TRIO R1000  £298 inc VAT  Carr £4.50

As for what else is inside this superb instrument — selectivity is catered for by three custom made IF filters; a 12kHz wide AM filter; 6kHz narrow AM filter; and a new 2.7kHz SSB filter with a shape factor of better than 1:2 6:60dB. Selectable sidebands are available at the touch of a switch.

For the first time in a mid-price receiver, a true noise blanker is provided to remove pulse type ignition noise.

To minimise front end overload, a step RF attenuator is included which gives 0-60dB attenuation in four steps.

All the rear panel connectors are recessed on a sloping panel so that you can stand the receiver either on its back, or pushed hard against a wall when used in conventional shelf mounting. The antenna inputs allow the use of either a high impedance wire aerial or a 50ohm balanced input so that the proverbial long lump of wire will work really well with the R-1000.

This receiver is so advanced it makes everything in its price range completely obsolete.

LOWE ELECTRONICS LTD. CHESTERFIELD ROAD, MATLOCK, DERBYSHIRE.
TRIO TR2300 £199 inc VAT

The TR2300 is a remarkable package which combines all the advantages of a portable station with those of a sophisticated mobile set. With the TR2300, you get full band coverage from 144-146 MHz in fully synthesized 25 kHz channels together with 600 kHz repeater shift (and reverse repeater if required) with automatic 1750 Hz tone burst.

The dial is directly calibrated in frequency and has switched illumination for ease of use at night.

The transmitter puts out a very clean signal at a power in excess of one watt, and the receiver is very sensitive, in fact better than many big rigs. The external power and external antenna sockets allow one to use it as a fixed station when desired.

The TR2300 is amazingly small, much smaller than its predecessor the TR2200GX and uses a more sophisticated case design and modular construction making a really rugged rig. It comes complete with carrying case, shoulder strap, battery charger, external power cord, etc. Needless to say, you don't need any crystals!

THE NEW EMPORIUM IS FINALLY OPEN!

Yes, the builders have finally, well almost, gone away and we are installed in our new home at last. We believe that the new showroom and workshop facilities are the best in Europe and if you care to check on that, we hope you will come and see us.

As an incentive, any visitor to our new showrooms will be invited to complete a card which will go into the hat at the end of March and a draw will be made for a prize of a brand new TS180S. No obligation to buy anything, just come along and see us.

In addition to the complete range of Trio amateur radio gear, we stock the widest possible range of other equipment for the keen electronic hobbyist, including our new 16K microcomputer system, the EG3003 Genie. Ready to go and complete with 16K of RAM, Microsoft extended Basic, full format keyboard, built in cassette and full compatibility with most TRS80 software, the Genie introduces a new low price into the small computer field — £425 inc. vat.

Bargains ? there are bound to be some because inevitably in the move we shall turn up all sorts of things lurking in the back of the warehouse which we shall be selling off. This is in addition to our normal range of low priced, top quality accessories for example — DL20 20 watt 50 ohm dummy loads at £6.04 inc. vat; an indispensable tool, the ME221 20K/V multimeter at £16.49 inc.; the FC5M 50 MHz frequency counter at £41.40 inc.; a 3 to 5 amp 12 volt regulated PSU for £18.40 or a smaller one giving up to 0.7 amp for £10.93; a smashing set of chassis punches for £8.63 and an equally useful small screwdriver set for £1.50; the SWR25 twin meter SWR bridge for £12.78; and the FU200 VHF aerial rotator for £40.39. We stock the full ranges from J Beam and Microwave Modules, and monitor receivers for all sorts of frequencies right up to 500 MHz at prices from about £46.00 — in fact we stock everything you need.

Come to the new Emporium and have a good browse around. You will certainly be welcome, and you could win a brand new TS180S.

And finally, a map to show you the way once you have reached Matlock.

STOP PRESS!!

TR9000

Ask us about the new TR9000 soon to come from Trio. This terrific new multi mode 2 metre rig gives you everything you wanted in a small package you can fit almost anywhere — just read on.

Basic specification

Full coverage from 144-146 MHz using a 100 Hz step synthesiser with digital frequency readout to 100 Hz. Modes of operation USB/LSB/CW/FM with minimum output in excess of ten watts on all modes. Five memories are provided, any of which can be recalled at the touch of a switch, and one of which can be used to generate odd repeater split frequencies (for transverting etc.). Noise blanker. CW sidetone — everything.

Now the small part. On FM, you have instant selection of either 25 KHz steps (for convenient mobile use), 12.5 KHz steps (for future use), or 100Hz steps for continuous tuning. On SSB and CW, the tuning rate is automatically switched to 100 Hz steps with the digital display extended to suit.

Scanning functions are provided with automatic stopping on any FM signal, and scan stop by touching the microphone PTT switch — the microphone by the way also has remote control of tuning the rig up/down touch switches. On SSB mode, the full band can be searched for signals and there is a further SSB quick search function ... in fact there is so much to say about the TR9000 I’ll have to do a full ad. feature to tell you about it.

Size ? amazingly it’s about the same size as the TR7600.

Weight ? also about the same as the TR7600.

Price ? we think around the £365 mark (inc. vat).
LOWE ELECTRONICS LTD

LOWE

SRX-30

New Receiver

500 kHz 30 MHz. AM.SSB.CW

Mains/12v Operation

Drift Cancelling System for Spot On Accuracy

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 10295 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 pf 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.

The new digital flight scan receiver from Regency of America is a stunning improvement on any other air band monitor receiver. Utilising its own micro computer system to control an advanced synthesiser, the flight scan allows you to monitor any air band frequency in the range 108-136 MHz and to store up to 16 channels which can then be scanned continuously. Other features include fast keyboard entry of frequency, full band search facilities, channel lockout and much more. For the last word in air band monitors contact us today.

Also available – K100 digital FM scanner covering 30.50 MHz, 144-174 MHz and 430-512 MHz. Flight Scan: £230.00 inc. VAT. K100 FM Scanner: £180.00 inc. VAT.

TS120V only £408 inc VAT

Measuring only 9" x 3½" x 9½" — which is about the size of a packet of cornflakes, the TS120V can best be described as a miniature TS20M. The rig covers all bands 80-10 metres — and all of 10 metres 28-30 MHz so it's ideal for transverter driving, has digital readout built in, vox, break-in CW, RIT, noise blanker and the unique Trio passband tuning system used in the 820. The power output is 10W and a matching linear will be along shortly.

The TS120V is clearly a winner for mobile operation but is equally attractive at home and is perfect for the VHF/UHF enthusiast who requires a high performance I.F. system for his transverters.

The transceiver is based on an advanced PLL system and the digital readout gives you the correct operating frequency at all times unlike many other rigs. Remember my previous comments about Trio attention to detail.

For ease of operation, the TS120V is unsurpassed; simply select the band required, tune the VFO to the frequency you want and there you are; no preselector or PA tuning to worry about, and a distinct safety feature for the mobile operator.

STOP PRESS – TS120S now in stock. As TS120V but 200W P.E.P. £495 inc. VAT.

SEND 50p IN STAMPS FOR COMPLETE CATALOGUE AND ANTENNA BOOK PLEASE SPECIFY ANY PARTICULAR INTEREST AND WE WILL SEND FULL INFORMATION
The R-1000 is a high class general coverage receiver covering 200 KHz to 30 MHz.
- Digital and analogue display
- Quartz digital clock and timer
- Selectable IF bandwidth
- Simplicity of operation
- Fully self-contained for AC or DC operation
- High quality finish
- Excellent value for money

OUR PRICE ONLY £289
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FC-107 Antenna Tuner
SP-107 Speaker
FP-107E AC Power Supply/ Speaker
FV-107 Remote VFO

PRICE £749.00
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MORE WATTs for your £££!

The CLIPPERTON L
from DENTRON

Surely the Best Value in Linears!
Features
- 160 to 10 metres
- 2000 W PEP input SSB
- 1000 W DC input CW, RTTY, SSTV
- Forced air cooling
- Self-contained PSU
- 4 x 572B valves in grounded grid

Only 42lbs,
6" x 14½" x 14½" small.
Price ONLY £499

ASK FOR DETAILS OF Western CREDIT CHARGE — PLANNED BUYING
### Electronics (UK) Ltd

**A FEW Western LEAP YEAR SPECIALS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
<th>Normal Price</th>
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<tbody>
<tr>
<td>FT-7B plus FP-12 p.s.u.</td>
<td>£439</td>
<td>(NORMALLY £484)</td>
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<tr>
<td>FTV-901R (2 m and 70 cm)</td>
<td>£389</td>
<td>(NORMALLY £422)</td>
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<tr>
<td>FT-225RD 2 m Multimode</td>
<td>£545</td>
<td>(NORMALLY £599)</td>
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*These offers for a limited period and subject to stock availability*

| S.A.E. for SECOND-HAND and SPECIAL OFFER LISTS |

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### A SELECTION FROM THE Western LINE

#### PEAK READING (PEP) WATTMETERS

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
<th>Description</th>
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<tr>
<td>PM-2000 (HF)</td>
<td>£51.75</td>
<td>NOW — BRITISH PATENT PROTECTED!</td>
</tr>
<tr>
<td>PM-2001 (VHF)</td>
<td>£51.75</td>
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#### ANTENNAS

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<td>DX-103</td>
<td>£69.00</td>
<td>3-el 10m beam</td>
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<td>DX-105</td>
<td>£69.00</td>
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<td>DX-31</td>
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<td>DX-34</td>
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<td>DX-5V</td>
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<td>5-band vertical</td>
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#### ACCESSORIES

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<tr>
<td>SRK-1</td>
<td>£11.96</td>
<td>Professional Morse Key</td>
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<td>DL-300</td>
<td>£11.95</td>
<td>100/300W Dummy Load</td>
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<td>Vibroplex Original Standard Key</td>
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<tr>
<td>Vibroplex “Champion”</td>
<td>£39.68</td>
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<tr>
<td>Keyer</td>
<td>£39.68</td>
<td>For el-bugs</td>
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<tr>
<td>At-40</td>
<td>£9.55</td>
<td>40m traps for dipoles</td>
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<tr>
<td>BA-1</td>
<td>£9.55</td>
<td>Balun 1:1 1 kw p.e.p.</td>
</tr>
<tr>
<td>BA-4</td>
<td>£9.55</td>
<td>Balun 4:1 1 kw p.e.p.</td>
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<td>Plugs - sockets - insulators - cable etc. etc. etc.</td>
<td>FULL PRICE LIST on receipt of S.A.E.</td>
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### Thinking Ahead to Spring-Time?

**TOWERS MASTS ANTENNAS**

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<th>Telex: 58121 WEST G</th>
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<tr>
<td>FAIRFIELD ESTATE, LOUTH, LINCS. LN11 0JH</td>
<td>(0507) 804995/6</td>
<td>58/121 WEST G</td>
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**Opening hours:**

LOUTH: 9-12; 5pm Mon Fri. By appointment Sat 9-12.

LEICESTER: May's Hi-Fi, Churchgate (Tel: 0533-58662).

Mon-Sat 9-6pm; closed Thurs.

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Our Agents

Southern: Alan Paxton, G4BIZ, Southampton, Hants. (0703) 582182

Scotland: Alan Cameron, GM30GJ, Alloa (0259) 214663

N. Ireland: Les Lyske, G13CDT, Newtownards (0247) 812449

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**Most equipment can be seen at our agents at:**

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**Our Agents**

Southern: Alan Paxton, G4BIZ, Southampton, Hants. (0703) 582182

Scotland: Alan Cameron, GM30GJ, Alloa (0259) 214663

N. Ireland: Les Lyske, G13CDT, Newtownards (0247) 812449
IT'S HERE!! GET HER (OR HIM) TO BUY YOU ONE FOR XMAS!

THE MOBILE OF CHOICE FROM THE WORLD FAMOUS ICOM STABLE — THE IC-255E

25 WATTS — 5 MEMORIES — SCANNING — 600 KHz AND USER SELECTABLE REPEATER SHIFT — FULL COVERAGE IN 5 KHz or 25 KHz STEPS

We have had a poke around one of these little beauties and are certain that Icom, yet again, have come up with a winner. As you can see, it has the expected smart Icom appearance. Features include:

- Crystal controlled Tone Burst
- Full band coverage — extendable to 148 MHz if required
- Four digit LED display
- 25 Watts output or 1W low power. A superb receiver using grounded gate FET front end
- Scanning over a user programmable range
- Memory scan
- Stop on empty or busy channels
- Tuning in 25KHz or 5KHz steps
- 5 Memories — retained while the power is connected to the rig
- Built-in 600 KHz Repeater shift
- Alternative programmable shift
- Reverse Repeater facilities
- RIT (±3 KHz) for those off channel stations
- Scan control from the microphone (an optional mic available shortly)
- Good loud audio
- Optically coupled tuning between control knob and CPU
- Multiway 24 pin socket on back for touchpad, computer, or external control (note the current RM3 cannot be used but a new version is to be introduced)
- Rugged modular PA (guaranteed of course)
- Mobile mount which can be padlocked

At £255 including VAT these are such value for money that demand may exceed supply for a while — but they are worth waiting for! (Delivery is free of course by Registered First Class Letter Post.)
ICOM®

“NEW”

DON'T WORRY — WE GUARANTEE ALL SOLID STATE RIGS INCLUDING PAs

AFTER YEARS OF SUCCESS THE IC-211E HAS NOW BEEN REPLACED BY THE IC-251E. NOT JUST A FACELIFT, BUT A NUMBER OF IMPORTANT DEVELOPMENTS HAVE BEEN INCORPORATED.

MICROPROCESSOR CONTROL — CPU control with Icom's original programs provides various operating capabilities. No backlash dial controlled by Icom's unique photo-chopper circuit. Band edge detector and Endless System provides out-of-band protection. No variable capacitors or dial gear, giving problem-free use. The IC-251E provides FM, USB, LSB, CW coverage in the 144-146 MHz frequency range. Thus the IC-211E can be used for mobile, DX, local calls, and satellite work.

MULTI-PURPOSE SCANNING — Memory Scan allows you to monitor three different memory channels. Program Scan provides scanning between two programmed frequencies. Adjustable scanning speed. Auto-stop stops scanning when a signal is received in all modes.

DUAL VFO’s — Two separate VFO’s can be used either independently or together for simplex operation, and any desired frequency split in duplex operation.

CONTINUOUS TUNING SYSTEM — Icom's new continuous tuning system features a luminescent display that follows the turning of the tuning knob movement and provides an extremely accurate readout. Frequencies are displayed in 7 digits representing 100 Mhz to 100 Hz digits.

Automatic re-cycling restarts the tuning at the bottom of the band when the top is reached — and vice versa. Quick tuning in 1 KHz steps is available, and fine tuning in 100 Hz steps in the SSB and CW modes, and 5 KHz steps and 1 kHz steps in the FM mode, is provided for trouble free QSO.

EASIER OPERATION AND LIGHTER WEIGHT — The most compact, lightest weight all-mode 144 MHz transceiver. First to use a pulse power supply in communication equipment, for lighter weight. 50 mm-diameter large tuning control knob for smooth and easy tuning. Trouble-free controlling knobs for both receiving and transmitting. LED indicator for transmit and receive modes.

MOST SUITABLE FOR BOTH FIXED AND PORTABLE STATIONS — Built in 240 V AC and DC power supplies. Convenient Dial Lock switch for mobile operation. Easy carry handle. Effective Noise Blanker. IC-701 high quality stand microphone is suitable for fixed station operation. Powerful audio output 1.5 Watts at 8 ohm, for easy listening even in noisy surroundings.

OUTSTANDING PERFORMANCE — The RF amplifier and first mixer circuits using MOS FETs and other circuits provide excellent Cross Modulation and Two-Signal selectivity characteristics. The IC-251E has excellent sensitivity demanded especially for mobile operation, high stability, and high quality Crystal Filters having high shape factors, exceptional selectivity. The Transmitter uses a balanced mixer in a single conversion system, a band pass filter and a high performance low-pass filter. The system provides distortion-free signals with a minimum spurious radiation level.

MODES — USB, LSB, CW and FM output.

SENSITIVITY — CW and SSB — Less than 0.25 microvolts for 10 dB S+N/N. FM — More than 30 IBS+N+D+N+D at 1 microvolt or less than 0.3 microvolts for 20 dB Noise quieting.

Computer compatible — the Best!
IC-701HF £899

ICOM’s superior LSI technology takes the lead in Amateur HF. The extremely compact IC-701 delivers 100 watts output from a completely solid state, no tune (broad band design) final, on all modes and all bands, from 160-10 M.

With single knob frequency selection and built-in dual VFO’s, the LSI controlled IC-701 is the choice in computer compatible, multi-mode Amateur HF transceivers.

The IC-701’s single frequency control knob puts fully synthesised instantaneous tuning at a single finger tip. WIDE bandspread, with 100Hz per division and 5KHz per step, is instantly co-ordinated between the smooth turning knob and the synthesiser’s digital read-out with positively no backlash or “dead time” (no waiting for counter to update less operator fatigue). And at the push of the electronic high speed tuning button, the synthesiser flies through megacycles at 10KHz per step (1500Hz per turn).

The computer compatible IC-701 LSI chip provides input of incremental step or digit-by-digit programming data from an external source, such as the microprocessor controlled accessory which will also provide remote band selection and other functions.

Full band coverage of all six HF bands, and continuously variable bandwidth on filter widths for SSB, RTTY, and even SSTV, help to make the IC-701 the very best HF transceiver ever made. IC-701 includes two CW widths, all of this standard at no extra cost.

Solid state complete with the high quality electret condenser base mic (SM-2), the IC-701 is loaded with many ICOM quality standard features. Standard in every IC-701 are two independently selectable, digitally synthesised VFO’s at no extra cost. Also standard are a double-balanced schottky diode 1st mixer for excellent receiver IMD, and RF speech processor, separate drop times for voice and CW VOX, optionally continuous RIT, fast/slow AGC, efficient IF noise blanker, fast break-in CW, and full metering capability.

FROM THANET OF COURSE

£479 inc.
**ICOM**

**Tried — Tested and Popular . . .**

**“New”**

**IC-240 NOW £193 inc.**

The IC-240 is the ideal mobile rig for most people. Apart from the fact that it is quite a lot cheaper than most, it is, in fact, more suitable than many to use in the car while driving. And yet it is under those conditions that most mobiles are used. It can be operated with ease without taking your eyes off the road and provides up to 22 channels (which is more than you are likely to need). Being synthesized, of course, there are no crystals to buy for extra channels. Full repeat, reverse repeat and automatic tone burst plus a low power facility are selectable from the front panel. By adding a ‘Superscan’ at a later date you can obtain full scanning facilities over the whole band at a **VERY** competitive price.

The IC-240 is a superbly built and very reliable piece of equipment as witnessed by the many thousands in use. All Icom equipment is built to a very high standard and the IC-240 is no exception. It has an excellently sensitive receiver and a very clean transmitter and will give you hours of headache-free pleasurable use — so why not get one now before the price goes up again!

240 Alone
Less VAT = £167.91  With VAT = £193.00

**IC-280E NOW £250 inc.**

**THE MOBILES**

**IC-255E 25 watt FM!**

- 25 watt output (1 watt low power).
- 5 memories.
- 2 VFOs.
- Built-in scanner (with optional mic for scan control from the mic). Can scan the whole band, a selected portion, or just the memories.
- Normal and reverse repeat — 600 kHz shift built-in plus another user programmable shift, from the front panel (for 70 cm transversing?).
- Size 64 x 185 x 223 mm.
- Price £255 inc. VAT.

**IC-280E WITH SCANNER £260**

As usual, ICOM have kept ahead with technology and have produced their revolutionary new IC-280E which uses a microprocessor to produce frequencies throughout the 2m band at the ideal 25kHz spacing required today. The IC-280 has the ideal advantage of being separable into two parts for easy mounting into today’s cars which so often forget to leave space for a rig. The removable front panel, with all controls, is only 3' deep and will fit in any convenient spot — in the glove pocket, on the dash or even on the sun visor! The main part of the set can be mounted anywhere within 4 feet — or even further in many cases — under the passenger’s seat is quite handy! Display is of frequency on an LED readout and there are three memories for your favourite channels. These are not cleared when the set is switched off as long as it is left connected to the car battery.

Less VAT = £217.50  With VAT = £260

**AGENTS (PHONE FIRST — All evenings and weekends only, except Barnsley and Burnley)**

Scotland — Jack GM8SEC (031-665 2420)

Wales — Tony GW3FKO (0222 702932) Burnley — (0282 384811) Midlands — Tony G8AVH (021 323 2305)

North West — Gordon G3LEG (Knutsford (0565) 4040) Yorkshire — Barnsley (022678 2517) Evenings

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Access

Buy it with Access
ICOM

...Simply the Best...

The IC-215 is getting more and more popular also as it combines the advantages of a portable, which can be operated anywhere, with the ability to double as a low power base station by virtue of its 3 Watts of output and SO239 antenna connector on the back. Of course there are facilities to operate it from an external power supply, and if it is fitted with Ni-Cads you can arrange to trickle charge these at the same time. The batteries used are of a sensible size being C type (or UII) instead of the ‘penlight’ batteries used by most of its competitors. This gives at least three times the operating power when you are away from home which you will appreciate if ever you have run out of battery in the middle of a QSO! It comes already crystalled up for 12 channels, S20, S22 and all the repeater channels 0 to 9. We think the extra power and larger batteries far outweigh the advantages of having the extra channels produced from a synthesizer.

Less VAT = £140.87  With VAT = £162.00

IC-202S
£199 inc.

ICOM’s range of sideband portables has been recently expanded. The well known and tested IC-202E has now been improved in the form of the IC-202S which has lower side band fitted also and provides sidetone on CW. The receiver has been hotted up making it even more suitable for use as a base station, either barefoot or as a prime mover. The new IC-402 is the 70cm version of the 202S giving the same facilities as its 2m cousin over the range 432-435.2 MHz. Both use a very stable VXO circuit, to give fully tuneable coverage of the band a 200 kHz segments and both have extremely clean signals so that using them to drive a linear to the full legal limit presents no problems. We are very impressed with both the 202S and the 402.

IC-202S  Less VAT = £173.04  With VAT = £199.00
IC-402  Less VAT = £255.65  With VAT = £294.00

"New"

IC-260E  MULTIMODE MOBILE

This exciting new mobile offers you FM, USB, LSB and CW, all in a neat small package. All with a built-in scanner too! Will scan 3 memory channels or scan between two programmed frequencies stopping on a received signal IN ALL MODES.

Other features include: Noise blanker, CW break-in, CW monitor, automatic PA protection, microcomputer control, two independent VFOs, tuning steps of 1 KHz and 100 Hz in SSB and CW or 5 KHz and 1 KHz in FM, full frequency readout in bright LED. Fast/slow AGC. don’t hesitate to ask for more details.

Phone — or put a message on the ansafone for further details

ALSO AVAILABLE FROM OUR SHOP IN HERNE BAY

MICROWAVE MODULES
STANDARD BEARCAT

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ANTENNA SPECIALISTS
YAESU MUSEN

J-BEAM
RSGB PUBLICATIONS

HP AND PART EXCHANGE WELCOMED
RADIO SHACK for BEARCAT 220
THE VERSATILE BEARCAT 220FB

Features:

- 20 Channels/2 banks — Scan up to 20 frequencies at once or either of two banks of 10 channels.
- 7 Band Coverage — Includes Low, High, UHF, UHF-Gov't and UHF-T public service bands, the 2-meter amateur (Ham) band, plus the aircraft band.
- Automatic Search — Seek and find new, exciting frequencies.
- Aircraft Search — Automatically search the entire Aircraft Band.
- Marine Search — Automatically search Marine frequencies by pressing one button.
- Priority — Samples designated priority frequency on channel 1 every 2 seconds.
- Limit — Sets upper and lower frequencies of search range.
- Speed — Choice of 5 or 15 channels per second scan and search speed for closer monitoring of desired frequencies.
- Automatic Lockout — Locks out channels and "skips" frequencies not of current interest.
- Selective Scan Delay — Adds a two-second delay on desired channels to prevent missing transmissions when "calls" and "answers" are on the same frequency. Patented by Electra.
- Simple Programming — Simply punch in the frequency you wish to monitor.
- Decimal Display — The large decimal display shows channels and frequency as well as features selected.
- Patented Track Tuning — Receive frequencies across the full band without adjustment. Circuitry is automatically aligned to each frequency monitored.
- Crystalless — Without ever buying a crystal you can select from all local frequencies.
- Automatic Squelch — Factory-set squelch automatically blocks out unwanted noise.
- Direct Channel Access — Move directly to desired channel without stepping through all channels.
- Deluxe Keyboard — Makes frequency and feature selection easy for simple programming.
- Space age Circuitry — Custom integrated circuits . . . a Bearcat tradition in scanning radios.
- Rolling Zeros — This Bearcat exclusive tells you which channels your scanner is monitoring.
- AC/DC — Operates at home or in authorized vehicle.
- UL Listed/FCC Certified — Tested for sale, quality design and manufacture.

Bearcat 220 £210.00 ex. £241.50 inc.

Bearcat® 220 FB
Specifications

Frequency Range:
- Low Band Mobile 66-88 MHz
- Aircraft 118-136 MHz
- Amateur Band 144-148 MHz
- Public Services & Marine 148-174 MHz
- UHF-Amateur 420-450 MHz
- UHF Band 450-470 MHz
- UHF Band 470-512 MHz

Size:
- 10 1/4” W x 3” H x 7 1/4” D

Weight:
- 5 lbs.

Power Requirements:
- 240V AC, 50 Hz.
- 12-15V DC, 8 Watts

Audio Output:
- 2.0 W rms.

Antenna:
- Telescoping (Supplied)

Sensitivity:
- 0.6 µV for 12dB Sinad on L and H bands
- µ bands slightly less
- 1.0 µV for 10dB S/N on aircraft

Scan Rate:
- 5 or 16 channels per second

Connectors:
- External antenna; external speaker; AC power, DC power

Accessories (included):
- Mounting bracket and hardware; DC cord

Hear It All With One Antenna
Total Frequency Coverage
- 40 To 700 MHz

DISCONE

The Hustler Discone Model DCX is a wide band antenna and has complete coverage of all frequencies from 40 to 700 MHz. This design is especially suited for monitor radio reception of LOW-BAND, HIGH-BAND AND UHF.

As a plus feature, use the Discone for outstanding 88-108 MHz. FM stereo reception.

The Discone is easy to assemble and install and may be used with any length coax cable. Manufactured from high strength, solid aluminum rod, zinc plated hardware and mounting assembly complete with SO-239 connector. Antenna mounts on vertical support up to 1 1/4” O.D. or on a flat surface. Cone elements, 55” in length. Disc elements, 20” in length. Shipping Wt. 2.5 lbs

Discone With Cable
Discone antenna supplied with 50” coax and factory installed connectors; PL-259 one end and monitor pin plug type on the other. Shipping Wt. 4.5 lbs.

RADIO SHACK LIMITED
TELEX 23718
188 BROADHURST GARDENS, LONDON, NW6 3AY
TELEPHONE 01-624 7174

Model DCX
VERTICALLY POLARIZED
NO ADJUSTING
NO TRIMMING
### Drake Prices

**TR-7/DR-7**  
Transceiver, gen. cov. receiver & Digital  
£897.00

**PS-7**  
Power Supply 120/240v for TR-7  
£158.70

**RV-7**  
Remote VFO for TR-7  
£126.50

**MS-7**  
Matching Speaker for TR-7 & R-7  
£25.30

**SL-300**  
CW Filter for TR-7 & R-7 (300Hz)  
£39.10

**SL-500**  
CW Filter for TR-7 & R-7 (500Hz)  
£39.10

**SL-1800**  
SSB/RTTY Filter for TR-7 & R-7 (1800Hz)  
£39.10

**SL-4000**  
AM Filter (4000Hz) for R-7 Receiver  
£39.10

**SL-8000**  
AM Filter for TR-7 & R-7 (8000Hz)  
£25.30

**AUX-7**  
Range Programme board & 1 Receive Module  
£32.20

**RRM-7**  
Range receive modules (500kHz) for AUX-7  
£5.52

**RTM-7**  
Range transceive modules (500kHz) for AUX-7  
£5.52

**NB-7**  
Noise Blanker for TR-7  
£66.24

**FA-7**  
Fan for TR-7 & PS-7  
£18.40

**MMK-7**  
Mobile mounting kit for TR-7  
£34.50

**MN-7**  
ATU/RF Wattmeter 160-10m 250 w  
£197.80

**MN-2700**  
ATU/RF Wattmeter 160-10m 2kw  
£59.80

**WH-7**  
RF Wattmeter/VSWR bridge HF  
£16.50

**385-0004**  
Service Manual for TR-7  
£37.95

**L-7**  
Linear Amplifier 2 kw 10-160m  
£759.00

**TR-4CW(RIT)**  
Transceiver AM/SSB/CW with R.I.T.  
£496.80

**AC-4**  
120/240v Power supply for TR-4CW  
£109.25

**34-PNB**  
Plug in Noise Blanker for TR-4CW  
£73.60

**DC-4**  
DC Power Supply for TR-4CW  
£138.00

**RC-4**  
Remote VFO for TR-4CW  
£109.25

**FF-1**  
Crystal Control for TR-4CW  
£39.10

**MS-4**  
Speaker for TR-4CW, R-4C & SPR-4  
£25.30

**TV-42LP**  
Low Pass Filter 1kw  
£10.35

**TV-3300LP**  
Low Pass Filter 3kw  
£18.40

**RP-500**  
Receiver Protector  
£73.60

**7072**  
Hand microphone for TR-4CW  
£13.80

**7073**  
Hand microphone for TR-7  
£13.80

**7077**  
Desk microphone for TR-7  
£25.30

**DL-300**  
Dummy Load, 300 watts  
£20.70

**DL-1000**  
Dummy Load, 1000 watts  
£47.95

**RCS-4**  
Remote control antenna switch, 5 way  
£82.90

**B-1000**  
Balun 4:1 for MN-7 & Mn-2700  
£18.40

**1845-EM**  
Encoder microphone  
£36.00

**AA-10**  
2m. Amplifier 1w in-10w output  
£46.00

**WV-4**  
RF Wattmeter 20-200 MHz  
£69.00

**SPR-4**  
Programmable general purpose receiver  
£460.00

**DC-RC**  
DC Power cord for SPR-4  
£9.00

**FL-Filters**  
For R-4C, .25/.5/1.5/4.0 & 6.0 kHz, each  
£39.10

**Manuals**  
Spare operator manuals  
£5.00

**Crystals**  
Accessory crystals for R-4C & SPR-4  
£5.00

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**Carriage Extra All Items**

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**Access**

DRAKE  SALES  SERVICE

**Barclaycard**

RADIO SHACK LTD.
In choosing a receiver you’ll want to be sure that you’re making the right choice. There’s quite a few to choose from but do not fall into the trap of thinking that a receiver produced by any of the large domestic hi-fi manufacturers and purporting to be a “true short wave or communications receiver” is necessarily a sound investment! We’ve been in the communications business long enough to know the good ones from the rest. Listed below are the ones we can recommend as best buys.

All are produced by acknowledged leaders in the communications field and all will give you hours of satisfactory and enjoyable listening, whether it be amateur or broadcast stations you wish to monitor.

But, to make sure you really are getting the best value for money, it’s no good purchasing a sealed box. All the receivers listed below have travelled many thousands of miles and are produced on a production line where final alignment time is limited. That’s why we test each receiver carefully before selling it. Our tests involve the use of several thousand pounds worth of instrumentation and it’s because of this that we can guarantee you that a receiver purchased from us is quite likely to be better than a similar model purchased elsewhere.

Don’t therefore take risks with your hard earned cash. Our advice is free and so are our pre-delivery checks—we can deliver anywhere in the U.K. and can quote competitive H.P. terms and accept telephoned orders against Access or Barclaycard — so if it’s a receiver you want, come to Waters & Stanton Electronics, one of the largest amateur radio outlets in the U.K.!

**LOWE SRX30**

The SRX30 is designed as a budget priced receiver that outperforms many receivers costing 3 times as much. Featuring the Barlow Wadley loop, it will enable you to explore the exciting world of short wave radio—amateurs, broadcast, aircraft, shipping, etc. This is a completely self-contained package, having all the features necessary for complete and reliable coverage of the frequency range 0.5 MHz to 30 MHz.

£178 inc. VAT and delivery

ASK ABOUT SUITABLE AERIALS & MATCHING TUNERS

Dear Sirs,

It is with pleasure I can say the R1000RX obtained from you at Leicester last Thursday is a great performer.

There were originally some doubts as to the N. Blanker’s efficiency. However, tests on the set receiving deliberately created aerial noise show the N.B. to be extremely good, removing all traces of the trouble. A beautiful piece of equipment.

A. BRADLEY, Hull.

**YAESU FRG7**

The FRG7 is one of the best known receivers. Many thousands have been sold and for value for money it’s hard to beat. Based on the Barlow Wadley loop, this sensitive receiver is able to cope with today’s crowded air waves. SSB/CW/AM — all are copied perfectly — the receiver has thirty1 MHz bands with excellent bandspread, operates from 230 volts or 12 volts and built-in speaker — frequency coverage is 0.5 MHz to 30 MHz.

£214 inc. VAT and delivery

**YAESU FRG7000**

The FRG7000 is based on the successful FRG7 design with a host of features that make it a deluxe receiver for the really serious short wave listener. Digital readout, electronic clock and timer, superb selectivity all go to make up the receiver that everyone aspires to own. Frequency coverage is 0.2 MHz to 30 MHz and the clear digital readout makes it one of the easiest receivers to use.

£375 inc. VAT and Delivery

**FDK TM56B**

The TM56B is a highly sensitive VHF monitor receiver for listening to the popular 2 metre FM transmissions from amateurs throughout the U.K. Hear your local amateurs transmitting from their cars, or from home or through one of the many repeaters sited around the country. 230 volt AC or 12 volt DC operation is possible and a built-in auto-scan circuit monitors 4 priority channels. The receiver is supplied with xtals for the 10 most popular channels in the U.K. Extra crystals are stocked at £2.45 each.

£106 inc. VAT and Delivery

**SWL AERIALS**

We are often asked what is the best aerial for general listening. With a good receiver the answer is simply a wire between 50 and 100ft. long and preferably outside. A simple ATU will improve the match between receiver and antenna. There’s no magic aerial system that will turn a poor receiver into a good receiver — beware of exaggerated claims — we’d rather sell you a length of wire and some free advice than kid you into thinking that the “XYZ” wonder aerial will enable you to hear stations you’ve never heard before. If you really want an aerial that is purpose designed for the SWL and gives good performance on the amateur bands, we can recommend the Mosley RDS dipole — 70ft. long and fed with coax. To improve on this you will have to follow the normal accepted antenna theory as used by transmitting amateurs and here reading of the several textbooks on aerial design and theory are recommended.

PETER WATERS G3OJV
The R-1000 uses an advanced PLL system in an up-conversion scheme to a high (48MHz) first IF to remove any possibility of image responses. The receiver covers the entire frequency range from below 200kHz right up to 30MHz in 30 bands, each 1MHz wide. The bands are selected, not by ambiguous knob twiddling as in receivers using the Wadley loop but by a 30 position band switch which controls the PLL system.

The band switch also electronically selects the appropriate band pass filter network in the RF stages of the receiver so there are no "preselector" or "antenna trim" controls to twiddle — simply set the band switch to the range required — that's it!

A highly stable VFO tunes each 1MHz range and its linear, back lit scale makes readout easy. However, in addition to this dial, Trio have also provided 5 digit true frequency digital readout so as to guarantee spot on accuracy on any frequency. As a further feature, the digital display can also be switched to read time, this being derived from a quartz standard. Marvellous for accurate log keeping. The display uses high intensity readout units which can be dimmed for use in low light conditions.

As for what else is inside this superb instrument — selectivity is catered for by three custom made IF filters; a 12kHz wide AM filter; 6kHz narrow AM filter; and a new 2.7kHz SSB filter with a shape factor of better than 1:2.6:60dB. Selectable sidebands are available at the touch of a switch.

For the first time in mid-price receiver, a true noise blanker is provided to remove pulse type ignition noise.

To minimise front end overload, a step RF attenuator is included which gives 0-60dB attenuation in four steps.

All the rear panel connectors are recessed on a sloping panel so that you can stand the receiver either on its back, or pushed hard against a wall when used in conventional shelf mounting. The antenna inputs allow the use of either a high impedance wire aerial or a 50ohm balanced input so that the proverbial long lump of wire will work really well with the R-1000.

Up until now we have been taking orders on a waiting list system because of short supply of this item. Hopefully by the time you read this we will be able to supply from stock. And remember all our R1000 are given our full pre-delivery check and then despatched promptly to reach you within 24 hours of us receiving your order. That's real service! Just one of the many things that make more and more people come to us for all their amateur radio needs.

£298 inc. VAT
WATERS & STANTON ELECTRONICS

TRIO HAS COME TO THE SOUTH EAST

ALL PRICES INCLUDE 15% VAT

TRIO

TS120V £408
TS120S £495

SOLID STATE RIG
RELIABLE AT LAST

Up until now there has been a natural reluctance to accept solid state HF rigs as anything but a second rig or mobile unit with dubious reliability of the PA devices. Now at last the new TS120 series gives you 80-10 metre coverage at either 10 watts or 100 watts output. Digital readout and variable selectivity are just two features that put them in a class above any other solid state rig we know of (apart from the TS180S) — even those costing nearly £1,000. The TS120 will put to shame many of the older valve PA designs and can confidently be regarded as a good reliable base or mobile station — and no tune-up means instant QSY from band to band at the flick of a switch.

TRIO

TS820S £832

THE DX OPERATOR’S EXECUTIVE RIG

The Trio TS820S must be the HF operators dream come true. Many superlatives have been used to describe it and all are justly deserved. It’s the transceiver that you’ll hear from about every corner of the World with its distinctive, clean, crisp audio. A most effective RF processor ensures a remarkable improvement in readability under CRM conditions without any degradation of quality and RF negative feedback produces just about the cleanest signal you’ll find anywhere. 160-10 metres, 200 watts PEP input and 0.2uv for 10dB S-N all add up to an enviable package. Add to this the digital readout display and unique selectivity obtained by "bandpass tuning" of the IF section produces a transceiver that is today’s DX operator’s No. 1 choice. For further information or credit terms, just drop us a s.a.e.

TRIO

TS520SE £485

This must be an absolute bargain in HF transceivers. The TS520SE gives you a complete station in one package covering 160 to 10 metres. A pair of rugged 6146B tubes give in excess of 100 watts output and the speech processor will take care of those extra db needed for DX contacts. We really think that if you are in the market for a new HF transceiver you should consider this one. It hasn’t got all the fancy gimmicks that some of the more expensive models have but there again we can’t all afford £600 to £1000 for a transceiver. But we will guarantee that if you hook the TS520 up to a dipole or other matched aerial you’ll be in there working the DX with the best of them.

VHF — UHF
AIRCRAFT MARINE AMATEUR
THIS RECEIVER COVERS THEM ALL!

NEW

TRIO

BEARCAT

220

£241

AM/FM 240V ac 12V dc (for mobile use)
66-88mHz 118-138mHz 144-174mHz
421-512mHz programmable scanning and search etc.

NEW

TRIO

TR2400 £235

The new TR2400 2 metre FM transceiver must be one of the most advanced portables available today. Delivery is due about now and there is already a waiting list for this one. The large LCD display means low current drain and easy frequency readout. Full keyboard function is incorporated covering 144-148 mHz in 5 khz steps. 10 memory channels put it in the super class of hand helds and full scanning of these memory channels is possible. Instant reverse repeater operation is possible and the power output of 1.5 watts will match any handheld unit in current production. It’s not cheap but the price does include ni-cads, charger, antenna etc. There is also a very nice base station supply box coming soon that enables you to power and charge from the mains whilst operating with the comfort of a separate microphone.

NEW! R517
AIR BAND RECEIVER
118-144mHz
£49.50

This is not a toy but a professional monitor covering 118-144mHz with both coarse and fine tuning controls. The most sensitive unit we have ever come across and now being supplied to flying clubs and professional pilots. In addition to the variable tuning, there are three crystal controlled positions for fixed tuning to your local airport. You can then enjoy ‘flush free reception and be sure you are on frequency even when there are no signals. Crystals £2.50 each — please state frequency.
TWO SUPER POWER HOUSES . . . IMPORTED DIRECT BY US

IN STOCK NOW!

DenTron MLA 2500
160 10m 2kW PEP
£695 inc. VAT and delivery
Send 25pf for complete DenTron HF Catalogue

160-10m ATU's also in stock
* 1kW DC continuous
* ALC Circuit
* 3 speed cooling
* Military specifications
* 234v/117v AC
* 2 of EIMAC 8875 tubes

FDK IN STOCK NOW!

Palmsizer
40x 25kHz Channels 145-146MHz
Bulk Shipment at Super Price!
£149 inc VAT buys this . . .

DenTron
GLA 1000
1 KW linear
80-10m
£295 inc. VAT
In Stock Now!

FDK HAND-HELDS PII & PIV

PII 145MHz £99.50, PIV 432MHz £159

Great Value — Great Performance

STOP PRESS
NEW FDK M700E MKII
Synthesized 2M Mobile
25 watts 25KHz & 121KHz Channels
£195 inc. VAT & delivery
Ex Stock

Dentron
G8NMU 102721 669454
G3XTX 107081 68956
GM3GRX 10324 24428

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MONDAY - SATURDAY 9-5.30
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Dentron
2200 LINEAR
160 10m 2kW PEP
£429 inc. VAT
(Securicor £4.50)
Sae for colour brochure

240v AC
* R.F. Wattmeter (inc. p&p)
* Size 5½' x 14' x 14'
* Weight 47lb.
* Ideal for SSTV/RTTY
* 3rd order down 30dB
* 40 watts drive for 1kW

240v AC
* 4CX-350F tube
* Receiver pre-amp
* 10-13 watts drive
* SWR meter built-in
* 500W PEP input
* 400W FM/CW input
* Fan cooled
* 12v DC output — 3 amps
* Covers 144-146MHz

240v AC
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* 500W PEP input
* 400W FM/CW input
* Fan cooled
* 12v DC output — 3 amps
* Covers 144-146MHz

A complete station in one package. Over one watt of FM capable of operating on any frequency in the FM band-plan. The convenience of changing frequency in 25KHz steps and selecting any frequency either simplex or repeater wherever you happen to be in the U.K. Surely a must for the travelling man. It's so much at home in a hotel bedroom as it is in the home. QTH on the main aerial. If you want the added convenience of an external microphone, this is available at £11 and the matching case with external battery pouch is £9.75. Whichever way you look at it you have to admit that a synthesized 40 channel hand-held with Ni-cads — plus over 12 month parts and labour guarantee — send for yours now.

The Palm II and IV offer truly amazing value for money in the field of hand-held transceivers. Certainly they are the most compact units currently available and fit easily into the pocket. The built-in condenser microphones make for a really superior quality of audio that would do credit to many base stations. Accessories such as Ni-cads, AC chargers and helical whips are all included in the basic price and additional channels will cost you a mere £3. Repeat operation is fully catered for with the built-in crystal controlled tone-burst and both the 2 metre and 70cms models have plus and minus repeater shifts. Don't miss these amazing prices — just think, you can have both 2 metre and 70cms hand-holds for less than £260 inc VAT — can't be bad!
AMATEUR ELECTRONICS UK

AEUK — Your number one

AS FACTORY APPOINTED DISTRIBUTORS WE OFFER YOU—
WIDEST CHOICE, LARGEST STOCKS, PROMPTEST DEAL AND
FAST, SURE SERVICE RIGHT THROUGH

HOW TO REACH US (EASY PRIVATE PARKING ON OUR 70ft. FORECOURT)

FROM SOUTH AND EAST. We are located approximately two miles from Junction 5 of the M6 from which follow signposts to Birmingham. Within \( \frac{1}{2} \) 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 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 M6 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.

Hours: 9.30-5.30 Continuous Including Saturdays — Early closing Wednesday, 1pm

Access or attractive
H.P. terms readily available for on-the-spot transactions. Full demonstration facilities. Free Securicor delivery.
This month we again show a selection from the incomparable Yaesu range, but this is by no means the full story and only the latest catalogue can give you that.

Why not take advantage of our offer below and get your own copy together with the latest Yaesu releases including the fabulous new all solid state FT-107M HF band transceiver — now in stock!

A - FT-202 ultra-compact 2m FM hand-held. Weighs less than a pound, comes in like a ton of bricks!
B - FT-901DM Competition Grade all-band HF Transceiver — strictly for that class of operator who will insist on the best and only the best!
C - What would the aspiring SWL do without the sturdy FRG-7? Used in thousands throughout the world and giving better performance than many a more expensive set.
D - FT-227R Memorizer 2m mobile. Sophisticated electronics coupled with the usual Yaesu high quality construction makes this the best scanning rig on the market.
E - FT-225RD 2m all-mode base station. Whatever the options you’ll never find a finer VHF rig and its new low price makes it the best buy on the market.
F - Dedicated SWL’s please note. When you invest in that receiver to end all receivers don’t cut corners on cost and regret it at your leisure. With the famous FRG-7000 General Coverage Receiver you find the very best in electronics together with superb mechanical construction in a non-miniature set that does justice to your station and yet is lightweight enough for complete portability.
G -- Here’s a brand new FT-207R which is selling like wildfire simply because it’s the best synthesized 2m hand-held on the market. Anyway what else would you expect from something with the YAESU label on it?
H - What can be said about the superb FT-101ZD HF Transceiver? Apart from the fact that it is really excellent value for money there are features which leave many other makers’ products standing. Don’t take our word for it, however, just listen on the bands!

The above is only part of the Yaesu story — for full details of all the models 36p in stamps will bring you the latest glossy catalogue of the full product range together with our credit voucher for £3.60 — A 10-1 Winning Offer!

AND WHAT ELSE IS AT AMATEUR ELECTRONICS?

The short answer is ‘PLENTY’, but the full reply is a very lengthy one indeed these days. Quite apart from the host of accessories and ancillary units stocked we import the superb SWAN range as per our recent advertisements and carry ATLAS equipment and latterly the full ICOM range. Add to these the superb new STANDARD RADIO models and you’ll soon see that a visit could be well worth while. If you can’t make it, of course, then we shall be pleased to send you all the information you require by return of post.

ATTENTION BARGAIN HUNTERS! A large S.A.E. will bring you our latest used equipment list and our special offers on discontinued new gear and near new demonstration models.
DATONG ELECTRONICS LIMITED

IMPROVE YOUR DX POTENTIAL!

Datong RF Speech Clipppers add "punch" to your speech signal and help you get through where otherwise you wouldn't. Their low-distortion R.F. clipping technique helps in two ways:

Firstly it allows your transmitter to radiate more useful average power and secondly it improves the intelligibility of your speech in difficult conditions.

The renowned fully automatic R.F. clipper MODEL ASP is now joined by a new manually operated R.F. clipper MODEL D75. This supersedes our original manually controlled unit, MODEL RFC, and offers the following additional features:

- Input monitor LED - lights when clipping is between 0 and 20 dbs.
- Power-on LED
- Low/High input impedance selector
- Stylish appearance to blend with any rig

Remember: all Datong R.F. clipppers connect in series with your microphone. No internal connections are required. For R.F. clipping at minimal cost our MODEL RFC/M is still available.

MODEL RFC/M is a fully assembled and tested R.F. clipper in PCB module form. You provide controls, case and power source.

Data sheets on all three R.F. clipppers, including the new MODEL D75, are available on request.

Price: Model D.75 £49.00 plus Vat (E56.35 total). Model A.S.P. £69.00 plus VAT (£79.35 total).

MORSE TUTOR

Morse Tutor has a calibrated speed control plus, and this is vital, a separately adjustable delay between letters.

Start at, for example, 12 words per minute but with a second delay and just reduce the delay as you improve. It delivers five character groups of letters, numbers, or both together. The sequence is random so the supply is unlimited!

All the plus portability, built-in loudspeaker, personal earpiece and key jack. Only £43.00 plus VAT (15%), inclusive price £49.45. Full data sheet free on request.

MODEL FL1

Frequency

Agile

Audio

Filter

AS REVIEWED IN AUGUST ISSUES OF "QST" and "73"

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SHORT WAVE MAGAZINE

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WARC '79

It is all over now bar the shouting, and the writer's reaction to the outcome is rather one of wonder — wonder at the enormous success in not only retaining our present bands, but actually gaining in the foreseeable future three new ones. Whatever one may say or think about individuals and organisations involved, in whichever country one may happen to choose, Amateur Radio has proved itself still to be a world force. We hope that as many G8's as can will go and take their Morse test (whatever they may think of Morse!) to become Class A licencees and operate, at least for some of their time, on the international bands.

Amateur Radio is an international activity which, by its very nature, largely avoids those elements which depressingly often seem to be only divisive and destructive, serving to set one man apart from another: politics, race, status, colour, class, religion and more besides. At a time of mounting global mis-understanding, the world needs every integrating factor it can get hold of — and Amateur Radio certainly falls into that all-too rare category.
Convention and Buffet are £4.50. For those attending the Buffet only the cost is £3.50. Tickets should be obtained from Mike Dormer, G3DAH, at 43 Mickleburgh Avenue, Herne Bay, Kent, CT6 6HA, with all remittances payable to “RSGB.” As usual, visitors to the Convention may pay at the door.

**WARC 1979**

Detailed examination of the frequency allocations for amateur radio above 144 MHz agreed at Geneva reveal little change to existing bands, but a number of new bands between 47 and 250 GHz. In the following list, “E” denotes an exclusive allocation to the amateur service; “P” and “S” indicate primary and secondary usage respectively, and “F” refers to footnotes. 144-146 MHz (E); 430-440 MHz (P); 1240-1300 and 2300-2450 MHz (S); 3300-3500 and 5650-5850 MHz (F); 10.0-10.5 GHz (S); 24.0-24.05 GHz (P); 24.05-24.25 GHz (S); 47.0-47.2 and 75.5-76.0 GHz (E); 76-81 GHz (S); 119.98-120.02 GHz (F); 142-144 GHz (E); 144-149 and 241-248 GHz (S); 248-250 GHz (E).

The only loss is 25 MHz at the low end of the 23 cm. band, but this is unlikely that much use was made of this section anyway. The ITU regulations define primary and secondary services. Primary should be obvious. A Secondary service must not cause interference to a Primary one and cannot claim protection from any interference caused by a Primary user. The Conference agreed on specific frequency bands for amateur satellite use and these are covered in the Satellite News section later in this feature.

**Satellite News**

After a couple of false starts, the European Space Agency’s first ARIANE rocket was successfully launched from the Kourou facility in French Guiana on December 24 at 1714 and 14.36 seconds UT, to be precise. A blow-by-blow account of the event was relayed by K1HTV and W2LQQ on 28878 kHz with “live feeds” from the controller at Kourou via NASA’s Goddard Space Flight Center in Maryland, through AMSAT’s office there, thence by telephone to K1HTV.

This mission did not carry any AMSAT hardware but was of keen interest to members since the next ARIANE launch, scheduled for May 30, will carry the first AMSAT Phase III satellite.

At WARC 1979, the 145.8-146.0 MHz and 435-438 MHz satellite sub-bands were retained and the following new sub-bands agreed: 1260-1270 MHz for uplink only; 2400-2450 MHz; 5650-5670 MHz uplink; 5830-5850 MHz downlink and 10.45-10.5 GHz. Satellite operation was permitted in all new bands from 47 GHz, up, except for the 120 GHz one.

The Phase III assembly is going well at AMSAT. The completed package has to be sent to Toulouse, France, shortly for integration into the launch vehicle and then the whole assembly has to be shipped to the South American launch site.

*Oscar 7* continues to work very well, inspite of defunct batteries. Your scribe monitored some Mode “A” telemetry on Christmas Day, one frame of which indicated a “battery” voltage of 13.7 volts. The transponder output power of 0.7 watts. Signals were excellent, especially that of VE5XU at 6,600 km. range. 0-8 is also resounding well and will complete its 10,000th revolution on Feb. 20. According to G3IOR, 4U1UN, in New York, is on downlink frequency of 29423 kHz on 0-8 only, Mode “A.” Pat says that TT8CR should be on soon from Chad in West Africa, and that the Russian RS-2 is switched on this month for telemetry data only.

**New Product**

The modern oriental all-mode VHF transceivers have indisputably revolutionised 2m. band operation. However, while they give satisfactory performance in the average station or car, their receiving limitations become apparent at contest weekends and when trying to receive the very weakest of signals as in E-M-E work. Many owners have “soupied” their transceivers by replacing an RF stage transistor and/or first mixer.

A commercial solution for the popular Yaesu FT221/225GT series is now available from *muTek Limited*. The man behind this new firm is Chris Bartram, G4DGU, a very well-known microwave and 70 cm. E-M-E operator. Briefly, they offer a complete replacement front end board as developed by Dr. Ian White, G3SEK, and used by the G3PIA contest team and in E-M-E contacts on 2 m. The RF
stage is a very low noise, ion-implanted, dual-gate MOSFET capable of a device noise figure of around 1 dB. Blocking and intermodulation performance are far superior to that of any unmodified set.

Very careful attention has been paid to bandpass filtering at 2m. and at the IF of 10.7 MHz and to impedance matching throughout. The device is now in full production and comes complete with a seven page manual covering the design, circuit diagram and installation data. An s.a.e. to muTek Ltd. at P.O. Box 23, Abingdon, Oxon., OX14 4TG, will bring a specification sheet. The company can also supply the NEC range of transistors, by the way.

**Six Metres**

Harry Wilson's, E12W, amateur licence allows him to operate in the 50 MHz band and he has sent along a detailed account of his activity since the band opened on October 20, last. Up to Dec. 20, 1,552 QSO's with around 600 different stations were concluded with all ten U.S. call areas, VE1, 2, 3 and 4, KP4, VP2 and VE. The peak day was Nov. 18 when 106 stations were worked. The highest MUF recorded was 62.75 MHz on Dec. 15 when 72 stations were worked.

Harry uses a Yaesu FT-620B loaned by SMC Ltd. of Southampton, with 10 watts output to a 3-ele. Yagi. The most consistent signal throughout the period was VE1AVX who runs 1 kW to an 11-ele. beam on a 30 ft. boom.

Derek Wrightson, G3BTO (Hants.) notes Dec. 8 as his best activity day when CW signals from W1, 2, 3, 4, 5 and 8 were copied at S2-S8 strength. That day was the only one when the beacon VE1ISX was copied intermittently between 1425 and 1700. The "Beacon in Nola," WB5ZRL, was S2. On the afternoon of Dec. 15, the Gibraltar beacon ZB2VHF was a consistent S8 at a QTF of 290° whereas the true great circle azithum is 200° on which bearing it was only S5. Derek was so puzzled that he very carefully checked the headings visually.

He mentions the bad operating procedures of many W and VE stations and writes; of, "... abysmally low standards of capability and a deplorable lack of real knowledge of the amateur radio scene outside their own immediate environments." Strong words! He also complains of unnece-...
Two Metres

G3COJ caught the Aurora of Jan. 1 between 1815 and 2015 and worked GM4FZH in YS33d. This event took most everyone by surprise and the usual warning networks were not activated, it seems. Your scribe's near neighbour Jack Mitchell, G3KEQ, worked a few GM's and LA3UU (FT) and mentioned three or four other LA's. QTF's were virtually due North.

John Hunter, G3IMV (Bucks.) is now past his double century with 206 squares worked. He has been quite active on MS. In the Geminids, he had successful contacts with Contest but ended up working 79 CW QRG. During the Quadrantids, out who works what on the random procedures, giving only partial calls, operators were not using the proper SSB. However, he suggests some QSL's have been better as reflexions were possible due to heavy and continuous local QRM. John concludes that the shower was not too bad but could reach him. Martyn Baker, G8KGF (ZD51h) on the next and OZIBSO (DG34h) the day before he consider MS to increase his squares

During the Nov. 27-29 event, Paul Osborne, G4IGO (Bristol) worked OZ1OF (EQ); SM7AED (GQ); DK2DO (EK) and SM7GWU (HS). On random MS, he had two QSO's with SM5CH (HS) on Dec. 21 and 22. Ken has received a letter from Peter Mure, OH3TH (LV50a) in which he listed British stations he has worked via MS and Ar. QSL's were awaiting G3NSM, G3CBW, GM4CVI and GD6UQ. Ken has sent all these folk his QSL and IRC.

During the Nov. 27-29 event, Paul Osborne, G8BWR (Warks.) told your scribe he worked HB7RO (DG34h) the first day; EA2HX (ZD51h) on the next and OZIBSO (EP25f) on the last. He reckons this temperature inversion lift only just reached him. Martyn Baker, G8KGF (Oxon.) caught the Jan. 1 Ar and worked two GM's in WS square, one in WR and another in YR and found optimum azimuth west of north.

Welcome to new correspondent Kevin Piper, G8TGM (W. Sussex), who was licensed on Sept. 25 last. He runs an Icom IC-202 and Microwave Modules 25 watts amplifier to an 8-ele. Yagi at 8m. Kevin took advantage of the Nov. 27-29 lift starting off at 1300 on the 27th with F8CH/P (AD37a). On returning from work, he contacted EA2HX (ZD51h). The next day produced several Frenchmen in central and eastern France and later on ON, DL and PA. On the last day, a number of German stations were contacted and the whole event gave Kevin 10 new squares.

In reply to G3FPK's suggestion that he consider MS to increase his squares tally, Arthur Breese, GD2HDZ, wrote, "Not ?!* likely!" In common with many others, he prefers to keep amateur radio as an enjoyable hobby and not to make hard work of it and lose his much-needed beauty sleep! From Jersey, Geoff Brown, G4JCD, reports successful Geminids QSO’s with IW3QBC (GG); DM2BYE (HM) and EA3ADW (BB). During the Nov. 27-29 fun, he casually mentions working CT1, EA, I and HB without any further details, before going on holiday in the U.K.

Would you believe Sporadic E in January? On Jan. 5 at 1000, ON7EH is reported to have worked RA3YCR (RN52f), a QRB of about 2,000 kms. This suggests an area of high ionization over central Poland so other possible paths would have been featured, like a hill behind it to the East?

FOUR-METRE ANNUAL TABLE

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TWO-METRE ANNUAL TABLE

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The results in the three classes of the AGCW-DL event last Sept. 22 reveal only three U.K. entries, from G4GGV, G3XWZ and G3MGL who came 10th., 11th., and 12th. respectively in the "B" category. Given decent conditions, this event might attract more U.K. participation although there is no reason why stations should not pile up a winning score by working other British Isles stations.

The 432 MHz Fixed contest on Feb. 3 will likely be history by the time you read this but your reports would be appreciated. The BATC's Activity Week and TV Contest is scheduled for Feb. 10-16, daily at 2000-2230 with scoring at 2 pts./km on 432 MHz; 8/km on 1,296 MHz and 16 on 10 GHz. The weekend March 1/2 sees the 144/432 MHz and s.w.l. affair.

Tabular Matters

Arthur Breese, GD2HHDZ, heads the 1979 Three-Band Annual Table with 190 points, just three ahead of Syd Harden, G2AXI. Nothing has been heard from Colin Wooff, G3SPJ, since time. Even so, his 153 points earned him third spot. It is interesting to note that scoring was down on the 1978 results if one averages the totals of the first six entrants, viz.: 159 against 173. In fact, this approach reveals that 1976 was the best year with 194 average and that was the first year based upon the present county structure. The Squares Table will be back next month along with the first claims for the 1980 Three Band one.

Final Miscellany

Dave Price, G4CQT, reports E-M-E QSOs with Hawaii and South Africa, the latter with Joe Ludlow, ex-GW3ZTH, now ZS6ZY, on Dec. 23 and Jan. 2. Joe runs a pair of 4CX250B's into sixteen 7-ele. Yagis. Dave Butler, G4ASR, is now running 250 watts input, mobile, to a gamma-matched halo aerial. The basic rig is a Belcom Liner-2 with the 2m. inners ripped out and replaced by a Microwave Modules converter, plus other major mods. on the Tx side.

VHF repeater GB3SCat at Wimborne, Dorset came on Ch. R1 on Dec. 24, but UHF relay GB3NK was closed down at the Chelsham site on Jan. 6 and will reappear later from Wrotham.

Deadlines

All your letters and claims for the March issue by Feb. 6 and for the April feature by March 5 to:- "VHF Bands," SHORT WAVE MAGAZINE, 34, High Street, WELWYN, Herts., AL6 9EQ. 73 de G3FPK.
The Yagi

Named after its inventor, the Yagi is a half-wave, centre-fed element with one or more parasitic half-wave elements. By placing reflectors behind, and directors in front of a half-wave dipole antenna, directivity results in a direction leading from the reflector(s) through the driven element and director(s).
current and, hence, its impedance. The same effect is seen with the Yagi: the “re-radiated” energy from the parasitic elements increases the total current in the driven element and, as \( Z = V/I \) (where \( Z = \text{impedance}, V = \text{voltage} \) and \( I = \text{current} \)), this increase in current results in a feed impedance which is lower than that of a single half-wave antenna at the same height. It should also be noted that the ground-reflected wave will alter the current flowing in the driven element and, like all horizontal antennas that are not ‘remote’ from the ground, the Yagi’s feed impedance is also affected by its height above ground.

Obviously, the actual feed impedance of a Yagi array will be influenced by several factors including (a) the number or elements used, (b) the element spacing, (c) the diameter of the elements in relation to their length, (d) the method of mounting the driven element on the boom, etc. But in general the feed impedance of a 2-ele Yagi will be around 25-35 ohms, a 3-ele around 15-25 ohms and 4-plus elements around 10-25 ohms. Some form of matching is therefore necessary and for a no-compromise antenna it is suggested that the Gamma match is most suitable for the Yagi, as it will match a wide range of feed impedances to either 75 or 50-ohm coaxial feeder and provide balun action at the same time (the Yagi being a balanced antenna).

Home-constructors have tended to shy away from the HF Yagi because of difficulties encountered during tuning of the antenna, but the author suspects that this reflects a failure on the part of many amateurs to realise that there are in fact two operations to be carried out, namely “tuning” and “impedance matching”. Tuning implies the adjustment of the lengths and spacing of the elements in order to achieve a system that is resonant at the required frequency and displays the correct directive properties, whereas the matching operation is simply the matching of the resonated array to its feedline. Fortunately, much work has been carried out on array dimensions that maximise either forward gain or front-to-back ratio, so it is possible to use information already available for choice of spacing and element length, and the only operation normally necessary is adjustment of the length of the driven element to resonate at the required frequency. In normal circumstances adjustment of the lengths of the parasitic elements will not be necessary as slight inaccuracies will not be detrimental to the antenna’s performance; however, minor adjustments can be made by observing the change that was necessary with the driven element.

For example, if we had to increase the length of our driven element by 3 ins. in order to achieve resonance, we can increase the lengths of all the parasitics by the same amount — this being an acceptable compromise. The lengths quoted in Fig. 2 are typical for Yagis for the 10, 15 and 20 metre bands and have been drawn from reliable sources. Fig. 2(a) gives details for 2-element Yagis and Fig. 2(b) is for the 3-ele version. Note that with a 2-element Yagi the parasitic element is tuned as a director; this is because slightly more gain is available and the required spacing is smaller than with a reflector element. The figures quoted are for “general purpose” beams and provide acceptable levels of gain, front-to-back ratio and operating bandwidth (the element spacings for the 3-element arrays are not those for maximum gain as the wide spacing required for this property makes such antennas rather large!).

The whole subject of Yagi design is a complex one as there are many interacting factors to be considered; any reader who wishes to study these antennas in more detail will find much material in the ARRL Antenna Book and also W6SAI’s Beam Antenna Handbook, both of which are available from the Publications Dept. of Short Wave Magazine.

Fig. 3 shows the Gamma match with typical dimensions and capacitor values for Yagis for 10, 15 and 20 metres. The Gamma rod can consist of a length of \( \frac{1}{2} \)-inch diameter aluminium tubing and is supported at one end by a “shorting clamp” and at the other end with an insulated support which can be cut from perspex or some other insulating material.

The method of adjusting the device is as follows: (a) find the resonant frequency of the antenna by use of a dip oscillator, the oscillator coil being inserted into a single turn coil connected between the two halves of the driven element. (At this point the driven element is left open at its centre); (b) if required, adjust the length of the driven element in order to establish resonance at the required frequency. (If this tuning is carried out close to the ground, e.g. on top of a loft, supporting pole, the resonant frequency will be lower than when the beam is mounted well clear of the ground; it is therefore suggested that beams so adjusted are resonated about 25-75 kHz below the required frequency). When resonant, join the two halves of
the driven element at the centre and ‘earth’ this point to the boom; (c) adjust the Gamma rod and capacitor, making length L about 80% of the figure quoted in Fig. 3(a), and then attach the feeder; (d) apply a little RF from the transmitter at the resonant frequency and note the SWR on the feeder; (e) adjust the Gamma capacitor to give a minimum value of SWR as indicated by the SWR bridge; (f) gradually adjust length L and then the value of capacitance until zero reflected power is noted on the SWR bridge — increasing the transmitter as the reverse reading drops in order to increase the ‘sensitivity’ of the test; (g) fasten the ‘shorting’ clamp permanently in position and secure it with self-tapping screws as shown in Fig. 3(b); (h) waterproof all components and connections.

The Gamma capacitor can be mounted in a waterproof box, a hole being cut to allow adjustment with a screw-driver. If it proves impossible to obtain a SWR of below about 1.1:1 or 1.2:1, the likelihood is that the transmitter is not operating at the antenna’s resonant frequency. Note that if the adjustment has been carried out close to the ground, raising the beam will probably alter its feed impedance and this will result in a rise in SWR, though it is likely that it will still be within acceptable limits. However, it may prove necessary in some cases to either adjust the Gamma match with the antenna in the operating position or to raise and lower it between successive adjustments; note, however, that the resonant frequency will probably be higher with the beam in the operating position and the measurement of SWR should take this into account.

A simplified method of matching is to assume that the feed impedance of the array will be close to 20 ohms, and to use a folded driven element in order to transform this figure up to around 80 ohms, thus making a good match for 75-ohm twin feeder, see Fig. 4. Indeed, by choice of element lengths and spacings we can be confident of arriving at a feed impedance of 15-25 ohms which gives an impedance of 60-100 ohms with a folded element, i.e. an SWR of about 1.35 : 1 maximum on a 75-ohm twin feeder and, as mentioned in the article on feeders, such a value is of little consequence with balanced feeders. It must be realised, however, that in order to get the required impedance transformation of 4 : 1, the two conductors must be made from tubing of the same diameter — if different diameters are used the ratio will be different. It will also be noted that the element length will be shorter than with a ‘single conductor’ element. The required resonance can be obtained by sliding the telescoping ‘link’ sections into the main conductors as shown in Fig. 4; however the parasitic elements are still ‘single conductors’ and the lengths should not be altered from those quoted earlier. In practice this method of Yagi construction appears to work well, although the compromise approach will not appeal to the purists in our ranks!

**Multiband Yagis**

Perhaps another reason why the HF Yagi is not popular among “home brewers” is because the devices described above are single-band antennas, whereas commercially made trapped Yagis are available that give coverage of all three HF bands — the difficulties encountered in home-brewing suitable traps deterring the amateur from constructing his own multiband array. It will be apparent that the trapped multiband Yagi is a compromise since different spacing (in terms of wavelength) is used on each band, and owing to the inductive shortening of the elements on the two lowest bands covered, the total size is smaller than with a full-sized Yagi. However, in practice these antennas work extremely well and provide a convenient method of obtaining three-band coverage with a single antenna. The essential details of the trapped Yagi are shown in Fig. 5 and its operation is similar to that of the trapped dipole discussed in the previous article.

When operating on 28 MHz, the 28 MHz traps (T2, T3, T6, T7, T10 and T11) effectively act as insulators and only the sections of the elements between them and the boom are operative — the result being a full sized Yagi on this band. On 21 MHz, the 28 MHz traps offer a low impedance and their action can be considered to be simply inductive. However, the 21 MHz traps (T1, T4, T5, T8, T9 and T12)
The Quad Antenna

The derivation of the Quad loop was discussed in an earlier article, but for the sake of completeness we will repeat the essential details here. Basically, one method of reducing the angle of radiation from horizontal antennas is to 'stack' them one above the other; so, if we have two half-wave antennas so positioned, a quarter-wave apart, the angle of radiation will be lower than from either of the single antennas alone. Fig. 6(a) shows the two antennas, whilst Fig. 6(b) shows that by bending the ends of these two antennas towards each other we arrive at a complete square with quarter-wave sides — the Quad loop. Not only does this configuration have a lower angle of radiation than the single half-wave horizontal antenna, but there is also a small power gain in a direction leading through the plane of the loop. Figures of 1 to 2 dB are often quoted for this gain — 1 dB being the more likely.

The free space gain coupled with the lower angle of radiation means that the single Quad loop is quite effective for DX working on the HF bands and many amateurs use them in this form: as the radiation pattern is bi-directional they need rotation through only 180° to give all-round coverage. However, the term 'quad antenna' is usually taken to imply the multi-element antenna that results when parasitic elements are added to form a true directional array, although the name 'cubical quad' is often used to describe it.

Before considering the multi-element device, let us look at the different forms of loop available. Fig. 6(c) shows the Square loop fed in the centre of one vertical side instead of the more common feed point at the centre of the bottom horizontal wire. This has the effect of making the loop vertically instead of horizontally polarised. The Diamond loop fed at one corner, Fig. 6(d), has an important difference from the square quad loop in that the two areas of maximum current (the feed point and the opposite corner) do not occur in parallel wires as they do in the square loops fed at the centre of one side. Although many authors describe Quads built in the diamond configuration, 144 MHz tests carried out at G3XAP have tended to suggest that such a device is slightly inferior to the more common Square loop — these tests were comparisons of received signal strengths from distant 144 MHz beacons. (Such tests may or may not be valid when considering antennas for the HF bands, but in practice comparative tests are more difficult at these frequencies and no actual work has been carried out by the author.) For this reason the author would tend to shy away from Diamond quads.
for the HF bands in favour of the more conventional Quad loop fed at the centre of one side.

The addition of parasitic loops to form multi-element quads is exactly the same practice as that of adding parasitic half-wave elements to a dipole to form a Yagi, the most significant difference being the fact that the parasitic element of a 2-element Quad is best tuned as a reflector, whereas the 2-ele Yagi is best with the parasitic element tuned as a director (as discussed above). Taking the case of the 2-ele Quad (the most common version), there are two distinctly different methods of constructing the reflector: (a) to make it physically larger than the driven element, or (b) to make it the same size as the driven element and add a 'tuning stub' at one of the high current points. The work carried out at G3XAP with 144 MHz wire quads has shown that, provided that the size of the parasitic loop is correct, there is no apparent difference in the performance of the array whichever method is used — but tuning a stub can be very difficult on the HF bands because the array is physically very large, and because there is an absence of suitable signals (both SSB and CW signals are unsuitable, and AM is rare!). The preference at G3XAP, therefore, is to make the parasitic elements physically different in size (as is the case with Yagis, of course). Fig. 7 shows the construction of a 2-ele Quad with a close-up diagram of the spreader plates, and Fig. 8 gives the appropriate dimensions including spacing between elements and, for those who prefer this method, lengths of stubs to use on the reflector. The actual method of constructing the stubs is detailed in Fig. 9 and the most common method of tuning them is to receive a signal off the back of the Quad and adjust the stub length for minimum received signal strength, i.e. maximum front-to-back ratio. The frequency of maximum gain of a Quad so tuned will be somewhat higher than the frequency for maximum front-to-back ratio; the actual difference varies with each antenna but is probably of the order of 50-150 KHz for a 14 MHz antenna (this figure is based on measurements made at 144 MHz).

The single Quad loop has a feed impedance of around 120 to 140 ohms at resonance, whereas for the 2-ele device this figure drops to 60 to 100 ohms. The antenna must be resonated prior to attachment of the feeder, and this is best carried out by adjustment of the lengths of the spreaders, the wire elements being shortened or lengthened accordingly. Resonance can be found with a dip oscillator, a single-turn loop between the two halves of the bottom wire being used for coupling (i.e. the coil is connected across the feedpoint). A 75-ohm twin-feeder directly connected to the feed point provides a good match to a 2-ele Quad antenna and a low SWR results. If it desired to use coaxial feeder, a balun should be used although many amateurs connect the co-ax directly to the antenna with apparently satisfactory results.

As with the Yagi, the purist will prefer to get as good a match as possible, and it is recommended that they use a Gamma match; however, with quads the Gamma 'rod' is best made with wire of similar diameter to that used for the loop itself. It can be supported by spacers similar to those used in the construction of open-wire feeders — Fig. 10(a); note, however, that if a Gamma match is used the element wire becomes a complete unbroken loop. Suitable values for the length of the Gamma section, its spacing from the element wire and the likely maximum capacitance required are given in Fig. 10(b).

**Additional Elements**

The most popular number of elements for an HF band Quad is two, as the addition of a third means that the centre element (the driven element) will be in very close proximity to the mast, and problems can thus arise — both mechanical and electrical. Some ambitious souls do build 4-ele devices, especially for 28 MHz. The additional elements are tuned as directors and each should be 2.5% smaller than the driven element. If stub tuning is used, the stubs are constructed in the same manner as for a reflector, except that the ends are not shorted; but tuning is still carried out by adjustment of the physical length of the stub.
Multi-band Quad Antennas

As with the Yagi, the attraction of multi-band operation with a Quad has lead to the development of antennas for this purpose, and there are two basic approaches. The first is to use a compromise spacing system and to mount all the driven elements on one set of spreaders and all the reflectors on another. Obviously, with a three-band antenna, the correct element spacing can only be provided for on one band. With a Quad for 14, 21 and 28 MHz, it is usual to have a boom 5ft. 7ins. long so that the spacing is correct on 21 MHz, rather wide on 28 MHz, and somewhat narrow on 14 MHz. This means that the feed impedances on 14 and 28 MHz will not match a 75-ohm feeder as well as the 21 MHz impedance. However, many amateurs feed such an antenna directly with 50 or 75-ohm feeder with perfectly acceptable results.

Figs. 11(a) and 11(b) show different methods of construction of multi-band elements, and of the two, that shown in 11(b) is the simpler to use if a single feeder is to be used. Antennas built on the lines of Fig. 11(a) should have a separate feeder for each band, or else each element should be individually Gamma matched. W6SAI’s excellent book “All About Cubical Quad Antennas” goes into this practice in some detail, and any reader contemplating multi-band Quad construction is advised to obtain a copy. (This book is also available from Short Wave Magazine Publications Department.) The apparent disadvantage of the “concentric” multi-band Quad (apart from the feed impedances on 14 and 28 MHz) is the fact that the front-to-back ratio on 21 MHz is slightly lower than with a single-band quad; however this is a small price to pay for the convenience of three-band operation.

The second approach to multi-band Quad construction is to dispense with the boom and mount the spreaders so that they radiate outwards from a single point. By the correct choice of angles a structure can be built which gives the correct spacing on all three bands — Fig. 12. The ‘boomless’ spider can be purchased ready made, as can a complete Quad, but for anyone wishing to fabricate their own hardware the information given in Fig. 13 was developed at G3XAP for comparative work on Quads of different construction methods. This work was carried out on 144 MHz and the overall conclusion arrived at was that for a 2-ele array it was difficult to see any great improvement in performance when a ‘correctly’ spaced triband device was used in preference to one with ‘compromise’ spacing.

Quads v. Yagis

The controversy over whether the Quad is better than the Yagi (or vice versa) has raged for a long time and the author has been in the fortunate position of having had the opportunity of comparing a 3-band, 2-ele Quad (with compromise spacing) with a 3-band, 3-ele trapped Yagi, the former antenna being home-brewed and the latter a good quality commercial array. Much work has also been carried out at G3XAP on Quad v. Yagi comparisons on 144 MHz models and much comparative information has been obtained.

Firstly one has to define one’s terms carefully; or to put it another way, if one asks the question “is the Quad better than the Yagi?” one has to ask in reply “is the Quad better at what?”. The first comparison to be made is the free space gain, and here the 3-ele Yagi has a slight advantage over the 2-ele Quad. (The author has no facilities for the measurement of gain, but comparisons made by other workers has established this fact.) Secondly, the 3-ele Yagi has a superior front-to-back ratio than the 2-ele Quad — again this fact has been established by other workers. However, the author has stated in a previous article in this series that for DX working, angle of radiation is a far more important factor than directivity, and since the main purpose of erecting a large HF array is, presumably, to work DX, this factor must be a very important one.

There has been a belief in amateur circles for some time that the angle of radiation from Quads mounted close to the ground is lower than from Yagis mounted at the same height, and that the gain of a Quad is much higher than that of a Yagi. Recent articles (“Ham Radio”, March 1979 and May 1979) have stated, however, that neither of these beliefs are true. There is no doubt that a single Quad loop at low heights has a lower angle of radiation than a single horizontal half-wave element at the same height — or that a Quad has about 1 dB gain advantage over a Yagi with the same number of elements. However, it is a fact that in the author’s Quad v. Yagi comparisons mentioned above, there were very many occasions when the Quad outperformed the Yagi by a significant amount, but no occasions when the Yagi significantly out-performed the Quad. Also, the differences were far more marked on 14 MHz than on 28 MHz — results on 21 MHz lying somewhere between these two extremes. The differences could have been due to
Close up details of the G3XAP "Boomless" Quad Spider. Spider is constructed from 16SWG Aluminium Plate. The two halves of the spider are clamped to the mast by means of "plumbers" pipe clamps.

Fig. 13

Matching (although this is unlikely as the VSWR on the Yagi feeder was low on all three bands), feeder losses (also unlikely as very high quality coaxial feeder was used for the Yagi) or that the 'physical shortening' of the Yagi elements by the traps has a significant effect on DX gain. Certainly on 28 MHz where little difference was noted, the sections of Yagi element in use create a practically full-sized device, whereas on 14 MHz the shortening is about 28%. It is also true that in terms of wavelength the two antennas compared were twice as high on 28 MHz as they were on 14 MHz!

Comparisons have also been carried out at G3XAP on full-sized Quads and Yagis on 144 MHz and the advantage of this frequency is that it is easily possible to mount the antennas several wavelengths from the ground. Again, the Quad was found to out-perform the Yagi on many occasions, although the differences were far less marked than at HF. Thus the answer is not a simple one, but, given a free choice, the author would always use a 2-ele Quad in preference to a 3-ele trapped Yagi when the antenna was to be mounted at heights less than about 50ft. — because all the tests carried out at G3XAP have indicated that when conditions are marginal, the Quad is far superior in its DX capability.

However, one must also consider the two antennas in practical terms, because although the Quad performs well when you've 'got it up', it tends to be somewhat more difficult than the Yagi to 'get up!' A Yagi is virtually a two-dimensional array, i.e. it has length and width but very little height; in contrast to this, a Quad has length, width and height and is a very large structure. A 2-ele full sized tri-band Quad laid on the ground with its boom horizontal to the ground is virtually unmanageable — its boom being over 8 ft. from the ground!

Before making a final choice the reader must consider these points very carefully, but having said this, the author believes the extra effort involved with the Quad to be well worthwhile, and repeats that he will still go for the Quad — every time!

_to be continued_
DIGITAL FREQUENCY READOUT
AND OTHER IMPROVEMENTS
FOR THE YAESU MUSEN
FRG-7 RECEIVER
PART II
ROBERT DAWSON

The hardware necessary is therefore a presettable down-counter which will operate up to about 3.5 MHz. The one used in this design is the Intersil ICM 7217. This is a CMOS device containing all the digit drivers and multiplexers and a bit more besides which is not used. It is quoted as having a typical operating frequency of 4 MHz (but, guaranteed to only 2 MHz); those used by the author have counted reliably to over 6 MHz.

Fig. 9 shows the circuit schematic of the complete counter and phase lock loop. All IC’s are CMOS and require the usual handling precautions. IC sockets are used throughout, and these are of immense benefit for initial construction and later testing and possible fault finding.

Fig. 8 OPERATION OF THE DIGITAL FREQUENCY READ-OUT
The internal 1 MHz oscillator is used for the reference frequency and a small PCB is used in its extraction. This PCB is shown in the photograph in Fig. 10. C312, a 22 pF ceramic capacitor, must be removed and the PCB soldered track side uppermost (when viewing from the underside of the chassis) by means of two stiff wires to the holes from where C312 was removed. The PCB is also soldered to the +9V tag for rigid support; C312 can be seen in Fig. 10 retained soldered to the PCB but not used. The box containing the 1 MHz oscillator can easily be raised from the chassis to accomplish this by removing the four screws that secure it. A small hole must be drilled in the box to enable a screened lead to convey the 1 MHz signal to the main PCB. This is the only hole that has to be made in any part of the FRG-7 throughout all the modifications. It should be just large enough for the screened lead to pass through to minimise any leakage from within the box. (The UR95 used has a thin transparent nylon insulating sheath.) If the receiver is later de-modified, the hole can be blocked up using a small screw.

On the main PCB, illustrated in the photograph in Fig. 11, the 1 MHz signal is amplified and squared in a linearised gate and then divided by 1,000 in dividers that are not reset to zero. The resulting 1 kHz signal is then used as reference for the BFO PLL. The 1 kHz signal is also further divided by 10 and then by 2 to provide the 10 mS gate period. The VFO signal is obtained from the underside of TP404 again by means of a screened lead, fed to TR1 on the
Fig. 9 COMPLETE DIGITAL FREQUENCY READ-OUT AND BFO PHASE LOCK LOOP FOR THE FRG-7

main PCB where it is amplified and gated into the ICM7217. It is the C-MOS operated at VDD of +5v. (because the ICM7217 operates at +5v.) which limits the maximum frequency handled by the counter. The end of the gate pulse is used to trigger a 4528 monostable which generates a store pulse. The end of the store pulse (which causes the reading attained to be stored for display) is then used to trigger another monostable in the same 4528 IC. This second monostable pulse is then used to preset the ICM 7217 and also to reset the resettable part of the gate counting chain. At the end of this rest pulse, the gate count begins again and the process repeats. The counters count whilst the reading stored is displayed.

The periods of the monostables are chosen to allow the optimum operation of the counter: if their sum is too short a time, there may be too much jitter on the 100 Hz digit (the 4th digit) due to the usual ±1 gating effect; if too long, the receiver tuning indication response is not rapid enough. The presetting of the ICM 7217 to 4550 or 4520 to take account of the two IF offsets is arranged by means of diodes D1 to D7 and the 4016 IC. Facilities are also provided for 453 kHz and 454 kHz, but these are not used in this application.

Four common-anode 0.3 inch 7-segment LED's are used on a fourth PCB as the tuning indicator. The tuning drum must be removed from its spindle to allow the fitting of the LED PCB to the two screws which secure the signal strength meter to its bracket. The tuning drum is then stored away inside the set by means of a small bent bracket.
which secures the drum tightly against the back of the set. An existing hole in the chassis is used for the screw which holds it. This can be seen in Fig. 12. The LED's are connected to the main PCB by means of short lengths of miniature wire, the 11 wires being screened inside a piece of copper braid.

The BFO signal is extracted at TP405 by means of another screened lead and amplified on the main PCB. Half of a 4027 (which would otherwise be spare) is used to divide the BFO signal by 2. The result is fed into eight further divide-by-two stages in a 4520. The binary outputs are fed into a 4068 eight input 

\textit{nand} gate in such a way that an output signal which is used to reset the binary dividers is obtained after dividing by 452 or 455. The same output signal is fed together with the 1 kHz reference signal to an edge-triggered phase comparator in the 4046 IC. The output of the phase comparator is fed via a low pass filter, by means of another screened lead, to a fifth very small PCB on which are mounted another low pass filter and the varicap diodes. The PCB is soldered directly to the FRG-7 PCB so that the varicap diodes are connected to C434 and the negative supply. C434 is used to isolate the DC potential applied to the varicap diodes and a 10 nF capacitor is
soldered across C434 underneath the chassis to maximise on the varicap diodes' capacitance change. The PLL PCB is shown in the photograph in Fig. 13. The existing wire connection from switch wafer S3c to TC404 is removed.

In this design, three varicap diodes type BB110 are used. It may well be possible to use alternative type diodes, but the capacitance ratio and the amount by which the core of T406 can be unscrewed is quite critical in view of the relatively small voltage change available from the 4046; bear in mind also that varicap diodes have highest capacitance when the voltage across them is least. The voltage change is made larger by operating the 4046 at +7.5v. by utilising its internal zener diode. In practice, the interfacing of 5v. logic with the 7.5v. operation of the 4046 still leaves a substantial margin of operation. However, pin 14 of the 4046 to which the reference signal is connected in this configuration has a linearised amplifier provided internally and 'purists' could provide another for pin 3 and use both — but it is unnecessary. The VCO in the 4046 is not used because it produces a square-wave output (with lots of harmonics) of insufficient drive capability without further filtering and amplification to operate the SSB demodulator. The PLL low pass filter component values are chosen again as a compromise so that the phase lock loop 1 kHz sidebands are removed and yet the settling time is not too long when switching on, or when changing between LSB and USB. The settling time of the BFO when switching LSB on is 400 ms, when changing LSB to USB it is 200 ms, and when changing USB to LSB it is 300 ms. The same mode which used to control the PLL is also used to control the IF offset in the frequency counter, and the +5v. supply is fed to the switch via a 1K resistor for this purpose.

The main PCB is mounted on a 1 mm. thick aluminium screening base, with its sides turned up 10 mm. at right angles for rigidity, by means of four 6BA nuts and bolts with four small spacers to distance the PCB from it. The base is mounted on the top side of the FRG-7 chassis on three ¼ inch diameter pillars, each 60 mm. long, and with tapped 2.5 mm. or 6BA threads in each end. The two screws holding the mains transformer to the chassis are removed and screws inserted from underneath into two of the pillars, thus securing both transformer and pillars. (One of them requires a washer also because an earth tag with two ceramic capacitors connected to the transformer winding is fitted under the other pillar.) The third pillar is fitted to the existing hole in the chassis nearest to TP403. The prototype has another aluminium lid but in practice it is not necessary since there is no interference produced without it. All the wiring is passed through the existing grommetted holes to the underside of the chassis and there it is held in place with the existing wiring loom clips. The mounting can be seen in the photograph in Fig. 12. The power supply lead is taken to TP408. The screens of all the screened leads act as negative supply leads. All the wiring to the Mode switch is shown in Fig. 14.
Setting-Up

With a project of this kind, if problems are experienced, a certain amount of test gear is required to solve them. Individual circumstances may require that some ingenuity is used, depending upon resources. However, most problems are avoided by using PCB’s already designed and proven.

It is best to check the main assembly and readout before fitting them to the set. First check for shorts; then before plugging-in any IC’s, apply 10 to 12v. from a power supply or battery and check that the +5v. rail is at +5v. Then switch off, insert the IC’s one at a time and between each insertion, check the +5v. and switch off. On inserting the 7217, check that the LED’s are lit, maybe with ‘nonsense’. Fit the 1 MHz oscillator PCB and connect up the 1 MHz signal to the main PCB. Check that when connecting the +5v. supply via the 1K resistor to (a) the 452 point, the readout reads 4519, and (b) the 455 point, the readout reads 4549. If not, using an oscilloscope, check the 1 MHz division chain and the two monostables. Now connect up the VFO signal input. The counter reading should now coincide fairly closely with the dial drum reading from zero to 1,000. If not, check the transistor amplifier, the linearised gate amplifier following it and the gate following that. Then check that the LED’s read all digits 0 to 9 properly by rotating the main tuning knob. If odd-looking characters are produced, look for shorts on the LED PCB. It can be worked out logically what is shorting to what, or what is disconnected.

Now mount all remaining units in the FRG-7. Set the 1 MHz oscillator to exactly 1 MHz by connecting one trace of a double-trace oscilloscope to pin 6 of the first 4518 and lock the trace to it; this signal is 100 kHz. Connect the other trace to a ferrite rod tuned to 200 kHz (with an aerial or battery and check that the +5v. rail is at +5v. Then switch off, insert the IC’s one at a time and between each insertion, check the +5v. and switch off. On inserting the 7217, check that the LED’s are lit, maybe with ‘nonsense’. Fit the 1 MHz oscillator PCB and connect up the 1 MHz signal to the main PCB. Check that when connecting the +5v. supply via the 1K resistor to (a) the 452 point, the readout reads 4519, and (b) the 455 point, the readout reads 4549. If not, using an oscilloscope, check the 1 MHz division chain and the two monostables. Now connect up the VFO signal input. The counter reading should now coincide fairly closely with the dial drum reading from zero to 1,000. If not, check the transistor amplifier, the linearised gate amplifier following it and the gate following that. Then check that the LED’s read all digits 0 to 9 properly by rotating the main tuning knob. If odd-looking characters are produced, look for shorts on the LED PCB. It can be worked out logically what is shorting to what, or what is disconnected.

Now mount all remaining units in the FRG-7. Set the 1 MHz oscillator to exactly 1 MHz by connecting one trace of a double-trace oscilloscope to pin 6 of the first 4518 and lock the trace to it; this signal is 100 kHz. Connect the other trace to a ferrite rod tuned to 200 kHz (with an aerial or amplifier as necessary). The 200 kHz signal will move relative to the 100 kHz signal: adjust the 1 MHz oscillator trimmer until it is stationary (the crystal oscillator will not be very far out anyway). Now switch to USB. Connect the oscilloscope (or high impedance voltmeter) to the PPL low pass filter and unscrew T406 core until lock is achieved and the DC voltage indicated is approximately 2.3v. Switch to LSB and check that the DC volts is now approximately 5.4v. and lock is retained. Check now that the filters and filter amplifiers work OK and that SSB signals can be tuned in. Peak the filter inductors for maximum S-meter readings.

The total current taken from the +10 volt supply when the display is all 8’s should be about 200mA and when all 1’s, about 100mA. This will depend upon the particular display LED used. The modified FRG-7 total 240v.AC consumption is about 12 VA.

Conclusion

With an FRG-7 so modified, the great improvement in ease of tuning renders the fine tuning knob provided on all later models not so necessary. There is not that much difference between it and the main tuning in degree of fineness anyway (maybe due to the sizes of the knobs). The fine tuning is made much more useful used in conjunction with the digital readout when a 10 pF capacitor is connected in series with it. Also, check that rotating the marking on the fine tuning knob clockwise against its scale increases the frequency. If not, loosen the screw holding the knob on the shaft, rotate the knob through 180° and retighten. Finally, if the overlap on each range, which is now indicated on the digital readout, requires equalising at each end of the scale, do this by means of the small tabbed washer pile mechanism on the main tuning spindle: loosen the screw, turn the spindle and retighten.

You will have a fine general coverage receiver which can be thoroughly recommended and which only much more expensive designs will better with their other more esoteric receiver characteristics and facilities.

1979 “MAGAZINE” CLUB CONTEST
THIRTY-THIRD ANNUAL EVENT
by “Club Secretary”

SAD to say we have to report another fall in the numbers of stations entering logs. Of these, two were Phone only, and in view of the fact that both had very valid reasons for not being on CW (like aerials falling down, and power cuts!) we decided for this time only, and with no question of precedents arising for future years, we would include them in the main listings.

As far as the gear used was concerned, it was transceivers all the way, some with outboard PA stages to get the power to the legal level on CW, some with transverters, and a few with transceiver alone. The old standard “separates” were hardly to be seen and there wasn’t a single HRO recorded.

Although at the time of writing we have only nineteen logs, there were some forty-odd clubs knocking around the bands, so there were some people who didn’t want the chore of writing up the log! The Rules pleased all but one club — which considered it hadn’t a cat in hell’s chance, because of the GM multiplier; but on the other hand, we reckon that if Gravesend and Dundee could have swapped aerials (and nothing else) on balance Gravesend would have won even more handsomely than Dundee. Gravesend, incidentally, had problems with the noise level remaining locally at S6 or worse throughout both days. Again, Maidstone 'Y' G3TRF can normally be expected to be in...
the top flight, but they said their poor score on CW was their own fault.

Unfortunately one of the invigilators was unable to take part at the last moment, which rather unbalances our own consensus that conditions were a bit better than normal and that, certainly at GM4AAF, they overcame the handicap by good operators and a superb aerial — who else would have a half-wave dipole at 200 feet? The other GM entry, GM3XNZ in Shetland, was nearly 500 miles further north than Dundee which in its turn was some 300 miles north of London — and from Shetland to Guernsey is all but 900 miles as the crow flies. Although they had an inverted-V at fifty feet, they were sorely troubled by the Hi-Fix beacons, particularly the one on 1900 KHz, which was reading 60 over S9 and covering the band completely with key clicks. Were this not enough, they lost the mains while working G4HZE, and didn’t get them back for some three hours.

Another interesting observation was that up there in Shetland, he could hear southerly G stations working other Gs who were quite inaudible to him.

So . . . on the whole the rules were popular and did what they were intended to, namely to try and balance the change of conditions in the evening with the clock, on the one hand, and the physical location of the stations on the other. This leaves in the plot ops. and aerial systems, and its here the differences are to be found.

There was one critical comment which lies fair and square on our plate, which is the rather short notice we gave; we will endeavour in future to give a little more warning. We also feel that in essence the rules will be the same. By and large, among the logs received, we found the balance about right for the scoring — although, had Maidstone ‘Y’ done anywhere near as well on CW as they did on Phone, they would have won by a fair old margin. Perhaps there is a moral here — we can think of a good few times in the old all-CW MCC when G3TRF had rolled up an awful lot of contacts, and they should have done much better (as they admit) in the CW leg this time. On a different tack, it was interesting to notice a couple of overseas clubs in the logs, and a fair representation of European countries, too.

Comments

“Ridiculous gimmicky rules” — Gravesend; “perhaps you should have asked for separate sheets for each session” — Gravesend. “FT-101E into half-wave dipole inverted-V centre at 200 feet. Glad MCC is back” — Dundee Kingsway Technical College; “Biased scoring system against people in London and around who have to contend with TV timebase interference. This leads to the thought that the activity should start an hour earlier (or be pulled back a month, which should amount to something like the same thing); another thought is to split the contest between two week-ends although this scheme is possibly one where the XYLs may have something rude to say!”

Top Band over the last twenty years has suffered an ever-increasing level of electrical noise, and in particular colour TV timebase interference. This leads to the thought that some clubs may think it worthwhile to operate portable, despite the season; an all-solid state rig for the band wouldn’t be too difficult for someone in the club to knock up, along with a low half-wave for the nearer stations and a vertical or high dipole for the more DX’y stuff. The rig could be run off a spare battery and operated in the car, or even using the car starting battery (with some arrangement for a tow-start at the end of the SSB session!). But we must go on using Top Band if we are not to lose it.

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<tr>
<th>Placing</th>
<th>Club name &amp; call</th>
<th>Score</th>
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<tr>
<td>1.</td>
<td>Dundee (Kingsway Tech. Coll.), GM4AAF</td>
<td>14262</td>
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<td>2.</td>
<td>Gravesend, G3GRS/A</td>
<td>8743.5</td>
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<td>4.</td>
<td>Maidstone ‘Y’, G3TRF</td>
<td>7366</td>
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<td>7.</td>
<td>Sutton &amp; Cheam ‘C’, G4CWH</td>
<td>6088</td>
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<td>8.</td>
<td>North Riding, G3TZU/A</td>
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<td>10.</td>
<td>Guernsey, GU3HFN</td>
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<td>Tyneside, G3ZQM/A</td>
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<td>Edgware, G3ASR</td>
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<td>Haverhill, G3TGA</td>
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<td>Shetland, GM3XH</td>
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<td>16.</td>
<td>Grimbsy, G3CNX/A</td>
<td>3133.75</td>
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<td>18.</td>
<td>Acton, Brentford &amp; Chiswick, G3IU</td>
<td>2213</td>
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CLUBS ROUNDUP

By "Club Secretary"

ONE looks at the pile of mail for this time, and observes it to be small... but there are some, we believe still to come, and no time left to wait. So, it'll be brief mentions from the card-file, plus the reduced pile of mail (and if we accidentally omit a 'regular' our apologies in advance).

However, on with the motley; and where better to make a start with things than Yeovil? They meet in Hut 101, Houndstone Camp, Yeovil every Thursday evening, and when possible have some formal programme. In addition, the club runs Morse and RAE classes as required.

Next we have South Birmingham, at Hampstead House, Fairfax Road, West Heath. The first Wednesday in each month is the big one, at which they aim to get the business into the first five minutes for a start to the main meeting to be on the dot of eight — so one could say a 7.45 start to allow time for a quick natter. The club shack is also open on Thursdays for HF operation, and again on Friday evenings.

The long silence from A.R.M.S. is explained in a letter from the Hon Sec, and he will be explaining to the members in the next copy of Mobile News. But as far as the club is concerned, the world-wide activity will most certainly continue.

Now to Midland and we have two copies of the Newsletter, the second one apparently a stray which should have gone elsewhere. However, we don't have any forward dates given, and as a new home is contemplated too, we would suggest a call to the Hon Sec — see Panel.

For Crawley, the AGM will have been passed by the time this reaches you, and there are known to be changes pending in the slate of officers of the club as members wish to retire. So — all we can tell you is that the group are based on Trinity United Reformed Church Hall, Ifield Drive, Ifield, on the fourth Wednesday of each month, and there is also an informal gathering at members' homes. For details, contact the 'old' Hon Sec — see Panel.

We have a long newsletter from Scotland, in which we read some rather startling things. Leaving out the controversial record of an RSGB meeting, we read that in Edinburgh they get their copies of RadCom some nine to twelve days later than the London chaps. We guess our readers are maybe in the same boat; but the startling bit comes when you add the ten-day spread in deliveries in any given area! Some may argue that this is a problem relating purely to magazines, but any reader who has largeish mail will confirm that it happens with all mail, first or second class. However, to return to our business, the newsletter has so much packed into this issue that details of the Edinburgh Repeater Group seem to have got pushed out. So — for details, we refer you to the box for the name and address to contact.

A reference to the Hon Sec has to happen for Verulam too, save that we can say the informal is on the second Thursday at the R.A.F.A. in Victoria Street, St. Albans, while the main meeting will be in the Jubilee Hall, Catherine Street on the fourth Thursday.

It is March 7 for Surrey, for a Sale — no reference to "surplus" or "junk" which must make it unique in hamdom! The Hq is at T.S. Terra Nova, 34 The Waldrons, South Croydon, and they are there on the first and third Wednesdays, 7.30 for 8 p.m.

Over now to Hereford where the cider comes from, and where the gang have recently seen it being made. They are to be found on the first and third Fridays of the month, at the County Control Civil Defence Hq, Gaol Street, Hereford.

Denby Dale now: the additional words (Pie Hall) in their full title tells you where they foregather each Wednesday evening. In each month there seems to be one date set aside for a talk or whatever, and another for the current project, with the rest being given over to a natter and/or Morse. Finally, if you are still scratching your head about the 'Pie', it's the famous one, the biggest one!

From a read of the Cheltenham newsletter, we gather they are thriving and healthy in all major respects, with regular gatherings at the Old Bakery in Chester Walk, Clarence Street; and after a bit of searching we found the dates to be the first Thursday and the third Friday. Note that we mind searching too much, as this is always an interesting newsletter which looks outwards as well as inwards.

Deadlines for "Clubs" for the next three months—

(March issue-January 25th)
April issue—February 29th
May issue—March 28th
June issue—April 25th

Please be sure to note these dates!

Even the members refer to the past 18 months as the great Gravesend revival — to see this phenomenon for yourself, hurry along to the Windmill Tavern, Shrubbery Road, Gravesend any Monday from 8 p.m.

RAIBC as always caters for the blind and invalids in our midst; if you know anyone licensed or SWL or even "interested but no receiver" you could do worse than put them in contact with the Hon Sec. And, at that, it wouldn't be a bad idea to join yourself either as a supporter or representative.

Next we have a new club (or should we say conglomerate?) consisting of the members, SWL or licensed, of the Boots the Chemists organisation, not forgetting of course the folk who have retired from the organisation. They hold the call G4JBC (Jesse Boot's Club) and would welcome any more of the group who haven't seen the details put out in the house magazine.

Long time indeed since last we heard from Clifton; but it is good to hear they are still based at 225 New Cross Road, every Friday evening. One of the features of late has been to put the club station on the air to work member G4DBW who at the moment is ZD8RH. One attempt, it seems, failed but brought back the first-ever VK3 for the club call in about thirty years!

Now we have the Royal Navy to mention; if you qualify it is worth a subscription just for the Newsletter! We might
Names and Addresses of Club Secretaries reporting in this issue:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, Acton, London W3 8LB. (01-359 3778)

AMATEUR UK: R. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ

A.R.M.S.: N. A. S. Fitch, G3FPK, 48 Eskdale Gardens, Purley, Surrey CR2 1EZ

BARKING: A. Simmons, G81ZN, 80 Lyndhurst Gardens, Barkingside, Essex IG11 5BZ

BASINGSTOKE: H. Lawrence, G4HTM, 60 Loggan Road, Basingstoke, Hants.

B.A.T.C.: M. Cox, G8HUA, 13 Dane Close, Broughton, Brigg, North Humberside

BISHOPS STORTFORD: T. E. White, G8LXB, 79 Elmbridge, Old Harlow, Essex.

BOOTS: I. Brothwell, G4EAN, 56 Arnot Hill Road, Arnold, Nottingham NG5 6LQ

BOURNEOUTH: G. R. Freeth, G4HEP, 9 South Avenue, New Milton, Hants BH25 6EY. (New Milton 618092)

BURTON: M. Bainbridge, G4GJY, 7 Rothbury Close, Bury, Lancs. BL8 2TT. (061-767 5083)

CAMBRIDGE: D. Wilcock, G2FKS, 19 Cavendish Avenue, Cambridge CB1 4UP. (Cambridge 47220)

CHELTENHAM: G. Cratchley, G4ILI, 47 Golden Miller Road, Cheltenham, Glos. (Cheltenham 43881)

CHESHIRE: R. E. Chastell, G8LNM, 4 Fairley Way, Cheshunt, Essex.

COVENTRY: J. E. Beech, G8SEQ, 14 Hollow Crescent, Coventry CV6 INT.

CRAY VALLEY: P. J. Clark, G4FUG, 42 Shooters Hill Road, Beckenham, Kent.

CRAWLEY: A. V. H. Davis, G3MGL, 41 Gainsborough Road, Crawley, Sussex RH10 6LD. (Crawley 20868)

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COVENTRY: J. E. Beech, G8SEQ, 14 Hollow Crescent, Coventry CV6 INT.

CUMBERLAND: G3AAJ on Microprocessors. More details from the Hon Sec — see Panel.

West of Scotland are based on 22 Robertson Street, Glasgow every Friday evening: every alternate being, if possible, a set subject, talk or films, or whatever. On the remaining dates we have no doubt that they use the club station which is equipped for HF and VHF.

It is a mere stroll from Glasgow to Edinburgh, where the venue is the City Observatory, Calton Hill on Tuesday evenings.

East London RSGB group have the third Sunday in each month at three pip emma, the venue being Wanstead House, 21 The Green, Wanstead, E.11. February sees G3PCA on the arts of printed circuits, and in March G3AAJ on Microprocessors. More details from the Hon Sec — see Panel.

B.A.T.C. is the specialist one for all those into the amateur side of TV, whether licensed or not. Details from the Hon Sec.

The current detail about Ipswich which we have, shows Wednesdays each week; for the venue we feel you should refer to the Hon Sec — see Panel.

Cornish have a full February meeting: G3XFL on QRA locators, then G4IGN on National Grid references, and then G3VGO talking about Amateur Marine Mobile and radio navigation. This is doubtless a prelude to the film in March from the Marine Department of Plymouth Technical College. The first Thursday in each month is the one, at the S.W.E.B. Clubroom, Pool, Camborne, at 7.30.

Across the water to Ireland now, to I.R.T.S. who have a full February meeting: G3XFL on QRA locators, then G4IGN on National Grid references, and then G3VGO talking about Amateur Marine Mobile and radio navigation. This is doubtless a prelude to the film in March from the Marine Department of Plymouth Technical College. The first Thursday in each month is the one, at the S.W.E.B. Clubroom, Pool, Camborne, at 7.30.
information on amateur radio activity in EI; they have a fine newsletter which also covers as much as is possible of the local club goings-on.

**Kidderminster** has a growing club based on Tuesday evenings at Aggborough Recreation Centre, Hoo Road, and we have it that an interesting and entertaining programme is planned. Details from the Hon Sec — see Panel.

**Cambridge** now, and the Hon Sec tells us they are to be found on Fridays at the ATC Hq, 730 Newmarket Road; alternate weeks are set aside for talks and suchlike, with informals in between.

At **Bishops Stortford** you have to find Windhill by first locating the traffic-lights in the centre of the town and then turning up the steep hill. The British Legion Club is then at the top of the hill on the right, the road running on from there towards Much Hadham. Having established the venue, the date is the third Monday in each month at 8 p.m. in the committee room upstairs. However, if you are a new-comer, it is probably easier to get there a few moments early and listen for amateur radio chat in the bar.

**West Kent** have an interesting programme. February 1 is down for the first NFD arrangements, and 15th G4BOO will be comparing receiver performance, and on 29th Modern Radio Control comes up for discussion by Terry Sadler. In addition there are informal meetings at the Drill Hall in Victoria Street on alternate Tuesdays; we should add that the main Hq is at the Adult Education Centre, Monson Road, both being in Tunbridge Wells.

**AMSAT-UK** are of course the group that are into the **Oscar** game — with so much going on you can hardly do much good in this line without membership! Details from the Hon Sec — see Panel.

Although we can tell you the dates are February 4th for 'Constructional', and 18th on which TVI appears, there isn't any indication in the newsletter of the Hq. All is not lost, though, as we can say that it is at the Library, Longlands School, Brook Street, **Stourbridge** (thanks to memory and a card-index!).

**Southgate** have a double bill in February 14; a talk on RAIBC, followed by an A-Z of CW Practice and Technique, by G3KTZ, both at the Scout Hut in Wilson Street.

Over to **Coventry** and their Hq at Baden Powell House, 121 St. Nicholas Street, where they are to be found on Fridays. February 1 is a projected trip to Radio Leicester, and on 8th G8SEQ presides over “Beech’s Quiz”. They are out again on February 29 if all goes well, to visit the Post Office's automated sorting office. (Interesting how anything automated loses efficiency in the system — if past history is repeated, God help us when the microprocessor really gets into our lives! — Ed.).

The **Guildford** newsletter has a little stir about Club news in its editorial piece, and makes the suggestion that if you are in a strange town a visit to the local library or Citizens Advice Bureau should turn up something useful. Good thinking, and it seems to us that every club, whether or not they have notices in this piece, should always keep something on file at the local library; after all there cannot be a club in the country without at least one library member! As to programme, they are based on Guildford Model Engineers Hq in Stoke Park on the second and fourth Fridays. We recommend a visit if only to hear the saga of “Guildford in J-O-T-A” by G3SKK. It sounds quite hilarious — but we bet it wasn’t at the time.

February 7 at **Stevenage** is down for G8KMG to talk and show slides of his recent visit to Skye; 21st is set aside for the AGM of the North Hertfordshire RAEN.

We are pretty certain the letter from York is one of those still in transit, but we know they foregather at the United Services Club, 61 Micklegate, York. Fridays it is except for the third one in each month.

Mike G4HIC, Geoff G4AFJ and Bev G3TVY seen relaxing in the Nottingham ARC’s shack at the end of the CQ WW contest. They, and many more of their members, had operated the club station, G6CW, on all six bands.

**Nottingham** have their corporate being at Sherwood Community Centre, Mansfield Road on Thursdays. Normally the first date in the month is the regular Forum, and the third one is an Activity Night. That leaves February 14 for a wattmeter-testing night, and on 28th G4EAN will talk about “Using a 75 on 45 in 80” — which is as much of a mystery to them as to us. No doubt G4EAN will reveal all in due course!

**Bury** keep aside the second Tuesday of each month for a formal session with a speaker; the others are usually informals at Mosses Community Centre, Cecil Street. The February 12 date is down for a talk on using the oscilloscope and the other one is a dual-fade slide show, which seems to be a popular event with the gang.

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**Always mention “Short Wave Magazine” when contacting Advertisers — it helps you, helps them, and helps us.**
Another one who we expect is in the "still in transit" packet is Bournemouth; they have the first and third Fridays in each month at 8 p.m.

Every Monday at the Cricket Club — what a lovely thought in mid-winter — for the Scarborough members as they head for HQ, which is in North Marine Road.

It is quite surprising how few clubs have places to meet in the HQ’s of any of the political parties. An exception is Liverpool who are in the Conservative Rooms, Church Road, Wavertree, on Tuesdays, and they seem to have, over and above the usual things, some other ideas to offer — more details from the Hon Sec — see Panel.

The next one on the pile is Scunthorpe and we note they also like Tuesdays for the “main” meeting so that Thursdays can be set aside for operating, Morse or RAE. They are to be found in the shack at Grange Farm Hobbies Centre, Franklin Crescent, Scunthorpe.

February in Maidenhead means 7th and 19th; on the first there is to be the RSGB tape-and-slide talk on Radio Over the Years and the latter date is down for G3YGF to talk about Moonbounce.

A talk on “various topics” is slated for February 15 at Melton Mowbray — they live at the St. John Ambulance Hall, Asfordby Hill, Melton Mowbray.

From Derby we hear much of the redecoration of the HQ address at 119 Green Lane, on top of the activities. February 6 is a Bring and Buy Sale, there is a Night on the Air on 13th, a visit to the local sorting office on 20th, and on 27th a talk by a member of the “flying squad” of Derby Royal Infirmary.

Barking’s HQ is clear and large on their letter-head: Westbury Recreation Centre, Westbury School, Ripple Road, Barking, Essex. More details of the various activities from the Hon Sec — see Panel.

February 6 at Cheshunt is sure to be fun, with G3NEE as the speaker; on 13th and 27th they have natter sessions, and on 20th, G8IFC will talk about New Zealand.

As an international force in amateur radio, the G-QRP Club is going from strength to strength — nearly up to 700 registrations in the membership book. Details from the Hon Sec — see Panel.

Now we come to Cray Valley who have added a bye-law to their constitution which forbids anyone from bringing CB gear to a meeting, even if it is only left in a car. The CB protagonists won’t like this, but frankly we feel every amateur radio club should do the same unless and until the situation changes. The same bye-law could also be applied to known pirates. The club meets at Christchurch Centre, High Street, Eltham, dates from the Hon Sec at the address in the Panel.

Christian radio amateurs could well consider becoming members of WACRAL, the more so as it has become non-denominational. Details from the Hon Sec — see Panel.

Has anyone any ideas for the Edgware meeting on St. Valentine’s day, wonders the Hon Sec. One thing is sure, there’ll be a good turn-out to Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. All jokes apart, the gang get together on the second and fourth Thursdays of each month.

At Sutton & Cheam the newsletter isn’t as far ahead with dates as us, so we must refer you to the Hon Sec for dates, subjects and venues this time.

Acton, Brentford & Chiswick are at the bottom of the pile. Their loss of HQ as a result of fire was rectified at some speed, and they now are at Chiswick Town Hall, on February 19, to see G3IIN demonstrate his blind-person’s test equipment. (This writer has not seen G3IIN in action, but watching blind G3WUX re-soldering a wire which broke off in the middle of his demonstration was quite incredible; and indeed his speed along the pavement on the way home unaccompanied, from work is quite amazing.)

Final

Just as we were preparing for posting, the incoming mail showed, with a few more clubs; of these we had some mention of all, save for Chiltern, who have a Junk Sale on Wednesday February 27, in the canteen of the John Hawkins Ltd. works in Victoria Street, which is off West Wycombe Road (otherwise known as the A40). Between writing this and your opportunity to read it, they will have a change of Hon Sec; but we hope the present name and address will serve for this once.

Finished

And so once more we come to the end of our monthly travelogue around the clubs — the places where the vast majority of radio amateurs get their start in the game. As for us, the deadlines for the next few months are in the ‘box’ in the body of the piece, and should be taken as being a last date for arrival here with your “Club Secretary” at SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts AL6 9EQ. See you around!

MOBILE RALLY SEASON — 1980

The following lists details of events received so far. March 30, White Rose Rally, Lawnswood School, North Leeds, opening 11.00 a.m., talk-in on 2m. (SU22) and 70cm. (SU20), car parking and trade stands. April 13, North Midlands Mobile Rally, Drayton Manor Park, Tamworth, Staffs., located on A4091, opening 11.30 a.m., talk-in on 2m. and 70cm. April 20th, Welsh Amateur Mobile Rally, Memorial Hall, Barry, Glam; further information from K. B. Hodge, 16 Claude Road West, Barry, S. Glam. May 25, ‘East Suffolk Wireless Revival’, Foxhall, Ipswich, Tx/Rx clinic, antenna testing range, trade stands, full details to be announced later; however, further information available from Jack Tootill, G4IFF, QTHR. June 15, RNARS Mobile Rally, in H.M.S. Mercury, between 10 a.m. and 5 p.m., trade stands plus family-orientated events; further details from A. G. Walker, G4D1U, QTHR. July 20, Cornish Mobile Rally, Cornwall Technical College, Pool, Camborne; more details later. Also, the Northern Radio Societies Association will be holding its annual amateur radio, computing and electronics exhibition at Belle Vue, Manchester, on April 27.

We would be glad to have reports and pictures covering these events, and notification of other Rallies to be held. Address to The Editor, Short Wave Magazine, 34 High Street, Welwyn, Herts. AL6 9EQ.
COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

ONE of the greatest pleasures that accrue to any writer who may sit in this chair is to hear, or rather, be involved with, the first QSO of someone who has put a lot of work and effort into the business of getting a G4 ticket, as a side issue to retirement from his first career and while coming to grips with a second one. A QSO, it was realised at this end, would be a battle even though within ground-wave range, by virtue of the two dipoles (one at each end) being as near as no odds, end-on. Of course our pre-chosen frequency was picked, on Ten, without a pocket calculator; which gave Murphy the chance to move a line timebase harmonic precisely where it was not wanted. However, after a quick re-tune all was well, and one G4ITL was safely launched. Thus it was, and his HF activities since have apparently been covering Europe and the East and central W call areas, with a W6 to introduce, stage left, the eternal Gotaway. With this as impetus, the world can now safely be told a tale of G3KFE coming on SSB, on Christmas Day at that! An altered aerial system is actively on the stocks at this shack, once your scribe had realised the old vertical had not so much given up the ghost as lost contact with the source of RF at the bottom end of the feeder — truly Murphy slept over Christmas!

Activity

Something we should all indulge in once in a while! The big difficulty in reporting it is that usually it appears in Geoff Watts' DXNS, or the DX Bulletin from Vernon, Conn., just in time for the keen types to bait up and danigle their hooks under the DX nose: by the time we have written this script and it has been through all the production processes the DX has been announced, appeared and gone. For example P29JS nipped off to C21AA and made 8300 QSOs, and another 1500 from H44BJ and T3KJ — all QSLs for these operation direct to P29JS with the usual SAE/IRC. This one came right out of the blue — the DX Bulletin got it by direct word, which is a bit hard on those who haven't kept ear to ground.

However, there are some others which can be mentioned such as the D68 group who seem to be making a habit of 14240 KHz, around 1715z on Wednesdays; sadly it seems to take the form of a "list" operation. Chagos can be heard on the lower bands, seeming to favour 7007 KHz and 3518: 80 at about 2300z, 40 at 2330, back to 80 at the witching hour and also on Forty around 1245 KHz. Still with the DX Bulletin, with an up-date from Geoff Watts, we turn to the Palmyra/Kingman Reef effort. The DX Bulletin gave details of the operators and timetable, while DXNS indicates that they had a rough landing in Palmyra, after being delayed by engine trouble. A tyre burst and the aircraft slewed into trees, and one of the operators, Jan Gould WA6YQW, was air-lifted off by USCG helicopter to hospital in Honolulu with serious injuries which mean a four-month stay in hospital. W6ORD is organising a fund to provide her with a two-metre rig in the hospital.

YA has now been without any amateur radio activity for some six years, and so DK5AR, Wolf Renner is inviting any ex-members of the Camel Drivers Radio Club to join up again, from wherever they may be, on 14.320 MHz. Still on that tack, with the Russians now looking to be settling for a stay in YA, one wonders whether YA may soon be on the air again.

The TLOBQ operation was quite a roaring success in it's own little way, but the DX Bulletin indicates that there was a bootleg TLOBQ on Eighty.

Talking of bootleggers, there are indications that VK6HD may have an attendant evil spirit. He is on 1802 KHz and listening on 1826 KHz; he is to be heard for the 20 minutes prior to sunrise at his end, at which time he turns to Eighty. Eighty-metre calls are useful from about ten minutes after the VK6HD sunrise time which is: February 1, 2142, February 11, 2151, and February 21, 2200z.

WARC '79 should produce much joy all round. It seems that the area of Top Band 1810 KHz to 1850 KHz will be general amateur territory and exclusive, with up to 200 KHz by footnote. This may well mean that when the dust has settled, there will be many more countries on Top Band, and they will in the main load this part of the band. Thus the local nets and whatever will, in this country at least, need to shift to the rest of the band on the one hand, while on the other it may be necessary or expedient to scrap the "DX-Window" concept which has for so long now been basic know-how for 160m. — in favour of the single-frequency QSO style of working used on other bands or by stations on Top Band working the (relatively) local stuff. The 1.8, 18 and 24 MHz bands will be brought into operation as and when it is possible to transfer services at present there to their new frequency allocations; but for those things not involving transfer procedures the executive date is January 1, 1982. Another area of interest is to bring the range of frequencies at which licensees do not have to pass a Morse test down from 144 to 30 MHz; and there is recognition by way of a footnote of the importance of Amateur Radio in disaster conditions.

The DM prefix should by now have disappeared from sight as the East German administration now have Y2-Y9 to play with as from the beginning of the year; and there will be another new country to take in later in the year when another of the African homelands becomes independent: Qwa-Qwa.

If you've not worked VR6 yet, there is now a YL, VR6KY, who needs the loan of a transceiver as she is for the moment using VR6TC's gear.

'CDXN' deadlines for the next three months—

(March issue—January 31st)
April issue—March 6th
May issue—April 4th
June issue—May 1st

Please be sure to note these dates.
Now let’s look at the QRP scene. The G-QRP club sports a new format for the newsletter, and some 700 members on the roll now. The DL-AGCW group, who look after QRP in that country are running a QRP Activity weekend, March 22-23, on the QRP frequencies, times as follows: 3.5 MHz 1700-1900; 7 MHz 1030-1230; 14 MHz 1100-1200; 21 MHz 1000-1100 plus 1300-1600 and 1300-1600 also for 28 MHz. Just for the record, the CW frequencies for QRP are: 3560, 7030, 14060, 21060, and 28060 KHz, and the SSB ones 3690, 7090, 14285, 21285, 28885 KHz.

An award comes for mention now, namely the BPZA or “Birmingham Postal Zones Award”, sponsored by the South Birmingham club. To get it you must work either G8OHM or G3OHM and a suitable number of stations in the 98 postal zones of the area. The contact with one or more of the club calls just given counts five, a member of the club in a given postal zone is good for two points and a non-member 1 point. Details from J. K. Harvey, G4IVJ, 38 Bodenham Road, Northfield, Birmingham B31 5DS, or telephone 021-477 7447.

Letters

First off, it falls to mention G3WW (Wimblington) as having collected the World No. 3 CQ DX Award all SS/TV. Congratulations.

G3NOF (Yeovil) had the misfortune to miss the bus by a fraction last time (Wimblington) as having collected the telephone 021-477 7447. northfield, Birmingham B31 5DS, or Harvey, G4IVJ, 38 Bodenham Road, Northfield, Birmingham B31 5DS, or telephone 021-477 7447.

G3VLX noted our comment in this piece a while ago that nobody seemed to care about Forty, and reckons the gap will have been filled. However, Deryck has sent in a log for that band, and also mentions the gear. He has Drake R4C/T4XB plus a home-brew linear, feeding into a W3DZZ at about thirty feet. Most of the G3VLX activity is crammed into the 15 minutes or so before rushing off to catch a train each morning; exceptions were on November 29 when conditions were so good that he let the train go hang, and December 17 when he was at home for the day. Another interesting morning was Christmas Eve, when ZL4BO fished out an HM station, but sad to say no one in Europe was getting any copy. Mostly the QSOs were SSB but of course G3VLX can read the dits and dahs if need be, and on at least one occasion that ability was needed to finish the task. The contacts noted, all on 7 MHz were (mornings first) CM1RH, CM1HJ, VK3WU, K4BVZ, ZL4BO, YY4CB, TG8IA, WA2MND, HT9MQ (this was the one which made him miss the train!), HC4EC, ZL2AQT; while in the evenings there were the odd session, out of which came EA8BQ, UK9WBR, UF6HK, ZL4BO, DJ9YY/HB0, SV0WEE and, just before bedtime, AP2KS.

G2BJY (Walsall) was very interested in the idea of 10 MHz; he always had a spare VFO knocking around and he has a mixer-VFO which at the moment comes out around 10.5 MHz but could be modified easily enough — brace of 807s and an hour’s work and he’d be on the band! Geoff, like the writer, had a short spell in hospital, but while on your scribe was quite content to have a stock of books all of which were old favourites to re-read, Geoff took a great pile of inwards QSLs and wrote out a great pile of outgoing ones, doubtless to the mystification of the staff. The state of play now at G2BJY is that he is still using the same bit of wire which has been up for years, and he just prays the darn thing won’t fall down, so that he can get on with stuffing RF up it and getting signals in return; in the intervals while the PA bottles are getting their breath back, there is the matter of home-brew mild ale — if you drink some, you have to make some more to keep the stock up! (Having sampled it, the writer would suggest it is more like a brew which in the Midlands used to be known forty years ago as “Nourishing Stout” and was often prescribed for the under weight!).

On behalf of the G-QRP Club, G4BUE writes in with news and doings on members; he lives in the delightfully-named Upper Beeding, which has to be good CW sending practice! One of the main interests has been, with GM30XX OK1DW and G4BUE, to see just how low one can drop the power output and still achieve contacts. GM30XX uses only wire aerials, and with some 50 milliwatts got over to HB9AMI and HB9BBY on 28 MHz CW. This fired the old imagination and he tackled VE2AOD and W1AIO with success. The final step was to go down to 25 milliwatts at which level W3OGY and W4BAA were hooked and QSOs completed. Turning over to OK1DW, we find Petr used 21 MHz for his efforts; the start was 4 milliwatts to a valve PA with some flexibility in the matter of anode voltages, as we shall see in a moment. The 4 milliwatts accounted for F2PC and then along came OH3VN who only

March issue will appear on Friday, February 29th.
needed 2\(\frac{1}{2}\) milliwatts; but when he came to G4FKC Petr came down to 600 microwatts with a delicious 3.72 volts on the PA! As for G4BUE himself, he chose the 28 MHz ARRL contest weekend. Summarising, with 750 milliwatts some 31 States were worked — which accounts for most of USA, come to think about it. “Specials” could be given the treatment, with some 0.05 volts on the PA and either five, ten or fifteen milliamps to achieve the desired power levels (input, in Chris’s case); at 750 micro-watts UK2GDZ was a good QSO, and with 500 microwatts O72AC was raised. Then it was down to 250 micro-watts, and then UK2GDZ; back to 750 microwatts input and W400 and N8II were booked in along with UL7LAW — it all sounds very like three continents in one weekend with 750 microwatts input, or at best about half that reaching the feeder line! If one takes into account the time spent running five watts in this contest the number of states worked would run up to 39. The five watts also accounted for country number 188 on QRP, in the form of TL0BO. With that 188 booked in, the cards have now come in for the 101 countries required for an application to CQ for the CQ Milliwatt DX Trophy, all at the one watt level.

G3RJV, G4BUE, and the writer had a moment’s chat in the bar at Leicester; the first-mentioned being the spark-plug who started all this QRP thing growing in U.K. Last time we mentioned his GW trip, and when he got back an early session on Ten brought him VK2NLE and VP2EEG in a space of an hour — the VK was a brief ragchew, but to get at the VP2 there was a pile-up to be negotiated. Who says QRP can’t get through a pile-up?

We left G3NOF hanging in mid-air some paragraphs ago, and it seems to be time to return to him, for a look at 21 MHz; the first letter indicates opening at 0800, and generally closing about 2000, and this is repeated in the second letter; as also is the comment that little has been heard from Africa. The earlier period saw SSB going out to A22GJ, D4CBS/J5, HC8MM, JAS, N7AHF (Idaho), P92CZ, TN8AJ, W7FFJ, W7KSA, W7JTH, W7LDD, XE1AE, ZL2FD, 3B8FA, 3C1AC, 6W8DY, and 8Z4AA. The second note mentions AJ3G/AM over the North Atlantic, J6L0O, J6ECJ, JF2EMY, JG3DVCW, JH2QYJ, JH3HPT, JR6EM, K5FSS/DU2, KH6AC, UA0NH for Zone 19, SV1DC/SV5, TF0TJ, WB7OUL, W7LXR, and YB0ADW.

We leave G3NOF to turn again to G2HKU (Sheppey) whose report covers all six bands. So: Top Band CW accounted for U42FCW, GM3PFO, HB9AOD, GW4ACC, OK1DWF, OK2BUV, K1PBW, UK2LAQ, and GM3LWS, with PA0PN on SSB. Eighty QRP CW accounted for ON5YC, UB5LI, UQ2IF, HA1KSO, DL100, and DKOTU. A change to the Big Rig (FT-101Z) and W1ZW, W2BA, N400, W9FXR, N9DX, N40W, K4YF, and W4BTZ were booked in. 7 MHz dealt with K1MA, W9KNI, and UL7BBE. SSB again on 14 MHz, carried across to ZL1VN, ZL3SE, and ZL3FV, while CW attended to the needs of HC4WA, JA7OYJ, and VE2DJS. CW all the way on 21 MHz, with JH1BAY and VE2AH, and just a solitary ten-metre offering by way of AD81.

Back once more to G3NOF and 14 MHz. In his letter Don notes how at 0700 it is either dead or Europe-only, with a quite sudden opening to VK2/7L/1A, with a sprinkling of Pacific stuff as a garnish, but no Africans. SSB contacts reached out to C21AA, FK8DH, HK0EFU, KH6IJ, OA4AWD, VKs, ZLs, 3D2ER, and 8Z4A. Turning to the second epistle, we find that the band opens to VK2/7L/1A around daybreak, but not as strongly as in previous months, with a few Pacific stations around. The West Coast Ws have been noted around 1700 and again as late as 2300. A feature of the month to G3NOF was the number of stations noted at unusual times, and activity has been noted through to 2300. One Gotaway was WA2FJ/KH5 on Kingman, through the activities of deliberate jammers from Europe. QSOs were completed with K6LPL/KH5 (Palmyra), J6LGL, Mic, VP2SAI, W7MMX, Idaho, ZL2AX, and the odd G when skip was that short.

**Conclusion**

Last month we pointed out that we would like some extra contributions to the piece: CDXN, as it’s title implies, is about Communication and DX — which means that the big shot hammering his way through a pile-up to his 301st country has a report of interest, but also of course it is equally of interest to hear that someone with a suburban noise-box for a location and next to nothing in the way of an aerial or power, makes it out of the UK over to the States or whatever. After all, the best DX any of us ever worked was the very first QSO! So — reports please, by the dates in the ‘box’ in the piece, addressed to “CDXN,” SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

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G4M4AP, D. H. Stewart, The White House, Leacklee, Harris, Western Isles. (Tel: 085-983-223.)
G4JBC, Boots Amateur Radio Club, c/o I. Brothwell, 56 Arnott Hill Road, Arnold, Nottingham NG5 6LQ. (Tel: Nottingham 262360.)
G4BJH, A. Denig (ex-GSTCO), 19 The Park, Yeovil, Somerset BA20 1D. (Tel: Yeovil 25521.)
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OSBORNE ROAD, TOTTON, SOUTHAMPTON SO4 4DN
9-5.30 Mon.-Fri 9-1.30 Sat.

**AGENTS STOCK AND SALES**

- G32UL Brian Stourbridge (03843) 5917
- G13KDR John Bangor (0247) 55162
- GM8GEC Jack Edinburgh (03165) 2420
- G13WWW Mervyn Tandragee (03406) 566
- GW3TME Howarth Pontypridd (035287) 846/324
- GWAGSW Alan Swansea (0792) 24140
Communications Ltd

★ 2 Year Guarantee ★ Free Securicor Delivery

FT207R — FT202R HANDHELDs

The FT 207R is a microprocessor controlled synthesized handheld that provides 2.5kHz channel steps! Four memory channels are provided and these may, as can the whole band, be scanned. Any one of the memories can be used as a priority channel. Simply operate as normal on any frequency, designate one of the memories as priority, and every few seconds, for a few milliseconds, the set will check occupancy of the channel. All frequency entry is by the keyboard (which includes touch tone). The readout displays frequencies (to 100kHz), memory channel number and "P". Switches are provided for keyboard lock (prevents accidental operation) and display "time-out". A 600kHz shift, and any programmable split, is available, both of course plus and minus. Memory back-up is provided but can be switched off for long-term storage. 2.5W + 200mW outputs and a whole host of accessories complete the brief specification of this exciting transceiver.

The FT 202R is an economical 6 channel handheld physically similar to the FT 207R.

FT207R Transceiver £173.04
NC 1A Slide-in charger £16.50
NC 2A Charger eliminator £34.50
NC-9C Small charger £6.50
NBP-9 Nicad pack/spare £14.50
FBA-1 Puck/charger adaptor T.B.A.
Y24 Speaker/ mic £14.50
Heavy duty case T.B.A.
AA nicad, each £0.87

FT202R Transceiver £103.50
NC-1AC charger 202 £16.50
PA-1 12V PSU 202 £18.50

FT225RD MULTIMODE 2 METRES

144-146-148MHz, USB, LSB, AM, FM, CW (semi-break-in with side tone). Smooth dual speed VFO control and 11 x 4 crystal channels, Simplex and autotone burst) repeater, 600kHz and auxiliary shifts both up and down. Single signal mix, with phase locked conversion oscillator, for spurious free output. Mains 244-1000V 50/60Hz and 12V DC for world wide portability. Excellent selectivity. SSB 2.5kHz with 1.75:1 SF, FM 12kHz at 6dB. High sensitivity with modern MOSFET RF stage. Good strong signal handling by careful gain distribution, mixer and crystal filter design. High power output 10W AM, 1-25W CW and FM. SSB 25W + + with great reliability and low IMD's. Mode sensitive digital readout to 100Hz and easy to service superior plug in board construction. Front panel controls for: SSB mic gain, FM power, squelch, Vox/Mox sensitivity, noise blanker, AGC, readout brightness, meter functions (S/centre plus relative power) etc. Digital and Analogue versions and memory option.

FT225RD Transceiver £485.00
FT225R Transceiver £445.00
MEM memory £85.00
COUNT Counter £58.00

FT227 SYNTHESIZED AND MOBILE

The FT227s are 10W output 2 metre transceivers whose receiver performance — sensitivity and immunity to overload has become the standard against which others are compared. They use a signal knob (photo interrupter) to control the synthesiser, which basically turns in 10kHz steps with a 5kHz "fill in" oscillator. FT227RXS an FT227R fitted with SMC's scanner. This maintains all the normal features of the 227 but the neat internal installation provides automatic tuning from 144 to 146 in 25kHz steps. When finding an occupied frequency the scanner pauses for about seven seconds and if not held will move on. A flick of the P.P.T. will lock out one for all) uncleared channels next scan around. FT227RXS an FT227RXS fitted with SMC's stepper. A four channel memory is provided in this model and tuning may also be accomplished by push buttons on the microphone. A single push on the transceiver 25kHz, hold the button down for 1 second and it scans the band until a station is found.

FT227RXS Transceiver £252.17
FT227RXSS Transceiver £287.02
FP4 12V 4A PSU £35.00
YD148 Desk mic. £18.50

YD148 £18.50 Desk microphone
YD148 £18.50 Desk microphone
YM21 £12.00 Push tune mic
YM17 £10.00 Push tune mic
YM848 £7.50 Hand microphone
YM2500 £22.00 Keyboard mic.
FF501 £17.50 Low pass filter

WRITE OR PHONE FOR FREE YAESU CATALOGUE, SMC STOCK PRICE LIST, ETC.

SMC (Jack Tweedy) LTD.
Roger Baines, G3YBO
79 Chatsworth Road,
Chesterfield, Derby.
Tel.: Chesterfield (0246) 34982
9-5 Tuesday-Saturday.

NORTHERN (Leeds) BRANCH
Colin Thomas, G3PSM
257 Otley Road, Leeds 16, Yorkshire.
Tel.: Leeds (0632) 782326
9-5 Monday-Wednesday & Friday-Saturday.
## South Midlands

### HANTS — YORK — DERBY — LINCS

#### ROTATORS

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Price</th>
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<tbody>
<tr>
<td>AR30</td>
<td>Light VHF/UHF</td>
<td>£14.00</td>
</tr>
<tr>
<td>AR40</td>
<td>VHF 4 Light HF</td>
<td>£12.00</td>
</tr>
<tr>
<td>BT1</td>
<td>Medium Duty</td>
<td>£7.50</td>
</tr>
<tr>
<td>CD44</td>
<td>Medium Duty</td>
<td>£9.50</td>
</tr>
<tr>
<td>CD45</td>
<td>Medium Duty</td>
<td>£8.50</td>
</tr>
<tr>
<td>HAM IV</td>
<td>Very Heavy Duty</td>
<td>£14.50</td>
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<tr>
<td>T2X</td>
<td>Ultra Heavy Duty</td>
<td>£19.00</td>
</tr>
<tr>
<td>2050</td>
<td>VHF/UHF Memoramic</td>
<td>£37.50</td>
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<tr>
<td>2010</td>
<td>VHF/UHF Automatic</td>
<td>£45.83</td>
</tr>
</tbody>
</table>

#### AR40

For antennas to 3 sq. ft. (tower) £52.00

#### CD45

For antennas to 8.5 sq. ft. (tower) £99.00

### V.H.F. LINEAR AMPLIFIER

- **ARX2**
  - 432MHz (p&p £1.00)
  - 144MHz 9' 6' tall, 13lbs (p&p £1.00)

- **ARX45**
  - 144MHz 9' 6' tall, 2lbs (p&p £1.00)

#### V.H.F. LINEAR AMPLIFIER

- 160W out for 15W maximum drive. 145MHz.
- 12V DC (circa 18A). RF or manual switching. SSB/FM. Excellent heat sink — over temp., trip out/reset with LED. PA15-160L.

#### ANTENNA COUPLER

- 3.5-30MHz, 50/75 ohm Coax (VSWR<5:1) and Single Wire (10-250ohms) transformed to 50ohms. To 500W RF, 55W Wattmeter £145.00.

### VHF AND UHF CONVERTORS

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Price</th>
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<tbody>
<tr>
<td>MMC-70-144/IF</td>
<td>MMC-332/IF</td>
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<tr>
<td>MMC-73-144/IF/FLO</td>
<td>MMC-432/IF</td>
<td>£21.00</td>
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<tr>
<td>MMC-73-144/F</td>
<td>MMC-1256/IF</td>
<td>£26.00</td>
</tr>
</tbody>
</table>

### COAXIAL RELAYS

- 12V DC operation, 50ohms. 1KW PEP at 30MHz.
- 50dB isolation at 1 GHz. 0.2dB loss at 0.5GHz.

#### DIGITAL FREQUENCY COUNTER

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Price</th>
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<tr>
<td>CX540D</td>
<td>38NC Sockets</td>
<td>£18.50</td>
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<tr>
<td>CX530D</td>
<td>38NC + 1' N&quot;</td>
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<tr>
<td>CX520D</td>
<td>3' sockets</td>
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<tr>
<td>CX120A</td>
<td>50W Cable entry</td>
<td>£9.30</td>
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<tr>
<td>CX120P</td>
<td>50W Pin connection</td>
<td>£9.30</td>
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</table>

### VHF/UHF SWR/POWER METER

- Power 10W FSD on 50 (70), 144, 432MHz.
- VSWR Calibrated to 3.1. 50ohms. Detachable RF head/indicator unit. UH74 (p&p 60p) £12.75.

### DIGITAL MULTIMETER

<table>
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<tr>
<th>Model</th>
<th>Type</th>
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<td>MMC-1296/IF</td>
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<td>MMC-70-144/IF/L0</td>
<td>MMC-28-70-144/IF</td>
<td>£21.00</td>
</tr>
<tr>
<td>MMC-28-70-144/IF</td>
<td>MMC-1256/IF</td>
<td>£26.00</td>
</tr>
</tbody>
</table>

### VHF LINEAR AMPLIFIER

- 160W out for 15W maximum drive. 145MHz.
- 12V DC (circa 18A). RF or manual switching. SSB/FM. Excellent heat sink — over temp., trip out/reset with LED. PA15-160L.

### ANGENTS STOCK AND SALES

- **GZU**
  - Brian Stockbridge (03843) 5917
- **G3KDR**
  - John Bangor (0247) 55162
- **G3BSG**
  - Jack Edinburgh (031665) 2420
- **G3JWWY**
  - Mervyn Tandragee (0762) 840665
- **GW3TMP**
  - Howarth Pontybedd (035287) 846324
- **GW4GSSW**
  - Alan Swansea (0729) 24140

### NEW FIVE BAND HF VERTICAL ANTENNA

<table>
<thead>
<tr>
<th>Model</th>
<th>Type</th>
<th>Price</th>
</tr>
</thead>
</table>
| SMCHF5  | 80, 40, 15, 10 metres, 500W PEP 10-20MHz, 200W 40-80MHz 50MHz coax feed. With/without radial, or use trapped radial kit Securicor delivery £3.50.
| SMCHF15 | 80, 40, 15, 10 metres, 500W PEP 10-20MHz, 200W 40-80MHz 50MHz coax feed. With/without radial, or use trapped radial kit Securicor delivery £3.50.
| SMCHF25 | 80, 40, 15, 10 metres, 500W PEP 10-20MHz, 200W 40-80MHz 50MHz coax feed. With/without radial, or use trapped radial kit Securicor delivery £3.50.

---

*ALL PRICES EXCLUDE VAT 15%*
THE ULTIMATE VHF RECEIVER — BEARCAT 220

Coverage
- 66-88 MHz
- 118-136 MHz
- 144-148 MHz
- 420-512 MHz

Power
- 240v AC or 12v DC

Antenna
- Built in telescopic

Size
- 10” x 3½ x 8”

Weight
- 5 lbs

Built in speaker

Have you ever wanted a VHF receiver that covers all bands with facilities such as scanning, lockout of unwanted signals, programmable memories, priority channel checking, etc., etc., etc? Well, now there is a set on the market that will do all this and much, much more. The BEARCAT 220 covers 41v1, 2M, Aircraft band, marine band, business band and 70cm amongst other frequency bands. It has up to 20 memories which can be programmed from a front panel keyboard. These can be scanned or locked out from scan as required, and any of them can be set to any frequency in the set’s coverage. Normal mode is FM, switching to AM for the Aircraft band. It is also possible to search entire bands or frequency segments between selected upper and lower limits.

Price £240.00 inclusive

H.F. RECEIVERS

R1000 .................................................. £298

It is some time since a brand new design has appeared in the amateur general coverage receiver field, and the new R1000 certainly makes the wait worthwhile.

We won’t use space listing all the features and performance figures available from this fabulous little receiver – you can read these in several adverts in this magazine. Suffice to say that we try lots of different receivers, and the R1000 performs better all round than every other in its price range.

Convence yourself as we are convinced — come and try one and compare it side by side with its competitors.

ALSO IN STOCK

LOWE SRX 30 .................................. £178
YAESU FRG 7 .................................. £215
YAESU FRG 7000 .......................... £372

V.H.F. MONITOR RECEIVER

AMATEUR £105
OR MARINE £116

inc. VAT
Carriage

F.D.K. TM 56B

VAT

TRIO TR2300

IDEAL FOR PORTABLE,
MOBILE OR HOME USE

£199
Inc. VAT & Carriage

TELEPHONE ENQUIRIES WELCOME
ALL PRICES INCLUDE VAT and CARRIAGE

2 METRE HANDHELD
TRANSCEIVERS

ALSO IN STOCK

FDK Palm II 6 channel ................................ £99.00
YAESU FT 202R 6 channel........................ £119.00
FDK Palm Sizer synthesized ...................... £149.00
ADR AR240 synthesized ........................ £185.00
YAESU FT 207R synthesized + keypad ........ £199.00
TRIO TR2400 synthesized + keypad ............ £235.00

TRIO TR2300

A fully synthesised 25kHz spaced rig offering full band coverage, digital readout of frequency and auto tone burst. The excellent 1 watt transmitter and very sensitive receiver make this rig excellent value for money and comes complete with case, charger, power lead, etc.

P.O.A.

TO ORDER ANY OF THE ABOVE ITEMS SIMPLY WRITE OR PHONE YOUR CREDIT CARD NUMBER TO THE ABOVE ADDRESS TO ENSURE SAME DAY DESPATCH

ACCESS • BARCLAYCARD • INSTANT HP • PART EXCHANGE
2. PA5 AUTOMATIC 2 METRE PRE-AMPLIFIER
Same as the Sentinel Auto but for 240V mains operations in a pretty little case. Size: 3½ x 6½ front panel, 2½ deep. SO239 sockets. Price: £28.75 ex. stock.

3. SENTINEL STANDARD 2 METRE PRE-AMPLIFIER
Same performance as the Sentinel Auto but no r.f. switching. Price: £13.22* ex. stock. 70 cms version £20.90* ex. stock.

PA3 DUAL GATE MOSFET 2 METRE PRE-AMPLIFIER
Mini 2 metre pre-amp. Size 1 cubic inch to fit inside transceivers. N.F. 2dB gain 18dB. 9-15V. £8.00 ex stock. 70 cm version £10.00 ex stock.

S.E.M. Z MATCH
This circuit is generally accepted as being the most VERSATILE transmatch system. It will match aerials of 15-5000 Ohms, to your equipment. BALANCED or UNBALANCED at up to 1kW. SO 239 and 4 mm terminals for co-ax or wire aerials. both end fed and open wire. Ex stock. Price: £45.00. Ex stock.

SENTINEL H.F. WIDEBAND PRE-AMPLIFIERS
2-40MHz, 15dB gain. Ideal units for pepping up receivers on 15 and 10, for OSCAR reception and as an ACTIVE AERIAL. 9-12V supply. Size: 2½" x 1½ x 3¾. We make the following two versions:

SENTINEL AUTO H.F. PRE-AMPLIFIERS
Same performance as above with a change over relay operated by your transceiver relay for direct connection in your aerial co-ax. £14.95* ex stock.

SENTINEL STANDARD H.F. PRE-AMPLIFIERS
Performance as above. £10.00 ex. stock.

SENTINEL 30 - Ten times power gain, e.g. 3W in 30W out up to 5 watts input. £50.00.
SENTINEL 40 - Four times power gain, e.g. 10W in 40W out up to 16 watts drive. £66.70.
SENTINEL 100 - Ten times power gain, e.g. 10W in 100W out up to 16W input. £126.50. All in stock.

SENTINEL 2 METRE PRE-AMPLIFIERS
The 2 metre units use a neutralised J. FET circuit rather than the more common MOSFET or grounded gate J FET. This gives lower noise figures and higher gain. We select the JFETs for a 1dB noise figure and 18dB gain. The noise figure of 2 metre receivers is usually 7-8dB and to overcome this noise we find the 18dB is necessary. We use 18 S.W.G. (1.22 mm) air spaced coils for high Q. These are both efficient and selective.

We have three models for your choice.
1. SENTINEL AUTO 2 METRE PRE-AMPLIFIER
For connection straight into the aerial lead and the r.f. switch changes over automatically between transmit and receive on any mode. See above for more detail. 12V nominal. Size: 1½ x 2½ x 4½. Price: £20.00* ex. stock. 70 cm version £23.00* ex stock.
S18 and S19 are now added to our stock range

---

**2M CRYSTAL RANGE**

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>145.000</th>
<th>145.025</th>
<th>145.050</th>
<th>145.100</th>
<th>145.125</th>
<th>145.150</th>
<th>145.175</th>
<th>145.200</th>
<th>145.225</th>
<th>145.250</th>
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<th>145.400</th>
<th>145.425</th>
<th>145.450</th>
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**CRYSTALS MANUFACTURED TO YOUR SPECIFIC REQUIREMENTS**

Prices shown are for one off, to our amateur spec. 
Ordering: When ordering please quote

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**PROFESSIONAL COMPLETE CRYSTAL SERVICE**

**AMATEUR TWO METRE — CRYSTAL RANGE**

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>6 MHz-10 MHz</th>
<th>10 MHz-14 MHz</th>
<th>14 MHz-18 MHz</th>
<th>18 MHz-22 MHz</th>
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**CRITICAL FREQUENCY RANGE**

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<th>Frequency</th>
<th>5 MHz-10 MHz</th>
<th>10 MHz-15 MHz</th>
<th>15 MHz-20 MHz</th>
<th>20 MHz-25 MHz</th>
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</table>

**PRICES**: (a) £1.95; (b) £2.32; (c) £2.80; (d) £3.94.

**AVAILABILITY**: (a), (b), (c), stock items, normally available by return (we have over 1,000 items in stock). (d) 4/6 weeks normally but it is quite possible we could be able to supply from stock.

**ORDERING**: When ordering please quote (1) Channel; (2) Crystal frequency; (3) Holder; (4) Circuit conditions (load in pf). If you cannot achieve these, please give make and model of equipment or channel or output frequency required and we will advise if we have details.

**JAPANESE AND AMERICAN EQUIPMENT**

We can supply crystals for YAESU (FT2, FT2A, FT22A), most of the ICOR range and the TRI-250 range. We can also supply from stock for the HEATHKIT HW202 and HW17A.

**CRITICAL FREQUENCY RANGE**

<table>
<thead>
<tr>
<th>Frequency</th>
<th>3 MHz-5 MHz</th>
<th>5 MHz-7 MHz</th>
<th>7 MHz-9 MHz</th>
<th>9 MHz-11 MHz</th>
<th>11 MHz-13 MHz</th>
<th>13 MHz-15 MHz</th>
<th>15 MHz-17 MHz</th>
<th>17 MHz-19 MHz</th>
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<td>Output Frequency</td>
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</tbody>
</table>

**PRICE**: £1.95 to Amateur Spec. or £4.64 to same spec. as stock items.

Delivery approx. 4/6 weeks.
FOR QUALITY CRYSTALS—AT COMPETITIVE PRICES

POPULAR FREQUENCIES IN STOCK
MADE TO ORDER 10 kHz to 225 MHz

OSL leads the field in supplying crystals world wide to major communications companies, broadcasting authorities and posts and telecommunications administrations. As a result we can supply the amateur with a high quality, competitively priced product over a frequency range from 10 kHz to 225 MHz. Get the power of the professionals in crystal supply behind you!

2 METRE STOCK CRYSTALS. Price £1.83 for one crystal. £1.74/crystal when two or more purchased.

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Price</th>
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<tbody>
<tr>
<td>10.7 MHz</td>
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<td>15.28 MHz</td>
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<td>19.88 MHz</td>
<td>£1.83</td>
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<tr>
<td>20.8 MHz</td>
<td>£1.83</td>
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</tbody>
</table>

Also in stock: 40 MHz to 225 MHz, £2.75/crystal. All above frequencies in stock.

MADE TO ORDER CRYSTALS SINGLE UNIT PRICING

<table>
<thead>
<tr>
<th>Frequency Ranges</th>
<th>Price and Delivery</th>
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<tbody>
<tr>
<td>£1.83 per crystal</td>
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<td>£1.42 per crystal</td>
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<td>£1.31 per crystal</td>
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<tr>
<td>£0.98 per crystal</td>
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<tr>
<td>£0.87 per crystal</td>
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</tbody>
</table>

MINIMUM ORDER CHARGE £1.50.

COMMERCIAL USERS. Crystals can be supplied for MPU, industrial control, etc. in the range 4-21 MHz fundamental and 3rd OVT 18 to 60 MHz at £1.15 per 100 off. This is only a limited example of our capabilities. Please enquire about other quantities, frequency ranges, watch and sub-carrier crystals. We can supply crystals for marine and land mobile radio telephone use. Send for details.

TERMS. Cash with order, cheques and postal orders payable to OSL Ltd. All prices include postage to UK and Irish addresses. Please note that it is not always possible to provide the A delivery service but a telephone call will confirm its availability. Any orders received for A delivery when it is not available will automatically be placed on B delivery and a credit note issued for the difference in price.

DISCOUNTS. 5% mixed frequency discount for 5 or more crystals at B delivery. Price on application for 10 or more crystals to same frequency specification. Special rates for bulk purchase schemes including FREE delivery. Price on application for 10 or more crystals to same frequency specification.

EMERGENCY SERVICE SURCHARGES I to be added to A delivery price. Instructions for B delivery.

OVERSEAS DISTRIBUTORS

West Germany, Austria and Benelux countries — SSB Electronic, Karl Arnold Str. 23, 5860 Iselrohn, West Germany.

Denmark — Asbjorn Jorgensen, Aalrue 1, Tapprup, DK800, Viborg, Denmark.

Portugal — Sorubal SARL, Rua General Pimenta de Castro, 15-81, Lisboa 5, Portugal.

(Enquiries invited from companies in other countries.)

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P.O. Box 73
London House S.E.18 3LR

Telephone: 01-690 4889
Telex: 912881 CWUKTX-G (Attention QUARTSLAB)

Cables: QUARTSLAB London S.E.
DECCA-KW107 SUPERMATCH
Antenna Tuning System Incorporates E-ZEE Match, SWR/RF power meter; Dummy Load; Antenna switch.
DECCA-KW109 SUPERMATCH
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