

THE SHORT WAVE

Magazine

VOL. XXXVII

FEBRUARY 1980

NUMBER 12



TRIO R1000

£298 inc VAT Carr £4.50

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 blander 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.

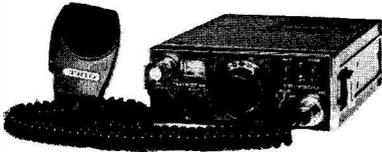
All the rear panel connectors are recessed on a sloping panel so that you can stand the receiver either on its back, or pushed hard against a wall when used in conventional shelf mounting. The antenna inputs allow the use of either a high impedance wire aerial or a 50ohm balanced input so that the proverbial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

LOWE ELECTRONICS Ltd

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.

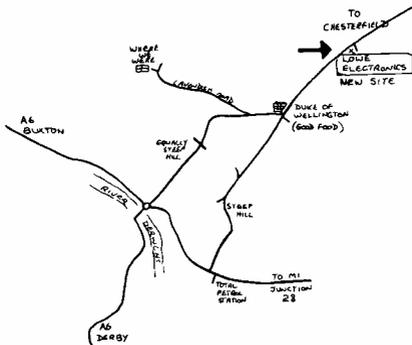
Now the small part. On FM, you have instant selection of either 25 KHz steps (for convenient mobile use), 12.5 KHz steps (for future use), or 100 Hz steps for continuous tuning. On SSB and CW, the tuning rate is automatically switched to 100 Hz steps with the digital display extended to suit.

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).



Matlock

LOWE ELECTRONICS HEAD OFFICE AND SERVICE CENTRE

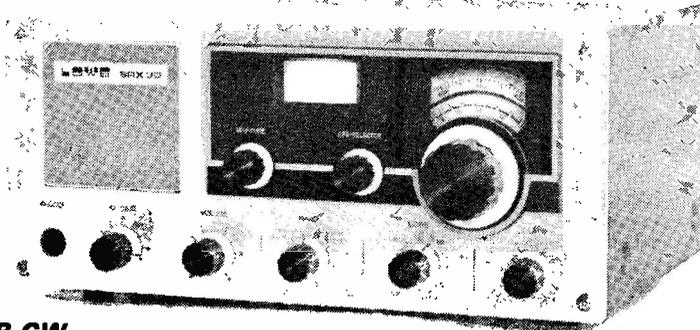
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Agents: John, G3JYG, 16 Harvard Road, Ringmer, Lewes, Sussex, Ringmer 812071. Sim, GM3SAN, 19 Ellismuir Road, Baillieston, Nr Glasgow. 041-771 0364

COME AND SEE US SOON — IT'S WORTH THE VISIT. 73 DE G3PCY

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

£178

Carr £4.50

SRX-30

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

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

The SRX-30 tuning system is so simple to operate. You have a dial reading in MHz from 0.29 and a main tuning dial reading 0-1000 kHz. So — if you know that Radio Slobovia is broadcasting on 10.295 MHz, you set the MHz dial to 10, the kHz dial to 295 and there you are. The MHz dial setting is not critical, as stability is guaranteed by a triple mixing drift cancelling system, thereby overcoming another problem in your Sooper Blooper Mk. 3: drift.

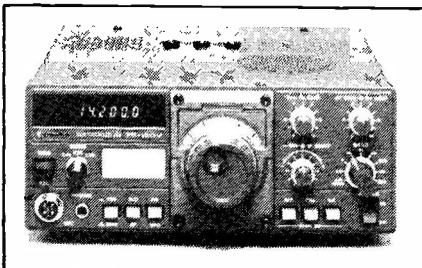
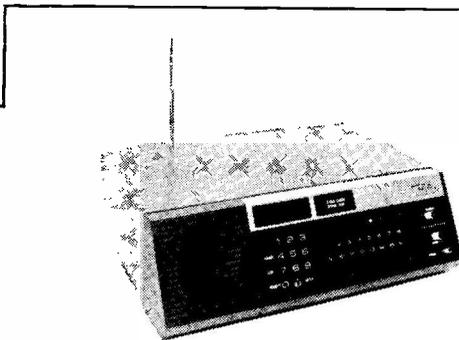
A further drawback to cheap receivers is massive image interference on the higher frequencies due to the use of a low IF, typically 455 kHz. The cure for this problem is the use of a high IF and the SRX-30 employs a first IF of around 40

MHz — so goodbye to first IF images. You could of course find the same system as this in the Racal RA17 series receivers; after all, the SRX-30 has copied the basic idea from this very receiver. The big drawback to the RA17 (apart from the price!!) is that unless you have the muscles of a prize fighter, lifting the RA17 may send you for a holiday at Heria 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 9½" x 3½" x 9½" — which is about the size of a packet of cornflakes, the TS120V can best be described as a miniature TS820. 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.

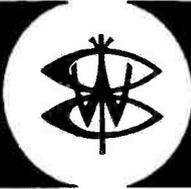
The transceiver is based on an advanced PLL system and the digital readout gives you the correct operating frequency at all times unlike many other rigs. Remember my previous comments about Trio attention to detail.

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.

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- ★ Digital and analogue display
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- ★ Excellent value for money



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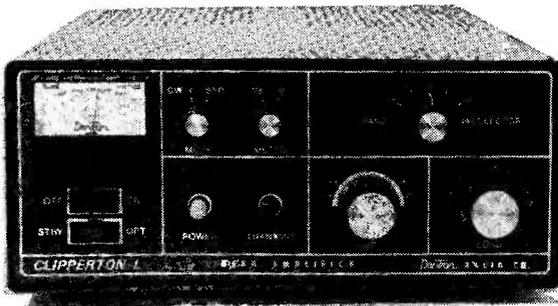
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IT'S HERE!! GET HER (OR HIM) TO BUY YOU ONE FOR XMAS!
**THE MOBILE OF CHOICE FROM THE WORLD
 FAMOUS ICOM STABLE — THE IC-255E**



**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.)

FROM

THANET

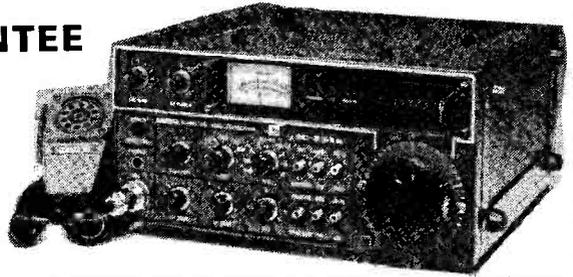
OF COURSE



"NEW"

£479 inc.

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



AFTER YEARS OF SUCCESS THE IC211E HAS NOW BEEN REPLACED BY THE IC251E. 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 IC251E provides FM, USB, LSB, CW coverage in the 144-146 MHz frequency range. Thus the IC2151E 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 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 SM5 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 IC251E has excellent sensitivity demanded especially for mobile operation, high stability, and with 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 dB S+N+D/N+D at 1 microvolt or less than 0.3 microvolts for 20 dB Noise quieting.

Computer compatible — the Best! IC-701 HF £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 instant tuning at a single finger tip. WIDE bandwidth, with 100Hz per division and 5kHz per turn, is instantly co-ordinated between the smooth turning knob and the synthesiser's digital read-out with positively no time lag or backlash (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 (500Hz 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.

Sold 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

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OF COURSE



Tried — Tested and Popular . . .

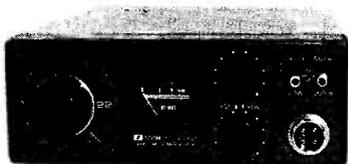
"New"



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 transverting?).
- ★ Size 64 × 185 × 223 mm.
- ★ Price **£255 inc. VAT.**



**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 let's face it, 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.**

★ **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 GM8GEC (031-665 2420)

Wales — Tony GW3FKO (0222 702982) **Burnley** — (0282 38481) **Midlands** — Tony G8AVH (021-329 2305)

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... Simply the Best ...



IC-215
£162 inc.

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 III) 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 QSO! It comes already crystallised 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



IC-402

"New"



IC-260E
£369 inc.

IC260E 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

WESTERN
G WHIP

ANTENNA SPECIALISTS
YAESU MUSEN

J-BEAM
RSGB PUBLICATIONS

HP AND PART EXCHANGE WELCOMED

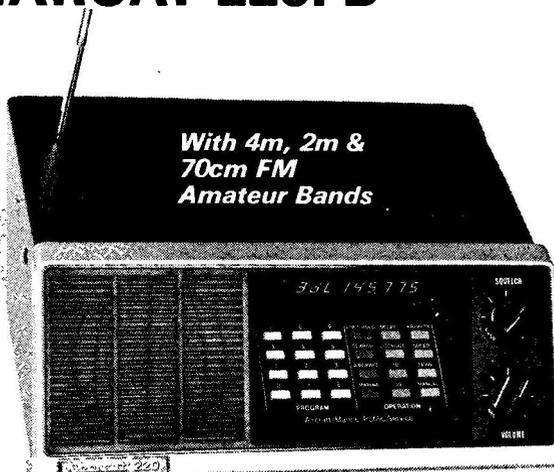
RADIO SHACK for BEARCAT 220

THE VERSATILE BEARCAT 220FB

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 either 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.
- **Crystallless** — 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 authorised vehicle.
- **UL Listed/FCC Certified** — Tested for sale, quality design and manufacture.



Bearcat 220 £210.00 ex. £241.50 inc.

Bearcat® 220FB Specifications

Frequency Range:

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

Size:

10 $\frac{1}{2}$ " W x 3" H x 7 $\frac{1}{8}$ " 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 μ v for 12dB Sinad on L and H bands
 μ bands slightly less
1.0 μ v for 10dB S/N on aircraft

Scan Rate:

5 or 15 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

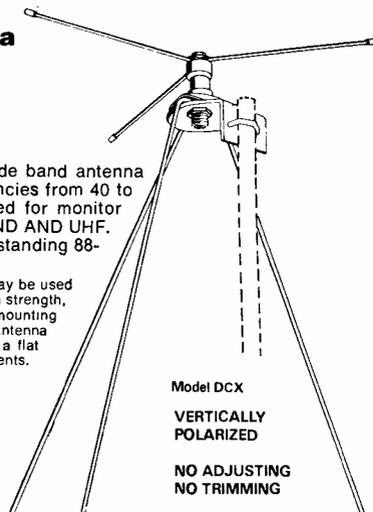
DISCONE

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 $\frac{1}{4}$ " 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.

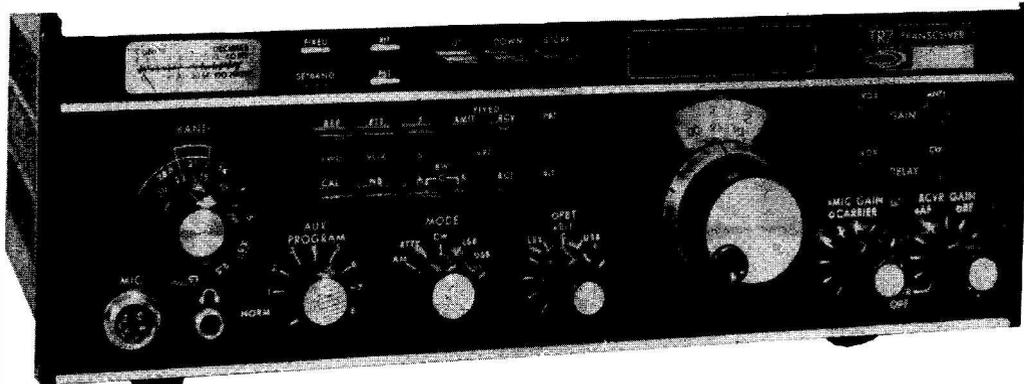


RADIO SHACK LIMITED
TELEX 23718

188 BROADHURST GARDENS, LONDON, NW6 3AY

TELEPHONE 01-624 7174

RADIO SHACK LTD for DRAKE



Designed and made by R. L. Drake Co, in Ohio USA

for details send 15p stamps or 4 international reply coupons

DRAKE PRICES

(Inclusive of 15% VAT)

		£
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
R-7/DR-7	Receiver 0-30MHz	833.75
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-6000	AM Filter for TR-7 & R-7 (6000Hz)	39.10
AUX-7	Range Programme board & 1 Receive Module	32.20
RRM-7	Range receive modules (500 kHz) for AUX-7	5.52
RTM-7	Range transceive modules (500 kHz) 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	124.20
MN-2700	ATU/RF Wattmeter 160-10m. 2kw	197.80
WH-7	RF Wattmeter/VSWR bridge HF	59.80
385-0004	Service Manual for TR-7	16.50
7037	TR-7 Service Kit	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
RV-4C	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 100w	10.35
TV-3300LP	Low Pass Filter 2kw	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	37.95
RCS-4	Remote control antenna switch, 5 way	82.90
B-1000	Balun 4:1 for MN-7 & Mn-2700	18.40
1525-EM	Encoder microphone	36.80
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-PC	DC Power cord for SPR-4	4.60
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	5.06

CARRIAGE EXTRA ALL ITEMS

ACCESS

DRAKE ★ SALES ★ SERVICE

BARCLAYCARD



RADIO SHACK LTD.



WATERS & STANTON ELECTRONICS

SHORT WAVE LISTENERS . . . OUR RECEIVERS ARE BETTER—WHY!

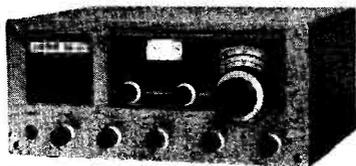
In choosing a receiver you'll want to be sure that you're making the right choice. There's quite a few to choose from but do not fall into the trap of thinking that a receiver produced by any of the large domestic hi-fi manufacturers and purporting to be a "true short wave or communications receiver" 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

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 thirty 1 MHz bands with excellent bandwidth, 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

**ASK ABOUT
SUITABLE AERIALS
& MATCHING
TUNERS**

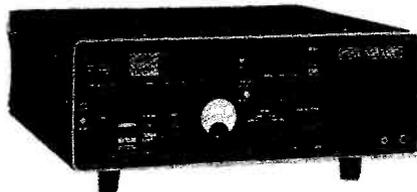
Dear Sirs,
It is with pleasure I can say the R1000RX obtained from you at Leicester last Thursday is a great performer.

There were initially 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.

**ASK ABOUT
AIR BAND
MONITORS**

YAESU FRG7000



£375 inc. VAT and Delivery

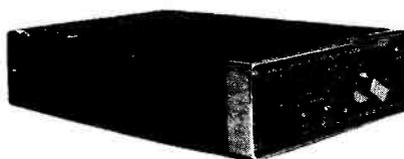
The FRG7000 is based on the successful FRG7 design with a host of features that make it a deluxe receiver for the really serious short wave listener. Digital readout, electronic clock and timer, superb selectivity all go to make up the receiver that everyone aspires to own. Frequency coverage is 0.2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

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 RD5 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 G30JV

FDK TM56B



£106 inc. VAT and Delivery

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.

WATERS & STANTON ELECTRONICS



All major items delivered by Securicor within
24 hours

A NEW EXPERIENCE — R1000



TRIO

R1000

TRIO

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

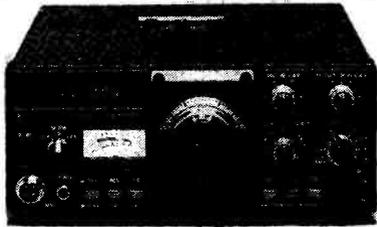
TRIO HAS COME TO THE SOUTH EAST



FULL RANGE
IN STOCK



ALL ON
DEMONSTRATION

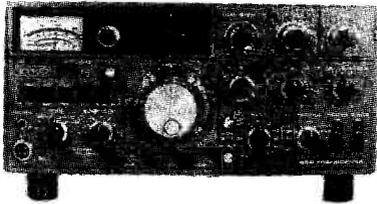


ALL PRICES INCLUDE 15% VAT

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 transmitter 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 transmitter that is today's DX operator's No. 1 choice. For further information or credit terms, just drop us a s.a.e.

NEW

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.

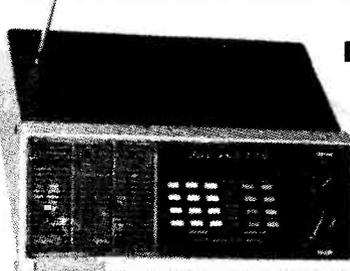
NEW

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 had coming soon that enables you to power and charge from the mains whilst operating with the comfort of a separate microphone.

VHF — UHF

AIRCRAFT MARINE AMATEUR
THIS RECEIVER COVERS THEM ALL!



BEARCAT
220

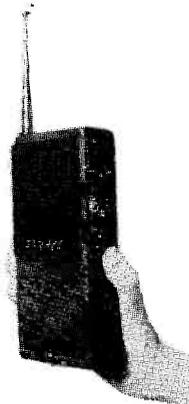
£241

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

NEW! 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 "trifree" 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

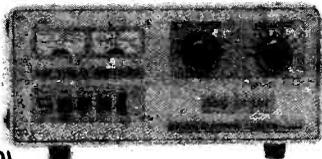
Send 25p for complete
DenTron HF Catalogue

- 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
 - ★ 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

144 MHz!
NAGAI
2200 LINEAR
£429

inc. VAT
(Securicor £4.50)

Sae for colour brochure



- ★ 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



PALMSIZER

40 x 25kHz Channels 145-146MHz

Bulk Shipment at Super Price!

£149 inc VAT buys this . . .



- ★ Cigar lighter plug
- ★ External DC cord
- ★ Over one watt output
- ★ AC charger included
- ★ 40 channel capability
- ★ Simplex or ±600kHz switch
- ★ BNC aerial socket
- ★ Flexible whip supplied
- ★ Xtal controlled tone-burst
- ★ Ni-cad battery pack supplied

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 as 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 charger and helical whip for £149 has to be an absolute bargain — plus over 12 month parts and labour guarantee — send for yours now.



HAND-HELDS PII & PIV

PII 145MHz £99.50, PIV 432MHz
£159

Great Value — Great Performance

Compare their features:

- ★ External DC cord
- ★ Over one watt output
- ★ AC charger included
- ★ 6 channel capability
- ★ Simplex or ±600kHz switch
- ★ BNC aerial socket
- ★ Flexible whip supplied
- ★ S20/SU20 supplied
- ★ Extra channels cost £3.00
- ★ Xtal controlled tone-burst
- ★ Ni-cad battery pack supplied
- ★ High quality condenser microphone



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. Repeater 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-helds for less than £260 inc VAT — can't be bad!

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



STOP PRESS

NEW FDK M700E MKII
Synthesized 2M Mobile
25 watts 25KHz & 12½KHz Channels
£195 inc. VAT & delivery
Ex Stock

MONDAY - SATURDAY 9-5.30

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EARLY CLOSING WED 1.00pm

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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**



**Access or attractive
H.P. terms readily
available for on-the-
spot transactions. Full
demonstration facili-
ties. Free Securicor
delivery.**



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 ¼ mile turn right at Clock Garage and proceed towards city. After one mile look for traffic lights at Fox & Goose and immediately over the lights take minor left fork into Alum Rock Road. We are located one mile from this point.

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

FROM THE WEST AND SOUTH WEST. Follow M5 then M6 to Spaghetti Junction (see above). Alternatively, leave 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

AMATEUR ELECTRONICS UK

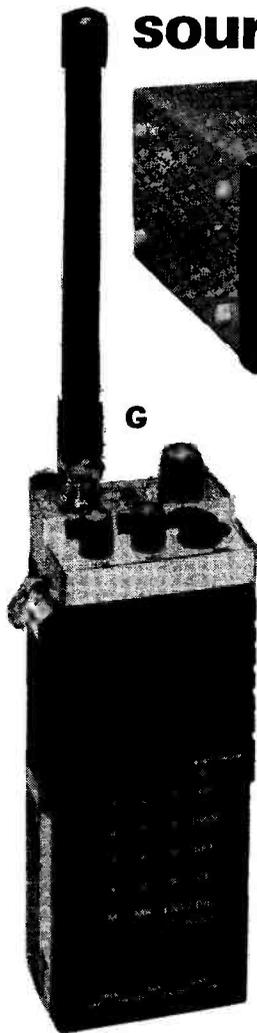
source for YAESU MUSEN



H

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!



G

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.

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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!

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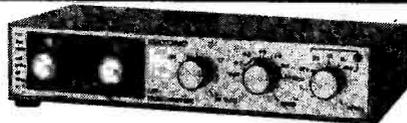
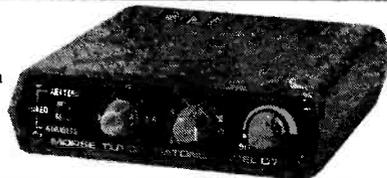


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Frequency

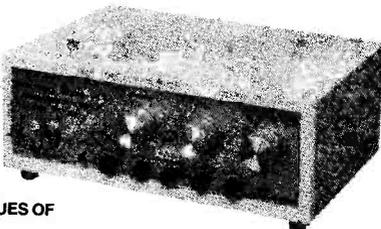
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"QST" and "73"

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SHORT WAVE MAGAZINE

(GB3SWM)
ISSN: 0037-4261

Vol. XXXVII FEBRUARY, 1980 No. 436

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Editor: PAUL ESSERY, G3KFE/G3SWM

Advertising: Charles Forsyth

Published at 34 High Street, Welwyn, Herts. AL6 9EQ, on the last Friday of the month, dated the month following. Telephone: 04-3871 5206 & 5207

Annual Subscription: *Home: £6.50, 12 issues, post paid*
Overseas: £6.50 (\$13.00 U.S.), post paid surface mail

**Editorial Address: Short Wave Magazine,
34 High Street, Welwyn, Herts. AL6 9EQ, England.**

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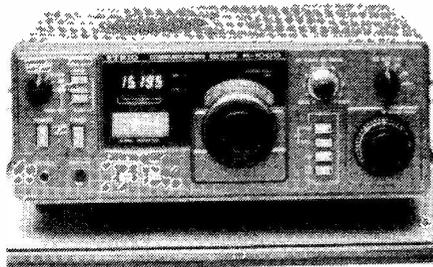
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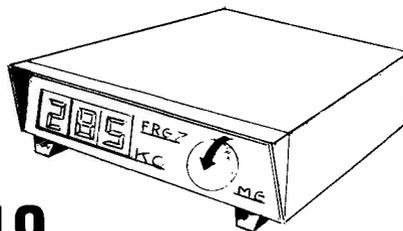
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The
SHORT-WAVE
Magazine

EDITORIAL

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.

Ed Collins
G3KFE.

VHF BANDS

NORMAN FITCH, G3FPK

Convention Time Again

SATURDAY, March 8 is the day in the VHF enthusiasts' calendars. The venues are the Winning Post Hotel and the Whitton School in Whitton, Twickenham, Middlesex. As last year, the accent will be on home construction with exhibitors concentrating on components and accessories to the exclusion of all-mode "black boxes." The trade show and specialist stands will be divided between the two buildings.

The successful format of three lecture streams has been retained. These will be in the school from 1430 with an opening address by RSGB President Peter Balestrini, G3BPT. The General lectures comprise *WARC 1979* by the RSGB at 1430, followed by *Microprocessors and amateur programs*, by GM8FFX and GM8NCM at 1530, ending with a *VHF Contest forum*, from 1630, chaired by G4BEL. The "B" stream has been christened, "Advanced Communication Techniques," and starts at 1430 with G3LTF on *Moonbounce*. At 1530, G3SEK will expound on *How to work more DX*, to be followed from 1630 by the AMSAT-UK team, headed by G3AAJ, telling us about the *Phase III satellite program*.

The Microwave stream "C" starts off with *Building and operating equipment for 24 GHz*, by G3WGD at 1430, followed by G3YGF on *10 GHz narrowband techniques*, at 1530, ending with G3JVL on *Constructing and testing microwave aerials*. The raffle draw is scheduled for 1730 at the Winning Post and the event will be rounded off with the popular buffet supper from 1930 and dancing to the *Second Foundation Modern Dance Band*.

Entry to the Convention is £1.00 (50p. for under-18's). Tickets for the

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 it 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 WA2LQQ 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 and 2/10m. transponder output power of 0.7 watts. Signals were excellent, especially that of VE5XU at 6,600 km. range. 0-8 is also transponding 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 once a 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 "souped up" 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, EI2W, 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 XE. 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 VEISIX was copied intermittently between 1425 and 1700. The "Beacon in Nola." WBSZRL, 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 azimuth 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 unneces-

THREE BAND ANNUAL VHF TABLE

Final Placings
at December 31, 1979

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	
GD2HDZ	49	5	68	14	48	6	190
G2AXI	51	6	60	15	46	9	187
G3SPJ	36	5	58	12	36	6	153
G3FIJ	49	5	56	12	20	4	146
G3CO	49	5	51	11	24	5	145
G80PR	—	—	69	15	39	9	132
G4ERX	49	5	30	8	30	7	129
G8GXE	—	—	60	15	46	8	129
G8LHT	—	—	70	19	28	7	124
G3KPU	—	—	62	12	38	6	118
G3PBV	14	3	54	13	26	7	117
G3BW	—	—	52	18	39	6	115
G4AEZ	23	3	48	14	22	4	114
G8IFT	—	—	59	11	37	5	112
G18EWM	—	—	70	8	27	6	111
G8KGF	—	—	57	15	33	3	108
G4BYP	32	4	41	10	14	2	103
G8KAX	—	—	49	10	34	9	102
G4ERG	—	—	67	30	—	—	97
G8PRG	—	—	60	10	23	3	96
G3FPK	—	—	73	21	—	—	94
G8GML	—	—	63	17	5	7	92
G8LEF	—	—	46	7	30	8	91
G4IGO	—	—	64	24	—	—	88
GM4COK	3	2	58	22	1	1	87
G4FBK	—	—	65	18	—	—	83
G4DEZ	—	—	59	21	—	—	80
GM4CXP	12	3	42	15	4	3	79
G8ITS	—	—	40	6	25	4	75
G81JR	—	—	53	14	6	1	74
G4GHA	—	—	47	19	—	—	66
G4HAO	—	—	54	8	—	—	62
G4GXT	—	—	45	12	2	1	60
G8JGK	—	—	41	11	—	—	52
G4FKI	28	4	6	2	7	3	50

sarily "contest-style" exchanges with gabbled call-signs and few operators being inclined to carry out any meaningful tests, etc. Derek regretfully concludes;— "For me it wasn't amateur radio — rather a deterioration to the worst traits of the Class B activities or, even worse, an extension of the Citizens' Band concept."

Brian Bower, G3COJ (Bucks.) confirms that conditions were surprisingly good with W7 and W0 audible in early December. Last ones heard were VE1 and W1 on the 21st. On the 11th, he worked crossband with W5UWB in Corpus Christi, Texas who, as G15ALP in Londonderry, was very active on 2m. about ten years ago.

John Baker, GW3MHW, has spent as much time as possible on 50 MHz and, up to Dec. 18, had made 378 crossband QSO's. He worked all ten W districts plus KP2, KP4 and KV4. K0GJX was audible when he was running 800 milli-watts. John has noticed the band fade out but then re-open 20 mins. later to W0, 5, 6 and 7. Mike Allmark (Leeds) copied lots of 6m. stuff most days between 1300 and 1700, including TV from the U.S.A. on 55.25 MHz video on Dec. 11-15. Arabic TV, possibly from the United Arab Emirates, on Channels E2 and E3 has been copied quite often, along

with Russian Ch. 1 TV sound on 56.75 MHz.

Jean-Louis Delpont (Brussels) sent in a 6m. list of stations heard up to Dec. 6 on his FRG-7000 or Racal RA-17-plus Microwave Modules converter combination. The list includes the VO1GT FM repeater on 50.353 MHz, the WBSZRL, WA8KGG, FY7THF and ZB2VHF beacons and dozens of stations in many call areas.

Four Metres

Congratulations to Syd Harden, G2AXI (Hants.) who has won the 4m. section in the 1979 Three Band Table with 57 points. G3CO, G3FIJ, G4ERX and GD2HDZ tied for second place each with 49 counties and 5 countries.

Alan Scott, G4BYP (Cheshire) reports a revival of Sunday morning activity in the Northwest, often resulting in six or more QSO's. He reckons if only this could be maintained each weekday evening, "... 70 MHz might start looking like an amateur band again." GW3MHW is still running his push-pull DET-12's on the band and notes G4ERP to be the strongest station. John suggests his call sign might be the reason! He wonders if G4ERP's QTH has some special

feature, like a hill behind it to the East?

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 QSO's on CW with HG6KNB (JI) and UR2AO (MT) on Dec. 12, and with UQ2FGZ (NR); HG1KYY (IH); I1KTC (EF) and HG0KLZ (KH) on the 14th, with OK3CGX on SSB. Skeds with UT5DL (LI) and UB5EAG (QI) were impossible due to heavy and continuous local QRM. John concludes that the shower was not too bad but could have been better as reflexions were rather short. He mentions F1JG (CD) and I4YIW very good on random SSB. However, he suggests some operators were not using the proper procedures, giving only partial calls, for example. John is intrigued to find out who works what on the random CW QRG. During the *Quadrantids*, G3IMV had successful contacts with OH7PI (NW); SL2CU (LZ) and SM3COL (IW).

Dave Sellars, G3PBV (Devon) came on quite late in the December Fixed Contest but ended up working 79

stations, best DX being G3ZIG/A near Norwich and G8EAH in Hull. Dave is a reserve GB2RS news reader for G3CHN, by the way. Clive Penna, G3POI, is now up to 282 squares worked. In the *Geminids*, he managed YU1ADN (KD) and LA7KK (FU) and in the *Quadrantids*, EA5NY (ZZ) on real-time CW at 30 w.p.m.

G4BYP comments on the general lack of activity apart from contests and openings, but reckons our Three Band Annual Table helps to generate some. Pete Etheridge, G4ERG (Hull) came top of the 2m. table last year with 97 points including 30 countries, even though he did not work EI. He reckons conditions were not too good in the *Geminids* but he did work EA3ADW (BB) for no. 30.

During the *Geminids* period, Ken Osborne, G4IGO (Bristol) worked OZ1OF (EQ); SM7AED (GQ); DK2DO (EK) and SM7GWU (HS). On random MS, he had two QSO's with SM5CHK (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 awaited from G3NSM, G3CBW, GM4CVI and GD6UQ. He has sent all these folk his QSL and IRC.

During the Nov. 27-29 event, Paul Lawrence, G8BWR (Warks.) told your scribe he worked HB7RO (DG34h) the first day; EA2HX (ZD51h) on the next and OZ1BSO (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 G3FPR's suggestion that he consider MS to increase his squares

TWO-METRE ANNUAL TABLE

Final Placings
at December 31, 1979

Station	Countries	Countries	Total
G4ERG	67	30	97
G3FPR	73	21	94
G8LHT	70	19	89
G4IGO	64	24	88
G8OPR	69	15	84
G4FBK	65	18	83
GD2HDZ	68	14	82
GM4COK	58	22	80
G4DEZ	59	21	80
G8GML	63	17	80
G18EWM	70	8	78
G2AXI	60	15	75
G8GXE	60	15	75
G3KPU	62	12	74
G8KGF	57	15	72
G3BW	52	18	70
G3SPJ	58	12	70
G8IFT	59	11	70
G8PRG	60	10	70
G3FLJ	56	12	68
G8JJR	53	14	67
G3PBV	54	13	67
G4GHA	47	19	66
G4AEZ	48	14	62
G3CO	51	11	62
G4HAO	54	8	62
G8KAK	49	10	59
GM4CXP	42	15	57
G4GXT	45	12	57
G8LEF	46	7	53
G8JGK	41	11	52
G4BYP	41	10	51
G8ITS	40	6	46
G4ERX	30	8	38
G4FKI	6	2	8

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, GJ4ICD, reports successful *Geminids* QSO's with IW3QBC (GG); DM2BYE (HM) and EA3ADW (BB). During the Nov. 27-29 fun, he casually mentions working FC, 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

FOUR-METRE ANNUAL TABLE

Final Placings
at December 31, 1979

Station	Countries	Countries	Total
G2AXI	51	6	57
G3CO	49	5	54
G3FLJ			
G4ERX			
GD2HDZ			
G3SPJ			
G4BYP	36	5	41
G4FKI	32	4	36
G4AEZ	28	4	32
G3PBV	23	3	26
GM4CXP	14	3	17
GM4COK	12	3	15
	3	2	5

M/LA to YU/HA/YO, UR2 to I, tc. There were reports of E's signals in Band 2 FM being received in Sweden at the time and suggestions that Italian Band 2FM stations had been heard in England, too. All reports on this intriguing event would be welcomed.

Our s.w.l. contributors have been busy. John Dimmick (I.O.W.) heard a lot of DX on Nov. 29 at the end of the lift and is sure he would have heard lots more with a better aerial. Mike Allmark's best DX in that period was SP3BLR (HM) with many other stations over the 700 kms. range from Leeds, including eight in West Berlin. On Dec. 6, he notes the good signal from F1CYB (BH20b). During the *Geminids*, Mike heard his 41st. country, IS0A, but did not think there was a lot of random SSB activity on 144.2 MHz.

Seventy Centimetres

G2AXI just topped the 70 cm. chart last year with 55 points. Joint second place went to GD2HDZ and G8GXE, with 54 points. Congratulations all.

70-CENTIMETRE ANNUAL TABLE

Station	Final Placings		Total
	Counties	Countries	
G2AXI	46	9	55
G8GXE	46	8	54
GD2HDZ	48	6	54
G80PR	39	9	48
G3BW	39	6	45
G3KPU	38	6	44
G8KAX	34	9	43
G3SPJ	36	6	42
G8IFT	37	5	42
G8LEF	30	8	38
G4ERX	30	7	37
G8KGF	33	3	36
G8LHT	28	7	35
G3PBV	26	7	33
G8EWM	27	6	33
G3CO	24	5	29
G8ITS	25	4	29
G4AEZ	22	4	26
G8PRG	23	3	26
G3FIJ	20	4	24
G4BYP	14	2	16
G8GML	5	7	12
G4FKI	7	3	10
GM4CXP	4	3	7
G8JJR	6	1	7
G4GXT	2	1	3
GM4COK	1	1	2

Jack Kay, G3CO (Essex), regrets his missing the periods last year when band conditions were above average so hopes to do better this year. Dave Thorpe, G4FKI (Essex), made his first continental FM QSO with ON6UV. Dave Cox, G8OPR (Hants.), is still recovering from the pleasant shock of working EA1CR (XD32d) in the Nov. lift, along with DJ7YP (EN73j) using 10 watts to an 18-ele. *Parabeam*. His 70 cm. total is not at all bad as it represents only seven months of operation.

Phil Johnson (GJ8KNV) worked no less than 250 new stations during the late November lift the best DX being to OZ at 1,140 kms. PE0ESN, at 700 kms. was only running 100 mW. so was the best QRP contact. Phil mentions having worked into DM and EA as well as into the more "local" countries. He noticed a very good lift a week later from 2300 on Dec. 5 to 1100 the next day but only strong beacons were copied, everyone apparently still recovering from the previous event. Mike Allmark confirms that, on the 6th, the UHF TV channels, "... were clogged with DX stations ..." and mentions reception from DM, HB and OK.

By all accounts, the Dec. 27 leg of the *Cumulatives* brought awful conditions and no wonder, with the torrential rain and raging gales. The session was universally deemed a "washout!"

Microwave News

Ray Elliott, G4ERX (Essex), is a member of the successful *HADRABS* contest team and advises they now have the call G4JAR to add to the G8PUB one. (PUBs and JARs, get it?) He asks folk to look out for them in the May UHF contest. Barry Titmarsh, GM8SAU, is keen on 10 GHz work and expects to be able to work some long distances this year. From Beinn Mhòr in South Uist, he can see Ben Nevis and there is a line-of-sight path to GD, too.

Contest News

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, GD2HDZ, heads the 1979 Three-Band Annual Table with 190 points, just three ahead of Syd Harden, G2AX1. Nothing has been heard from Colin Wooff, G3SPJ, for some 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 184 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* QSO's 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. innards ripped out and replaced by a *Microwave Modules* converter, plus other major mods. on the Tx side.

VHF repeater GB3SC 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.

ANTENNAS — THE WEAK LINK, PART XI

TWO MORE COMMON ANTENNA TYPES

A.P. ASHTON, G3XAP

FOLLOWING on from the previous article where we looked at a few of the simpler antennas used in Amateur Radio today, we now consider what are probably the most popular directive antennas used by amateurs — the *Yagi* and the *Quad*.

Although it was stated in a previous article that the importance of directivity should not be over-emphasised, it is nevertheless a fact that a directive antenna does have certain advantages over a non-directive type; namely, the reduction of QRM from signals arriving from unwanted directions and the concentration of as much of the transmitter's output power as possible in the desired direction. It should also be noted that both of these properties have a reciprocal effect: directivity helps to reduce QRM from us to stations not in our direction of interest (we tend to overlook the fact that *our* signal may be QRM to someone!), and the antenna's gain increases the strength of wanted signals at our location. It can therefore be argued that the use of omnidirectional antennas on the HF bands is a somewhat antisocial practice!

Directive arrays also have their disadvantages and these include (a) they are generally more expensive to build (or buy); (b) they are somewhat more difficult to construct, resonate and match; (c) unless pointed in a fixed direction, they require some form of rotation; (d) the presence of a weak "desirable" signal can pass unnoticed if the direction of our antenna puts that signal into a null position, and (e) they can be aesthetically unacceptable (a thing of beauty to an amateur can be an eye-sore to a neighbour).

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).

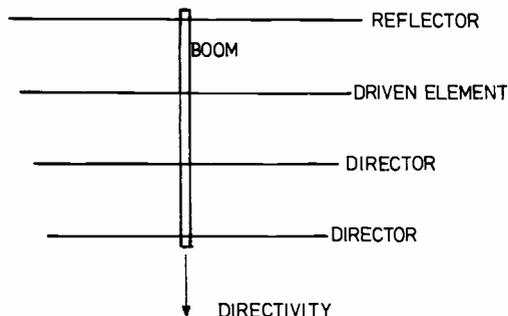


Fig.1. A 4 ELEMENT YAGI BEAM

Frequency MHz	Element lengths		Spacing D.E. - Dir.
	D.E.	Dir.	
14.15	33'-7"	31'-7"	8'-6"
21.20	22'-5"	21'-1"	5'-7"
28.40	16'-7"	15'-4"	4'-2"

Fig.2a. DESIGN DETAILS FOR 2 ELEMENT YAGI's.

Frequency MHz	Element lengths			Spacing	
	Ref	D.E.	Dir.	R- D.E.	D.E.-D
14.15	35'-5"	33'-7"	31'-8"	11'-0"	9'-0"
21.20	23'-9"	22'-5"	21'-2"	7'-6"	6'-0"
28.40	17'-8"	16'-7"	15'-5"	5'-6"	4'-6"

Fig.2b. DESIGN DETAILS FOR 3 ELEMENT YAGI's

FIG. 2

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Fig. 1 shows a 4-element Yagi antenna having one reflector and two director elements, and it will be noted that the reflector is longer than the driven element while the directors are shorter. The elements are mounted on a 'boom' and may be either insulated from it, or directly connected to it depending on such factors as the method of feeding, etc. Whilst an increase in the number of directors used results in an increase in gain and a narrowing of the forward lobe of the array (*i.e.* increased directivity), the addition of second and subsequent reflectors does little to enhance the antenna's performance. In practice therefore, only one reflector is normally used, whereas several directors may be added. For a given number of elements the actual gain of a Yagi is influenced by the length of the parasitics and the spacing between them, but it should be realised that the element spacing giving maximum gain does not coincide with the spacing required for maximum "front-to-back" ratio. The practice among most amateurs tends to be to tune a beam antenna for maximum front-to-back as the sacrifice in forward gain that results is small, and many HF DX-ers believe that reduction of QRM from unwanted directions is a vitally important factor.

The directivity of the Yagi antenna arises because, in addition to the signal received directly by the driven element, the parasitic elements also receive a signal and part of this energy is "re-radiated" from the parasitics and then hits the driven element. Hence the total signal fed from the driven element to the receiver is the sum of the directly-received signal and those portions of the re-radiated signals that have been collected by the driven element. During transmission the converse happens — radiation from the driven element strikes the parasitics and the re-radiated energy combines with the directly radiated energy to form the radiation pattern. It is the choice of positioning and length of the parasitic elements in relation to the driven element that governs the directions in which the signal will either be enhanced or diminished (*i.e.* reinforced or cancelled), and hence the shape of the resulting lobes of radiation.

When considering, in a previous article, the effect of height of a horizontal antenna on its feed impedance, we noted that the reflected energy from the ground induced a secondary current into the antenna — thus altering its total

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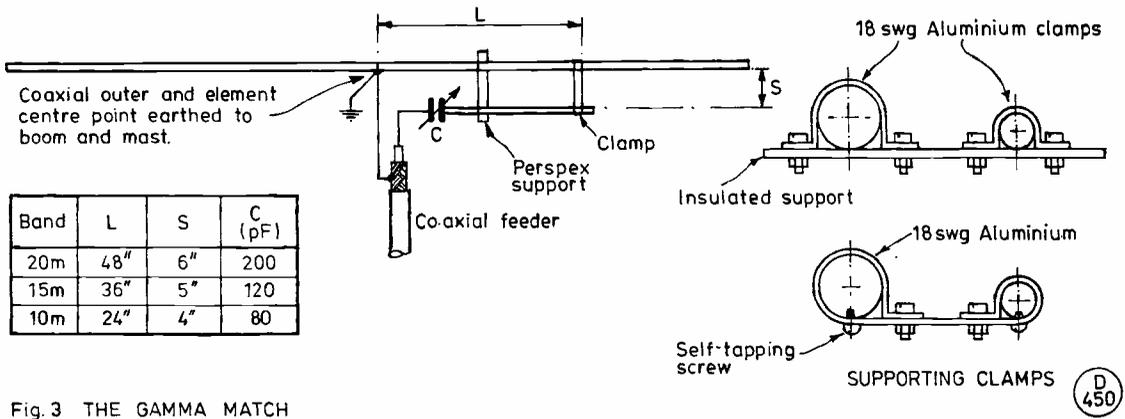


Fig. 3 THE GAMMA MATCH

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 = impedance, V = voltage and I = 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 of 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 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 10ft. 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

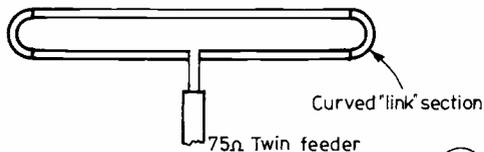


FIG. 4

Fig. 4. 'Folded' driven element for Yagi beam; the curved link sections are telescoped into the main conductors until resonance is obtained.

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 screwdriver. 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)

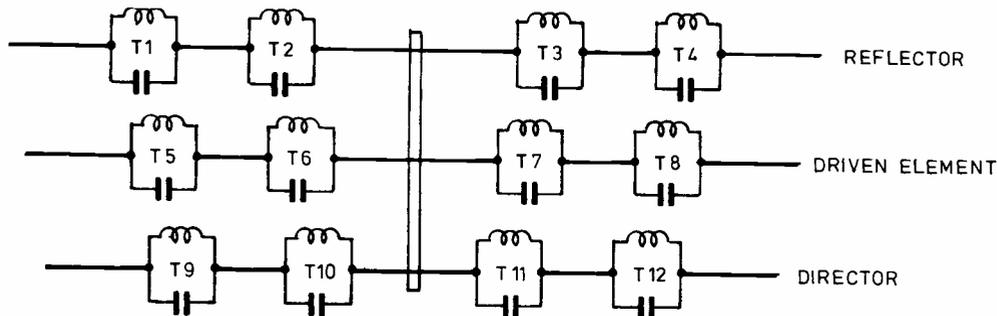
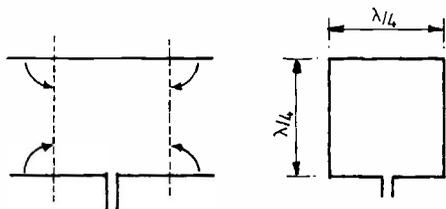
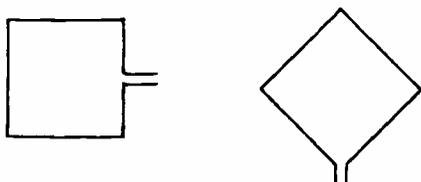


FIG. 5

Fig. 5. Electrical representation of the triband trapped Yagi. The two traps on each half of each element may be combined into one enclosure: the innermost traps are resonant at or around 28 MHz, and the outermost traps at 21 MHz.



(a) 2 Stacked Half Waves. (b) The Quad Loop



(c) Vertically polarised Quad Loop (d) "Diamond" Quad Loop

FIG. 6

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act as insulators, preventing the outermost sections of the elements from receiving power; thus we have a 21 MHz Yagi whose elements are "shortened" by the inductance of the 28 MHz traps.

On 14 MHz all of the traps behave as inductances and we have an inductively loaded 14 MHz Yagi. In practice the 21 and 28 MHz traps are housed in the same enclosure and the newcomer could be forgiven for assuming that there are only 6 traps, whereas there are in fact twelve! (An excellent article in *Short Wave Magazine* for August 1979, by G3VMC, gives full details of trap construction.)

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

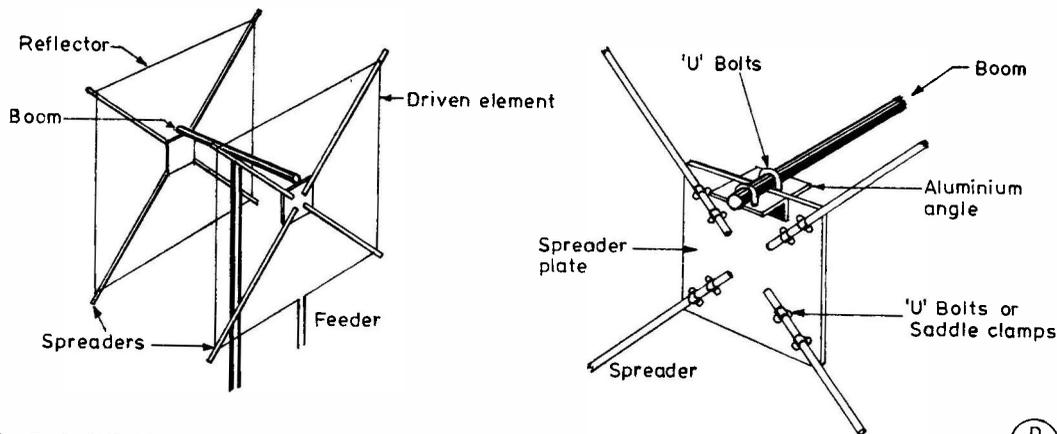


Fig. 7 THE CUBICAL QUAD ANTENNA - WITH SPREADER PLATE DETAILS

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Freq. MHz	Quad side	Ref. side	Spreader		Stub length	Spacing
			DE.	Ref.		
14-15	17'-8"	18'-2"	12'-6"	13'-2"	35-40"	8'-4"
21-20	11'-10"	12'-2"	8'-2"	8'-10"	18-25"	5'-7"
28-40	8'-10"	9'-0"	6'-3"	6'-7"	14-19"	4'-2"

Fig.8 DESIGN DETAILS FOR QUAD ANTENNA

D 455

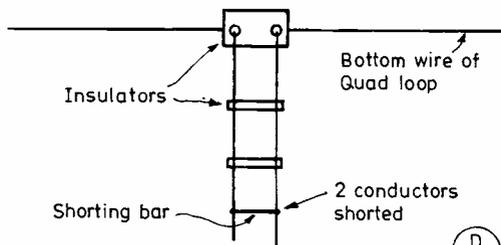


Fig.9 QUAD REFLECTOR TUNING STUB

D 456

Fig. 9. The distance between stub wires is not critical, two to three inches being a suitable spacing. Tuning the Quad is by moving the shorting bar up the stub.

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.

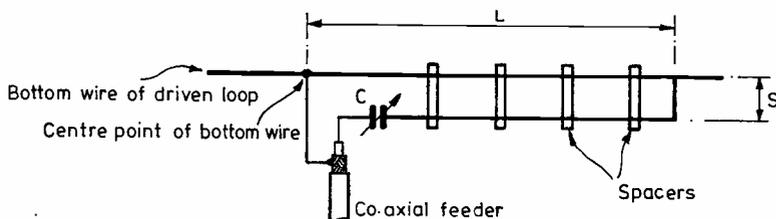
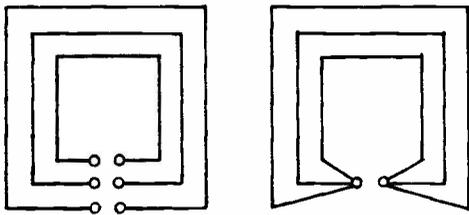


Fig.10 GAMMA MATCH FOR A QUAD ANTENNA -WITH DESIGN DETAILS

Band	L	C (pF)	S
20m	30-40"	250	2"
15m	25-30"	120	1.5"
10m	15-20"	75	1"

D 457



(a) Multi-band Quad for use with separate feeders for 3 bands.

(b) Multi-band Quad for use with a single feedline.

FIG. 11

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458

Multi-band Quad Antennas

As with the Yagi, the attraction of multi-band operation with a Quad has led 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

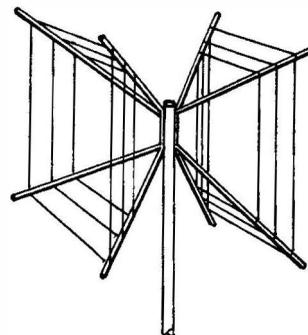


Fig. 12 CUBICAL QUAD ANTENNA USING 'NO-COMPROMISE' BOOMLESS SPIDER

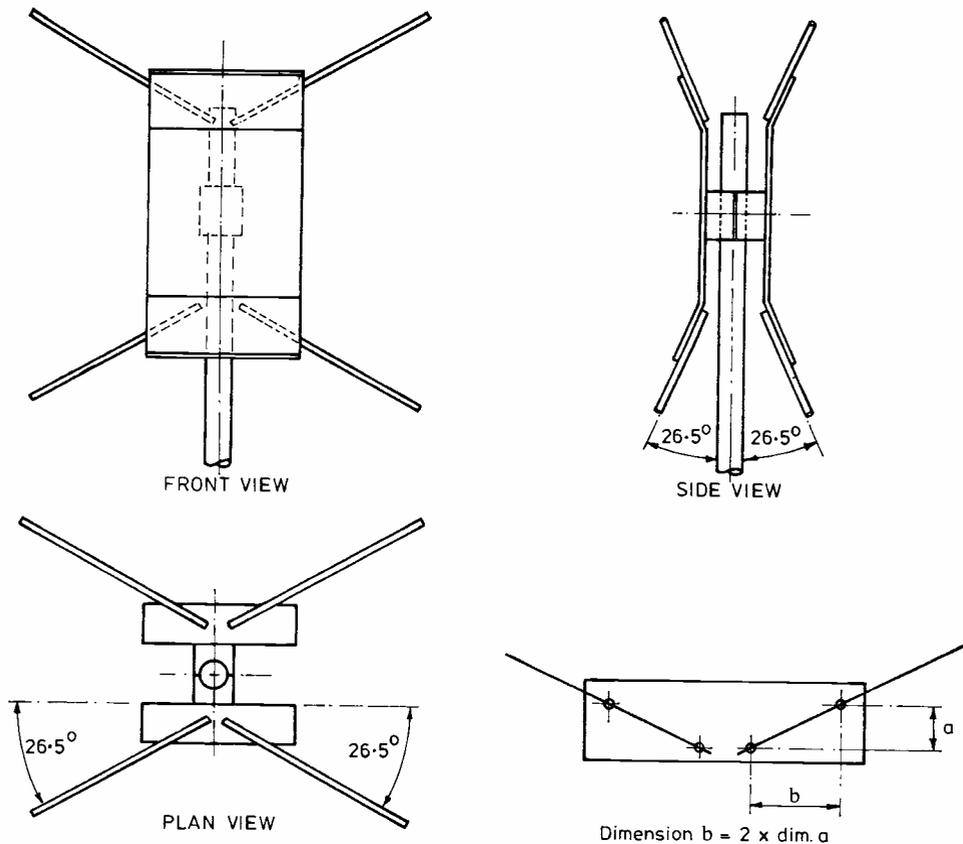


Fig. 13 Close up details of the G3XAP "Boomless" Quad Spider. Spider is constructed from 16 swg Aluminium Plate. The two halves of the spider are clamped to the mast by means of "plumbers" pipe clamps.

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460

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 triband 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 C-MOS 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 C-MOS 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.

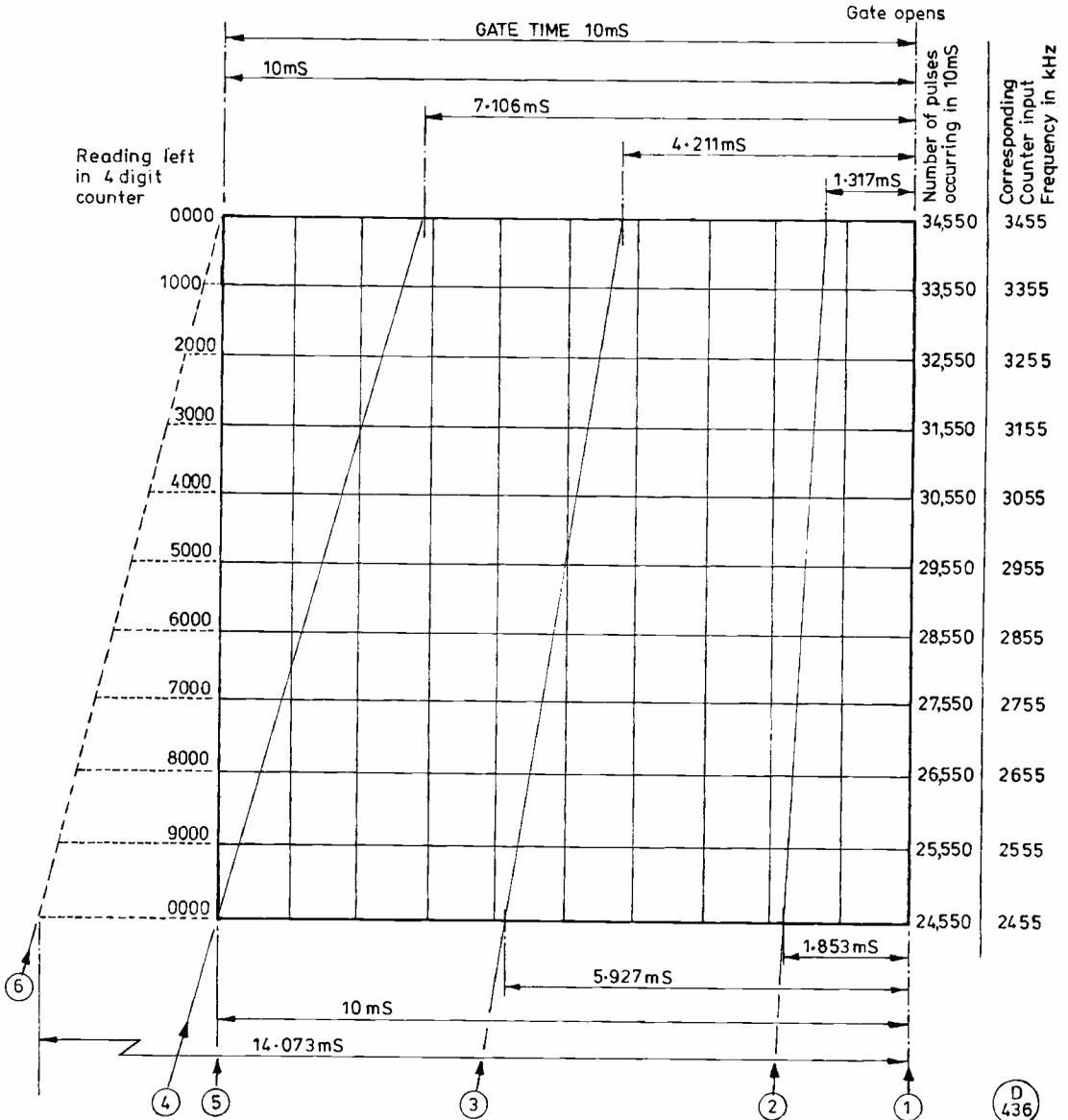
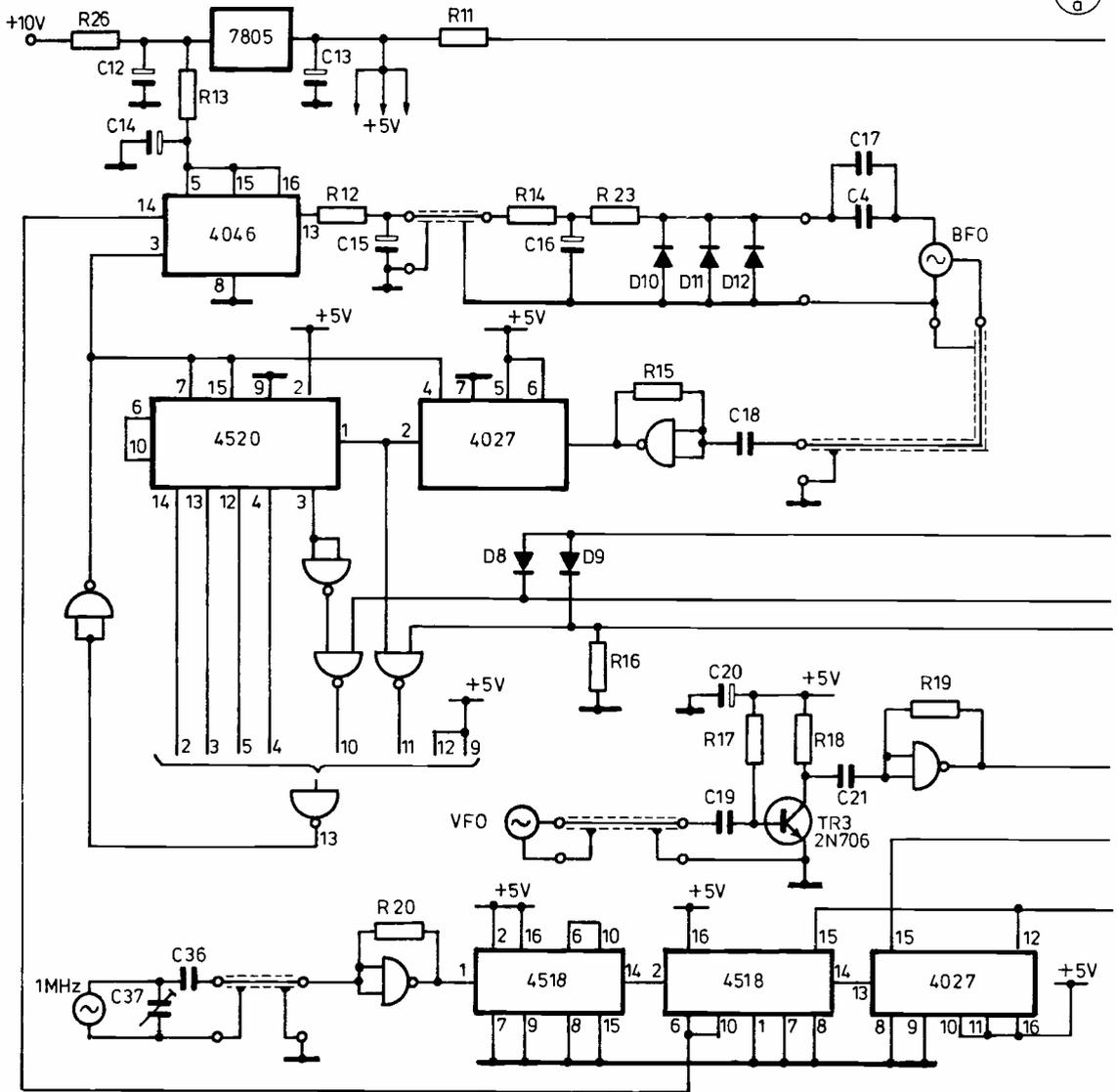


Fig. 8 OPERATION OF THE DIGITAL FREQUENCY READ-OUT



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

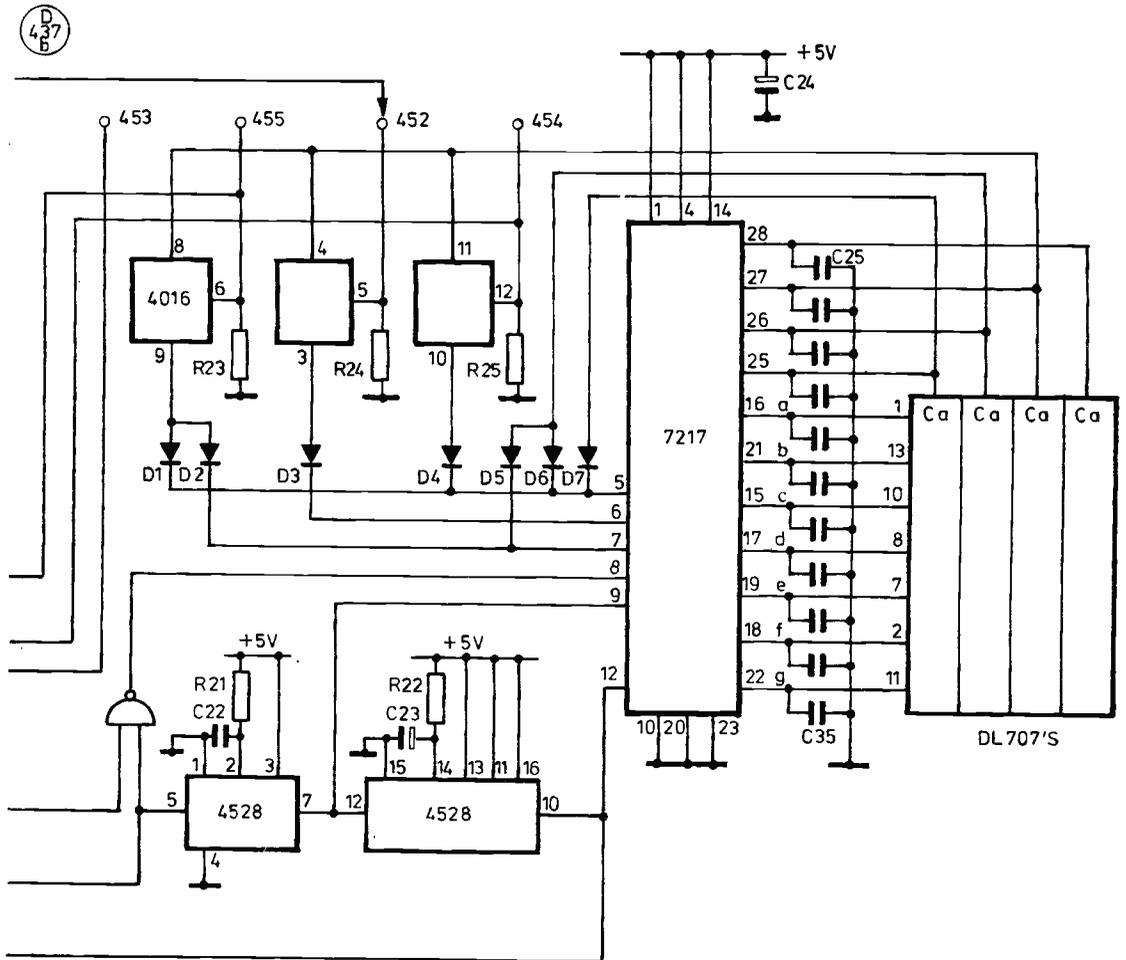


Fig.9 COMPLETE DIGITAL FREQUENCY READ-OUT AND BFO PHASE LOCK LOOP FOR THE FRG-7

main PCB where it is amplified and gated into the ICM7217. It is the C-MOS operated at V_{DD} 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

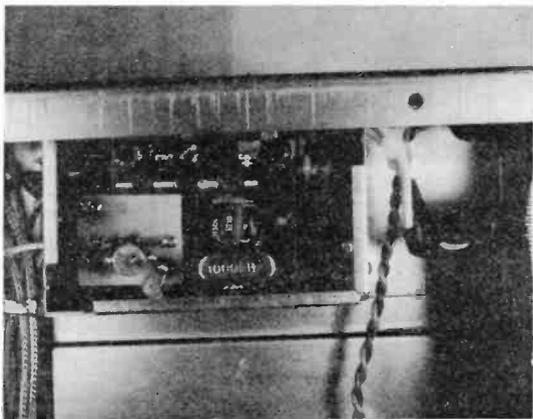


Fig. 10. The 1 MHz oscillator PCB.

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 *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

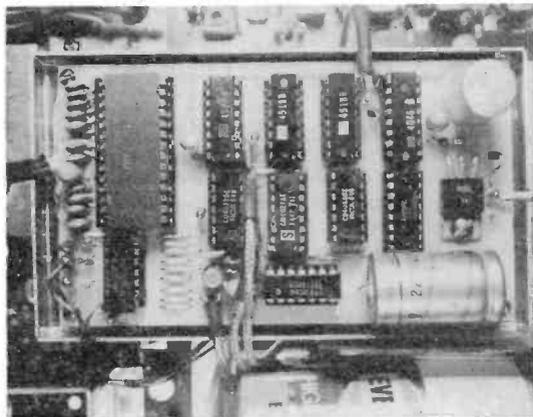


Fig. 11. The main PCB of the Digital Readout.

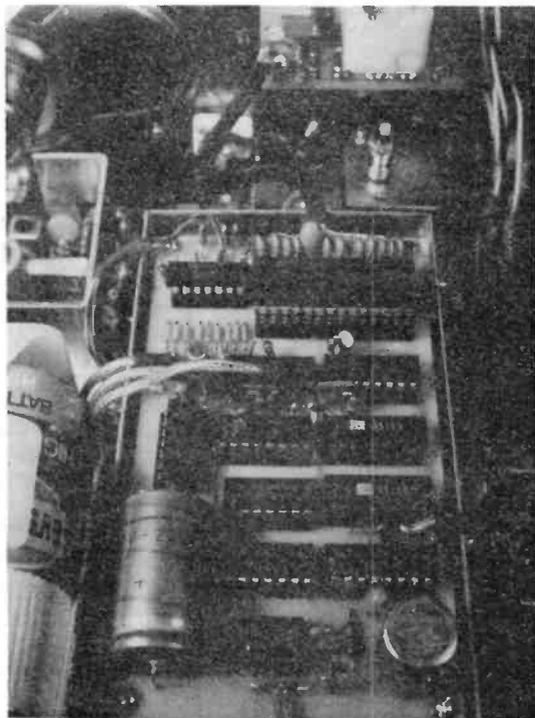
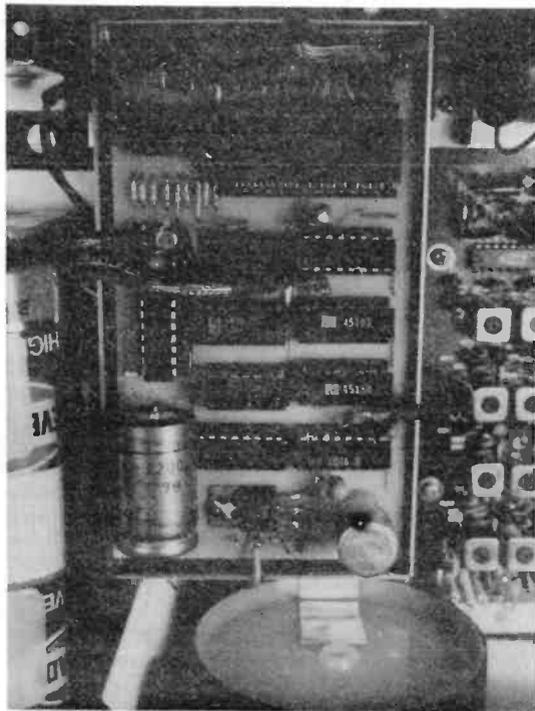


Fig. 12. Above, the rear of the 7-segment LED PCB is seen underneath the S-meter together with the screened interconnecting wires to the main digital readout PCB; below, the original tuning drum is seen retained against the backplate of the receiver.



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

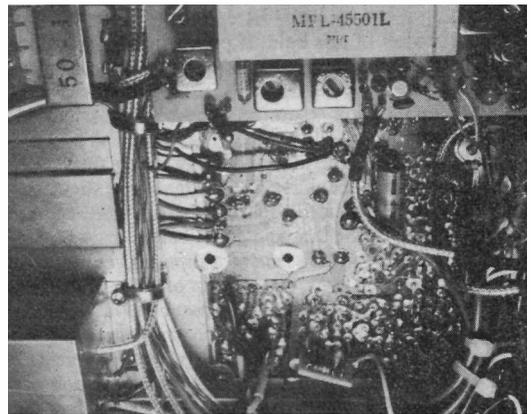
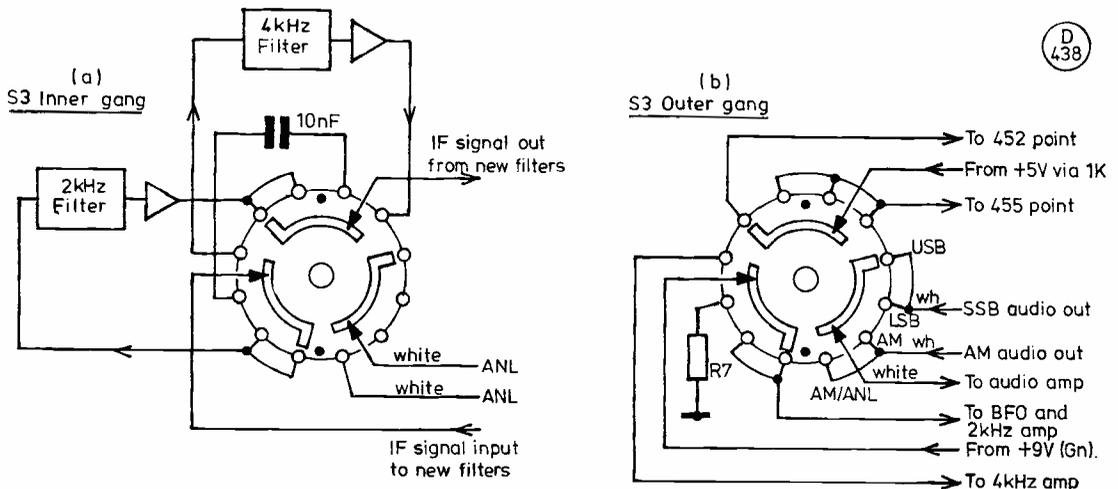


Fig. 13. The Phase Lock Loop PCB, seen at the top centre; at the top right, the screened lead is seen emerging from the 1 MHz oscillator box and the filter and amplifier board is at the bottom.

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.



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Fig. 14 DIAGRAM OF WIRING TO FRG-7 MODE SWITCH S3 (Viewed from underside rear of radio).

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 amplified 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 mark 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, GM3XMZ 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 timebases, other electrical noise, and fitting an aerial into a suburban garden" — *Sheffield 'A'*; "Contest most enjoyable, and the mixed CW/Phone well received by all the operators. We are disappointed in that we have inter-club contests based on MCC with four other groups, none of whom managed to get a station on the air" — G3LCH on behalf of the four stations entered from *Sutton & Cheam* club; "Half-wave at forty feet plus four hundred feet of radials" — *Tyneside*; "Only one other club on from the whole of greater London!" — *Edgware* (there were in fact several); "Conditions on the Saturday very variable; on the Sunday several stations overdriving their gear" — *Haverhill*. A final comment, from *Acton, Brentford & Chiswick*: "results as usual for this club were only fair, due

to the limitations of the club room site, and on Saturday the noise was R9+. Those who took part enjoyed it on both evenings."

The bottom of the poll was G4IRX, operating as *Sheffield 'C'* with an AT5 on the transmit side and a CR-100 to receive, plus a half-wave at about twenty feet above ground-level: "Didn't work miracles on Phone, but a reasonable distance — anyway, someone's got to be bottom!" With that approach he should go a long way.

As we were finishing this write-up, what should come to the surface but GU3HFN's (Guernsey) log. They were adrift on the time scale, and their score was not as good as we would have expected; they seem to have only worked all the clubs who were going to send in logs — a crystal ball, maybe?

Conclusions

While the contest was pretty well supported, a number of operators didn't bother to send in logs. Now that we know we are not going to lose the band, we can say with some certainty that there will be another MCC in 1980, with the Rules much as they were this time.

There might be some worth in the suggestion 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 XYs 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.

Thirty-Third MCC — Results

Placing	Club name & call	Score
1.	Dundee (Kingsway Tech. Coll.), GM4AAF	14262
2.	Gravesend, G3GRS/A	8743.5
3.	Sheffield 'A', G3FJE	7600
4.	Maidstone 'Y', G3TRF	7366
5.	Sutton & Cheam 'B', G2DMR	6702
6.	Sutton & Cheam 'A', G4IFB/A	6202
7.	Sutton & Cheam 'C', G4CWH	6088
8.	North Riding, G3TZU/A	5588.5
9.	Sheffield 'B', G4GIR	5519
10.	Guernsey, GU3HFN	5060.5
11.	Tyneside, G3ZQM/A	4914
12.	Edgware, G3ASR	4539
13.	Haverhill, G3TGA	4084
14.	Verulam, G3VER	4053
15.	Shetland, GM3XMZ	3440.25
16.	Grimsby, G3CNX/A	3133.75
17.	Sutton & Cheam 'D', G4BFJ	2619
18.	Acton, Brentford & Chiswick, G3IIU	2213
19.	Sheffield 'C', G4IRX	1434

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 largish 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', its 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. (01-992 3778)
- AMSAT-UK: R. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ
- A.R.M.S.: N. A. S. Fitch, G3FPK, 40 Eskdale Gardens, Purley, Surrey CR2 1EZ.
- BARKING: A. Sammons, G8IZN, 80 Lyndhurst Gardens, Barking, Essex IG11 5BZ.
- BASINGSTOKE: H. Lawrence, G4HTM, 60 Loggon Road, Basingstoke, Hants.
- B.A.T.C.: M. Cox, G4HUA, 13 Dane Close, Broughton, Brigg, South Humberside
- BISHOPS STORTFORD: T. E. White, G8LXB, 79 Elmbridge, Old Harlow, Essex.
- BOOTS: I. Brothwell, G4EAN, 56 Arnot Hill Road, Arnold, Nottingham NG5 6LQ.
- BOURNEMOUTH: G. R. Freeth, G4HFG, 9 South Avenue, New Milton, Hants BH25 6EY. (New Milton 618092)
- BURY: M. Bainbridge, G4GSY, 7 Rothbury Close, Bury, Lancs. BL8 2TT. (061-761 5083)
- CAMBRIDGE: D. Wilcock, G2FKS, 19 Cavendish Avenue, Cambridge CB1 4UP. (Cambridge 47220)
- CHELTENHAM: G. Cratchley, G4ILI, 47 Golden Miller Road, Prestbury, Cheltenham. (Cheltenham 43891)
- CHESHUNT: R. E. Chastell, G8LNM, 4 Fairley Way, Cheshunt, Herts. EN7 6LG. (Waltham Cross 35393)
- CHILTERN: N. C. Ambridge, G4FRL, 53 The Avenue, Chinnor Oxon. OX9 4PE.
- CLIFTON: R. A. Hinton, 42 Sutcliffe Road, Welling, Kent.
- CORNISH: S. T. S. Evans, G3VGO, Glengormley, Carnon Downs, Truro, Cornwall. (Devoran 864255)
- COVENTRY: J. E. Beech, G8SEQ, 14 Hollow Crescent, Radford, Coventry CV6 1NT.
- CRAWLEY: A. V. H. Davis, G3MGL, 41 Gainsborough Road, Crawley, West Sussex RH10 5LD. (Crawley 20986)
- CRAY VALLEY: P. J. Clark, G4FUG, 42 Shooters Hill Road, London SE3. (01-858 3703)
- DENBY DALE: J. Clegg, G3FOH, 8 Hillside, Leak Hall Lane, Denby Dale, Huddersfield HD8 8QZ. (Skelmanthorpe 2390)
- DERBY: Mrs. J. Shardlow, G4EYM, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ. (Derby (0332) 56875)
- EDGWARE: D. L. Lisney, G3MNO, 119 Draycott Avenue, Kenton, Harrow HA3 0DA. (01-907 1237)
- EDINBURGH: M. Darke, GM3GK, 44 Inverleith Row, Edinburgh. (031-552 4593)
- EDINBURGH (Repeater Group): c/o G. Dawson, GM3GBX, 32 Morningside Place, Edinburgh EH10 5EY.
- G-QRP Club: Rev. G. C. Dobbs, G3RJV, 17 Aspen Drive, Chelmsley Wood, Birmingham B37. (021-770 5918)
- GRAVESEND: A. Watson, G4GML, 93 St. Dunstons Drive, Gravesend.
- GUILDFORD: L. Bright, G4BHQ, 4 Dagley Farm, Shalford, Guildford, Surrey. (Guildford 76375)
- HEREFORD: S. Jesson, G4CNY, 181 Kings Acre Road, Hereford. (Hereford 3237)
- IPSWICH: J. Tootill, G4IFF, 76 Fircroft Road, Ipswich, Suffolk IP1 6PX. (Ipswich (0473) 44047)
- I.R.T.S.: G. Gervin, E18CC, 185 Elton Court, Leixlip, Co. Kildare.
- KIDDERMINSTER: R. Manton, G4ILQ, 7 Osborne Close, Offmore Farm Estate, Kidderminster, Worcs. DY10 3YY. (Kidderminster 4930)
- MAIDENHEAD: J. Patrick, G3TWG, Bedford Lodge, Camden Place, Bourne End, Bucks. (Bourne End 25275)
- MELTON MOWBRAY: R. Winters, G3NVK, 32 Redwood Avenue, Melton Mowbray, Leics. (Melton Mowbray 3369)
- MIDLAND: N. Gutteridge, G8BHE, 68 Max Road, Quinton, Birmingham B32 2AN. (021-422 9787)
- NORTHERN HEIGHTS: M. Topham, G8NUC, 1200 Great Horton Road, Bradford. (Bradford 73271)
- NOTTINGHAM: M. C. Shaw, G4EKW, 50 White Road, Nottingham NG5 1JR.
- ORMSKIRK: J. K. Higgins, G4IGX, 8 Delp Top, Greetby Hill, Ormskirk L39 2DX. (Ormskirk 75546)
- R.A.I.B.C.: Mrs. F. Woolley, G3LWY, 9 Rannoch Court, Adelaide Road, Surbiton, KT6 4TE.
- ROYAL NAVY: M. Puntick, G3LIK, 21 Sandyfield Crescent, Cowplain, Portsmouth PO8 8SQ. (Waterlooville 55880)
- SCARBOROUGH: Mrs. M. A. Crofts, G4JAQ, 43 Broadlands Drive, East Ayton, Scarborough, N. Yorks YO13 9ET.
- SCUNTHORPE: J. A. Sheardown, G8TIY, 5 Winteringham Lane, West Halton, Scunthorpe, South Humberside DN15 9AX.
- SOUTHGATE: J. Fitch, G8EWG, 16 Kent Drive, Cockfosters EN4 0AP. (01-440 7353)
- SOUTH BIRMINGHAM: Mrs. G. Apperley, G4GZI, 35 Denise Drive, Harborne, Birmingham 17.
- SURREY: R. Howells, G4FFY, 7 Betchworth Close, Sutton, Surrey. (01-642 9871)
- STEVENAGE: E. Godfrey, 94 Common View, Letchworth. (Letchworth 72184)
- STOURBRIDGE: C. Williamson G4IEB, 14 Lawn Street, Stourbridge. (Stourbridge 2006)
- SUTTON & CHEAM: G. Brind, 26 Grange Meadow, Banstead, Surrey.
- VERULAM: A. Clarke, G8MAE, 24 Kiln Ground, Hemel Hempstead, Herts. HP3 8EZ. (Hemel Hempstead 64751)
- W.A.C.R.A.L.: L. Colley, G3AGX, 13 Ferry Road, Wawne, Nr. Hull, Yorks HU7 5XU.
- WEST KENT: B. P. Castle, G4DYF, 6 Pinewood Avenue, Sevenoaks, Kent TN14 5AF. (Sevenoaks (0732) 56708)
- WEST OF SCOTLAND: I. E. McGarvie, 3 Kelso Avenue, Paisley PA2 9JE.
- YEovil: D. L. McLean, 9 Cedar Grove, Yeovil, Somerset. (Yeovil (0935) 24956)
- YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

add that the qualifications required are not too tight, taking in MN, overseas navies, ex-navies and so on at the discretion of the committee — dammit, they even accepted the writer! Details from the Hon Sec at the address in the 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.

BATC 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 SWEB Clubroom, Pool, Camborne, at 7.30.

Across the water to Ireland now, to **I.R.T.S.** who have a new Hon Sec — see Panel. This is the place to go for all

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 newcomer, 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, on 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 Sky; 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 for servicing.

Another 'Tuesdays' lot foregather at the Over 60's Club, Liverpool Road, opposite Christ Church, **Ormskirk**. More details may be obtained by either just turning up, or by contacting the Hon Sec at the address in the Panel.

At **Basingstoke** the address is Chineham House, Popley, Basingstoke, on the third Wednesday in each month. For the rest — the Hon Sec's address is in the Panel.

February 13 and 27 are the dates for **Northern Heights** in the Bradshaw Tavern, Bradshaw, Halifax. A demonstration by *Northern Communications* is set for the first date, and the other one is a dual-fade slide show, which seems to be a popular event with the gang.

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. (S22) 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, G4DIU, 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 better, 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 dangle 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 licences 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.

'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.

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.

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; 7MHz 1030-1230; 14MHz 1100-1200; 21MHz 1000-1100 plus 1300-1600 and 1300-1600 also for 28MHz. 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 G3OHH and a suitable number of stations in the 98 postal zones of the area. The contact with one or t'other 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 round; however, he made no mistake about his next one. Summarising the two letters, Don notes the progressively earlier closing time on Ten, and of course rather later opening too. Around 0800 was the time for VK/ZL/JA on the long path, with Ws from noon at the time of the first letter; the second notes the same start, but the change to short-path around 0930, Ws appearing a little later, and band closure at the start around 1830, falling away to 1800 in the second period, but on the odd occasions remaining open till as late as 2100. SSB QSOs resulted with, in the first period, JH2BUF, JH7FMJ, PZ1AR, TF3IM, VE7BTU, VE7AI/1 (Sable

Is.) W5NUT/PJ8, W7LAB (Nevada), WB0IZO (Colorado), WD0DND in the same state, XE1OE, ZD7BW, 8P6KY, 8ZA and all W call areas. During the second period, it is noted that not much was heard of Africa or South America, but SSB worked its way out to CZ6MP, J6LOO, K7PGL (Montana), KA7AXJ (Arizona), N7DD likewise, N7DF (Utah), N8TE/5 in New Mexico, TA1MB, VE5DX, VE6CLH, VE6KW, VE7BTU, VE7EML, VK3AWY, VK3NAC, VK5RX, VK6NYL, VS6CT, VS6HD, W7EJ (Oregon), W0SD (S. Dakota), W0YK (Colorado), WA6VPA/7 (Oregon), WA7HQD ditto, WB0MWJ (S. Dakota), WB0TEI and WD0GXV both in Colorado, ZE1CS, ZF1GC, 6Y5HM and 9K2DR.

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, YV4CB, 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 your scribe was quite content to have a stack 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 OK1DKW 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 OK1DKW, 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

needed 2½ milliwatts; but when he came to G4FKC Petr came down to 600 microwatts with a delightful 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 microwatts UK2GDZ was a good QSO, and with 500 microwatts OH2AC was raised. Then it was down to 250 microwatts, and then UK2GDZ; back to 750 microwatts input and W400 and N811 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 TL0BQ. 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?

On to G2NJ (Peterborough) who reports pretty regularly on the daytime 3.5 MHz CW QRP scene. The loudest QRP signal by far was the two-watt job driven by GM3OXX, which fairly made the rafters ring. Using QRO, Nick had a long contact with G5NX/M who operates CW as he drives, the QSO lasting from Skipton, West Riding, right the way through the journey to Southwell (which is Newark way). A bit of bad news ends his note: G2CAS — he of the regular/P efforts — would appear to have had a fall off a ladder that gave way, but fortunately got away with only sore ribs and slight concussion.

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), PJ2CZ, TN8AJ, W7FFJ, W7KSA, W7JTH, W7LLD, XE1AE, ZL2FD, 3B8FA, 3C1AC, 6W8DY, and 8Z4AA. The second note mentions AJ3G/AM over the North Atlantic, J6LOO, JE6CAJ, JF2EMY, JG3DVV, JH2QYJ, JH3HPT, JR6AEM, K5FSS/DU2, KH6CF, UA0NH for Zone 19, SV1DC/SV5, TFOTJ, 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 UA2FCW, GM3PFQ, HB9AOD, GW4ACC, OK1DWF, OK2BUV, K1PBW, UK2LAQ, and GM3LWS, with PA0PN on SSB. Eighty QRP CW accounted for ON5VC, UB5LI, UQ2IF, HAIKSQ, DL100, and DK0TU. A change to the Big Rig (FT-101Z) and W1ZW, W2BA, N400, W9FSR, 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 VE2DJX. CW all the way on 21 MHz, with JH1BAY and VE2AH, and just a solitary ten-metre offering by way of AD8I.

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 VK/ZL/JA, 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 VK/ZL/JA 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 WA2FIJ/KH5 on Kingman, through the activities of deliberate jammers from Europe. QSOs were completed with K6LPL/KH5 (Palmyra), J6LGL, M1C, VP2SAL, W7MXM, Idaho, ZL2ASX, 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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NEW QTH's

This space is for the publication of the addresses of holders of new call signs, or changes of address, in EI, G, GC, GD, GI, GM and GW of stations not already listed. All addresses published here will appear in the U.K. section of the American "CALL BOOK" in preparation. Please write clearly and address on a separate slip to QTH Section. Be sure to give correct County designation and post-code. In the case of direct subscribers needing Change of Address, please state for card index adjustment. Address items for this space to: "New QTH Page", *SHORT WAVE MAGAZINE*, 34 HIGH STREET, WELWYN, HERTS., AL6 9EQ.

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G4JBC, Boots Amateur Radio Club, c/o I. Brothwell, 56 Arnot Hill Road, Arnold, Nottingham NG5 6LQ. (Tel: Nottingham 262360.)

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G8PRN, R. L. Morley, 21 Meadow View, Skelmanthorpe, Huddersfield, W. Yorkshire. HD8 9ET.

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TR2300 2m Synthesised Portable Transceiver. We have lost count of the number of this model we have sold over the last 12 months. Hikers, campers, climbers, you can hear them all over the country and reliability which is the essence of TRIO equipment. £166.75

JAYBEAM

5Y/2M 5 element yagi	£10.24
8Y/2M 8 Element yagi	£13.23
10Y/2M 10 Element	£28.41
PBM/14/2m. 14 element Parabeam	£40.38
5XY/2m. 5 element crossed yagi	£20.70
8XY/2m. 8 element crossed yagi	£25.88
10XY/2m. 10 element crossed yagi	£34.27
Q4/2m. 4 element Quad	£21.51
Q6/2m. element Quad	£28.52
D5/2m. 5 over 5 slot fed yagi	£18.29
D8/2m. 8 over 8 slot fed yagi	£24.84
UGP/2m. ground plane	£9.37
MBM48/70cms. Multibeam	£28.18
MBM88/70cms. Multibeam	£37.49
TAS 2m. Whip mobile	£15.30
C5/m. Colinear	£40.02
C8/70cm. Colinear	£45.43
D15/1296 23cm. Antenna	£30.94

Carriage on Antennas £3.00



TRIO R1000

R1000 Receiver £298.00
The latest general coverage from Trio. Frequency coverage 200 KHz to 30 MHz in 30 bands. Using an advanced PLL system. Full digital readout. Three filters 12 KHz for AM -6KHz narrow AM and 2.7 KHz SSB. Also incorporates a noise blanker. Operation is from 100-240 V AC or 12 V DC.

TR7625



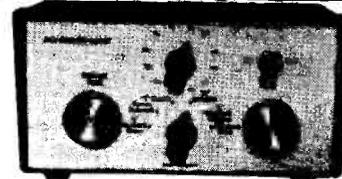
The new TR7625 is a high performance 2m FM Transceiver with memory, designed to permit multi-channel (400 channel) operation. Featuring the ability of repeater operation. This transceiver brings you all the convenience and versatility in both mobile and fixed station operation.

The TR7625 has provision for connection of optional remote control unit (with built-in microcomputer) for added versatility. £246.10

TRIO

R820 Receiver	£690.00
TS820 Transceiver	£669.30
VFO820	£118.45
DSIA 12v. DC Inverter	£42.93
SP820 Speaker	£37.95
SM220 Monitorscope	£197.80
TL922 Linear Amplifier	£672.75
VFO520S	£98.80
SP520 Speaker	£17.25
DG5 Digital readout for TS520S	£103.50
TS120V 80-10m. Mobile Transceiver	£347.30
PS-20AC power supply for TS120V	£44.85
MB100 Mobile mounting bracket	£17.25
SP70 Speaker	£18.40
R1000 Receiver	£298.00
TS770 2M + 70cm All Mode Transceiver	£690.00
TR2300 2m. Portable Transceiver	£166.75
PB15 Battery Pack	£20.25
TS250SE HF Transceiver	£437.00
TR2400 Hand held 2m Transceiver	£210.45
DM800 Grid Dip Meter/Wavemeter	£59.80
TS120S 200 watt Transceiver	£432.40
TL120 Linear Amplifier	£128.80
HS5 Headphones	£21.85
HS4 Headphones	£10.35
MC50 Desk Microphones	£24.15
MC30S Hand microphone 50K	£13.80

Crystals and accessories in stock



The Mk. 2 Multituner was designed by us to many requests who found our Mk. 1 the finest they had ever used but required a wider frequency range. This covers 550 kHz to 30 MHz. The circuitry gives 50 switchable, tunable positions to match any antenna over 5 metres in length to practically all communication receivers. Our "Multituners" are designed and manufactured by ourselves and have been exported to over 50 Countries. Many operators use them for QRP Transmitting also. See the February edition 1977 of the "Short Wave Magazine" or send SAE for details. £27.50 inc. VAT and postage

NEW ANTENNA MODELS

H.S. HFS Vertical 10-80m	£41.40
HF R. Ground Plane Kit	£23.00
GDX 2 Discone Antenna 50-460 MHz	£36.80



TRIO TS120 TRANSCEIVER

ALL SOLID STATE HF BAND TRANSCEIVER

Freq. 3.5-30 MHz Amateur Bands and WWW. I.F. Shift System, Noise Blanker, Vox, Single conversion system using PLL circuit. Digital display dial.

TS 120V 10 watts PEP	£347.30
TS 120S 200 watts PEP	£432.40



TS 180S

TS 180s. HF Transceiver. An all solid state Transceiver with Digital Frequency Control. A rig that has the facilities that DXer, Contest operator or any Amateur would desire for maximum flexibility on the 160 through 10 metre bands. Up to 200 watts PEP input. No tune final amplifier. With digital readout. £679.65

RECEIVERS AND TRANSCEIVERS

(inc. VAT and Postage)	
SR9 Tunable 144-146 MHz Receiver	£46.00
AMR217B Scanner Receiver. AC or DC operation	£113.50
R512 Aircraft Band Scanning Receiver	£135.00
Regency Digital Flight Scan Synthesised Aircraft Band Receiver	£230.00
Phillips FM321 70cms FM Transceiver	£264.00
Yaesu FRG7 Receiver	£214.00
Yaesu FRG7000 Receiver	£375.00
FDK TM563 Scanning 2m Receiver	£109.00
'SkyACE' Hand held Aircraft Band Receiver	£49.50
Bearcat 220 Scanning Receiver	£241.50

SECONDHAND EQUIPMENT

Due to delay in publishing secondhand lists please send SAE for our up to date lists. We have a very quick turn over in secondhand equipment, especially in receivers. If you require a specific model please let us know and we will inform you as soon as we have one available. Our secondhand equipment carries a three month guarantee. We would be pleased to sell your equipment on a commission basis, which saves you time and money advertising.

ACCESS and BARCLAYCARD facilities.
Instant HP service

Part exchange always welcome. Spot cash paid for good clean equipment. If you have equipment surplus to your requirement we would be pleased to sell this on commission for you.

Shop Hours: 9.30 to 5.30 Monday to Friday. 5 p.m. Saturday

No parking problems. Turn at the Greyhound Motel on the A580 (East Lancs.) Road. S.A.E. with all enquiries. 25p will bring you further information and prices, credited to your first purchase over £5. Postage carriage extra.

ALL OUR PRICES INCLUDE VAT

ROTATORS

AR30	£47.16
AR40	£54.73
CD44	£109.25
AR22	£49.46
KR400	£98.13
DR7500	£108.10

CABLE

UR43	21p metre
UR67	.80p
	300 ohm Ribbon
	1p metre
	75ohm lowloss 20p

Hy Gain

12AVQ 3 band Vertical	£43.12
14AVT/WB 4 band Vertical	£60.37
18AVT/WB 5 band Vertical	£87.40
ASP and Diawa 144 MHz anfd 70 cms Antennas in stock	

SRX-30

Solid state Receiver 550 kHz-30 MHz £175.00

TEK

5D Multi Band Trapped Dipols 80-40-20-15-10 metres. 50 ohm feed. 23 metres in length. This is complete, not a kit. High quality Traps and wire. 2kW PEP rating
PRICE (inc. VAT) £50.00

Accessories

2 way Antenna Switch 50 ohm-200 watt	£6.60
3 way Antenna switch SWL push button type	£4.60
3 way Antenna Switch 2 kW PEP 0.500 MHz	£10.60
4 way Antenna Switch 50 ohm 200 watt PEP	£10.60
6 way Antenna Switch 2 kW PEP 0-30 MHz	£17.50
Single Meter SWR Wall type	£10.87
Single Meter SWR Desk type	£11.00
Twin Meter SWR Desk type	£13.55
T345N Thru Line Wattmeter 140-435 MHz	£34.45
DL20 20 watt 50 ohm Dummy Load	£6.30
DL50 50 watt 50 ohm Dummy Load	£7.50
DL120 100 watt 50 ohm Dummy Load	£12.50
DL-1000 1 kW Dummy Load 50 ohm	£31.00
Morse Keys Lightweight	£3.25
Nye King Morse Keys	£10.15
HyMound HK708	£10.50
Katsumi EK150 Electronic Keyer	£79.00
Katsumi MK 1024 Electronic Keyer, with memory	£135.00
DX-008 Programmable Frequency Counter	£116.25
Antenna Gutter Mounts	£3.55
HP3A High Pass Filter	£3.25
Twin Keying Paddle Chrome plated with heavy base. Precision Unit	£26.50
Full Range of Microwave Modules Converters, Transverters, Linears, etc.	

Mini Products

C4X 3 band Vertical	£48.00
HQ1 Mini Beam	£96.00

TECHNICAL ASSOCIATES

Rx Band Pass Filter. 9 I.C.'s. 1 watt output* 8 switched positions of filters* High pass 2.5 kHz-2.00 kHz-1.5 kHz-200 Hz-110 Hz-80 Hz* Ideal for increased selectivity with FRG7, SXR30, etc. Price £30.45

MULTIFILTER

This unit is the complete answer to interference and bandwidth problems. The unit contains the well proven peak and notch filter and band pass filter. Ideal for users of the FRG7, SXR30, SSR1 type of receivers: No internal connections to your receiver £51.75

Pre-Selector. Coverage 1.6 MHz to 31 MHz* Three switched bands* Type 1 with antenna changeover relay for Transceiver op Price £30.45

Type 2 for SWL without relay Price £27.25

Crystal Calibrator. Seven ranges down to 1 kHz. Selected from front panel. Complete with antenna Price £22.80

Some Models in New Type Cabinets

These prices include VAT and postage.



ARAC 102 Receiver, 28-30 MHz, 144-146 MHz AM-SSB-FM-CW Price £107.50

S.T.E. Prices include VAT and postage

ARAC 170 10m and 70cm Receiver	£129.00
AAI Audio Module for AR10	£4.10
AD4 FM Discriminator	£5.00
AL8 Linear Amplifier	£27.60
AG10 Tone Generator	£4.50
ATAL 2m AM-FM Tx	£129.00

STANDARD

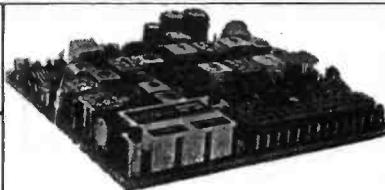
C8800 2M FM Mobile Transceiver £252.00

G-WHIP

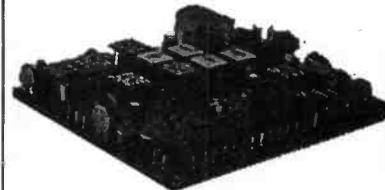
Tribander Helical 10-15-20m	£24.72
LF Coils for Tribander	£6.55
LF Telescopic Whip Section	£3.35
Basemount standard type	£4.48
Multimobile 78, 10-15-20m	£28.75
MM Coils	£6.55
MM Telescopic whip section	£3.33
Flexiwhip basic 10 metres section	£17.25
Basemount standard	£4.48
Ball type Basemount	£6.32
Coils for Flexiwhip	£6.55
Base thread adaptor USA/G Whip	£0.75
Extendedard 40"	£11.50

DRAKE

TV3300 Low Pass Filter	£18.40
TR7 Transceiver and AC psu	£1021.00
MN7 ATU/RF Wattmeter	£126.50



AR20. 12 channel FM receiver 144-146 MHz. Input impedance 50-75 ohm. AM-FM modes. Sensitivity 0.2uV AF output 3 watts. 12v DC operation Price £50.00



AT23. 12 Channel PM Transmitter. 3 watts 144-146 MHz. Frequency deviation 3-10 kHz adjustable. 12v DC operated AF input sensitivity 2mV adjustable to 50mV Price £50.00

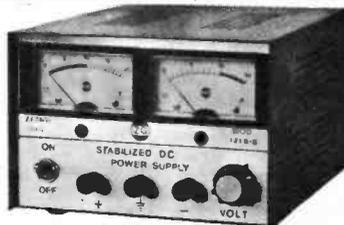


455 kHz FM DISCRIMINATOR AMPLIFIER. Limiting threshold 100uV. Amplitude modulation rejection 40dB. Audio output voltage at 1 kHz 20-300mV frequency deviation ± 3kHz Price £5.00

SOLID STATE STABILISED POWER SUPPLIES

Maximum ratings quoted. Prices include postage.

Model 122 12.6V 2.5A	£15.55
Model 125 10-15V 5amp	£28.00
Model 153S 4-20V 3amp Dual Meter	£29.35
Model 156S 4-15V 5amp Twin Meter	£35.00
Model 1210S 4-20V 10 amp Twin Meter	£85.00
Model 1210SV 4-20V 10 amp Digital Readout	£110.00
Model 153SV 4-20V 3amp Digital Readout	£38.00
Model 1220/1 13.5V 20 amp	£90.00
Model 1220/2 13.5V 12 amp	£80.00



Mod. 1210 S

STEPHENS-JAMES LTD.

47 WARRINGTON ROAD, LEIGH, LANCs. WN7 3EA
Telephone (0942) 676790



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HANTS — YORKS — DERBYS — LINCS

YAESU MUSEN UK DISTRIBUTORS

FT107M NEW SOLID STATE TRANSCEIVER



FT107M

All solid state transceiver, 160-10M (+ WWV Rx and 2 Aux). 12V DC. SSB, CW, FSK and AM. 240W pip. The fan cooled (thermostatically controlled) no tune "broad band" power amplifier delivers 75% power output into 3:1 VSWR. Analogue and digital readout to 100Hz. Sensitive and with excellent dynamic range (hard driven schottky diode ring mixer). Continuous variable bandwidth 300Hz to 2.4kHz plus optional "basics" of 350/600Hz and 6kHz. Full equipment includes: audio peak/notch filter, full metering including SWR, RF speech processor, advanced noise blanker, semi break-in with side tone, VOX, clarifier on Tx, Rx, or both, 20dB attenuator etc. The optional memory system provides 12 stored channels (with fine tuning), and offers scanning from the microphone. The store employs DMS — digital memory shift — to allow tuning, via a photo interrupter of any of the memorised frequencies (equivalent to 13 VFOs!!).

FT107M Transceiver	£660.00	FV107 Ext. VFO	£80.00	FTV107 Transverter frame	£96.50	YM34 Mic. desk	T.B.A.
MEM/DMS Memory	£87.00	PC107 Antenna Tuner	£92.50	430-440 70cm module	£158.50	YM35 Mic. hand. scan	T.B.A.
FP107E AC PSU Extnl.	£92.50	SP107 External Speaker	£24.00	144-148 2m module	£68.50	YM36 Mic. noise cancel	T.B.A.
FP107 int. AC PSU	T.B.A.	FTV107(2) Transverter	£181.50	50-54 6m module	£68.50	YM37 Mic. Hand	T.B.A.

FT901DM THE SUPERB PERFORMER



FT901

160-10M (+ WWV Rx), 12 and 234V (PSU Built-in). SSB, AM, CW, FSK and FM (Tx & Rx), 180W. PIP, 80W FL. Analogue 1kHz and digital to 100Hz. Sensitive μ V with AGC controlled Mosfet RF, to push pull FET RF, Balance active mixer, push pull IF amp, to crystal filter then noise blanker. Continuously variable selectivity 300Hz to 2.4kHz and fixed 600Hz, 2.4kHz, 6kHz and 12kHz (at 6dB), 80dB cross mod rejection, 90dB desensitisation immunity (at 20kHz off at 14MHz). Audio Peak and separate notch tuning. Negative RF feedback on 6146B stage (-31dB 3rd order). RF processor, VOX, Curtis electronic keyer, tune button (10sec on full power), PLL VFO with memory for any Tx, Rx or T/Rx frequency, Modular plug-in construction, permeability tuning (for new band allocations) 25kHz calibrator, 20dB switchable attenuator, sidetone, clarifier and an advanced noise blanker are all features of the FT901.

FT901DM Transceiver	£800.00	YVM-1 Video Monitor	£125.00	FTV901 Transverter	£245.00	FC901 Antenna Tuner	£115.00
FT901D Transceiver	£710.00	YD901 Monitorscope	£240.00	430-440 70cm module	£160.00	FL2100Z Linear Amp.	£355.00
FT901DE Transceiver	£700.00	YD901P YD901 with pan	£280.00	50-54 6m module	£68.00	FV901DM Synth. Ext. VFO	£215.00
YR901 Morse/TTY read	£395.00	PAN KIT Mod kit	£47.00	70-74 4m module	£75.00	SP901 External Speaker	£24.00

FT101ZD PERFORMANCE AND ECONOMY



FT101Z

A hybrid HF transceiver, 160-10M (+ WWV Rx + Aux). 234V AC and 12V DC (inbuilt inverter option). SSB, CW and AM. 180W PIP from a pair of 6146B with negative feedback. Analogue and "mode sensitive" digital readout to 100Hz. Continuously variable IF bandwidth 300Hz-2.4kHz plus optional "basic fixed" of 350/600Hz. Full equipment includes: adjustable level RF processor, advanced adjustable level noise blanker, front panel adjustable VOX, semi break-in with side tone, 0-10-20dB attenuator, switchable AGC, Slow/fast/off, clarifier (RIT) selectable on Tx, Rx or both, etc., etc. The FT101ZD is compatible with nearly all the FT901 accessories listed above — morse reader and video display, monitor scope with panadaptor, 3band transverter, ATU, linears, speakers, and a choice of synthesized or conventional (NEW FV101Z) external VFOs.

FT101ZD Transceiver Digital	£575.00	FT101Z Transceiver Analogue	£500.00	Count Analogue/Dig. Kit	£80.00	DC-DC 12V Inverter Kit	£30.00
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YC500J £168.50
500MHz 10p.p.m.

YC500S £237.00
500MHz 1p.p.m.

YC500E £306.50
500MHz 0.02p.p.m.



YH55 £8.75
Padded Phones



QTR25D £22.50
World Time Clock



FP12 £67.50
12Amp 12V PSU



FP4 £35.00
4Amp 12V PSU



YP150 £58.50
Wattmeter/Load

PRICES EXCLUDE VAT (15%) BUT INCLUDE DELIVERY — SECURICOR/POST IN THE UK

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AGENTS STOCK AND SALES

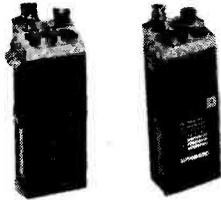
G3ZUL	Brian	Stourbridge	(03843)	5917
G13KDR	John	Bangor	(0247)	55162
GM8GEC	Jack	Edinburgh	(031665)	2420
G13WVY	Mervyn	Tandragee	(0762)	840656
GW3TMP	Howarth	Pontybodkin	(035287)	846/324
GW4GSW	Alan	Swansea	(0792)	24140

Communications Ltd



★ 2 Year Guarantee ★ Free Securicor Delivery

FT207R — FT202R HANDHELDS



The FT207R is a microprocessor controlled synthesized handheld that provides 2.5kHz channel steps!! 4 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 100Hz), 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 FT202R is an economical 6 channel handheld physically similar to the FT207R.

FT207R Transceiver £173.04
NC-1A Slide-in charger £18.50
NC-2 Charger eliminator £34.50

NC-9C Small charger £6.50
NBP-9 Nicad packspare £14.50
FBA-1 Pack/charger adaptor T.B.A.

YM24 Speaker/mic £14.50
Heavy duty case T.B.A.
AA nicads, each £0.87

FT202R Transceiver £103.50
NC-1 AC 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 (x4) crystal channels. Simplex and (auto tone burst) repeater, 600kHz and auxiliary shifts both up and down. Single signal mix, with phase locked conversion oscillator, for spurious free output. Mains 234-100V 50/60Hz and 12V DC for world wide portability. Excellent selectivity, SSB 2.4kHz 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. etc. Digital and Analogue versions and memory option.

FT225RD Transceiver £485.00

FT225R Transceiver £445.00

MEM memory £85.00

COUNT Counter £50.00

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 145 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 (or all) uncleared channels next scan around. FT227RBXSr an FT227RB 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 moves the transceiver 25MHz, hold the button down for ½ second and it scans the band until a station is found.

FT217RXS Transceiver £252.17

FT227RBSC Transceiver £247.82

FP4 12V 4A PSU £35.00

YD148 Desk mic. £18.50



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 (0532) 782326
9-5 Monday-Wednesday & Friday-Saturday

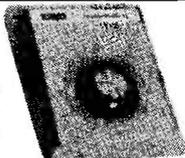
SMC (Jack Tweedy) LTD.
Jack Tweedy, G3ZY
150 Horncastle Road,
Woodhall Spa, Lincs.
Tel.: Woodhall Spa (0526) 52793
9-5 Tuesday-Saturday (1+ appoint.)





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STOLTE 2050

ROTATORS

AR30	Light VHF/UHF	£41.00
AR40	VHF 4 Light HF	£52.00
BT1	Medium Duty	£79.50
CD44	Medium Duty	£95.00
CD45	Medium Duty	£99.00
HAM IV	Very Heavy Duty	£145.00
T2X	Ultra Heavy Duty	£190.00
2050	VHF/UHF Memomatic	£37.50
2010	VHF/UHF Automatic	£45.83

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

80W out for 10W nominal drive. 145MHz. 12V DC (circa 10A). Switchable; SSB/FM Hang time, RF or manual cont. Low noise pre amp. Remote control unit available. B108. (Post free.) **£99.00**



WATT METERS

LDM885 Through line (illus.); 1.8-54MHz 20-200-2000W FSD (P&P 75p) **£44.50**
LPM880. Absorption. 1.8-500MHz. 5-20-120W. FSD (p&p 95p) **£69.00**



HF BALUN TRANSFORMER HIQ

1:1 Ratio. 3-40MHz. SO239 (UHF) Socket 5½" x 1½" D. 7½ozs. "Hang up type". High power handling. HIQ (Post free of charge) **£8.70**



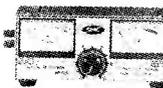
VHF MONITOR RECEIVERS

12 Chan. FM Monitor, 2½" x 1½" x 4½" Bozs. 12KHz BW. 130-170MHz.
HF 12 c/w Accessories **£50.00**
HF 12A12 c/w S (20-23), R(0-7) **£70.00**
HF 12M9 c/w 16, 6, 8, 10, 67, M, 12, 14 **£66.95**



MULTIMETERS

20K ohms per volt. 1000X overload on ohms. Plug in range selection.
80 Microtest 40Ranges **£16.50**
680G Supertest 48Ranges **£24.50**
680R Supertest 80Ranges **£32.00**



HF/VHF SWR METER

Twin Meter, 3.5 to 170MHz. Calibrated to 3:1 SWR. 50ohms. Relative power, SO239 sockets. T3-170L (p&p 60p) **£11.25**



DIGITAL FREQUENCY COUNTER

100KHz to 30MHz. 12V DC operation 5-7 segment displays resolves to 10HZ only 6½" x 2½" x 5½". RT75D (p&p free). New Low Price **£38.26**

HIGH EFFICIENCY VHF VERTICALS

(illustrated)
RINGO RANGER: 6dB gain over ¼" ground plane. Uses 3phased ¼" and ½" stub. Ultra low angle radiation. No radials required. ARX450 432MHz (p&p £1.00) New Low Price **£20.00**
ARX2 144MHz 9' 6" tall, 1½lbs (p&p £1.00) New Low Price **£20.00**

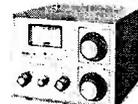
Other omnidirectional VHF antennas — horizontal and vertical in stock.

★ ALL PRICES EXCLUDE VAT 15% ★



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. PA15-160BL. (Post free.) **£178.50**



ANTENNA COUPLER

3.5-30MHz. 50/75 ohm Coax (VSWR<5:1) and Single Wire (10-25ohms) transformed to 50ohms. To 500W PIP SSR Wattmeter 20+250W FSD LAC895 (p&p free **£80.50**)



DIP OSCILLATOR

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HY-GAIN (Carriage extra £1.5-£5)+VAT 15%

103BA	10m	3 element yagi	17.0'LE 8'B	£51.00
105BA	10m	5 element yagi	18.5'LE 24'B	£92.00
153BA	15m	3 element yagi	23.0'LE 12'B	£62.75
155BA	15m	5 element yagi	24.5'LE 26'B	£117.50
203BA	20m	3 element yagi	35.0'LE 16'B	£117.50
204BA	20m	4 element yagi	36.5'LE 26'B	£155.90
205BA	20m	5 element yagi	36.5'LE 34'B	£205.00
402BA	40m	2 element yagi	43.0'LE 16'B	£158.00
OB 10-15A	10-15m	3 element yagi	23.0'LE 13'B	£116.00

MOSE QUAD Fibreglass 10-20m (Carriage £2.£9)+VAT 15%

G2E	2 Element quad	£124.00	G04E	4 Element quad	£249.00
G03E	3 Element quad	£187.00	G0CK1	1 Element Conversion kit	£63.00

MOSLEY Triband Beams (Carriage £3.50)+VAT 15%

TA32	2 ele. 200W RMS	£70.00	MUSTANG 2	2 ele. 1KW RMS	£95.00
TA33	3 ele. 200W RMS	£105.00	MUSTANG 3	3 ele. 1KW RMS	£130.00

G-WHIP HF Mobile Antennas (Carriage £0.95)+VAT 15%

Tribander	10-20M Side	£21.50	Flexiwhip	10M Mast	£15.00
LF Coil	40/80/160M	ea £5.70	FF	15/20/40/80/160M	ea £5.70
LF Whip	Telescopic	£2.90	GW Base	Standard Base	£3.90
Multimobile	10-20M Auto	£25.00	35 Base	Heavy Duty base	£5.00
MM Coil	40/80/160M	ea £5.70	TA	35 to G-Whip	£0.80
MM Whip	Telescopic	£2.90	Extended	Extension	£10.00

ASCOT ANTENNAS VHF Mobile (Carriage £0.95)+VAT 15%

340 1/2	Standard Base	£2.10	085 1/2	8 1/2" Cable Assembly	£2.80
310 1/2	Swivel Base	£3.50	095 1/2	10" Fibre-glass Mount	£2.10
344 1/2	Spring Base	£5.55	092 1/2	8 1/2" Magnetic Mount	£8.95
440 1/2 2m	Standard Base	£5.50	084 1/2	4" Cable Assembly	£4.15
330 1/2 2m	Swivel Base	£4.45	088 1/2	4" Cowli Mount	£4.95
341 1/2 2m	Spring Base	£6.85	091 1/2	4" Magnetic Mount	£9.80
350 1/2 2m	Fine Tune Base	£7.15	089	Gutter Mount	£4.75
351 1/2 2m	Spring 350 Base	£8.25	093	Boat mount	£2.90
057	127cm Tapered Whip	£1.95	031	Blank off 1/2" & 3/4"	£0.80
056	63cm Parallel Whip	£0.95	044	Blank off 1/2"	£0.45

BANTEX VHF Mobile Antennas (Carriage £0.90)+VAT 15%

42SS	1/2 4m	Stainless whip	£1.75	BSU	1/2 70cm whip	£2.10
40GF	1/2 4m	Glass whip	£3.55	UDL	1/2 & 1/4 70cm Colinear	£6.45
20SS	1/2 2m	Stainless whip	£1.50	UDL	1/2 & 1/4 70cm Colinear	£11.95
18GF	1/2 2m	Glass whip	£2.80	BM	Standard base 1/2"	£1.65
B5	1/2 2m	Glass whip	£7.75	BC	Claw base	£3.50
BGASS	1/2 2m	Stainless whip	£8.60	BD	Trunk lip base	£5.50
BGAF	1/2 2m	Glass whip	£9.10	BMM	Magnetic base	£10.95

SMC-HS (Carriage Extra)+VAT 15%

SMC15SE	1/2 15m	1.72m	£11.00	GDX2	Discone 50-580MHz	£39.50
SMC10SE	1/2 10m	1.72m	£11.00	GDX1	Discone 90-480MHz	£37.50
SMC2NE	1/2 2m	1.30m	£8.15	VHFL	Rx Discone 65-520MHz	£15.95
SMC78F	1/2 2m	1.75m	£10.00	U7606	Log Per. 50-500MHz	£75.95
SMC78B	1/2 2m	1.72m	£11.00	VS-BNC	Helical 145MHz BNC	£3.85
SMC258	1/2 & 1/4 70cm	0.94m	£10.00	145PL	Helical 145MHz PL259	£3.00
RG4M	Cable Assembly		£3.00	156PL	Helical 156MHz PL259	£4.35
GSS	Gutter clip		£5.00	GPV-5	Colinear 145MHz 6.5dB	£21.74

JAYBEAM VHF Fixed Ants (Carriage about £1.00)+VAT 15%

4Y4M	4 element yagi	£14.95	5KX72M	5 element crossed	£18.00
PMH2/4M	2 way harness	£10.60	8KX72M	8 element crossed	£22.50
D15/23	15 over 15 slot	£26.90	10XV12M	10 element crossed	£29.80
UGP12M	Ground Plane	£8.15	PMH2/C	Circular harness	£5.80
C5/2M	Vert Colinear	£34.80	PMH2/2M	2 way harness	£7.80
5/12M	5 element yagi	£8.90	PMH4/2M	4 way harness	£18.70
8/12M	8 element yagi	£11.50	C8/70	Vert Colinear	£39.50
10V12M	10 ele long yagi	£24.70	P8/18/70	8 over 8, slot fed	£17.80
14V12M	14 ele long yagi	£31.50	P8M18/70	18 ele Parabeam	£21.50
P8M10/20M	10 ele Parabeam	£29.20	MBM48/70	48 ele Multibeam	£24.50
P8M14/20M	14 ele Parabeam	£35.50	MBM68/70	86 ele Multibeam	£32.80
D4/2M	4 element quad	£18.70	8XV170	8 element crossed	£27.00
06/2M	6 element quad	£24.80	12XV12M	12 element crossed	£33.50
05/2M	5 over 5, slot feed	£15.90	PMH2/2M	2 way harness	£6.75
08/2M	8 over 8, slot fed	£21.60	PMH4/70	4 way harness	£14.30

12WQ	10-20m	Trapped vertical	14'H	£37.50
14A/WB	10-40m	Trapped vertical	18'H	£52.50
18A/TWB	10-80m	Trapped vertical	25'H	£76.00
14RMO		Roof kit for 12, 14 & 18		£19.50
18V	10-80m	Loaded vertical	19'H	£37.50
18HT	10-80m	Hy Tower "stubbied"	50'H	£225.00
TH2MK3	10-20m	2 element yagi	27.3'LE 6'B	£109.75
TH3JNR	10-20m	3 ele 600W yagi	24.2'LE 12'B	£113.50
TH3MK3	10-20m	3 element yagi	27.0'LE 14'B	£157.00
TH6DXX	10-20m	6 element (total)	31.1'LE 24'B	£205.00
HY quad	10-20m	2 element quad	13.5'TR 8'B	£169.00

SMC Trapped Dipoles 10-80M (Post £0.75)+VAT 15%

S500	Standard - 14 SWG	£26.50	P500	Portable - Cu/Terylene	£32.50
HP1K	High Power - 14 SWG	£28.00		brad, c/w 75ft feeder	

MINI-BEAM (Carriage £2.50)+VAT 15%

MB10-20	New Mini-beam	£69.50	HOI Miniquad	10-20m; only 6ft 2in radius	£83.85
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CABLES RF Feeders (Carriage extra)+VAT 15%

RG58U	50Ω 0.2" Stranded	yd £0.18	307EP	75Ω "Economy"	yd £0.12
UR43	50Ω 0.2" Solid	yd £0.17	UR70	75Ω 0.225" Stranded	yd £0.18
UR76	50Ω 0.2" Stranded	yd £0.17	UR39	75Ω 0.306" Medium	yd £0.27
UR67	50Ω 0.405" Heavy	yd £0.45	UR57	75Ω 0.405" Heavy	yd £0.45
RG213	50Ω 0.405" Heavy	yd £0.42	302	75Ω Flat twin	yd £0.11
306	300Ω Ribbon	yd £0.12	3X21	240Ω Oval twin	yd £0.18

COAX PLUGS UHF (Post and packing £0.20)+VAT 15%

PL259	Standard UHF plug	£0.48	S0239	Free angle UR43	£0.88
UG175/U	Reducer UR43	£0.12	PL258	Back-back, female	£0.79
UR178/U	Reducer UR70	£0.12	PL274	Back-back, chassis	£0.93
PL259R	"Reduced" plug	£0.58		Back-back, male	£1.20
PL259SL	"Solderless" UR67	£0.55	M359	Angle (1m + 1p)	£0.93
PL259SS	"Solderless" UR43	£0.55		"T" (3 females)	£1.48
PL259P	Push-on plug	£0.69	M358	"T" (2 fem, 1 male)	£1.20
PL259E	Elbow plug UR43	£0.83		4-way (3 fem, 1 male)	£1.85
	Panel mount PL259	£0.83		S0239/Car + phono	£0.98
S0239F	4 hole socket	£0.42		S0239/2.5mm Jack	£0.69
S0239T	2 hole socket	£0.42		S0239/3.5mm Jack	£0.69
S0239NI	Socket "nut" inside	£0.51	255/U	S0239/BNC male	£1.53
S0239NO	Socket "nut" out	£0.51	273/U	S0239/BNC female	£1.53

COAX PLUGS BNC (Carriage £0.20)+VAT 15%

UG68	Plug, Std UR43	£0.54	UG491	Double male	£0.93
UG959	Plug, Large UR67	£2.68	UG274	"T" 2 female, 1 male	£1.44
UG291	Socket, 4 hole stand	£0.56		"T" 3 female	£1.74
UG1094	Socket, Nut firing	£0.56	UG306	Elbow adaptor	£1.62
UG69	Socket, Free, UR43	£0.72	255/U	BNC male/S0239	£1.53
UG914	Double female	£0.93	273/U	BNC female/PL259	£1.53

MASTING (Carriage EXTRA)+VAT 15% (N.B. Max. 20' Max. BRS 13')

1 1/2" od	Aluminium 16g	ft £0.42	2"	Al Thk w/ 1 1/2"	£1.05
1 3/4" od	Aluminium 16g	ft £0.46	2"	Steel Galv. 1 1/2"	£0.82

MAST BANDS AND PLATES (Carriage £0.40)+VAT 15%

SMP3	3 hole guy plate 2"	£0.85	SMB43	3 hook band	£1.15
SMP4	4 hole guy plate 2"	£1.55	SMB151	4 hook band 2"	£1.65

ROPE - WIRES (Post and packing extra)+VAT 15%

3mm	HT steel, 0.63T	yd £0.18	X150	Rustproof, 1/2" 0	490' £16.30
4mm	HT steel, 1.5T	yd £0.24	7X18g	Galvanised	100' £4.40

ROPE - TERYLENE (Post and packing extra)+VAT 15%

1/2"	BS150 lbs (arc)	yd £0.87	1/2"	BS1250 lbs (arc)	yd £0.14
3/4"	BS650 lbs (arc)	yd £0.10	1"	BS2450 lbs (arc)	yd £0.27

STAND OFF BRACKETS (P&P £1.75, Sec £2.80)+VAT 15%

W12	12" bracket	pair £6.50	W21	21" bracket	pair £9.50
W18	18" bracket	pair £8.75	W24	24" bracket	pair £11.50
W18HD	18" Heavy duty	pair £11.75	W24HD	24" Heavy duty	pair £14.25

MAST TO BOOM CLAMPS (Post and packing £0.70)+VAT 15%

SMC53	1-2" mast, 1" boom	£1.10	JBL73	1-2" mast, 1 1/2" boom H.O.	£1.50
SMC63	1-2" mast, 1 1/2" boom	£1.25	CP1	2" x 2", 6" x 6" plate	£2.30

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Power	240v AC or 12v DC
Antenna	Built in telescopic
Size	10 $\frac{1}{2}$ " x 3 $\frac{1}{2}$ " x 8"
Weight	5 lbs
	Built in speaker

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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 4M, 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.

H.F. RECEIVERS

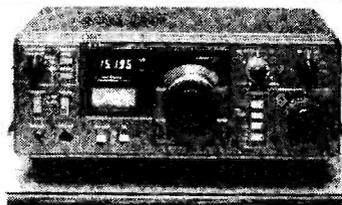
R1000 £298
It is some time since a brand new design has appeared in the amateur general coverage receiver field, and the new R1000 certainly makes the wait worthwhile.

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.

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LOWE SRX 30	£178
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YAESU FRG 7000	£372

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R1000
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F.D.K. TM 56B

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This receiver is designed for use as either a Base Station incorporating a 240V A.C. supply or as a Mobile Monitor in a car or boat. The four scanning crystal channels can continuously monitor priority channels and immediately lock on to ANM signals. The Rig comes complete with mobile mounting bracket, hardware, power lead, etc.

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TRIO TR2400 synthesized + keypad	£235.00

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Ringo Ranger Vert. Antenna VHF	£25.00 (75p p&p)
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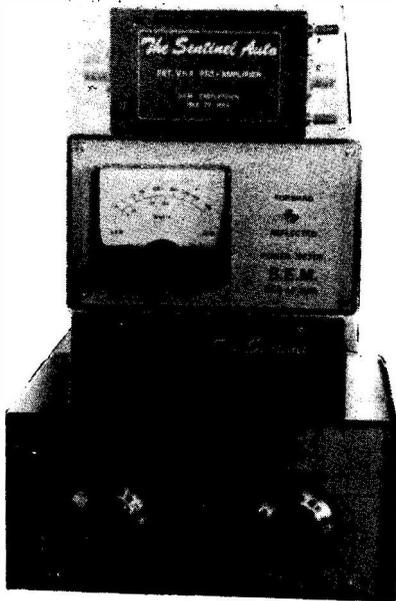
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All are linear, ALL MODES. Switch straight THROUGH on receive. R.F. switching switches at .1 watt. Latest SWR protected power transistors. Receive J FET selected for 1dB N.F. 18dB gain, same circuit as Sentinel V.H.F. pre-amp (see below) SO239 sockets.

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 JFET. 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: $1\frac{1}{2} \times 2\frac{1}{2} \times 4$ ". Price: £20.00* ex. stock. 70 cm version £23.00* ex stock.

2. PA5 AUTOMATIC 2 METRE PRE-AMPLIFIER

Same as the Sentinel Auto but for 240V mains operations in a pretty little case. Size: $3\frac{1}{2} \times 6\frac{1}{2}$ " front panel, $2\frac{1}{4}$ " 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 aërials 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 aërials. 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: $2\frac{1}{2} \times 1\frac{1}{2} \times 3$ ". We make the following two versions:

SENTINEL STANDARD H.F. PRE-AMPLIFIERS

Performance as above. £10.00* ex. stock.

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.

S.E.M. FORWARD/REFLECTED POWER METER

500W 1-30 MHz. Separate pick up unit £29.17 ex stock. Separate pick up unit £29.17 ex. stock.

S.E.M. EUROPA C 2 METRE TRANSVERTER

200W input. 2dB N.F. Plugs straight into Yaesu equipment for any mode 2 metre use. £126.65. Repeater shift £15.00. CPS10 for use with other equipment, £57.57 ex stock.

CONVERTERS

SENTINEL 2 metre converters: IFs, 28-30MHz, 4-6MHz, 2-4MHz. 2dB N.F. 30dB gain. £23.00 ex stock.

SENTINEL X 2 metre converters — same as above with internal mains supply — £26.50 ex stock.

SEM 70 70 cms to 2 metres — £23.00.

SENTINEL TOP BAND CONVERTER £20.80. Ex stock.

Prices include VAT and delivery. *Belling Lee sockets standard, SO239s £1.73 extra. 12 months guarantee. To order: C.W.O. or credit card. Phone your credit card number for same day service. Belling Lee Plugs 25p. PL259 plug and reducer 75p.

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TWO METRE — CRYSTAL RANGE

CRYSTAL FREQUENCY RANGE USE (Tx or Rx) and HOLDER	4 MHz-TX-HC6/U	6 MHz-TX-HC25/U	8 MHz-TX-HC6/U	10 MHz-RX-HC6/U	11 MHz-RX-HC6/U	12 MHz-TX-HC25/U	14 MHz-RX-HC25/U	18 MHz-TX-HC25/U	36 MHz-TX-HC6 & 25U	44 MHz-RX-HC6/U	44 MHz-RX-HC25/U	48 MHz-TX-HC6 & 25/U	52 MHz-RX-HC25/U	72 MHz-TX-HC25/U
OUTPUT FREQUENCY														
144.4 (433.2)	b													
144.480	b													
144.800	b													
144.850	b													
145.000/ROT	e													
145.025/R1T	e													
145.050/R2T	e													
145.075/R3T	e													
145.100/R4T	e													
145.125/R5T	e													
145.150/R6T	e													
145.175/R7T	e													
145.200/R8T	e													
145.300/S12	e													
145.350/S14	e													
145.400/S16	e													
145.425/S17	e													
145.450/S18	e													
145.475/S19	e													
145.500/S20	e													
145.525/S21	e													
145.550/S22	e													
145.575/S23	e													
145.600/ROR	e													
145.625/R1R	e													
145.650/R2R	e													
145.675/R3R	e													
145.700/R4R	e													
145.725/R5R	e													
145.750/R6R	e													
145.775/R7R	e													
145.800/R8R	e													
145.950/S38	e													

S18 and S19 are now added to our stock range

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

AVAILABILITY: (a), (b), (c) stock items, normally available by return (we have over 5000 items in stock). (e) 4/6 weeks normally but it is quite possible we could be able to supply from stock.

N.B. Frequencies as listed above but in alternative holders and/or non stock loads are available as per code (e).

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

JAPANESE AND AMERICAN EQUIPMENT We can supply crystals for YAESU (FT2F, FT2 Auto, FT224), most of the ICOM range and the TRIO-KENWOOD range. We can also supply from stock crystals for the HEATHKIT HW202 and HW17A.

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Due to the much higher multiplication involved (3 times that on 2m.) all our stock 70cm. crystals are now to much closer tolerances than our standard amateur range.

We are stocking the following channels RB0 (434.60/432.00), RB2 (434.66/433.05), RB4 (434.70/433.10), RB6 (434.75/433.15), SU8 (433.20), RB10 (434.85/433.25), RB14 (434.95/433.35), SU18 (433.45) and SU20 (433.50) — TX and RX for use with: PYE UHF Westminster (W15U), UHF Cambridge (U10B), Pocketfone (PFI) and STORNO COL/COM 662 all at £2.32. For the U450L Base Station we have the TX crystals for all the above channels. The RX crystals for the U450L Base Station, together with the TX and RX crystals for the remaining SU channels (SU12—433.30-RTTY, SU16—433.40 and SU22—433.55) for all the above equipments are available at £3.94 to Amateur Spec. or £4.64 to same spec. as stock items. Delivery approx. 4/6 weeks.

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100 kHz in HC13/U and 100 kHz in HC13/U and 200 kHz and 455 kHz in HC6/U, £2.95.

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CRYSTALS MANUFACTURED TO YOUR SPECIFIC REQUIREMENTS

Prices shown are for one off, to our Amateur spec., closer tolerances are available, please send us details of your requirements.

A Low frequency fundamentals in HC13/U or HC6/U

Adj. tol. ±50ppm. Temp. tol. ±100ppm 0 to +70°C.
 6.0 to 19.999 kHz £28.12 (£31.63) 80 to 99.999 kHz ... £7.30 (£8.21)
 20 to 29.999 kHz. £17.75 (£19.97) 100 to 149.99 kHz .. £6.68 (£7.51)
 30 to 59.999 kHz. £15.51 (£17.45) 150 to 499.99 kHz .. £6.20 (£6.97)
 60 to 79.999 kHz. £12.41 (£13.19) 500 to 799.99 kHz .. £7.30 (£8.21)

B High frequency fundamentals/overtones in HC6/U, HC18/U or HC25/U

Adj tol ±20 ppm, Temp. tol ±30 ppm — 10 to +60°C
 *£800 to 999.9 kHz (fund) ... £9.50 * 25 to 30MHz (fund) ... £7.56
 *£1.0 to 1.499 MHz (fund) ... £9.45 * 15 to 20.99 MHz (3 O/T) ... £4.72
 *£1.5 to 2.599 MHz (fund) ... £4.21 * 21 to 62.99 MHz (3 O/T) ... £3.94
 *£2.6 to 20.99 MHz (fund) ... £3.94 * 60 to 105 MHz (5 O/T) ... £4.53
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 *£4.0 to 5.999 MHz (fund) ... £4.21 125 to 180 MHz (O/T) ... £6.48
 * 6.0 to 20.99 MHz (fund) ... £3.94 180 to 25 MHz (O/T) ... £10.64
 * 21 to 24.99 MHz (fund) ... £6.14

Delivery * Normally 4/6 weeks (express available), all other frequencies 6/8 weeks. Holders: Low frequencies HC13/U or HC6/U dependent on frequency. High frequencies are available in HC6/U, HC18/U or HC25/U unless marked * only available in HC6/U or * only available in HC18/U and HC25/U, HC17/U (replacement for FT243) and HC33/U (wire end HC6/U) available as per HC6/U above at 25p extra on HC6/U price. Unless otherwise specified, fundamentals will be supplied to 30pf circuit conditions and overtones to series resonance.

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HC6/U	HC6/U	HC25/U 30pF and 40pF TX	HC25/U 20pF and 30pF RX	HC25/U 25pF and 20pF TX	HC6 & 25/U SR RX
RO	4.0277	8.0555	12.0833	14.9888	18.1250 44.9666
R1	4.0284	8.0569	12.0854	14.9916	18.1281 44.9750
R2	4.0291	8.0583	12.0875	14.9944	18.1312 44.9833
R3	4.0298	8.0597	12.0895	14.9972	18.1343 44.9916
R4	4.0305	8.0611	12.0916	15.0000	18.1375 45.0000
R5	4.0312	8.0625	12.0937	15.0027	18.1406 45.0083
R6	4.0319	8.0638	12.0958	15.0055	18.1437 45.0166
R7	4.0326	8.0652	12.0979	15.0083	18.1468 45.0250
S8	—	—	12.1000	14.9444	18.1500 44.8333*
S9	—	—	12.1020	14.9472	18.1531 44.8416*
S10	—	—	12.1041	14.9500	18.1562 44.8500*
S11	—	—	12.1062	14.9527	18.1593 44.8583*
S12	—	—	12.1083	14.9555	18.1625 44.8666*
S13	—	—	12.1104	14.9583	18.1656 44.8750*
S14	—	—	12.1125	14.9611	18.1687 44.8833*
S15	—	—	12.1145	14.9638	18.1718 44.8916*
S16	—	—	12.1167	14.9667	18.1750 44.9000*
S17	—	—	12.1187	14.9694	18.1781 44.9083*
S18	—	—	12.1208	14.9722	18.1812 44.9166*
S19	—	—	12.1229	14.9750	18.1843 44.9250*
S20	4.0416	8.0833	12.1250	14.9777	18.1875 44.9333*
S21	4.0423	8.0847	12.1270	14.9805	18.1906 44.9416*
S22	4.0430	8.0861	12.1291	14.9833	18.1937 44.9500*
S23	4.0437	8.0875	12.1312	14.9861	18.1968 44.9583*

SR = Series Resonance *HC25 only

Also in stock: RO to R7 for FT221 RO to R7 and S8 to S23 for following: Belcom FS1007, FDK TM56, Multi 11 Quartz 16 and Multi 7, Icom IC2F, 21, 22A and 215, Ten Kenwood 2200, 7200, Uniden 2030 and Yaesu FT2FB, FT2 Auto, FT224, FT223 and FT202.

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4 METRE CRYSTALS for 70.26 MHz in HC6/U at £2.25. TX 8.78250 MHz. RX 6.7466 or 29.78 MHz in stock.

70cm CRYSTALS in stock 8.0222 and 12.0333 in HC6 £1.85. Pye Pocketfone PF1, PF2, PF70 and Wood and Douglas £4.50 a pair or TX £2.25. RX £2.50. SU8 (433.2)RBO, RB2, RB4, RB6, RB10, RB11, RB13 and RB14.

CONVERTER CRYSTALS in HC18/U at £2.85. In stock 38.666, 42.000, 70.000, 96.000, 101.000, 101.500, 105.666 and 116.000 MHz.

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FREQUENCY STANDARDS in stock £2.75. HC6 200 kHz, 455 kHz, 1000 kHz, 5,000 MHz and 10,000 MHz. HC13 100 kHz, HC18 1000 kHz, 7,000 MHz, 10,700 MHz, 48,000 MHz and 100,00 MHz.

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	6	10	1.50 to 1.999 MHz	£4.75 £4.20
	7	10	2.00 to 2.599 MHz	£4.75 £4.00
	8	10	2.60 to 3.999 MHz	£4.55 £3.70
	9	10	4.00 to 20.999 MHz	£4.55 £3.60
	10	10	21.00 to 24.000 MHz	£6.00 £5.40
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5th OVT	12	10	60.00 to 99.999 MHz	£5.00 £4.00
	13	10	100.00 to 124.999 MHz	£6.15 £5.20
5th, 7th & 9th OVT	14	20	125.00 to 149.999 MHz	— £6.00
	15	20	150.00 to 225.00 MHz	— £7.50

Unless otherwise requested fundamentals will be supplied with 30pF load capacity and overtones for series resonance operation.

HOLDERS — Please specify when ordering — 10 to 200 kHz HC13/U, 170 kHz to 170 MHz HC6 or HC33/U, 4 to 225 MHz, HC18 and HC25.

DELIVERY. Column A 3 to 4 weeks (this service is subject to availability), Column B 6 to 8 weeks.

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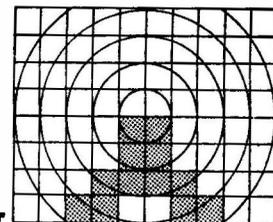
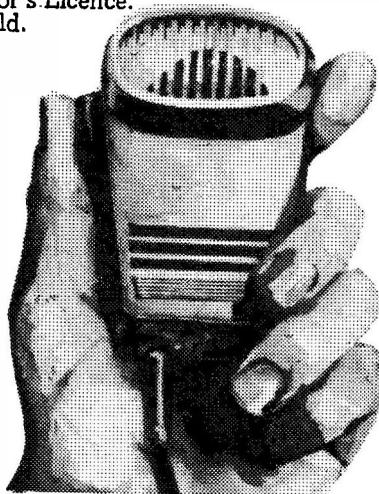
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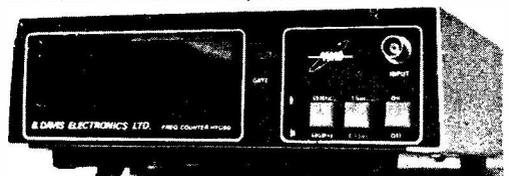
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