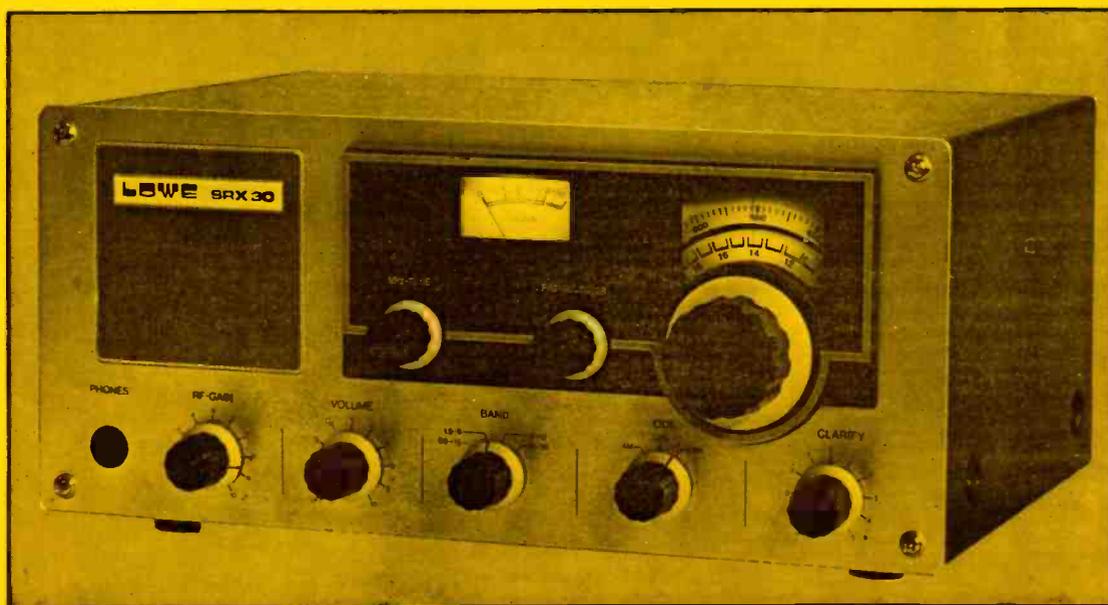


# The SHORT WAVE Magazine

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NUMBER 7



## SRX-30

For the advanced, keen short wave listener, the choice of receiver has usually been between cheap and nasty or very good but very expensive equipment. We think that the SRX-30 will provide that listener with excellent performance at a reasonable cost and is the answer to this eternal problem.

The SRX-30 provides AM, CW, USB and LSB reception on all frequencies from 500 kHz to 30 MHz. All right, so does your Sooper Blooper Mk. 3 but you can't set the Sooper Blooper dial to the frequency you want and be sure that it's correct!

The SRX-30 tuning system is so simple to operate. You have a dial reading in MHz from 0-29 and a main tuning dial reading 0-1000 kHz. So—if you know that Radio Slobovia is broadcasting on 10.295 MHz, you set the MHz dial to 10, the kHz dial to 295 and there you are. The MHz dial setting is not critical, as stability is guaranteed by a triple mixing drift cancelling system, thereby overcoming another problem in your Sooper Blooper Mk. 3; drift.

A further drawback to cheap receivers is massive image interference on the higher frequencies due to the use of a low IF, typically 455 kHz. The cure for this problem is the use of a high IF and the SRX-30 employs a first IF of around 40 MHz—so goodbye to first IF images. You could of course find the same system as this in the Racal RA17

series receivers: after all, the SRX-30 has copied the basic idea from this very receiver. The big drawback to the RA17 (apart from the price !!) is that unless you have the muscles of a prize fighter, lifting the RA17 may send you for a holiday at Hernia Bay (staying at the Truss House?).

To summarise, the SRX-30 covers 500 kHz to 30 MHz with excellent dial readout and reset accuracy; it has all mode (AM, CW, SSB) reception and is equally at home in broadcast or amateur bands; it has all the facilities of a top class communications receiver, RF gain, fine tuning, selectable sidebands, built in loudspeaker, operation from ac mains or 12v. Dc, rugged construction and super styling and all at an attractive price—£158.00 inc. VAT.

See it soon at your nearest stockist, you will be agreeably impressed.

SRX-30—£158.00 inc. VAT.

Carriage £3

**LOWE ELECTRONICS**  
Cavendish Road,  
Matlock,  
Derbyshire

# TS520S

## Setting new standards in 6 band transceivers



### TS520S

The TS520 from Trio was, as we expected, an outstanding success and many thousands are now in use around the world. Following the Trio practice of listening to suggestions and comments from users of the equipment, the TS520 was updated and appears as the TS520S. All accessories such as the TV502, WFO520 and SP520 are fully compatible with both models so there is no obsolescence. Major new features in the TS520S are:

Full band coverage from 160-10 metres with WWV at 15 MHz and a most important uncommitted band which will be used following any expansion or modification of amateur HF bands at WARC in 1979. This provision is typical of Trio advanced planning. Now that LORAN has finally gone from 160 metres, a whole new area of operation has opened up for the amateur and the TS520S gives you top performance for top band.

New speech processor using the latest audio compression techniques to give you extra signal punch when in the pile up but without introducing any clipping or distortion. The compressor can be put into use instantly by front panel switching.

Advanced noise blanker is built into the TS520S for virtual elimination of impulse interference such as ignition noise. The TS520S also incorporates the 35K35 dual gate MOSFET in the RF amplifier for outstanding cross modulation and spurious response characteristics. The 35K35 has a low noise figure (3.5 dB typ) and high gain (18dB typ) which contributes to the excellent receiver performance—less than 0.2µV required for 10dB S/N ratio on all bands. When the signal levels are exceptionally high, a 20dB attenuator can be inserted at the touch of a push button.

Razor sharp selectivity resulting from the use of an 8 pole HF crystal filter with 2.4 kHz bandwidth and better than 2:1 shape factor.

Skirt selectivity and ultimate stop band rejection are outstanding. Dual gate MOSFET devices in all receiver IF stages give first class AGC characteristics with no overloading or popping on speech peaks. The AGC has swiftable time constant and can also be turned off for the keen CW operator.

A matching 8 pole 500 Hz CW filter is available and can be fitted by the set owner in a few minutes. This filter gives the CW operator really excellent selectivity with stop band rejection of a very high order.

Multi function metering of signal strength, ALC level, PA input current, RF output and HT voltage to the PA not only keeps the operator informed about the performance of the rig, but also allows instant calculation of power input. A built in low noise cooling fan keeps cabinet temperature very low, even over extended operating periods. Break in CW with keyed sidetone and an advanced VOX system give easy control at all times.

Tuning up the TS520S is simple and fuss free due to the provision of a lower power tune up facility. No need to worry about the crackling noises which are often apparent in transmitters using line output tubes; rugged 6146B tetrodes in the 520S give high power output with very low intermod products—in fact, the Trio TS520 series transceivers have always sounded outstandingly good on the air due to this fact.

The TS520S has all the features desirable in a high quality transceiver—RIT control, 25 kHz calibrator; separate mic gain and carrier level controls; built in speaker; power saving heater switch; provision for up to 4 fixed channels; all connector provision for linear and transverter control and many, many more.

Ask anyone about the TS520S, all reports are the same—it's the best around.



### DG-5

The luxury of digital readout is available on your TS520S by connecting the new DG-5 readout unit. More than just the average readout system, the DG-5 mixes the carrier, VFO and heterodyne oscillator outputs to show your exact frequency at all times in all modes. This handsome accessory can sit on the TS520S for in-shack use... or on the dashboard during mobile operation for safety and convenience. Six bold digits display your operating frequency, and the digital hold switch serves as a memory.

Unique feature—the DG-5 can be used as a general purpose counter reading signals from 100 Hz to over 50 MHz so it's more than just a readout system.

N.B.—The DG-5 can be fitted to earlier TS520 models by using the adaptor kit DK-520.

TS520S £525 inc. VAT

DG-5 £134 inc. VAT

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## TRIO TS700S

### NEW TS700S. 2 metre all mode transceiver

The TS700S is intended to be top of the line in 2 metre multi mode stations. Building on the solid foundation of the TS700G with its outstanding signal quality and unbeatable receiver dynamic range. TRIO have now incorporated all the facilities which customers have expressed a wish to see in the 700 series. Main new features are:

#### Digital readout

Built into the rig and using the same easy on the eye blue/green readout tube as the TS820. The counter is a complete frequency measuring system and incorporates the VFO and carrier oscillator frequencies to measure the CW transmit/receive shift as well as USB/LSB shift. The display reads to 100 Hz on SSB and CW but is automatically rounded off to the nearest 1 kHz on FM—However—if you insist on reading to 100Hz, the touch of a switch restores this facility on FM also.

#### Smooth accurate tuning

Using the new dual ratio gearbox with flywheel action for fast band scanning. It is true to say that nothing compares with a real VFO backed up by first class mechanical engineering, when it comes to pin point accurate tuning of SSB and CW.

#### Receiver pre amplifier

The TS700S is fitted with a low noise receiver pre amplifier with carefully calculated gain figures to give that extra performance when digging into the noise for real DX. When signal levels are high, simply remove the pre amplifier at the touch of a front panel switch.

#### Vox operation

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

#### High/low power

A front panel button allows instant selection of high power or a nominal 1 watt low power transmitter output.

#### Split frequency working

Using the new external VFO unit VFO/700S. The frequency of the external VFO is checked by the digital readout on the TS700S. A press switch on the VFO allows instant frequency checking at any time and any frequency split or full transceiver operation can be carried out using external VFO. A unique accessory for the VHF operator.

### New standards of performance

On the samples which we have checked, the 10dB S/N ratio sensitivity is around 0.15  $\mu$ V on SSB and the 20dB quieting level is less than 0.2  $\mu$ V on FM. This gives the TS700S a real lead over any other rig around. Plus of course all the features which make the 700 series so outstanding. Remember the signal quality resulting from the use of a high supply voltage on the PA and driver giving unbeaten linearity (TRIO patent). Remember the rugged, go anywhere construction which makes the 700 series so popular on expeditions and field days. Remember the all mode (AM, FM, USB, LSB, CW) operation—not all rigs have them. Remember the Simplex/Repeater/Reverse repeater operation available at the turn of a switch.

Finally, remember the combined reputations of TRIO and Low Electronics and you will agree with us that for the ultimate 2 metre all mode station it has to be the TS700S.

TS700S £580 inc. VAT

VFO70S £89 inc. VAT



### TR2200GX

TR2200GX, £142 (3 ch.) £172 (12 ch.) inc. VAT

This is the definitive 2 metre FM portable rig which has won praise from all over the world. Over 2W transmitter output with switched reduction to 400mW for local contacts. High gain receiver with double IF filtering at 10.7 MHz and 455 kHz for razor sharp selectivity. The TR2200GX is supplied with all accessories including the battery charger for the optional Nicad battery pack, the removable telescopic antenna, the carrying case, the shoulder strap, external power lead, microphone and handbook. Fitted with 12 channels, the price is only £172 inc. VAT. If you wish to start out at a lower price, we can supply the rig fitted 3 channels for only £142. With all its performance, the TR2200GX is a must for the portable operator. At the price, it has to be the best around. Just look around at the next rally and see how many operators are carrying them.

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Sim GM3SAN. 19 Ellismuir Road, Baillieston, Nr. Glasgow. Telephone: 041-771 0364.  
Alan—GW3YSA. 35 Pen Y Waun, Efail Isaf, Pontypridd, Glamorgan. Telephone: Newtown Llantwit 3809.

# LOWE ELECTRONICS LTD

## NEWS SHEET

So many good things are constantly being added to our stock list that it's difficult to keep track (and even more difficult to find advertising space in magazines). We decided to produce this news sheet to give you brief details of several interesting new lines. If you need more information, simply give us a ring or see us at one of the many rallies which we attend—and so to the goodies, large and small.

### HONEST COUNTER FC-5M



I don't know where the name came from since you can hardly have a dishonest frequency counter but we thought that this was an outstanding amateur accessory. It is a five digit frequency counter requiring 12v. DC (or 5v. if available) for power, and reading to 50 MHz. As an additional feature, the FC-5M has a 455 kHz offset which allows you to hang it on to the oscillator of your 9R59 (or whatever) and have digital readout. Two major points in its favour: (1) The size—look at the hand and (2) The price—

would you believe £38 including VAT. A real toolbox item and almost as cheap as a secondhand BC221! (Postage 36p extra).

### TRESTA HAM CLOCK



Ever tried to find a digital clock for the shack? Yes, plenty with 12 hour readout but the one which we are offering is 24 hour, has two time zone settings, alarm, stop watch facilities, is a quartz controlled device for accuracy and runs completely for a small 1.5v. dry cell—and it's only £24 including VAT. Only a limited number available so hurry. (Postage 44p extra).

### HANSEN DL20



This was the result of small boys at rallies! As you know, we usually try to have our display equipment switched on at these shows but we found that small hands kept pressing microphone buttons and running our precious transceivers into an open circuit. We bought several 15 Watt 50 ohm dummy loads from Hansen and screwed them on to the back of the rigs as protection only to find that observant customers spotted them and wanted to buy them—so, here they are. It's an excellent device, screws

directly on to any S0239 socket and although rated at 15 Watts continuously, will stand well in excess of this for short periods. An ideal shack accessory for any test work, checking SWR bridges, etc., and at only £4.64 including VAT it's not an expensive addition to the tool box. (Post and packing 24p extra).

### MIZUHO SB2M



This one really requires a lot of space to describe. We are delighted to be stocking and selling the Mizuho SB2-M 2 metre SSB/CW portable. As you can see, it's in the familiar Trio style case but it's smaller than the TR2200 series although it retains the excellent feature of having all the operating controls on the top face of the rig so that you can actually use it whilst carrying it around—that may sound silly but the only other SSB portable cannot be used easily when slung over the shoulder!

Frequency control is by VXO with a range of 50 kHz for each crystal fitted; since there are four crystals, this gives a tuning range of 200 kHz. As supplied, the SB2-M is fitted for the range 144.1-144.3 MHz but other ranges may be used without needing any realignment by the owner.

Power output is around 1W pep and the speech quality is quite honestly the best we've heard in a long time. The receiver sensitivity is also quite outstanding and the use of a high quality 9 MHz crystal filter makes the selectivity first class.

The SB2-M uses all the latest semiconductor devices including double balanced mixers for transmit and receive and altogether is a great alternative to the endless procession of FM boxes. Due to constantly falling exchange rates, the price is a little higher than expected but at £155 including VAT it's not expensive.

### PUNCH KIT



We have decided to reintroduce a popular item which we carried some time ago. This is a set of first class chassis punches in a fitted plastic case which also includes a most useful tapered reamer—believe me, if you've never used a reamer, you are in for a pleasant surprise when you find how easy it is to make beautifully round holes of any size.

There are five punches, having diameters of 16, 18, 20, 25 and 30mm, and the whole kit costs only £6.48 including VAT. Postage is a further 67p.

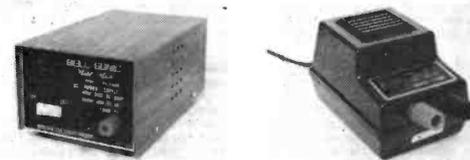
### TOOL KIT



As a further help to home brew (what am I saying?) we now stock a useful little tool kit which comprises a pair of long nose pliers, pair of cutters, pair of very sharp tweezers, and an interchangeable lock-in hand with a selection of flat blade, cross point screwdriver bits and a 6mm. box key bit (fits most Japanese nuts resident at the House of the Rising Goon). There is also a very sharp pointed "thing," presumably for extracting Boy Scouts from horses' hooves.

The whole kit is supplied in a nice zipped case and costs a mere £7.34 including VAT. Post and packing 44p. A nice present, even if you buy it for yourself.

### POWER SUPPLIES



We thought that Japanese DC power supplies were very expensive but we have now changed our tune. We have found two mains supplies which cover most amateur requirements and they are at very reasonable prices, i.e. you would find it hard to build them at the price!

The first PSU is a heavy duty 13v. regulated supply which will give 3 amps continuous and 5 amps peak. We have tried out all our FM boxes (not the TR7400A) on this, and it handles them all without distress. The supply is protected by an automatic overcurrent trip—in simple terms, you can stuff your pliers across the output terminals and the supply automatically shuts down—remove the short and it resets to normal. The whole thing is housed in a robust metal case measuring 6 1/2" x 4" x 3". The input cable is 3 core European standard 240v. AC and the output is by heavy duty terminals. Really good value for money at £16.20, including VAT. Post and packing £1.06.

The second mains/13v. DC supply is rated at 700mA regulated DC output. This may not seem very much but we intend it to be a supply for such rigs as the TR2200/3200 series, the new Mizuho SSB portable and other rigs such as the IC202, etc. Housed in a small moulded case, it's a really nice supply and at £9.72, including VAT, it won't break your heart. Post and packing 67p.

### HS-FI



How about a really good rubber flexible helical aerial for 2 metres? The HS-FI is 7 1/2' long, mounted on a PL259 plug and is of really strong construction. It will fit most 2 metre rigs, screwing straight on to the external aerial connector, and the price is a monumental—wait for it—£3.38, including VAT. Postage and packing 16p.

### FINALLY, RA-144 PRE AMP

As a general rule, we have doubts regarding the efficiency of preamps on 2 metres, but for those of you who really want, or need additional gain, we are now stocking and selling the RA-144 which provides around 12-15 dB of gain when operated from a 9-15v. DC supply. It uses a dual gate Mosfet device and all-in-all is very similar to many other RF preamps on the market now. So, why did we choose this one? Simply because the whole thing is enclosed in a tiny moulded plastic box 35mm. x 22mm. x 15mm. which allows you to fit it anywhere without any danger of inadvertent short circuits. The box makes all the difference, silly though it seems. Try one; at £7.95, including VAT, it's not too expensive and you may well find it's just what you needed. Post and packing 15p. Here endeth Wilson's first letter to the Anglo Saxons. For further details (should I say Revelations?) please do not hesitate to ask us.

73 John W Ison.

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OR ANY OF OUR BRANCHES LISTED ON PREVIOUS PAGE

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FT301 trans. 1.8-30 MHz 12v. DC 100W. ... <b>£515.00</b>	FR101D Deluxe Receiver ... <b>£493.50</b>	FT227R 10W 2M 400 Ch. Digital Mobile ... <b>£202.00</b>	YC5001 500 MHz counter ... <b>£160.00</b>
FT301D Digital FT301 ... <b>£588.00</b>	FR101SD Digital S ... <b>£481.00</b>	FT7 HF 10W. Mobile ... <b>£318.00</b>	YC5005 500 MHz counter ... <b>£225.50</b>
FP301 PSU/Speaker ... <b>£96.00</b>	FR101DD Digital D ... <b>£573.50</b>	FL101 Lin/Amp for FT7 ... <b>£123.00</b>	YC500E 500 MHz counter ... <b>£291.00</b>
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	FT101E Transceiver ... <b>£515.00</b>	FL2100B Linear 1-2kW ... <b>£307.00</b>	QTR24 World Clock ... <b>£15.50</b>
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Asp629 ¼w, 3dB 2m. mobile <b>£7.60</b>	Asp magnetic mount ... <b>£8.95</b>	Asp A659 UK 70cm. 5dB base antenna ... <b>£19.00</b>	
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IC22A 10W. mobile ... <b>£145.00</b>
IC240 10W. mobile ... <b>£178.00</b>
IC245E 10W FM/SSB ... <b>£352.00</b>
IC211E 10W. FM/SSB ... <b>£470.00</b>

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**SPECIAL OFFER.** Constant current Ni-Cad chargers. Adjustable charge rate for AA or C type Ni-Cads  
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C146 2M Hand held with carry case, tone burst, S20 and S22 ... <b>£125.00</b>
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New Mobile Master. 2W.  
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2m. 10W. Mobile with scanning channels. Fitted 9 channels ... <b>£139.95</b>
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- ★ Scans 40 channels
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- ★ Scanning facility

Controlled by switch fitted to microphone (not illustrated)

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- YC221 Digital module to 100 Hz
- YK721/D Mod. Kit YC221 for older 221's
- MANUAL Service Manual for 221
- FT223 T/Rx 2m. FM 24 channels
- FT225RD T/Rx 144 SSB/FM/AM/CW Dig.
- FT225R As above but analogue
- FT227RX T/Rx 10V, 2m. FM synthesised
- FT227RXS FT227RX fitted SFL Scanner
- FT227RXS Scanner including installation
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**HF Equipment**

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- FP4 PSU 12v. 4A fully regulated
- FL110 Linear, 10-100W, 12v. DC
- FT75B T/Rx 120W. V.X.O. 10-80m.
- FP75B PSU 234v. AC with speaker
- DC75 PSU, 12v. DC. Speaker etc.
- VC50C VFO
- VC50C VFO
- MM875 Mobile bracket. FT75
- FT101E T/Rx, 10-160m. RF Proc. 240/12v.
- FT101EE As 101E less proc. and FIX unit
- FT101EX As 101EE less DC PSU, Fan, TB
- FV101B External matching VFO
- SP101B External Speaker
- FL2100B Linear, 1-2 kW, 80-10m.

**HF Equipment**

- Y0100 Mon/scope Tx/Rx, 2-tone
- Y0101 Mon/scope Tx/Rx, 2-tone
- YC601 Digital Readout 101
- MMB101 Mounting Bracket for 101
- MANUAL Service Manual for FT101s
- FT200B T/Rx 10-80m, 250W. PIP
- FP200B PSU AC, with speaker
- DC200B DC 12v. PSU for FT200B
- FV200 External VFO
- FT301 T/Rx 1-8-30 12v. DC 100W.
- FT301D T/Rx Dig. Version of 301
- FT301S T/Rx 1-8-30 12v. DC 10V.
- FT301SD T/Rx Dig. version of FT301S
- FP301D PSU 12v. 25a. 230v. inc. speaker
- FP301D FP301 with clock/timer

## USED and EX-DEMO. EQUIPMENT

**HF TRANSCEIVERS**

- FT75 Yaesu £120.00
- FT75B (2) Yaesu £145.00
- 180 Atlas £300.00
- TR4/M54 Drake £400.00
- FT301D Demo Mod. £530.00

**HF TRANSMITTERS**

- SB401 Heathkit £140.00

**HF RECEIVERS**

- FR101 Yaesu £330.00

**GENERAL COVERAGE REC'RS**

- SVW717 Heathkit £50.00
- DX160 (2) Realistic £80.00
- EC10 Mk. II Edgystone £80.00
- EB35 AM/FM Edgystone £50.00

**VHF/UHF TRANSCEIVERS**

- KP202 Ken £100.00
- FT12 Auto Yaesu £150.00
- FT220 Yaesu £220.00
- Liner II Belcom £100-135.00
- HW202 Heathkit £85.00
- Multi U II FDK £165.00
- Sig. 200 (10 kHz steps) Yaesu £120.00
- IC22A Icom £140.00

**VHF/UHF TRANSVERTERS**

- TV502 Trio £135.00
- Magnum 2 Electronic Developments £105.00

**VHF AMPLIFIERS**

- HA202(40W) Heathkit £30.00
- HA201(10W) Heathkit £10.00

**MISCELLANEOUS**

- DDI Digital Display FT101 £80.00
- KW103 Power/SWR Meter KW £19.00
- SB640 External VFO Heathkit £35.00
- PV400S VFO Yaesu £40.00
- G3LLL Clipper Holdings £15.00
- DC75B (5) DC PSU Yaesu £30.00
- VC75 Voice controller £16.00
- FP75 AC/DC PSU Yaesu £30.00
- FV101 External VFO £60.00
- FP301 AC PSU Yaesu £80.00
- Transverter 70 cms. Mod. Elect. £50.00
- KCP2 Charger Ken £106.00

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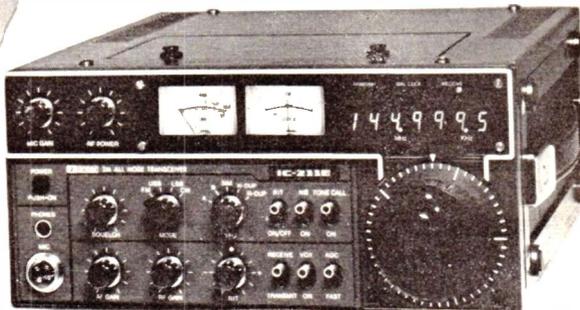
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- ★ Non-volatile memory
- ★ New mic up/down freq control

AMAZING VALUE **£289** inc VAT

REMOTE "HEAD UP" DISPLAY £19.95

The Multi-800D is the latest 2m. transceiver to leave the production line in Japan. It is a fully synthesised transceiver covering 144-148 MHz with a full bodied 25 watts plus output to give you longer distance contacts. But its big attraction is the things it doesn't have. Ironical but true!

- (1) No restricted coverage—you can operate any channel you choose—no need to get the soldering iron out to change the diode matrix.
- (2) No power control on the rear panel; it's on the front—and the power is infinitely variable between 1 and 25 watts—ideal for transverting.
- (3) No tone-burst control on the rear panel—it's automatic but can be defeated by a front panel switch.
- (4) No confusing channel numbers or doubt whether you have selected the correct repeater shift—the bright LED read-out gives true frequency display on both TX and RX even when working normal or reverse 600 kHz repeater shifts.



- (5) You won't have to retune the front-panel frequency selector for reverse repeater working or monitoring the input frequency—the flick of a front-panel control is all that is necessary.
- (6) The memory is not lost when you switch off the ignition or unplug the rig—it's there always and it can memorise two frequencies not just one!
- (7) It doesn't just have one repeater shift—you can programme any shift you wish in addition to the 600 kHz—e.g. 1.6 MHz for 70 cms.
- (8) No wrist-aching tuning either—tuning is manual or electronic—you can take a leisurely stroll at 10 kHz per second or race across the board at 500 kHz per second.
- (9) And there are two safety features—every 100 kHz of electronic tuning a bleep sounds—this means less looking at the dial and more eyes on the road—and there's also a remote "head-up" display available that enables you to place the frequency read-out in a position near the line of vision.

Having read about all the things the 800D hasn't got, an SAE will bring you a four-page brochure about all the things it has got! But hurry—they are in great demand.



## 70cms MULTI-U11

- ★ Fitted 6 repeaters and 4 simplex
- ★ Automatic tone-burst
- ★ 12 watts output
- ★ Receiver RF pre-amp
- ★ Receiver RT control
- ★ 4 channel autoscans

**£259. inc VAT**  
Fitted 6 repeaters +  
4 simplex

70 cms. is fast becoming a most exciting band for mobile operation with more and more repeaters coming on the air. Many enjoyable QSO's are being had on 70 cms. now; completely QRM free and S9 plus. And more and more people are finding that the U-11 with its 12 watts output (typical), receiver pre-amps for the hottest front-end around and auto-scan is the ideal choice. Not surprising therefore that more and more people are saying "I'm using a U-11 here."



## QUARTZ-16



STILL AT  
OLD PRICE! **£159.00** inc  
(Limited period) VAT

Includes tone-burst and 10 channels fitted

### EVERY CAR SHOULD HAVE ONE!

If ever you needed an excuse to purchase a 2-metre rig for the car here it is. We've managed to negotiate a special deal with our factory in Japan. The result? £159's worth of engineering that even amazes the most critical purchaser for its sheer value and performance. If you still need convincing then thumb through some of the past couple of years' advertising to see when a 2-metre FM rig could be bought for less than £160! The latest factory fresh shipment has just arrived so here's your chance to make the biggest saving of 1978! And here's a prediction too: many of you will look back at this advertisement in a few months' time and be glad you purchased your rig at such an incredibly low price—just a few will regret they hesitated and found the price had risen! So what do you get for £149.75—12 watts FM, 25 channel capability (S0, S20, 21, 22, 23, R3, R4, R5, R6, R7 fitted), 2 priority channels, channels fitted indicator light, Automatic protection circuit, microphone, quick release mobile mount, DC power lead, hardware etc., a 12 months' guarantee and free delivery.



## TM 56B VHF MONITOR

The TM56 is one of our most popular models, combining great performance with modest price. The TM56B has the basic receiver design of our mobiles and includes its own 230 volt AC supply, plus external 12v. DC input. 12 fixed channel positions are included, plus four autoscans. Any one of the Autoscans channels can be cancelled. Price includes 10 channels, R3, R4, R5, R6, R7, S0, S20, S21, S22 and S23, necessary leads etc., and 12 month guarantee. At £104 it is unbeatable! 10 channel marine version £113 inc. VAT.

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TELEX 897406

Complete Ham Radio Centre

**FAST  
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SERVICE  
& EXPORT**



## PRICE LIST 1ST JULY, 1978

**STOP PRESS.** Still a few MICROWAVE MODULES 0.5-500 MHz frequency counters left at £65 inc. VAT. Hurry!

### YAESU COMMUNICATIONS EQUIPMENT (JAPAN)

- FRG7 General coverage receiver 5-30 MHz AC/DC ... £199.95
- FRG7D As above but digital readout ... £269.00
- FR101D 160-2m. + broadcast Rx AC/DC ... £555.10
- FT101E transceiver 160-10m. AC/DC ... £579.00
- FT101EE As above less processor £360.00
- FT101E Extra-narrow CW filter £23.35
- FT101B External vfo for FT101... £90.50
- SP101B External speaker for FT, FR Series ... £19.60
- FT200 Transceiver 80-10m. 260 watts ... £365.00
- FP200 Matching AC PSU for above ... £77.50
- YO101 Monitor scope ... £156.00
- FT221R 2m. all mode transceiver AC/DC ... £399.00
- FT227R 400 channel FM transceiver 12v. DC ... £227.00
- YPI50 150 watt dummy load ... £54.60
- FT910D Digital 160-10m. transceiver 200W ... £829.00
- FT910DM Digital 160-10m. transceiver 200W ... £960.00
- FT7 80-10m. transceiver ... £357.00
- QTR24 Amateur Radio World clock ... £16.74
- YH55 Communication head-phones ... £9.95
- YD84 Desk microphone ... £20.25
- YD84 Hand microphone ... £8.40
- FT225RD all-mode 2m. Digital readout receiver ... £601.00
- FRG7000 all-mode 2m. Digital readout receiver ... £364.00

### DENTRON RADIO COMPANY HF EQUIPMENT (USA)

- MLA2500 160-10m. Military quality amplifier 2KW pep continuous ... £695.00 (n.c.)
  - MT3000A 160-10m. ATU SWR/PEP 5-way selector 3KW ... £275.00 (n.c.)
  - MT2000A 160-10m. ATU long wire, coax, balanced feed 3KW ... £175.00 (n.c.)
  - 160-10AT 160-10m. ATU long wire, coax, balanced feed 1KW ... £99.50 (n.c.)
  - MONITOR 160-10m. ATU as above, Rf indicator, 300 watts W-2 160-10m. SWR/POWER METER 0-200/0.2KW DC/PEP 160-10m. Doublet. Tuned feeders ... £25.00 (n.c.)
  - DTR-1 HF transceiver-new 1978 model ... t.b.a.
- A separate catalogue on Dentron is available priced 25p—refundable.

### HF ANTENNAS (UK & USA)

- Mosely TA33 (balun fed) 10-15 20m 3 el. ... £119.25 (£2.50)
- Mosely "Mini-Beam" coming soon.
- Mosely TA33 JR 400W. PEP 10-15-20m 3 el. ... £106.87 (£2.50)
- Mosely TA32 JR 10-15-20m. 2 el. ... £72.00 (£2.50)
- Mosely TD3JR Wire dipole 10-15-20m.23ft. ... £25.87 (£1.00)

- Mosely RD5 SWL Amateur band dipole 69ft. ... £27.00 (£1.00)
- Hygain 12AVQ Vertical 2kW. 10-15-20m. ... £39.95 (£2.00)
- Hygain 14AVQ Vertical 2kW. 10-40m. ... £56.20 (£2.00)
- Hygain 18AVT Vertical 2kW. 10-80m. ... £81.45 (£2.00)
- HQ-1 "Mini beam" 10-20m. ... £94.00 (£2.00)
- C4 "Mini-vertical" 10-20m. ... £41.50 (£2.00)
- EL400 Compact 80/40 dipole inc. balun 79ft. 1kW. ... £29.00 (£1.00)

### ASP VHF/UHF MOBILE ANTENNAS (USA)

- 201 1/2 wave standard 2m. ... £2.95 (£1.00)
- 677 5/8th wave deluxe 2m. ... £14.95 (£1.00)
- 2009 5/8th wave budget 2m. ... £7.95 (£1.00)
- 667 7/8 cms. colinear de luxe ... £17.71 (£1.00)
- 462 7/8 cms. budget 3dB gain antenna ... £6.75 (£1.00)
- "No-hole" Boot mount for all above ... £3.50 (£1.00)
- K220 Magnetic mount (677/667) + 4m. cable ... £8.50 (£1.00)
- K220A Magnetic mount (2009/467/201) + 4m. cable ... £8.50 (£1.00)

### JAYBEAM VHF/UHF ANTENNAS (UK) 4 METRE ANTENNAS

- 4Y/4M 4 element folded dipole yagi with 1 1/2" boom ... £12.65 (£2.00)
- PMH2/4M 2 way phasing harness for two 4m. yagis ... £9.39 (£1.00)

### 2 METRE ANTENNAS

- C5/2M 5dB glass fibre colinear omnidirectional ... £30.93 (£2.00)
- 5Y/2M 5 element folded dipole yagi with 1" boom ... £7.70 (£1.25)
- 8Y/2M 8 element folded dipole yagi with 1" boom ... £10.00 (£1.25)
- 10Y/2M 10 element folded dipole "long yagi" with 1 1/2" boom and trombone support ... £21.32 (£1.75)
- PBM10/2M 10 element Parabeam with 1 1/2" boom and trombone support boom ... £25.36 (£2.00)
- PBM14/2M 14 element Parabeam with 1 1/2" boom and 45° braces ... £31.16 (£2.00)
- 5XY/2M Crossed 5 element yagi with 1 1/2" boom ... £15.98 (£1.50)
- 8XY/2M Crossed 8 element yagi with 1 1/2" boom ... £19.91 (£1.75)
- 10XY/2M Crossed 10 element yagi with 1 1/2" boom ... £26.32 (£2.00)
- PMH2C 2 way phasing harness for circular polarisation ... £5.06 (£1.00)
- Q4/2M 4 element quad yagi ... £16.31 (£1.50)
- Q6/2M 6 element quad yagi ... £21.71 (£2.00)
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- D8/2M Double 8 slot-fed yagi with 1" booms ... £18.22 (£2.00)
- SVMK/2M Mounting kit for vertical polarisation for 2 slot-fed yagis ... £3.82 (£1.00)
- UGP/2M Unipole and ground plane ... £7.03 (£1.00)
- HO/2M Mobile "Halo" head only ... £3.26 (75p)
- HM/2M Mobile "Halo" with 24" mast ... £3.88 (£1.00)
- PMH2/2M 2 way phasing harness for two 2m. aerials ... £6.80 (£1.00)
- PMH4/2M 4 way phasing harness for four 2m. aerials ... £16.33 (£1.00)

### 70 cm. Antennas

- C8/70 cm. 8dB glass fibre colinear omnidirectional ... £39.37 (£2.00)
- D8/70 cm. Double 8 slot-fed yagi with 3" booms ... £15.46 (£1.50)
- PBM18/70cm. 18 element Parabeam yagi with 1 1/2" boom ... £18.56 (£1.50)

- MBM48/70 cm. element Multi-beam yagi with trombone mounting ... £21.66
- MBM48/70 cm. element Multi-beam yagi with trombone mounting ... £21.62 (£2.00)
- MBM88/70 cm. 88 element Multi-beam yagi with trombone mounting ... £28.97 (£2.00)
- 8XY/70 cm. Crossed 8 element yagi complete with phasing harness and "N" type connector ... £24.13 (£2.00)
- 12XY/70cm. Crossed 12 element yagi complete with phasing harness and "N" type connector ... £29.70 (£2.00)
- PMH2/70cm. 2 way phasing harness for two 70 cm. yagis ... £5.90 (£1.00)
- PMH4/70 cm. 4 way phasing harness for four 70 cm. yagis ... £12.26 (£1.00)
- 23 cm. ANTENNA
- D15/1296 Double 15 slot-fed yagi with "N" type connector ... £22.78 (£1.00)

### CDE/STOLLE JAYBEAM ROTATORS (USA/GERMAN/JAPAN)

- AR40 VHF and light HF beams CD44 HF beams ... £53.43
- STOLLE 2010 VHF rotator ... £106.87
- STOLLE 2030 VHF rotator deluxe control box ... £48.95
- STOLLE Alignment bearing RZ100 ... £54.00
- RZ100 ... £11.25
- 9502 Channel master. Ideal VHF arrays (3 core cable) ... £45.00 (£1.50)
- KR400 1 ton de luxe rotator HF beams (6 core cable) ... £95.00 (£1.50)
- 9523 Alignment bearing for 9502 ... £9.55 (£1.00)

### SWR METERS (JAPAN)

- Single Meter SWR 3 MHz-150 MHz ... £9.50
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**SPECIAL OFFER.** Sharp MW/Air Band receivers £13.95 delivered. Waltham LW/MW/VHF/+ Mains battery £24.95 delivered. Limited quantities only.

### MICROWAVE MODULES (UK)

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- MMT432/144R transverter ... £169.88 (n.c.)
- MMT144/28 transverter ... £88.88 (n.c.)
- MMT432/4-4 4-6; 28-30 conv. ... £20.25 (n.c.)
- MNC144/28LO converter ... £22.50 (n.c.)
- MNC70/28 28-7 converter ... £20.25 (n.c.)
- MNC70/28 LO converter ... £22.50 (n.c.)
- MNC432/144 or 28 converter ... £27.00 (n.c.)
- MMC 296/144 or 28 converter ... £31.50 (n.c.)
- MMD050 50 MHz counter ... £66.96 (n.c.)
- MMD050/500 500 MHz counter ... £65.00 (n.c.)
- MMS00P 500 MHz pre-scaler ... £27.00 (n.c.)
- MMV1296 70 23cm. tripler ... £33.75 (n.c.)
- MMP 12/3 transceiver PSU ... £56.25 (n.c.)

### SHURE MIC. SPECIAL DISCOUNTS

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- 526T 500-50K base station ... £32.50 (£1.00)
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- HP3A UHF TV High pass filter ... £2.95 (25p)
- TV33 00LP Low pass filter 2kW. ... £18.00 (75p)
- Ferrite Rings 1 1/2" diam ... 30p (5p)

### KATSUMI KEYS

- EK121 Electronic Keys (6v. DC) 8-45 wpm ... £29.95 (75p)

### ICOM

- IC202 SSB hand-held portable 3 watts ... £169.00
- IC240 FM 22 channel transceiver ... £198.00

**MAIL ORDER & CALLERS:** Hockley Audio, 31 Spa Road, Hockley, Essex. Tel.: 03-704 6835 (2 lines)  
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AGENTS: G3XTX J.R. Electronics, 198 Collier Row Lane, Romford Essex.

Tel.: Romford (0708) 68956

GM3GRX Eric Simpson, 6 Drossie Road, Falkirk, Stirlingshire. Tel.: 0324-24428

G3OQT Bradhurst Electronics, The Street, Thakeham, Fulborough, W. Sussex.

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Early closing Wednesday



# AMATEUR ELECTRONICS UK

## AEUK—YOUR NUMBER ONE



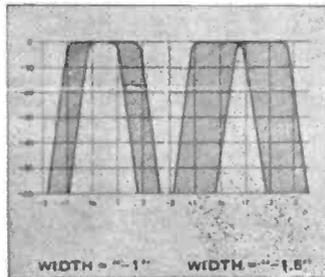
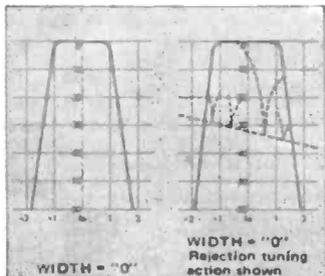
### FT-901DM

COMPETITION-GRADE HF TRANSCEIVER

#### HIGHLIGHTS

The ham's dream—to have the best—is now reality. Introducing the FT-901DM all mode HF transceiver from YAESU. Designed to give you the competitive edge either at home or on a DX-pedition, the FT-901DM includes these advanced features:

Unique receiver filtering system including rejection tuning, variable IF bandwidth tuning, and audio peak frequency tuning for the ultimate in unwanted signal rejection.



Digital frequency display with memory circuitry for transmit and receive. Ideal for QSY during net operation, multiplier hunting during contests, or daily schedules. Modern PLL frequency derivation for accurate, stable operation.



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Yes, technical excellence in its *fullest* sense including a standard of mechanical engineering beyond compare to guarantee you, the discerning purchaser, years of trouble-free service. YAESU's electronic engineering capabilities have never been bettered and when it comes to construction the standard of workmanship and quality of mechanical parts are truly superb. Never mind the fancy specifications that appear from time to time—before you purchase examine the general construction and then ask to see the “innards”—we think you'll then do what the majority does—settle for a non-compromise piece of *machinery* with the YAESU label on it.



◀ The new FT-7 for HF mobile operation is another fine example of Yaesu engineering as is the exciting FT-225RD all-mode 2m. Transceiver shown below. ▼



Once again space does not permit anything approaching a description of Yaesu's ever growing range—therefore Yaesu's latest catalogue with our valuable credit voucher is a must—please see our offer below.

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**FROM SOUTH AND EAST.** We are located approximately two miles from Junction 5 of the M6 from which follow signposts to Birmingham. Within ¼ mile turn right at Clock Garage and proceed towards city. After one mile look for traffic lights at Fox & Goose and immediately over the lights take minor left fork into Alum Rock Road. We are located one mile from this point.

**FROM NORTH.** Leave M6 at Junction 6 (Spaghetti) and follow left fork down to traffic island beneath motorway complex. Take third turning off to Lichfield. One mile further on follow A4040 to the right and within 100 yds. veer again to the right, approximately one mile further on brings you to the Fox & Goose. Turn right and see preceding directions.

**FROM THE WEST AND SOUTH-WEST.** Follow M5 then M6 to Spaghetti Junction (see above). Alternatively, leave M5 at Junction 4 or 3 and proceed to inner ring road. Turn South on ring road and leave on A47 (East). We are located three miles from this point.

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Now **RADIO SHACK LTD.** presents a new addition to the famous C Line from the R. L. Drake Co.



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15p stamps or 4 i.r.c.'s for details

To answer your next question, the famous C line continues in production led by the big DXer's ideal radio, the R-4C Receiver.



# RADIO SHACK LTD for DRAKE

## PRICE LIST

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FL 250	Filter for R-4C (·250 kHz)	... £36.00	£40.50	
FL 500	Filter for R-4C (·500 kHz)	... £36.00	£40.50	
FL 1500	Filter for R-4C (1.5 kHz)	... £36.00	£40.50	
FL4000	Filter for R-4C (4.0 kHz)	... £36.00	£40.50	
FL 6000	Filter for R-4C (6.0 kHz)	... £36.00	£40.50	
4-NB	Noise Blanker for R-4C	... £48.00	£54.00	
MS-4	Matching spkr. for R-4C/T-4XC/ TR-4CW	... £22.00	£24.75	
SPR-4	Receiver—general purpose	... £400.00	£450.00	
	DC Power Cord for SPR-4	... £3.60	£4.05	
	Accessory Crystals for SPR-4	... £4.00	£4.50	
DSR-2	Digital Receiver	... £2000.00	£2250.00	
SSR-1	Receiver—general purpose	... £133.20	£149.85	
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AC-4	115/240v. PSU for TR-4CW/T-4XC	£76.00	£85.00	
34-PNB	Plug-in Noise Blanker for TR-4CW	£64.00	£72.00	
DC-4	12v. PSU for TR-4CW/T-4XC/R-4C	£86.00	£96.75	
RV-4C	Remote VFO for TR-4CW	£94.00	£105.75	
UV-3E	144-432 MHz FM Transceiver	£440.00	£495.00	
PS-3	AC Power Supply for UV-3E	£62.00	£69.75	
UMK-3	Remote Trunk Kit for UV-3E	£48.00	£54.00	
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T-4XC	Transmitter—SSB	£380.00	£427.50	
L-4B	Linear Amplifier and Power supply	£620.00	£697.50	
MN-4C	Antenna Match Network (new model)	£110.00	£123.75	
MN-2000	Antenna Match Network	£153.60	£172.80	
DRAKE ADDITIONAL ACCESSORIES				
W-4	RF Wattmeter 2-30 MHz	£54.00	£58.32	
WV-4	RF Wattmeter 20-200 MHz	£60.00	£64.80	
TV 42 LP	Low Pass Filter 100w.	£9.00	£10.13	
TV 3300 LP	Low Pass Filter 2kw	£16.00	£18.00	

### VERY SPECIAL PACKAGE DEAL FOR CASH SALES OR H.P. ONLY

We are offering the TR-7 Transceiver with DR-7 General Coverage/Digital Readout Board plus PS-7 Power supply for the **exceptional price of £783.00 including VAT. (£696 ex. vat)**

Obviously at this price we cannot accept trade-ins

**Securicor Delivery £6.00**

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RV-7	Remote VFO	for TR-7	... £105.78	£119.00	7072	Hand microphone	... £12.60	£14.18
MS-7	Matching speaker	for TR-7	... £22.00	£24.75	7075	Desk microphone	... £25.00	£28.13
NB-7	Noise Blanker	for TR-7	... £49.60	£55.80	RCS-4	Remote control Antenna Switch	... £74.00	£83.25
FA-7	Fan	for TR-7	... £16.00	£18.00		Accessory Crystals	... £4.00	£4.50
AUX-7	Range prog. Board	for TR-7	... £25.60	£28.80		Fixed frequency Crystals	... £7.00	£7.88
SL-300	CW Filter	for TR-7 (·300 kHz)	£35.20	£39.60		Spare operating manuals	... £3.00	£3.00
SL-500	CW Filter	for TR-7 (·500 kHz)	£35.20	£39.60	B-1000	Balun. 4:1 for use with MN-4C only	... £16.00	£18.00
SL-1800	SSB/RTTY Filter	for TR-7 (1.8 kHz)	£35.20	£39.60	The R.L. Drake Company are no longer making the following items: however, we still have a few of each — please check our stock position before ordering:—			
SL-6000	AM Filter	for TR-7 (6.0 kHz)	£35.20	£39.60	TA-4	Transceiver adaptor for SPR-4/T-4XC	£24.00	£27.00
MMK-7	Mobile mounting kit for TR-7	... tba	tba	FF-1	Crystal Control for TR-4CW	... £34.00	£38.25	
MN-7	ATU with RF Wattmeter. 160-10m. 250w.	... £110.00	£123.75	A-10	10 watt 2m. Amplifier	... £40.00	£45.00	
WH-7	HF Wattmeter/VSWR Bridge	... £58.20	£62.85					
TR-4CW (RIT)	Transceiver—SSB, CW with R.I.T.	£448.00	£504.00					

SECURICOR

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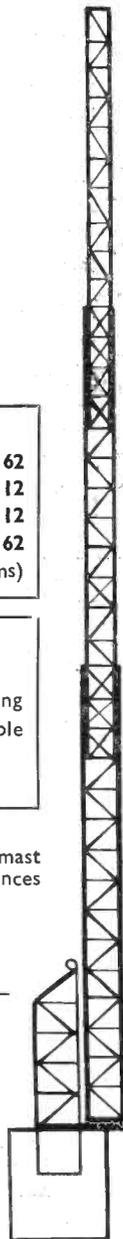
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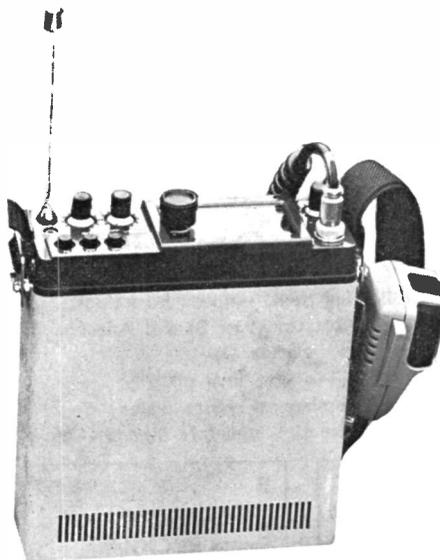
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# The SHORT WAVE Magazine

## EDITORIAL

### ***Justification***

Over the past months we have indicated from time to time how and why we could lose some, or all, of our bands at the World Administrative Radio Conference 1979 (it is perhaps relevant to note that most amateurs there will be present by virtue of their own speciality rather than as amateurs). So there have to be some pretty cogent arguments in favour of amateur radio. Let us consider the LF/HF bands first. Here there is little doubt that the prime reason for continued global amateur radio is the study of world-wide propagation, with the information locked in the logs of LF/HF stations—data not obtainable on a similar scale in any other way. It is possible too that information from amateurs, randomly distributed geographically as they are, on the subject of electronic pollution of the spectrum may be the key to improvement in consumer equipment by legislation.

At VHF/UHF, the challenge of moonbounce, *Oscar* and MS working lead to technical improvements, by reason of the amateur with his constraints of cash and real-estate, which can in their turn be noted and adapted in professional work.

Perhaps the real challenge for the amateur is at SHF and the upper end of UHF, in the development of simple and easily reproduced stable equipment for narrow-band applications such as CW and SSB; the spin-off would not be in communications so much as in designs for *inherent* stability in areas where synthesiser techniques are for one reason or another impracticable. This will enable interesting and important work to be done by amateurs—again, as at HF, in propagation.

It seems very likely that we have as yet only scratched the surface of knowledge of propagation, even at HF, and the amount to be learnt on the higher frequencies is enormous. And, as before, it is only the presence of a geographically randomly occurring service which makes the study *possible*, let alone practical. Therein lies our hope for the future, comprising as it does a mixture of “appliance operating” on the one hand, and technical experimentation on the other—and that is what amateur radio is about, *exactly!*

But man does not live by bread or science alone. The only *real* hope for each and every one of us is to somehow lower the countless tragic and catastrophic barriers which separate nations and individuals, to somehow reduce man’s apparently pathological need to be inhuman—in the widest sense of the word—to his brother. In this pursuit Amateur Radio has a part, albeit minute, to play, and this *must* be borne in mind at WARC ’79.

*John*  
K3KFE.

# COMMUNICATION and DX NEWS

**E. P. Essery, G3KFE**

TO consider the general picture, there can be no doubt that the difference in the state of the bands since the low of mid-1976 is quite amazing—though of course it still has its ups and downs. The differences should be taken in the light that we have already seen sunspot counts as high as the more pessimistic forecasts for the peak, and indeed the current figure is in that bracket—which suggests that provided the rate of rise continues the peak should be quite spectacular. At this writer's QTH, where the receiver is mostly tuned on the 14 MHz CW end (while the OM is otherwise occupied), there has not been a single time when it has been switched on and failed to show something of interest within the SSB bandwidth, although the combined noises of rain static and electrical pollution are obviously covering much of the weaker stuff. That is as always at this time of the year—but the signals are *there* and often quite workable despite the noise. Even 28 MHz has been noted to yield the odd signal, as last month did; and by the time you come to read this, we should with any luck be beginning to see the equinoctial peak season.

## Ten

This seems as good a place to start as anywhere; and G2ADZ (Chessington) is the man to tell us all about the CW end: ZD7WT, KP4BC, FM7WH, 8P6JA, 8P6IT, KZ5FP, KV4CI, CE3ZW, CX8DT, CX4JK who was on 25 watts, GM3YOR/OY, GM3YOR/TF, EP2IA, J28AY, WA7JRL/SU, 9L1CA, JA8PMF/MM, PY0MAG, VK3MR, HK0BKX, and late one evening VE1ARE, K1YZW, WB4RLQ, WA4SNI, K5KLA, not to mention various PY, LU, and UA9 stations. However, some wouldn't play in Bill's game, such as 7P8BH, 9J2CJ, TF6EM, HK1RCB, 8R1J, YB0ACT, several YV's, VK5QQ, VK6WT, and various ZS's. An interesting QSO was with PY2EGM, who progressively reduced power one watt and yet remained a good 579

signal. Another item of note was the ability to hear on the band that familiar rushing noise, like waves on a distant shore, which indicated some hefty solar activity (which no doubt was entertaining the VHF lads).

A nice letter from G2BJY (Walsall) indicates that he has been busy taming a hedgehog instead of DX-ing—nonetheless Geoff has managed to work some 68 countries on Ten this year. There have been very few days when the band hasn't been alive; about the only absentees from the log are the VK's and ZL's, albeit VK8HR has been heard. Among the worked we find GM3YOR/OY, LU1HDC, PY0MAG, PY1DG, ZD7WT, and W7JRL/SU.

### 'CDXN' deadlines for the next three months—

October issue—September 1st  
November issue—October 5th  
December issue—November 2nd  
*Please be sure to note these dates.*

At G3PKS (Wells) there have been holidays, followed by visiting grandchildren—which just has to mean toy-mending!—plus a nephew's reluctant fishing-rod and a local SWL's receiver to be sorted out, the result of it all having been a marked negative-going step in the rate of log entries. However, there have been a few things going on, and on Ten the main item of interest was the escape of ZD7WT, the only signal on an otherwise dead band.

On now to G2DHV, who has been doing a spot of aerial farming; on the 28 MHz one, UY5XF was worked, just to prove the thing a "goer," and some listening sessions revealed signals from JR3, UM8MAD, C31QR, and WA7JRL/SU.

Another one to have been suffering is G4BHE (Basingstoke) who found himself with a couple of weeks' holiday, followed by a visit to W9, where Barry stayed with W9NIN near Chicago. While there, G4BHE played the Ten-Ten QSO party for 48 hours with K9HV, who reckoned

the English accent was worth a few QSO points. From home, EA6FL, C31QR, VP2MBB (also raised from W9), VK6NAY, VK2AVZ by long path at 2210, and a hearing of ZL3QN also by long path. 8P6JA and CE0AE made the numbers up to 106 countries in 1978 on Ten.

## Personal Points

Our first was a surprise visit from old friend G3UKP (ex-9J2KP, ex-7Q7AJ, ex-A4XGQ!). Alan is now working in Saudi Arabia, where he cannot get a ticket, but he asks us to point out that he still has some cards left for his previous operations; and he wants to make it clear that if anyone lacks a card, it was *not the fault of G3MGW*. Alan will be pleased to QSL for any of these operations, saving that he obviously cannot QSL those 9J2KP QSO's made by Peter King who held the call after Alan left Zambia. A plain envelope (no callsign on the outside please, and no IRC's), addressed to Box 1625 Riyadh should do the trick. At the time of writing this, we don't know just what the date of Alan's return from leave will be, so we suggest a hang-fire until about mid-September.

G3KPO (Shanklin, I.O.W.) writes to say that the Wireless Museum is very popular, particularly with school parties. Douglas continues that they are holding their second Island get-together at his place on Sunday, September 17, starting at 3.0 p.m., when it is expected many of the South Coast amateurs will turn up to meet the locals at Alverstoke Manor Hotel, Shanklin, which is where G3KPO looks out over the sea.

We don't usually receive letters from SWL's, but we would like to mention the one from David Brooks of Loughborough, passed back to the writer by Justin Cooper; David and his wife, who are both on the HPX Ladder, were contacted by Bob, W5MJQ (staying with G2HDT in Burton-on-Trent), who had seen their name and address in a copy of *S.W.M.* W5MQJ is regularly on 21.080 MHz at weekends, 1400z in

summer and 1500z in the winter, and said he would be pleased to receive reports on his QSO's (as well as replies to his calls, we guess!); Bob is one of those licensed amateurs who haven't forgotten their apprenticeship as SWL's—more credit to him.

On the subject of Contests, September is relatively quiet, apart from the European Phone over September 9-10, the Scandinavian CW a week later, and the Scandinavian Phone over the weekend September 23-24. October is the big month, with October 7-8 carrying the VK/ZL/Oceania Phone and RTTY, followed a week later by the VK/ZL/Oceania CW and the RSGB's 21/28 MHz Phone contest; October 21-22 is down for the RSGB 7 MHz Phone, and on October 28-29 comes the CQ WW DX Phone. For those who have long griped at the lack of a CQ WW WPX CW contest, W1WY, to whose Contest Calendar we are indebted for all this data, is able to give us advance warning that there will be one in 1979, in the last weekend in May, to rules similar to the ones which hold for the existing WPX Phone.

Turning now to the YI1BGD situation out in Baghdad. Originally, an Iraqi advance party of thirteen boys and two girls went to YU-land to study the hobby fields of radio-controlled models, scuba diving and amateur radio; and on their return to YI in early April were accompanied by YU1NZV, Matic, to help them make a start. Things first got going around April 14, and the permitted operating areas have gradually been extended from 12 hours a day on 14 MHz to 24 hours daily on 80-10 metres. However, the present military situation there is such that they will not tolerate offers of help or DX-peditions; there will only be club stations, and their rate of progress will be determined by their own abilities. Donations of equipment are not welcome at this point in time; but we hear that the Yaesu tackle has in fact reached the Ministry of Communications and should shortly reach the members of the YI1BGD club. On the QSL front, YU1NZV has been handling about 60 a day, but our latest news is that the group has moved its Hq and QSL route; they now operate from Radio Club Baghdad, Scientific Centre, Azamia

Kizrah, Baghdad, and the QSL's (with *s.a.e.* or IRC) go to P.O. Box 5864, Baghdad.

A brief letter and report comes in from G3CED/G3VFA, in Broadstairs, who reckons all the regular Joystick types are soaking up the sun, except for his local, Frank, G4EVO, who is not in the best of health at present—our best wishes go to him for a quick recovery to full health and plenty more QSO's. On a different tack, G3CED says that his septuagenarian fist is getting snarled up—we suggest that trying to send that phrase at 40 w.p.m. on a straight key ought to provide some exercise; alternatively some Liszt on the piano!

#### Fifteen

Having digressed somewhat, let us return to the attack. G4FNL (Brighton) uses an FT-101, and on this band feeds it into his 7 MHz dipole, which he says doesn't work too well—but he keyed with all *W* call areas (except *W8*, *W9*, and *W0*), PY0MAG, OA4AC, TI2PZ, HC2HM, G6ZY/CN/M, JA, JD1YAH, VE7DXI, A4XVK, A4XVC and, the only one on SSB, TJ2P.

G2HKU (Sheppey), and others, mentions the blackout on July 10, which for Ted lasted from 0619z until 0629z when the first faint signals began to re-appear and things picked up rapidly; quite tremendous sunspot activity was mentioned by the BBC, and Ted himself could see clearly three very big areas through his special equipment—which is where we mention the warning *not* to try looking at the sun through binoculars, but rather project the image on to a card and look at the reflected image; if you disregard this warning, you will suddenly find yourself blind—permanently.

G3PKS was using ten watts of RF output for a nice ragchew with K6LQA in San Francisco, which came to an abrupt end when it had its "tail" bitten off by the wolf-pack! Jack also established to his own satisfaction that the CG prefix is being used over a larger area than he had thought to be the case; a QSO with CG1QN in "Truro" was clearly identified as not being either in Truro, Cornwall or Truro, Australia and apparently a prefix for the Commonwealth Games.

Others worked were K4PQL, K4BAI, 9H1FQ, and JA2UA.

G2DHV (Sidcup) prefers 21 MHz CW, and with this mode worked WOMWO/MM, HV3SJ, *WB7*, *KA5*, *WD6*, and ZC4LP. Gotaways included JA6RDI/MM, YB1ADU, YB2SV, assorted *J*'s, *ZS2*, *ZS6*, *KS6*, 9M2FK, 9J2WS, and 9M8HG.

#### Twenty

14 and 21 MHz are the homes of the pestilential Thing from Poltava—but it is surprising how much can be winkled out from them. Perhaps the radio amateurs of the world should all turn their beams on to Poltava and jam it until it goes away!

Not a lot of reports this month of 14 MHz; as far as the writer was concerned, it varied from very good indeed to atrocious, the latter a combination of low conditions and static. The primary snag these days for your scribe is the time factor: it is certainly possible to listen to the bands, but there is rarely time to drop everything in favour of the chase after some sort of tempting DX! One supposes that with the help of the microprocessor and the ROM and RAM, not to mention the varicap diode, one should be able to rig up a station which will stay on a given band, scanning up and down, until it hears the CW signals from one of the wanted DX countries noted in the memory; it would then tune up, call the chap, give him a 599 (best way to guarantee a QSL card!) and print out the QSO details from off-the-air copy of the other chap's CW, and whatever one has dished out by way of the programme. This would just leave the log to be written-up after the day's DX-ing. Perhaps even that and the QSL-writing could be programmed into the system too, come to think of it. Automation, they call it!

G6TC (Wednesfield) does it the hard way, but he says that the good days must have been *good* if only because the *VK/ZL* chaps were calling him; the *ZL* on Campbell Is. came back to a CQ, as did KH6AJF and TI2PI. Now if VR6TC would just do the same . . .

The best of the month are listed as: KH6AJF, VK2EK, VK2VR, VK3AVQ, VK2GT, VK3BMJ, VK3VJ, VK5AI, VK5MD, VK5FE, ZL2GW, TI2PI, KV4AA, W7RO

(Utah); Ted also noted the July 10 event, and commented that it was just as well things got back to normal in 24 hours!

G4FNL says he didn't spend too much time on the band because the competition is too tough, but he did make CW QSO's with most W call areas save the West Coast chaps, PY7CC, PT7VJZ, LU8DQ, 8P6AU, VE3AR, WB1EZ1/KP2 (St. Thomas, Virgin Is.), UI8IAZ, and VU2BK; on SSB we note VP9IV/P and 4M3M.

Now we turn to the letter from G2HKU, from which it seems that Ted has been having his own private field - day; SSB accounted for WB7DYB, W6SJC, VP2MZZ, EP2IL, W7XE, KP4KW, K6XT, K5UR in Arizona, K6RLY, and HC2HX; then there was some CW, to deal with KV4AA, N6AN, VE7BS, VK5FE, AA7C (Oregon), UK9AAN, UL7OE, K6ZM, VK5FU, WA0TJU, WB6HGJ, UK8IAA, WD6ETH/7 in Arizona, KH6JG, VK3ANJ, W7GHJ (Nevada), VK3LV, VE4FZ, ZL4CO, UF6FCZ, WB6HEU, W7NEJ, XE1OM, TF6M, HSIABD, CG3JAQ, UK0QAH, W6SC, VK4XA, WB0QMC/PL, DK7AH/3A, K0KES, VK3NR, N7TT, and DJ6SI/OH0.

#### Forty

If you really want to become a first-class operator who can cope with all the QRM in the world this is the band for you!

G3CED/G3VFA stuck to this band, with two watts of QRP and a Joystick, testing out his new indoor radial system on CW. Mainly rag-chew contacts of 15-20 minutes or more, with DF2PU, G4FNL, G4CXN, GM3CYZ, DK0DD, ON8NY, I2ZZV (a QSO which was clobbered by DJ0PH), and F2WL/P who was getting a nice signal out of one of those old B.2 sets used by the wartime Resistance chaps. Harking back to that comment about keeping the keying hand in trim, ragchewing at 40 w.p.m. is quite an achievement at any age if one is sending with a straight key.

Just before G6TC packed his two-metre gear for a trip to GW, Ted had a look at Forty and in one session worked VK3MR, ZL2UV, YV7AJ, and K0FX, which demonstrates admirably what we said a paragraph or so back. The stuff is there if you can cope with the

distractions.

G4FNL reckons conditions have been better of late on Forty; the band starts to open to South America about 2200z, and the W's follow on. It seems to have been all CW, with PY7PO, PT7AC, PY7AEV, PY1DDI, PY0RO (PY1RO on his St. Peter & St. Paul rocks trip), YV2BE, KP4FHC, KP4CKY, VE1VB, VE1AWN, 3A0PN, OH2BDA/OH0, DJ6SI/OH0, and C31PS which was a DX-pedition mounted by DL5NJ; most of the Russian prefixes were logged. Graham remarks how few people understand the meaning of QSX, on Forty at least.

#### Eighty

Seems to have been more or less ignored by most of the reporters. G2NJ notes from his Peterborough QTH that he has been on at times when most of us are at work, and thus is able to mention three of the wipe-outs which occurred in July: the one on July 7, which cut short a QSO with G5NX in Windermere, the one on July 10 already commented on, and another on July 11, from 1100 to 1200z. However, Nick finds that on Eighty it is well worth the trouble of putting out a CQ in these periods, as sometimes there is some propagation.

#### The Ladder

Well, what about it? We haven't run it in the piece for the simple reason that we haven't had entries! G3NKC has put in a first entry, being the chap who used to report to Justin Cooper as D. Sharred; the call is a re-issue. Dave uses a CR-100 and the transmitter a DX-100U, a combination which means a strengthening of the operating table—or at least it did when this old scribe ran just such a combination years ago. So—we have one entry, and since G4AEJ is just up the road, doubtless G3NKC will lean on him too for a second entry—now *what about some more?* Just to remind you of the rules of the game, the idea is to work *counties*—which means the administrative areas of the U.K. under their current names, not the counties as they used to be known; the Hebrides and the Isles of Scilly count separately. SSB/SSB QSO's count one, CW/CW two points, and AM/AM

three points, with just one contact in each mode with each county; while cross-mode contacts don't normally count, we will let in the AM/SSB QSO with two points, the two points to be counted in the score for the mode in use (in the SSB column for the SSB end, in the AM column for the chaps using AM). Similarly for *countries*. Your score is the sum of the points in each column. All Top Band, no 28 MHz, as we think there is quite enough DX-ing on the band to keep us out of trouble for a while! On the list of counties again, note that Orkney, Shetland, and the Isle of Wight all count as counties, and don't forget the GI ones as well.

#### Top Band

The previous paragraph brings us naturally to Top Band; G3NKC (Birmingham) is not far away from G4AEJ, and between them they seem to be working the stuff quite happily; we have already mentioned that Dave has an AM machine at the moment, but a KW-2000A will be in use ere long and then the feathers will start to fly! After all, 43 counties worked with an AM-only rig shows promise after *just one month* of operation. We'll have to do something about it!

G2HKU is the only other entrant for Top Band notice this time. Ted worked SSB to the PA0PN, PA0HYY and PA0INA skeds, and comments that the OSN Thing has returned to its old spot near DHJ, and while it is hefty in U.K., it is about 60 dB over the nine in Holland, making life *very* difficult for the few Dutch Top-banders, with their tiny segment lying so close to them. Changing to CW, we note OL9CJB, GM3TMK, DK8XK, and G13JEX.

#### Finale

We'd love to hear from you about your Communicating or DX-ing on the bands between 1.8 and 30 MHz. Address to "CDXN," SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts. AL6 9EQ, to reach us no later than the date shown in the 'box' in the piece; if you want to make it arrive a little earlier we won't complain! Oh, yes, and please make up your Table entries and send 'em in with your letter, the tabular matter *as clearly written as you can*, lest we be berated for maltreating your score!

## ANTENNAS—THE WEAK LINK PART V

### RESONANCE, REACTANCE, IMPEDANCE AND RESISTANCE

A. P. ASHTON, G3XAP

ONE of the prime requirements for efficient operation of any radio station is that power must be fed between the antenna and the transmitter/receiver with a minimum of power loss. Before we can ensure that this condition is being met we must fully understand the principles involved in transferring this power, and hence be in a position to recognise the likely reasons for power loss.

In the first article an antenna system was likened to an electrical circuit, and it was suggested that just as the receiver is adjusted and aligned prior to use, so should be the antenna. Carrying this argument one stage further, we would probably ensure that each part of the receiver was functioning correctly prior to moving on to an overall alignment; this is also true of the antenna system—we should establish 'correct operation' of the antenna itself before considering the matching of the feedline to it, and the subsequent matching of the feeder to the receiver/transmitter.

This article attempts to define some of the antenna's parameters and, hence, should enable us to install a system which we know to be efficient.

#### Resonance

This is probably the most important condition that the antenna has to meet, and can be crudely defined by the statement: "the shortest length of conductor which will resonate to a given frequency is one just long enough to permit an electric charge to travel from one end to the other, and back, in the time of one RF cycle at that frequency." During one RF cycle the electric charge will travel one wavelength, and since the charge has travelled twice the length of the conductor, it follows that the shortest resonant length is one half-wavelength. Considering Fig. 1, which represents the current and voltage distribution on a half-wave antenna, we see that the current is zero at both ends, whilst the voltage is at its maximum levels—positive at one end and negative at the other. (In practice there is a slight flow of current at the ends of the antenna as there is some leakage around the insulators in the case of wire antennas, and leakage into the atmosphere in the case of self-supporting tube constructed antennas.)

Thus, both the current and voltage curves just "fit in" on the antenna, and any alteration to its length will upset the balance, as will a change in frequency, which will alter the "length" of the current and voltage curves. Looking at resonance from the point of view of power fed to the antenna, the RF feed to the antenna is now in a position such that at the commencement of any cycle of energy, the current and voltage distribution along the antenna is the same as at the commencement of any other cycle. Contrast this with a non-resonant situation—if we lengthen the antenna and put the RF source into it, it is apparent that the second cycle will commence before

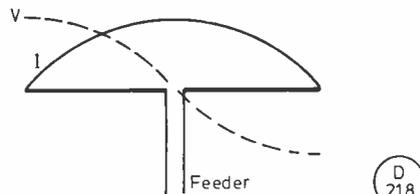


FIG. 1

Current and voltage distribution on a half-wave antenna.

the charge from the first cycle has had time to travel along the antenna and back to the feed-point.

#### Reactance

Let us now consider the antenna as an electrical circuit with RF fed to it at its centre. If we now vary the frequency below the resonant frequency, the antenna will display Capacitive Reactance; this is because as the frequency is low, the charge is arriving back at the feed-point before the next cycle commences which gives rise to a situation in which the current at the antenna input terminals "leads" the voltage—the condition for capacitive reactance. Conversely, if the frequency is higher than the antenna's resonant frequency, the current at its input terminals "lags" behind the applied voltage and the antenna now displays inductive reactance.

As we will see in the next article (on feeders), the presence of reactance affects the transfer of power to the antenna, and a non-resonant antenna will not, therefore, perform as well as one which is operated on its resonant frequency. One of the effects of reactance is to increase the SWR on the feeder, and unless this situation is rectified, it can ultimately affect the power amplifier in the transmitter—leading to reduced efficiency and, in very severe cases, to damage or destruction of the amplifier valves or transistors.

#### Impedance

Impedance can be simply defined as the ratio of voltage to current, and Fig. 1 shows that this ratio varies along the length of the antenna. Hence, one cannot refer to impedance without indicating the point to which that impedance applies.

The most important impedance is at the point at which the antenna is fed—known as the feed impedance. Looking again at Fig. 1, it can be seen that as the voltage on the half-wave antenna is at its minimum value at the antenna's centre, so the ratio of voltage to current, and hence the impedance, is at a minimum value here also. If impedance is plotted along the length of the antenna—Fig. 2—it will be seen that at the ends of a half-wave it reaches its greatest value. For a half-wave antenna, the impedance at its centre will be around 75 ohms, but it can depart quite widely from this figure as we shall see later. (Note that although Fig. 1 shows the voltage at the centre to be zero, in fact it is at its minimum value here but cannot actually be zero as this would imply that, as a current is flowing, the circuit has no resistance.)

The impedance at the ends will be somewhere between about 1,000 and 5,000 ohms—the actual value varying widely from one antenna to another, and being influenced by such factors as the ratio of the antenna's length to the diameter of the conductor from which it is made, the

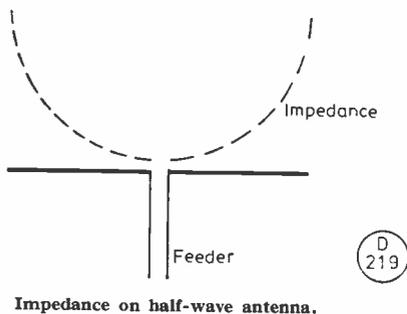


FIG. 2

Impedance on half-wave antenna.

type of insulators (if any) at the ends of the device, the height of the antenna above ground, etc. An antenna fed at a point of minimum impedance is said to be "current fed" and, conversely, one fed at a voltage antinode is said to be "voltage fed."

### Radiation Resistance

When an antenna is supplied with RF energy, this energy is dissipated in the form of radiation, in a similar way to which a DC current passed through a resistance will dissipate energy in the form of heat. In both cases the dissipated power is equal to  $I^2R$ —the R in the DC case being the actual resistance, whereas with RF the R is a fictitious resistance which, if present, would dissipate the same power as had been lost by radiation; this fictitious resistance is called the Radiation Resistance. Because an antenna also has a real resistance, there will also be an energy loss due to heat, and the above expression should be modified to:

Power =  $I^2(R_0 + R)$ , where  $R_0$  is the radiation resistance, and R is the real resistance.

As antennas are made from conducting materials, the heat loss through R is usually very small in practice, but in the case of very short antennas (e.g. mobile whips)—which have very low radiation resistances—these losses can reach 10 per cent or more of the transmitter output. When referring to radiation resistance it is assumed that the measurement is made at a current antinode—the centre of the antenna in the case of the half-wave type.

There appears to be much confusion in amateur radio circles regarding the two terms Impedance and Radiation Resistance, and this has not been helped by the fact that many publications on the subject of antennas make no real distinction between the two terms. If we feed the antenna at a current antinode (e.g. the centre of a half-wave dipole) the value of these two properties is practically the same—around 75 ohms, as stated earlier. If, however, we feed at some other point, then the radiation resistance ceases to be of real interest, and we should concern ourselves solely with the feed impedance, which will be of a higher value. For example, if we intend to feed the half-wave with a 600 ohm "open wire" feeder, we could do so in the manner described in Fig. 3: the ends of the feeder wires are fanned out and attached to the points on the antenna where the impedance is 600 ohms—thus matching the 600 ohm feeder. The feed impedance of this antenna is 600 ohms, but the radiation resistance is still 75 ohms.

For the purpose of feeding in this manner, the actual value of the radiation resistance is of little interest;

therefore for the remainder of this series the author will stick to the term "feed impedance" on the grounds that (a) it is less ambiguous, and (b) it is of more practical interest than radiation resistance.

### Influencing Factors

Having considered and, hopefully, understood the topics discussed above, the reader should be in a position to consider the influences that may alter these parameters, and then be able to understand why it is not possible to simply cut an antenna to the required length, erect it, and put it into use without the requirement of careful tuning and matching.

Perhaps the most important thing is to understand why the length of conductor required to resonate on a given frequency, varies from one antenna to a second seemingly identical antenna. The first factor is that electromagnetic energy does not travel through a given material (e.g. copper) at the same speed as it does through air or a vacuum, and even for a given material the actual velocity is influenced by the thickness of it. (In free space, electromagnetic radiation travels at 300,000,000 metres per second.) The length of a half-wave antenna can easily be calculated from the formula  $l = 492/f$ , where f is the frequency in MHz. Hence at 14.10 MHz, for example, a free-space half wavelength is 34.89 feet, but as RF energy travels more slowly in a conductor such as copper wire, it follows that in a half a cycle the energy will travel a slightly shorter distance than it does in free space, and a half-wave antenna made of copper will be shorter than the figure just calculated. Fig. 4 shows the factor by which the free-space half-wave has to be multiplied to give us this modified length: the 14.10 MHz antenna made of copper wire 0.1 inches in diameter has a length to diameter ratio of about 4,200 : 1 and we must, therefore, use a factor of 0.975 in determining this new length. Thus:  $34.89 \times 0.975 = 34.01$  feet.

If the antenna is made of tubing and requires no supports and, hence, no insulators at its ends, this would be a realistic figure, but with wire antennas this is not the case. The insulator and the loop of wire that secure it to the antenna add a small amount of capacitance to the ends which tunes the antenna to a slightly lower frequency—this is known as "end effect." The result is that a further correction must be made to the physical length of the antenna; in practice the formula  $l = 468/f$  is often quoted and, applying this formula to the 14.10 MHz example antenna, we now have:

$$\text{Length} = 468/14.10 = 33.19 \text{ feet.}$$

This formula is obviously a compromise because it encompasses both effects discussed above, and clearly

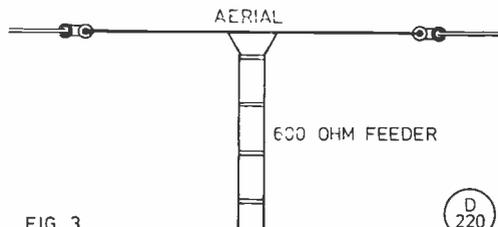


FIG. 3

Attachment of 600-ohm feeder to the 600-ohm point on a half-wave antenna.

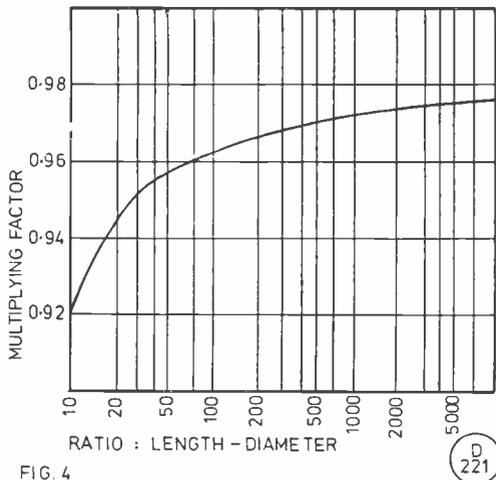


FIG. 4

Factor by which free-space length of antenna must be multiplied to give physical length for different antenna diameters.

end-effect can vary considerably from one antenna to another; taking account of other factors such as the proximity of metallic structures (such as supporting masts), the effect of detuning by not having the two halves of the dipole in the same plane (e.g. inverted vee dipoles), etc., and it can be seen that calculation of length is a real compromise. The final resonant frequency can, in fact, vary considerably from the required figure and the author can quote from his own experience here—an antenna "cut" for 3.55 MHz was actually resonant on about 3.85 MHz after erection—this may have been an extreme case, but shows the possible error.

The other factor that can vary widely in practice is the feed impedance—the figure of "around 75 ohms" quoted earlier actually applies to a centre-fed half-wave antenna in free-space. The proximity of the Earth is the most important influence on feed impedance for a given antenna, although it should be noted that the proximity of additional elements—such as the addition of a reflector to a half-wave element to form a two-element Yagi—will have an even greater influence (the feed impedance of a two-element Yagi is around 15-20 ohms). The reason for this "ground effect" is that energy radiated from the antenna strikes the ground, is reflected back up and in passing the antenna induces a current into it. Therefore the current flowing in the antenna consists of two components: one induced by power from the transmitter and one induced by the ground-reflected wave. These two components will either be in or out of phase—the actual effect being determined by the distance between the antenna and the ground. If the antenna is exactly one half-wavelength above ground, for example, the reflected wave will induce a current which is exactly in phase with the "transmitter-supplied" current because the reflected wave has travelled one complete wavelength before striking the antenna. (Note: this is an over simplification, as the actual picture is a very complex one with waves radiated at various angles from the antenna causing reflected waves to strike it with differing phase differences.)

It is apparent that if the two component currents

are in phase, the total antenna current will rise, whereas currents out of phase will lead to a decrease in the total current. As the impedance of the antenna is determined by the ratio of voltage to current, a change in antenna current must lead to a change in impedance; Fig. 5 shows this variation as the antenna height is changed—note that the effect diminishes as the height of the antenna is increased. It is also of interest to note that at heights of multiples of a quarter-wave, the impedance is at the "75 ohm" level—this suggests that at these heights the ground reflected waves induce a resultant current which is neither in nor out of phase with the "transmitter-induced" current.

### Harmonic Operation

When discussing resonance it was stated that a half-wave antenna is the *shortest* length of conductor which could be termed "resonant"; however, it is not the only length of conductor which will meet the conditions for resonance. Consider Fig. 6a which shows the current and voltage distribution on an antenna three half-waves long, and it can be seen that the current and voltage at its centre are of the same order as at the centre of the half-wave shown in Fig. 1—i.e. maximum current and minimum voltage. The impedance here is therefore low, thus this antenna can be fed in a similar manner to the centre-fed half-wave dipole. Note, however, that there are two other low impedance points on the antenna, and it could equally well be fed at either of these points, but in practice it will be found somewhat simpler to adjust the antenna's length for resonance if it is centre-fed.

Because this antenna is three times the length (electrically) of the shortest resonant length (a half-wave), it is operating on its third harmonic. Fig. 6b shows an antenna one wavelength long, fed at its centre, and it will be seen that this is a point of high impedance. For this reason, the antenna operated in this manner is not behaving as a true second harmonic antenna. It will be noted that the current direction (indicated by the arrows) is the same in each half-wave section, whereas for true harmonic operation the current must be reversed in adjacent half-

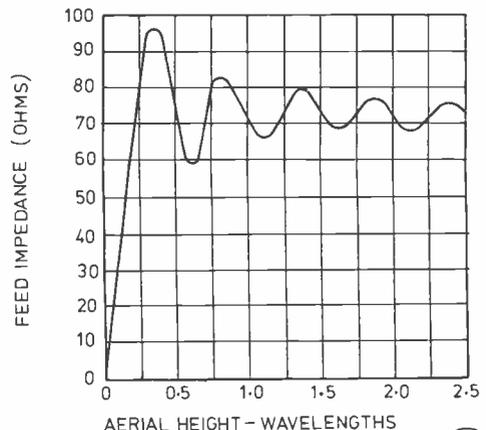


FIG. 5

Variation of feed impedance of centre-fed half-wave antenna with height above ground.

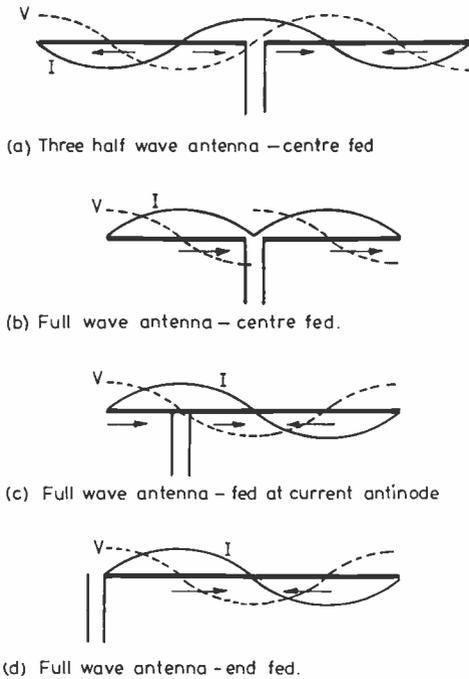


FIG. 6

**Voltage and current distribution on harmonically operated antennas.**

waves. However, if we feed the full-wave antenna at a current antinode as in Fig. 6c, the currents flow in the required direction and the antenna is now a second harmonic antenna. We could also obtain second-harmonic operation by end-feeding as shown in Fig. 6d but, in this case, difficulties will be experienced which will be dealt with in the next article.

From the above examples it can be seen that any antenna can be operated in the harmonic mode, but if we intend to centre-feed, the antenna must be odd multiples of a half-wave in length; for even harmonics we must feed at a current antinode or end-feed if the antenna is to exhibit true harmonic operation. (End feeding is common in amateur radio circles by bringing the end into the shack and connecting it directly to a matching unit—*i.e.* no feeder is used.)

The next important point to note is that although a harmonic antenna is an exact electrical multiple of a half-wave, its physical length does not bear the same exact relationship. This is because the "end effect" discussed earlier only affects the voltage antinodes at the points of attachment of the antenna and not those at other points. Put into absurdly simple terms, "a half-wave antenna has two ends, but a full-wave does not have four."

It is common practice to erect a half-wave dipole for 7 MHz and operate it on its third harmonic as well—*i.e.* 21 MHz. In fact, in its third harmonic mode this

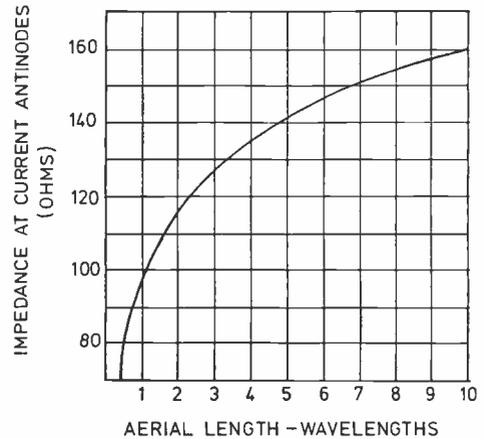


FIG. 7

D  
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**Variation in feed impedance of long-wire antennas (fed at current antinode).**

antenna will resonate at a somewhat higher frequency and work carried out at G3XAP has found this frequency to be nearer 22 MHz than 21 MHz. This practice is therefore a compromise, and for those wanting the best possible efficiency from their antennas, is a practice that should be treated with caution.

Finally, the impedance at the current antinodes of harmonic antennas is not the same as at the centre of the single half-wave. The antennas shown in Fig. 6 can be considered as consisting of a series of collinear elements fed in such a way that the currents in alternate sections are out of phase. There is some slight coupling between adjacent half-waves and because of this (plus the effect of radiation from these sections), the impedance at the current antinodes is increased compared to the half-wave. Fig. 7 shows how the impedance at the current antinodes varies with antenna length, and it will be noted that for lengths up to about three or four wavelengths, the increase in impedance is quite significant.

**Summary**

We have now established that for most efficient operation our antenna must be resonant, and that if it is not, there will be reactance present which will cause problems when we come to feed power into it. We have also seen how the feed impedance is dependent upon the actual point at which we attach the feeder, and how, for a given antenna, this impedance is influenced by such factors as its height above ground. As to how we actually determine that the device is, in fact, resonant and how we can measure the feed impedance will be covered in a later article on test instruments and their usage. Our next concern is, having erected and resonated our antenna, how do we actually supply power to it? This topic will be discussed in the next article which deals with the subject of feeders.

*to be continued*

# • • • SWL • • •

## SHORT WAVE LISTENER FEATURE

By Justin Cooper

BACK to our mutttons again, and our first thoughts are inspired by the letter from *S. Donnelly (Adlington)*: he is quite clearly thinking about the article on the FRG-7 in the July issue when he asks "why was a separate filter embodied, and not a Q-multiplier or a band-pass filter?" This seems to touch an area of interest to many people, so perhaps we will try and clear it up. Firstly, we may say that a single tuned circuit will always have a characteristic shape regardless of the Q factor: improvement of Q will alter the ratio between the bandwidth at the nose and down the sides, but the single tuned circuit of infinite Q will have zero bandwidth at the top and bottom, tailing off in the practical case to a sharp nose and fairly wide skirt. This is acceptable to the CW man in that a bit of drift merely sees his man getting a little weaker as the distant transmitter and the local receiver drift, one to the other, between overs.

If one considers modulation, either AM or SSB, then we have a different requirement, which is to have a response curve with very steep sides, and a specified nose bandwidth wide enough to accept all the intelligence contained in the wanted signal, and to reject anything outside that pass-band. If we define the ratio of nose-bandwidth to skirt-bandwidth as the "Shape Factor" we would expect the 'practical' first case to show a shape factor of as high as 10 : 1, while the typical good SSB filter will have a shape factor (between 6 and 60 dB) of around 2.5 : 1 or better, and a wider nose bandwidth. There is just *no way of getting a single high-Q tuned circuit to give a flat topped shape.*

Hence a 'filter' is a group of elements which act as tuned circuits—the elements being anything from actual tuned circuits, crystal groups, mechanical groups, or any other device which can be made to show resonance and be used in groups. Such filters are defined as low-pass, high-pass, band-pass, or band-stop filters dependent on their action; thus our SSB filter is a band-pass type, and the pi-tank output of a transmitter is an elementary form of low-pass type. The ideal band-pass filter would have a rectangular shape, when plotted response *v.* frequency; the approach to the rectangular shape is achieved by the use of several tuned-circuit elements, which are 'coupled' to a chosen degree. In ordinary IF transformers, the degree of coupling is achieved by the location of the two windings relative one to the other: light coupling giving the essentially pointed shape of the single tuned circuit but narrower skirts, critical coupling resulting in a flattish top, and over-coupling causing the shape to divide into two peaks on different frequencies with a dip in the middle.

The use of more than two tuned circuits, as in the best mechanical or crystal filter designs, will result in a near-rectangular shape with a minimum 'ripple' across the top, falling down steeply to the stop band. The design will also have been checked to be sure that there are no spurious (unwanted) responses near enough to the pass band to be of any nuisance value.

Thus we may sum up by saying that while it is desir-

able to have band-pass filter characteristics, to receive SSB or AM, the bandwidth requirements will be different for the two modes, and in neither case can the single-tuned circuit arrangement of the Q-multiplier fill the bill. Modern CW receivers, it may be noted, also use the band-pass type of filter, typically with a nose bandwidth as low as 400 Hz, and less than 1 kHz wide at 60 dB down: such a filter renders SSB unreadable. However, in a *practical* case there may be something to be said for a Q-multiplier as a general aid when one is talking about the simpler and cheaper receivers such as appear at surplus and club junk sales—the motive being to get a small, but nevertheless useful, improvement at almost no cost.

On a different tack, reader Donnelly seems to have been having adventures recently: illness, a spell in the bandage-works (hospital to you!) and the acquisition of an FR-50B receiver.

*B. L. Henderson (Chetnole, Dorset)* has the old problem of the "no outside aerials" clause attached to his home, and wonders about ways and means of getting over the difficulty. Clearly, the obvious one is to move! One can do much in the aerial line by use of the loft space, but even more can be done by disguising outdoor aerials to make them 'invisible.' Some thoughts along this line: the law, we believe, still says there is nothing to stop you putting a flag-pole outside your house, suitably painted white, capped, and fitted with halliard and pulley. A wire running up the pole and also painted while, can have its bottom-end run into a little box containing matching units for various bands, the coaxial cable coming out of the box into the ground and away to the shack. Plus some buried radials, and you are left with an aerial that is quite elegant in the view of your neighbours and its "lightning conductor" and the ground connection will be a positive benefit to them (don't forget to tell them about the rule-of-thumb which says 'the conductor protects a ground area covered by a circle whose radius equals the height of the conductor'). Two flagmasts at a suitable separation and treated as indicated above may well form the basis of an all-driven vertical beam array, giving the cardioid pattern in two opposite directions, and a figure-eight pattern to cover the remaining two directions.

The "invisible wire" technique which was used by G3KFE for so long can be adapted to other methods. For example a thin-wire dipole for three bands fed into thin coaxial cable can be fitted and painted to blend into the wall colour; this is a particularly good way if your outer walls are pebble-dashed or whitened, as nylon monofilament used to support the aerial ends won't need an insulator by virtue of its own qualities, and a bit of white coaxial coming down the wall won't be noticed, especially if you train a climbing plant up it!

*D. J. Byers (London N.7)* spent a VHF NFD with Grafton club, and comments on Murphy's Law: "when you've got the 430 MHz array on the top of an 80ft. Versatower, now is the time to discover one leg of the feeder has come off!"

*M. Ribton (Oxted)* remarks that he returned to the radio scene a year ago, after being driven away from it by his XYL's dislike of the R.107's appearance! He came back by way of the purchase of a rather deaf 9R-59D—the owner had said so, and when he got it home he had to admit the seller was right. However, when the cover was taken off and the chassis examined, all was made clear because there was no connection between the 'works' and the back of the aerial terminal. Take two inches of wire and one soldering iron, remake the missing connection, and no more deafness plus lots of S9 signals! However, most SWL's seem to up-grade fairly regularly, and Mike is no exception, now having an FRG-7 which he feeds from a selection of aeri-als.

Next we have a letter from *M. Livingston*, of 38 *Belvedere Drive, Bilton, Hull, HU11 4AY*, who wants to swap experiences of the National Panasonic DR-48 receiver he uses, in particular its preference in the matter of external aeri-als. We guess it probably doesn't mind, so long as whatever aerial you use is either tailored to give whatever input impedance the beast prefers (which figure will probably appear in the instruction book), or you couple it to the receiver by way of an aerial tuning or matching unit.

*H. M. Graham (Harefield)* always sends us a useful rundown on the bands as he found them; Maurice found Ten to be in the summer doldrums, but lots of DX on 21 MHz. Twenty didn't yield much in the way of DX, largely for want of a good listen round when the QRM was abed. The same went for the LF allocations, too, although some time was spent on Forty looking for WAB areas.

That WSEM call used by the Russians which was puzzling *J. H. Roswell* of Bakewell last time round is, says *J. F. Coulter (Winchester)*, the anglicised version of the Russian letters meaning "to all", or in other words a CQ call. However, reader Coulter has the nub of it when he says "presumably for internal consumption". We would like to think it might be a CQ to a Russian-speaking amateur anywhere in the world.

The origin of the AB4X call is worrying *D. G. Sim (Southampton)*, largely because it was a very spasmodic sort of signal and it was not possible to copy all the details. Your scribe would say it is of American origin, but just where he wouldn't like to be specific, as he has not yet assimilated the full implications of the changed licensing system which issues calls to old-timers with a suffix of one or two letters in place of their old three-suffix-letter ones, and with one or two letters before the numeral (in accordance with a tabulation which takes into account the classification of the station as a General/Conditional, Advanced, or Extra Class licence, both in Continental U.S.A. and the U.S. Dominions).

Pressing on with the pile, we have an interesting letter from *Gerard Brazil (Dublin)* on various HPX points. Firstly we have no more knowledge of the "AE1AYY" Gerard heard last time, claiming to be nothing to do with MARS, but an officially licensed station of the Red Cross in Frankfurt—without any German suffix or indication on the call; we conclude it must have been phoney. That CT3LP/OH2BC mentioned last time was also heard, but signing OH2BC/CT3—which is interesting in that if both hearings were genuinely correct, and were genuinely licensed, then the same station could

count as CT2 (as we said in the July piece), and as CT3. Which all goes to show that any rule interpretation which is designed to cover every case must throw up a comic result some time if the rule itself is arbitrary in origin! On the matter of the Italians and their calls, Gerard wasn't aware that the number part of an Italian call now defines what part of the country they are in, by, we believe, postal regions. However, as he says, the recent issue of such as IN3 confuses the issue a bit, as we understood that the second letter indicated which of the many groups of offshore islands was involved, and indicates the extension of the two-letter prefix codes to the semi-autonomous mainland regions of Italy. How much nicer and easier it was when they all signed II!

*S. Farkas (Birmingham)* now uses another receiver of the same era after disposing of the TCS job—he now has a B.28 (the service designation of the old Marconi CR-100 receiver used in such numbers in the naval ships of W.W.II). He seems to be happy with it, mainly on 14 and 21 MHz, and with occasional excursions into the LF Bands.

If you're doing 'O' or 'A' Levels, the run-up to them gets in the way of listening—but when one is teaching, they get in the way twice as much and every year! One has first to set exams., then to mark them, and then to write reports on them! Thus *J. Fitzgerald (Gt. Missenden)*, who as a result of such duties has to neglect his gear—which gives full coverage from Top Band through to 430 MHz. On a different tack, John is not happy about that 5X1 station, but as it appears in Geoff Watts' *DXNS* that's good enough for him! John managed the Clipperton effort on the last day of operation, which pleased him no end.

*D. Brooks (Loughborough)* has a chuckle about the way we misread his first name from his signature; this time to make sure he has typed his letter and entry. On HPX queries, FU2OC sounds like a no-hoper, but his other two raise points of procedure, namely a station heard over *Oscar* and GB2RS. After a lot of thought we have come to the conclusion that *Oscar* contacts *should* count, despite the third-party involved up aloft; and as for GB2RS we don't know whether it is licensed for two-way contacts, but it most definitely is within the "amateur service" and should therefore count.

Now we come to *K. Kniveton (Kingswinford)* who, apart from his Phone entry, also sets up a few more in

## ANNUAL HPX LADDER

(Starting date, January 1, 1978)

SWL	PREFIXES	SWL	PREFIXES
D. W. Waddell (Herne Bay)	499	M. Ribton (Oxted)	349
R. E. Thomas (Corwen)	495	N. Rimmer (Port Erin)	342
P. Leather (Camberley)	457	C. I. Mobbs (Leeds)	334
K. Piper (Bognor Regis)	449	P. Sharpe (London W.2)	316
J. Nicol (South Croxton)	431	B. L. Henderson (Chetnole)	308
R. Jacobs (Margate)	423	J. Doughty (Birmingham)	301
D. G. Sim (Southampton)	389	S. Farkas (Birmingham)	247
Mrs. J. Brooks		P. Matthews (Eastwood)	229
	(Loughborough) 368	G. Moody	
K. M. Rogers (Lutterworth)	364		(Stockton-on-Tees) 204
D. Lightfoot (BFPO 58)	355		

200 Prefixes must be heard for an entry to be made, all heard since January 1, 1978. See also HPX Rules.

the CW; furthermore he has news of P. Djali who, it appears, had almost lost interest until he recently got a CR-100 and set to work on bringing it up to scratch (although even in its present state it functions better than the old DX-160). Reverting to Keith for a moment, he took his FRG-7 off to Poole on holiday, and found some quite good DX with just a fifteen-foot length of wire wrapped around the room—a combination which netted such goodies as A9 and 3B6 on 21 MHz.

*P. L. Shakespeare (Foulness)* has an interesting point to make in that he heard, on May 20, a station in the contest signing Z42CK on CW; most likely the same as the ZV2CK on Phone the previous weekend. However, the chap continued to bash away in the contests with his CW Z42CK for a good half-hour of Peter's listening, and so he wonders as what he should be claimed. A Good Question! It would seem likely that the only way to verify his station would be to QSL and see if he comes back! In CW contests this business of the less-skilled operator who tries to "keep up with the boys" is a nuisance all-round; far better for him to go steadily at a pace which he can cope with on the pump-handle, regardless of the speed he can copy—although if the error was repeated that number of times, we would have thought he would have been checked and asked for repeats by so many stations and ignored them, that he couldn't have been copying much that was sent to him! Another odd one heard several times on 21 MHz was signing 5BA2P/MM and being worked by several optimists. Whatever he was, we strongly doubt his amateur status!

*K. Kyezor (Irchester)* has now got a Yaesu receiver and to celebrate sent in his list in typescript—odd how many people practise their typing on old J.C! Be that as it may, K.K. has a real live phoney in his collection in the shape of YI0WX. Not too difficult to spot since, despite all the talk, there is no doubt that YI1BGD in Baghdad is the only true-blue job; and the fact that his signals are weak has encouraged lots of people to try and get in on the act, the more so as it is generally known that both sides of the Iron Curtain have been doing their best to get better gear and beam aerials to YI1BGD—the gear having been given by a Japanese maker, the aerial offer from the States, with transport arrangements being made by the YU chaps and OH2BH. A truly world-wide effort!

Two readers mention the hearing of VR4; *E. W. Robinson (Bury St. Edmunds)* did a double-act by hearing VR4CF on one day, and the same station signing H44CF on the very next day and giving the same QSL address at Box 6, Honiara, Solomon Islands. VR4CF is given that same address in the 1978 edition of the *DX Listings Callbook*, and the name C. Fitch. However, other VR4 stations were reported a month later and not using H44. One is inclined to feel that the H44CF should be regarded as a pirate unless and until we get either a QSL or some other supporting indications, as the H44 prefix is not mentioned in Geoff Watts' *DXNS* which would surely have carried an update. But, VR4CF is definitely OK, and we expect that the other one will in the end turn

## HPX LADDER

(All-Time Post War)

SWL	PREFIXES	SWL	PREFIXES
PHONE ONLY		PHONE ONLY	
K. Kyezor (Irchester)	1964	K. A. Burch (Plymouth)	766
S. Foster (Lincoln)	1692	R. Towson (Nottingham)	759
B. Hughes (Worcester)	1635	D. Brooks (Loughborough)	754
R. Shilvock (Kingswinford)	1621	K. Linge (Willington)	730
J. Fitzgerald		M. Shaw (Huddersfield)	686
(Gt. Missenden)	1552	D. J. Byers (London N.7)	674
R. Carter (Blackburn)	1510	S. T. Bowen (Kippax)	659
M. J. Quintin		K. Kniveton (Kingswinford)	641
(Wotton-u-Edge)	1394	D. A. Robinson (Felixstowe)	635
P. C. Jane (East Looe)	1375	D. Hill (Crawley)	612
E. W. Robinson		A. Rimmer (Port Erin)	552
(Bury St. Edmunds)	1319	Gerard Brazil (Dublin)	529
H. A. Londesborough		P. Ramsay (Steventon)	508
(Swanland)	1303	L. Stockwell (Grays)	507
M. C. P. Bennett (Datchet)	1274		
J. H. Sparkes (Trowbridge)	1157	CW ONLY	
Mrs. J. B. Jane (East Looe)	1095	N. A. Phelps (Devizes)	1410
H. M. Graham (Harefield)	1059	A. Glass (Plymouth)	1354
M. Rodgers (Harwood)	1003	H. A. Londesborough	
A. R. Holland (Malvern)	988	(Swanland)	1087
W. H. Smyth (Hartlepool)	912	D. W. Waddell (Herne Bay)	804
D. Taylor (Harborne)	859	J. H. Rosling (Bakewell)	730
M. Law (Chesterfield)	844	P. L. Shakespeare (Foulness)	604
P. L. Shakespeare		K. Kniveton (Kingswinford)	240
(Foulness)	803	D. L. Hill (Crawley)	235
P. Rooney (Chester)	789		

Minimum score for an entry is 500 for Phone, 200 for CW. Listings in accordance with HPX Rules, and to include only recent claims. A "Nil" return is permissible in order to hold a place.

out to be a good 'un.

For *P. Matthews (Eastwood)* this is a first appearance; he has an FRG-7 attached to a four-element FM radio aerial about twenty feet up. We guess that such an aerial would be made much more effective if the outer and inner were shorted, and the vertical aerial thus resulting were to feed the receiver through an ATU. It isn't too difficult—one can obtain the "line-coupler" elements to fit TV plugs from most radio/TV shops, and then all you need is a TV co-ax plug with outer and inner shorted, and a single tail of wire hanging on the end to sit on the aerial terminal of the ATU. When the aerial is required for its proper work all one does is unplug the coupler complete with shorting plug, and then bung the aerial back into the FM set.

### Other Notes

We have the usual crop of entries without covering letters, or with just a brief note; these include *M. J. Quintin, Wotton-under-Edge; D. Taylor, Harborne; Mrs. J. Brooks, Loughborough; M. Law, Chesterfield; J. H. Rosling, Bakewell; K. A. Burch, Plymouth; K. M. Rogers, Lutterworth; J. Doughty, Great Barr; and H. A. Londesborough.*

### Next Time

Deadline is *September 14*, and the address as ever: "SWL," SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. Meantime, your J. C. intends to get a little time in at the receiver!

# TOP BAND FOR NEXT TO NOTHING

G. C. DOBBS, G3RJV

THE author doesn't pretend that G3RJV is old as a call, but he can recall the time when radio amateurs boasted of how little their equipment cost, rather than how much. It is still possible to get by, and even achieve good results, on the amateur bands using simple and inexpensive equipment. Most of the members of the G-QRP Club will testify to this simple matter of fact.

This article shows one simple way in which it can be done (for many, familiar ground). This is the idea of using a simple commercial transistor radio receiver for use on the 1.8 to 2.0 MHz amateur band.

To begin one requires a medium-wave transistor radio, and one of the cheap "Far East wonders" will serve the purpose. There are many of these around, mostly tuning to around 1.6 MHz, so Top Band is not far away.

Usually these receivers have a ferrite rod or slab aerial and a medium-wave oscillator cunningly disguised as a IF transformer; most of these receivers are *pnp*, with a positive earth, so that configuration has been assumed for this article. The oscillator coil is usually in the can with the red blob of paint on the slug; it is sometimes possible to tune the core up to the band, but more often than not a little more work than this is required. The oscillator and mixer tuning range have to be changed and made to track over the band, and the required change is shown in the block diagram Fig. 1.

### Capacitive Method

One simple method is to replace the original tuning capacitor with a smaller value, something like a two-

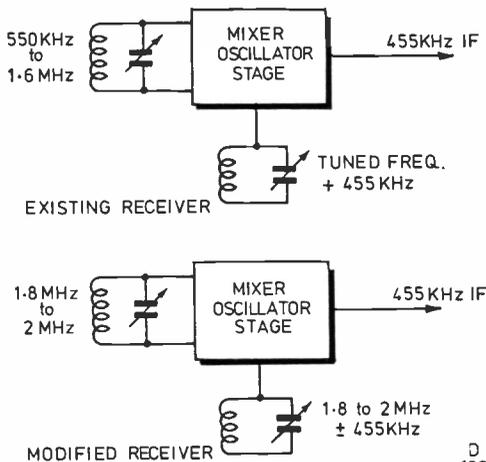


Fig. 1

D 132

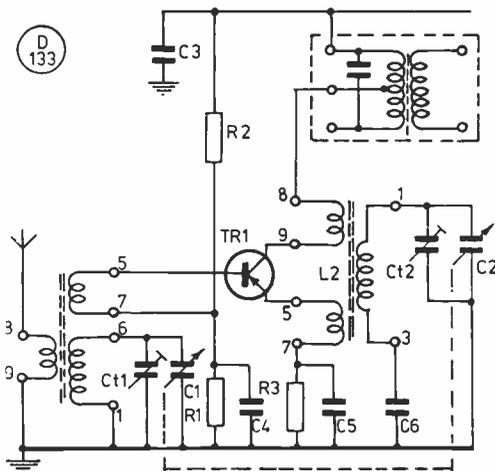


Fig. 2 ADDED MIXER-OSCILLATOR STAGE

### Table of Values

Fig. 2

- R1 = 2.7K
- R2 = 10K
- R3 = 1K
- C1, C2 = 350pF 2-gang variable
- C3 = 0.01 μF
- C4, C5 = 0.04 μF
- C6 = 1100pF
- Ct1, Ct2 = 3-30pF trimmer
- L1 = Denco Range 3T, blue
- L2 = Denco Range 3T, red
- TR1 = OC171

gang 25pF capacitor is ideal, and this can be done by experiment.

Another method was suggested by G5PP in a *MARS Newsletter*. In this the oscillator section is replaced by a 75pF fixed value, with the 25pF oscillator section of a two-gang capacitor in parallel.

The writer has found that turns may be taken off the ferrite rod aerial by experiment, but this method implies a new coil. A suggestion is 30 turns of 24 s.w.g. enamelled wire, tapped 4 turns from the earthy end for the input to the mixer base; this coil is wired in parallel with the other section of the 25pF tuning capacitor, and a small trimmer capacitor in parallel. If a low impedance input is required, a small coil of some 5 turns may be added on the top end of the rod.

The setting up may be done with a signal generator, a GDO, or by the simple "tune and listen" method. The dreaded *Loran* signal is a guide to finding the band!

### Inductive Method

This involves retuning the oscillator by changing the frequency of the coil. When the receiver is at the high end of the tuning scale, the oscillator will be on about 2055 (1600 + 455) kHz; by listening on the existing receiver, the oscillator can be checked, moved, and tracked by unscrewing the dust core. See how far it will go—it may go up to 300 to 400 kHz which will

give reasonable coverage of the low frequency end of the band.

It is now possible to use a two-gang, low value capacitor of 10 to 20pF as bandsread tuning (the original main tuning capacitor is set at full mesh and remains as a band set control). Remove turns from the ferrite rod coil to raise its frequency, or rewind the coil as above. A little experimental trimming or padding should enable the bandsread capacitor to tune the required portion of the band.

**New Mixer Method**

This is the most drastic method, but it has been found to be the best. It involves scrapping the complete mixer/oscillator stage and using the existing receiver IF and audio stages. One may wish to wind new coils, but it is much easier to use the well known *Denco* range of coils; with these coils it is possible to use the Range-3 coils and have a Top Band and Eighty metre receiver. The circuit for use with these coils is shown in Fig. 2.

For this modification the whole of the mixer/oscillator section is removed and this may, in some cases, involve cutting some of the tracks on the printed circuit board. It is sometimes possible to use the existing transistors, but generally it is simpler to scrap the whole lot, and build an outboard mixer/oscillator stage. (The author also used another two gang tuning capacitor with a simple epicyclic slow-motion drive). The coil makers recommend 350pF, but a two-gang 500pF component, with 1,000pF in parallel will perform the task. If only one band is required two 250pF trimmers can be used, with a two-gang 100pF main tuning control. The trimmers are set to give either 160m. or 80m. coverage. The new mixer/oscillator circuit feeds into the first IF transformer of the receiver, as shown in Fig. 2.

**BFO**

There are many suitable circuits for a simple BFO for the receiver, and one of the simplest is shown in

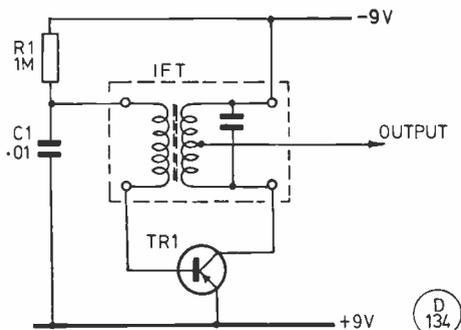


Fig. 3 SIMPLE BFO

**Table of Values**

Fig. 3

R1 = 1M	TR1 = OC44
C1 = 0.01 $\mu$ F	IFT = 455 kHz IF transformer

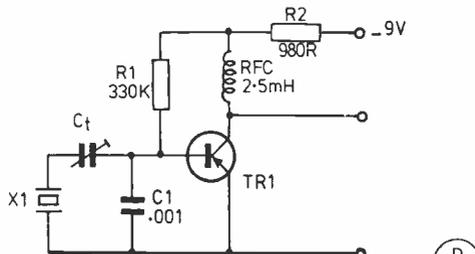


Fig. 4 CRYSTAL BFO OR CALIBRATOR

**Table of Values**

Fig. 4

R1 = 330K	RFC = 2.5 mH
R2 = 980R	Ct = 10-250pF
C1 = 0.001 $\mu$ F	TR1 = OC44
X1 = 500 kHz crystal	

Fig. 3; this is again *pnp* to match most of the Far East radios. Coupling the output to the receiver IF strip is a matter of experimentation (no coupling may be required if the receiver is close to the IF stages, or a single lead may be draped close to the final IF transformer).

**Birdie Problems**

Assuming that the BFO is on 455 kHz and that it will produce some harmonics, multiply by 4 and we have an output on 1820 kHz; a birdie right in the middle of a good spot on the band! It may help, but not fully solve the problem, to shield the BFO; a simple method is to move the IF frequency and the BFO frequency to a more suitable point. This will be in the band, but could be on a useless frequency, for example one used by commercial traffic.

Another method that is sometimes used is to retune the IF to 500 kHz (which is possible with many IF transformers); this will give a birdie at 2 MHz, right at the end of the band. This can have a secondary benefit, because it may be possible to build a 500 kHz crystal-controlled BFO; this will not only serve as a very stable BFO but also act as a useful band edge marker—see Fig. 4.

**Summary**

This article suggests some of the ideas for making use of inexpensive or surplus broadcast receivers for amateur band use: many other ideas exist in the "folk lore" of amateur radio.

If a low impedance aerial coupling is used, it is advisable to house the receiver in a metal box; electrical or mechanical bandsread can be added; it may be important to remove the AVC action of the receiver if a BFO is used. The best plan is to get your hands on an unwanted transistor radio and see what can be done. But a word of warning: avoid spending money! By the very nature of these receivers, only limited results can be expected, although G3RJV has found a cheap receiver conversion has coped with most UK CW work on Top Band.

## MEMORY ADDITION FOR THE G4CIK MORSE KEYS

INCREASING THE VERSATILITY  
OF THE KEYS DESCRIBED  
BY THE AUTHOR IN A  
PREVIOUS ARTICLE

N. HOULT, G4CIK

THIS article describes a 'memory' for the G4CIK Morse keyer [1], for use whenever a message has to be sent repetitively—CQ calls, contests, etc. Only minor modifications to the original keyer are necessary; the unit could probably be adapted to work with other keyer designs, but considerable changes to the logic of either keyer or memory might be required. Both the output speed and memory size may be chosen to suit the intended use; the prototype, built primarily for VHF meteor-scatter use, had two memories of 512 bits each (a dot and dot-space are stored as two bits) and an output speed range of approximately 12-120 w.p.m. As a guide to the choice of memory size, each half of the memory in the prototype could hold a message such as "CQ CQ de G4CIK G4CIK CQ CQ de G4CIK G4CIK AR PSE K."

### General Principles

This unit uses the simple technique of storing data in the memory exactly as it is to be sent; while it is possible to use more efficient techniques for storing the data to economise on memory space (two bits would be enough to hold either dot, dash, character space or word space), it was decided that the saving in cost of memory would probably be more than outweighed by the extra decoding logic required. A random access memory (RAM) with a binary counter to hold the address was used rather than a shift register, since RAM's are now available at very reasonable prices and give a more flexible design. The main design problem in a memory unit of this type is how to determine, as easily as possible, the start and end of the stored message, so that messages of arbitrary length may be sent repetitively without there being a long gap at the end in the case of a short message.

The start of the message is defined here as the start of the first dot or dash, *i.e.* there can be no leading spaces. This has two advantages: firstly, there is no problem in having a pause between operating the 'write to memory' switch and starting to send, and secondly the oscillator in the basic keyer, which times all 'writing' operations, may be allowed to start in the same way as it would in the original keyer. Once started (by sending a dot or dash), however, it must not stop at the end of a character or character space as normal (otherwise it would be impossible to send a word space), but must run continuously until the message ends; this function is provided by a simple bistable circuit. The end of the message is defined as a 'long' word space, about four times the normal length, which gives the desired effect and is easy to implement. A counter counts input clock pulses (one per dot or dot space etc.), and is reset during the sending of either a dot or dash. When it reaches a

predetermined value, writing-to or reading-from memory is stopped. To warn the operator if the message being written to memory is too long, writing is also automatically stopped when the memory (or section of it in use) is full.

### Circuit Description

The circuit is shown in Fig. 1. IC6 is the RAM, with IC5 and IC7 forming the address counter. This type of RAM has 1024 bits, addressed by ten address lines A<sub>0</sub> to A<sub>9</sub>; the nine least significant of these (A<sub>0</sub> to A<sub>8</sub>) are fed from the counters, while the most significant bit is selected by S1, thus giving effectively two independent memories of half the size. Details of how to change the memory size are given later.

IC10a and b, IC11c and IC9a switch the input to the address counter between the basic keyer oscillator (for writing) and IC10c and d, which form the oscillator for reading, the speed being adjusted by C1 (coarse and RV1 (fine).

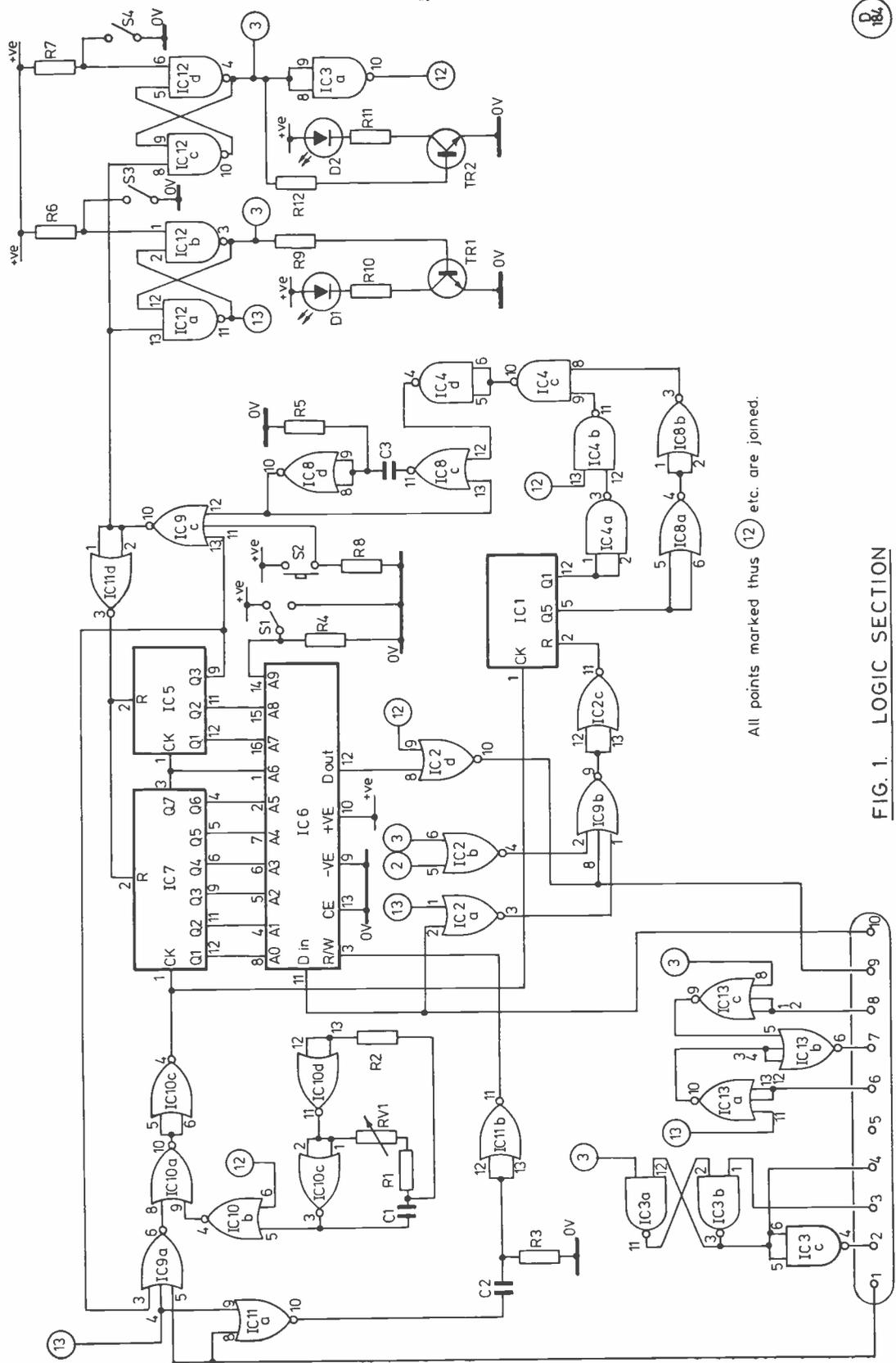
IC11a and b provide short pulses to the 'write' pin of IC6 half-way through the bit to be written, which minimises the risk of glitches on the input causing errors to be written to the memory. IC1 is the counter which measures the length of spaces, with IC2a, b, c and IC9b providing the necessary gating to reset it; IC4 ensures that one more space has to be detected on writing than on reading—this is necessary because the final space is not written to the memory. IC8a and b equalise the delay in the paths from the two outputs of IC1 to IC4c preventing the generation of spurious pulses there, while the remainder of IC8 forms a monostable to generate the pulse that resets all the counters etc.

IC12 forms two bistables to record the state of the unit (reading, writing or neither); these are set by the switches S3 and S4, and reset either by the memory becoming full, by the monostable IC8c and d, or by S2, which is a push-button switch providing an overall reset function, which may be used to interrupt a message before it ends if desired. S3 should be, if possible, a push-button or biased toggle switch; it only needs to be operated momentarily to set 'writing' mode. S4, on the other hand, should be a normal toggle switch. If this is operated only momentarily the message will be read out only once, but if it is left switched on, the message will be read out repetitively. Note that as the

Table of Values

Fig. 1

C1 = <i>see text</i>	IC1, IC5,
C2, C3 = 1nF	IC7 = CD4024
R1 = 39k $\frac{1}{2}$ W.	IC2, IC8,
R2 = 1M $\frac{1}{2}$ W.	IC10,
R3, R5 = 47k $\frac{1}{2}$ W.	IC11 = CD4001
R9, R12 = 47k $\frac{1}{2}$ W.	IC3, IC4 = CD4011
R4, R6 = 100k $\frac{1}{2}$ W.	IC6 = 2102 or equivalent
R7, R8 = 100k $\frac{1}{2}$ W.	IC9,
R10, R11 = 330 ohms $\frac{1}{2}$ W.	IC13 = CD4025
RV1 = 100k linear	S1 = SPDT switch
D1, D2 = LEDs	S2 = 1 pole, push-to-make
TR1,	S3, S4 = <i>see text</i>
TR2 = BC108 or similar	



All points marked thus (12) etc. are joined.

FIG. 1. LOGIC SECTION

bistable IC12c and d is reset by end of message, the keyer will, unless interrupted by S2, always send the message in its entirety regardless of the exact time that S4 was switched off. It is possible to combine S3 and S4 into a single two-way switch, as was done in the prototype, but note that a central off position is essential.

IC3b, c, d form the bistable referred to earlier which keeps the keyer oscillator running continuously, once started, in write mode, while IC13 switches other parts of the basic keyer to cope with this mode of operation.

Two LEDs are provided to indicate the current state of the unit; these are driven by TR1 and TR2, which are general-purpose *npn* transistors, as CMOS outputs are incapable of driving them directly. More such indicators could be added if desired (e.g. to show the memory address as a guide to how much space was left) by copying the same driver circuit.

### Power Supply and Output Circuit

One unfortunate feature is that the extra current taken by the RAM IC (about 30mA) is too large to enable the keyer to be powered *via* the key socket of the rig, as was possible before; it is doubtful if even the use of a CMOS memory would alleviate this problem (IC6 is NMOS). Therefore an additional external power supply will be needed. The original output circuit may still be used, bearing in mind that if this is done the power supply will have to be negative with respect to earth (no problem if batteries are used). The author, however, having changed his transmitter for one which needed a positive voltage switching to key it, decided to reverse the earth polarity of the basic keyer as described in [1], and change the output circuit to that shown in Fig. 2 (which does not need the output of the basic keyer inverting as described in [1]). This enables rigs which need a few milliamps at low voltage switching to key them (e.g. the Icom IC-202) to be keyed electronically, and any other type to be keyed *via* the relay RL1; a conventional reed relay was found adequate for speeds of up to 120 w.p.m. The resistor R3 was found necessary on the prototype to prevent the relay contacts sticking; its power rating should be consistent with the current being switched, and its value as low as possible—that shown is suitable for the FT-101B.

To avoid confusion over which side of the power supply is earthed, the two power connections are labelled "+ve" and "-ve" on all the circuit diagrams; the operation of the memory is unaffected by whichever of these is grounded.

### Sidetone Circuit

A sidetone oscillator is very useful on a device like this; Fig. 3 shows a suitable circuit, based on a popular toneburst design [2]. The frequency may be varied by changing C1—the value given is for about 1 kHz—while RV1 controls the amplitude. This may, of course, be added to the keyer independently of the memory unit if an external power supply is in use.

### Readout Speed

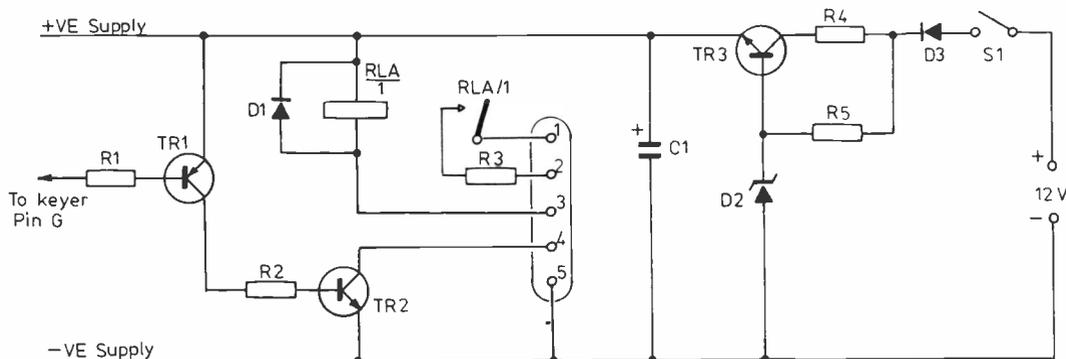
As mentioned earlier, the speed with which the contents of the memory are read out is controlled by C1 and RV1 in Fig. 1. The values given for R1 and RV1 give a 3.5 : 1 range, chosen to make the setting of RV1 not unduly critical at the high-speed end. If a greater range is required, C1 may be switched. The equations relating speed to the component values are approximately:

Speed (w.p.m.) = oscillator frequency (Hz)  $\times$  1.2 (i)  
 frequency (Hz) =  $444 / (C1 \times R)$  (ii)  
 where C1 is in  $\mu$ F, and R is the total resistance of R1 and RV1 in kilohms. Values for C1 of 0.1 $\mu$ F and 0.25 $\mu$ F will give a speed range of about 12 to 120 w.p.m. as used in the prototype.

Table of Values

Fig. 2

C1 = 100 $\mu$ F 16v. electrolytic	D1 = 1N914 or similar
R1 = 47k $\frac{1}{2}$ W.	D2 = 5.6v. zener, e.g. BZY88 C5V6
R2 = 1k $\frac{1}{2}$ W.	D3 = 1N4001 or similar
R3 = 33 ohms $\frac{1}{2}$ W. (see text)	TR1 = PNP silicon, e.g. BCY70
R4 = 27 ohms 1W.	TR2 = NPN silicon, e.g. BC108
R5 = 560 ohms $\frac{1}{2}$ W.	TR3 = BFY51 or similar
RL1 = reed relay, 5v. coil	S1 = SPST switch



Electronic keying: take output from pins 4 and 5

Relay keying: link pins 3 and 4 and take output from pins 1 and 2

FIG. 2 POWER SUPPLY AND OUTPUT CIRCUIT

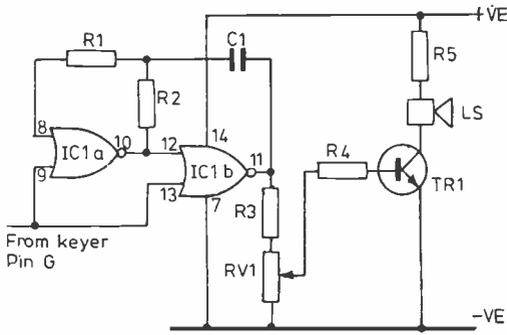


FIG. 3 SIDETONE CIRCUIT



**Table of Values**

Fig. 3

- C1 = 1.5 nF (see text)
- R1 = 1M  $\frac{1}{2}$ W.
- R2 = 330k  $\frac{1}{2}$ W.
- R3 = 12k  $\frac{1}{2}$ W.
- R4 = 47k  $\frac{1}{2}$ W.
- R5 = 390 ohms  $\frac{1}{2}$ W.
- RV1 = 10k log.
- TR1 = BC107 or similar
- IC1 = CD4001
- LS = 70 ohms loud-speaker, 2in. dia.

To calibrate the speed control, especially at the higher speeds, there are several methods available:

- (a) measure the oscillator frequency (at IC7 pin 1) either with a digital frequency meter or a calibrated oscilloscope, and use equation (i) above;
- (b) count the number of dashes sent in 5 seconds; this is, to a good approximation, the speed in w.p.m.
- (c) fill the memory completely, say with dots, and measure the time taken to read it out once. The speed may then be determined from:  
 $\text{speed (w.p.m.)} = 614/\text{time (secs.)}$   
 assuming a memory size of 512 bits.

**Memory Size**

Although the author has found the two 512-bit memories of the prototype adequate for his use, the available space may be expanded if necessary. There are two ways in which this can be done: the individual memories may be lengthened, or their number increased.

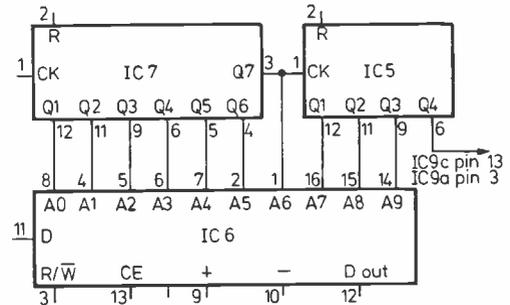
**Length:** The length of available memory may easily be doubled (at the cost of halving the number of memories) by feeding all 10 address inputs from the counter IC5/7, the connections to IC5 which detect the 'memory full' state being suitably adjusted, as in Fig. 4a. It is doubtful whether any further increase in length would be useful; 1024 bits corresponds to about a minute at 20 w.p.m.

**Number:** The 2102 RAM, in common with many others, has a 'chip enable' or  $\overline{CE}$  pin, which may be used to force its output to a high-impedance state, and disable writing to the IC, irrespective of the state of all other inputs. This makes increase in the number of separate memories very simple; all the IC's may have all pins except  $\overline{CE}$  connected in parallel, and be selected by connecting the  $\overline{CE}$  pin of the selected one to the -ve supply, all other  $\overline{CE}$  pins being connected to the +ve

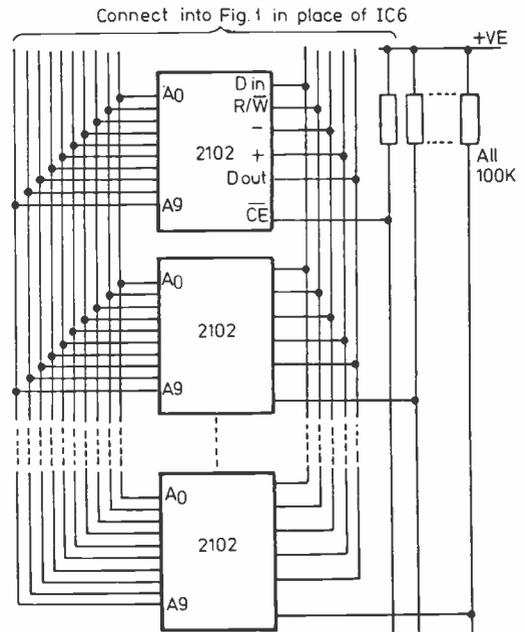
supply via suitable resistors, see Fig. 4b. Each IC may, of course, be used either as two 512-bit or one 1024-bit memories, as described earlier. The only point to note is that each extra RAM IC takes another 25-30mA, so the power supply regulator circuit may need modification. It may be more convenient to use a 5v. IC 3-terminal regulator for this job if several RAM's are to be used.

**Modifications to the basic keyer**

The essential changes are shown in Fig. 5, which is self-explanatory. However, there are other modifications which may be made if the keyer and memory are to be built as a single unit; these consist of the elimination of components which are then redundant, and some



(a) DOUBLING THE MEMORY LENGTH



(b) INCREASING THE NO. OF MEMORIES

FIG. 4 MEMORY EXPANSION



changes which reduce the impedance of various parts of the circuit, giving a possible increase in reliability (and stability of speed) under damp conditions; this is made possible by the use of an external power supply. They are as follows (numbering as in Fig. 3 of [1]):—

- R3, R4 — remove
- R5, R6\* — change to 27k (value not critical)
- R1 — change to 470k
- R2 — change to 12k
- RV1 — change to 100k linear
- C1 — change to 1 $\mu$ F polyester

\* or their equivalents in the positive-earth version

**Construction**

As with the standard keyer, layout is completely non-critical due to the slow operating speeds, but good screening is essential to prevent RF pickup. The memory unit may be built into the same box as the keyer, as with the prototype, or as a separate unit; in the latter case an 11-way lead will be required between the two (the 9 connections shown in Fig. 1 and the two power supply connections) and this should be as short as possible. A plug, wired as in Fig. 5, will also be required to restore normal operation with the memory unit disconnected. However, it may be possible to dispense with this if each of the pairs of pins 2 & 3, 4 & 5 and 7 & 8 on the socket in the keyer are linked with a resistor of 100k or so. This, being small compared with CMOS

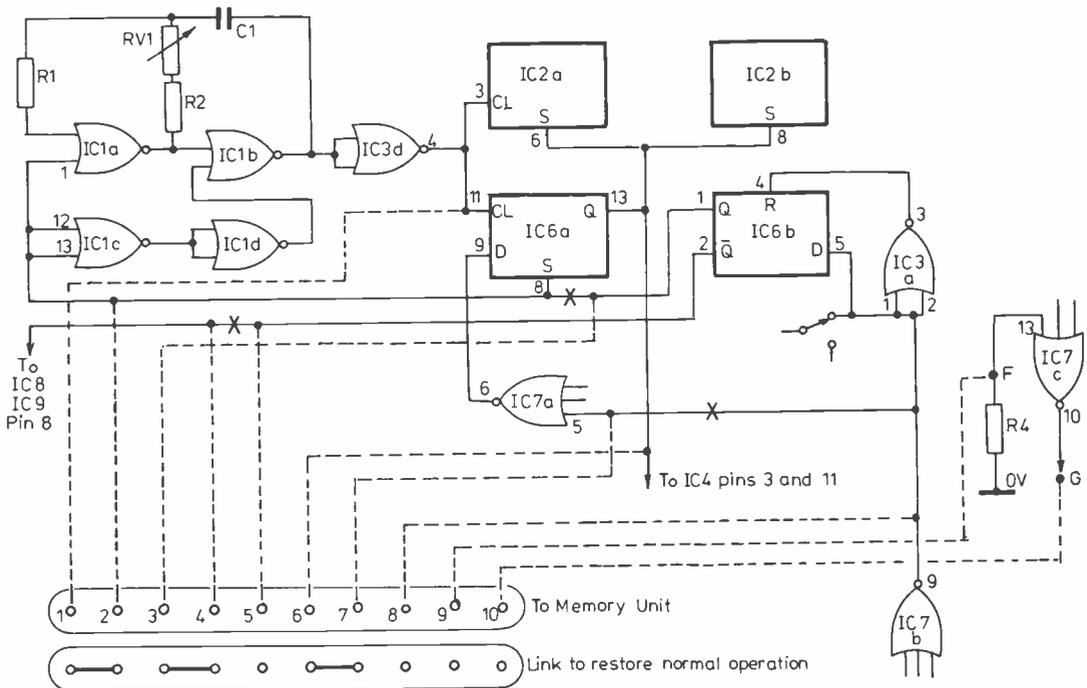
input impedances, would act as a short-circuit when the memory unit was disconnected, providing the required links for normal operation. Also, with the memory unit connected, the resistors would merely act as a small additional load to the logic circuits, as CMOS output impedances are much less than 100k. However, this has not yet been tested in practice.

**Testing**

After checking that the power supply current is normal (about 25mA for each memory IC used), test the basic keyer to verify that it is working normally and any new output circuit is functioning correctly. Then operate S3 briefly, putting the unit in 'write' mode, checking that D1 lights and remains lit—if not, check the wiring to IC12 and TR1. Send some letters, and check that a little while after stopping D1 goes out; if it does not, check the circuitry around IC1, IC4 and IC8. If there is any difficulty in sending characters after word spaces check IC13 and its associated circuitry.

Next operate S4, and check that D2 lights and the keyer repeats the message just sent until S4 is released, only stopping at the end of the message. Any problems associated with the detection of 'end of message' are probably a fault in the IC1, IC4, IC8 circuitry.

If for some reason the unit fails to work correctly and the above suggestions do not help, the waveforms at various key points may be checked with an oscilloscope.



Only relevant IC's and pin numbers are shown.

X — connection to be broken. - - - - connection to be added.

FIG. 5 MODIFICATIONS TO THE BASIC KEYER

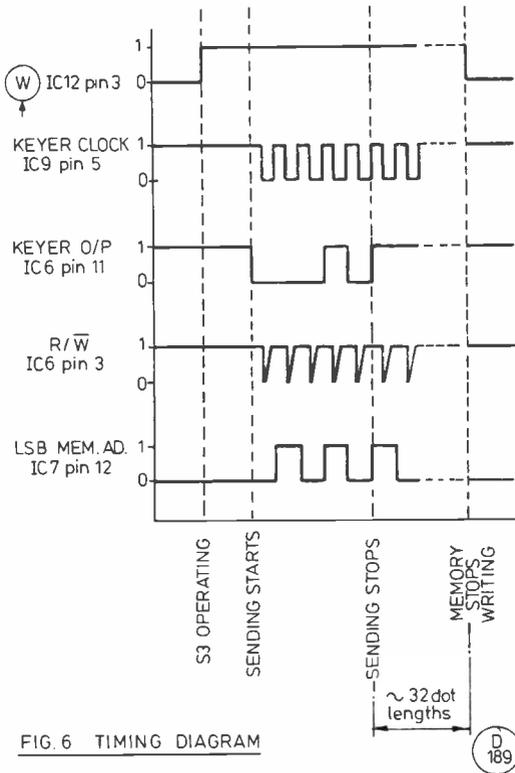


FIG. 6 TIMING DIAGRAM

Fig. 6 shows the waveforms that should be observed during writing; the pulses shown on IC6 pin 3 are of about 50 micro-second duration. If writing is satisfactory and IC10c and d are oscillating there are unlikely to be any problems in reading back.

- References  
 1—"A CMOS Morse Keyer" by N. Hoult, G4CIK, *Short Wave Magazine*, December 1977.  
 2—"Toneburst Generator using IC's" by G. B. Packer, *Radio Communication*, December 1973.

(Note: Copies of the referenced issue of "Short Wave Magazine" are available from the Circulation Dept., at 50p including postage and packing).

## THE MONTH WITH THE CLUBS

BY 'Club Secretary'

AS your scribe begins this piece for another month, with thoughts inevitably wandering in the direction of warm sun and water, his mind is brought back to the present (and future) by a copy of some sample questions, sent by the City & Guilds of London Institute, for the 1979 new-style R.A.E. examination. We note, if the sample is a fair one, that the proportion of time spent on the "Licensing Conditions and Interference" section of the examination is increased to one-third of the total,

and that in Section 2 (the "technical questions" as we used to call them) a significant addition to the syllabus is "Operating Practices and Procedures." By the same post also we have a letter from G8CVR, who has been somewhat involved with this type of paper in the past. It seems to us that those who are intending to take R.A.E. classes this year should get in touch with the C. & G. authorities for copies, so that they too can get a "feel" for the task in its new form. The address is 46 Britannia Street, London WC1X 9RG. And, we feel sure, Frank Fear G8CVR, 185 Longwood Road, Aldridge, Walsall WS9 0TB, who knows about the way in which the R.A.E. course will be oriented to the new syllabus, because he is running the local one, and who has been in contact with C. & G. on the subject to a considerable extent would be pleased to help any part-time R.A.E. class teacher who may find himself in difficulties.

### The Mail

Divided this time into Southern, Scotland and North, West and wester, and the others! So, let's start with the Southrons.

Top of the clip come **Cheshunt**, who are at the Church Room, Church Lane, Wormley, every Wednesday. They will take part in SSB Field Day, and on September 6 and 20 it is a natter and CW practice evening. September 13 sees a talk on Spectrum Analysis by G8ATB, leaving room for a Junk Sale on September 27, ready for the winter projects.

On to **Verulam**, and their *Newsletter* records July as possibly the busiest month in the history of the club, and perhaps that is why it doesn't do much looking forward this time. However, the Hon. Sec. writes to let us know that on September 28, in the Market Hall, St. Albans G3LXP will be talking about his knowledge of two and four-metre transverters—and if we know much about him we'll make a sure guess he will prove his words with examples for the group to see.

There are get-togethers on September 1, 15 and 29 for **West Kent**, the venue being the Adult Education Centre, Monson Road, Tunbridge Wells. The first date will be down to G8CDD on "Current IC's and their Application in Communication," while the middle date is a D/F hunt on two metres (for which the assembly point is the car park at the rear of Marks & Spencers shop). September 29 is an Open Evening with film, talk, a display of gear for all pockets, live demonstrations, and the possibility of arranging visits to members' shacks. In other words a big "showing the flag" exercise, not just to collect new recruits, but to tell the world about our hobby as it *really* is. All these are on Fridays, and on the Tuesday following each of these Fridays there is an informal session at the Drill Hall, in Victoria Road.

After a fall in attendance through the winter, the **Basingstoke** crowd are getting 'em all back, plus some new chums as well—the third Wednesday in each month is the date, and the place Chineham House, Shakespeare Road, Popley, Basingstoke, starting at 7.30 p.m. An extra activity in September will be the Basingstoke Show, where on September 23-24, they will have GB3BSS on the air.

**Stevenage** are based at the Hawker Siddeley Dynamics canteen in Gunnels Wood Road, where on September 7 G8KMG will explain just how he got started in the game; while on September 21 G8LWC will be talking about

Microprocessors.

A serious note is struck at Acton, Brentford & Chiswick, where on September 19, they have a discussion on WARC 79 and its implications. This will be, as ever, at Chiswick Trades and Social Club, 66 High Road, Chiswick, London W4. We confess to being rather surprised that more clubs have not taken more interest in this subject, bearing as it does on the whole future of the hobby.

A tape lecture by G6CJ on Aerials is a poor substitute for his celebrated "Aerial Circus" lecture, done by Dud for so many years but now, alas, reduced to a very small number of visits as age takes its toll. However, even on tape-and-slide he is still interesting, as Southdown will find on September 4, at Chaseley Home, South Cliff, Eastbourne. In addition, there is another trip to the Rouen club set down for September 30/October 1.

Southgate are at the Scout Hut, Wilson Street, Winchmore Hill, on the second Thursday of each month, and new members are always welcome, particularly if they contact the Hon. Sec. first—see Panel—so he has advance warning. This is a very good idea indeed, and could be adopted by other clubs, and by chaps who are thinking of paying a visit for the first time; then there is no excuse on either side for the oft-repeated plaintive "But nobody spoke to me!"

After an August break, at least as far as the Marle Place evenings go, the Mid-Sussex gang reconvene there on September 7, for an evening of slides and talk by G5RV about his holiday in South America. Informals are held at members' homes, and so before any considera-

tion is given to attending one of these, contact the Hon. Sec.; but no such problem arises with G5RV's talk because it is at the Hq. address at Marle Place in Burgess Hill.

The September dates for Sutton & Cheam are all taken at Ray's Social Club, London Road, North Cheam; Sutton College of Liberal Arts come back into the picture the following month. Wednesdays, September 13 and 27 are noted, but at the time of writing it would appear that the details were still outstanding. Doubtless the Hon. Sec. at the address in the Panel would be only too pleased to help.

At Chichester the routine is to have a meeting in Room 34A, the Lancastrian wing, Chichester High School for Boys, Basin Road, Chichester. On September 5, G8JVE will be showing them how to make a printed board, and on 21st the theme will be Autumn Projects.

Over to Crawley where we see dates—like September 13 *chez* G3MER/G3MGL—but no note of a formal date, so perhaps if you intend to look them up you should first contact the Hon. Sec. at the address in the Panel.

Not far away is Reigate, who have their 'Natter Nites' at the Marquis of Granby, and their formal sessions at the Constitutional Centre, Warwick Road, both in Redhill, on the third Tuesday.

There's no messing about with the Harrow chaps, who have it clear on the front cover—every Friday evening at the Harrow Arts Centre, High Road, Harrow Weald, Middlesex. Inside the covers there is an article on the question of legal action and the Wireless Telegraphy Act. It is generally assumed that the amateur

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PLYMOUTH: R. Hooper, G3SCW, Station House, Tavistock North, Tavistock, Devon PL19 0EW.

REIGATE: F. H. Mundy, G3XSZ, Westview, rear of Manor Farm, off Reigate Road, Hookwood, Surrey. (Horley 73878.)

SOUTHDOWN: B. Chuter, G8CVV, 15 Coopers Hill, Willingdon, Eastbourne, East Sussex BN20 9JG.

SOUTHGATE: J. Fitch, G8EWG, 16 Kent Drive, Cockfosters, EN4 0AO. (01-440 7353.)

SOUTH MANCHESTER: W. L. Seddon, G3VIW, 12 Barwell Road, Sale, Cheshire M33 5FF. (061-973 3355.)

STEVENAGE: T. J. Tugwell, G8KMV, 11 The Dell, Stevenage, Herts. SG1 1PH.

SURREY: R. Howells, G4FFY, 7 Betchworth Close, Sutton, Surrey SM1 4NR.

SUTTON & CHEAM: J. Korndorffer, G2DMR, 19 Park Road, Banstead, Surrey. (01-255 8729.)

TORBAY: M. Yates, G3UIQ, 2 Lower Coombe Road, Blindwell Park, Kingsteignton, Newton Abbot (3025).

VERULAM: B. Pickford, G4DUS, "Netherwood," 130 The Drive, Rickmansworth (77616), Herts.

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YEovil: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset.

YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

cannot act alone but must pass his complaint to the Home Office who may initiate a criminal action; however, the article goes on to show where a civil action may exist, and who may bring such. We feel that this brief paper could well be in the possession of every club in the country, and its advice taken. For example, a radio amateur whose signal is interfered with—not just the repeater case but the colour TV time-base: QRM?

**Wessex (Bournemouth)** have their place at the Dolphin Hotel, Holdenhurst Road, Bournemouth, 7.30 for an 8.0 p.m. start. September 1 sees an Auction Sale and Junk Sale, plus a talk on "First Aid for Electrical Shock," by G8ASX. September 15 promises to be really interesting—"Print-out equipment for RTTY transmissions, and developments which will be available on the amateur radio market soon," by Alan Brown, G3NUN, who will both explain and demonstrate.

The *T.S. Terra Nova*, 31 The Waldrons, South Croydon is the Hq. of Surrey, on the first and third Wednesdays in each month; we hear September 6 is down for a Surplus Equipment Sale, but the forward programme stops short at that point, so a contact with the Hon. Sec.—see Panel—would give you the latest information on the situation.

#### Westerly

Our first port of call is with **IRTS Region 1**, who puts out the sort of *Newsletter* which will go on for ever—or almost, anyway! Nothing pretentious, but simple and sensible, so that an editor can run it without tears. Perhaps the prime item to note this time is the respects paid to the late EI9F, Bill McIlwaine, who died on June 6 after a short illness. He had been a stalwart member since those far-off days in 1926 when IRTS was first formed, licensed since the early thirties, an addict of the key and home-brew, who served on many committees and in no small way helped to swell the numbers of EI callsigns. For details of anything to do with amateur radio in Ireland, we suggest you get in touch with the Hon. Sec.—see Panel.

For **Cornish**, the date to be remembered is the first Thursday in each month, and the venue the *SWEB* Clubroom, Pool, Camborne. At the time of writing we do not have the details of the September meeting, but it will doubtless be obtainable from the Hon. Sec.—see panel.

Now we go to the border country, and first to **Blackwood**, who are at Oakdale Community Centre, near Blackwood, Gwent. It seems to be a routine of every Friday, and highlighted this month are September 15, when GW3KYA and GW3PFV will put out a tape-and-slide presentation entitled "The Privileged Ones." A week later all is put to one side in favour of Convention preparations. The last date mentioned is September 29, when they have the AGM. Over and above all this, they will be running an R.A.E. and Morse class, and of course the club station which operates on HF and VHF.

Just up the road is **Newport**, who have Mondays at Brynglas Community Centre, Brynglas Hill, Newport, Gwent. On the same evenings they have an R.A.E. class—possibly this is the same one as that mentioned for Blackwood, but if not a glorious chance for a local candidate to get in two lots of teaching!

We head now down to **Plymouth** who have a new

Hq., which is the TAVR Centre, Lambhay Hill, Plymouth; and a new Hon. Sec. who wants to know just how much "gen." we need for this piece. Simple and easy—just a note of the dates for the month in question, which ones have which activity, a note of the Hq. address and a note of the Hon. Sec. and his address and 'phone number. History, unless it's something big, is not normally mentioned here, if only because the locals will know about it, and the folk scanning through for a local group to join would prefer to know what's in the wind for the coming month! However we must return to the Plymouth gang, and announce a change to fortnightly meetings every other Monday from July 17, when they went into the new place. One hopes the shift from Tuesdays won't upset too many regulars, or find too many who already have standing arrangements which cannot be broken—always a problem when it comes to a change of routine.

We hear that G6CJ is bringing his "Aerial Circus" out of retirement, for Yeovil, on September 14. September 7 is down to G3MYM to talk about "recruiting new members," and on 28th the competition for the best ten-metre design will be held, with G3MYM as the judge. The club net is on 3-660 kHz, on Sunday mornings. Find them in Building 101, Houndstone Camp, from 7.30 each Thursday.

Heading now to **Torbay**, we see the Hq. address is Bath Lane (rear of 94 Belgrave Road, Torquay). The monthly Saturday session will be on September 3, at Hq., when G4FCN will talk about and demonstrate Slow-Scan TV. They are also pleased to have recruited some new faces among the younger element, who are keen to help out with the chores. In addition to the Saturday session, they hold other evening meetings for which we must refer you to the Hon. Sec., at the address in the Panel.

#### Deadlines for "Clubs" for the next three months—

(For October issue—August 25th)  
 For November issue—September 29th  
 For December issue—October 27th  
 For January issue—November 24th  
*Please be sure to note these dates!*

#### Midlands up to Scotland

A large lump indeed—but it yields a pile about the same size as the South-Easterlies.

Our first is **Macclesfield** who say they have a membership of 52 "but we have decided to double this in the year." Such optimism and faith deserves a reward. They have a place at the Old Millstone Inn, next to Macclesfield station—Tuesdays formal, Friday ones more relaxed, is the general routine, and it sounds as though the chap who has the pub is a keen type himself. They have an R.A.E. course set up for the autumn, under G3TPW and at the local Technical College.

At **Cheltenham** the combined group will be at the Old Bakers, Chester Walk, at the rear of the public library, and on September 7 when they will be receiving Lord Wallace of Coslany. After that comes September 15—no mistake about either date—when Eric Mollart will be talking about D/F, a subject on which he is more than a bit knowledgeable, having been in the top echelon of

the sport for twenty years or so.

Although they are sticking to the usual routine of a get-together each Thursday evening, at the Sherwood Community Centre, Mansfield Road, Nottingham are not committing themselves. They have activities fixed up for all dates but are holding everything open in the hope that someone from RSGB will be able to come along and talk about WARC 79.

Another gang with a new Hq. is Bolton where they are now booked in to the Horwich Leisure Centre, on September 6 and 20. The former date falls on the local holiday week and so will be a natter evening; but on 20th there will be a discussion on Raynet, with a view to setting up a possible exercise.

The White Rose group have outgrown their old Hq. at 83 Town Street, Armley and will be, by the time this is being read, at Moortown Rugby Club, Moss Valley, Alwoodley, Leeds 17, where they have a 200-seat lecture room, ballroom, use of the bars, and lots of space for aeriels.

September 6 sees the resumption of activities by the Kidderminster group after their summer recess; the venue will be the Youth Centre, Bromsgrove Street, Kidderminster, for a discussion on the club construction project. This is followed on September 20 by an evening on the air with the HF band rig.

South Manchester are doubtless very pleased to report enough progress on the club shack to be able to resume the Monday evenings there. As for the Fridays, on September 1, G3SMM, as the regional representative for Region 1 of RSGB, will be reviewing RSGB activities, while on 8th it is back to the technical stuff with G8LQO discussing A Simple Digital Frequency Meter. September 15 has a nice title for the talk: "Watts a dB—some Sound Information"—no spelling mistake, we are assured! On 22nd some 30 members have a limited-number visit to the Granada TV Manchester set-up. The month is finished for them on September 29 by a Surplus Equipment Sale.

Yet another R.A.E. class for mention, this time at Bury where it is being taken at Bury Metropolitan College of Further Education. However to return to the club and its own affairs, we note they are still based at Mosses Centre, Cecil Street, every Tuesday evening, with a whole gamut of interesting activities planned, a lecture being thrown in once each month; the September 12 effort is on HF aerial systems.

York were the victims of Murphy's Law as far as their station at the Great Yorkshire Show at Harrogate went, at which the chosen dates were, sadly, three very flat days for HF conditions. However, things *could* have been worse, for at one time they were, to use their own phrase, "knee deep in VP8's"—visitors to the show, not QSO's! To return to their normal activities, they are to be found on every Friday except the third, at the United Services Club, 61 Micklegate, York.

Every Wednesday evening the Derby crew get together at 119 Green Lane, Derby; September 6 for a Junk Sale, and a tape/slide talk on September 13. A chat on English Churches makes a change from radio on 20th, and on 27th there is a New Members Night.

The Wolverhampton Hq. is at Neachells Cottage, Danescourt Road, Stockwell End, Wolverhampton, where on September 4, G6GR will reminisce about the

early years of DX working, followed on 11th by a Natter Nite. September 18 is set apart for an evening on the air, on UHF only for a change. The committee meeting is on 25th.

There's one thing the *Newsletter of Northern Heights* does not do, and that is to discuss the programme! We can however say that they have a booking at the Peat Pitts Inn, Ogden, Halifax, on alternate Wednesdays. For the rest, try the Hon. Sec.—see Panel.

The exact opposite is the case with the *Norfolk Newsletter*, which carries a separate sheet giving all the plans for the rest of the year plus a note that late changes will be notified in "Whats On" in the *Eastern Evening News* the previous evening. September 6 is to G2BCX on Aerial Design, and on September 13 it's *Oscar*, the talk being given by G3IOR. September 20 is an informal with CW tuition available, and on 27th there will be a Surplus Equipment Auction. The Hq. is at Crome Community Centre, Telegraph Lane East, Norwich.

"At last the renovations to the building have been completed," exults the *Hereford Newsletter*, which goes on to discuss the cleaning-up operations which now have to be done. However, by the time you get to read this, it will all be history, and so the first and third Fridays can be devoted to other things: September 1 is down for a Constructional Contest. Hq. is at the Civil Defence Hq., Gaol Street, Hereford.

#### Finale

The deadline, as always, is in the 'box', and the address is "Club Secretary," SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. Meantime, enjoy yourselves!

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#### SPECIAL EVENT STATIONS

GB3TCF, at the Town and Country Festival, National Agricultural Centre, Stoneleigh, Kenilworth, Warks., 26th-28th August; operating from 0900-2100 on 26th and 27th, 0900-1700 on 28th. Continuous operation on 160m. and 2m., 0900-1100 on 20m. or 15m., 1100-1500 on 80m., remainder of day on 20m. or 15m., QSL cards issued for all contacts. Talk-in on 145.55 MHz (S22), the Centre is situated on the A444 near Kenilworth. GB3NBH, at the North Bristol Model Railway and Hobby Exhibition, 13th-14th October, operating on HF and VHF; QSL cards will be issued, incoming cards should be sent to G8BKR (QTHR). Further details available from G8BKR.

The 1978 *Welsh Amateur Radio Convention*, on 24th September, will be held as usual at Oakdale Community College, Oakdale, Blackwood, Gwent, and among many items will be a film on the 1978 Clipperton Island DX-pedition and an illustrated lecture by S. Cherry, G3SJK, of the Appleton Laboratory, entitled "Telemetry Communications from High Altitude Balloons using Low-Power HF."

**Silent Keys:** It is with great regret that we record the passing of W. R. Longmire, G3TKL, and Robin Sinclair, G3VAD.

## COURSES FOR THE R.A.E., 1978-79

- Bangor (Co. Down):** At Bangor Technical College, Monday and Thursday evenings, starting second week of Sept., enrolment from Sept. 7. Further details from college, or course tutor, C. Billington, G13WSS, QTHR (Tel: Holywood 4277).
- Belfast:** At Belfast College of Technology, College Square East, Belfast, Theory and Practical on Tuesdays 5.30-8.30 p.m., also Morse if required, enrolment early Sept., full details from course tutor, J. Wilson, at the above address.
- Birkenhead:** At North Wirral College of Technology, Borough Road, Birkenhead, Thursdays at 6.45 p.m., enrolment Sept. 4-11 or at class meetings, course lecturer D. E. Owen, G4GGB. Contact Dept. of Electrical Engineering for further details.
- Blackburn:** At Blackburn Technical College, Wednesday evenings commencing end of Sept., enrolment Sept. 6-8 at the college (Feilden Street, Blackburn). Full details from the lecturer, H. Leeming, G3LLL (Tel: Blackburn 40762 evenings, Blackburn 59595/6 day-time).
- Birmingham:** At the Bournville Institute, Selly Park Centre, Pershore Road, Birmingham, Thursdays at 7.15 p.m. Contact the lecturer, R. Blacker, G4GBE, for details (QTHR).
- Borehamwood:** At Borehamwood College of Further Education, Elstree Way, Borehamwood, Tuesdays and Thursdays 7-9 p.m., starting Sept. 26, enrolment 4-8 p.m. Sept. 13-14. Lecturer, G. L. Benbow, G3HB.
- Burgess Hill:** At Marle Place Adult Education Centre, Leylands Road, Burgess Hill, W. Sussex, Tuesdays at 7.30 p.m. commencing Sept. 19, tutor F. R. Canning, G6YJ. Full details from the Centre, ring Burgess Hill 6355.
- Bury:** At Bury Metropolitan College of Further Education, Market St., Bury, starting Sept. 25 in Room A18, enrolment evening Sept. 7 (time not given), lecturer G8NOF. Contact E. Thirkell, G4FQE, QTHR, for details.
- Canterbury:** At Canterbury College of Technology, Mondays 6.30-9 p.m., enrolment Sept. 8 and 11, course tutor G3LCK, from whom details may be obtained (QTHR).
- Crawley:** At Sarah Robinson School, Ifield, Crawley, W. Sussex, Mondays 7-9 p.m. starting Sept. 25, enrolment Sept. 13-14. For further details contact R. Scrivens, G3LNM, Crawley 22540.
- Dover:** At South East Kent YMCA, Leyburne Road, Dover, starting Sept. 25 at 7.30 p.m. Ring P. Pennington, G4EGQ (Dover 203000/206138) for full details.
- Dudley:** At Dudley Technical College, Dudley, enrolment 6.30-8.30 p.m. Sept. 5. For full details contact N. Lee (Head of Department), Dept. Electrical Engineering and Science, Dudley 53585.
- Hatch End:** At Hatch End High School, Hatch End, Middx., starting Sept. 27, including Morse, enrolment at Nower Hill School Sept. 16 and 19. Course tutor D. T. Busby, G4HFC.
- Hemel Hempstead:** At Dacorum College, Marlowes, Hemel Hempstead, Tuesdays at 6 p.m. commencing Sept. 12, enrolment Sept. 4-5. Course organiser C. Burke, G3VOZ. (Tel: Hemel Hempstead 833300.)
- High Wycombe:** At Buckinghamshire College of Higher Education, Queen Alexandra Road, High Wycombe, enrolment 9.30 a.m. to 8 p.m. Sept. 4. Enquiries to R. A. Stringer, G3IOZ (School of Engineering) at the above address.
- Knottingley:** At Knottingley High School, enrolment Sept. 11 (new syllabus), lecturer A. E. Ashby, G3HCW.
- Leamington Spa:** At the Mid-Warwickshire College of Further Education (Dept. of Engineering), Warwick New Road, Leamington Spa, enrolment Sept. 7 and 8. Contact Dr. C. A. Smith, Head of Department, at the above address, for full details.
- London (Acton):** At Acton Technical College, High Street, Acton, London W3 6RD, Wednesdays at 6.30 p.m. Details of enrolment and date of commencement from the college. Course instructor W. G. Dyer, G3GEH.
- London (Camden Town):** Organised by the Grafton Radio Society, at the Holloway Institute Annexe, Highgate Hill, London N.19, Mondays 7-10 p.m., starting Sept. 18, enrolment Sept. 11-15. Further details from Course Lecturer, B. C. Bond, G3ZKE, QTHR. (Tel: 01-485 7065).
- London (Merton):** At Merton Technical College, Morden Park, London Road, Morden, Surrey, Tuesdays 7-9.30 p.m. Morse, Wednesdays 7-9.30 p.m. Theory; enrolment Sept. 11-12, 2-4 p.m. and 6.30-8.30 p.m. Course tutor C. E. Travers.
- London (Paddington):** At Amberley Road Adult Education Centre, Mondays and Thursdays (with Morse) starting Sept. 18, enrolment Sept. 7-8 and 11-13. Course tutor D. T. Busby, G4HFC.
- Loughton:** At Loughton College of Further Education, Borders Lane, Loughton, Essex (01-508 8311), Tuesdays 7-9.30 p.m., commencing Sept. 19, enrolment Sept. 5-7 from 6-8.30 p.m. or at first class.
- Macclesfield:** Contact S. R. Webb, G3TPW, 110 Grasmere Road, Royton, Oldham, Lancs. OL2 6SW, for full details.
- Manchester (Openshaw):** At Openshaw Technical College, Whitworth Street, Openshaw, Manchester, Tuesdays at 6.45 p.m. (including Morse), enrolment Sept. 4-6 from 6-8 p.m. Course tutor A. B. Langfield, G3IOA.
- Manchester (Swinton):** At Moorside High School, East Lancashire Road, Swinton, Manchester, Thursday evenings commencing Sept. 28. Details from P. Whatmough, 061-794 3706.
- Morley:** At the Technical Institute, Fountain Street, Morley, W. Yorks., Monday evenings commencing Sept. 18. Further details from D. Parker, G4DZU, QTHR.
- Motherwell:** Organised by Mid-Lanark A.R.S., Wrangholm Hall, Community Centre, Jerviston Street, New Stevenson, Motherwell, commencing Sept. 8 at 7 p.m. Instructors will be GM8FHK and GM8LRL.
- Newcastle-upon-Tyne:** At the Gosforth Adult Association, Gosforth High School, Gosforth, Tuesdays and Thursdays 7-9 p.m. Full information from course tutor D. R. Loveday, G3FPE (Tel: Newcastle-upon-Tyne 668439).
- Newport (Gwent):** Organised by the Newport A.R.S., at Brynglas Community Centre, Brynglas Hill, Newport,

Gwent, Mondays at 6 p.m. commencing Sept. 11. Further details from M. L. Busson, GW8MER, QTHR.

**Northampton:** At Duston Adult Centre, Duston Upper School, Northampton, Tuesdays 7-9 p.m. starting Sept. 26, enrolment week commences Sept. 11 from 7 p.m. Fee for 20 weeks, £12. Course instructor D. Watton, G4AYZ, QTHR (Tel: 0604-33834).

**St. Helens:** At St. Helens College of Technology, Monday and Thursday evenings, enrolment Sept. 4-6 from 6-8 p.m. Ring E. H. Lewis, G3OCCG, at the college (St. Helens 20831), or at home (St. Helens 52926).

**Slough:** At Langley College of Further Education,

Station Road, Langley, Slough, Mondays 5.30-8.30 p.m., Thursdays 7-9 p.m., enrolment Sept. 12-13 from 12.30-8 p.m. Full details from E. C. Palmer, G3FVC, Senior Lecturer at the College (Slough 49222).

**Stockton-on-Tees:** At Stockton-Billingham Technical College, Oxbridge Avenue, Stockton-on-Tees, Mondays 6.30-9 p.m. Full details from J. Ross, G3WWG, Dept. of Science. (Tel: 0642-552101).

**Walsall:** At Walsall College of Technology, St. Paul's Street, Walsall, commencing October, enrolment Sept. 6-8 and 11. Ring Walsall 25124 for further information.

## GEOFF WATTS

### PROFILE OF A DEDICATED MAN

LAST October, we heard about our old friend Geoff Watts being elected to the CQ "Hall of Fame," an award given only to those who have done something very important in the world of the DX fraternity.

In Geoff's case, that "something very important" was for many years, his weekly *DX News Sheet*. It took him on average 72-80 hours each week of his own effort, not to mention the additional effort turned out by his XYL Marjorie, and typist Joy. For fifteen years, up to autumn 1976, *DX News Sheet* was eagerly awaited, to see if that rare country was going to be activated, or perhaps to note whether another station had managed the QSO. The circulation was some 1250 at that time, and the subscriptions came in in about twenty different currencies: that alone took many hours of work each week. In order to make "News" in the title into reality every week, Geoff had to scan every report-form and every other DX information source he could, not to mention listening himself on the air for the various expeditions.

When it is realised that up to 1969, Geoff ran his own radio-repair business (only given up because of failing eyesight), all the above takes on an extra meaning. Geoff had, for many years, got *DXNS* out on the scheduled day only by doing a twenty-hour stint each week. This effort was made insufficient in the end, by the efforts of the Post Office when they ceased Sunday collections—this meant that much of the preliminary work which had been done on the Monday could not now be done until Tuesday: to add insult to injury, the 0030 to 0130 Wednesday morning collection which had served so well was cut back, so the material had to go out by 2215 Tuesday if it was to be in readers' hands at the proper time.

This in fact was the reason for the original *DXNS* coming to a halt. Geoff was willing to carry on, despite using four, progressively-stronger pairs of glasses, but the headaches and the effects of the extra concentration involved in working at almost twice the earlier speed took their toll: on September 8, 1976, in the small hours, the doctor was called in. The upshot was, essentially, that Geoff—and *DXNS*—were out of action until early 1977; and when they did come back it was to a UK-only circulation, and more a QSL directory than a news-sheet. The circulation was well down now, as the time had

been cut back; but of course the income was down too.

However *DXNS* still appears like clockwork each week, and his other activity—his World Prefix List—is a "must" for anyone interested in the traditional DX world-wide scene.

Why are we telling you all this? Largely because we want the world to know how Geoff came to be elected to the CQ "Hall of Fame"; but also because we are proud to honour the longest-serving member of the *Short Wave Magazine* staff. Geoff has worked behind the scenes in many areas, both while G6FO was the Editor and more recently. Being BRS-3129 dates his wakening interest in DX to the pre-war period, 1937 to be precise, and during all that time as an SWL his performance has been exemplary—first G to hear all 40 CQ Zones, first G with 300 countries confirmed (SWL); and now, after 41 years, has the DXCC Lot, having just received his Clippernet QSL card. All this knowledge and dedication makes his service to the *Magazine* highly prized—and whatever he undertakes to do, is done as perfectly as humanly possible. Long may he be able to continue to produce Prefix Lists, *DXNS*, and help us on *Short Wave Magazine*.



"... I wonder where they got 'em from ..."

# VHF BANDS

NORMAN FITCH, G3FPK

## Scottish VHF Convention

THIS year's Aberdeen VHF Convention will be held in the Beech Ballroom on Sept. 30. Exhibition, lectures, informal dinner and "guaranteed raffle" are planned, plus a bring-and-buy sale. Full details from Graham Knight, GM8FFX, P.O. Box 49, Aberdeen. (N.B. English visitors please note that passports are *not* necessary when crossing the border!)

## Awards and Tables

Congratulations to Geoff Brown, GJ8ORH, who has received the "Worked All Malta Award" for four E's QSO's in June. It was numbered 388 and is believed to be the first one awarded to a British Isles amateur for 2m. operation.

With no VHFCC certificate winners this month, some notes about the tables. First the Three Band Annual one. The basis for the countries is the ARRL "DXCC" countries list rather than the WAE one. The only significant point here is that Sicily (IT9) counts the same as mainland Italy and all the numerous islands, like Capri (IC8), Tremeti (IL7), Ponziane (IB0), etc. However, Sardinia (IS0), is a separate country. Regarding counties, it is the latest, official ones that are used. This means that such as Middlesex, Rutland and Monmouth are no longer valid, nor any of the former 33 Scottish counties. There are three Glamorgans and Yorkshires and two Sussex counties to work nowadays, but only twelve Scottish regions. However the 26 counties of the Irish Republic can be included. The Isle of Wight and the Isles of Scilly are separate counties. The Channel Islands comprise four counties—Alderney, Sark, Guernsey and Jersey, and two countries—Jersey and Guernsey, with

Alderney and Sark counting as the country of Guernsey. To sum up, it is possible to work eight countries and 104 counties in the British Isles.

Second the Squares table, the starting date for which was January 1, 1975. Obviously it is only the main, primary squares which are counted—e.g. AL, BK, ZM, etc. This table is intended for fixed stations only working from one location. This rules out entries from portable stations but not from those with permanent alternative QTH's. They can submit entries for both the main station and the -/A one *separately*. Club stations can join the table provided they operate from the one location, an example being the University of Kent, G8KUC. However, individual club station operators cannot add any squares they may have worked *via* their club station to their own, personal score from their home QTH. That should be obvious, however similar a club and an individual callsign might be!

The main reason for running these tables is to promote VHF/UHF activity, thus generating a little friendly rivalry among readers. As no certificates are awarded, no proof of the claimed scores are required. Even so, it is expected that participants will give a few details if only to inform others what they may have missed.

## Beacon Notes

The Danish group, OZ7UHF, during their very successful trip to the Faroes using the call OY70, installed two new beacons which commenced operation on July 10. On 2m, OY6VHF is on 144-885 MHz with 25 watts RF output, and on 70 cm., OY6UHF operates on 432-885 MHz.

With the autumnal equinox approaching and thus the aurora season, the following is a list of European 2m. beacons which are worth monitoring:

DL0PR	EO54c	144-910	MHz
GB3GI	XO41j	144-137	..
GB3LER	ZU65f	144-965	..
LA2VHF	FX42e	144-870	..
OH8VHF	MZ79h	144-800	..
OH6VHF	KW59f	144-900	..
SK4MPI	HU46d	144-960	..

All these run adequate power beaming in an auroral direction but there are many others which are heard *via* Ar, such as GB3ANG, GB3VHF, GB3CTC, etc. The latest *DUBUS*

magazine lists 60 2m. beacons throughout Europe, including some QRP "private" ones.

## Satellite News

A welcome letter from AMSAT-UK Chairman Pat Gowen, G3IOR, expresses satisfaction with the coverage given to the amateur space programme in this feature. Pat received a lot of inquiries for the *BASIC* computer programme following mention of it in the July feature. Your scribe seems to have created a lot of work for G3IOR on his return from three weeks' holiday! Sorry Pat!

The latest AMSAT-UK predictions for *Oscar 8* are based on a period of 103-2331128 minutes and a corresponding longitude increment of 25-8090283 degrees, both modified by the long-term "drag" figures given on page 283 (July). The reference orbit used was no. 2069 for August 1, the parameters of which were—equatorial crossing time, 0059 and 5-126190 secs., and longitude west, 53-985558°.

Even so, on a recent 80m. AMSAT net, Pat did suggest that these predictions were a little out. It appears that the 0-8 orbit is lengthening but this is very difficult to explain. Usually satellite orbits decay and get shorter due to the friction of the atmosphere. (H. G. Wells fans might suggest that *Cavorite* was to blame!).

New stations heard and worked *via* satellite recently include FG7XP, on 29-45 MHz, KG400 on 29-47 and 8P6ES on 29-485. Reportedly coming on soon are VP2DD, VP2MX, 9LIJM and father and daughter team SU11M and SU1M1. Latest news can be gleaned from the AMSAT net on 144-28 MHz, Sunday evenings from 7.30 *BST*, in the London area. Membership details can be obtained by sending an *s.a.e.* to the secretary, G3AAJ. (*QTHR*.)

## Contests

Conditions during the 144 MHz QRP event on July 30 were pretty poor. High serial numbers were GW4BCH/P with 227 contacts and a claimed score of 1466 points and G3PIA/P, who made 211 QSO's. As monitored at G3FPK, activity, both fixed and portable, seemed quite good. One or two signals sounded rather distorted but most were quite good.

*Coming events*—The weekend Sept. 2/3 sees the 144 MHz Open and Listeners' contest from 1600-1600 GMT. This one coincides with an IARU Region 1 affair so only QTH locators need be exchanged and *not* locations, in addition to the usual RST and serial numbers. Radial ring scoring for the RSGB section but one point per kilometre if you plan to enter the IARU event.

September 10, from 0900-1700 is the scene for the RSGB Region 1 contest. Region 1 comprises Cheshire, Cumbria, Gtr. Manchester, Lancashire, Merseyside and the Isle of Man. Any three bands from 70, 144, 432 or 1296 MHz, multi-operator, single operator, fixed or portable. Region 1 portables may operate up to 20 kms. outside the region. Complicated scoring system with multipliers derived from aerial height.

Don't forget the B.A.R.T.G. VHF/UHF contest on Sept. 9 and 17—see page 369, August.

### Spanish Two Metre Activity

A QSO between G3POI and C31NX in Andorra provided some interesting information in that the latter had worked nine mainland Spanish and four Balearic stations on 2m. SSB/CW in the contest. In call/square/mode order these were: EA1FD (YD) CW; EA1EH (YC) CW; EA2IE (ZC) CW; EA3ARR (AA) CW; EA3FP (BC) SSB; EA5HM (ZZ) CW/SSB; EA5KA (ZZ) CW; EA5NY (ZY) SSB and EA7APU (YY) SSB on the mainland. In the Balearics, which count as a separate country of course, were: EA6BW (BZ) CW/SSB; EA6CE (BZ) CW; EA6CH (CZ) SSB and EA6DU (BZ) SSB. This will answer Paul Lock's, G8HTE, query about the availability of SSB in Spain and yes, Paul, the Portuguese also use SSB, an example being CT1WW in WB, who has recently moved to a much better QTH.

### Repeater News

David Evans, G3OUF, RSGB General Manager, has sent along the very latest *Repeater Status* print out which includes 15 more 2m. repeaters approved in principle by the Home Office to improve mobile coverage in certain hitherto difficult areas. These are: GB3AR (XN79e) R4; GB3AS (YO15e) R1; GB3BL (Blandford,

Dorset) R1; GB3CF (ZM24j) R0; GB3FR (AN61g) R7; GB3HI (XQ42g) R4; GB3HS (ZN49j) R2; GB3MN (YN50d) R2; GB3NB (AM36d) R1; GB3NI (XO32h) R5; GB3PR (YQ53b) R3; GB3SR (ZK20j) R3; GB3TR (YK32d) R2; GB3WH (ZL24d) R4; GB3WT (WO33b) R7. None of these has yet been licensed.

### Seventy Centimetres

According to the "Presstop" column in August *Ham Radio* the 432 MHz band is to be clobbered when the US Air Force establishes its "PAVE PAWS" very long range radar system in the next year or so. Average ERP is said to be 10<sup>9</sup> watts. Someone has estimated that, if aimed at the Moon, a signal of 10-20 microvolts would illuminate an entire hemisphere! The first installation is to be Cape Cod, Mass., the next in California.

### QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G3POI	—	—	248	248
I4EAT	—	25	196	221
G3JXN	26	66	88	180
G3SEK	—	—	172	172
G8HVY	—	57	113	170
G3CHN	—	—	160	160
G8LEF	10	51	94	155
G3COJ	17	61	75	153
G3FPK	—	—	153	153
GM4CXP	—	25	127	152
G8GML	8	50	89	147
G4BWG	—	27	118	145
G4CMV	—	11	132	143
9H1CD	—	13	127	140
9H1BT	—	—	138	138
G3OHC	4	31	98	133
G3XCS	—	21	111	132
G4DEZ	—	—	132	132
G2AXI	—	48	82	130
G8HHI	—	29	99	128
G8BKR	—	22	101	123
G4BAH	—	32	92	124
GM4COK	—	9	106	115
G4FCD	—	22	89	111
G8IWA	—	29	77	106
G4DKX	5	30	68	103

GD2HDZ	10	32	59	101
GJ8AAZ	1	24	67	92
G3FIJ	—	27	62	89
G4ERX	1	24	63	88
G8GII	—	22	63	85
G4AWU	—	—	85	85
G6UW	—	—	85	85
G8HUY	—	28	56	84
9HIC	—	—	83	83
G8EOP	8	36	38	82
G4AEZ	2	22	57	81
G8JJR	—	—	79	79
G4FBK	—	5	73	78
GJ8ORH	—	13	64	77
G8KGF	—	—	76	76
G8IFT	7	18	49	74
G4GEE	—	24	50	74
G8JHX	—	—	74	74
G8LHT	—	1	71	72
G8KSS	—	—	71	71
G4GET	—	—	70	70
G8KPL	—	—	70	70
G3BW	1	21	47	69
GM8NCM	—	4	65	69
G8JAG	—	—	69	69
GD3YEO	—	8	59	67
G8KUC	—	7	60	67
G8ITS	—	12	53	65
GJ8KNV	—	13	50	63
G8KLN	—	1	62	63
G8LGL	—	1	62	63
G4CIK	—	—	62	62
G4GCQ	—	—	61	61
G3KPU	—	—	60	60
G8KSP	—	—	60	60
G8JEF	—	—	58	58
GW4FJK	—	—	57	57
G8MFJ	—	9	44	53
OZ9IY	—	—	53	53
G4GSA	—	1	48	49
G4EYL	—	—	41	41
G8JGK	—	—	37	37
G8JAH	—	1	35	36
G8JAJ	—	—	24	24
G8JKA	—	—	21	21

Starting Date January 1, 1975. No satellite or repeater QSO's.

In a more modest vein, Geoff Brown, GJ8ORH, reports daily QSO's with F1BYM in Bordeaux (ZE) with 200 watts PEP. He also has 200 watts of video available. Phil Johnson, GJ8KNV, mentions working nine Dutchmen in the minor lift on June 19. Steven Ruff, G18EWM (Antrim), writes that "... things have been happening on 70 cm. at last!" On July 12, 13 and 15 he worked 13 different stations, including G8HPW (Tyne & Wear), G8HYQ (W. Yorks.), G4FXW (S. Yorks.) plus two GW's and GI's.

John Woodham, G8BKR (Bristol), had worked the EI lads in WL on the 24th and from VL on the 26th of July. John missed out on F6CBC/P (ZD43a) on July 16, but fellow Bristolian Harry Gratten, G6GN, did work him at over 900 kms. George Gullis, G8MFJ (Wilts.), has added three squares and eight counties to his 70 cm. tally.

### Two Metres

First auroral matters. On a negative tack, Roger Thorn, G3CHN (Devon), says that the July 4 event was the first one he has never been able to get into, although many SM's and UR2HD (LS53e) were heard. G8BKR had SSB QSO's with G8LIC (ZO34d) and G18EWM (XO21j) in this one, though. G8KSS (Bristol) also worked G8LIC.

During an aurora on July 18, not heard in the U.K., SM4AXY was operating portable in Norway in LE78g at 70°N and heard SM's in the Stockholm area calling "CQ A." They were T9, though, but Lars says tropo. propagation was out of the question, so concludes it was *Auroral E*. He worked SM5BEI (JU), SMØFFS (JT) and SMØDJW (IS) between 2318 and 2341, and copied SK4MPI (HU) at T9 for three hours from 2135 GMT. On Aug. 5, SM3BIU (HX18j) copied SK4MPI and GB3LER (ZU) aurorally but heard no GM's. However, Berndt worked OY5NS (WW77f) at 1601, for perhaps the first *Ar* QSO with the Faroes?

Next tropo. The French contest on July 15/16 gave Clive Penna, G3POI (AL51g) a couple of new squares thanks to F1DUW/P (AF) and F6CSX/P (BE) while the *CUWS* chaps came up with UL, UM and WL. Bob Mackean, G4HAO (Liverpool), has added eight more counties

THREE BAND ANNUAL VHF TABLE  
January to December 1978

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	
G3SPJ	58	7	62	14	35	6	182
GD2HDZ	37	5	44	7	30	7	130
G2AXI	36	5	46	12	24	6	129
G3CO	30	4	49	11	19	6	119
G4BWG	23	4	54	14	14	5	114
G8GXP	—	—	55	12	40	7	114
G8LEF	—	—	50	13	36	12	111
G8BKR	—	—	68	14	25	4	111
G8HHI	—	—	54	19	29	6	108
G4ERX	15	1	50	13	20	7	106
G4AEZ	23	4	36	10	19	5	97
G8MFJ	—	—	60	13	22	2	97
G4DEZ	—	—	74	23	—	—	97
G3FPK	—	—	77	20	—	—	97
G4GEE	—	—	54	8	29	3	94
G18EWM	—	—	60	11	16	6	93
G3FIJ	29	3	38	6	14	2	92
G4BYP	9	3	44	9	21	6	92
G8KSS	—	—	66	16	—	—	82
G8KGF	—	—	60	16	—	—	76
G8APZ	—	—	56	13	3	1	73
G4HAO	—	—	59	11	—	—	70
G8ITS	—	—	43	6	12	3	64
G8BLJ	—	—	50	9	—	—	59
G4GXT	—	—	51	8	—	—	59
G8GRT	—	—	35	4	15	3	57
G8MKW	—	—	47	9	—	—	56
G4FKI	6	1	29	6	9	1	52
G8NYS	—	—	44	8	—	—	52
GJ8ORH	—	—	28	14	4	5	51
G4GET	—	—	42	9	—	—	51
GJ8KNV	—	—	25	8	9	7	49
GJ8AAZ	—	—	31	6	7	5	49
GM4CXP	—	—	36	11	1	1	49
G8OGD	—	—	38	5	4	1	48
G8LHT	—	—	36	10	—	—	46
G8JGK	—	—	29	9	—	—	38

including EI2VOY/P in Cork. G8BKR did well with the *CUWS* folk, too, and in the French contest worked into AE, AF and ZD squares, best DX being F6CBC/P in ZD43a. John reports a new EI on July 16; EI2CZ in Waterford City. GU8AYN/P on July 16 and GU3AEF/P on

the 22nd provided Guernsey and Alderney contacts. During the QRP contest on July 30, he worked EI2VPC/P in WL02j, who is an Englishman, with a French licence (F6DBG) and working in Switzerland!

John Pilags, G8HHI (Hants.), did

well in the French contest with QSO's with AE, AF, BE, BF, CF, DF, ZD, ZE, ZF and ZJ, plus HB9AMO/P in DG32g on July 16. He heard G3OSS working EA1CR who was in XD51f at 0019 on the 16th, but Ruben was only S1 in Yateley. Paul Lock, G8HTE (Cornwall), mentions a sudden lift on the evening of July 7, during which he had QSO's with EA1KO, EA1MV and EA1UK on FM through an unknown, northern spanish repeater. He also managed to work F6EBN/MM in VD26j for a new square. By 2040 GMT, this repeater on R6 had disappeared. On the morning of the 9th, the Pyrénées repeater was S5 but Paul was unable to access it.

Ken Osborne, G8KSS, was another who worked a number of distant Frenchmen on July 16, his best DX being F1EWG in ZD48j. Paul Broadhurst, G8LGL (Avon), worked EA1CR on July 15. Ruben was 1800m. *a.s.l.* running 100 watts to a 6-ele. Yagi. In the early hours of the 16th, up to about midday, Paul worked many stations well into France including a number in the Pyrénées around the 900 km. mark in AD and ZD squares. Best DX was F0ELC/P (G8KQB) in AD71a at 952 kms. and who was running 10w. to a 6-ele. beam. At 2253 that night, HB9MGK/P and the HB9HB beacon were heard and F6DND/P in CF69g was worked shortly after.

Now for the *Sporadic E* reports. In the July 8 event, G3CHN worked I4EAT, I0HKD, I4MJQ, I4XCC, I7ECT, I1W4AFO, and I2CNB, between 1708 and 1832, plus I4PPH at 1936. On the 10th, Roger heard LZ1AB at 1822 briefly and between 2025 and 2109 worked YU1QEO, HG5KDQ, HG0DG, and heard YU3TCD. Alan Scott, G4BYP (Liverpool), worked I4MJQ and YU3TCD on the 10th. Jon Dougherty, G4FUT (Sunderland), contacted three IT9's on July 8 plus other mainland Italians. On the 10th, he worked IC8FHF (Capri) at 1936 and was working other I's up to 2200 GMT. He reports that PA0CSL worked SV1CS and SV1JE on the 10th and Cor mentioned a PA having had an SSB QSO with 7X4CL (Algeria). Cor himself heard a 4X4 station *via E's*.

Bob Nash, G4GEE (Coventry) was QRV on the July 8 affair and

managed IT9VMN (GY76b), I2KSX/8 (HY40h) and IWOAKA (GB13a). G4HAO got I4BXN (FE38c) at 2055 on the 10th. G8BKR missed the start of the July 8 event but did work I6WJB (HC42a) later. On the 10th, John connected with YU2CKL (HD30a) and I4EAT (FE60f) at 2144. On the 10th, G8HHI heard SV1KD at 1754, YU0OM at 1858 and I3YAK at 2038. John later worked YU2RGO (HG02c), YU0OM (HD28c) and I7DPQ (I1B52c).

Julian Moss, G8ILO (Essex), worked I6WJB, I0MNI (GC41h) and IT9TDN (HY68b) on the 8th and heard other I's and IT9VMN, between 1843 and 1943. Dave Gregory, G8JDX, is a new correspondent from Devon who, between 1809 and 1832 on the 8th managed to work I0HKD (GC04c), I7ECT (HB77c), I4XCC (GD03d), I4MJQ (GE77e) and I2CNB. G8KSS also worked I0HKD and I6WJB on the 8th, plus I0JFE (GC45e) and I0KWK/P (HC42h) and reckons he heard SV1CS on the 10th.

G8LGL missed out on the July 8 *E's*, only catching the tail end. Paul heard a bit from an FC? at 1710 on the 10th and at 1906 worked YU0OM. Around 2030 several YU's were heard. At 2100, he was called by SV1DX, gave his information, but heard nothing else. Four minutes later YU2CBV (IG73d) called, resulting in a completed QSO. YU2RGR (HF48b) was the last one worked at 2118 although further I's were heard around 2200. G8MFJ was another who contacted YU2CKL and YU0OM on the 10th. GJ8ORH was in on the acts and, on the 8th, worked I7ECT, I4EAT and I4MJQ (GE73), while the 10th produced LZ1AB (LC27d), and YU4VIP (JD12c).

On the 8th, EA3LL (BB) worked 4X4IX. On the 10th, OZ2GZ reckons he heard a 4X4, but HG5KDQ (JH), worked three Israelis. George Vernardakis, SV1AB, near Athens, three times heard a call ending in NCM on the 10th. Could it have been GM8NCM? During an *E's* opening on Aug. 4 at 1628, HB9QQ (EH45e) worked RB5EHT (R133j).

Just as your scribe was editing this, another *E's* event occurred in the morning of Aug. 8, heralded by strong Italian FM stations on Band

2. G3POI worked stations in squares GB, GC, GY, HA, HB, HX and HY. Your scribe managed I2KSX/8 (HY40h), I0JFE and I0DLP (GB03f). First one heard was IT9ZWV (GY67) at 0939. Mike Dorner, G3DAH (Kent), worked Paul Galea, 9H1BT (HV03f).

### Meteor Scatter

Some of the more dedicated MS buffs have contrived to have some days off around the peak of the *Perseids* shower, so your reports will be welcomed for the next issue. G3POI's newest squares were provided by GM3YOR/TF, probably from QX and RY or SY, and SL2CU/P in KY.

Edmund Ramm, DK3UZ, from EN square, is looking for MS skeds with stations in YJ, YS, YT, XL, XM, XP, XQ, XS and all of the W and V columns. He runs 100 watts output to an 8/8/8 array, 200ft. *a.s.l.* His QTH is: Postfach 38, D-2358 Kaltenkirchen, German Federal Republic, and Edmund requests correspondents include their phone numbers.

Chris Bartram, G4DGU, is looking for MS skeds on 432 MHz, over 1200 kms. (QTHR).

### Solar Inactivity

After the amazing solar events of recent weeks, Charlie Newton, G2FKZ, reports that our star has virtually gone to sleep, with a *solar flux* level of 109 and an *Ap* figure of 27. These are the kind of figures more associated with sunspot minima years. On July 11, all the X-ray sensors were saturated—they register up to 8 units—and it is suggested that the figure for the X-ray bursts would have been X15! At 10 cms., the solar flux on the 11th reached 4900 flux units.

### Sign Off

Another fascinating month. All your contributions and updated claims by Sept. 7 please, and for the November edition, the deadline is Oct. 5. Everything to: "VHF Bands," SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts. AL6 9EQ. 73 de G3FPK.

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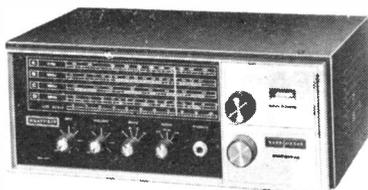
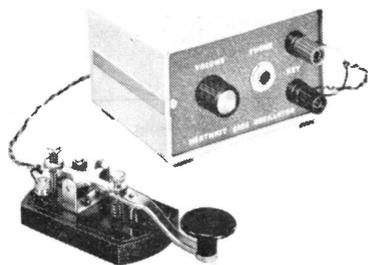
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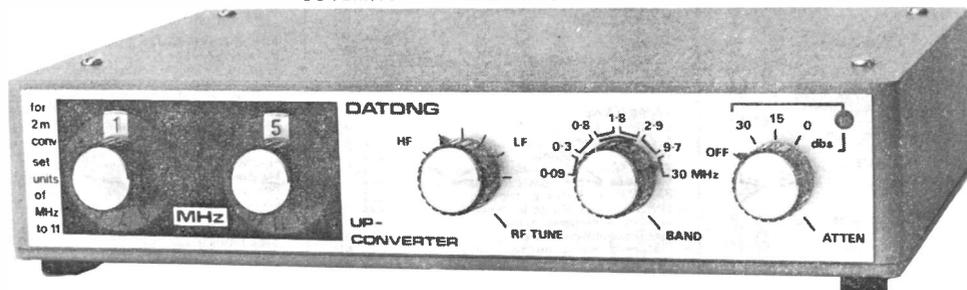
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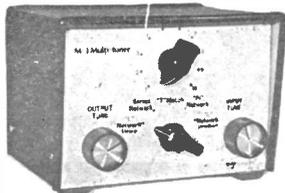
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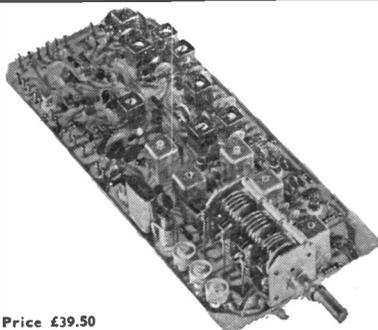
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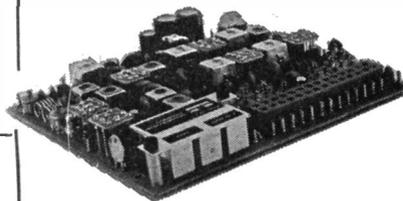


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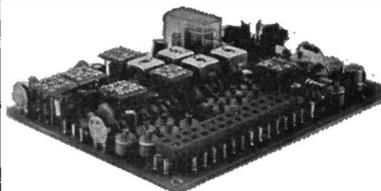


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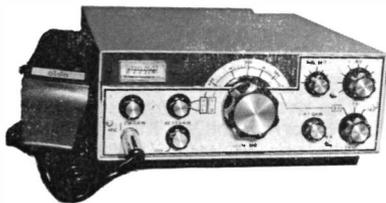
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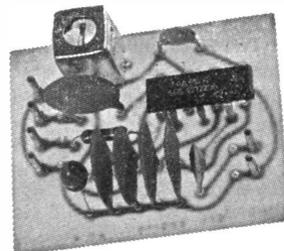
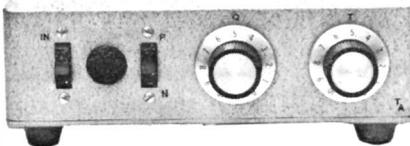
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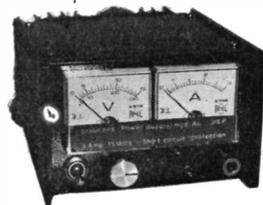
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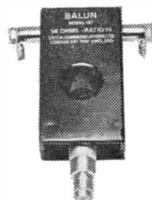
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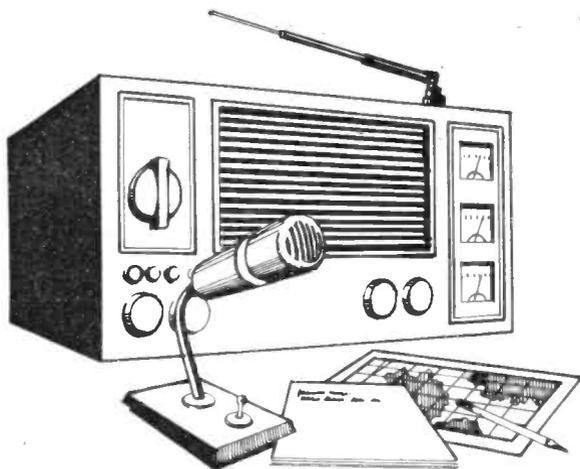
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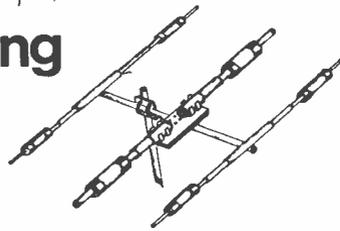
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OUTPUT FREQUENCY														
144-030 ...	b													
144-4/433-2 ...	b													
144-480 ...	b													
144-800 ...	b													
144-850 ...	b													
145-000/SO ...	b													
145-050/R2T ...	b													
145-075/R3T ...	b													
145-100/R4T ...	b													
145-125/R5T ...	b													
145-150/R6T ...	b													
145-175/R7T ...	b													
145-200/R8T ...	b													
145-300/S12 ...	b													
145-350/S14 ...	b													
145-400/S16 ...	b													
145-500/S20 ...	b													
145-525/S21 ...	b													
145-550/S22 ...	b													
145-575/S23 ...	b													
145-600/S24 ...	b													
145-650/R2R ...	b													
145-675/R3R ...	b													
145-700/R4R ...	b													
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**Wanted:** Eddystone Type EP-17R Panoramic Adaptor, reasonable price paid.—Roberts, 28 Mumbles Road, Swansea, Glam.

**Wanted:** Heathkit HA-14 linear with power supply.—Ring Sharratt, G3XKF, Cheddington 661390 (Bucks.).

**Will the gentleman** who phoned from Worcester concerning the AMK.III, please contact me again with name and address.—Shufflebotham, 122 North Street, Stoke-on-Trent. (Tel: 0782-411568.)

**Selling:** AR88 with manual, good condition, £45.—Barns, 97 Ringmer Road, Worthing, Sussex.

**For sale:** Yaesu FR-101 Rx, 2m./4m./general coverage, separate amateur bands, with manual, boxed, mint, £360 no offers.—Ring Pradier, 01-267 3872.

**Sale:** National Panasonic DR-48 digital general coverage receiver, £230. Sony CF-950S cassette radio, FM/MW/SW, £130. Philips N-2215 portable mono tape-recorder, £35. All battery/mains, all new 1978. Catronics xtal calibrator, £12. Eddystone active antenna, £12. Cambridge Kits LW converter, £7. Everything first-class and unconditionally guaranteed.—Box No. 5655, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

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**Sale:** IC-240, with home-brew 80-channel switching box, mains PSU and original packing, only six months old and still under guarantee, mint, £190.—Ring Saunders, G3OSC, 0485-70685.

**Selling:** KW-2000B transceiver, works OK but would benefit from a re-alignment, case scratched, £140. No offers.—Ring Devereux, Waterlooville (07014) 54828 after 6 p.m.

**For sale:** KW-77 receiver, 160-10m., WWV, excellent condition, £75 or near offer. Sphinx SSB Tx, 160/80/40/20m., 6146 PA, £55 or near offer. EK-9X electronic keyer, £8. Pye PF1 Pocketfones, xtal'd for RB10, £32. Traps for 160/80m. dipole, pair £4. Western Electronics AT-40 7 MHz traps, £4.—Spencer, G3ILO, 49 Rosebery Road, Dursley, Glos. GL11 4PT.

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**October issue:** Due to appear September 29th. Single copies at 50p post paid will be sent by first-class mail for orders received by Wednesday, September 27th, as available.—Circulation Dept., Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

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Wanted: K.W. Vanguard Tx.—Taylor, GM4HBQ, 3 Ben Alder Place, Kirkcaldy, Fife. (Tel: 0592-62117.)

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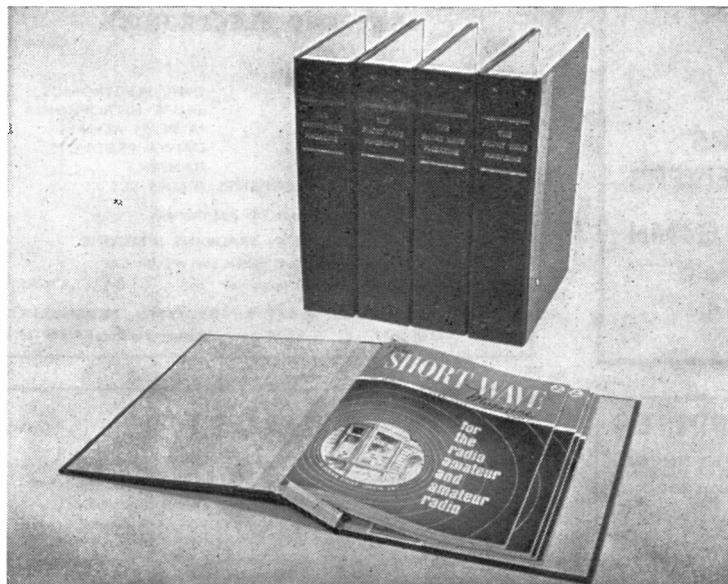
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