. Newnham, G6NZ; G. C. Oxley, G8MW; D. M. Pratt, G3KEP; R. Wallwork, G3JNK; F. C. Ward, G2CVV.
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**IARU Working Group:** Dr E. J. Allaway, G3FKM; D. Andrews, G3MXJ; R. J. Baker, G3USB; R. J. Hughes, G3GVV; C. Squires, G3XCS (corresponding); R. F. Stevens, G2BVN; G. M. C. Stone, G3FZL; D. Thom, G3NKS.
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**Raynet:** P. Balestrini, G3BPT; M. Barker, G8CAC; E. R. L. Bassett, BRS16075; Dr A. C. Gee, G2UK; S. W. Law, G3PAZ; T. I. Lundegard, G3GJW; S. J. Scarborough, G3MBQ; E. W. Yeomanson, G3IIR.
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**VHF:** A. H. Bower, G3COJ; J. A. Coffey, G3PSH; B. R. Coleman, G8AZU; M. Dann, G3NHE (corresponding); Dr D. S. Evans, G3RPE; R. J. Baker, G3USB; P. Gowen, G3IOR; J. Hum, G5UM; A. L. Mynett, G3HBW (corresponding); M. J. Sparrow, G6KQJ/T; G. M. C. Stone, G3FZL; Hon M. Wallace, G8AXA.
**VHF Contests:** M. T. Deacon, G3XHU; L. N. G. Hawkyard, G5HD; F. Matthews, G8ACJ; W. J. McClintock, G3VPK; C. Sharpe, G2HIF; G. M. C. Stone, G3FZL; L. V. G. Turner, G8CUT; I. F. White, G3SEK; P. Willcocks, G4BWY.

# OBITUARIES

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

**Mr C. T. Wakeman, G4FN**
"Jack" Wakeman died on 31 January 1975. He was a keen dx operator and worked 268 countries over a period of 35 years, visiting many of the contacts he made abroad.

We have also been advised of the death of:
**Mr. W. Sansom, G3CEW,** on 29 January.

## Mobile rallies calendar

**20 April** —North Midlands rally, Drayton Manor Park, Tamworth. Details from G3ZKQ, QTHR.

**4 May** —Tulip Time rally, Gleed Boys School, Halmer Gardens, Spalding. All the usual attractions. Talk-in on 1·980MHz (G4DSP) and 145·0MHz (G3MMS). Location maps on request. Picnic site at Surfleet available for overnight camping and caravanning. Details from G3VPR, QTHR.

**18 May** —Northern Mobile Rally, Victoria Hall, Keighley, Yorks.

**18 May** —Amateur Radio Mobile Society rally. The Clinical Research Centre, Northwick Park Hospital, Watford Road, Harrow, Middx. Exhibition manager W. S. Barwick, 34 Malvern Road, London N8 0LA. Tel 01-888 0636.

**25 May** —Maidstone trade exhibition and rally, "Y" sportscentre, Melrose Close, off Cripple Street, Loose, Maidstone. GB3YSC talk-in on 160, 80 ssb, and 4 and 2m multimode. Details from G3WXL, QTHR (trade) and G3ORP, QTHR.

**25 May** —Hull & D ARS rally, East Riding College of Agriculture, Bishop Burton, near Beverley. Rally opens at 12 noon. Organizer G3AGX, QTHR.

**1 June** —RNARS rally, *HMS Mercury*, near Petersfield, Hants.

**8 June** —Elvaston Castle rally. Talk-in on 2 and 160m by G3ZBI/P and G3EEO/P. Details from G4CTZ, QTHR.

**15 June** —Bangor & D rally, Castlewillan Forest Park.

**29 June** —City of Bristol RSGB Group rally, Longleat House, near Warminster.

**6 July** —Upton rally, organized by Worcester & D ARS. Details from G8ASO, QTHR.

**20 July** —Cornish RAC rally, Cornwall Technical College, Pool, Camborne. (Provisional.)

**20 July** —Polegate Steam Engine Rally (A27 Polegate to Lewes). Southdown ARS. Exhibition station GB2SS, talk-in on 2m and 4m on GB3SS. Details from G8CFZ, QTHR.

**3 August** —Woburn rally, coach park, Woburn Estate. Details from G3MVV, QTHR.

**17 August**—Derby & DARS rally, Rykneld School, Bedford Street, Derby. From 12 noon. Talk-in on 2m and top band. Admission and parking free. All the usual attractions, including a monster junk sale. Details from G3FGY, QTHR.

**17 August**—Preston ARS rally. Details later.

**24 August**—Torbay ARS rally.

**28 Sept** —Harlow & D ARS rally, Netteswell School, Harlow. Details from G8JXU, Mark Hall Barn, Harlow, Essex.

**NOTE**—The South Shields & DARC is not holding a rally this year.

## YOUR OPINION

The Editor
*Radio Communication*

Sir—May I suggest to G3VIJ and others that when he has used a call, say GM3VIJ, he should send an addressed envelope labelled GM3VIJ to the correct sub-manager or G2MI for cards with this call. This is all that is needed to stop sorting confusion at G2MI. When operating from, say, Elgin, then G3VIJ will sign GM3VIJ/A and send his QTH—Elgin/G3VIJ.

With ever-mounting postal costs it is time to consider putting the QSL Bureau at one address and abolishing sub-managers. This would reduce postal and parcel costs at a stroke and should make up to three months reduction in QSL delivery.

Perhaps the outgoing QSL could be operated by using coupons from the magazine, so stopping non-members using the service.

G. A. Hook, G2CIL



# telecommunication journal

In the increasingly international age in which we live, it is more important than ever that everyone connected with radio should be in touch with authoritative world opinion on radio matters.

The Telecommunication Journal, the official organ of the International Telecommunication Union (ITU), serves just this purpose. Since 1869 (when it first appeared as the "Journal télégraphique") it has faithfully covered all aspects of telecommunications which come within the purview of the world organization (now a UN specialized agency) set up in 1865 to regulate them.

The Journal contains

- a news section covering the activities of the ITU, of its Member administrations and of private operating companies and highlighting technical advances in radio throughout the world
- articles by world experts, with a heavy emphasis recently on the latest developments in space communications
- a comprehensive list of articles of telecommunication interest appearing in the scientific press throughout the world
- official ITU information, including lists of forthcoming ITU Conferences and other international telecommunication meetings
- a monthly and an annual table of satellite launchings
- monthly sunspot predictions
- a column devoted to international aspects of amateur radio.

It is published monthly by the ITU in separate English, French and Spanish editions.

It costs 5 Swiss francs a copy. The annual subscription is 50 francs for one language edition, 100 francs for two and 150 francs for three.

For further information, write to: Telecommunication Journal, ITU, Place des Nations, 1211 Geneva 20, Switzerland. Telephone (022) 34 70 00-34 80 00.
Advertising: Agence Polliand, 1, rue du Vieux-Billard, 1205 Geneva, Switzerland.

**Authoritative — Readable — Comprehensive**

The Editor
*Radio Communication*

Sir—Reference Mr Taylor's letter in the February issue concerning the difficulty of obtaining certain components used in construction articles published in magazines, I should like to draw attention to the fact that it was just this sort of problem which prompted us to form the Amateur Radio Bulk Buying Group. Since we started operation over two years ago, many amateurs have been able to construct projects that they might not otherwise have been able to do.

Regarding the specific project mentioned (the G8AMU multi-mode 427 receiver) we did in fact consider obtaining components for it. However, as printed circuit board layouts were not available it was felt that many intending constructors would not build it.

If Mr Taylor and sufficient others who are interested in this project would contact us, we will be happy to look into the possibility of supplying the filter and other components.

P. Burton, G3ZPB

## Contests calendar

| | |
|---|---|
| **5-6 April** | —70MHz Open and SWL (Rules in March issue) |
| **12-13 April** | —EEC DX |
| **13 April** | —80m Low Power (Rules in March issue) |
| **13 April** | —DF Qualifying—Derby (Rules in March issue) |
| **27 April** | —1,296MHz Open (Rules in March issue) |
| **27 April** | —DF qualifying—Rugby (Rules in March issue) |
| **4 May** | —432MHz Open and SWL (Rules in April issue) |
| **18 May** | —DF qualifying—South Manchester |
| **31 May-1 June** | —144MHz Portable (Rules in April issue) |
| **1 June** | —DF qualifying—Stratford on Avon |
| **7-8 June** | —HF NFD (Rules in February issue) |
| **21-22 June** | —Microwave FD (Rules in April issue) |
| **22 June** | —DF qualifying—High Wycombe |
| **28-29 June** | —Summer 1·8MHz |
| **5-6 July** | —RSGB VHF Open and SWL (Jubilee) |
| **12-13 July** | —SSB Field Day (Rules in March issue) |
| **13 July** | —DF qualifying—Salisbury |
| **27 July** | —144MHz QRP |
| **3 August** | —DF qualifying—Dartford Heath |
| **9 August** | —60MHz Portable |
| **31 August** | —DF qualifying—Coventry |
| **6-7 September** | —VHF NFD and SWL (Rules in March issue) |
| **14 September** | —80m Field Day |
| **21 September** | —DF final—Slade |
| **4-5 October** | —RSGB UHF Open and SWL |
| **11-12 October** | —21-28MHz |
| **18-19 October** | —7MHz CW |
| **1-2 November** | —144MHz Open |
| **1-2 November** | —7MHz Phone |
| **8-9 November** | —2nd 1·8MHz |
| **16 November** | —432MHz Open |
| **7 December** | —144MHz Fixed |


**Northern Radio Societies Association Annual Convention**

Belle Vue, Manchester

**Sunday, 27 April 1975**

**Commencing at 11am**

**Trade stands** — **Club display stands**

**Inter-club quiz** — **Grand raffle**

**Construction contest** — **Club stand trophy**

**The entrance to the exhibition is at the rear of Belle Vue, opposite the main car park (off Hyde Road, A57).**


# RAYNET

## by S. W. LAW, G3PAZ*

All group controllers should by now have received full details of the concession granted by the licensing authority in respect of Raynet co-operation with the user services at functions which have hitherto been outside our sphere of legitimate operation. We must strongly emphasize that the conditions laid down must be strictly adhered to at all times and that any departure from the agreed procedure may well result in the rescinding of this new privilege, as well as placing the offender's licence at risk.

The generic principle is simple: risk to human life. Since this has always been the guiding factor in Raynet operation there should be no difficulty in following the ruling of the concession. We hope to hear of some good work arising from this very welcome development and trust that members will respect the very reasonable limits involved.

**Kennet and Loddon Group**

We have been asked to point out that the assistant controller for the W Berkshire (Newbury) area of the Kennet and Loddon Group (controller G3OWF) is not yet listed in the RSGB *Callbook*. The address is: C. A. McNeill, G8JFS, 40 Turnpike Road, Newbury, Berks RG13 7LE. Letters from prospective members in this area will be welcome. This is an active group with excellent liaison with the British Red Cross Society with which some interesting exercises have been accomplished, including one in connection with the bomb incidents in Guildford (see also our past report on the Surrey stand-by in this respect). G8JFS also draws our attention to the assistance provided by the Christ's Hospital Royal Signals Troop (near Horsham, Surrey) with thanks for the willing co-operation freely given as runners and general helpers as a part of their training and in the public service.

Controllers are asked to note that there are only two of these Royal Signals Troops in the country; the other is in the Marlborough area.

**Frequency lists**

It is understood that there is still some difficulty in compiling a comprehensive list of frequencies of Raynet groups due to the apparent tardiness in forwarding exact information. Will those controllers who have not already done so please ensure that full information is supplied to G3GJW (QTHR) as soon as possible?

**Raynet Committee**

The meeting at RSGB HQ of the Raynet Committee on Saturday 1 March will be reported next month. Membership position as noted at January stood at 27 new registrations and 124 re-registrations. G4GJW will circulate new frequency lists as soon as possible but the comments above still hold; if your group does not appear in the lists the reason is not far to seek! As controller for Kent, G3GJW will do all he can to assist in promoting a southern area controllers' meeting in the near future but this must rely on the co-operation of all concerned by mutual agreement.

The committee have been asked to provide a representative to attend at the north-west controllers' meeting and Mr. J. Scarbrough G3MBQ, offered his services in this capacity.

**Looking ahead?**

The Raynet Committee is looking into the possibility of supplying Raynet Christmas cards to members at a suitable price. Some ideas as to format and probable support for this suggestion will be welcomed by the committee for consideration at the next meeting.

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


* 130 Alexandra Road, Croydon, Surrey CR0 6EW

# CONTEST NEWS

## RSGB 21/28MHz Telephony Contest 1974 results

Despite a disappointing number of entries all the leading stations succeeded in scoring more points than in the 1973 event, proving that activity was greater but that the number of entrants was less. Conditions were difficult, 28MHz being virtually dead to the majority of contestants on the Sunday, although on the first day this band was particularly good but not for North America. The 21MHz band produced some good dx, including a good opening to Japan, and scattered contacts were made with VK and ZL. Europe was prominent almost throughout the contest period.

The UK winner made over 500 contacts, of which about half were with USA stations on the Saturday on 21MHz. G4APL, improving his position each successive year, made more contacts on 28MHz than the two leaders. G4CNY, in his first 21/28MHz contest as an operator, achieved fourth place.

The overseas winner, T. A. Wilson, EP2TW, is congratulated on his perseverance, being 10th last year and 3rd in 1972. He commented on conditions on 21MHz, with QSB from S9 + 20 to zero in the space of a few minutes.

R. Treacher, BRS32525, wins the UK receiving section, with C. Henderson, A7460, runner-up. The disappointing number of swl entries, 11 as in 1973, is causing some concern to the HF Contests Committee, as this section always used to be well supported. If any receiving member has ideas on improving the support of this event, please write to M. Harrington, 123 Clensham Lane, Sutton, Surrey SM1 2ND.

Thanks to all who entered and for the good logs received, checking was relatively easy and the duplicate-contact bogey was virtually absent. Check logs were received from G6RC, UA3XAW, UA6HBU, UB5LBP, UB5PS, UB5UAL and UW3RR; all are thanked for their interest and usefulness.

**UK TRANSMITTING**

| | | 21MHz | | 28MHz | | |
|---|---|---|---|---|---|---|
| Posn | Callsign | QSOs | Bonus | QSOs | Bonus | Points |
| 1 | G3SEM | 467 | 68 | 37 | 28 | 7,308 |
| 2 | G3NAS | 243 | 52 | 53 | 42 | 6,178 |
| 3 | G4APL | 217 | 49 | 64 | 36 | 5,653 |
| 4 | G4CNY | 257 | 56 | 38 | 22 | 5,373 |
| 5 | G2QT | 235 | 50 | 43 | 29 | 5,338 |
| 6 | G3YJI | 202 | 44 | 36 | 20 | 4,368 |
| 7 | G2FNK | 228 | 48 | 17 | 11 | 4,131 |
| 8 | G4CLA | 114 | 33 | 8 | 4 | 2,460 |
| 9 | G8MY | — | — | 77 | 38 | 2,283 |
| 10 | G3TXF | 35 | 19 | 30 | 20 | 2,273 |
| 11 | G4CLN | 79 | 23 | 20 | 8 | 2,045 |
| 12 | GW4CYD | 61 | 31 | 3 | 2 | 1,970 |
| 13 | GM3SSB | 61 | 27 | 5 | 4 | 1,880 |
| 14 | G8KU | 50 | 23 | 9 | 5 | 1,695 |
| 15 | G3UAS | 56 | 25 | — | — | 1,530 |
| 16 | G3ZDF | — | — | 39 | 23 | 1,345 |
| 17 | G3MXJ | 73 | 15 | 4 | 4 | 1,335 |
| 18 | G3MWZ | 27 | 16 | 3 | 3 | 1,100 |
| 19 | G2AJB | 30 | 12 | — | — | 748 |
| 20 | G3TGR | 32 | 10 | — | — | 658 |

An entry from G3MSB/A was disallowed due to contravention of General Rule 8(c)

**UK RECEIVING**

| | | 21MHz | | 28MHz | | |
|---|---|---|---|---|---|---|
| Posn | Station | QSOs | Bonus | QSOs | Bonus | Points |
| 1 | BRS32525 | 321 | 59 | 76 | 44 | 7,129 |
| 2 | A7460 | 213 | 50 | 70 | 36 | 5,707 |
| 3 | BRS26431 | 136 | 52 | 37 | 23 | 4,615 |
| 4 | BRS29909 | 159 | 47 | 28 | 22 | 4,385 |
| 5 | A8482 | 159 | 45 | 32 | 21 | 4,255 |
| 6 | BRS28198 | 118 | 40 | 38 | 27 | 4,128 |
| 7 | BRS15822 | 134 | 46 | 22 | 14 | 3,780 |
| 8 | A8187 | 85 | 40 | 21 | 17 | 3,380 |
| 9 | BRS26407 | 51 | 36 | 24 | 21 | 3,225 |
| 10 | BRS18461 | 57 | 28 | 11 | 9 | 2,190 |
| 11 | A8606 | 34 | 16 | 9 | 8 | 1,415 |

**OVERSEAS TRANSMITTING**

| | | 21MHz | | 28MHz | | |
|---|---|---|---|---|---|---|
| Posn | Callsign | QSOs | Bonus | QSOs | Bonus | Points |
| 1 | EP2TW | 228 | 19 | 51 | 9 | 2,795 |
| * | UK5IAZ | 141 | 14 | 100 | 12 | 2,503 |
| 2 | UA9CBO | 102 | 16 | 8 | 5 | 1,600 |
| 3 | UA6HAC | 116 | 10 | 18 | 5 | 1,418 |
| 4 | ZE1BL | 21 | 5 | 92 | 12 | 1,411 |
| 5 | 9M2DQ | 68 | 8 | 38 | 9 | 1,378 |
| 6 | YO6AWR | 117 | 12 | 2 | 2 | 1,295 |
| 7 | UB5LU | 48 | 7 | 23 | 9 | 1,153 |
| 8 | UK5FAD | 97 | 8 | 7 | 4 | 1,118 |
| 9 | UA6ADC | — | — | 93 | 9 | 915 |
| 10 | PY4KL | 18 | 6 | 25 | 8 | 913 |
| 11 | I3BBZ | 40 | 8 | 7 | 5 | 883 |
| 12 | RB5IOV | — | — | 53 | 12 | 865 |
| 13 | OD5BA | 39 | 8 | 14 | 4 | 861 |
| 14 | UK1ABA | 78 | 9 | — | — | 840 |
| 15 | HA4XX | 60 | 10 | — | — | 800 |
| 16 | VE3GCO | 55 | 10 | — | — | 775 |
| * | UK2WAF | 43 | 11 | — | — | 765 |
| 17 | HA9KOV | 44 | 10 | — | — | 720 |
| 18 | UV9BB | 15 | 5 | 28 | 5 | 715 |
| 19 | UB5VAZ | — | — | 43 | 10 | 713 |
| 20 | UC2BF | 40 | 10 | — | — | 700 |
| 21 | W9LKI | 50 | 9 | — | — | 698 |
| 22 | EA5BS | 36 | 9 | 1 | 1 | 685 |
| 23 | I2PHN | 28 | 8 | 2 | 2 | 650 |
| 24 | UB5GBY | — | — | 38 | 9 | 640 |
| 25 | ZB2CJ | 30 | 8 | 1 | 1 | 605 |
| 26 | UA3ERD | 44 | 5 | 4 | 2 | 590 |
| 27 | K4ISV | 36 | 8 | — | — | 580 |
| 28 | UA6BV | 45 | 7 | — | — | 575 |
| 29 | RB5VAC | — | — | 30 | 8 | 550 |
| 30 | UL7TA | 8 | 2 | 24 | 5 | 508 |
| 31 | EA2JD | 19 | 6 | 2 | 2 | 505 |
| 32 | UW9WB | 31 | 7 | — | — | 503 |
| 33 | UA3XP | 30 | 7 | — | — | 500 |
| 34 | K8CFU | 20 | 8 | — | — | 498 |
| 35 | OK2PEQ | 28 | 7 | — | — | 490 |
| 36 | VK2AVZ | 11 | 7 | 1 | 1 | 460 |
| 37 | YO3JW | 35 | 6 | — | — | 425 |
| 38 | SQ8AWL | 13 | 6 | — | — | 365 |
| 39 | SP6FSH | 9 | 6 | — | — | 345 |
| 40 | JH6CAW | 12 | 5 | — | — | 308 |
| 41 | OK1MSP | 9 | 4 | — | — | 245 |
| 42 | HA1ZD | 7 | 4 | — | — | 233 |
| 43 | K8PYD | 6 | 4 | — | — | 230 |
| 44 | VE2CK/W1 | 6 | 4 | — | — | 228 |
| 45 | UK3SAG | — | — | 6 | 3 | 178 |
| 46 | WB2NDR | 4 | 3 | — | — | 170 |
| 47 | ZL1AGO | 5 | 2 | — | — | 125 |
| 48 | JA7CXF | 3 | 2 | — | — | 115 |
| 49 | JR3XUC | 1 | 1 | — | — | 55 |

* Multi-operator stations

**OVERSEAS RECEIVING**

| | | 21MHz | | 28MHz | | |
|---|---|---|---|---|---|---|
| Posn | Station | QSOs | Bonus | QSOs | Bonus | Points |
| 1 | UB5-070-9 | 86 | 10 | 27 | 7 | 1,415 |
| 2 | OZ-DR.1704 | 65 | 8 | 12 | 6 | 1,085 |
| 3 | OK1-15835 | 85 | 13 | — | — | 1,075 |
| 4 | OK1-15689 | 14 | 3 | — | — | 220 |

## 70cm Open and SWL Contest rules

**0900–1700gmt 4 May**

All entries and check logs to: G5HD, 100 Shirley High Street, Southampton SO1 4FB.

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

The Council Cup will be awarded to the winner of this event.

## December 144MHz Fixed Contest results

This contest was carried out in average conditions and compares interestingly with the last event in 1973. When comparing the QSO and points totals for the leading stations, this year's contest shows considerably more activity, but there were disappointingly fewer contest entries.

The leading station was the Hinckley Amateur Radio and Electronic Society, G3VLG, which was operated by G3NAS and G8FQE. This result should be most satisfying to G3NAS who was placed third in last year's list when he entered as a single operator. *M.T.D.*

| Posn | Callsign | QSOs | Points | Best dx | Km | County |
|---|---|---|---|---|---|---|
| 1 | G3VLG | 256 | 1,412 | DC9KT | 556 | LR |
| 2 | G4DGA | 204 | 1,301 | GM8FFX | 630 | SY |
| 3 | G3FEC/A | 211 | 1,245 | GM8BDX | 462 | WE |
| 4 | G4DDP/A | 180 | 992 | ON5VU/A | 417 | EX |
| 5 | G4CTF | 171 | 863 | ON8IW | 445 | WK |
| 6 | G8GNE | 137 | 861 | GM4DMZ | 430 | CE |
| 7 | G8IWW | 150 | 816 | F1CBH | 460 | |
| 8 | G4CZP | 133 | 811 | G8IXN | 470 | LE |
| 9 | G3JQA | 135 | 753 | GM8FFX | 445 | |
| 10 | G8GGP | 160 | 723 | G4CJG | 425 | KT |
| 11 | G3XDY | 119 | 721 | GM8FFX | 410 | LN |
| 12 | G3ZMD | 138 | 706 | F1BLO | 496 | BD |
| 13 | GD2HDZ | 76 | 696 | G3NPZ | 425 | IM |
| 14 | G4CJG | 74 | 632 | G3NPZ | 420 | DH |
| 15 | GM8FFX | 53 | 617 | | | KN |
| 16 | G4ANS | 114 | 606 | G8BQX | 255 | NM |
| 17 | G8IXN | 62 | 597 | G3BHW | 480 | CL |
| 18 | GM4DMZ | 64 | 554 | G4DML | 552 | AY |
| 19 | G3WZT/A | 125 | 541 | G8IXN | 376 | SX |
| 20 | G4AJE | 115 | 533 | G3BW | 315 | NR |
| 21 | G8FBL | 99 | 486 | G3UKC | 254 | SD |
| 22 | G3JSF | 101 | 481 | G3USF | 305 | |
| 23 | G3UER | 95 | 445 | GM8FFX | 380 | YS |
| 24 | G8AZA | 67 | 435 | G3BHW | 345 | YS |
| 25 | GW3UCB | 62 | 395 | GM8FFX | 444 | CV |
| 26 | GW3KGD | 50 | 394 | F1BHL | 450 | |
| 27 | G8AWN/A | 87 | 382 | GM8FFX | 300 | YS |
| 28 | G4AEZ | 113 | 370 | GD2HDZ | 405 | MX |
| 29 | G8GAH | 82 | 354 | G4DML | 320 | LE |
| 30 | GC3YIZ | 54 | 351 | G3VLG | 350 | GY |
| 31 | G8HHI | 97 | 350 | G4CJG | 200 | HE |
| 32 | G8FVR/A | 65 | 347 | G3UKC | 257 | |
| 33 | G8GBY | 63 | 338 | GI8EWM | 408 | YS |
| 34 | G3WDH | 82 | 320 | GW4CBR | 274 | LE |
| 35 | G8GOX | 88 | 290 | G8IXN | 360 | SY |
| 36 | G8ERW | 101 | 289 | G8GAH | 255 | HE |
| 37 | G8CBN | 50 | 288 | G3FEC/A | 320 | CD |
| 38 | G4CIK | 63 | 287 | GD2HDZ | 260 | LR |
| 39 | G8FKI | 72 | 286 | ON8IW | 275 | EX |
| 40 | G8GHR | 67 | 285 | G4CZP | 270 | HF |
| 41 | G8IAT | 71 | 275 | G3BHW | 370 | LE |
| 42 | G8EGY | 64 | 272 | GM4DMZ | 353 | NM |
| 43 | G8IKO | 97 | 259 | G4CZP | 300 | |
| 44 | G8DHA/A | 67 | 253 | | | GR |
| 45 | G3LCH | 104 | 247 | G4CZP | 330 | LD |
| 46 | G3HBR | 78 | 244 | ON8IW | 336 | BS |
| | G3SZS | 60 | 244 | F5ZA | 380 | |
| 48 | G8HOW | 101 | 243 | G4DMF | 175 | MX |
| 49 | G3ZLQ | 74 | 240 | F5ZA | 375 | |
| 50 | G8EEM | 55 | 236 | G4DGA | 275 | YS |
| 51 | G8IBB | 37 | 231 | G3BHW | 360 | YS |
| 52 | G8BXJ | 61 | 223 | GD2HDZ | 320 | GR |
| 53 | G8GVA | 47 | 205 | G3BW | 260 | LR |
| | G8HSS | 113 | 205 | GW8GDX/P | 190 | LD |
| 55 | G8BKR | 46 | 203 | GD2HDZ | 330 | GR |
| 56 | G8HAX | 74 | 202 | F5ZA | 370 | |
| | G8FDL/A | 65 | 202 | GM8FFX | 390 | LE |
| 58 | G4BYB/A | 65 | 201 | F1DBB | 323 | OX |
| 59 | G8IYI | 48 | 192 | G3BHW | 270 | LN |
| | G8ECO | 76 | 192 | G3NHE | 210 | SY |
| | G8IXS | 59 | 192 | GD2HDZ | 270 | WR |
| 62 | GD3YEO | 28 | 188 | G4DDP/A | 410 | IM |
| 63 | G4ALG | 68 | 184 | G8IXN | 342 | BE |
| 64 | G4ATH | 47 | 173 | GM8FFX | 350 | |
| 65 | G4DLB | 49 | 172 | G3XDV | 215 | OX |
| 66 | G8HWQ/A | 39 | 166 | G3BHW | 330 | YS |
| 67 | G3SMM | 42 | 165 | G3BHW | 320 | |
| 68 | GI8EWM | 26 | 164 | G3XDY | 395 | AM |
| 69 | G4BYP | 44 | 158 | G4DGA | 275 | LE |
| 70 | G8JKX | 60 | 154 | GW8GDK/P | 202 | HD |
| 71 | G8CSA | 72 | 152 | G8IWW | 180 | LD |
| 72 | G8FFI | 32 | 138 | G8IXN | 307 | HE |
| 73 | G8IMV | 58 | 124 | G4DMF | 176 | BE |
| 74 | G3SXY | 30 | 116 | G3WDH | 223 | |
| | G3ZQF | 76 | 116 | G3VLG | 130 | SY |
| 76 | GM5VG | 34 | 104 | GW8FKB | 278 | RW |
| 77 | G8EYC | 62 | 94 | GW8GDK/P | 205 | GL |
| 78 | GM8HFJ | 29 | 87 | G3GZK | 270 | LK |
| 79 | GC4ASO | 16 | 50 | G3CZZ/P | 260 | GY |
| 80 | GM8BJJ | 10 | 30 | GW8GDK/P | 225 | KT |
| 81 | GC8ITE | 9 | 17 | G3EGV | 130 | GY |
| 82 | G4BKY | 1 | 1 | GW8GDK/P | | GR |

Disqualified: G4DML—Rules 10(a), 14(ii), 17.
Check logs received from BRS28198 and G3NHE.

## 144MHz Portable Contest rules

**1600gmt 31 May to 1600gmt 1 June 1975**

All entries and check logs to: VHF Contests Committee, c/o G8ACJ, Easedale, Woodway, Merrow, Guildford, Surrey GU1 2TF.

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

## January 1975 70MHz CW Contest results

As for the 2m contest on the previous day, conditions were poor. However, the winner made a good score and achieved a higher scoring rate on this band than on 2m.

Comments: timing and duration ideal, a definite improvement on previous 4m cw contests—G3LVP; I found the contest desperately hard going—G3JYP; would like the 4m and 2m contests with more spacing—G3ZMD; where were the other countries—GW, GD etc?—G3LCH/P; Operating standards first class—G3GVM; a stroke of genius to have 2m and 4m contests same weekend, it must have increased activity for both—G3KMI; the day of crystal-controlled transmitters is over, could have doubled score with a vfo—G3JXN.

A small group of entrants expressed a wish for 4m ssb contests. The VHF Contests Committee invites more views on this subject before considering the matter further.

Certificates go to the winner and to the runner up, and special thanks to G3LVP for a very constructive appraisal of 4m contest requirements.

*G3FZL*

| Posn | Callsign | Points | QSOs | Best dx | Km |
|---|---|---|---|---|---|
| 1 | G3NHE | 275 | 37 | G3OZT | 270 |
| 2 | G3OHH | 246 | 34 | G3DAH | 295 |
| 3 | G3UKV/P | 194 | 32 | G3DAH | 288 |
| 4 | G3WRA/P | 180 | 30 | G3JYP | 300 |
| 5 | G3LVP | 137 | 29 | G3BOC | 280 |
| 6 | G4ABR/P | 136 | 28 | | 225 |
| 7 | G3JYP | 135 | 13 | G3JEQ | 395 |
| 8 | G3VPK | 130 | 22 | G3OQT | 270 |
| | G3FIJ | 130 | 22 | G3OHH | 254 |
| 9 | G3ZMD | 124 | 30 | G3OQT | 190 |
| 10 | G3LCH/P | 119 | 21 | G3OHH | 235 |
| 11 | G3GVM | 114 | 24 | G3NHE | 282 |
| 12 | G3KMI | 113 | 25 | G3NHE | 275 |
| 13 | G3JXN | 109 | 27 | G3JYP | 355 |
| 14 | G3ZRF | 105 | 21 | G3OHH | 280 |
| 15 | G3CDG/P | 98 | 18 | G3FIJ | 205 |
| 16 | G4BWG | 96 | 22 | G3JYP | 390 |
| 17 | G3BOC | 92 | 16 | | |
| 18 | G5UM | 86 | 20 | G3ZRF | 165 |
| 19 | G3OZT | 83 | 21 | G3NHE | 280 |
| 20 | G3FEC/A | 82 | 20 | G3FDW | 198 |
| 21 | G3NPI | 81 | 21 | G4AIR | 220 |
| 22 | G5HD | 70 | 16 | G3OHH | 240 |
| 23 | G3PGN | 68 | 16 | G3OHH | 230 |
| 24 | G3USE | 64 | 20 | G3OHH | 180 |
| 25 | G3ZIG | 54 | 10 | G3OHH | 220 |
| 26 | G4ALG | 51 | 17 | G3NHE | 220 |
| 27 | G3YQW | 44 | 10 | G3CDG/P | 166 |
| 28 | G3VPS/M | 31 | 9 | G3NHE | 256 |
| 29 | G3KSU | 29 | 9 | | |
| 30 | G3OIT | 24 | 4 | G3OHH | 300 |

## Microwave Field Day rules

**Date:** 21–22 June 1975.
**Times:** 1600 to 1600gmt.

All entries and checklogs must be sent to: VHF Contests Committee, G4BWY, 27 Manor Road, Barnet, Herts EN5 2LE.

**1.** Scoring contacts may be made on any amateur frequency above 1GHz, but lower frequencies may be used for setting up contacts.

**2.** Contest exchanges will be as follows:

On the 1,296MHz band; RS or RST report followed by a serial number, QTH Locator and QTH.

On each of the other bands: RS or RST report followed by a serial number and a code word of the operator's own choosing (eg "Centimetric Overture"). The same code word cannot be used on more than one band. Contestants must record their code word clearly on the 427 Cover Sheet accompanying the entry log for each band. If the station has not already been contacted on the 1,296MHz band, the QTH Locator and QTH may be substituted for the code word. Serial numbers shall begin at 001 for each band, and information should be passed on the band for which points are claimed. All data should be recorded on the log.

**3.** Scoring will be as follows:

1,296MHz band: two points per kilometre.
2·3GHz band: three points per kilometre.
Other bands: five points per kilometre.

**4.** The same callsign must be used on all bands for all scoring contacts.

**5.** Unless superseded by the above, the following General Rules will apply: 1, 2, 3, 4b, 6, 8b, 9a, 10a, 11–22.

## January 1975 144MHz CW Contest results

Conditions were very poor for this contest and the number of entrants was slightly down from the February 1974 contest. The timing was changed, however, from 1000 to 1800 on a Sunday to from 2000 to 0059 on a Saturday. The winning station found activity from the Continent poor. However, an RSGB member in Belgium, ON8IW, entered the contest and submitted an excellent score from only 17 contacts. This may encourage other RSGB members in adjacent countries to take part in our contests—one could very easily win.

The contest as arranged appeared to be popular with most entrants and several mentioned their liking for the close spacing of the 2m and 4m events. G3NHE suggested that a 70cm cw contest could also have been introduced into the weekend. However, a few entrants did not like this close proximity. G3NNG expressed dislike of the new three-letter county codes—but these are decided by the HF Contests Committee, having been originated for top band use.

Overall the contest was successful and is likely to remain unchanged in the calendar for next year. Certificates go to the winner and to the runner up. A further certificate goes to ON8IW for a noble effort from Belgium.

*G3FZL*

| Posn | Callsign | Points | QSOs | Best dx | Km |
|---|---|---|---|---|---|
| 1 | G3POI | 302 | 60 | ON4PL | 405 |
| 2 | G3WSN | 249 | 53 | ON8IW | 265 |
| 3 | ON8IW | 239 | 17 | DK1KO | 565 |
| 4 | G3NHE | 233 | 41 | ON8IW | 460 |
| 5 | G3NNG | 232 | 54 | G4BYK | 253 |
| 6 | G3ZMD | 229 | 52 | PA0LSC | 335 |
| 7 | G4ANS | 207 | 42 | G3XDV | 260 |
| 8 | G3MOT | 205 | 52 | G3XDV | 215 |
| 9 | G3LCH/P | 190 | 43 | G4CDC | 275 |
| 10 | G3JVJ | 185 | 43 | G3BHW | 237 |
| 11 | G3OHH | 182 | 36 | | |
| 12 | G4BWG | 176 | 45 | PA0LSC | 370 |
| 13 | G3PHO | 153 | 27 | G3BHW | 296 |
| | G4BRQ | 153 | 37 | GW3GLY | 271 |
| 14 | G3KMI | 148 | 38 | G4ANS | 230 |
| 15 | G4ABR/P | 124 | 30 | G3BHW | 240 |
| 16 | G4DLB | 123 | 37 | G3UOE | 156 |
| 17 | G4DRB | 116 | 32 | ON8IW | 260 |
| 18 | G3OZT | 115 | 27 | ON8IW | 375 |
| 19 | G4DPT/P | 108 | 28 | G3XDV | 242 |
| 20 | G4AUR | 87 | 19 | G3POI | 281 |
| 21 | G4ALG | 79 | 31 | GW3WRE | 192 |
| 22 | G3WAO | 78 | 18 | G3JVJ | 209 |
| 23 | G4BZP | 76 | 22 | G3WSN | 163 |
| 24 | G6GL | 71 | 33 | G4ABR/P | 160 |
| 25 | G4DDL | 58 | 31 | G3DAH | 127 |
| 26 | G3TMQ | 46 | 20 | G4ANS | 190 |
| 27 | G4BKY/A | 39 | 15 | G3OHH | 185 |
| | G4DSE | 39 | 21 | G3LCH | 110 |
| 28 | G3OTK/A | 35 | 13 | GW3GLY | 110 |
| 29 | G3USE | 4 | 2 | G4BWG | 52 |

Check logs received from G2WS and G8GP

## BATC International ATV Contest 1974 results

The winner of Section A (fixed or /A stations transmitting and receiving vision) was DL1LS with 1,318 points, followed by G6KQJ/T with 1,078 points. G6AHT/T and G6AHJ/T occupied positions 11 and 12 respectively among the 14 entries in this section. In Section B (/P stations transmitting and receiving vision), the leading station of the four entrants was GW6AGT/T with 2,880 points. There were no UK stations among the six entrants in Section C (stations receiving vision).

## G2CJN Grafton VHF Contest 1975 rules

**2100–2400gmt 3 May 1975**

Open to all UK licensed amateurs (club entries not accepted). All modes allowed.

Certificates of merit will be awarded to the stations placed first and second, and a further certificate for the highest placed station licensed within six months of the contest (date to be sent on contest entry). Scoring as per RSGB vhf contest rules. Entries postmarked no later than 24 May 1975.

Further information from B. C. Bond, 86 Agar Grove, Camden Town, London NW1.

## February 432MHz Open Contest results

Good conditions, but not as good as prevailed later in the week, brought nearly 150 "G" stations into operation, with 27 sending in entries. GW3UCB/P again demonstrated what can be achieved with 400W p.e.p., 20dB of aerial gain and a suitable mountain top. Significantly no stations, portable or fixed, without ssb, scored 200 points.

Certificates go to the winners and runners up.

*G5HD*

| Posn | Callsign | Points | QSOs | QRA | Best dx | Km |
|---|---|---|---|---|---|---|
| 1 | GW3UCB/P | 866 | 103 | YN75 | LX1DT | 743 |
| 2 | GW8AWM/P | 565 | 71 | YM54 | LX1DT | 683 |
| 3 | G3JQA/P | 394 | 68 | ZN61 | ON5GF | 580 |
| 4 | G3NHE | 381 | 56 | ZN54 | ON5GF | 520 |
| 5 | GD2HDZ | 254 | 24 | XO68 | ON5FF | 640 |
| 6 | G3KMS | 231 | 35 | YN38 | F1AVG | 500 |
| 7 | G3NNG | 183 | 39 | ZL23 | ON5FF | 373 |
| 8 | G8AAY/P | 171 | 39 | ZN71 | G3VPS/P | 284 |
| 9 | G3KAC | 155 | 31 | YL48 | G3DAH | 259 |
| 10 | G3XBY | 152 | 32 | ZM52 | G3BW | 275 |
| 11 | G8FMK | 117 | 29 | ZL26 | GW3UCB/P | 210 |
| 12 | G4AEZ | 96 | 22 | ZL30 | ON5FF | 270 |
| 13 | G5UM | 74 | 26 | ZM35 | G3DAH | 187 |
| | G3OHM | 74 | 21 | ZM41 | GD2HDZ | 267 |
| 15 | G8IWW | 73 | 24 | ZM21 | G8ABH | 190 |
| | G3FEC/A | 73 | 17 | ZL22 | G3KMS | 225 |
| 17 | G3VPS/P | 69 | 17 | AK11 | GW3UCB/P | 320 |
| 18 | G3KIN/P | 61 | 17 | ZL59 | GW8AWM/P | 232 |
| 19 | G3GLM/P | 60 | 12 | ZN18 | GW8AWM/P | 265 |
| | G8DCA | 60 | 12 | ZK10 | GW3UCB/P | 302 |
| 21 | G4DLB | 48 | 11 | ZM70 | G3KMS | 200 |
| 22 | G4DDL | 41 | 13 | ZL47 | GW3UCB/P | 230 |
| 23 | G4AJE | 30 | 10 | ZM57 | GW3UCB/P | 175 |
| 24 | G8DHE | 15 | 5 | ZK18 | FC1CM | 140 |
| 25 | G3YQW | 12 | 6 | ZL70 | G4BEL | 135 |
| | G8FAT/P | 12 | 4 | ZL17 | G3NHE | 165 |
| 27 | G3USE | 7 | 5 | ZL09 | G4BEL | 62 |

## Alex Volta RTTY DX Contest results

There were only four UK entrants among the 83 listed in the results table. GW3IGG in position 61, G3OUR in position 65, G3RDG in position 67, and G2FKO in position 79. Paul Winchester, BRS25676, was placed fifth in the swl section with eight entrants.

## 1st Cray Valley RS Transmitting and Receiving Contest rules

**1.** There will be two contests:
Section 1 160m, 6 April 1975, 0900–1300gmt
Section 2 2m, 13 April 1975, 0900–1300gmt

**2.** The contests are open to all licensed amateurs and SWLs. Portable, mobile and fixed stations may take part. Any mode may be used.

**3. Contacts.** Cray Valley stations must send report, serial No (starting with 001) and CV. This identifies that they are Cray Valley stations.

Non-Cray Valley stations must send reports and serial number (starting with 001). Contacts via repeaters will not count for points.

**4. Scoring.** 10 points for contacting club stations G3RCV or G8FCV.
3 points for contacting club members.
1 point for each other contact.

The total score in each contest will be the total number of points multiplied by the number of Cray Valley stations worked. Only one contact with each station in each section of the contest may be allowed for points.

**5. Entries.** Logs must include the following information: date, time, callsign of station worked, RS(T) and serial number sent, RS(T) and serial number received, points claimed.

Separate logs for each section should be sent to: R. A. Treacher, 392 Rochester Way, Eltham, London SE9 6LH, postmarked not later than 28 April 1975.

**6. SWL** entries. Scoring etc will be as for the transmitting sections but only stations in the contest may be counted for points. Logs should show date, time, callsign of station heard, report and serial number given, callsign of station being worked, points claimed.

**7. Awards.** Certificates will be presented to the winner and runner-up of each section of both the transmitting and SWL contests.

# 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 40p (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

**Hamgear PM11D preselector,** £7.50. EK9X electronic keyer, cw monitor AT8, £10. MJF cw filter 80/110/180, £5. G8LD, QTHR. Tel Leics 832969.

**FRDX400S 160-4m-2m rx** with SP400 spkr, £159. Trio 9R59DE, £30. Microwave Modules 70cm conv, £10, and 2m preamp, £7. G8ATK tx strip, £5. Katsumi MC701 speech compressor, £10. Xtal FT243 8·025, 8·075, 8·106, £1 each. Sherratt, 32 Springfield Way, Cranfield, Beds MK43 0JN.

**Yaesu FLDX400 tx** with all 10m xtals fitted, £120. Reason for sale: short of space, must go transceive. *Wanted:* FT200 plus psu, subject to sale of above. G4DCQ/G8DCQ, QTHR.

**Channel Master Rotator,** comp with control unit, good wkg order, £12. G8BSX, QTHR.

**Liner 2** with psu used once, £140. HW17A, £45. Eddystone 840C, £40. Bantex 2m, ⅛ whip unused, £3. Antec 2m whip with integral ground plane, £5. G8EUD. Tel Windsor 60867.

**IC21XT tx/rx,** ext vfo, ac/du 12V, mint cond, comp home mobile rig for 2m. G3UGQ, QTHR. Tel 0204 41645.

**Dx tv gear:** TVs, tuners, i.f. panels, aerials, preamps, £50 the lot, SAE list. 14-el Parabeam, £12. *Wanted:* QQV06-40. G4DSC/G8IBB, QTHR.

**100W 2 × KT88 output transformers** as for use in GEC u/l circuit, £11 each. Tel 01-452 4535 after 6pm.

**Trio 9R59D.** Pair manufacturer's matched 6HF5s, unused. Brennel mk5 tape deck. Two cowlgill motors. Mullard hi-fi 10W amplifier. All exc cond. Offers. G4JJ, QTHR.

**Heathkit sig gen,** £15. Heathkit gdo, comp with coils, £12. Heathkit HW30 2m tx/rx, £18. Xtal calibrator, £5. G8ERF, 9 Highfield, Long Crendon, Aylesbury, Bucks.

**RA1 rx,** £20. Codar AT5 plus homebrew mains and mobile PSUs, £15. T28 rx, £12. Pye Reporter 4m tx/rx, tunable rx, xtal on 70·26, £10. Tavasu centre-loaded whip plus 160m coil, £9. Homebrew portable scope, £10. Superb Class D wavemeter, £8.50. Alternatively, the lot for £80. G4BKM, QTHR. Tel 01-892 7641 evenings.

**Plumbicon camera tubes,** int/sep mesh, very slight blemishes, £15. Dallmeyer Super Six tv lenses, C mount, fixed-focus anastigmatic, 25mm and 50mm, £15. Spacemark sstv boards, most Rs, Cs and rectifiers fitted, £10. 3RH1 fss pc board less ICs, £2. 931A and base, new, £3. Gem quad, 2 e/e, £45. GI3MBB, QTHR. Tel Bangor 61946.

**McCoy Golden Guardian 9MHz xtal filter** with both sideband xtals, £15. Telford TC7 mk2 with DL6SW 2m converter, £35. AM10D Cambridge tx/rx 145·0MHz plus extra tx xtals, £20. GM8BBA, QTHR.

**TA33jnr beam,** will exchange for 12AVQ or 14AVQ vertical. Buyer collect. G8EQL, QTHR. Tel Blagdon Hill 253.

**Woden mod transformer UMI** (25W), £1.50. Transistor modulator in diecast box (Garex kit) for QQV03-10 with mic and relay, unused, £1.50. Postage extra both. G3MDQ. Tel 021-353 3608.

**HW32A, HP13A,** Tavasu whip, mic, spkr. £85. Heath Cotswold spkr, £18. BC221AJ, charts, mains psu, £18. Pair AM25B highband, £12. BC453B, £3. Valves 813/QV047/PL519 etc, sae list. 19 page printer teletype, £10. G3LDI, QTHR. Tel Wymondham 3463.

**Creed 7E** with silence cover, £16. Creed 7TR, £10. Both mains motors. Pye F27AM 4m base station, £30. Heathkit SSU-1 spkrs, £15 pair. Stereo amp, preamp, £12. KW2000A, ac psu, £150. G3OZF, QTHR. Tel (029674) 354.

**G8AEV 2m converter.** 4-6 i.f., £6.50. D. Turner, 53 Birches Head Road, Hanley, Stoke-on-Trent ST1 6LH.

**Hygain TH4** with balun, 4-element tri-band, 2kW p.e.p., good cond, £25 ono. Buyer collects. G3YHD, QTHR. Tel 061-748 9152.

**Exchange/sell HC6/U xtal 12227·5kHz,** giving coverage 21·2-21·4 KW Vespa, for any HC6/U 8001-8006 or 8011·1 or 8097·2. GM3LWS, QTHR. Tel Glenrothes (0592) 754714.

**Standard 19in rack** with door and plinth, 5ft tall, £15 ono. Rack mounting psu, mains to 200-500V variable, stabilized at 350mA, 6·3V at 10A, £15 ono. Commercial dc/dc converter 12/110 at ½A, £20 ono. G8CHE, QTHR. Tel 01-953 2030 ext 3394 office hours only.

**Yaesu FT2 fm tx/rx xtals** 146, 148, 145, 145·5, with ⅛ Bantex, handbook, £60. Pye base station, table mic, £2.50. 15W modulation trans, £1. Pye multi-channel control box £1.50. Shack spkr and cabinet, £1. All plus postage. G8AMN, QTHR. Tel Leicester (0533) 714786.

**Heathkit DX100U tx,** good cond, mods for ssb, £35. Heath SB10U ssb adaptor, exc cond, £35. Heath RC bridge, £6. HRO plus coils and power pack. G2FFN, QTHR. Tel Billericay 02774-52441.

**KW Ezee Match,** £17, KW low-pass filter, £6.50, both 6 months old, valid reason for sale. Veroboard ic boards, 60p each, selection of ttl and valves. State requirements to S. Whittingham, 2 Bedford Street, Wolverton, Milton Keynes.

**KW Vespa mk2,** late model, little used, original cond and performance, £85. Once-erected Hy-Gain 18AVT/WB comp with assembly data, £27. G3HIS, Vermont, Cranham, Glos. Tel Painswick 812485.

**FLDX400 and FRDX400,** tx 80-10m, rx covers all bands, £250 ono. Tel Robert, G8IJP, 0272 834776 evenings.

**Heath SB200 linear** 80-10m, very little used, mint cond, with manual, £140, or exchange for Liner 2. G8BII, QTHR. Tel Shipton-under-Wychwood 830067.

**Late G6XH equipment:** KW2000 with psu, Heathkit swr meter HM-11U, £100. VVTM V-74UK, £10. About 100 FT243 xtals, £5. Offers. Buyers collect. G8ETL, QTHR. Tel Worthing 62013.

**Modern QTH,** large garden for aerials, situated Highcliffe, Hants. G3CVF, QTHR. Tel 042-52 5531.

**Eddystone EA12 rx,** exc cond, factory serviced, for sale on behalf xyl of late swl friend, £130. G3AYJ, QTHR. Tel 021-354 5783.

**Heathkit HW17 2m tx/rx,** £45 ono. Xtals (freq in MHz) HC18U, 105·666 and 67·333, £2.50 each. FT243, 8·0555 and 8·075, £1 each. 10XJ, 8·00769, 8·00931, 8·0135, 8·01882, 8·03571, 8·0600, 8·06125, 8·0750 and 8·10714, 50p each. G8BXJ, QTHR. Tel Bristol 695839.

**Low-band AM25B** with xtals for 70·26, £8. Labgear LSP30 manpack 25W p.e.p. less filter and case, £5. Silver-plated K6AXN 23cm trough, £6. Teletype mod 14 teleprinter, £5. RTTY terminal unit, £3. Pye U450L 70cm tx, £7. Post extra. G3TTV, QTHR.

**Transformers:** 450-0-450 200mA, 6·3 and 5V, £2.50. Elstone high-quality multi-tap output transformers, 25W push-pull, £1.50. Carriage extra. G3XZO. 3 Archers Road, Southampton.

**Two PSUs, type APT465,** metered, 500V, 500mA, regulated, variable, ditto 500V, 500mA unregulated, 0-250V bias variable regulated, 6·3V 10A, £20 each. *Rare* 111/2 (not B/2) spy tx/rx in suitcase, collectors item, offers. G3MHS, QTHR. Tel Sedgley 73465 (Staffs).

**Codar T28 rx,** Codar 12M/S & 12/RC, £18, will separate. 10, 15, 20m xtal-controlled converter, i.f. 6·5MHz, £3. Grundig EN3 tape recorder with lapel mic, £24 ono. G3PXJ, QTHR.

**KW 1000 linear,** £90. Drake R4 rx with top band, £140. Tel Exeter 74607. G3YBG.

**SSM 432MHz converter** plus BFY90 preamp, very quiet, £9. 3-20 70cm linear, integral psu, 20W+ output, gone solid state, less valve, £10. Chris Bartram, G4DGU/G8FEV, QTHR. Tel Steventon (023584) 330 early evenings.

**Ex/A.C. TXs,** pair 4X150s in final, new cond, make cheap ssb linear, £10. G3IUL. Tel 01-890 7091.

**HW17A,** rx wkg ok, tx needs attention, one or more valves reqd, 12V external supply reqd, 12V transformer winding o/c, £20 ono. Buyer collects. G8ICM, QTHR. Tel Bourne End (Bucks) 26377.

**HF synthesizer type RC/460/S** 1MHz to 29·9999MHz in 100Hz increments, 1V output into 50Ω, £180. G8FXY, QTHR. Tel 67690 after 6pm or at weekends (Peterborough).

**Liner 2,** preamp, Belcom psu, £130. SSM Europa, comp, £65. Both little used, exc cond. G4DAC, QTHR. Tel 01-657 3081 evenings.

**Trio TS510** with PS510 and Shure 201 ptt mic plus complementary VFO5D, very stable, all in exc cond, best offer over £155. Carriage extra. W. H. Vann. Tel 041-427 1337.

**HQ1 mini beam** and AR22 rotator, £52, delivered 20 miles. G4ADK, QTHR.

**Transformer** 510-0-510 275mA, 375-0-375 83mA, 5V 3A, 6·3V 9A plus 6·3V six times 0·5-2A, £5, prefer buyer collects. *Radio Communication* June-December 1971, January-December 1972 and 1973, small excisions 71-72, offers. *Wanted:* VF1U vfo. G2ACB, QTHR. Tel Longworth (Oxon) 820332.

**90W modulator,** 2 × 829B output, by Marconi, £4.50. Pair 240V selsyns, £3.50. Rotary transfmr (ex equipt) 12/260V dc, £1.25. G2ABD, QTHR. Tel Fontmell Magna (074781) 509.

**Lafayette PF60 fm rx,** 152-174MHz perfect cond, £30. Heath GR98 aircraft band rx 108-136MHz with ac adaptor, very sensitive, £33. Both with handbooks, stabilized mains psu, twin outputs 12-15V 0·1A, brand new, with data, £10 each. GM3BQA, QTHR. Phone North Berwick 2519.

**TH3 mk3,** vgc, £45. Trio 9R59DS, SP5DS spkr, mint, used few hrs only, £40. *Wanted:* scrap or cheap HRO for dial and xtal filter, details req. G3VMW, QTHR. Tel 0904-89 445.

**LG300 comp** with original modulator and PSUs, spare 813s, £25 or exchange for 2m Cambridge or similar mobile rx/tx. G3AJP, QTHR. Tel Stevenage 50241.

**Microwave 1,296-3cm equipment disposal:** 2304 pulse, TX/RX. 4ft dish. £10. 3cm klystrons, waveguide components, 2K41 2·3W S band, TS13 test set, 1296 parametric amp, many other items. G3BNL. 7 Kayte Close, Bishops Cleeve, Cheltenham. Tel Cheltenham 3976 evenings.

**Power supply** 1,000V dc 1A, 450V dc 250mA, 300V ac ct 250mA, 0-4V 0-5V, 0-4-0-6·3 6A, 0-75, 0-100V ac 100mA. BC221 modulated, regulated psu, charts, exchange good rx HQ170, BRT400, cash adj. G3GVN, QTHR. Tel 021-706 7992.

**Ni-cads** for 2m fm walkie talkie, DEAC 500mAh capacity, brand new, many sets available, £10.20 per set of ten including postage. Also available, any type of DEAC ni-cads, brand new, sae for list and details. G8FAS. 85 Bushfield Road, Crewkerne, Somerset.

**Taylor model 45C valve tester,** £12 ono. J. Sones, The Police Station, Ardleigh, Colchester, Essex. Tel Colchester 230318.

**Exchange Pye marine gen cov rx** type PM128, eight bands covering 50kHz-31MHz continuous with spkr, psu, handbook etc, all in vgc, for Trio 2200 or similar 2m fm rig. Phipps, 47 Dean Road, Hinckley, Leics. Tel 35811.

**FT75** with mobile psu, £90. Hygain 40m beam £80 ono. New G-whip with 20m coil, £12. G3WJN. 654 Evesham Road, Crabbs Cross, Redditch, Worcs. Tel Astwood Bank 3339.

**G3LLL rf clipper** for FT101 mk2/B, £25. R. Dunham, 110 Cheltenham Road, Wrose, Bradford, Yorks. Tel (0274) 598433.

**400W tx/rx,** Galaxy 5 mk4, mobile ps, manual, spares, £165. Sig gens: Marconi TF801/A1, 10 to 300MHz, £35. Osc Test No1, 85kHz-32MHz a.m./fm, £35. Solartron CO546 25Hz-500kHz, £30. BC221, charts and ps, £14. Creed 75RP mk4, £50. DVM DM2003, £30. G2AXO, QTHR. Tel 0604-61794 6-7pm.

**Hioki AS-100D multimeter,** 100kΩ/V dc, 10kΩ/V ac, 0-1·2kV ac/dc, usual other ranges. Universal Avo model 8X mk4, leather carrying case. Both vgc, sensible offers. G4CKI, QTHR.

**Redifon marine radiotelephone** GR286 with G297 booster unit, both are high-band fm, and comp with PSUs and manual, size 21 by 21 by 16in, 240V ac, £25, carriage extra. G3TPX, QTHR. Tel Darton 2517 (0226-78) evenings weekends only.

**KW Vanguard** with top band, good wkg cond, £25. Complin, 5 Marsh Way, Pimperne, Blandford, Dorset. Tel 02582-3695.

**Lafayette KT-390 tx,** £20. VFO 10-80m, £8. HA-700 rx with spkr, £16. HE-73 pre-con, £8. Homebrew Z-match with coaxial relay, £4. T/R switch, £3. Trapped dipole 108ft, £3. Comp station, £55 or separately. G3WYZ, QTHR. Tel East Horsley 2622 evenings.

**2m Nuvistor converter,** approx 28-30MHz, built-in psu, £7. New 12V ni-cad 2AH, £7. 100kHz xtal calibrator, £3. 4X150As, 75p. Emupressor speech processor, £4.50, carriage extra. *Wanted:* Osker power meter and Microwave Modules converter with 116MHz output. G8ENI, QTHR. Tel Cheslyn Hay 415374.

**Solartron VF252 millivoltmeter,** 30MΩ+ input impedance, 1·5mV-15V exc cond, £15 ono. IDL 1805B scaler, internal 400V-2kV supply, £15 ono. Marconi TF517E vhf sig gen 150-300MHz, wkg, £10 ono. Peter Tovey, 36 Northville Road, Bristol BS7 0RG. Tel Bristol 693665.

**Transformer** 10V 10A, power pack 2kV/1kV, *Radio Communication* 1953-1968. G2DCG, QTHR.

**Liner 2** with preamp, £100. Heath HW-7 QRP tx/rx, £25. Heath IB-102 175MHz pre-scaler, £40. 2m 6/40 linear, built-in psu etc, £30. All ono, prefer buyers collect. G4AOK, QTHR. Tel 061-969 7922 after 6pm.

**SSTV 7in tube 7BP7,** new, direct replacement of 5FP7, £4. G3GRJ, QTHR. Tel 01-804 4571 daytime.

**FL50B, FV50B, FR50B** (cal/WWV), comp rig, used about ten months, almost as new, need space, £120. G4BRU, QTHR. Tel Truro 77108 evenings.

**Eddystone 770R** 19-165MHz, exc cond, realigned by mfr, £100 ono, carriage at cost. G2BVN, QTHR.

**Mains 800W generator,** brand new, £110, or swap Liner 2 with cash adj. G8BZN, QTHR. Tel 0455 35621.

**Garex Twomobile** a.m./fm tx/rx, comp with three xtals, spkr, aerial, purchased new, little-used, new cond, input 12V dc, ideal fixed station or mobile, £70, buyer collects. G3YLR, QTHR. Tel Bicester 41047 evenings.

**Heathkit gen cov rx GR78,** 200kHz–30MHz product detector and fitted fm discriminator, rechargeable battery, exc cond, £65. Would consider exchange Trio 9R59DE/DS with cash adjustment. G4BRX, QTHR.

**Eddystone 940** with plinth spkr, late model, showroom cond, £125, or exchange EC10 mk2 same cond with cash adjustment. Advance Voltstat; three dc motors, ⅙ hp, 200V; two aerial traps, offers. *Wanted:* Sig gen from 85kHz. G3FK, QTHR. Tel Breamore 436.

**B44 tx/rx,** vgc, suitable 4m, £7. Transformer 1,000-700-0-700-1,000V, 200mA, £5. G3YGM, QTHR.

**FM208,** 3 sets, all on same 2m channel, and fitted preamps, £20 each. G3YNC, QTHR. Tel 01-521 3008.

**Marine mf/hf solid-state exciter,** 1·5-25MHz, A1/A2/A3, with 35 2MHz HC6/U xtals, £25. Toyo monolithic xtal filter, pcb mounting, 21·4MHz ± 6kHz, 60dB ± 15kHz, £10. Bantex 160m helical whip, £8. 6LQ6 (2), £3. 6146B, £2.25. 6146, £1.50. G3JMJ, QTHR. Tel 073-271 3467.

**Codar AT5,** T28 ac/dc psu, remote control and cables, mint cond, £40. Trio JR310 160-10m, extra 10A2 filter, mint cond, £65. G3WFG, QTHR. Tel Broughton-in-Furness 340 after 6pm.

**"Radio Communication"** 1971-1974 inc, £5. TCS12 rx 1·5 to 12MHz, with mains psu, £10. Top band "Command" rx, £5. 6SK7/6V6 3W audio amp, £3. 7W (2 × ECL82 in u/l) audio amp, £7.50. Offers considered. G3TQB. Tel 061-483 7060 after 6.30pm.

**FT2FB 2m tx/rx,** 9 months old, little used, fitted 144·48, 145·00, ·500, ·525, ·550, ·575, R5, R6 & R7, c/w Jaybeam ¼ mobile whip, £110 ono. G8BPK, QTHR. Tel Aylesbury (0296) 630600.

**Creed 7B,** silence cover, spare carriage, FSY1·1 tu and psu, £20. 25W BCC low-band base station, wkg 4m, tx xtals, tunable rx, £10. BCC mobile 4m, mic with xtal, £6. Transistor 4m converter, £4. G3SJX, QTHR. Tel 01-656 9054.

**Atlas 180 mobile solid-state tx/rx,** mint, £240. Atlas broadband aerial balun, £12.50. *Wanted:* Osker swr bridge and FV101 vfo. G4DGM, 106 Goldthorn Hill, Wolverhampton.

**Heathkit HW32A 20m tx/rx,** including ac psu. HQ1 mini beam in original packing (unused). Offers please for either or both. Buyer to collect. K. M. Wells, 58 Allandale Road, Tunbridge Wells, Kent TN2 3TZ.

**Free furnished accommodation** in exchange for help with cooking etc, would probably suit young married couple, preferably licensed amateur, N.W.4 area. Tel 01-203 2539.

**FT501, FP501,** 10 months old, little-used, £370. G4CPJ, QTHR. Tel Newark 892301.

**FT250,** 13 months old, plus psu, valid reason for sale, £185 ono. QM70 2m 2W transverter, never used, £32. Western Electronics trap dipole 6 months old, £13. Will del 50 mile radius. Write S. Whittingham, 2 Bedford Street, Wolverton, Milton Keynes.

**TE15 gdo,** £12. Eagle swr meter, £5. Both as new, boxed. BC221, own charts, mains unit, £15. G8AEV 2W tx, mod, vfo, all assembled but unused, £10. Carriage extra. G4LA, QTHR. Tel Hexham 2734.

**FL2100,** one spare 572B, £150. IC-20 fitted nine channels, ¼λ G-whip, £85. 12V dc input PSUs, sae details. G5RP, QTHR. Tel East Hendred 384.

**FTDX 401,** ssb and cw filters, new mid-January 1975, little used, spare new 6KD6s, 6AH6, 6GK6, Lowe pulser tune-up device, £265, genuine reason for sale. Enquiries after 16 April. Burgis, 11 Morningside Avenue, Portchester, Fareham, Hants. Tel Portsmouth 812611 ext 102 (office).

**Ham-M rotator,** little-used, vgc. TW Phase-2 2m transverter 6·40A pa, mosfet preamp, mains psu. Collins TCS12 rx 1·5-12MHz, 240V. Offers, sae. *Wanted:* 2m ⅝λ, 70cm beam, why? Exchange above for 160, 144, 70cm tx/rx, why? G4BXD, QTHR.

**Command receivers,** one each 200kHz-550kHz and 1·5MHz-3·0MHz, £4 each, one TCS8, 1·5-12MHz, £7. *Wanted:* Xtal filter Kokusai MF45510CK. Martindale, 20 St Conans Road, Lochane, Dalmally, Argyll, PA33 1AL.

**HW32 20m tx/rx** with HP23 mains psu and Shure mic, comp station only £50. Vaneyken, Physics Dept, UCW Aberystwyth, Dyfed. Tel 0970 3111 (day).

**UR67 coax,** 50ft, new, £3.50. Comp HRO tuning assembly, dial, gearbox, t/gang, immaculate, £8.50. BC221 xtal, new, £3. Original Admiralty manual CT54 vtvm, £3. All plus postage. *Wanted:* Kokusai MF455-10K, HC/6U xtals, 7157kHz, 7197kHz, 9422kHz, crt 3WP7. G3GUU, QTHR.

**FTDX150,** mint, £140. AR88LF, chrome front, £30. TW Topmobile, 160 rx, £15. Pye Vanguard LB, boot mount, control box etc, £10. *Wanted:* British rx KW37, KW201 or similar, tx LG300 rf plus psu, DX40 or similar. G3RJF, QTHR. Tel 0622 43767 after 6pm.

**Electroniques GC166** rf assembly, 5-460kHz, type S3D1 i.f. transformers, 2 Eddystone 898 dials, £30. Creed 75R, £15. Tel Mellor 3182

**Telford TC7 mk2 rx,** Microwave 2m converter, also bandsearcher, mint, £45. Heathkit HA202 2m, FM40W amplifier, wkg with manual, little-used, £25. Reslo mic type VMC and table stand, £5. G8FRE, QTHR. Tel 01-894 1244.

**Pye Ranger,** 144 a.m./cw, 3/20 pa, with 240V psu and four tx xtals, £12. BC348 rx, S-meter, incl dc converter supply, £15. 144-28MHz mosfet converter comp, special VK design, £6. 29-3MHz Oscar converter, only £3. Ex-G4DJV. Tel Peter 01-504 4984.

**DX100-U,** perfect cond and wkg order, £30 ono. Also HRO, good cond, 8 coils, bandspread 80, 40, 20, 10, £20 ono. Buyer collects over 20 miles. G3KUG, QTHR.

**Microwave Modules 5W a.m. transistor tx** with four xtals and cw facility, £18. Sentinel 2m converter, 28-30MHz i.f., £10. Alternatively, £25 the pair. *Wanted:* Joystick VFA. G3ZOG, QTHR. Tel Sunderland 280080 between 6-8pm.

**145MHz station:** 100W tx inc vxo, xtals, psu, mod EC10 rx, Sentinel conv (2-4MHz i.f.), offers around £70 or will split. Prefer buyer collects. G8DEA, QTHR. Tel Sheffield 395555.

**FL200 ssb tx,** good cond, plus few spares, can demonstrate, £70 ono. G4AXD, QTHR. Tel W. Malling 841021.

**National NCX-5 mk2 tx/rx** and companion NCX-A psu/ls console. Digital read-out, comp five-band ssb/cw rig, exc cond, £160. Set of six brand-new RCA valves for AR85161L, £5. GW3JUV, 25 West Road, Bridgend, Glamorgan. Tel 0656 3875.

**Electroniques gen cov transistorized coilpack,** unused, with datasheets, £16. Heavy-duty transistorized psu for tx, 450V from 24V, new, £4. G3WIF, QTHR. Tel Bristol 293738.

**Pye Vanguard AM25T** (with fully-transistorised rx), xtals 70·26, remote controller, mic, spkr, cables, ¼ whip and handbook, 100 per cent wkg, £25. Heath HP13A dc psu, £25. G4BDW, 69 Halifax Crescent, Sculthorpe, Fakenham, Norfolk. Tel East Rudham 464.

**Yaesu FL2500 linear,** 160-10m 2kW, mint, £120 ono. DL8TM digital frequency counter, 220MHz prescaler, dual-input preamp, psu, 200kHz locking rx, kit, £65. MF455 mechanical filter, lsb xtal, £7.50. Six PL509 valves plus bases, £4. G4CCZ. Tel Walton 42381 evenings.

**Drake R4B,** plus 160m, exc cond, £150. *Wanted:* Johnson transmitting capacitor, also large rotary inductance. G3MPN, QTHR. Tel Wymondham 3382.

**Eddystone 770R rx,** 19-174MHz with handbook, will del reasonable distance, £50. G3VGW, QTHR. Tel Derby 672245.

## WANTED

**XF9-A or similar 9MHz filter,** with or without carrier xtals. Shepherd, 59 Lime Avenue, Camberley, Surrey.

**KW77 or FR100B Sommerkamp rx** or equivalent, first-class cond essential, willing to collect within say 50 miles London, will not haggle for a good model. G3GNL, QTHR. Tel 01-462 3287 evenings,

**Good general cov ex-gov rx,** in good cond, AR88D, B40, CR150 etc. Also small rotator AR30 or similar. G4ANW, 21 The Esplanade. Burnham-on-Sea, Somerset.

**Heath or KW Monitorscope** or similar, price and details to G8LD, QTHR or tel Leics 832969.

**Detector, amp and master indicator** for CL2 Gyrosyn compass, G3YPS, QTHR.

**Voight corner horn,** Hartley Turner and very old spkrs, rx, tx valves, components, pre-war radio books, magazines, catalogues, service sheets (wanted for museum archives and research purposes), collection arranged. G3KPO. Alverstone Manor Hotel, Shanklin, IOW. Tel (098386) 2586.

**Private enthusiast** wants for spares and/or restoration old tape recorders, comp or otherwise, eg Ferrograph, Brennell, Telefunken, Vortexion etc, or anything interesting, also old unwanted service manuals and data etc. Tel Stroud (04536) 3773 (Gloucestershire).

**Kokusai mechanical filter** type MF455-15K. G3WSH, QTHR. Tel Eastbourne 26630.

**Tx/rx suitable for club** (G3TAD), 80m-10m, with or without 160m, will pay up to around £200, any offers to Robert, 0272 834776 evenings.

**FLDX400,** fair price paid. Details H. R. Christopher, 1 Woodland Avenue, Goole, North Humberside DN14 6QT. Tel Goole 3182 evenings only.

**KW Valiant** or Johnson Navigator, cond and price to GM3OWI, QTHR.

**FV200 Yaesu vfo,** £20 offered. G3NXD, QTHR. Tel 0562-850570.

**Good price offered** for *QST* January 1968 to present day, *Ham Radio* January 1968-July 1969, November 1969-December 1970, December 1971-August 1972, circuit T4188 tx unit. G3NXT, QTHR.

**Pye Bantam** or other low-band a.m. hand portable, also mobile or hand portable for high-band fm, and any control gear for Pye Cambridge or Vanguard. Cook, 26 Thames Close, Chertsey, Surrey. Tel 01-891 0081 (office) or home Chertsey 61393 (evenings/weekends).

**Pye Westminster** or Motofone high-band a.m. G3XAC, QTHR.

**Heathkit SB610 monitor,** Heathkit HM-2103 wattmeter, Yaesu YC355 or similar, LM type wavemeter, good gdo, Lafayette/Trio "precon" converter. Mogford, 27 Ynysmaerdy Road, Briton Ferry, Neath, Glamorgan.

**FL200B tx,** HQ1 minibeam or similar, will collect reasonable distance. G3OCA. 1 Chesterton Road, Spondon, Derby DE2 7EN. Tel Derby 62818.

**Electroniques front end,** gc or hb transistor with i.f. strip. 15m beam. G3WKF, QTHR.

**EB144G manual,** also any other information on the TF144G signal generator. Willing to purchase or borrow and photo. David Knight, 56 Windermere Avenue, Hullbridge, Essex. Tel Southend-on-Sea 230820.

**R1475 and psu,** mint or good cond, your price paid. Bennett, 1 Whitehaven Road, Bramhall, Stockport, Cheshire SK7 1EL. Tel 061-439 1346.

**Cambridges, AM10D** hi-band wanted for local net. G3SLI, 13 Holden Park Road, Southborough, Tunbridge Wells, Kent TN4 0ET. Tel Tunbridge Wells 37563.

**Collins type 490-T atu** (also known as CU1658). G3UFZ, QTHR. Tel Bishop's Stortford (0279) 723088.

**DC psu for KW2000A.** G3VHA, QTHR.

**B4F valve bases** for large CV4049GD mercury-vapour thyratrons. State condition and price, all letters answered. GM3WFJ, QTHR.

**BC221,** preferably with charts. R. D. Hunt, 9 Cemmaes Court Road, Hemel Hempstead, Herts.

**Eddystone 730/4** or 940 or similar rx. *For sale:* scope tube VCR138A with base, £1. Scope chassis 50Hz with VCR139A, £1.50. Cooper, 45 Nightingale Crescent, Harmans Water, Bracknell, Berks. Tel Bracknell 54168.

**Loudhailer-type spkr,** preferably 8Ω impedance. G8DPS, QTHR. Tel 01-337 2712 evenings.

**HRO,** old type with round i.f.s and 2·5V valves, pre-war vintage. G3FKM, QTHR.

**FL2100 linear** (not "B" model), offers with price. GM3VCM, QTHR. Tel Helensburgh 3916.

**XF9C** or similar cw filter. *For sale:* HA350 rx, £35. Buyer collects. G3PLP, QTHR. Tel 021-744 3187.

**VFO-5 unit** for TS500, in good cond. G3FMO, QTHR. Tel Chelmsford 71604.

**Slow-scan 5FP7 crt** and AR88D manual. G4CTR, 188 Sandbanks Road, Poole, Dorset. Tel Castle Hill (02014) 2009.

**Plug-in elements** for model 43 Bird "Thruline" wattmeter. Tel Fred May, 01-985 2277 (daytime).

**KW2000 NCX5** or similar hf band tx/rx, any cond suitable for rebuild, reqd for oap so must be cheap. G3MOT, QTHR. Tel Shipton-under-Wychwood 830640.

**Linear:** KW600, KW1000 or SB200 etc, hf bands, must be in good cond. G3UOL, QTHR. Tel Coventry 414684.

**Short loan of August 1974 "CQ-DL"** or full details of DL9's sstv etc filter preferably translated. Also sources of 5FP7s. G3WW, QTHR.

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| 145·500MHz S20 | 44·9333 | 10·3603 |
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PRICE **£2.86**

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| | |
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**COMING SOON**

IC201 ssb/fm 144MHz fully tunable transceiver.

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| 75Ω low loss cable per metre | 15p |
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**The IC-225** has all the advantages of the IC-22 but has no less than 80 channels fitted as supplied. These include all the repeater channels and all frequencies from 144·00 to 145·975-MHz in 25kHz steps. We can supply a crystal for 144·48 or any other frequency which does not fit into the 25kHz channel system, one for reverse repeater operation, or even a VFO (if you don't feel like having a go at building one) to operate on both transmit and receive. It costs £195 + VAT but there are no more crystals to buy to give you 80 channel operation. The VFO costs **£42** plus VAT.

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**DAVE G8ELP** **PAUL G3VJF**

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**BELCOM (exc. VAT)**

| | |
|---|---|
| Liner 2 | **£145.00** |
| 100W amp | **£165.00** |

**SWAN**
700cx **£395.00**

**SWR METERS (inc VAT)**

| | |
|---|---|
| Single meter | **£6.00** |
| Twin meter | **£11.00** |
| SWR 3 | **£7.00** |
| SWR 4 | **£7.00** |
| FS 1 | **£3.80** |

**SECOND HAND**

| | |
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| FV 50B | **£25.00** |
| BRT 400 Rx | **£50.00** |
| FR 50B | **£60.00** |
| BC 348 rebuilt | **£25.00** |

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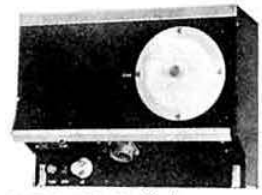

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(Also known as CU1658 and CU1669)

**ARC-51 Control Box**

**ARC-51 Transceiver**

**618-T Transceiver**
(Also known as MRC95, ARC94, ARC102, or VC102)

Highest price paid for these units. Parts purchased. We will trade for new amateur gear. GRC106 and PRC74 also required. **Contact Ted, W2KUW, or write:**

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| | | |
|---|---|---|
| 4 element yagi | £7.34 | (£1) |
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| 8Y/2m yagi 8 element | £6.05 | (1.00) |
| 10Y/2m yagi 10 element | £11.88 | (1.00) |
| PBM14/2m parabeam | £18.25 | (1.25) |
| D5/2m slot fed yagi | £8.56 | (1.00) |
| D8/2m slot fed yagi | £11.24 | (1.00) |
| 5XY/2m 5 el. crossed yagi | £8.86 | (1.00) |
| 8XY/2m 8 el. crossed yagi | £11.03 | (1.00) |
| 10XY/2m 10 el. crossed yagi | £15.23 | (1.25) |
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| HM/2m Halo with mast | £2.38 | (75p) |
| D8/70cm slot fed yagi | £9.72 | (1.00) |
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| 12XY/70cm 12 el. crossed yagi | £18.04 | (1.00) |

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### MFJ PRODUCTS (USA)

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| CWF-2BX boxed cw audio filter | £13.95 | (25p) |
| SBF-2BX boxed ssb audio filter | £14.58 | (25p) |
| CWF-2 unboxed sw filter | £9 | (25p) |
| CWF-3 unboxed cw filter | £5 | (25p) |
| 100BX 100/50/25kHz boxed calib. | £11.50 | (25p) |
| MFJ-100 calibrator unboxed | £9.35 | (25p) |
| MFJ-100 calibrator less xtal | £11.50 | (25p) |
| CMOS Electronic keyer with monitor | £21.06 | (25p) |

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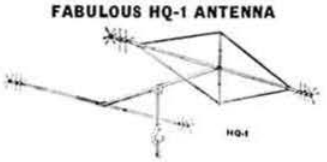
**FABULOUS HQ-1 ANTENNA**




10–15–20m 1200W p.e.p.
Weight 15lb Turning radius 6ft 2in
Still only **£54** but hurry!

**NEWS FLASH!** G4DML in 1975 CQ contest worked no less than 89 countries in one weekend using FT101 plus HQ-1 mini-beam (ask about a special package deal!) including VK, ZS2, A2, FY0, CR6, TJ, PY, VU, ZL, YV, KP4, VP2, LU, OA, CE0, PJ9, KG4, VP9 etc. This superb piece of American engineering is protected by World patents and now enables the operator with a small garden to compete on the DX bands. Order your HQ-1 now.

### MINI-PRODUCTS "MINI-BEAMS" (USA)

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|---|---|---|
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| B24 2 element yagi 10–15–20m | £42.12 | (1.50) |
| RK3 reflector element for B24 | £27.00 | (1.50) |
| C4 vertical dipole 10–15–20m | £24.30 | (1.30) |

### HY-GAIN ANTENNAS

| | | |
|---|---|---|
| 12AVQ 10–20m self supporting | £20.00 | (1.50) |
| 14AVQ 10–40m self supporting | £30.00 | (1.50) |
| 18AVT/WB 10–80m self supporting | £44.00 | (2.00) |

### MOBILE ANTENNAS

| | | |
|---|---|---|
| G-Whip tribander 10–15–20m | £13.28 | (75p) |
| Multimobile 10–15–20m | £15.44 | (75p) |
| Basemount | £2.00 | (15p) |
| Extra coils | £4.43 | (15p) |
| Flexiwhip basic 10m with base | £10.26 | (75p) |

Antenna specialists VHF antennas:

| | | |
|---|---|---|
| 4 metre ¼ wave whip | £4.60 | (75p) |
| 2 metre ¼ wave whip | £3.50 | (75p) |
| 2 metre 5/8th whip | £8.65 | (75p) |
| 2 metre dexluxe 5/8th whip | £17.28 | (75p) |
| Jaybeam 5/8th whip | £7.50 | (75p) |

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AR30 **£27.00** (75p) AR40 **£32.00** (75p) CDE 44 **£64.80** (1.00)

STOLLE:

2010 **£33.48** (75p) 2030 **£37.80** (75p)

CABLE

5 core round **18p** yd (1p) 5 core flat **15p** yd (1p)

### ANTENNA FEEDERS

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

### COAX FITTINGS

| | | |
|---|---|---|
| PL259 coax plugs | 42p | (5p) |
| Reducers | 15p | (1p) |
| Belling male coax plug | 12p | (1p) |
| Belling female plug | 18p | (1p) |
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|---|---|---|
| NEW! 70cm transverter 28/70cm | £67.00 | (50p) |
| 2m converters 2–4/4–6/28–30 | £16.42 | (25p) |
| 4m converter 28–28·7 | £16.42 | (25p) |
| 70cm converters 28–30/144–146 | £19.55 | (25p) |
| 2m pre amp | £9.72 | (25p) |
| 1296MHz converter 28–30 | £25.92 | (25p) |
| 2m converter 28–30/116 osc. o/p | £17.60 | (25p) |

### SOLID STATE MODULES

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|---|---|---|
| 2m or 4m Europa B | £88.00 | (1.00) |
| As above less valves | £74.00 | (1.00) |
| Matching power supply | £34.00 | (1.00) |
| 2m converter 2–4/4–6/28–30 | £16.20 | (25p) |
| 70cm converter 144–146 | £16.20 | (25p) |
| 2m pre amp | £9.72 | (25p) |
| PA3 pre amp | £5.94 | (25p) |
| 70cm pre amp | £9.72 | (25p) |

### TESTED TRADE-INS

| | | |
|---|---|---|
| FT501 plus psu 6 months old, mint | £359.00 | (n/c) |
| Eddystone 830/7 8 months old, mint | £395.00 | (n/c) |
| Heath RA1 + calib. + spkr + Burns FM det. | £45.00 | (cost) |
| Drake SPR4 receiver brand new | £279.00 | (n/c) |
| Europa 2m transverter with valves | £65.00 | (1.00) |
| Europa 4m transverter with valves | £60.00 | (1.00) |
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**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 **£22.68** (30p) it's a bargain with the famous Shure 444 mic at **£35** the two units, it's unbeatable! Order yours now and save money.

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| Shure 444 | £13.95 | (45p) |
| Yaesu YD844 | £16.12 | (30p) |

### YAESU EQUIPMENT (ex VAT)

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|---|---|---|
| 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 | | (n/c) |
| SP401 matching speaker | | (1.00) |
| FT200 80–10m transceiver | £170.00 | (n/c) |
| FP200 matching spkr./AC supply | £45.00 | (1.00) |
| FT220 2m SSB/FM tcvr. 240/12V | £264.00 | (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) |

### SWAN EQUIPMENT (ex VAT)

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|---|---|---|
| 700cx transceiver plus psu | £395.00 | (n/c) |
| 700cx/ss16 transceiver plus psu | £435.00 | (n/c) |
| Remote vfo unit | £99.00 | (n/c) |
| Vox unit | £25.00 | (n/c) |

### BELCOM

| | | |
|---|---|---|
| Liner 2 2m SSB tcvr 10W p.e.p. o/p | £156.00 | |

### TRIO

| | | |
|---|---|---|
| QR666 receiver 160–10m plus general coverage 230V/12V | £140.00 | (n/c) |
| Matching xtal calibrator | £9.50 | (25p) |

### LOWE ELECTRONICS

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| 2m FM 6ch. monitor receiver | £19.95 | (50p) |
| 'xtals 145/5/525/55/repeaters | £1.50 | (5p) |

### TONEBURST MODULES

| | | |
|---|---|---|
| Dual 1700 & 1750Hz o/p | £3.95 | (15p) |

### STATION ACCESSORIES

| | | |
|---|---|---|
| SWR metre 160–2m | £7.50 | (35p) |
| SWR metre plus power metre 160–2m | £11.50 | (35p) |
| Baluns 1kW 75 ohm | £4.95 | (25p) |
| Baluns 1kW 50 ohm | £4.95 | (25p) |
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| Dipole centre insulator SO259 | £1.75 | (20p) |
| Wightraps 1kW pair | £4.60 | (35p) |
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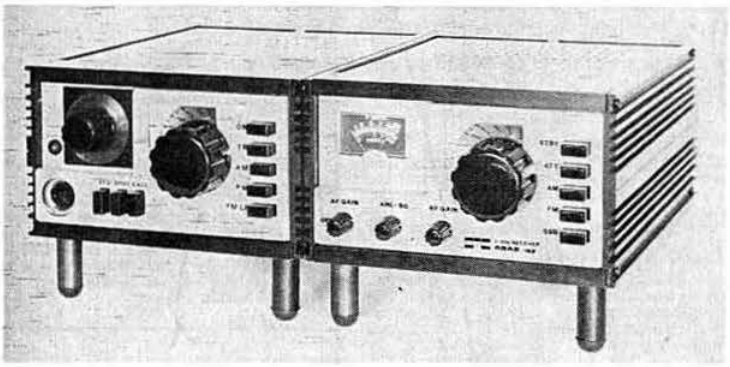

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| FR101D Receiver | £356.40 |
| FT200 Transceiver | £232.20 |
| FL2100B Linear | £205.20 |
| YC355 Frequency Counter | £137.00 |
| FT220 VHF Transceiver | £291.00 |

**BELCOM**

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| 100 watt 2m Linear | £172.00 |

**Hy-Gain**

| | |
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| 14AVT/WB 1- to 40m Vertical | £31.91 |
| 18AVT/WB 10 to 80m Vertical | £45.86 |
| BN86 Balun | £10.26 |
| TH3MK/ Tribander Beam | £97.74 |

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| 432MHz Converter | £19.55 |
| 432 Varactor Tripler | £18.90 |
| 144MHz Dual Outpu pre-amp | £9.72 |

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| 300B Transceiver | £307.00 |
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| MB80 Transceiver | £194.40 |
| SS-200A Transceiver | £538.00 |
| TB-4HA 4 Element Tribander | £135.00 |

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| AR30 ,, 65p | £27.00 |
| AR40 ,, 65p | £32.40 |
| CD44 ,, 75p | £64.80 |
| HAM 2 (post £1.00) | £97.20 |
| Stolle Automatic | £33.48 |
| Stolle Multimatic | £37.80 |

**Barlow Wadley**

| | |
|---|---|
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| TR801 FM Tuner | £17.15 |

**DRAKE**

| | |
|---|---|
| TR4C Transceiver and AC PSU | £349.92 |

**MICROPHONES** (post free)

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| Yaesu 844 Desk Microphone | £16.12 |
| Yaesu 846 Hand Microphone | £6.30 |
| Shure 201 Hand Microphone | £7.00 |
| Shure 444 Desk Microphone | £16.00 |
| Shure 444T Desk Microphone | £16.50 |
| Electro Voice 729 Desk | £13.50 |

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| KW Linear Amplifier | £198.18 |
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| KW109 Matching Unit | £17.72 |
| KW Monitorscope | £95.04 |
| KW160M Antenna Match | £20.05 |
| KW E-Z Match | £24.41 |
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**Solid State Modules**

| | |
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| 2m FET Pre-Amp | £7.31 |
| Europa Transverter | £88.00 |

**Accessories**

| | |
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| Single Meter SWR Bridge | £6.60 |
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| Dipole "T" Pieces | 28p |
| PL259 Plugs 42p SO259 Skts | 40p |
| Cable reducers | 14p |
| 300 & 75 ohm twin feeder | 8p yd |
| UR43 16p yd UR67 40p yd | |
| Omega Noise Bridge TE702 | £22.00 |
| Omega Noise Bridge TE701 | £14.75 |
| Morse Practice Oscillators | £2.75 |
| MF100 Audio Generator | £22.00 |
| Planet 808 Speech Compressor | £32.39 |

**Electronic Developments**

| | |
|---|---|
| 2m and 4m Transvertors | £95.00 |

**Secondhand Equipment**

| | |
|---|---|
| Racall RA17 Mk2 Receiver | £325.00 |
| Eddystone 940 Receiver | £140.00 |
| IC21XT 2m FM Transceiver and VFO | £165.00 |
| FR50B & FL50B | £150.00 |
| Trio JR500 Receiver | £50.00 |
| KW202 Receiver | £150.00 |
| RCA AR88D (Buyer Collects) | £50.00 |
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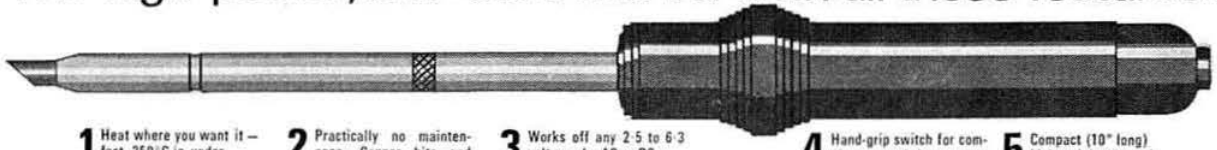

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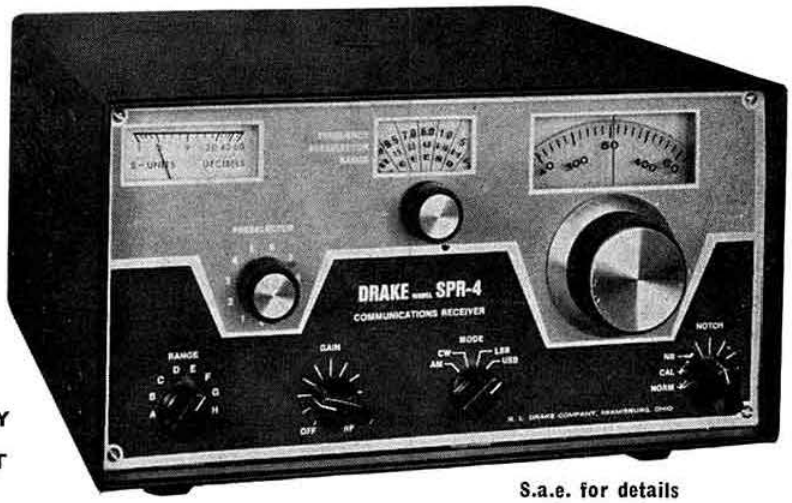


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*Full Range of Accessories—Matching Speaker, Noise Blanker, Loop Antenna, etc.*

**SPECIFICATIONS**

| | |
|---|---|
| **Frequency Coverage** | Can be programmed with accessory crystals for 23 ranges (each tuning a 500kHz band) from 0·5 to 30MHz plus 150 to 500kHz. Crystals supplied with the receiver allow coverage on these ranges: 150-500kHz, 0·5-1·0MHz, 1·0-1·6MHz*, 6·0-6·5MHz, 7·0-7·5MHz, 9·5-10MHz, 11·5-12 MHz, 15-15·5MHz, 17·5-18MHz, 21·5-22MHz. |
| **Modes of Operation** | AM, CW, LSB, USB, (RTTY with RY-4 accessory installed) |
| **Selectivity** | AM: 4·8kHz @ -6dB, 10kHz @ -60dB<br>SSB: 2·4kHz @ -6dB, 7·2kHz @ -60dB<br>CW: 0·4kHz @ -6dB, 2·7kHz @ -60dB |
| **Intermediate Frequencies** | 1st IF 5645kHz four pole crystal lattice filter, 2nd IF 50kHz four pole Hi-Q Ferrite LC filter. |
| **Frequency Stability** | At room temperature, drift for all causes (including ± 10% change in supply voltage) is less than ± 100Hz. |
| * Generous overtravel gives additional 50kHz or more off each end of range. | |
| **Sensitivity** | SSB and CW: 0·25microvolt for 10dB $\frac{S+N}{N}$. AM: 0·5microvolt with 30% modulation for 10dB $\frac{S+N}{N}$ |
| **Calibration** | Dial is accurate to better than ± 1kHz when calibrated at nearest 100kHz calibration point. |
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**CONVERTERS** 2 metres, 4 metres, 70cm, Satellite Band (136–138MHz), Marine Band from stock. Other frequencies to order.

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

★ N.F. 2dB. Gain 30dB.
★ Dual gate MOSFETS in RF and MIXER stages.
★ No oscillator frequency multiplication.
★ 2 metre IFs: 28–30MHz, 2–4MHz, 4–6MHz.
★ 4 metre IF: 28–28·7MHz.
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★ Price only **£16.20.** Ex 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 IFs: 2–4MHz, 4–6MHz, 28–30MHz. Price: **£21.06.** Ex stock.

**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: **£11.00.** IF it doesn't work, send it back with £2.00 and we will fix it for you.

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**SM 70 FET CONVERTER**

★ IF output 144–146MHz. Noise figure 3·5dB. Gain 30db.
★ Size: 2½" × 3" × 1½".
★ By using the SM70 with your 2 metre receiver you get excellent 70cms receiving performance for only **£16.20.** Ex stock.

**EUROPA 70CM FET RECEIVE CONVERTER.** Can be used as a receive converter on its own or in conjunction with our Europa transmit converter for transmit operation as well.

★ IF output 28–30MHz. Noise figure 3.5dB. Gain 30dB.
★ Two FET RF amplifiers and FET mixer.
★ Oscillator chain uses a 101MHz crystal with oscillator output socket to drive the Europa 70 transmit converter.
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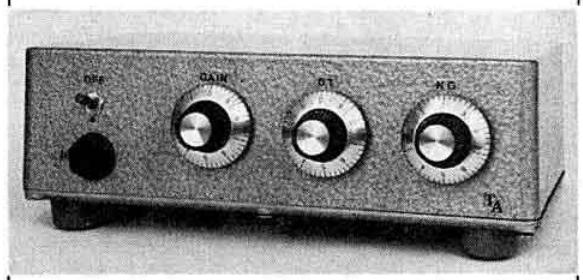


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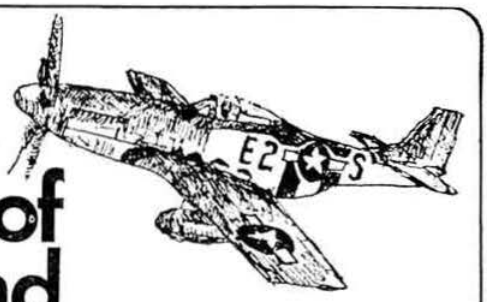

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**Price: kit £5.50 + VAT M&T £6.55 + VAT**

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This module converts the output of a teleprinter keyboard into two audio tones with a common mark of 2125Hz. Space frequency is 2295Hz (narrow) and 2975Hz (wide). Output level is 1 volt p-p sinewave and dc supply 9-15 volts. CW Indent facility. PCB dimensions 2 × 4 inches.
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Single stage MOSFET preamp with screened tuned input and output, provides 16dB of stable gain and 3dB noise figure. Features AGC point and various methods of interconnection to current rigs. Available for 28/50/70/144MHz (specify). PCB dimensions 1·5 × 1·7 inches, DC supply 9-15 volts.
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Crystal oscillator: 116MHz (zenered)
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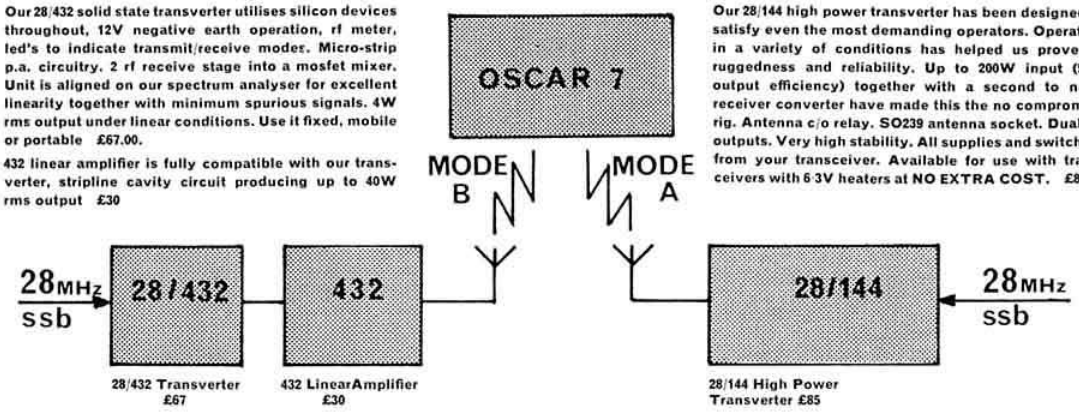


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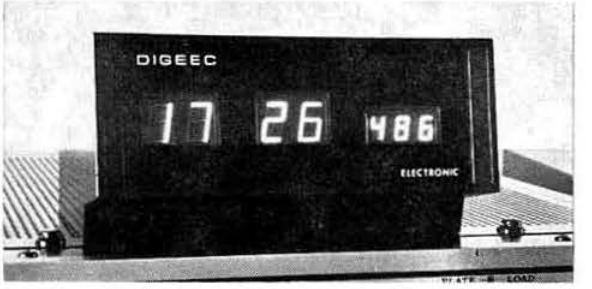


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220mfd at 35V, **5 for 75p.**
330mfd at 35V, **5 for 95p.**

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