April 1980

radio communication

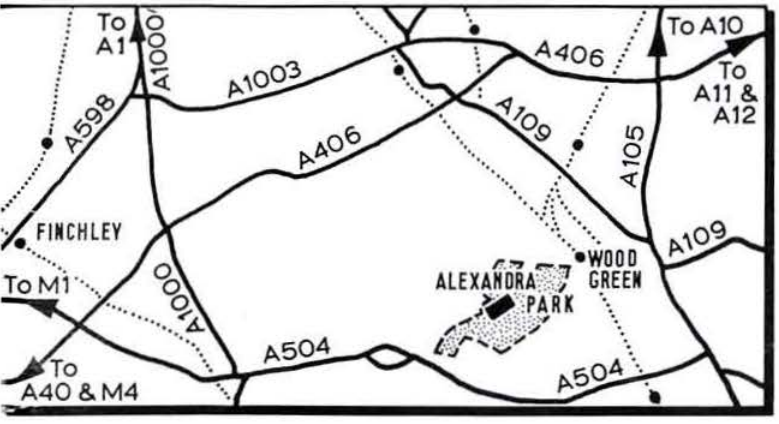
journal of the Radio Society of Great Britain

MAY 9th,10th

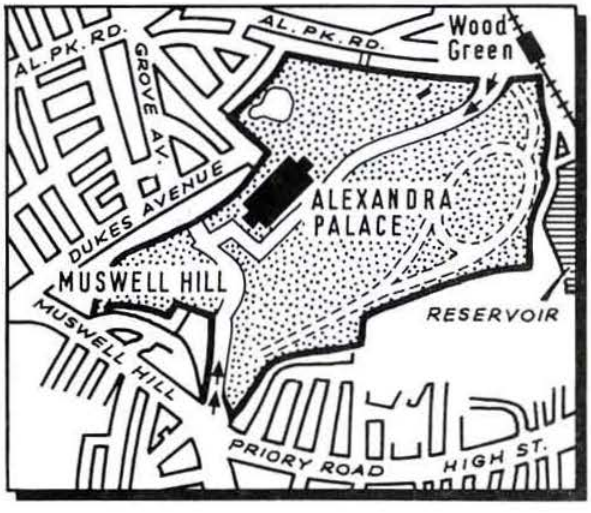
AP

RSGB 1980 EXHIBITION AT ALEXANDRA PALACE

THE PREMIER AMATEUR RADIO EVENT OF THE YEAR



Routes to the palace



ONLY A MONTH AWAY!
9–10 MAY

SEE, BE SEEN, BE THERE

Now available from Catronics— real value for money in microcomputers

video genie system

Advanced features are:

1. **Built-in TV interface, the users TV set may be used as the display terminal, thus saving money.**
2. **Main Control Unit contains the CPU plus,**
   i) **51 key typewriter keyboard, with 10 key rollover.**
   ii) **High quality cassette recorder, enables recording and playback of programs, data and the use of pre-recorded tapes.**
3. **Built-in audio cassette interface for connecting another cassette recorder to serve as cheap and compact storage for large amounts of data on tapes.**
4. **16k user RAM included, expandable to 48k.**
5. **Fully TRS 80 level II software compatible so a huge range of software is already available.**
6. **Full 12k Microsoft BASIC in ROM.**
7. **Full expansion capability to Discs and Printer, a small system with big possibilities.**
8. **Self-contained, all in one attractive case.**
9. **The system uses the powerful Z80 processor.**

Price only £425.00 inc VAT
Also available 9" Monitor—built to full professional specification (NOT a converted television) Model CVM600: £158.00
Full range of supporting programs and accessories available.

Buy your TRIO rig from a specialist TRIO dealer such as Catronics

Because WE specialise in TRIO, YOU get a better deal.
1) SALES: Only a TRIO specialist such as Catronics knows and stocks the full TRIO range of equipment and accessories.
2) SERVICE: Only a TRIO specialist such as Catronics can offer the servicing arrangements required for today's microprocessor controlled equipment. We have probably the best equipped service workshop in the south of England with trained engineers who know how to use the equipment.

TRIO PRICE LIST (inc VAT at 15%)

TS820	160-10m transceiver 200W PEP	£669.30
DG1	Digital readout to 100Hz	£121.90
SP820	Speaker	£37.95
VFO820	External VFO	£118.45
YG88C	CW filter 8 pole	£36.80
R820	The ultimate matching receiver to the TS820	£690.00
YG455C	CW filter 500Hz	£58.65
YG455CN	CW filter 250Hz	£60.95
YG88A	AM filter 6kHz	£34.50
TS520SE	160-10m Transceiver	£437.00
SP520	Speaker	£17.25
VFO520S	External VFO	£98.90
YG3395C	8 pole CW filter	£37.95
DG5	Digital display/counter	£103.50
DK520	Conversion for older TS520	£10.35
TS120S	80-10m mobile transceiver 200W PEP	£432.40
TS120V	80-10m mobile transceiver 20W PEP	£347.30
PS20	AC power supply for TS120V	£44.85
MB100	Mobile mounting bracket	£17.25
YK88C	500Hz CW filter	£28.75
SP120	External speaker	£25.30
VFO120	External VFO	£89.70
AT120	Antenna tuner (100W)	£55.20
PS30	AC PSU for TS120S	£85.10
AT200	1·8-30MHz antenna tuner	£82.80
SM220	Monitor scope	£197.80
BS5	TS520 scanboard for SM220	£48.30
BS8	TS820 scanboard for SM220	£48.30
TL120	80-10m 200W linear	£128.80
TL922	HF linear amplifier 160-10m/2kW PEP 2 × 3-500Z tubes	£672.75
MC50	De luxe desk microphone dual impedance PTT locking bar	£24.15
MC35S	50K fist microphone	£13.80
MC30S	500 ohm fist microphone	£13.80
TS770	2m/70cm all mode dual bander	£690.00
SP70	Matching speaker	£18.40
TR7625	2m Synthesised mobile/fixed transceiver 25 watt	£246.10
RM76	Microprocessor control unit	£60.95
TR2300	2m FM portable transceiver PLL with all 80 FM channels	£166.75
VB2300	10W booster	£49.45
MB2	Mobile mount	£17.25
RA1	Helical rubber antenna	£6.90
PS1200	Power unit and charger TR2300/3200/2200GX	£29.50
TR2400	2 meter synthesised handheld transceiver	£210.45
ST1	Base stand and quick charger	£43.70
BC5	12V quick charger	£17.25
SC3	Carrying Case	£11.50
TS180S	160-10m solid state transceiver	£589.95
TS180S	As above but with digital frequency control	£679.65
VFO180	External VFO	£96.60
SP180	Speaker	£36.80
DF180	Digital frequency control	£104.65
AT180	1·8-30MHz antenna tuner	£95.45
PS30	AC power unit for TS180S	£85.10
TR8300	70cm FM mobile 10W transceiver fitted 4 channels	£225.00
TR3200	70cm FM handy transceiver fitted 3 channels	£164.45
MB1A	Matching mobile mount	£9.20
PB10	Pack of 10 ni-cad batteries	£10.35
TR3200/2300	Spare power lead	£1.30
R1000	0·2-30MHz receiver	£297.85
SP100	External speaker	£26.45
R300	General coverage receiver	£149.50
HS5	Communications headphones, tailored response	£21.85
HS4	Communications headphones, tailored response	£10.35
LF30A	HF low pass filter 1kW 90dB, stop band rejection	£18.40
BPF2A	2m band pass filter 144-146MHz 50W rms 100W PEP	£21.85
RD300	High power dummy load	£48.30

APPROVED TRIO DEALER

BARCLAYCARD VISA

We are 300 yards from Wallington Railway Station (London Bridge or Victoria). Frequent buses from Croydon and Sutton. Three large car parks within 100 yards. **Hire purchase facilities available on all equipment. Credit cards accepted.** Mail orders normally dealt with on day of receipt. Securicor delivery arranged. All prices include VAT.

Access

CATRONICS LTD, DEPT R4, COMMUNICATIONS HOUSE,
20 WALLINGTON SQUARE, WALLINGTON, SURREY SM6 8RG. Tel: 01-669 6700.
Shop/showroom open Monday-Friday: 9.00-5.30, closed for lunch: 12.45-1.45. Saturdays: 9.00-1.00.

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Contributions **(including Members' Ads)** and all correspondence concerning the **content** of *Radio Communication* should be addressed to:

The Editor, RSGB,
88 Broomfield Road,
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Belle Vue Radio And

by the Northern Radio Societies Association

NRSA '80

RADIO & ELECTRONICS EXHIBITION

BELLE VUE — MANCHESTER

SUNDAY 27th APRIL 1980 — DOORS OPEN AT 11 a.m.

THE AMATEUR RADIO SHOW OF THE YEAR

THIS YEAR OCCUPYING THE WHOLE OF THE LANCASTER HALL!

- ★ **Inter-Club Quiz**
- ★ **Construction Contest**
- ★ **RSGB Bookstall**
- ★ **Grand Raffle**
- ★ **Amateur Computer Club Stand**
- ★ **Radio Societies' Stands & Trophy**
- ★ **Morse Code Challenge**
- ★ **Teletext Display & H.O. Exhibit**

(Bring your transmitting licence for an RSGB identity card)

★ **Trade stands featuring Radio Equipment, Micro-processors, Home Computers and Components**

The following traders have booked space:

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Amateur Radio Exchange
Amateur Radio Shop
Andor Electronics Ltd
Arrow Electronics
J. Birkett
Bredhurst Electronics
CB Electronics
Crayford Electronics
DS Electronics
Digital Devices Ltd
Display Electronics
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Electrosupplies
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Proton Electronics
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SMC Ltd (Northern)
SOTA Communications Systems Ltd
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Wilson Valves

NB: North Midlands Mobile Rally at Drayton Manor Park is on Sunday 13th April 1980

★ **BELLE VUE HAS AMPLE CAR PARKS AND AMUSEMENTS FOR THE FAMILY!** ★

FM TALK-IN VIA GB4NRS & GB8NRS ON 145·55MHz and 433·20MHz

ADMISSION 30p INCL. RAFFLE TICKET AND EXHIBITION PLAN

ENTER AT REAR OF BELLE VUE, OPPOSITE MAIN CAR PARK—OFF HYDE ROAD, A57

Electronics Exhibition

Sunday 27th April 1980

LOWE ELECTRONICS Ltd

APPROVED TRIO DEALER

TRIO TR2300

£166.75 inc. VAT

Nicad Pack £10.35 inc **VB2300 £49.45 inc**

Trio have always been acknowledged leaders in the field of portable VHF equipment and this leadership is amply demonstrated by the TR2300. Following the long established TR2200 line, the TR2300 combines all the virtues of small size, ease of use and rugged go-anywhere construction but introduced for the first time, full band coverage in 25kHz steps from the same advanced synthesiser used in the TR7500. This provides all 80 FM channels from 144–146MHz together with 600kHz repeater shift (and reverse repeater if requested). Automatic tone burst is provided for repeater operation thus catering for all operational needs.

The high sensitivity receiver section uses a combination of effective RF filters providing optimum cross modulation rejection across the entire band. An extra low profile speaker uses a samarium cobalt magnet to reduce equipment size whilst improving speaker efficiency and clarity of reproduction.

The remarkable asset of the TR2300 has to be it's unexcelled versatility. Using the carrying case and shoulder strap, you can take the 2300 anywhere, powered by the rechargable ni-cad batteries, and this is certainly the way that most operators use the rig. Sit the 2300 on top of a 12V dc supply at home, however, using the power cord provided, and you have a terrific home station FM rig.

If you want mobile operation, slot the 2300 into an MB1 mounting bracket, possibly add the matching VB2300 amplifier and you have a really high performance mobile transceiver—and being so small, the TR2300 fits almost anywhere. The front panel layout was designed for ease of operation and the back illuminated dial is so easy to read that it's a delight to use.

TR2300—truly the transceiver for all seasons.

Now—if you insist on a handheld, and don't need the versatility of the 2300, take a look at the new TR2400.

TR2400

£210.45 inc. VAT

(includes Nicads, charger & helical aerial)

The TR2400 is a futuristic 2 metre FM handheld transceiver incorporating a large LCD frequency display, 400 channel operation from 144–146MHz, 10 memory channels and a host of frequency control systems (including scanning) all designed around a microcomputer. The sophisticated design makes the TR2400 the ideal handheld to meet all repeater or simplex operation for the 2 metre man.

1. Large LCD digital frequency readout. Clearly readable even in direct sunlight, with black illumination for night use. Virtually no current drain (unlike LED displays) so display stays on all the time. Shows RX and TX frequencies and memory channels. Also included in display are indicators for "on air", "memory recall", "battery status" and "lamp".
2. Frequency control functions. Keyboard entry of any frequency from 144–146MHz in 5kHz increments. Up/down manual scanning from 144–146MHz in single or fast continuous 5kHz steps.
3. 10 memories (retained by battery backup), one of which can be used as a non-standard repeater shift. Automatic scanning of all 10 memory channels is provided, and scanning can be for a busy channel or the next free channel.
4. Full repeater operation and also instant reverse repeater operation at the touch of a switch. Proper auto tone burst provided.
5. Fast 1½-hour base charger and stand with full external microphone facilities available.
6. Lock switches are provided to prevent misoperation of the keyboard and also to disable the press to talk switch.

7. Power output of over 15W to a BNC aerial connector (flexible whip supplied as standard). Decent size batteries for long operating time.
8. Superb mechanical design in the Trio tradition of top engineering, based on a die cast frame for real drop-proof performance.
9. Supplied complete with Nicad pack, charger, rubber helical aerial—ready to go.
The TR2400 is the best available; would you expect less than the best from Trio?

It's a little more expensive than it's competitors—but oh so far ahead in performance.

THE TRIO 2 METRE TWINS

LOWE ELECTRONICS Ltd

Trio's TS180S with DFC is an all solid-state HF transceiver designed for the DXer, the contest operator, and all other Amateurs who enjoy the 160 through 10-metre bands. The following features prove, beyond doubt, that the TS180s is the finest rig available!

Digital Frequency control (DFC) including four memories and manual scanning. Memories are usable in transmit and/or receive modes. Memory frequencies to be tuned in 20-Hz steps up or down, slow or fast, with recall of the original stored frequency. It's almost like having four remote VFOs!

All solid-state . . . including the final. No dipping or loading. Just dial up the frequency, peak the drive, and operate.

High power . . . 200W p.e.p./160W dc input on 160-15 metres, and 160W p.e.p./140W dc on 10 metres. Also covers more than 50kHz above and below each band (28-30MHz), WARC, etc., and receives WWV on 100MHz.

Improved dynamic range.

Single-conversion system with highly advanced PLL circuit, using only one crystal with improved stability and spurious characteristics.

TRIO TS180S

£679.65 inc VAT
(including DFC memory unit)

Built-in microprocessor-controlled large digital display. Shows actual VFO frequency and difference between VFO and "M1" memory frequency. Blinking decimal points indicate 'out of band". Monoscale dial, too.

IF shift . . . Trio's famous passband tuning that reduces QRM.

Selectable wide and narrow CW bandwidth on receive (500-Hz CW filter is optional).

Automatic selection of upper and lower sideband (SSB NORM/SSB REV switch).

Tunable noise blanker (adjustable noise-sampling frequency).

RF AGC ("RGC"), which activates automatically to prevent overload from strong local signals.

AGC (selectable fast/slow/off).

Dual RIT (VFO and memory/fix).

Three operating modes—SSB, CW and FSK.

Improved RF speech processor.

Dual SSB filter (optional), with very steep shape factor to reduce out-of-passband noise on receive and to improve operation of RF speech processor on transmit.

13·8 VDC operation.

TRIO TS120V/S

TS120V £347.30 inc VAT

TS120V	£347.30	TS120S	£432.40
PS20 4 Amp	£44.85	PS30 20 Amp	£85.10
AT120	£55.20	MC355 mic	£13.80
SP120	£25.30	TL120 linear	£128.80
VFO120	£89.70		

THE SYSTEM APPROACH

What do we mean by the "System Approach"?

Well, take the TS120V and you have the finest 20W p.e.p. mobile HF transceiver you could buy. Many operators are even buying it as a second station because it's so good. Consider its features, the single conversion PLL derived top performance; the accurate digital readout; the passband tuning; the noise blanker; the superb engineering; THEN maybe add the PS20 mains power supply and you have an equally great home station; OR maybe add the multi-function VFO120 second VFO unit; OR the SP120 external speaker; OR the 100W AT120 antenna tuner or maybe even a superb Microwave Modules 2 metre or 70 cm transverter to get you up on the VHF and UHF bands. It all adds up to a fine station tailored exactly to your own needs.

If you need more power, the TL120 200W p.e.p. linear is now available, but you will need a heftier 12V supply to run it. A suitable unit would be the PS30 which delivers up to 20 amps fully regulated and protected. Lots of people are buying the PS30 as a general purpose heavy duty supply for shack use.

Finally, should you really want high power all the time, consider the TS120S which incorporates all the features of the TS120V but has a built-in high power, fully protected 200W p.e.p. linear and it's still not too expensive to enjoy!

TAKE A GOOD LOOK AT THE PRICES!!!

THE GREAT HF LINE-UP BY TRIO

LOWE ELECTRONICS Ltd

TRIO TR9000

2 metre MULTIMODE

£365.00 (approx)

If you sat down at some time and designed your ideal 2 metre multimode rig, you probably laid down the specification for the new Trio TR9000. I believe that this transceiver will satisfy the needs of every radio amateur, combining as it does small size (same as the TR7600), light weight (same as the TR7600), and powerful performance.

As you can see, the TR9000 has a complete array of facilities including all mode operation, noise blanker, RIT, 5 memories, twin digital VFOs and digital frequency readout to 100Hz. Now for the smart parts.

The TR9000 is based on a 100Hz synthesiser controlled either by a photo microsensor on the main dial or by the remote up/down microphone. On FM, the operator has instant selection of either 25kHz steps (for convenient mobile use), 12·5kHz steps (for future use), or 100Hz steps (for continuous tuning). On SSB and CW, the synthesiser steps are automaticaly switched to 100Hz and the digital display is extended to match.

A special feature is the search facility on SSB which tunes the whole band, and the scan facility on FM which scans in 25kHz or 12·5kHz steps, stopping momentarily on any received signal. The scan may then be held by touching the HOLD button or depressing the PTT switch on the microphone.

The TR9000 has so much to offer, it's bound to be yet another leader from Trio. Contact us soon for further details.

TRIO TS770

2 metre and 70 cm MULTIMODE

£690.00 inc VAT

The only dual band high performance transceiver available today. The TS770 is another successful result of Trio's advanced engineering capability and represents the peak of RF engineering for VHF and UHF.

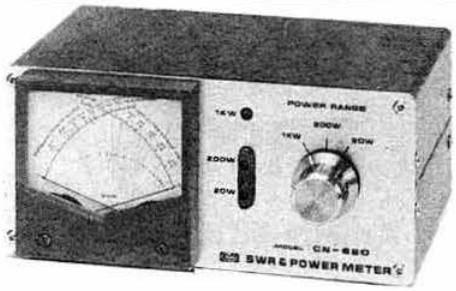
Full coverage 144–146 and 430–440MHz using an advanced microprocessor controlled synthesiser generating 20Hz steps for that "VFO feel". Eight memory channels which can be scanned, cross band operation for satellite use, VOX, break in CW, 15–18W output at any frequency, terrific receiver performance, search and scan facilities, in fact everything one might expect from the best equipment designed by the best manufacturer in the business.

The TS770 gives you a single package to replace all those boxes you use right now. Performance and convenience on VHF and UHF are yours today with the TS770.

For complete information, contact us right now and we will send a detailed brochure.

THE COMPLETELY NEW APPROACH TO VHF/UHF

LOWE ELECTRONICS Ltd



CN-620 SWR & POWER METER

The CN-620 is a radical departure from the accepted norm for in-line power and SWR measurements and represents a considerable improvement over all existing power meters.

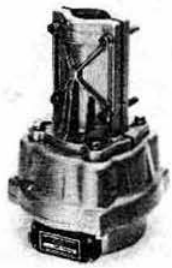
The system is based on a crossed needle twin meter, one needle indicating forward power, the other reflected power. The point at which the two needles cross indicates the SWR existing on the system. In one instrument, you combine power and SWR measurement with high accuracy and simplicity of operation.

The CN-620 is simply inserted into any 50 ohm coaxial line. No adjustments are necessary in order to use the instrument. The CN-620 covers the frequency range from 1·8-150MHz and can measure power as low as 400mW reflected and as high as 1kW forward using three easy to read ranges. With the CN-620, doubt in measurement is a thing of the past and once you have used the CN-620, all other power meters will seem old fashioned.

£52.81 inc VAT

CN-620 SPECIFICATION	
Frequency range	1·8-150MHz
Line impedance	50 ohms
Power ranges forward	20W, 200W, 1kW
Power ranges reflected	4W, 40W, 200W
Through power rating	1kW CW, 2KW P.E.P. 1·8-30MHz 250W CW, 500W P.E.P. 140-150MHz
Min. power for SWR measurement	5W
Connectors	SO239
Size	165 × 75 × 97mm

At last, a safe reliable rotator capable of continuous use without going up in smoke! For some time we have been trying out many rotators in the search for something better than usual and we believe we found it in the Daiwa DR7500 series. You can see from the photograph that the quality of construction in the rotator is very good indeed but the most interesting bit of the system is the DC7001 controller.



Basically, the whole system is a closed loop servo which is self aligning and self correcting. The resistance element in the rotator head is part of a bridge which, if unbalanced, drives a reversible motor in the controller, via a high gain amplifier to turn a balancing resistor (and the indicator pointer) until the system is rebalanced. In practice, what this means is that using the left/right switches on the controller drives the rotator in the usual fashion and the indicator follows the rotation smoothly, quietly and with spot-on accuracy all the time. Further point—the usual rotator system has its end stops at south and if like me you like to work DX from Africa, it's b- - - -y annoying to have to swing the beam all the way around from 5 degrees E of S through 350 degrees to point 5 degrees W of S. With the DC7001, you can have the end stops anywhere you like, just choose your least favoured direction.

Power to the rotator motor is split phase 24V ac so there's no dangerous voltage up the mast. Load carrying and turning torque of the DR7500 is more than adequate for a 3 element tribander and if you really need a big brute there is the DR7600 with even higher ratings. Really, we have found nothing to compare to the Daiwa DR7500 and we are sure that you will agree that it is a new step forward in rotator systems.

DR7500 **£108.10** including VAT. DR7600 **£154.10** including VAT.

Note: The rotators are supplied complete with control box and both upper and lower mast clamps.

P.S. There's a new fully automatic ATU now from Daiwa. It's magic! Give it a few watts of RF and little motors whizz round and tune for best SWR. Has a CN620 built in too!

AUTHORISED DEALERS IN THE UK

Yorkshire	Leeds Amateur Radio
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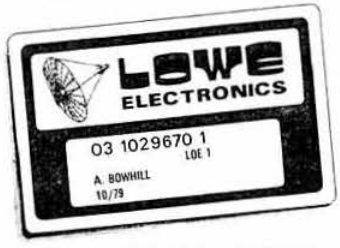
South London	Catronics Ltd
North London	Radio Shack Ltd
Lancashire	Stephens-James Ltd
Wales	M.R.S. Communications Ltd
Essex	Waters & Stanton Electronics Ltd
Sussex	Bredhurst Electronics

REMEMBER. Only an authorised Trio dealer can give you the service, spares and advice that you may need, and only an authorised dealer can give you full advantage of the regular meetings between the distributor and Trio factory personnel at which there is a constant exchange of information and advice.

Everyone is talking about the new Lowe credit card scheme, following its introduction at Leicester. This is the new, easy way to have the rig you wanted right away and avoid any future price rises. How does it work? You simply agree to pay a fixed amount each month and you then get instant purchasing power of 24 times the payment. For example, a payment of £10 gives you £240 of credit, more than enough to buy that TR2400, aerial and accessories. No fuss and no hefty deposits needed. A further advantage is that as the payments continue, your credit is automatically extended to allow further purchases. Why not send for full details right away and join the growing numbers who hold the Lowe blue card—the way to have tomorrow's equipment today. A major advance to your purchasing power.



THE WAY TO HAVE TOMORROW'S EQUIPMENT TODAY

As sole official distributors for Trio, we recommend that you purchase your Trio equipment from an approved dealer (full list above). Any dealer *not* on this list has no connection with the Trio UK sales and service organisation and cannot, despite claims to the contrary, offer any meaningful guarantee of backup service on Trio equipment.

LOWE ELECTRONICS Ltd

Hello—

I'm John Wilson, and I'm the Lowe Electronics director whose main responsibility is the after sales service and customer advice areas of the company. (I also write our sometimes controversial advertising.) As most of you may know, ever since Bill Lowe began business from his garage, our company emphasis has leaned heavily towards service to the customer, and by accepted standards we are top heavy in our service staff/sales staff ratio. We have always believed that when a man has trouble with his radio equipment, he is entitled to the best advice and help that it is possible to give, and our customers world wide know that we do offer this kind of service.

As we have had it said to us (and about us) many times, "You won't get a penny off at Lowe's, but they really look after you when you are in trouble, and they certainly know what makes a rig tick."

The reason for the lack of discounting in our prices is the simple one that discounts have to be paid for by cutting elsewhere, and in this business, that cutting back usually takes place in the back-up service. We will not do this. The ultimate examples of discounting are often the cash and carry operations. You know the thing; they take the cash, you carry off a sealed box, and you carry also the responsibility for repairing your rig if it goes wrong. That philosophy is not ours.

But to return to after sales service. it must be obvious from the photograph that we have exceptional service facilities here at Matlock, and in addition to the hardware have the widest accumulated experience in amateur radio gear of possibly any dealer in Europe. That is why even dealers in this country send equipment to us for repair when they come up against the particularly nasty faults. All this is at the disposal of our customers, as is the unique connection to the Trio company in Japan. As the sole distributor for Trio in the U.K., we keep in constant touch with the factory on all aspects of equipment design and use. Many of the refinements in design of the gear (such as the reverse repeater shift on the TR2300, or the modified filter switching in the R1000) are originated here in Matlock as a direct result of comments from our customers. That is one aspect of our special relationship as the connection between you and the factory.

As for my staff here at Matlock, we have Barrie who is a whiz at HF gear, Rob of the slender fingers who gets stuck into the subminiature stuff; David who has just joined us to look after the pre sales preparation and special orders; John T who is a digital wizard and who is going on to Cambridge this year with Lowe Electronics sponsorship (come back soon, J.T.!); and of course myself—I get landed with all the nasty faults. We can also call on Alan, who has a callsign even older than mine, and who can remember details of faults we fixed years ago. He is now more involved in finding new goodies for you.

So, to summarise what I have really been saying: If you need help or genuine advice on amateur radio matters, call Lowe Electronics. if you intend to own the best equipment made, backed by real service, get Trio from Lowe Electronics, and if you have any doubt about what I've been saying, just ask our customers if it is true. **73 G3PCY**

And from Bill, G3UBO (now retired); Alan, G3MME (very tired); Steve, G8VEF (sales aspired); Rob, G8MBO (newly tyred); Barrie, G8OTY (much perspired); Rob, G8MPT (casually attired); John T, (hard wired); David, (just hired); and myself, John Wilson, G3PCY (almost expired). And if anyone wants to chat about George V keyplates from African colonies—contact me.

HOKUSHIN AERIALS

From the makers of our popular HF5 vertical, we have a complete range of vehicle aerials for VHF and UHF use. All the whips terminate in a PL259 plug so that you have complete flexibility, and any aerial in the range will fit the RG4M base or the magnetic mount. The 2E, 2NE, and 430E have a quick foldover joint at the base so that you can drive in and out of your garage without dismantling the aerial.

2E	2M 5/8, 3·4dB gain foldover whip	**£6.50** inc VAT
2NE	2M 7/8, 4·5dB gain foldover whip	**£11.00** inc VAT
430E	70cm 5/8+5/8, 5·5dB gain	**£10.00** inc VAT
HS-F1	2M rubber helical on PL259 plug	**£3.95** inc VAT
320	2M stainless quarter wave on PL259	**£1.50** inc VAT
RG4M	Base for all above units including 4 metres of cable ready terminated in PL259	**£3.00** inc VAT
GSS	Heavy duty gutter/boot mount to take RG4M base	**£3.15** inc VAT
MB5	Magnetic mount complete with 5m of cable and PL259	**£7.95** inc VAT

Also two really great base station aerials

GPV5	High performance 2m base station colinear. Forget the S ...MJ ...M and R ...OR ...R	**£22.00** inc VAT
GDX2	3dB gain over the range 50-480MHz. The classic wideband aerial. 500W p.e.p.	**£36.80** inc VAT
HF5	Our original success. 5 band vertical 80-10m with great performance, great savings only	**£41.40** inc VAT

Great News!

The AR240 is back in town but with higher battery capacity, provision for separate microphone and the hot performance (better than 0·2μV for 12dB SINAD, and 2W output on TX) that you all appreciate.
PRICE? Even better value at £168 inc VAT (price includes Nicads, charger, etc).
It has a new name too—the AR240A.

144-148MHz synthesized FM Hand-Held

SEND 48p IN STAMPS FOR COMPLETE CATALOGUE AND ANTENNA BOOK
PLEASE SPECIFY ANY PARTICULAR INTEREST AND WE WILL SEND FULL INFORMATION

HEAD OFFICE AND SERVICE CENTRE
CHESTERFIELD ROAD, MATLOCK, DERBYS. TEL: 0629-2817 or 2430. TELEX 377482. OPEN 9-5.30 TUES-SAT. PHONE IN 9am-9pm

For personal attention on the South Coast contact John, G3JYG, 16 Harvard Road, Ringmer, Lewes, Sussex. Ringmer 812071.

For equally helpful attention in Scotland contact Sim, GM3SAN, 19 Ellismuir Road, Baillieston, Nr. Glasgow. 041-771 0364.

FOR ALL THAT'S BEST IN HAM RADIO CONTACT US AT MATLOCK ANYTIME

DATONG ELECTRONICS LIMITED

NEW PRODUCT ANNOUNCEMENT

MULTI-MODE AUDIO FILTER MODEL FL2

Adds knife-edge variable selectivity to any receiver.
Superb for all modes but especially for SSB.

Today's crowded H.F. band conditions demand more control of a receiver's selectivity than most receivers provide. Conventional fixed bandwidth crystal filters are quite inadequate to cope with problems such as partially overlapping SSB stations, over-modulation splatter, very close-spaced CW stations, RTTY reception through interference, heterodyne whistles.
Model FL2 offers a new high standard of performance under these critical conditions. **It gives the user full control of upper and lower pass-band edges and even beats most crystal filters for the sharpness of its pass-band edges.** It also contains a separate variable notch filter.

- *Extremely steep skirt responses from a pair of 5-pole elliptic function active filters. Gives remarkable rejection of close-spaced interference in SSB, CW, RTTY.*
- *Superb "rectangular" pass-band out-performs crystal filters for close-in interference rejection.*
- *For SSB, AM and SSTV contains independent low-pass, high-pass and notch filters. Each continuously tuneable from 200 to 3500 Hz.*
- *For CW and RTTY the filters combine to give a pass-band variable from 40 Hz to 1750 Hz, with selectable peaked or 'flat' response shape and independent control of centre frequency and bandwidth.*
- *Convenient push-button selection of operating mode, and colour coded panel labelling for ease of use.*
- *Connects between loudspeaker and receiver audio output. Two-watt power amplifier built-in.*

A new data sheet is available free on request.

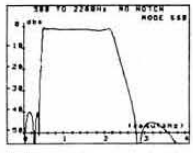
Price: £78 plus V.A.T. at 15% = £89.70

Application to SSB and RTTY
Model FL2's ultra sharp skirts wipe out "monkey chatter" interference from adjacent off-tune SSB stations (HF or LF). With minimal effect on the desired signal.
Interference rejection is superior to "IF shift" or "Pass-band tuning" techniques and of course Model FL2 works with any receiver.
The notch filter can be switched in or out as required without affecting the low and high-pass filter settings.

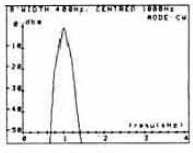
Application to CW
The main CW mode uses 12-poles of filtering to give remarkable skirt selectivity together with peaked response for easy tuning. With minimum bandwidth selected, the response is typically 40 Hz at -3 dbs and only 280 Hz at -40 dbs.
A second CW mode ("CW(2)") using 10-poles of filtering has a 'flat' response instead of peaked. This is useful for net operations.

Model FL2 requires an external DC supply of between 10 and 20 volts. It contains 21 integrated circuits and is built to high standards using close tolerance parts for the filter sections and a double sided epoxy-glass printed circuit board.

Computer simulated frequency response curves for Model FL2.



Response in "SSB" mode showing the very steep pass-band edges and the ideal "rectangular" response shape.



Response in "CW" mode. Note the remarkable skirt response.

DATONG ELECTRONICS LIMITED
Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE. England. Telephone: (0532) 552461

WATERS & STANTON ELECTRONICS

IT'S NEW! . . .
. . . IT'S EXCITING!

£299 inc VAT (provisional)

FDK MULTI 750E TRANSCEIVER

2M ALL MODES FM — USB — LSB — CW 144–146MHz

- ★IDEAL BASE OR MOBILE DUAL VFO CONTROL
- ★NORMAL/REVERSE REPEATER
- ★NOISE BLANKER
- ★MICROPHONE/HARDWARE etc
- ★DIGITAL READOUT
- ★DUAL SPEED TUNING
- ★CRYSTAL TONE-BURST
- ★RECEIVER CLARIFIER
- ★12 MONTHS GUARANTEE

Hopefully the first deliveries of this transceiver will be with us during April. Well worth waiting for and surely a model that will revolutionise 2 metre mobile operation. The price is very competitive but the performance is every bit as good as the modern base station. In fact at the projected price of £299 it is likely that the Multi 750 will become a dual function mobile and base station rig. Send us a stamped addressed envelope and we'll send you the latest information on this model.

FDK products are distributed by:
FDK UNITED KINGDOM, WARREN HOUSE, MAIN ROAD, HOCKLEY, ESSEX, ENGLAND.

WATERS & STANTON ELECTRONICS

TRIO

APPROVED TRIO DEALER

NEW SUPER DEAL PRICES

COMING SOON

TR9000 2m all mode £365 approx.

ALL PRICES INCLUDE 15% VAT

TRIO TS120V £347
TS120S £432

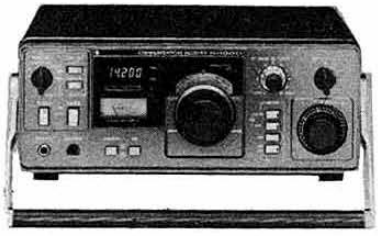
SOLID STATE RIG RELIABLE AT LAST

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 output 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 TS520SE £437 inc VAT

NEW LOW PRICE UNBEATABLE

For the operator that wants an HF transceiver on a budget this surely must be the answer. 160-10 metres (full coverage) with built-in speech processor and the fine Trio engineering that now has become a legend amongst amateurs around the World. The price is really competitive and from tests we have carried out we must say that if you are looking for a 100 watts output base station the TS520SE should be top of your list for value for money. A pair of fan cooled 6146B's ensures high efficiency and good linearity. There's no longer a 12 volt facility but for mobile work it's a little big these days—for base station use it's unbeatable at this price.

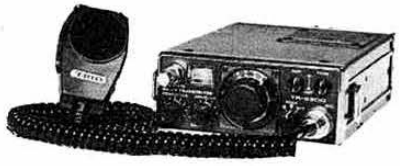


NEW **TRIO R1000 £298 inc VAT**

At last the Trio R1000 has been announced—a real purpose-built receiver for the serious short wave listener. 200kHz to 30MHz in 30 bands. This receiver has many features that are not available on other models and, of course, has the technical backing of the world's largest manufacturers of amateur communications equipment. Features include: 1kHz digital readout and separate analogue dial, large high quality speaker, digital 12 hour clock—AM and PM, three separate filters for razor sharp selectivity, noise blanker (try finding this on any other receiver!), automatic preselector tuning via the 1MHz band switch, three-stage attenuator, dimmer control, tone control, timer circuit, and all this in a diminutive package measuring $12\frac{3}{4} \times 4\frac{1}{2} \times 8\frac{7}{8}$ in. Trio have now solved the problem of choosing a receiver—there is no choice—it's got to be Trio!

KING OF THE PORTABLES

TRIO TR2300 £166.75



The TR2300 is a remarkable package which combines all the advantages of a portable station with those of a mobile transceiver. In many ways it's the ideal "starter rig" in amateur radio. Full band coverage from 144-146MHz in 80 × 25kHz channels plus 600kHz repeater shift and 1750Hz automatic tone-burst complete its versatility.
The dial is directly calibrated in frequency and has illumination for night use. The transmitter is exceptionally clean with an output power in excess of 1 watt. Receiver sensitivity is every bit as good as the best mobile rigs and either internal batteries or an external DC source may be used. Fits easily into a suitcase or on the corner of a desk and makes a really compact mobile rig. Price includes carrying case, shoulder strap, battery charger, external DC cord and, of course, the Waters & Stanton 12 month warranty. An absolute bargain—we even sell them to our staff!

NEW

TRIO

TR2400 £210 inc VAT

The new TR2400 really does eclipse all other hand-helds in its sheer technology. There's no other model that can approach its performance. The large LCD readout has low current drain and the 1·5 watts output is a good compromise between effective communication and reasonable battery drain. 10 memories, automatic scanning, instant reverse repeater operation, 16 key touch-tone encoder, 144-148MHz etc etc . . . all adds up to the new leader in hand-helds . . . the Trio TR2400. Get your Barclaycard or Access cards ready for this one . . . half its fascination is operating it—the other half is owning it.

WATERS & STANTON ELECTRONICS

IT'S NEW! . . .

AND LOOK AT THE PRICE!

FDK MULTI-700EX

144–146MHz
12½kHz & 25kHz STEPS
4 PRIORITY CHANNELS
CHANNEL SCANNING

ALL FOR

£199 INC VAT (provisional)

£99.95

FOR A HANDHELD?
YES . . . AND INCLUDING NI-CADS & AC CHARGER

PALM II £99.95* inc. vat
PALM IV (70cms) £159* inc. vat

Both units come complete with all accessories and fitted S20, 22/SU20 plus 600kHz and 1·6MHz shifts. Extra channels £3 each.

*If xtal controlled toneburst not required please deduct £10.

SAE FOR LEAFLETS

TUNES IN 25kHz and 12½kHz CHANNELS. 1–25 WATTS OUTPUT VARIABLE. INSTANT REVERSE REPEATER OPERATION. INCLUDES MICROPHONE, MOBILE MOUNTING BRACKET AND DC LEADS.

DELIVERY APRIL

STOP PRESS (IN STOCK NOW)

1) MICROWAVE MODULES 1296MHz TRANSVERTER 144MHz input—1296MHz at 1·5 WATTS OUTPUT. £159.85 inc. vat.

2) MMA144V 2 METRE AUTO SWITCHING PRE-AMP—Almost indestructible even if you leave the volts off! £20.00 inc. vat.

Waters & Stanton

TWO SUPER POWER HOUSES . . . IMPORTED DIRECT BY US

IN STOCK NOW!
DenTron
MLA 2500B
160–10m 2kW PEP
£695 inc. VAT
and delivery

Send 25p for complete DenTron HF Catalogue

NEW 'B' VERSION NOW IN STOCK
FITTED HIGH/LOW POWER SWITCHING

- 1kW DC continuous
- ALC circuit
- 3 speed cooling
- Military specifications
- 234v/117v AC
- 2 of EIMAC 8875 tubes
- R.F. Wattmeter (incl. p&p)
- Size 5½" × 14" × 14"
- Weight 47lb.
- Ideal for SSTV/RTTY
- 3rd order down 30dB +
- 40 watts drive for 1kW

160-10m ATU's also in stock

144 MHz!
NAGAI
2200 LINEAR
£429
inc. VAT
(Securicor £4.50)

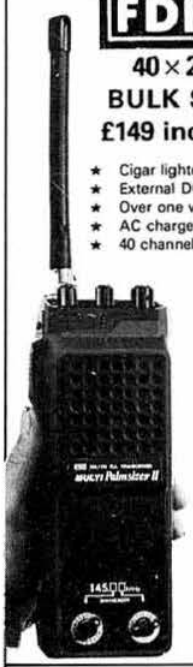
Sae for colour brochure

- 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

FDK **PALMSIZER**

40 × 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



NEW! DenTron HF200A
100 WATTS OUT 80–10 METRES

£395 inc. VAT & AC PSU!

All solid state transceiver with separate AC PSU. Incorporating USB/LSB/CW, this American made transceiver makes for a really compact station at a really low price. There's no tune-up needed and the PA transistors are virtually indestructible.

DenTron GLA–1000

(IN STOCK NOW)
10–80m 1200W LINEAR
LOW COST, SMALL SIZE, BUT . . .
. . . BIG VOICE DELIVERY FREE IN UK **£295 inc VAT**

This beautiful HF linear covers 80 to 10 metres and has its own built-in 117/234V power supply. Its diminutive size means less table space needed but without sacrificing power capability. Weighing in at just 24 pounds it measures only H.5¾" × W.11" × D.11" with room to spare inside. An almost silent fan ensures cool running whilst the little power house generates 1200 watts input on SSB or 1kW DC for CW. RF drive required is approx. 80 watts and the amplifier can be instantly switched in or out of circuit. Comprehensive metering monitors HF volts, PA current and output RF voltage. Altogether a linear we can thoroughly recommend at a price you can afford—just £295 delivered.

ROTATOR DISCOUNTS!

CHANNEL MASTER 9502
IDEAL FOR 2M OR 70CMS.
USES 3 CORE CABLE
PREVIOUS PRICE £55.80
OFFER PRICE £43.50 inc. VAT
(Carriage £2)

SPECIAL OFFER

Previously advertised at £43.50

STOLLE 2050
VHF ROTATORS
(USES 3 CORE CABLE)
£32.75 inc. VAT!
Carriage £2 extra

MATCHING 3 CORE CABLE 16p per metre

PAUL
G3VJF

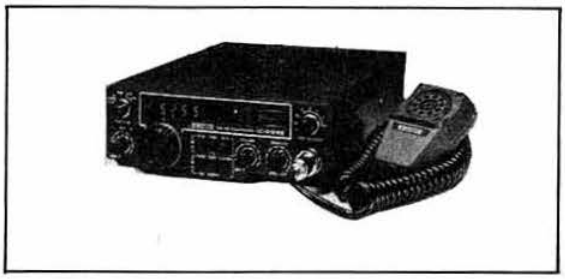
ICOM®

Tried — Tested and Popular . . .

THE MOBILES

★ 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—600kHz shift built-in plus another user programmable shift, from the front panel (for 70cm transverting?).
★ Size 64 × 185 × 223mm.

PRICE £255 INC VAT



IC-255E 25 WATT FM!

IC-240 NOW £169 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 = £217.39 **With VAT = £250**

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)
North West—Gordon G3LEQ (Knutsford (0565) 4040) **Yorkshire**—Peter G3TPX (022678 2517 Evenings) (0226 5031 Day)

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Access

PAUL
G3VJF

ICOM®

IT'S THE FASTEST MOVER YET, SO TRY TO CATCH ONE!

THE MOBILE OF CHOICE FROM THE WORLD FAMOUS

ICOM STABLE – THE IC-255E

25 Watts–5 Memories–Scanning–600kHz AND User Selectable Repeater Shift–Full Coverage in 5kHz or 25kHz 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 148MHz 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 600kHz Repeater Shift
- ★ Alternative programmable shift
- ★ Reverse Repeater facilities
- ★ RIT (±3kHz) 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

AMATEUR RADIO EXCHANGE

WHO'S FOOLING WHO?

There are some who would have us believe that the much sought-after TRIO/KENWOOD range of amateur radio equipment is manufactured not in the Land of the Rising Sun but in the Dales of Derbyshire; what is more, that these coveted products may only be purchased from one particular appointed distributor or his appointed agents.

Well, here's a little DISAPPOINTMENT for those folk, but good news for the rest of us! As the only shop in London where ALL the leading makes can be seen and tried under one roof . . . YAESU, ICOM, TRIO/KENWOOD, STANDARD, etc, etc . . . we have been able to secure large shipments of TRIO/KENWOOD equipment, fully backed by spares, so that we can give it the same high standard of before- and after-sales service that our customers have come to expect of us on everything we sell.

So, whether you're looking for a major piece of equipment or just some accessories . . . whether you're buying, selling or just browsing . . . Brenda and Bernie invite you to 'phone or call in to discuss that new rig you've been promising yourself. Try it out in the shop. Compare it with the others in its class, because that's the only way you'll know that what you're investing in is really right for you. So, come to the shop where they care . . . and have a cup of Brenda's coffee too!

THE ICOM PAIR . . .

IC-260E

Here it is, ICOM's latest 2m synthesised mobile, the IC-260E all-mode transceiver with microcomputer enabling it to scan either between two programmed frequencies or just the memories, two VFOs (used independently or together in tracking mode), and many other features. Altogether, an amazingly sophisticated package, as is its twin, the IC-255E for FM only.

IC-255E £255 inc VAT IC-260E £369 inc VAT

. . . THE STANDARD PAIR

Two new high-performance mobiles at very competitive prices. The C-7800, for 70cm operation, is fully synthesised with five memories, two-speed scan from mic etc, etc, and the C-8800 is the matching unit with the same features covering the 2m band in 5kH or 25kH steps.

C-7800 £275 inc VAT

C-8800 £250 inc VAT

C-8800

. . . AND WHAT ABOUT THESE?

YAESU's latest hand-held, the FT-207R, microprocessor controlled, synthesised, with four memories, 2·5W output, LED frequency display . . . and TRIO's answer, the TR-2400, with 10 memories, LCD readout etc. Each has so much to offer, so try them both here and see which is right for you.

FT-207R £199 inc VAT

TR-2400 £210 inc VAT

CLOSED WEDNESDAY, BUT USE OUR 24-HOUR ANSAFONE SERVICE

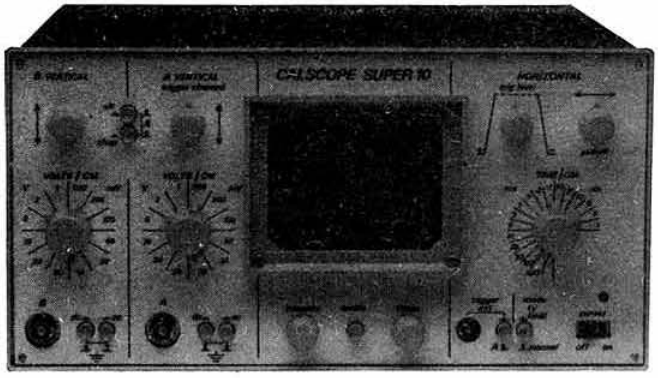
EASY TERMS UP TO 2 YEARS

CREDIT SALES BY TELEPHONE

INSTANT HP FOR LICENSED AMATEURS

Calscope-the professional Scope you've always needed

Now available from South Midland Communications Ltd. of Totton

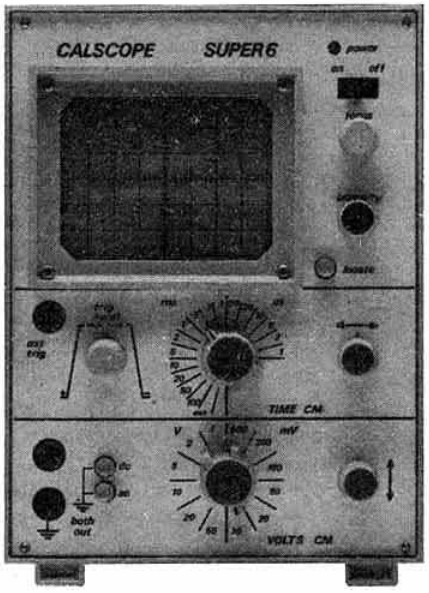


Super 10
£219.00 + VAT

This Calscope Super 10 dual trace oscilloscope is a 10MHz-3dB with 3% accuracy on time and voltage measurement. Instrument usable up to 20MHz. A truly professional instrument at a very realistic price.

Super 6
£162.00 + VAT

This Calscope Super 6 single beam oscilloscope is a 6MHz-3dB instrument usable up to 9MHz. With easy to use controls and a specification that would outclass many more expensive oscilloscopes.



Both instruments are available ex stock at the Main office (Totton) and at the Chesterfield, Leeds and Woodhall Spa branches.

SOUTH MIDLANDS COMMUNICATIONS LTD

S M HOUSE, OSBORNE ROAD
TOTTON, SOUTHAMPTON
HAMPSHIRE SO4 4DN

TELEPHONE: TOTTON (0703) 867333
CABLE: 'AERIAL' SOUTHAMPTON
TELEX: 477351 SMCOMM G

KYOKUTO

KYOKUTO DENSHI COMPANY LIMITED

NEW! 2025 FM DIGITAL SYNTHESIZED TRANSCEIVER

★ **Custom designed microprocessor control**
★ **25kHz *and* 12·5kHz synthesizer steps!!**
★ **'Instant QSY', 10 times rate button**
★ **25 Watts of reliable RF output**
★ **Band scan between any 'easy set' limits**
★ **10 write-in non-volatile memory channels**
★ **Memory scanning with hold facility**
★ **Standard ± 600kHz or any repeater split**

The KDK FM2025E is a 12V DC two-metre FM transceiver for mobile or base station use. Although packed with more features than any previous model, operation is made even easier, by using a "custom built" microprocessor.

Digital frequency synthesis provides full band coverage 12·5kHz or 25kHz steps. "Single knob" frequency selection is by an optically coupled encoder plus a dialling speed switch that increases the tuning steps tenfold to facilitate the selection of widely spaced frequencies.

An electronic memory, with Ni-Cd back-up, provides 10 simplex (plus standard ±600kHz shift) and/or five semi-duplex channels from the 10 slot, two group store, making the 2025 as easy to use mobile, as a crystal controlled transceiver. One memory slot is semi-dedicated to "priority" use, and is programmable even when the 2025 is dial controlled.

The 2025 embodies the best non-lockout scanner available. It seeks occupied or empty channels and a flick switch hold facility enables immediate transmission on a desired frequency. The scanner functions on both memory channels and across any selected portion of the band; scan limits are defined by two of the memory channels.

Dual gate UHF MOSFETS in the RF and mixer provide superior intermodulation performance with high sensitivity maintained over the band by auto varicap tuning.

A monolithic crystal filter in the first IF and a commercial quality 15-pole ceramic filter in the second IF provides extremely sharp selectivity. A one-chip multifunction IC provides all the second conversion circuitry.

The single conversion transmitter uses a balanced mixer and a VCO on the signal frequency (directly modulated for superb FM) and a hybrid power module for 25W (or 3W) RF output. The PA is impervious to breakdowns under infinite VSWR and produces a substantially spurious free signal. All necessary control function instructions are programmed into the microprocessor itself. But by re-arranging a diode matrix, the lower frequency transceive limit, the high frequency receive limit and the high frequency transmit limit may be altered to allow for changes of band plan or location.

Switchable auto-tone-burst, RF attenuator, squelch, microphone, microphone clip, power lead, mounting bracket, handbook are, of course, part of the package.

CALL IN AND SEE ONE IN YOUR LOCAL DEALER'S TODAY

The Price £250 inc. VAT (£217.39+VAT) inc. Securicor Delivery

SOUTH MIDLANDS COMMUNICATIONS LTD

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ASCOT

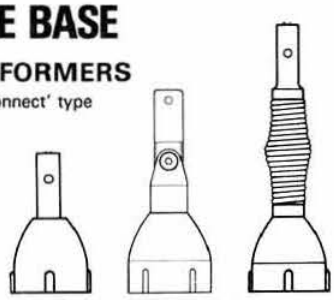
THE FIVE-EIGHTS ANTENNA A SIX POINT GUIDE!

1 PICK THE BASE

BASE TRANSFORMERS

Screw on 'quick disconnect' type

- ★ 130-175MHz
- ★ 3dB Gain
- ★ 5MHz Band
- ★ 1·5:1 max
- ★ 100W Rated
- ★ 50 ohm nom.
- ★ A100 nylon
- ★ Chrome plated
- ★ Stainless spring
- ★ Beryllium Cu.



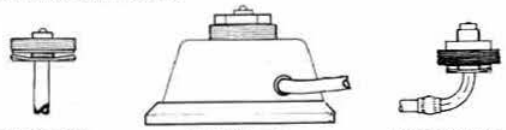
STANDARD (440) £3.50 | SWIVEL (330) £4.45 | SPRUNG (341) £6.65

2 CHOOSE THE MOUNT

all fit the above

BASE CONNECTORS

All c/w 4.5m coax



STANDARD (085) £2.80 or MAGNETIC (092) £8.95 or FIBRE-GLASS (085LR) £3.35

3 ADD AN ACCESSORY

(if required)

MOUNTS AND COVERS

universal type fitting the standard cable assembly

Blank-off (031) £0.80 and Boot-lip (093) £2.90 or Gutter clip (089) £4.75

4 SELECT THE WHIP

STAINLESS STEEL GROUND TAPERED

(057) 127cms long £1.95

5 ADD THE CARRIAGE

Mail order is offered direct from SMC HQ and the Branches.
Carriage £1.00 complete antennas or £0.50 for accessories any quantity.

6 ADD THE VAT+15%

An illustrated leaflet on the full range of ¼λ and ½λ antennas is available

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PEP & LEVEL RESPONSE IN-LINE WATTMETERS

The FS700 series are flat frequency response, peak envelope power and R.M.S. in-line wattmeters with many novel features. The most notable being the 'power independent' SWR scale—no forward power calibration knob, just a direct reading SWR scale.
Get into the Hansen habit today.

Specifications	FS700H	FS700V
Freq. Range	1·8-60MHz	50-150MHz
Power FSD	15,150, 1·5kW	15,150W
V.S.W.R.	1:1 to 4:1 and 1:1 to 20:1	
Accuracy	±7% of FSD	
Impedance	50-52 Ohms	
Connectors	SO239	
Power	240 Volts AC 50Hz	
Weight	3·3lbs (1·5Kgs)	
Size overall	8" × 4" × 5½" (205 × 100 × 140mm)	
Size Meter	2" × 3¼" (51 × 97mm)	
Time Const.	PEP follow 4 seconds PEP Hold 600 seconds	

FS700H or FS700V **£68.00**

FS500

PEAK READING WATTMETER
Power RMS and PEP ±7% FSD
SWR Measurement 1-5:1
Size 8" ×4" × 5½"

FS500H	1·8-60MHz	20, 200 & 2kW	**£59.00**
FS500V	50-150MHz	20 & 200W	**£59.00**

FS60*

PEAK READING WATTMETER
Power RMS & PEP ±10% FSD
SWR measurements 1-3:1 ±3%
SIZE 6½", 2½", 4½"

FS601MP	1·8-30MHz	20 & 200W	**£40.00**
FS601MO	1·8-30MHz	200 & 2kW	**£40.00**
FS602M	50-150MHz	20 & 200W	**£40.00**
FS603M	430-440MHz	5 & 20W	**£40.00**

Hansen Wattmeters are available from reputable amateur radio dealers throughout Britain.

Mail order service (£0.75 post and packing) is offered direct from SMC or any branch.

The range encompasses level response wattmeters and remote indicator types. Please contact your local stockist for further details.

NB. All prices exclude VAT at 15%

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VERSATOWER

TELESCOPIC & TILTOVER RADIO TOWERS

Twelve years of continuous development has produced a range of over 50 models, all of which conform to the current B.S.S., requiring *minimum* designed wind speeds of 85mph and up to 117mph.

Before purchasing a Tower, we strongly recommend consulting one of our engineers for advice regarding the most suitable combination for an installation. *It would be incorrect to nominate a specific headload as this is dependent upon load distribution, geographical location and siting.*

25–120ft, post, base plate, wall, fixed base or mobile (on high-speed trailer) versions.

Price of towers are for the complete package – tower sections, mounts, telescopic and luffing gear, guys, head unit and winches. AS APPROPRIATE FOR ANY PARTICULAR MODEL

The sample of prices exclude VAT and delivery

STANDARD 13M20 SERIES				*HEAVY DUTY 16M20 SERIES*			
Post Mounting 13M20				*Post Mounting* 16M20			
P25	25'	Tower	£236.20				
P40	40'	Tower	£323.60	P40	40'	Tower	£476.60
P60	60'	Tower	£392.70	P60	60'	Tower	£541.10
Fixed Base 13M20				*Fixed Base* 16M20			
FB25	25'	Tower	£175.60				
FB40	40'	Tower	£262.40	FB40	40'	Tower	£382.20
FB60	60'	Tower	£332.20	FB60	60'	Tower	£446.70
Socket Types 13M20				*Socket Types* 16M20			
SP25	25'	Tower	£274.60				
SP40	40'	Tower	£361.50	SP40	40'	Tower	£528.50
SP60	60'	Tower	£431.30	SP60	60'	Tower	£592.70
Base plate 13M20				*Base plate* 16M20			
BP25	25'	Tower	£276.00				
BP40	40'	Tower	£361.90	BP40	40'	Tower	£496.30
BP60	60'	Tower	£431.20	BP60	60'	Tower	£560.70
Wall Mounting 13M20				*Wall Mounting* 16M20			
W25	25'	Tower	£190.20				
W40	40'	Tower	£277.00	W40	40'	Tower	£390.30
W60	60'	Tower	£346.80	W60	60'	Tower	£449.50

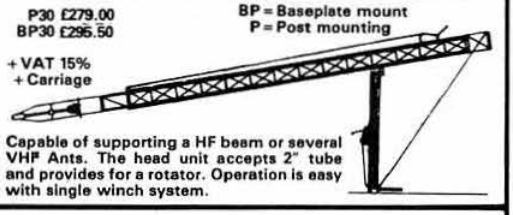
80-85-100-120' and MOBILES PRICES ON APPLICATION

NEW '30ft': 10ft SECTIONS

P30 £279.00
BP30 £295.50

+ VAT 15%
+ Carriage

BP = Baseplate mount
P = Post mounting



Capable of supporting a HF beam or several VHF Ants. The head unit accepts 2" tube and provides for a rotator. Operation is easy with single winch system.

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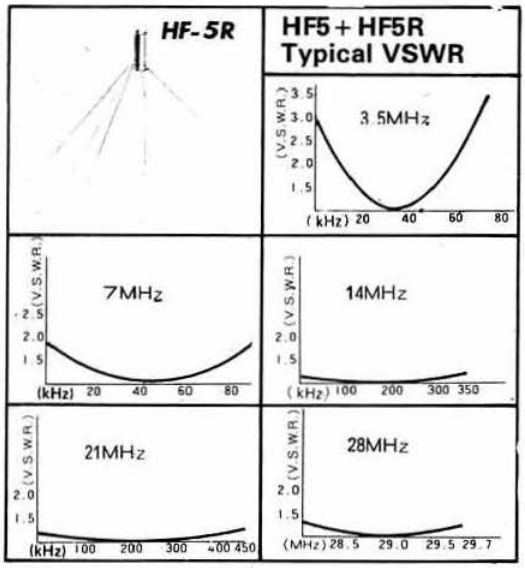
SMC-HS

FIVE BAND VERTICAL ANTENNA

Only 15' 9" high (4.8m) and around 1⅝" in diameter (4.2cm). This remarkable new antenna operates on 80, 40, 20, 15, and 10 metres. Power handling of 500W PEP on 10, 15 and 20m and 200W PEP on 40 and 80m, within its 1.5:1 V.S.W.R. bandwidth.

The SMCHF5 weighs only 6lb 6ozs (2.9kg) and is suitable for mounting at ground level on a good earth post (with or without radials) or in an elevated position with wire radials or better still the SMCHF5R.

THE SMCHF5R Radial kit, with power handling capabilities of 150W PEP weighs only 4lbs (1.8kg) and is the perfect answer to restricted locations, consisting as it does of five solid rods of similar length 6' 6"–7' 3" (2.05–2.2m) sloping at 45° to the antenna.



SMCHF5V and SMCHF5R are available from reputable amateur radio dealers throughout Britain.

SMCHF5V £35.00 + 15% VAT, £40.25 Ex-works
SMCHF5R £25.65 + 15% VAT, £29.50 Ex-works

Carriage–Antenna or radial or both together
SECURICOR DELIVERY £3.30 + 15% VAT, £3.80
RAIL DELIVERY £1.50 + 15% VAT, £1.73

Check out our exciting new range of mobile and VHF colinear antennas today.

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South Midlands

SMC & YAESU FOR HF—SMC & YAESU FOR HF

FT707 NEW SOLID-STATE TRANSCEIVER

The FT707 'The Wayfarer' is an ultra-compact solid-state transceiver covering 80-10m, including 30, 17 and 15m—all factory installed, with 100W output (IOW's' model) 50% out developed in 3:1 VSWR, digital (bright LED's in mode sensitive counter) and analogue readout, status at a glance (from string LED and single displays) 16 poles of crystal filtering continuously adjustable IF bandwidth 2·4kHz to 300Hz. Noise blanker of most advanced design using local AGC loop, Schottky diode ring module, power transistor buffers, ultra-clean low noise local oscillator are combined to produce, size and price not withstanding: Probably the best receiver you have ever used.

FT707 Transceiver 100W	£455.00	FV707DM Ext. Dig. VFO	£157.00	FP707 12 Volt P.S.U.	£95.00	MMB707 Mobile Mounting	£12.00
FT707S Transceiver 10W	£425.00	FC707 Antenna Tower	£63.00	MR7 Rack Mount Cabinet	£11.50	YM35 Scanning Microphone	£11.00

FT107M

FT107M SOLID STATE TRANSCEIVER

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	FC107 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

FT901DM THE SUPERB PERFORMER

160-10m (+WWV Rx), 12 and 234V (PSU Built-in). SSB, AM, CW, FSK and FM (Tx & Rx), 180W. PIP, 80W FI. Analogue 1kHz and Digital to 100Hz. Sensitive, ½µV 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 350/600Hz, 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 output 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	YO901 Monitorscope	£240.00	430-440 70cm module	£160.00	FL2100Z Linear Amp.	£355.00
FT901DE Transceiver	£700.00	YO901P YO901 with par	£280.00	50-54 6m module	£60.00	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

FT101ZD PERFORMANCE AND ECONOMY

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, 3 band 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 | FV101Z £110.00

FT7B & YC7B

FT7B MOBILE AND BASE TRANSCEIVER

A compact all solid state HF transceiver. 80-10M. (full 2MHz coverage of 10 with optional crystals). USB-LSB CW-AM. 100W PIP (A3j and A1), 25W (A3). VFO control with clear analogue scale to 1kHz, plus an optional digital readout unit that can be conveniently sited above the transceiver, on the dash or steering column. The front panel remains remarkably uncluttered for a transceiver boasting a; crystal calibrator, vox, clarifier, side tone, and an excellent audio peak filter for CW. A mosfet RF stage for sensitivity, and a schottky diode ring mixer for dynamic range provides a level of receivers performance that outclasses "competitive" (?) transceivers. Supplied complete with mobile bracket, microphones, leads, plugs, etc. The FT7B provides the economic answer to world wide communications from home or from the car.

FT7B Transceiver £375.00 | YC7B Digital Readout £60.00 | FP12 12V 12A PSU £67.00 | YD148 Desk Mic. £18.50

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

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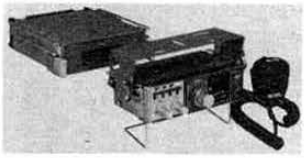
YAESU

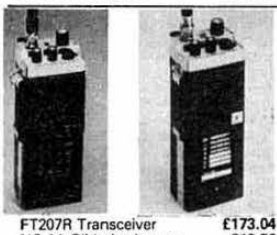


FT720R NEW 'REMOTABLE'

The FT720R is a new concept in mobile FM. Take a neat 'remotable' control head (2m or 4m of extension cable and your choice of 2m (10 or 25W) and 70cm 10W main units. Add if you wish a switching box and both 2 and 70cms are available from the one money and space saving controller.

The package offers sophisticated microprocessor PLL control system, optical coupled tuning, 5 memory channels, priority channel, up/down scanning from the mic (stop on busy or empty), auto or man. Tone burst up/down repeater shift and a string of yellow and red leds for power out and S meter etc.

FT720R Control head **£130.00** — S72 Switching box **£47.50** — E72S 2m cable **£20.00** — E72L 4m cable **£23.50** — 720RV Transceiver 10W 2m **£148.00** — 720RVH Transceiver 25W 2m **£153.00** — 720RU Transceiver 10W 70cm **£179.00**



FT207R–FT202R: 2m HANDHELDS

The FT207R is a microprocessor controlled synthesized handheld that offers 12·5kHz 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 **£16.50** — NC-2 Charger eliminator **£34.50** — NC-9C Small charger **£6.50** — NBP-9 Nicad pack spare **£14.50** — FBA-1 Pack/charger adaptor **TBA** — YM24 Speaker/mic **£14.50** — FLC1 Heavy duty case **TBA** — AA Nicads, each **£0.87** — FT202R Transceiver **£103.50** — NC-1 AC charger '202 **£16.50** — PA-1 12V PSU '202 **£16.50**

CPU2500 MICROPROCESSOR CONTROLLED

The CPU2500 family are 2 metre FM transceivers available in 25W or 10W output form with keyboard or standard push tune microphones. CPU stands for Central Processing Unit and it is this microprocessor that governs the synthesizer functions. Frequency control is possible either by rotating the main tuning knob (optically coupled), by using the up/down push buttons on the front panel, by using the up/down buttons on the microphone or by tapping in the data on the keyboard microphone. Plus and minus 600kHz repeater shift and any split (up to 4MHz) can be programmed in. Four memory channels with back-up are provided and these may be scanned, as can the whole band, the scanner stopping at the first vacant or occupied channel. The SMC stepper (St) provides 25kHz steps between 145–146MHz (and entry of 5kHz direct from the keyboard) rather than the 10kHz (+5 up) synthesizer steps only, when it is switched into circuit.

CPU2500R 25W standard **£292** — CPU2500St 25W c/w stepper **£319** — CPU2500RKS 10W key mic **£292** — CPU2500RKSSt 10W key, stepper **£319** — CPU2500RK 25W key mic **£308** — CPU2500RKSt 25W key, stepper **£335** — CPU2500RS 10W standard **£272** — CPU2500RSSt 10W c/w stepper **£279**

FT227 SYNTHESIZED MOBILE TRANSCEIVER

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 synthesizer, which basically turns in 10kHz steps with a 5kHz 'fill in' oscillator.

FT227RXS is 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) unwanted channels next scan around.

FT227RBXSt is 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 25kHz, hold the button down for ½ second and it scans the band until a station is found.

FT227RXS Transceiver **£252.17** — FR227RBSt Transceiver **£247.83** — FP4 12V 4A PSU **£35.00** — YD148 Desk mic **£18.50**

FT225RD MULTIMODE 2 METRE TRANSCEIVER

144–146–148MHz. USB, LSB, AM, FM, CW (semi-break-in with side tone). Smooth dual speed VFO control and 11 (×4) 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 option **£85.00**. — COUNT Counter R/RD **£50.00**

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

Access

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OF PROFESSIONAL EXPERIENCE

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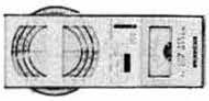
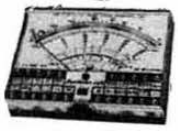


DIP OSCILLATOR
1-5 250MHz on fundamental c/w earphone, battery, 6 plug in coils 1-15MHz crystal test, 2kHz modulation.
LDM815 (p&p foc) **£45.00**

V.H.F. LINEAR AMPLIFIER
80W out for 10W nom drive. 145MHz 12V (circa 10A). Switchable; SSB/FM Hang time. RF or man cont. Low noise pre-amps
RC1 Remote control (p&p £0.40) **£15.00**
B108 Amplifier (p&p foc) **£99.00**

WATT METERS
Through line, 1.8-54MHz, SWR scale.
LMP885 20, 200, 1000W FSD (p&p foc) **£51.00**
Absorption 1.8-500MHz
LDM 880 5, 2, 120W FSD (p&p foc) **£79.00**



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

VHF/UHF SWR/POWER METER
Power 10W FSD on 50 (70), 144, 432MHz VSWR. Calibrated to 3:1 50 ohms
Detachable RF head/indicator unit
UH74 (p&p £0.60) **£12.75**

DIGITAL MULTIMETER
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ME522 (p&p foc) New Low Price **£38.26**

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12V dc operation, 50 ohms. 1kW PEP @ 30MHz 50dB isolation at 1 GHz. 0.2dB loss at 0.5GHz.
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240V 50/60Hz input
3 Amps cont. 5 Amp peak 3 × 4½ × 6". 3½lbs
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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.
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NEW SOLID-STATE HF TRANSCEIVER

The FT707 'The Wayfarer' is an ultra-compact solid-state transceiver ideally suited for the home station or as a travelling companion, providing performance previously proffered only by the 'Top liners'.

The FT707 is THE radio of the eighties: 80–10m, including 30, 17 and 15m—all factory installed—100W output (10W's' model) 50% developed in 3:1 VSWR—Digital, bright LED's in mode sensitive counter and analogue readout—Transceiver status at a glance, from string LED and single displays—16 poles of crystal filtering provides continuously adjustable IF bandwidth 2·4kHz to 300Hz (N.B. This is true 'variable bandwidth' that minimises much of the adjacent channel interference not 'IF shift')—Noise blanker of most advanced design using local AGC loop—Schottky diode ring module, power transistor buffers, ultra clean, low noise local oscillator are combined to produce, size and price notwithstanding—*Probably the BEST receiver you have ever used.*

The FV707DM is an external digital VFO that uses an advanced twin loop PLL to provide 10Hz tuning steps with excellent spectral purity. The addition of this 1" high package, with its 12 channels of memory with Receiver independent tune and internal/external (mic), up/down, fast/slow scanning, perfects the FT707 for mobile or contest use.

Illustrated below (L to R): The FP707 regulated power supply, the FT707 and the FC707 antenna coupler/switch/SWR meter on top of the FV707DM.

For further details of this exciting new system, please contact any authorised sales outlet for a free colour brochure. Better still: *see it for yourself—try one out today!!!*

FT707
*80–10 metres (including 10, 18 and 24MHz bands!!!!)
*USB—LSB—CWW—CWN—AM (Tx and Rx operation)
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*AGC; slow-fast switchable from the front panel
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*25kHz crystal calibrator feature
*Internal, xtal or external VFO control

FV707DM
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*Scanning: up/down, fast/slow from mic or unit

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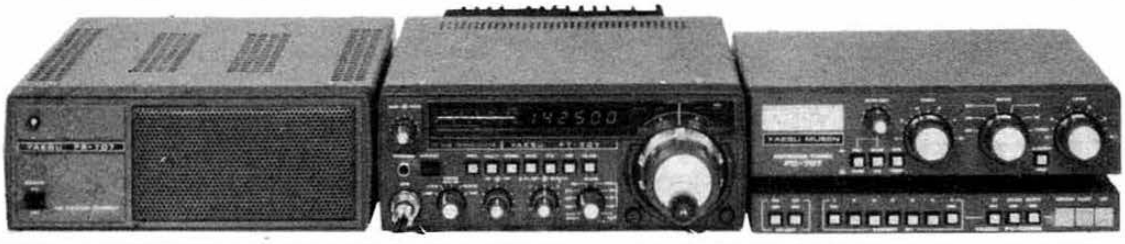

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J. Anthony, G3KQF

Correspondence to RRs and honorary officers should be addressed directly to them (QTHR).

RADIO SOCIETY OF GREAT BRITAIN

35 Doughty Street, London WC1N 2AE
Telephone 01-837 8688

Founded 1913 · Incorporated 1926
Member society, International Amateur Radio Union

PATRON: HRH The Prince Philip, Duke of Edinburgh, KG

The national society representing all UK radio amateurs

Membership is open to all those with an active interest in radio experimentation and communication as a hobby. Applications for membership should be made to the general manager, from whom full details of Society services may also be obtained.

GENERAL MANAGER AND SECRETARY
D. A. Evans, G3OUF

EDITOR
A. W. Hutchinson

ANNUAL SUBSCRIPTION RATES

UK corporate: £10, including VAT — **Overseas: £10**

Associates under 18: £4. — **Students aged 18 to 21: £6**
(Student applications should give the member's age at last renewal date and include evidence of student status)

Affiliated societies: £10 (including *Radio Communication*);
£6 (excluding *Radio Communication*).

RSGB NEWS BULLETIN SCHEDULE

INTENDED RECEPTION AREA	NORMAL READER	RESERVE READER	LOCAL START TIME
Frequency: 3,640kHz. Mode: SSB			
NE Scotland	GM3HGA	GM3VEY	1130
Frequency: 3,650kHz. Mode: SSB			
SE England	G2MI	G4ARZ	0900
Midlands	G2CVV	G8QZ	0930
SW England/Wales	G8ML	G3JFH	1000
N Ireland	GI3GAL	GI3SXG	1030
NE England	G5VO	G3MCF	1100
E Scotland	GM4CUZ	GM4FLP	1430
Frequency: 3,660kHz. Mode: SSB			
Central Scotland	GM3TCW	GM3ULP	1130
Frequency: 7,047·5kHz. Mode: AM			
UK	G3LEQ	G2CVV	1100
Frequency: 144·250MHz. Mode: SSB. Horizontal polarization			
SW from Midlands	G3BA	G3KQF	0930
NE from S Devon	G3CHN	G3PBV	1000
NW from Manchester	G3SMT	G4IAL	1000
NNW from Cleveland	G8LIC	G8FTZ	1000
W from Carlisle	G8DVD	G8OAU	1030
SE from Lincoln	G8OFQ	*(Vacancy)*	1030
SW from London	G3FZL	G3IIR/G3VAG	1030
S from Aberdeen	GM8GHV	GM3ZBE	1030
W from Bristol	G4CJZ	G3ZWY	1100
W from Bangor, Co Down	GI3TLT	GI3SXG	1130
Frequency: 145·525MHz (S21 FM). Vertical polarization			
Jersey	GJ8KNV	GJ4ICD	0930
Cornwall	G2ABC	G3NPB	0930
Hampshire, north	G8CKN	G3PZN	0930
Suffolk	G3ZNU	G4FSG	0930
Leeds	G3SPX	G3PSM	0930
Co Down	GI3WEM	*(Vacancy)*	0930
Edinburgh	GM4EHO	GM8PKQ	0930
E Cornwall/S Devon	G3ZYY	*(Vacancy)*	1000
Londonderry	GI2DHB	GI4AHD	1000
London	G3FZL	G3IIR/G3VAG	1000
Birmingham	G3PWJ	G3BA	1000
Lincolnshire	G8OFQ	(Vacancy)	1000
Tyneside	G4FUT	G3WNR	1000
Glasgow	GM4HCO	GM4CXM	1000
Elgin	GM4ILS	(Vacancy)	1000
Southampton	G8LVC	G8ADM	1030
E Sussex coast	G8SC	G3ZFE	1030
Bristol	G4CJZ	G3ZWY	1030
Manchester	G3LEQ	G3JWK	1030

QTC

amateur radio news

Repeater report

There are now over 110 licensed repeater stations in the UK, most of them supported by repeater groups, some of which have a membership running into three figures. The RSGB's function as the licensee of all repeater stations is to be responsible to the Home Office for all aspects of repeater licensing and operation.

In order to maintain a regular link with repeater groups, the RSGB circulates a special newsletter to them so that they can be kept up-to-date with the latest news and requirements for repeater operation. In most cases groups are able to pass on this specialist news to members of their groups through their own local newsletters. Any member of a local repeater group who has not yet seen this publication should contact his group secretary.

Tax relief?

Members who are engaged professionally or commercially in the electrical or electronic fields are reminded that they may be able to obtain income tax relief in respect of the subscription they pay to the RSGB. Full details and conditions concerning the eligibility of such subscriptions will be found in the notes accompanying the Income Tax Return Forms for 1980/81.

QSL Bureau, assistance required

Would any member living in, or travelling through south-west London who is willing to sort incoming QSL cards on an occasional basis, please contact the QSL Bureau manager, G3DRN, 30 Bodnant Gardens, London SW20 0UD.

RAE classes

Following the "QTC" item in *Radio Communication* December 1979, an ex-member of the Kingston & D ARS, who is professionally engaged in radio engineering, has agreed to run RAE classes. These will be held at "Alfriston", Berrylands Road, Surbiton, on Tuesday evenings from 15 April to 28 October, the objective being to enable students to take the December 1980 RAE.

Further details are available from N. Smith, G3HFO, 7 The Byeways, Surbiton, tel 01-399 9526.

HQ closed for a day

RSGB HQ will be closed during the Alexandra Palace Exhibition on Friday 9 May.

Please advise

Members may have noticed that Parliament recently renewed the Prevention of Terrorism Act for a further year. This statute gives the police sweeping powers which are often not realized by the ordinary citizen. There have been several instances recently when licensed radio amateurs have been stopped and interrogated by the police on a suspicion of having and using equipment operating on 27MHz.

It has been reported that the police were unwilling to attach any importance to the production of an amateur licence. The Society is well aware of these incidents, and has already asked the Home Office to take such steps as are necessary to safeguard the position of the licensed radio amateur.

Any member who is stopped and interrogated by the police is asked to please report the circumstances to the general manager at RSGB HQ.

Appeals for drugs

The British Red Cross Society has drawn attention to the procedure for dealing with requests for drugs from foreign countries. They can only accept requests for drugs from or through the national Red Cross Society of the country concerned, and cannot accept requests for drugs from individual radio amateurs, even when such requests are passed on via police authorities.

The RSGB recommends UK amateurs who may be asked by a foreign amateur to accept a message for a rare drug to advise the sender to contact his own national Red Cross Society.

"Interference—its causes and cure"

This is the title of an article by Harry Leeming, G3LLL, published in *Hi-Fi News*, December 1979. The article instructs the user of hi-fi equipment that most interference problems are due to shortcomings of his equipment. This may be of use to radio amateurs in the event of complaints of interference to hi-fi equipment.

Members may obtain copies of this article from Holdings Photo Audio Centre, Mincing Lane, Darwen St, Blackburn BB2 2AF, either over the counter or by sending an sae, and from CB Electronics Unit Three, 771 Ormskirk Road, Pemberton, Wigan, Lancs.

"Some refinements for the G3PLX vdu"

The author of this article, published in the July 1979 issue of *Radio Communication*, has notified the following amendments:

1. ICC pins 4 and 14 should be grounded; pin 14 is incorrectly shown grounded twice.
2. ICD pin 14 (not pin 4) should be connected to row address (36); pin 4 should still be grounded.
3. ICH pins 3, 4 and 16 should be connected to +5V via a 1·2kΩ pull-up resistor, not pins 13, 14 and 16 as shown. Pin 13 should be grounded as shown in the ic list. Pin 14 should be left unconnected.
4. ICF pin 2 should go to input board reset (28), not to the memory board as shown.

"Frequency swept reception"

The author of this article, published in the February 1980 issue of *Radio Communication*, has notified the following amendment: page 145, lines 10–12, the voltage ratio corresponding to 68dB is $6{\cdot}3 \times 10$, and for this ratio, assuming p-p output, the input signal is $0{\cdot}015\mu V$.

He has also received information about a much cheaper log amplifier ic than the SL521 used in the prototype. This is the SL1613C, and an application note for it, No PS1659 (Jan 1979), is available from Plessey Semiconductors.

Missing and stolen equipment

FDK Palm 2 144MHz transceiver, serial number 05009, since June 1979, presumably in the post between Germany and Waters & Stanton Electronics, Essex. Any information to R. Dunn, G8CDI, British Forces Broadcasting Service, Germany, BFPO 19.

On 30 January 1980 from 43 Copse Avenue, West Wickham, Kent: Yaesu FRG7, fine tune with modified ssb filter, serial number 6H505021; Daiwa CL22 atu, and Philips mono tape recorder. Any information to J. W. Dainty, BRS42293, at the above address.

NRSA exhibition

The Northern Radio Societies Association Radio & Electronics Exhibition will be held at Belle Vue, Manchester on Sunday 27 April; doors open at 11am.

Full details appear on pages 326–7 in this issue.

AMATEUR RADIO CONVENTION

9am–6pm, Sunday 20 April 1980

Martin Road, West Leigh, Havant

(Restaurant area of Plessey Avionics and Communications)

This convention is being organized by the Plessey West Leigh Radio Society by kind permission and assistance of the Plessey Co Ltd and the site general manager.

Lectures on the following

"The outcome of WARC" by Eric Godsmark, G5CO
"E-M-E" by Charles Suckling, G3WDG
"Microwave antennas" by Mike Walters, G3JVL
"Linear ics in communication receivers" by Peter Chadwick, G3RZP
"Semiconductor discrete devices" by Peter Tunbridge, G8DEK
"FM repeaters" by Roy Powers, G8CKN

There will be an exhibition of Plessey communication equipment but no trade exhibition

Seating for 250 **Ample car parking**
Bar and buffet facilities 12 noon–2pm
No admission fee, but donations to RAIBC will be gratefully accepted.

The organizer, T. R. Greeman, G8HND, would appreciate an indication from members wishing to attend, preferably by writing with sae (QTHR) or by phone to Havant 486391 extension 369 between 8.30am and 5pm. This will assist with catering arrangements.

Kite-borne antennas

Concern is being expressed at the growing number of amateurs who use kites to raise long-wire antennas from hill tops. These can be a danger to low-flying aircraft, and the following regulations of the Air Navigation Order 1980 are drawn to members' attention:

65 (1) (a) "A captive balloon or kite shall not be flown at a height of more than 60 metres above the ground level or within 60 metres of any vessel, vehicle or structure."

65 (1) (d) "A kite shall not be flown within 5 kilometres of an aerodrome."

REGIONAL REPRESENTATIVES

REGION 4

Mr N. J. H. Grassby, G4CPY, has resigned as representative for this region because of pressure of other commitments.

Not later than 28 April 1980, any five corporate members resident in Region 4 (Derbyshire, all that part of Humberside south of the River Humber, Leicestershire, Lincolnshire, Nottinghamshire) may nominate any other qualified corporate member resident in the region for the office of Region 4 representative by delivering their nominations in writing, together with the written consent of the nominee to accept office if elected, to the general manager at RSGB HQ. Each such nominator shall be debarred from nominating any other person for this election.

In the event of more than one person being nominated, a ballot will be conducted, details of which will be published in the June issue of *Radio Communication*.

REGION 10

Valid nominations for this appointment have been received in respect of:
Mr P. Jones, GW4HAT, nominated by B. W. Coverley, GW3OGG; D. J. D. Doherty, GW4HZH; L. S. Garley, GW4ALJ; F. C. Rudd, GW4BIQ, and J. R. Dowdall, GW8HDH.
Mr J. Lawrence, GW3YJL, nominated by J. A. Brown, GW3RNC; C. Snook, GW4HCV; G. Williams, GW8TRJ; G. Edwards, GW8CNG, and G. C. May, GW8TIX.
Corporate members residing in Region 10 (Dyfed, Gwent, Mid Glamorgan, Powys, South Glamorgan, West Glamorgan) are invited to vote for one of these candidates by sending a postcard in the following form addressed to: The General Manager, RSGB, 35 Doughty Street, London WC1N 2AE, to arrive not later than 28 April 1980.

I.....,
being a fully paid up member of the RSGB resident in Region 10, wish to record my vote in favour of

Mr.....as representative for Region 10.

Signed .....

Callsign or BRS number .....

Address .....

REGION 14

One nomination was received to fill the vacancy in this region, in respect of **Mr C. W. Tran, GM3WOJ**. At its meeting on 13 March, Council approved the appointment of GM3WOJ as representative for Region 14.

REGION 20

Mr G. Mather, G3GKA, has resigned as representative for this region because of pressure of other commitments.

Not later than 28 April 1980, any five corporate members resident in Region 20 (Avon, Gloucester, Somerset) may nominate any other qualified corporate member resident in the region for the office of Region 20 representative by delivering their nominations in writing, together with the written consent of the nominee to accept office if elected, to the general manager at RSGB HQ. Each such nominator shall be debarred from nominating any other person for this election.

In the event of more than one person being nominated, a ballot will be conducted, details of which will be published in the June issue of *Radio Communication*.

A 144MHz synthesized fm transceiver

by N. G. HYDE, CEng, MRAeS, MIERE, G2AIH*

(PART 2)

Circuit description (continued)

Receiver (Fig 4)

A low-noise flatpack mosfet Type BF900 (TR1), having a reputed nf of less than 2dB at 200MHz, is employed as rf amplifier. This stage is coupled to a second rf amplifier (TR2) on the converter board. The second amplifier is bandpass-coupled to the second mixer (TR3); both these stages employ dual-gate mosfets.

The circuitry associated with the receive heterodyne oscillator is similar to the corresponding unit in the transmitter. For simplex operation S3b switches a 13·697222MHz crystal (X1) into the oscillator circuit; to operate on repeater channels a 600kHz upshift is obtained by a 13·763888MHz crystal (X2). When S3 is set to the repeater position, out-of-band signals could be received at certain settings of the TENS channel switch S1, and so in a manner similar to that employed in the transmitter, repeater operation is possible only when S1 is in the "0" position, by linking the crystal switch with S1c.

TR4, the crystal oscillator, is followed by two ×3 multiplier stages (TR5 and TR6). For simplex operation the resultant output frequency from TR6 is thus 123·275MHz, which is applied to gate 2 of TR7, another dual-gate mosfet functioning as first mixer. To gate 1 of TR7, 11·025 to 12MHz from the vco buffer is applied, the resultant output from the mixer being the sum of these, namely the final heterodyne frequency of 134·3 to 135·3MHz. The mixer is followed by an amplifier stage (TR8) which is coupled to a second amplifier (TR9) located on the converter board, and this raises the injection voltage to a level adequate to secure optimum conversion gain from the second mixer (TR3). In the author's opinion the performance of many home-constructed (and commercial) converters is degraded due to inadequate injection voltage and the presence of unwanted frequencies at the output of the heterodyne oscillator-multiplier.

The reason for capacitance coupling, through C57 and C58 from the second mixer output circuit, is because during early stages of development this particular board was used as transmit mixer, with satisfactory on-the-air results. Although with the double-balanced mixer now used in the transmitter the generation of unwanted products is lower, it was felt that the added expense was not justified for the receiver.

The 10·7MHz i.f. at the output of the second mixer is routed to the input of the i.f. amplifier, and it is in this stage that receiver selectivity is obtained, by the eight-pole crystal filter (FL1). Input and output of the filter are coupled through matching transformers T2, T3 and terminating resistors R39 and R40 respectively. The circuit of the variable-gain i.f. amplifier IC1 is similar to that of the vco buffer in the transmitter, the difference between the two being in the single-ended output circuit following IC1.

Output from the i.f. amplifier is coupled to the limiter and quadrature IC2. A crystal quadrature element is employed, the crystal having an actual frequency of 10·698MHz which is set to 10·7MHz by a series trimmer C78. Supply voltage to the ic is reduced to 10V by ZD2.

In the mechanical design of the equipment, provision has been made for inclusion of an S-meter and squelch control. The TAA570 device at present fitted as limiter and quad detector does not provide either of these facilities, and it is proposed to replace this circuit board by one using a more sophisticated ic that will provide these refinements.

A conventional low-power audio amplifier (IC3) follows the quadrature detector, giving an af output of approximately 1·5W. R52 and C86 constitute a Zobel network to suppress any high-frequency oscillation. The external speaker is connected via a two-pole DIN switched socket; removal of the speaker automatically substitutes a 10Ω resistor as the amplifier output load.

Power and control circuitry (Fig 5)

Protection against accidental connection of reversed voltage to PL1 is provided by a shunt diode D1, a high-current device with its stud anode connected to chassis.

In the receive condition, power is applied to all sub-assemblies forming the receiver through the normally-closed contacts of RLA; this is a dpco relay with its contact sets connected in parallel to increase the current rating. Power is also

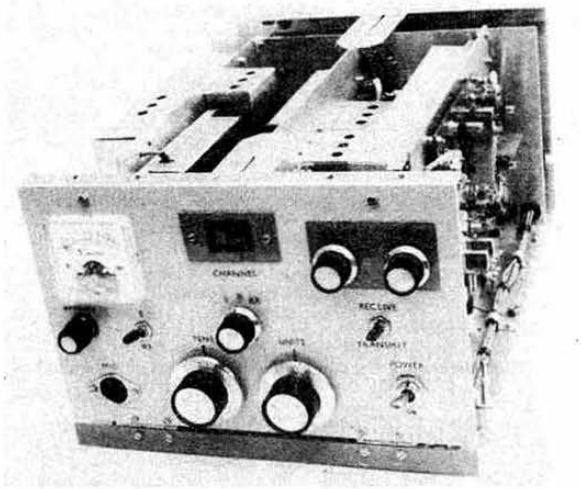


Photo 1. Transceiver with cover removed. L to r: transmitter driver, synthesizer and receiver

*114 Tattenham Grove, Epsom Downs, Surrey

Table 3. Receiver components list

R1, 5, 9, 27	330kΩ
R2	100kΩ
R3, 37	68Ω
R4, 8, 12, 38, 44	150Ω
R6, 10	150kΩ
R7, 11	270Ω
R13	1kΩ
R14	22kΩ
R15, 41, 42, 48, 51	10kΩ
R16	1·2kΩ
R17, 21, 31	120Ω
R18	47kΩ
R19, 49	6·8kΩ
R20	180Ω
R22	100Ω ¼W
R23, 47	27kΩ
R24	1·8kΩ
R25, 34	39Ω
R26, 45	100Ω
R28	120kΩ
R29, 36	2·2kΩ
R30	220Ω
R32	18kΩ
R33	1·5kΩ
R35	15kΩ
R39, 40	470Ω
R43, 46	4·7kΩ
R50	56Ω
R52	1·5Ω
R53	10Ω 1W
RV1	4·7kΩ 0·1W horizontal preset pot
RV2	25kΩ logarithmic pot
C1, 5, 8, 12, 15, 47, 64	3·3pF 63V cp
C2, 4, 6, 9, 10, 13, 17, 28, 38, 39, 52, 54, 61, 63	1nF 50V c
C7, 11, 16, 18, 23, 24, 27, 29, 30, 41, 43, 46, 53, 66, 68, 69, 70, 71, 72, 82, 89	10nF 50V c
C14, 67	2·2pF 63V cp
C19, 21	33pF 100V cp N750
C20, 22	25pF fdt DAU
C25, 26, 31, 74	100pF 63V cp
C3	1·5nF 50V c
C32, 33, 44, 48	2·2nF 50 V c
C34	12pF 63V cp
C35	4·7pF 63V cp
C36, 60	18pF 63V cp
C37	47pF 63V cp
C40, 42, 55, 62, 65	5·6pF 63V cp
C45	68pF 63V cp
C49, 56	1·8pF 63V cp
C50, 59	6·8pF 63V cp
C51	22pF 63V cp
C57	38pF fdt DAU
C58	45pF fdt DAU
C73, 75, 76, 77, 81, 84, 86, 87	100nF 25V c
C78	10pF fdt
C79, 83	10μF 25V e
C80	47nF 50V c
C85	470nF 3V c
C88	220μF 16V e
IC1	MC1350P Motorola
IC2	TAA570
IC3	LM380
TR1	BF900
TR2, 3, 7	40673
TR4	BSX20
TR5	BC107
TR6, 8, 9	BFX89, 2N918
D1, 2, 3, 4	1N914
ZD1, 2	BZY88C10
X1	13·697222MHz 30pF parallel resonance HC25U
X2	13·763888MHz 30pF parallel resonance HC25U
X3	10·698MHz
FL1	10·7MHz crystal filter Toyocom 10M-4B-1
T1, 4	10·7MHz i.f. transformer Toko KALS 1506A
T2, 3	10·7MHz i.f. transformer Toko 119LC30099N
SK1	Two-pin DIN switched speaker socket
S3b	One bank of three-pole three-way rotary switch
L2, 3	4½t 22swg enam 4mm id dust-core tuned
L1, 4	1½t 22swg enam at earth end of L2, L3
L6	3½t 22swg enam 5mm id dust-core tuned
L5	1½t 22swg enam at earth end of L6
L7, 8	3½t 22swg enam 5mm id dust-core tuned
L9, 10	13½t 26swg enam 5mm id dust-core tuned
L11	3½t 22swg enam 5mm id dust-core tuned
L12	1½t 22swg enam at earth end of L11
L13	1½t 26swg enam at earth end of L14
L14	4½t 26swg enam 5mm id dust-core tuned
L15	4½t 28 swg enam at earth end of L16
L16	22½t 28swg enam 5mm id dust-core tuned
L17, 18, 23, 24	3½t 22swg enam 5mm id dust-core tuned
L19	3½t 22swg enam 5mm id dust-core tuned
L20	3t 22swg enam 6mm id 7mm long no former
L21	1½t 22swg enam at earth end of L22
L22	3½t 22swg enam 5mm id dust-core tuned
RFC1, 2, 3	470μH Toko 7BA
RFC4	2½t 28swg enam FX1115 ferrite bead
RFC5, 6	100μH Toko 7BA

All resistorss ⅓W 5% carbon film unless otherwise stated.
Capacitors—cp = ceramic plate, c = ceramic, fdt = film dielectric trimmer, e = electrolytic.

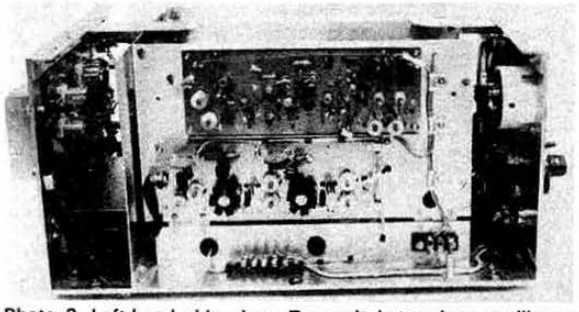
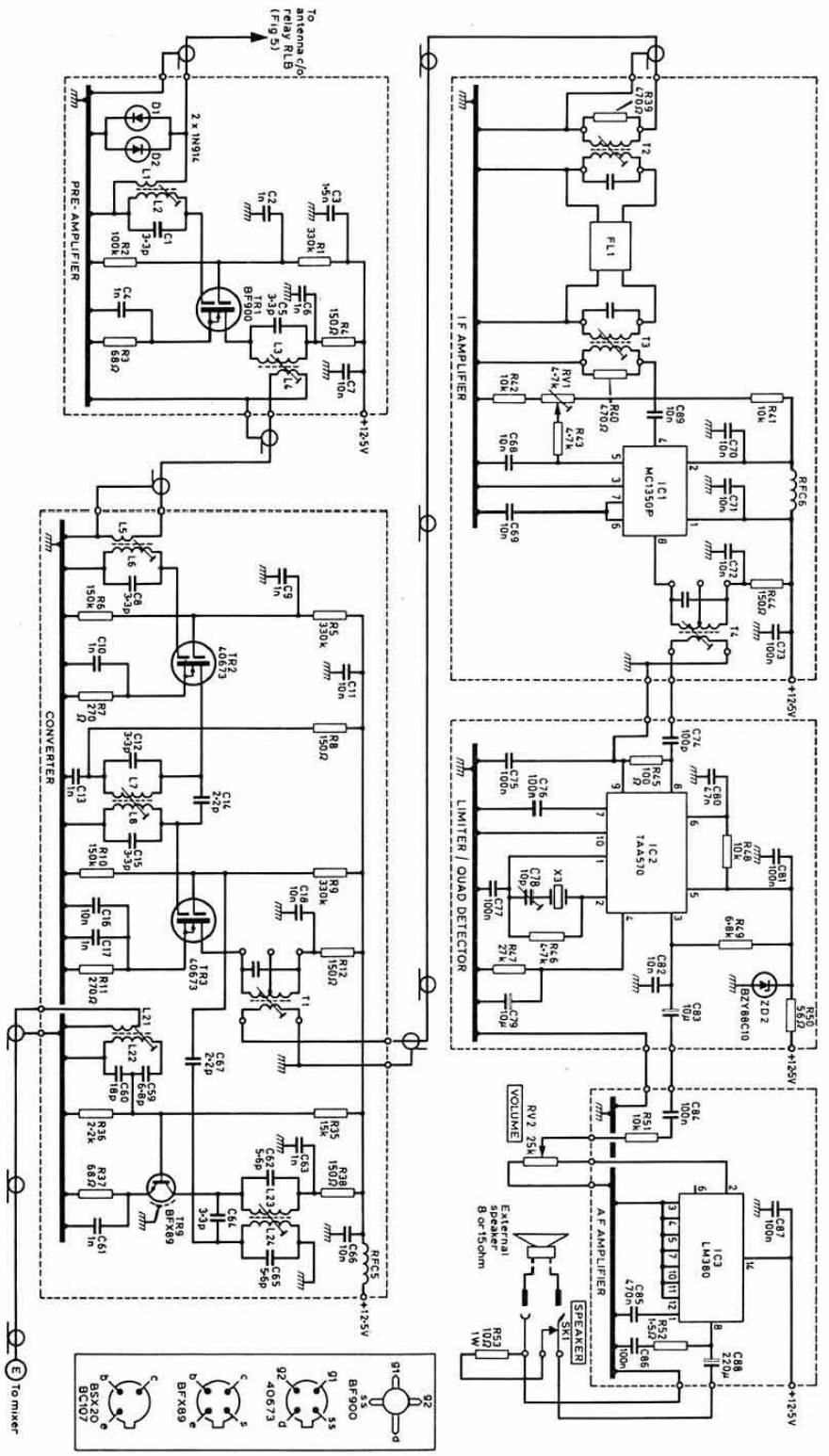


Photo 2. Left-hand side view. Transmit heterodyne oscillator-multiplier (above) driver amplifier (below)

Table 4. Power and control components list

PL1	Six-pole miniature panel-mounting plug P427
S1	SPST switch 24VDC 17A rating
S2	SPST miniature toggle switch
FS1	5A 1·25in fuse
D1	BYX97-C2 (stud anode)
RLA	DPCO relay 12V coil
RLB	50Ω coaxial relay 12V coil (Magnetic Devices 951-170)
SK1	BNC 50Ω bulkhead socket


PRE-AMPLIFIER
2 x 1N914
BF900
CONVERTER
TR2 40673
TR3 40673
TR4 BFX89
IF AMPLIFIER
MC1350P
FL1
LIMITER / QUAD DETECTOR
TAA570
BZY88C10
A.F. AMPLIFIER
LM380
VOLUME
SPEAKER
SK1
External speaker 8 or 15ohm
+12·5V
To antenna c/o antenna relay RLB (Fig 5)
To mixer
BF900
40673
BFX89
BSX20
BC107

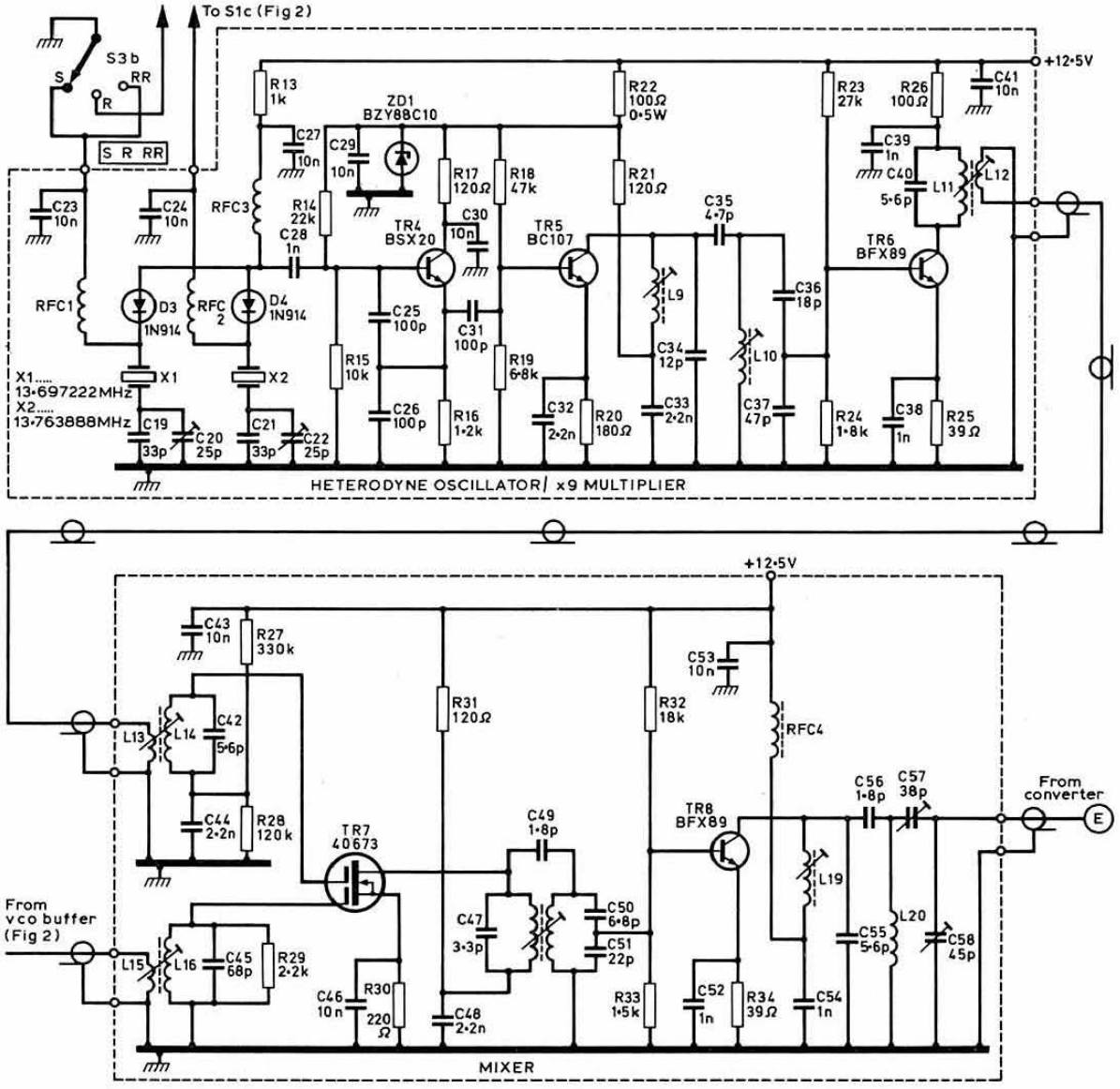


Fig 4. Receiver circuit diagram

applied continuously to all elements of the synthesizer, the transmitter driver amplifier and the power amplifier.

On operation of the RECEIVE-TRANSMIT switch S2, RLA changes over, the receiver is de-energized, and power is applied to the transmit heterodyne oscillator-multiplier, mixer, speech processor and (through S3, Fig 3) to the access tone generator. The press-to-talk switch on the microphone performs the same function as S2, being connected in parallel with the panel-mounted switch via pins 3 and 5 of the MIC socket SK2 (Fig 3). Operation of S2 or the ptt switch also energizes the antenna changeover relay RLB.

Construction

As the prime role of the author's station is an experimental one, the main criterion for mechanical design was easy accessibility to all parts of the equipment to allow incorporation of future modifications; additionally, to achieve this end, each identifiable circuit function has been constructed as a sub-assembly on a discrete printed circuit board.

External dimensions of the equipment (excluding pa heat sink) are 8in wide by 5¼in high by 11¼in deep, and Photo 1 shows a view of the transceiver with the three-section dust cover removed. Sub-assemblies forming the synthesizer (Fig 2)

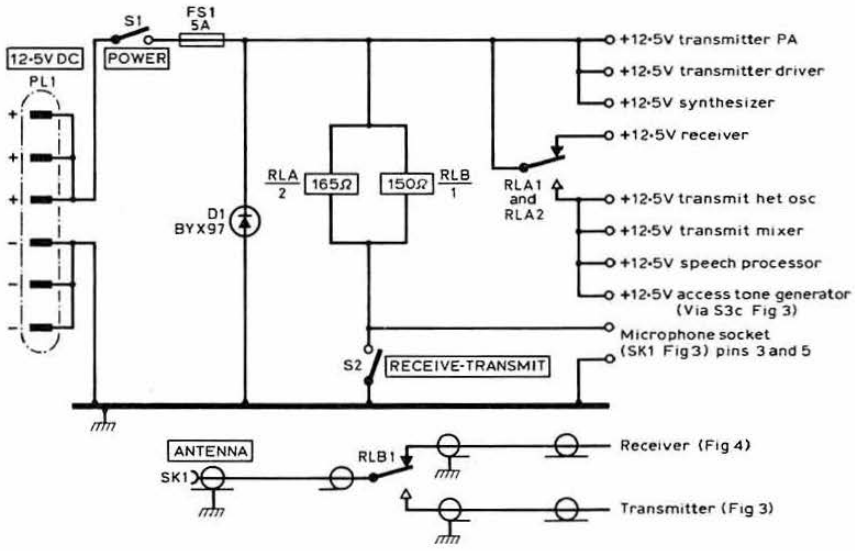


Fig 5. Power and control circuit diagram

are mounted on both sides of a central fixed vertical plate running from front to rear. Screening covers, secured in position by clips, are fitted to the phase comparator, vco and programmable divider. The short connections between the synthesizer pcbs are made through single pvc-covered wire.

The transmitter driver, ie all sub-assemblies shown in Fig 3 with the exception of the pa, and the receiver (Fig 4) are likewise fitted to both sides of vertical mounting plates to the left and right of the synthesizer respectively. Each of these plates is, however, hinged at the lower edge which, after removing securing screws at the rear, permits them to be lowered to a horizontal position, giving access to the interior-mounted sub-assemblies. In a similar manner the front panel, and the backplate on which the transmitter pa and antenna changeover relay are mounted, are hinged and may be lowered to a horizontal position.

In the transmitter driver the heterodyne oscillator-multiplier, speech processor, access tone generator and mixer are fitted with screening covers, with the speech processor and tone generator having a common cover for both sub-assemblies. Photo 2 shows the heterodyne oscillator and driver amplifier. Photo 3 is a view with the mounting plate lowered, showing from right to left the speech processor, tone generator and transmit mixer. The power changeover relay RLA is also mounted on this plate adjacent to the mixer. At the rear, from left to right, are the programmable divider and display decoder. In these views the screening cans have been removed from the relevant sub-assemblies.

The receiver, mounted at the right-hand side of the equipment, is shown in Photos 4 and 5. Photo 4 shows the mixer with the oscillator-multiplier immediately beneath. At the right-hand side is the pre-amplifier; none of these units is fitted with screening covers, but both mixer and pre-amplifier have vertical copper screens soldered to the pcb earth plane between input and output circuits of the amplifiers. In Photo 5 the mounting plate has been lowered to the horizontal, and the remainder of the receiver, with its cover removed, can be seen in the foreground; these are, from right to left, converter, i.f. amplifier, quadrature detector and af amplifier. At the rear,

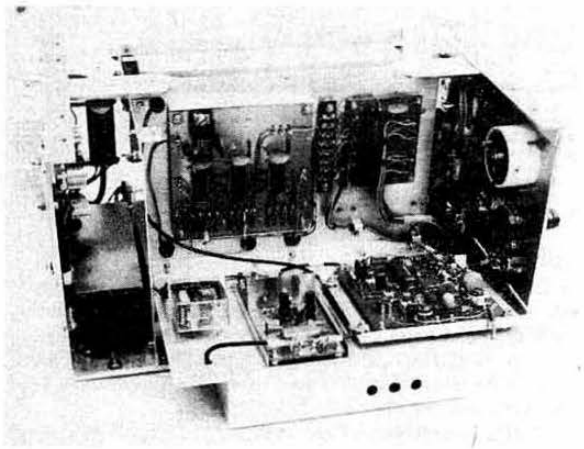


Photo 3. Left-hand side view. Programmable divider and display decoder (rear) speech processor, access tone generator and transmit mixer (front)

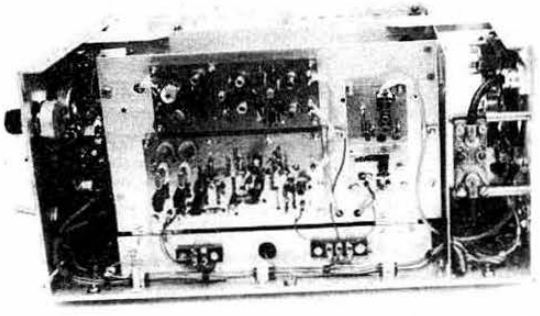


Photo 4. Right-hand side view. L to r: receive mixer (above) receive heterodyne oscillator-multiplier. RF pre-amplifier at right

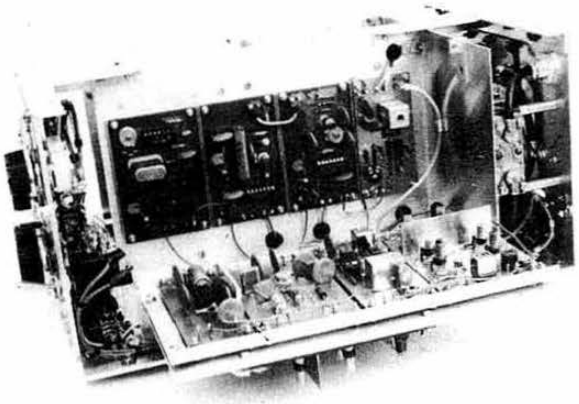


Photo 5. Right-hand side view. At rear, l to r: reference frequency oscillator, phase comparator, vco and vco buffer. Receiver at front

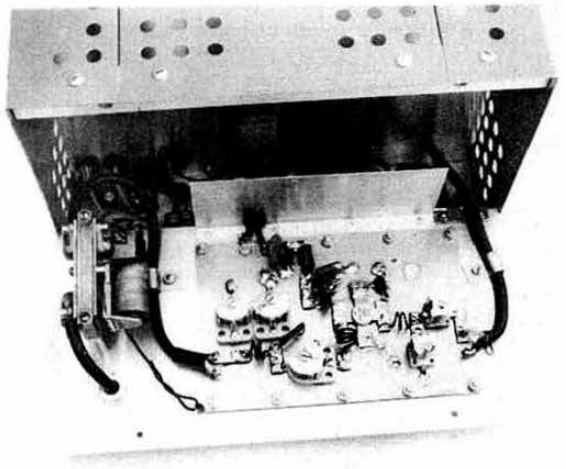


Photo 6. Rear view showing transmitter power amplifier. Antenna changeover relay at right

mounted on the central fixed plate, are the reference frequency oscillator at the left, followed by the phase comparator, vco and vco buffer.

Photo 6 shows the transmitter power amplifier with the antenna changeover relay RLB at the left. A heatsink (DAU 4·2° C/W 4½ by 2in) is secured external to the backplate and centred on the transistor mounting stud.

With the exception of the transmitter pa, decoder, receiver quadrature detector and af amplifier all sub-assemblies are constructed on double-sided printed circuit board with the top-side acting as earth plane. The pa is assembled on a single-sided board with interconnections made through insulated islands formed by small pieces of pcb, copper-side up, secured to the copper-foil ground plane by an epoxy adhesive.

The backplate also carries a miniature BNC socket connected internally to a wire loop adjacent to the pa output; this provides rf pickup so that the radiated frequency may be monitored on a counter when setting the frequency of the transmit heterodyne oscillators.

RF interconnections between receiver sub-assemblies, and between low-level sub-assemblies in the transmitter, are made through UR95 miniature coaxial cable; connections between pa input, output and antenna changeover relay are made through UR43.

The power input plug (SK1, Fig 5) is a miniature six-pole type with two pairs of three poles connected in parallel. The reason for this is that a miniature component was essential for space considerations, and a relatively high current capacity was required to allow for future modifications.

Alignment and test

Alignment of rf circuits in both transmitter and receiver follows normal vhf practice and will not be described here.

The first step in alignment of the synthesizer is to set the reference oscillator frequency. This is carried out by connecting a frequency counter to the output of the second divider and adjusting C1 to give a readout of 25·000kHz. It is essential that this frequency is set accurately as it determines the channel spacing, and once set it should not be re-adjusted during subsequent alignment.

Adjustment of the vco frequency is made by disconnecting its output from the programmable divider and setting the free-running oscillator to a frequency around mid-band, ie 11·5MHz. The actual frequency to which the oscillator is set is not critical, because when the programmable divider is reconnected the synthesizer will lock to the relevant channels, as determined by S1 and S2. The vco buffer tuned circuit is aligned by adjusting the core of T1 to give maximum rf output at mid-band frequency.

After the above-mentioned procedures have been carried out the synthesizer will maintain lock over its switched range of 11·025 to 12MHz.

The final step is to adjust the loop filter to minimize any 25kHz reference frequency component that may be present in the output, which will appear as upper and lower sidebands spaced 25kHz from the selected frequency. This adjustment is carried out by listening to the synthesizer output on an hf receiver with the bfo switched on, and loosely-coupled through screened cable to the output of the vco buffer. The receiver is then detuned 25kHz either side of the selected frequency (which will appear as a pure cw note) to detect one of the sidebands, and RV1 is adjusted until the sideband is at minimum level. When RV1 is correctly adjusted the sideband will be either undetectable or at a very low level indeed; this condition obtains when RV1 is set to a resistance of approximately 8kΩ.

Adequate output from the vco buffer to drive both transmit and receive mixers is obtained with the gain control RV2 set to approximately mid-position.

The importance of adequate bench testing prior to carrying out on-the-air tests cannot be overemphasized, as this enables design errors not apparent at first sight to be corrected. In fact the synthesizer in the prototype equipment described spent several hundreds of hours on bench test before either transmitter or receiver circuits were functional. Current consumption of all stages was monitored during development and logged for future reference, eg should any fault condition subsequently occur. Current consumption figures for each of the sub-assemblies is given in Table 5.

Table 5. Typical current readings (Vcc = 12·5V)

Synthesizer	
Reference frequency oscillator	24·5mA
Phase comparator	30mA
VCO	35mA
VCO buffer	15mA
Programmable divider	120mA
Decoder and display	Approx 200mA
Transmitter	
Heterodyne oscillator	59mA
Mixer	11·5mA
Driver TR7	100mA
TR8	400mA
Power amplifier	2A max
Speech processor	5mA
Access tone generator	17mA
Receiver	
Heterodyne oscillator	60mA
Mixer	12mA
RF amplifier	2·5mA
Converter	13·5mA
IF amplifier	12·5mA
Limiter-quad detector	45mA
AF amplifier (quiescent)	6·5mA

Conclusion

Apart from the change to a different type of quadrature detector mentioned previously, several other modifications to the equipment are planned. These include a higher-power transmitter pa stage to give some 25W rf output, possibly incorporating Type 6080 and 6082 transistors; a simple rf output monitor with indication given on the S-meter; the advantages in using different types of fourth-generation mosfet as first rf amplifier in the receiver. Also, experiments are planned to investigate different types of vco circuit having a high spectral purity.

Finally the author wishes to acknowledge the assistance given by Motorola Ltd in providing information on phase-lock-loop frequency synthesizers in general, and on the particular devices manufactured by the company for use in this application. Acknowledgement is also made to G3GVM for his assistance prior to commencement of work on the project.

References

[1] Motorola application note AN535.
[2] Motorola publication: *Phase locked loop, general information.*
[3] Motorola publication: *Phase-frequency detector MC4344 MC4044.*
[4] Motorola publication: *Emitter-coupled oscillator MC1648.*
[5] "A channelized 144MHz fm transmitter-receiver", *Radio Communication* May 1978. □

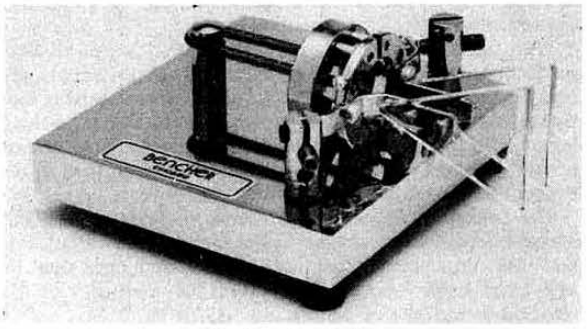
NEW PRODUCT

Bencher "ultimate" Paddle

In recent years amateurs have become used to revolutions in equipment design regularly changing the shape of this hobby, but until recently the humble morse key has escaped these leaps in technology. Without doubt the electronics of automatic keyers have benefited enormously from the microchip; contests can now be conducted at the press of a button, and indifferent paddle operation logically "ironed out" to produce a flow of perfect cw from the transmitter. But the actual interface with humans—the mechanical key or paddle itself—has not received such attention... until now!

CW operators have always been aware of the major shortcoming of the conventional paddle which, descended from the original McElroy and Vibroplex designs, features a central arm or arms, pivoted top and bottom. Unless excessively-high spring tensions are used, these are difficult to operate with small contact spacing, as the residual play in the bearings gives the paddle a sloppy and unpredictable "feel". This becomes a particular problem where squeeze keying is employed, as most operators prefer to use very small gaps in this mode.

The revolutionary approach of the USA manufactured Bencher Paddle has overcome this difficulty. The semicircular bearing plates, on which the contact arms and operating levers are mounted, are spring loaded on nylon bushes against pointed steel pins, thus eliminating any free play in the bearings. The spring tension screw, which produces a wide range of adjustment, in effect moves the point of attachment of the spring in relation to the pivot points of the levers, again resulting in a much more reliable operation than in conventional designs.



The Bencher Paddle

The overall construction is extremely simple and robust. Slipping the spring from the rear mounting post allows removal of the operating arms for easy cleaning. The contacts themselves are made of solid silver, gold plated to ensure minimum corrosion. The contact posts, bearing rings and other parts are of chrome-plated brass, and everything is mounted on a very heavy steel base (total weight 1·36kg) ensuring that the unit stays put in the operating position.

The paddle has been in use by the writer for a year, and its positive feel has made it extremely satisfying and easy to use, and the sending of good quality cw for long periods is achieved with ease.

The Bencher Paddle is marketed in the UK by Radio Shack Ltd, 188 Broadhurst Gardens, London NW6 3AY. The basic paddle with black textured finished base costs £28.75, and the deluxe version with chrome finished base is £37.95. Both versions come complete with three-core screened cable. *G3MXJ*

NEW PRODUCTS

91072 a.m. radio unit

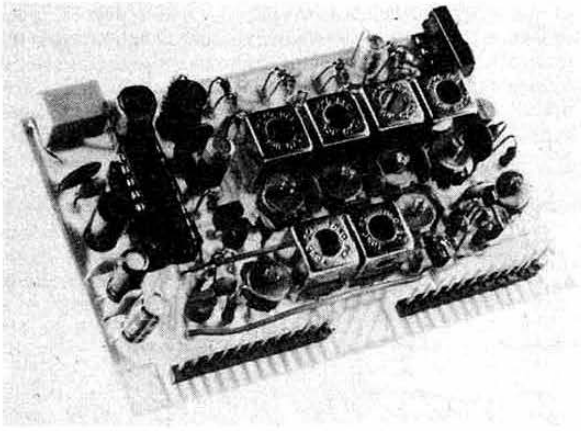
The new 91072 from Ambit is a four-band dc switched and tuned a.m. radio unit and is available in three stages of complexity, culminating in a four-band unit that can be (uniquely) both switched and tuned by dc connections only. Switching uses a "ground-to-make" system, enabling easy control from mpu bus lines, if required.

The standard bands are:

Long wave	150–400kHz	SW1	5–10MHz
Medium wave	510–1,620kHz	SW2	1·6–4MHz

Any frequency span of up to approximately 3:1 ratio can be accommodated in the region 100kHz to 30MHz to special order.

The unit is intended for broadcast radio reception, and is fitted with a 6–8kHz bandwidth multi-element ceramic filter. A buffered local oscillator output, together with dc switch-off through a high impedance drive is also available. Tuning a complete 3:1 frequency span is achieved with only 1–9V bias; thus the unit may readily be interfaced with any Ambit tuning synthesizer system.

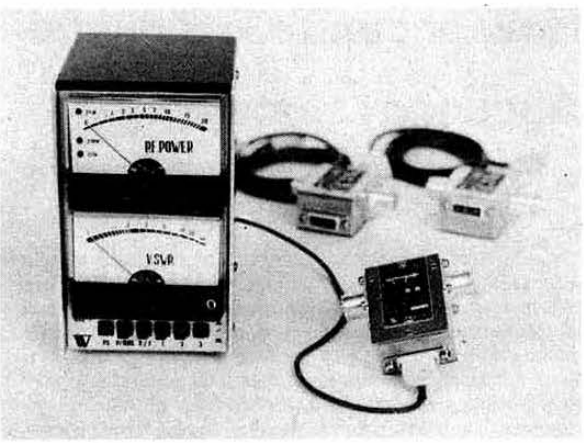


The Ambit 91072 tuner module, shown with all options (LW/MW/SWA/SWB) fitted

The board will normally be supplied in a screening can, with edge-connector terminations, or may be supplied as a bare pcb for incorporation into larger enclosures. The antenna for lw/mw is a ferrite rod, but the other two bands are intended for long wire termination. If required, the two sw bands may be substituted with wire fed mw/lw instead. Price £14–£17 each (one off). Further information from: Ambit International, 200 North Service Road, Brentwood, Essex CM14 4SG.

VSWR/power meter

A combined vswr and power meter offering direct reading of both functions without interpolation is available from Zycomm Electronics Ltd. In operation, the unit is autoranging for power output, covering 20W to 2kW in three ranges 1·8–30MHz and 50–150MHz, and 2W to 200W for the



The Zycomm vswr/power meter

430–470MHz range. VSWR from 1:1 to infinity can be measured. Separate sensing heads are supplied to cover each frequency range, and these can be connected at any position in the feedline—including the masthead for precise radiated power indication. Press switches on the front panel allow the selection of the appropriate head, and the display of forward and reverse power as either peak or rms readings. The electronic comparator included in the unit allows constant readout of vswr irrespective of power variation, ie gives true indication during speech on ssb. A 240V 50Hz supply is required for operation. For further information contact: Zycomm Electronics Ltd, 47, 49 and 51 Pentrich Road, Ripley, Derbys DE5 3DS. Tel Ripley (0773) 44281.

Interference reduction system

RadMic Systems Ltd is now producing an electronic system which may be added to conventional Yagi, quad or other triband/monoband beam antennas to provide remote control and adjustment of the beam polar diagram on reception. The antenna vector processor, developed by Ken Franklin, G3JKF, enables the beam pattern to be optimized to reduce rear QRM over a wide arc, giving much greater rejection of interference than conventional antennas, especially towards the band edges where standard beams fall off in f-b performance. A controllable rear null 20 to 50dB deep may be positioned within an arc of ±70° on 14, 21 and 28MHz (for a triband antenna) and slewed by the operator to attenuate particular sources of interference at any frequency in the band. Performance is limited only by propagation characteristics which introduce multipath and scatter components in addition to the direct ground or skywave signal. Beam performance on transmit is unchanged, and the processor may be selected as required on reception, with automatic de-selection when transmitting.

The system uses a vector processor unit adjacent to the transceiver, coupled to the modified reflector of the beam antenna via a low-grade coaxial feeder and an antenna unit fitted on the boom at the reflector.

The UK price is £98, including carriage and plus VAT; export orders are approximately £109, depending upon freight charge. Further information from: RadMic Systems Ltd, 10 Weald Drive, Crawley, Sussex RH10 6JU. Tel Crawley (0293) 28280.

How accurate is a digital frequency meter?

by N. D. N. BELHAM, G2BKO (ex G8FCH)*

Introduction

The adoption of the hertz as the unit of frequency measurement tends to disguise the fact that, in measuring frequency, two independent processes are involved—a counting process and a time measurement. The previous unit, cycles per second, made it quite clear that two measures were involved. Any frequency counter is therefore both a counter and a clock, and its final accuracy depends on the accuracies of both of these elements. The clock controls the time during which counting takes place and, in most dfms, there is an equal rest time between counts during which the counter is reset to zero and the display updated.

Counters, ±1 count uncertainty

Digital counters, as the name suggests, count only in whole numbers; the input signal is converted into a series of pulses which are either present or absent, and the pulse detector has no means of knowing when the next pulse will arrive. This point may perhaps be made clearer by considering a dfm which is able to display four figures and which the operator is using to measure a frequency of 144,800,253 hertz. If the clock in the dfm is set to allow counting only for 1μs, the four figures displayed will be 0144, as only 144 pulses will have been counted. If the clock is set for 1ms the figures displayed will be 4800 since 144,800 pulses will have been counted, whereas if the count goes on for 1s the display will show 0253. To display together all the figures of a 1s count would be costly in equipment, and so arrangement is usually made to switch the clock control time, thus "moving" the figures along.

To measure a frequency to a number of decimal places of hertz, the counting time must be lengthened beyond 1s, to 10s for the first decimal place and to a 100s for the second decimal place, etc. This is equivalent to making the frequency to be counted into a whole number. In all cases only the last-but-one figure displayed is accurate. The last figure changes from time to time to the one higher or the one lower and back again. This happens even with a stable source unless the frequency happens to be a multiple of the clock frequency. Most people would no doubt be quite satisfied with such accuracy—but we have yet to consider the accuracy of the clock!

Standards

The internal clock of a dfm is usually a crystal oscillator running at 100kHz or 1MHz. One manufacturer quotes, for moderately priced crystals, a tolerance of ±30 parts per million for crystals made to order. The displayed frequency by a dfm using such a crystal could be within ±4,344Hz of a signal whose actual frequency was 144,800,253Hz. The manufacturer also states that the temperature tolerance is ±30ppm from 0–60°C. In the worst case, therefore, the display could be over 8kHz out either way! Crystals are often made on the assumption that the external circuit will add 30pF to their own capacitance, and the frequency can be adjusted to some extent by altering this external capacitance. Temperature variation can be much reduced by building the crystal into a small temperature-controlled oven. The currently available "best buy" is probably the Cathodeon MCO-2M which will take an HC6U 1MHz crystal. Under commercial conditions, Terman, in his classic book on radio engineering, suggests that the stability of a crystal oscillator may be between 10 and 30ppm.

*7 Binyon Close, Badsey, Evesham, Worcs WR11 5EY.

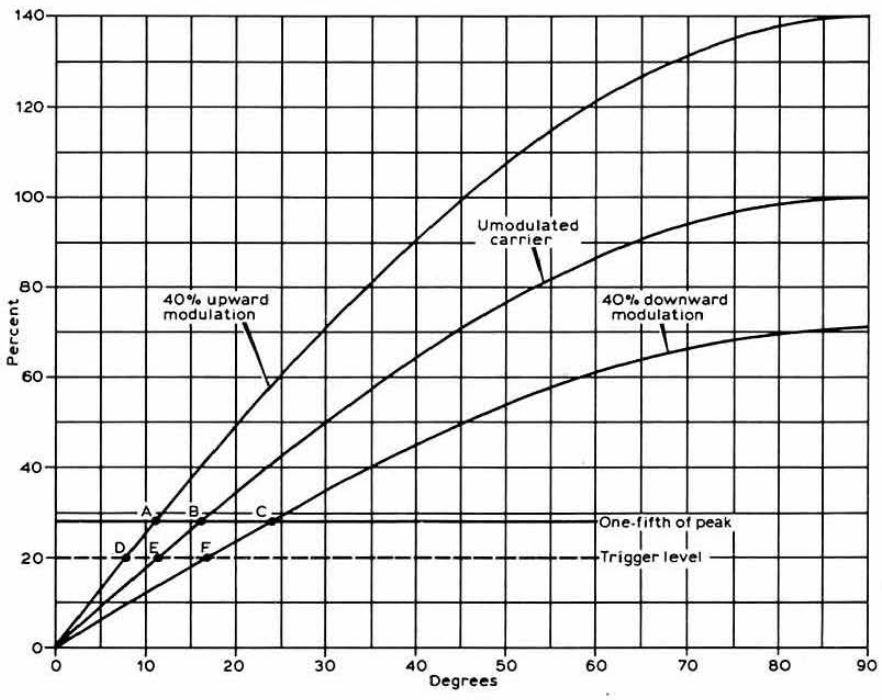


Fig 1. Variation of triggering point with modulation depth

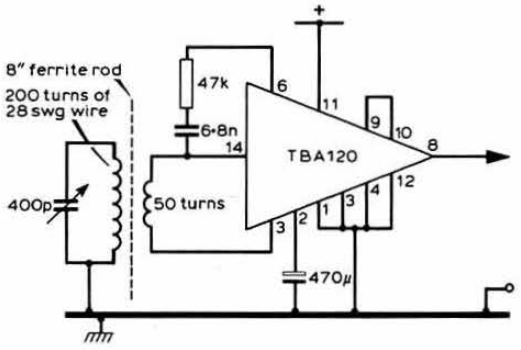


Fig 2. A simple Droitwich receiver

Off-air standards

The most convenient standard frequency transmission with which to compare a dfm crystal clock is that of Droitwich on 200kHz.* (Transmissions from Rugby on 60kHz are designed to operate chronometers and so have a carrier break every second, with a longer break every minute in which is inserted the time-of-day code. Transmissions on the hf band are subject to interference and fading, as well as breaks in transmission.) The carrier frequency of Droitwich is controlled by a rubidium gas cell which enables the frequency to be maintained within ±2 parts in 10^{11}. This corresponds to about 3/1,000th of a hertz at 144MHz. This accuracy is considerably greater than that required of a dfm clock to enable frequencies in the 144MHz band to be measured to 1Hz.

It might be thought a simple matter to set a crystal clock to zero-beat with Droitwich to the required accuracy, but for one cycle accuracy at 144MHz this would mean counting seven beats in 5,000s and doing it in the presence of modulation! If one is going to the trouble to remove the modulation and then sit counting beats for 1½h it would seem better to add a little more circuitry and let Droitwich drive the dfm directly. Not many people would want to use a dfm during the few night hours for which the station closes down.

If the Droitwich signal is displayed on an oscilloscope it is clear that the modulation is not allowed to become 100 per cent. There is therefore a possibility that severe limiting might remove the modulation sufficiently or even completely, provided that the noise level is negligible.

It should be noted that the limiting part of the TBA120 cannot process signals having a peak value greater than 5V, and that it requires a signal of at least 1V peak before proper limiting takes place, ie 20 per cent of peak input. Fig 1 shows the first quarter of a sine wave, together with another having its amplitude increased by 40 per cent, while the third has its amplitude reduced by 40 per cent. The full horizontal line represents the voltage at which limiting takes place. In the case of simple limiting the leading edge of the "square" wave output will be of the type shown by the line 0B in Fig 1, whereas the leading edge when modulation takes place at 40 per cent will be somewhere between 0A and 0C.

When the output of the limiter is to be reduced from 200kHz to 100kHz for clocking purposes, the divider will fire at some voltage represented by the dotted line. This triggering will take place anywhere between D and F, ie between phase angles of 8 and 16·5°. The only way to make the firing regular is to eliminate the modulation or reduce the signal to zero! For the case shown in Fig 1 even a four per cent modulation would make the stability and accuracy of the Droitwich carrier valueless.

Methods

Several simple receivers have been described which work on this principle and consist of little more than an integrated circuit. Fig 2 shows a simple receiver using a ferrite rod and tuned circuit based on the TBA120, an integrated circuit with several limiting stages, used for frequency modulation reception. The resulting "square" wave looked ideal when first viewed on a 'scope, but when external triggering, from a 100kHz crystal, was applied to the time base it was clear that the output was "sidestepping" with the modulation. The unit would no doubt serve its original purpose as a generator of band markers, but when used to clock a dfm the figures in the display "danced". The circuit was further investigated, together with the complete circuit of the ic. The feedback from pin 6 enabled the circuit to oscillate on its own, and tuning, of course, altered the frequency. Locking did take place but not only on the carrier. Without the feedback it was found that an input of about 1V was needed for complete limiting, and when an input of 5V was approached the ic stopped operating correctly. Even with the maximum input permissible, stable square waves could not be obtained. The input signal was excellent as the transmitter was only some 20 miles distant.

It was decided to look at the effect of positive feedback on its own as a carrier recovery process, and this was investigated by using the circuit shown in Fig 3, in which the positive feedback could be controlled by the potentiometer in the source circuit. In fact the circuit could be made to slide smoothly into oscillation provided no external signal was present, a condition ensured by setting the ferrite rod antenna for the minimum pickup. The ferrite rod and its associated coils were removed from a defunct "all-wave" receiver. The bandspread tuning capacitor C2 was fitted with a dial reading 0–100 to enable the

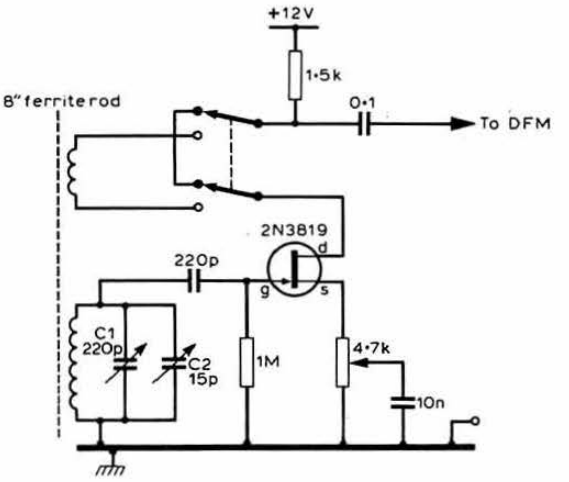


Fig 3. Test circuit for investigation of the effect of positive feedback

*Unfortunately, as a result of WARC 79 Droitwich will eventually change to 198kHz, but this will not be for some years yet—*Ed.*

bandwidth to be measured when Droitwich was tuned in on the main capacitor C1. A double-pole changeover switch enabled the feedback coil to be replaced by a shorting link.

The results may be tabulated as follows:

	Feedback coil out of circuit		Feedback coil in circuit	
(The circuit was adjusted to be clear of oscillation)				
	Response		Response	
	Max	50%	Max	50%
Bandspread reading div	36·5	75·5	33·0	41·0
When just pushed into oscillation, with no signal, the dfm readings were:				
	199·89	197·78kHz	200·08	199·65kHz
Bandwidth @ 50%	4·22kHz		0·86kHz	

There seems little doubt that the reduction in bandwidth would be a lot greater as one approached and reached the oscillation point.

The signal, with and without positive feedback short of oscillation, was viewed on an oscilloscope and estimates made of the average depth of modulation with the following results:

Without feedback coil	With feedback coil
35%	4%

Another Droitwich receiver consisting of a single integrated circuit which works on the phase locked loop principle has been described from time to time. To investigate the performance of such a loop a simple receiver consisting of a ferrite rod with tuned circuit, untuned rf amplifier and an NE567V ic was constructed as shown in Fig 4. The l.e.d. connected to the output pin 8 glowed when the internal vco was locked to the Droitwich

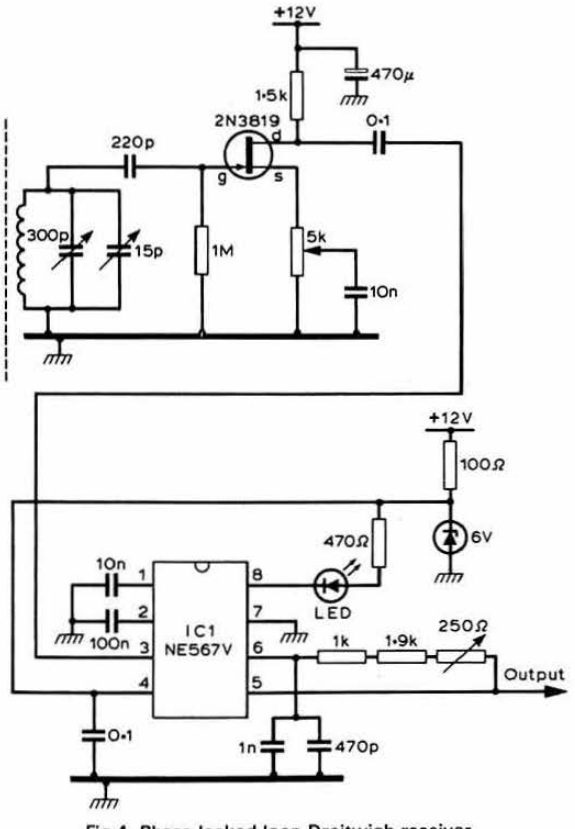


Fig 4. Phase-locked-loop Droitwich receiver

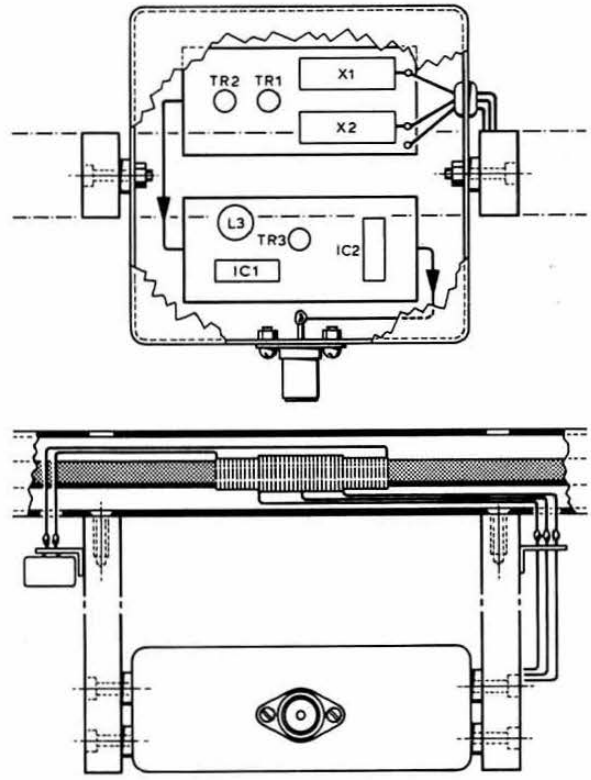


Fig 5. Layout of crystal-filter Droitwich receiver

signal. The bandspread tuning and the source volume control made locking a simple operation, once the unlocked vco had been adjusted to 200kHz with the aid of a dfm connected to pin 5 (this output will accept a 1kΩ load). The timing resistors between pins 5 and 6 are critical and may have to be varied from those quoted.

Need to use filters

When the output of the vco was taken from pin 5 and examined on a 'scope whose timebase had been externally locked to a 100kHz crystal oscillator, jitter was present up to some three of the 40 divisions occupied by a half square wave. The "brutal" method of filtering out all of the signal but the carrier would seem to be the only solution.

The layout of such a receiver which gives a 100kHz square wave output is shown in Fig 5 which also serves as a block diagram. The antenna and first tuned circuit consist of a 200-turn coil occupying a length of about 3·5in, close wound in a single layer, on an 8in ferrite rod. The rod also carries a 100-turn centre-tapped output coil and is housed in a length of plastic water pipe which also serves as a handle. The pipe is first screwed to the two wooden supports by inserting a small screwdriver through two holes, before the tuned circuit is in position. Initially the circuit is tuned with a 500pF variable capacitor, but the capacitance needed is permanently provided by fixed ceramic capacitors mounted on a tag strip. The circuit is shown in Fig 6. Two 200kHz crystals form a balanced filter, and the output is amplified by TR1 and TR2. Crystals ordered

for the frequency, with a manufacturing tolerance of 30ppm, should be within ±6Hz. Since the modulation at 10Hz is said to be 60dB or more down on mid-audio, an accuracy to within 6Hz should be adequate. If ex-service crystals are used selection will be necessary. The output from TR2 is fed to the tuned circuit associated with the first ic (TBA120). This tuned circuit is made up of L3, 50t pilewound on a 7mm slug-tuned former, and C6, 3,600pF.

The 200kHz square-wave output of limiting IC1 is divided by two, using part of IC2 (when 7490s fail it is often the divide-by-five part that is at fault and the rest is usable). TR3, an emitter follower, matches the output of IC1 to IC2. The output from IC2 is of course compatible with the 7490 clock chain of a dfm and can replace the output of the internal 100kHz crystal clock or the divided-by-10 output of a 1MHz version.

When the final output of the receiver was displayed on a 'scope, with its timebase locked to an external 100kHz crystal oscillator, no jitter could be detected. The value of the crystal filter unit is therefore obvious. As a matter of interest its bandwidth was measured, and the 6dB points were found to be at 200,020 and 1,999,990Hz, giving a bandwidth of 30Hz, 10Hz on one side of the carrier and 20Hz on the other. However, if the Droitwich sidebands are 60dB down at 10Hz, sidebands at 20Hz will also be negligible.

A number of amateurs find the pll unit already described good enough to clock a dfm. This is possible because the percentage error is reduced by the dividing down process in the dfm. The dividers are triggered by square waves initiated by

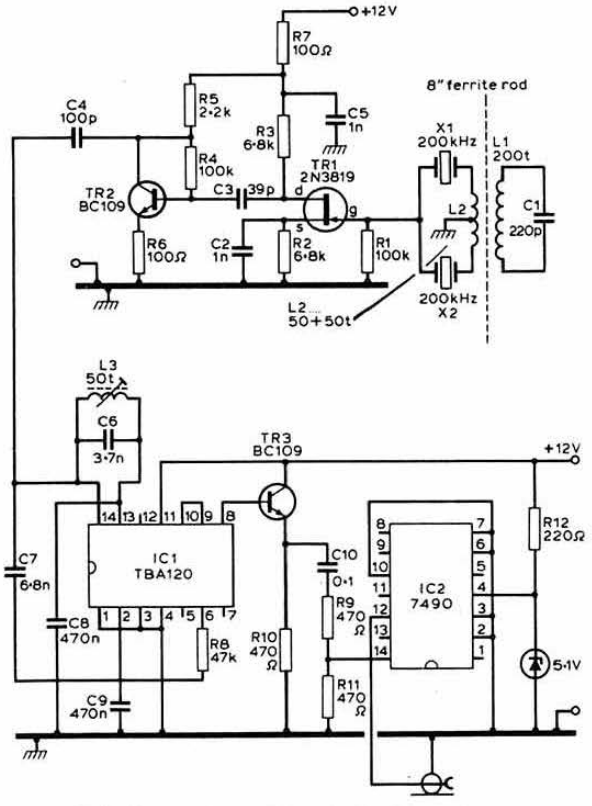


Fig 6. Circuit of crystal-filter Droitwich receiver

those from the NE567V and so suffer the same error, ie 3/40ths of half a square wave. By the time the 1s gate time has been reached all the pulses between 0 and 1s have been suppressed, being used only to count down. The gate is timed at the beginning and the end of that second by pulses having a time error already quoted, which is about 2 in 10^7, and so, if frequencies in the 144MHz band are being measured, error will not show until tens of hertz are displayed.

Harmonics of Droitwich receivers are also used as band markers, so harmonics of the crystal filter and pll units were compared using a communication receiver. Those of the crystal filter unit give the usual carrier hiss for all harmonics investigated but no modulation while those of the pll unit were fully modulated, both a.m. and fm being present but distorted. As higher and higher harmonics were tuned in, the pll output sounded more and more like an ssb signal. The bandwidth of the pll unit was measured at 18kHz.

One may conclude that both as a dfm clock and as a band marker, the crystal filter receiver is superior to the simple limiter or pll units tested, which cannot make use of the stability and accuracy available from the Droitwich carrier. □

oscar news

Phase 3 launch

The successful launch of the Ariane LO-1 mission from Kourou on 24 December 1979 has paved the way for the anticipated launch of LO-2 on 20 May 1980. This vehicle will carry both the Phase 3 satellite and also the Firewheel project.

The Firewheel project comprises four ejectable satellites carrying monitoring instruments. These will observe lithium and barium from a series of canisters that will be detonated at an altitude of about 68,000km. If the weather is clear at the time of the chemical release, the barium cloud may be seen in North America as a spectacular comet. The experiment is designed to measure the effects of the chemical disturbance of the earth's atmosphere and energy field.

It is hoped to publish the latest news on the Phase 3 satellite (to be known as AMSAT Oscar 9 after launch), together with full information on the facilities available from the satellite and recommendations for its use, particularly in the days following launch, in the May issue of *Radio Communication*.

Further information on the Phase 3 satellite will appear in *Oscar News*, the quarterly journal of AMSAT-UK. Application forms for membership of AMSAT-UK (annual subscription £4) can be obtained from R. J. C. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12.

Other satellite news

Despite a low battery, Oscar 7 continues to perform well, due to its reliable function from the solar-cells now in continuous sunlight. Both transponders, the telemetry and beacons are working very well indeed. Codestore will be in use again soon. Oscar 8 continues to perform well, despite some critical attenuation of the Mode A 29·4-500MHz downlink due to the dense layers of F1, F2 and E layers in the present solar-maximum. Mode J is superb. It is hoped that a new *Radio* RS satellite will be launched from the USSR this year with a power-control system to provide further "2 to 10" sdx. □

Further information on the G3JVL 10GHz transverter

by CHARLES SUCKLING, G3WDG*

Introduction

Since the design of the G3JVL 10GHz narrow-band transverter was published in *Microwaves* (January 1979) much interest has been shown in this device. A large number have now been built (including four by the author) and much experience has been gained in both their construction and alignment. What follows is an attempt to expand somewhat the original description in the light of this experience.

Construction

Two modifications to the design can simplify the tuning-up procedure considerably. These are the construction of the mixer and step-recovery diode multiplier as two separate units, and a minor modification to the arrangement of the matching screws. These modifications are shown in Fig 1. With this arrangement it has been found convenient to use the G8DEK multiplier, exactly as described in *Microwaves* (March 1976). The overall length of the multiplier, from the front of the flange to the rear short-circuit, was 29mm in the author's versions. An attractive feature of this design is the built-in attenuator pad in the input circuit, which results in very stable operation due to the high degree of suppression of interactions between the multiplier and the output stage of the 378·666 MHz exciter. The price for this, of course, is an increased drive requirement (1·5–2·5W) of the multiplier, but this is more than outweighed by the improved stability. A point not made in the original description of the multiplier is that the diode should be mounted with its heatsink end (ie that end remote from the flange) in the 2BA screw.

The original mixer design also called for the use of copper screws for cavity tuning to minimize losses. In practice it has been found that the use of brass screws instead of copper ones causes hardly any degradation in noise figure, and so it would seem not worth the extra trouble involved in manufacturing copper screws.

The construction of the mixer can be made as easy as possible if a careful procedure is followed. There are several "irreversible" stages, which must be done in the correct order to avoid later trouble. First saw off a length of waveguide and roughly square off its ends by filing. Mark out the positions of the iris slots carefully (aim for ±0·1mm accuracy). The slots may then be cut out using a junior hacksaw (with a new blade!), starting at each corner and working inwards towards the centre to maintain the accuracy of each cut. All holes are then marked out and drilled 2·3mm (6BA tapping). The centre hole must be drilled carefully, using a vertical drill, through both walls of the waveguide. The upper hole is then opened out to 3/32in and the bottom to 4mm (2BA tapping). This hole is then tapped 2BA, and the 18 holes for the tuning and matching screws tapped 6BA.

Next, the whole assembly is carefully deburred by running a file through the waveguide. This tends to push metal back into the holes and slots, which are then cleared using the hacksaw and appropriate drills and taps. Further filing and cleaning out should be repeated until all traces of burrs and loose metal are removed. The final deburring operation is to run a 4mm drill through the 2BA tapped hole just into the 3/32in hole, and rotate slowly by hand to cut a slight chamfer on the inside wall of the waveguide. This ensures a flat surface for the diode post to be mounted against, with no burrs remaining to puncture the insulation.

*31 Oakwood Road, Chandler's Ford, Hants SO5 1LW.

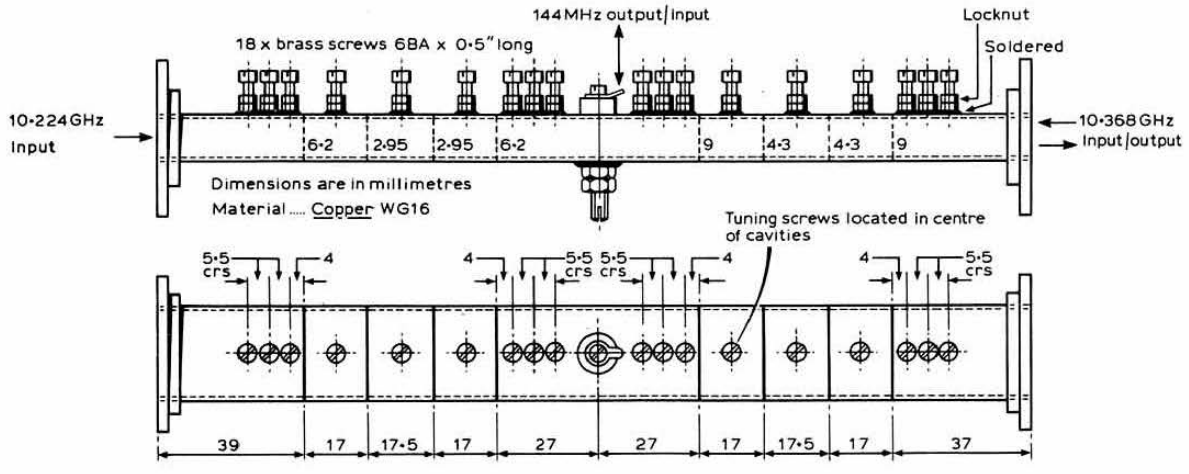


Fig 1. Constructional details of the modified G3JVL 10GHz transverter

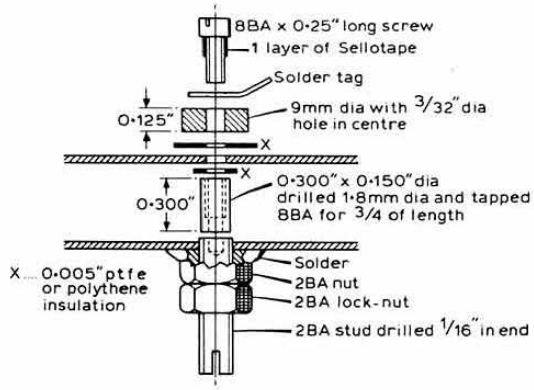


Fig 2. Arrangement of the mixer diode mount

Details of the mixer diode mount are shown in Fig 2. After manufacturing the component pieces of this, deburr the surfaces which are to be mounted against the walls of the waveguide, by rubbing them on emery paper placed on a flat surface. The diode mount should then be assembled and checked for insulation, and for alignment using a scrap diode. For this operation the 2BA nut should be screwed up against the waveguide wall by hand. Should the diode not quite fit, the upper hole may be filed slightly so that the assembly may be moved to the correct position. A very useful tool for checking the alignment of diode mounts of this type can consist of a 2BA screw with a 1·8mm diameter pin turned on one end. This is used in place of the 2BA screw and scrap diode referred to above, and will positively assure that the mount is correctly aligned. The importance of this cannot be too highly stressed, as a mount which is out of alignment will result in broken diodes (an expensive experience!). When the diode mount has been checked, it should be dismantled. In order to obviate problems later on, ensure that the 0·3 by 0·150in piece will pass freely through the 2BA nut and the 2BA tapped hole in the waveguide. If not, open these out slightly with a suitable drill.

The next items to be made are the iris plates. These are manufactured form 0·9 by 0·5in pieces of 0·024in copper sheet which have been carefully filed to size; the 0·5in dimension, not being as critical as the 0·9in dimension, which should be in the range 0·895–0·900in. The iris holes are drilled centrally in the plates; the diameters of these are given in Fig 1. After deburring and flattening the plates between two smooth pieces of metal in a vice, they may be assembled into the waveguide. The 6BA nuts which are to be soldered to the waveguide are jigged in place using cadmium-plated or stainless steel screws. Old steel or brass screws which are sufficiently corroded not to take solder easily can also be used.

The assembly is then soldered, using a hotplate to provide the heat—direct heating with a flame is much less satisfactory. A suitable hotplate could consist of a piece of 1/8in aluminium plate on a domestic cooker ring. Perhaps the most critical part of the construction of the mixer is this soldering stage, as too much solder or flux inside the cavities can introduce excessive losses and/or detuning. Thus the cleaning of all parts to a bright finish before soldering is necessary. If all the parts are clean it should only require the application of a small amount of solder to each side of the irises to solder them. However, be careful that no gaps remain after soldering. The author has found 18swg Multicore solder to be ideal for this operation. Speed is essential, or the copper oxidises and becomes more difficult to solder. In this context the temperature of the hotplate should be only just high enough so that the solder runs freely.

When all the 6BA nuts and upper sides of the irises have been soldered, the waveguide is turned on its side and the bottom iris joints soldered, applying the solder to the tops of the joints. The 2BA nut is then jigged in position (using a suitable screw, as described above, and soldered. Next, the flanges are fitted in position, having been preheated on the hotplate, and soldered. A small amount of waveguide should be left sticking out of the flanges, to be removed later by rubbing on a sheet of emery paper laid on a flat surface, which then leaves a well-finished surface. Remove the assembly from the heat and, when it has cooled to just below solder melting point, solder several solder tags to the top and bottom walls of the waveguide, using an iron. These are to act as anchoring points for the i.f. preamplifier housing.

When the unit has fully cooled, remove all the jigging screws and run a 2BA plug tap through the nut and into the waveguide. The tap should be inserted vertically upwards and withdrawn vertically downwards to reduce the chance of metal dust falling into the cavity. This tapping operation ensures that the 2BA diode-mounting screw runs freely in the thread. Next, the diode mount may be reassembled. This *must* be done in the following way to avoid losing pieces inside the waveguide, which are then very difficult to retrieve (as the author knows to his cost—twice!).

Pass a 1in-long 8BA screw through the top hole and out through the 2BA nut. Place the small insulating washer over the screw, and screw on the 0·3 by 0·15in post hand-tight. Then pull this piece through the 2BA nut up against the inside wall of the waveguide, and insert a 2BA screw or, preferably, the alignment tool mentioned above, and screw in until the post is pushed firmly against the wall. The 8BA screw is then removed and the top part of the diode mount assembled. The 2BA screw is removed and replaced by the 2BA diode-mounting screw complete with diode. In order to avoid dropping the diode inside the cavity, the screw and diode are held with the

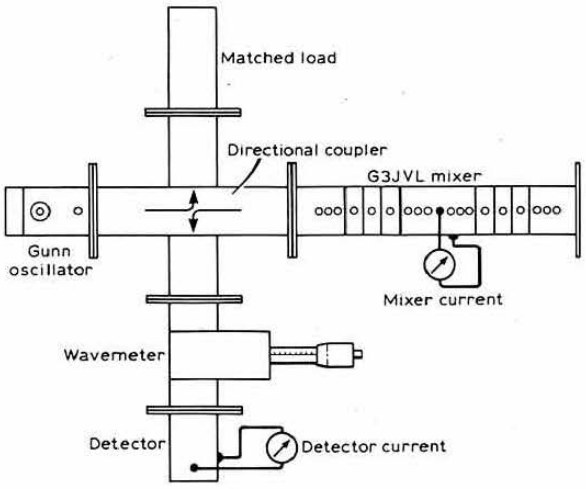


Fig 3. Waveguide test set-up for aligning the mixer

diode uppermost and then fitted vertically upwards into the waveguide. The screw is tightened by hand so that the diode is held in place, and the locknut tightened up. Diode removal is achieved by slackening off the locknut, unscrewing the 2BA screw one turn, tapping the screw gently sideways to release the diode from the upper post, and then unscrewing downwards. The mount itself can be dismantled, if required, by reversing the assembly sequence.

Initial tuning-up

As with the construction, the alignment of the unit is much simplified by the adoption of a logical procedure. The first step is to connect a multimeter to the diode, via short leads to reduce the risk of transient pickup, which could damage the diode. Next, the waveguide test bench shown in Fig 3 should be assembled from the station 10GHz (wideband) equipment. The directional coupler is orientated so that the detector current is a monitor of reflected power, ie the current should be very small or zero with a matched load connected in place of the mixer, and several hundred microamps with the mixer in place (and off tune). Set the Gunn oscillator to 10,368MHz and connect the signal input end of the mixer to the directional coupler. The procedure is to then adjust the first filter tuning screw (ie that tuning screw nearest to the directional coupler) until a sharp change is seen in the level of reflected power, indicating resonance. The three matching screws in front of the filter should not be inserted at this stage. Leave the tuning screw at the position of resonance, and adjust the second cavity tuning screw for a similar effect. Adjust the third tuning screw likewise, and then repetitively adjust the three screws until no reflected power is indicated. Recheck constantly during the alignment that the Gunn oscillator is still on frequency, as it is possible that its frequency may be affected by the tuning of the cavities.

At this point there should be an indication of a few microamps on the meter connected to the mixer diode (referred to below as the "mixer current"), indicating some transmission of power through the filter. If no current is indicated, slowly

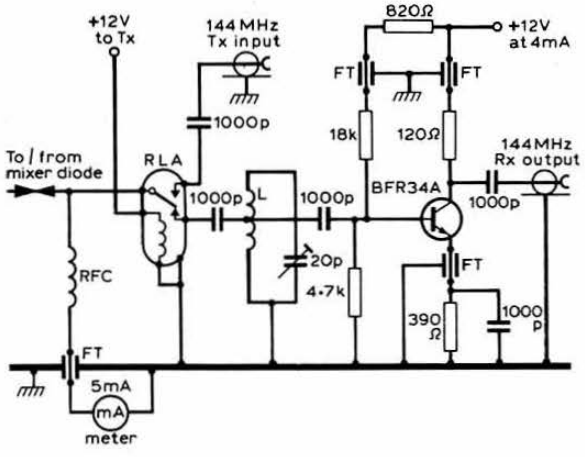
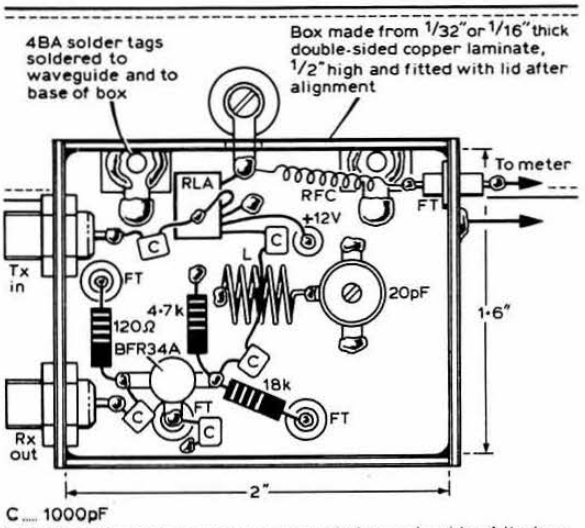


Fig 4. Circuit diagram of a suitable i.f. preamplifier and changeover system. All 1,000pF capacitors are miniature ceramic plate types. L: 5t 18swg, 0·55in long, 0·25in id, tapped at 2·5t. RFC: 20t, 26swg, closewound 0·15in id. RLA: RS type 349 591 or equivalent. FT: 1,000pF feedthrough capacitors.



C ... 1000pF
The 390 and 820Ω resistors are mounted on underside of the box

Fig 5. Layout of the i.f. preamplifier

insert a matching screw into the hole nearest to the signal filter, on the mixer diode side of the cavity. As the reflected power is seen to rise, readjust the tuning screw in the adjacent filter cavity for minimum reflected power. As this procedure is continued with increasing penetration of the matching screw, at some point some mixer current should be seen. When some mixer current has been obtained, readjust the filter tuning screws, and insert matching screws on either side of the signal filter and experiment with their penetrations until maximum mixer current is obtained. As all the screws tend to interact with each other to some extent, it is necessary to go several times round the "loop" until the optimum settings are found. A mixer current of several milliamps should be achieved using a 5–10mW Gunn oscillator.

Lock the screws in position, readjusting if necessary to maintain the tuning, remove the mixer from the directional coupler and reconnect the other way round. Reset the Gunn oscillator to 10,224MHz and repeat the above procedure for the local oscillator section of the mixer. Do not interfere with the tuning and matching screws associated with the signal filter. Since the local oscillator filter is somewhat narrower in bandwidth than the signal filter, it is rather more difficult to adjust, and greater care will be necessary.

The step recovery multiplier should be aligned next. Connect its output to a detector and, on application of drive at 378·666MHz to the multiplier, some current should be seen in the detector. Maximize this by repeated adjustment of the tuning screw, the two trimmer capacitors and the variable resistor on the multiplier. When several milliamps of detector current have been obtained, the multiplier may be transferred to the mixer unit, whereupon some mixer current should be observed. This is maximized by repeated adjustments of the multiplier and the local oscillator filter and its associated matching screws. The mixer current should then be at least 1mA, and possibly as high as 5mA. The final tuning-up stages require the use of the i.f. preamplifier, and will be discussed later. Before proceeding further it is best to remove the mixer diode to avoid any chance of damage by transients during subsequent soldering operations.

A suitable i.f. preamplifier

No information was given in the original *Microwaves* item concerning i.f. preamplifiers. Since the noise figure of a mixer is partly dependent on the noise figure of the subsequent receiver, a low-noise i.f. preamplifier is vital. For optimum performance this should be mounted on the waveguide assembly.

The circuit and suggested layout of a suitable preamplifier are shown in Figs 4 and 5. Note that if receive-only operation is required the relay may be omitted.

Final alignment

The final alignment of the mixer requires the use of an automatic receiver alignment aid, such as that referred to in *Microwaves* (October 1979). First adjust the 20pF trimmer in the preamplifier for maximum receiver noise. Then connect up the alignment aid and reset the trimmer for best noise figure.. Adjustments may then be made to all the tuning and matching screws for best noise figure, although these are somewhat interactive, and it may take time to reach the optimum settings. Once an optimum has been found the output power on transmit can be checked by applying sufficient drive (5–20mW) at 144MHz to approximately double the mixer current. This drive may be obtained from the station 144MHz transceive via a suitable attenuator (*see Microwaves* March 1979) with an adequate power rating. The settings for maximum transmit power and best noise figure do not coincide exactly, and it will be necessary to compromise if real transceive operation is intended. However, if it is expected to use the unit mainly as a receiver, then optimize for best noise figure only.

Additional information

The original *Microwaves* item on the G3JVL mixer specified a BXY41E diode for the multiplier and an AEI DC1304 GaAs Schottky diode for the mixer. The former device is no longer readily available, while the latter is somewhat expensive. Some cheaper, more readily available diodes manufactured by Microwave Associates have recently been tested, with very satisfactory results indeed. A suitable replacement for the BXY41E is the MA44150, while the MA40150 and MA4E024 devices have performed very well as mixers, both with noise figures of 7·5dB. This is not quite as good a performance as that measured by the author using the DC1304C device, which had a 6·5dB noise figure, but is still very acceptable. These noise figures refer to the overall system using the i.f. preamplifier described above feeding a 3dB noise figure 144MHz receiver.

If full transceive operation is intended it will be necessary to add a coaxial relay, switched by the 144MHz transceiver ptt line to switch the transceiver from the receiver output socket to the transmitter input socket, as shown in Fig 6. The value of attenuation required in the transmit line should be such as not to overdrive the mixer. Suitable starting values are 20dB for a 3W output 144MHz exciter and 25dB for a 10W exciter. Extra attenuation should be inserted until the 10GHz output just starts to decrease; the attenuator can then be rebuilt to that value. It is important to ensure that the resistors comprising the attenuator will handle the power safely, since any failures could result in a large drop in attenuation with the consequent risk of damage to the mixer diode.

Little has been said concerning the 378·666MHz exciter. This is of course a crucial part of the system, and careful attention must be paid to its design in several respects. The most important of these concerns the noise generated by the crystal oscillator. A noisy oscillator can seriously degrade the overall noise figure; this problem beset early experimenters on 10GHz narrow-band. Also, the oscillator must be extremely stable, implying the use of high quality crystals as well as a good circuit. An exciter designed specifically for use with this mixer is currently being developed, and details of this will be published in due course.

In use, few problems have been found with this design. One thing which it specifically dislikes is water finding its way into the cavities, so operation in wet weather requires careful attention to be paid to waterproofing the unit. Most constructors mount the mixer, together with the changeover system and 378·666MHz exciter, in a large diecast box. Also, some detuning of the cavities can occur over extremes of temperature, usually resulting in low mixer current. The first screw to adjust in this event is the local oscillator filter tuning screw nearest to the mixer. Do not attempt to move two screws at once, or the mixer may well go irrecoverably out of alignment. Some more cautious operators have been known to take automatic noise figure optimization equipment out with them in the field, but this is not usually necessary.

Finally it should be recognized that this design is most definitely not for the beginner on 10GHz, both in respect of its relative complexity and the absolute necessity for test equipment, albeit homemade, for tuning it up. □

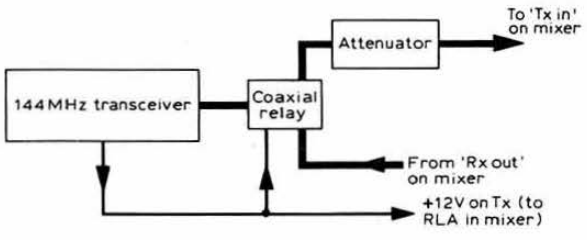


Fig 6. Block diagram of a complete 10GHz transceiver

technical topics

Pat Hawker, G3VA

ONE of the enduring attractions of amateur radio is that there is virtually no age at which enthusiasts are too young or too old to make a genuine contribution to the hobby and to the science and technology of two-way radio. An early, but outstanding, example of this occurred when, in the early morning of 19 October 1924, a young engineering student, Cecil Goyder, at the key of the Mill Hill School Wireless Society station, 2SZ, made the historic first two-way contact on about 3·5MHz with Frank Bell, Z4AA, in New Zealand: the first time that low-power two-way short-wave radio had ever girdled the globe! In doing so, he wrote himself into history, although undoubtedly he upset a number of the experienced dx-pioneers who had been responsible for the organization of the trans-ocean tests and who were striving to make the first contact.

Cecil Goyder also pioneered the art of "locking" (if only crudely) a self-excited oscillator to a crystal-controlled reference oscillator (the notorious "Goyder lock") the forerunner of the modern pll frequency synthesizers such as those discussed below. His subsequent long career in broadcasting and communications, with All-India Radio and the United Nations and as a consultant to BOAC, took him away from England in the mid-'thirties. He died in February this year in Princeton, New Jersey, as a result of a motor accident. A silent key that will echo on in the proud history of our hobby.

Using 40-channel cb pll chips

One of the increasingly popular techniques in modern factory-built vhf mobile and hand-held equipment is the use of phase-locked-loop (pll) frequency generation; although generally referred to as "frequency synthesis" this is something of a misnomer since in this type of unit no frequencies are actually "synthesized" in the classical sense. In a recent article ("Phase-lock frequency generation—the modern technique for land mobile," *Global Communications* winter 1979, pp16–24) Tom L. Dennis, of Pathcom Inc, suggests this technique is proving "perhaps the most significant technological improvement" in mobile radio in the past 10 years. He admits wryly that the land mobile service owes a debt of gratitude to cb radio for pioneering the highly integrated (many functions in one ic) pll frequency generator. While his article contains no specific circuit diagrams, it does provide a useful outline of the way in which these new cb-type pll chips can be used on bands other than 27MHz.

For amateurs the prime advantage is the elimination of the cost and "waiting time" involved in acquiring separate crystals for each required channel (in most cases two crystals per channel unless the "off-set oscillator" technique is used). In general terms, a pll system can now meet the important goals of: (a) not significantly impairing performance of an equipment relative to separate crystals (and may reduce spurii on both transmit and receive); (b) meet the cost targets of an equipment having only a minimum number of channels; and (c) not impairing reliability, or requiring specialized test and alignment equipment, or highly skilled setting up and maintenance. Such goals cannot readily be achieved with the earlier synthesizers, including those based on a significant number of ic devices.

While a number of equipments using pll generators have been described in *Radio Communication* it is felt that there is still a good deal of confusion about how they work and what is now offered in the latest generation of ic devices. The following notes may thus help readers come to grips with these units and are based on the *Global Communications* article.

Fig 1 shows the basic diagram of a pll frequency generator. A voltage-controlled-oscillator (vco) has its frequency controlled by a dc voltage, preferably (to mimimize spurii) operating directly within the output frequency range of the transmitter. Output from the vco goes both to the transmitter amplifying stages (no frequency multiplier chain) and to a digital frequency divider; this can be thought of as a frequency counter delivering an output pulse each time it counts a predetermined number (N) of cycles of rf from the vco. The number N can be changed by means of the logic programming lines. Output from the divider goes to a phase detector where its frequency is compared with a fixed reference frequency, delivering a dc output voltage that depends on the phase difference between the two input frequencies and, initially, an ac output voltage depending on the frequency difference between the two frequencies. The initial ac output causes the vco to sweep over a range of frequencies until it "locks" on to the frequency that results in a steady or no dc output from the phase detector; such a vco is then "locked" (with the stability of the reference frequency) in frequency and phase. A "loop filter" is inserted between the phase detector and vco; this is simply a low-pass filter which passes dc but rejects af and rf. The "reference frequency" may be very much lower in frequency than the vco, by a ratio determined by the divide-by-N setting. The choice of this reference frequency is important, since it fixes the incremental steps at which the vco can be locked. For example, if one wants 25kHz channel spacing, the phase detector is provided by the reference oscillator with a 25kHz input, so that the vco then locks only at multiples of 25kHz; for 10kHz steps the reference frequency becomes 10kHz and so on. Since vlf crystals would not be practical, a crystal-controlled hf oscillator digitally divided down to the required incremental frequency is used.

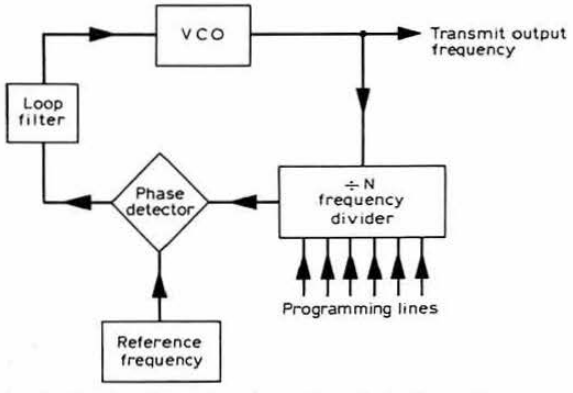


Fig 1. Block schematic of a phase-locked-loop frequency synthesizer

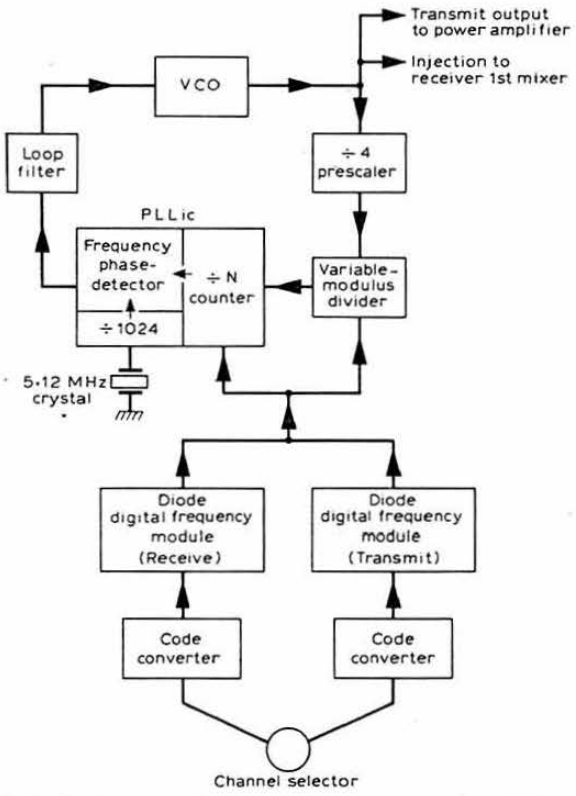


Fig 2. Block diagram of 30-50MHz pll frequency generator designed around a modern 40-channel cb frequency synthesizer ic. A similar approach can be used on the amateur bands since the pll ic itself operates at vlf and not at 27MHz

The programmed divide-by-N counter similarly presents submultiples of the vco frequency to the phase detector. For example, a unit intended to provide 25kHz steps and a required transmitter output on 145·00MHz would need the divide-by-N counter to divide by 145·00/0·025, ie 5,800. Then to change channel to 145·025MHz the counter needs to be changed to 145·025/0·025, ie 5,801.

To use the same frequency generator for receiving on the transmitting channel, it is relatively easy to arrange a suitable change of the divide-by-N ratio when changing from transmit to receive, with a diode-switched capacitance to centre the vco reasonably close to the required "local oscillator" frequency. Similarly a pll generator can readily be programmed for repeater operation, etc.

Frequency modulation of the vco can be achieved by applying the af across a voltage-sensitive element such as a voltage-variable-capacitance diode, connected across the vco tuned circuit; however, it is important that the audio range is beyond the range of the loop bandwidth. What this means in practice is that the low-pass loop filter will normally have a cut-off frequency of about 200Hz; otherwise the control loop would immediately strip off the af deviation in holding the carrier steady.

Compared with the separate crystal approach, the pll vco, particularly if it operates on the output frequency, generates far fewer spurii since there are no Class C multipliers or heterodyne mixers, etc; this also means that the equipment can be made relatively broadband (the absence of sharply-tuned frequency multipliers is the prime reason for this) and on, say, 144MHz, the lock-in range of the vco can cover the entire band so that it is necessary only to switch the pll generator to change frequency from one end of the band to the other. For 144MHz it may be necessary to operate the vco at 72MHz, involving a single frequency doubler.

The penalty that may have to be paid for all these advantages is the "jitter" that is inherent in the output of pll systems, though this is hardly a real problem for mobile, hand-held operation etc—nevertheless it may have to be taken into account for more exacting dx-type vhf operation.

A representative design of a modern pll frequency generator for the land mobile service (Pace Landmaster 2 covering the American low-band of 30-50MHz) is shown in Fig 2 and this puts some flesh on the bones of Fig 1. The vco uses discrete components, operating directly at the transmitter output frequency. A fixed divide-by-four prescaler at the output of the vco permits the use of lower-speed programmable counters; the prescaler also means that the reference frequency for 20kHz channel spacing becomes 5kHz. A variable-modulus programmable divider based on ttl permits low-cost cmos to be used for the main divide-by-N counter.

The divide-by-N counter, frequency-phase detector, reference oscillator and associated divider, and a portion of the loop filter are today all incorporated in single pll synthesizer integrated-circuit devices of the type developed for 40-channel cb equipment. The 5·12MHz oscillator, in conjunction with the fixed divide-by-1024 section of the pll ic, provides the 5kHz reference frequency. This class of pll ic includes a combination frequency and phase detector; that is to say, the circuit operates as a frequency discriminator when out of lock but as a "sample and hold" phase detector when the loop is locked. The phase detector, plus an active filter within the pll ic, isolates the 5kHz reference frequency from the output, although a simple external loop filter may usefully supplement this.

In this particular type of commercial land-mobile application, up to eight channels may be provided with a rotary switch connected by only three wires to the main unit, so simplifying remote control. The channel selector feeds both a transmit and receive code converter in parallel; the code converters (octal) select the appropriate "digital frequency module" (each containing 11 diodes) which form a diode matrix memory that can be set to select a specific channel. While such a control system could be adapted to amateur operation, it should be remembered that many land-mobile users are restricted to designated channels and could not use "40 channels". Amateur designers would be more likely to design a switching facility for a maximum number of channels, combined with a "memory" facility for a few specific channels.

What is important to note is that these highly integrated cb synthesizer devices, although developed for 27MHz operation, are not tied to specific operating frequencies and are thus entirely suitable for use in frequency generators for amateur bands. They now make economic sense for use even on a very restricted number of channels—and more than ever for multi-channel operation.

Modulated 100kHz calibrator

A 100kHz calibrator which provides an optional amplitude-modulated output is described by Jean Lacroix, F1EBL, and Jean-Paul Lacroix, F6CZA, in *Radio-REF* No 12 1979. This

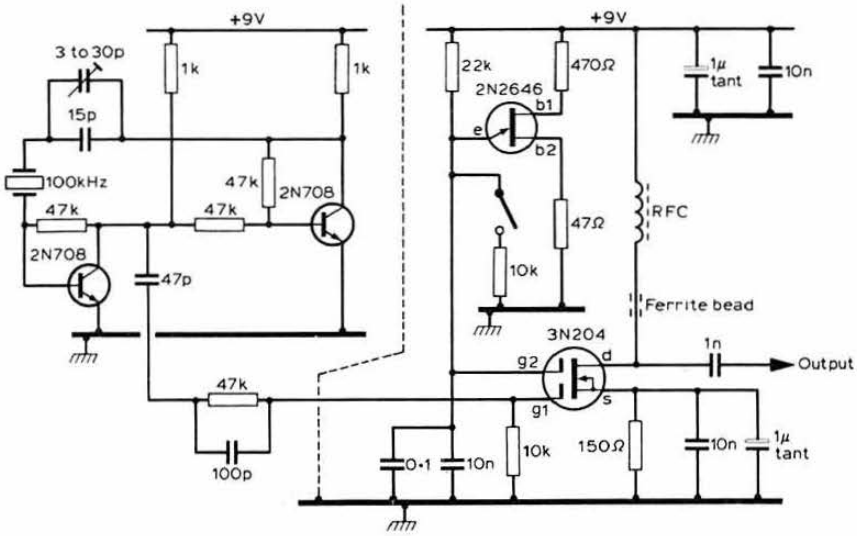


Fig 3. Modulated 100kHz calibrator using unijunction tone generator and dual-gate mosfet modulator as described in *Radio-REF*

uses a unijunction af generator in conjunction with a dual-gate mosfet (40673 or 3N204, etc) as a modulated amplifier: Fig 3. The 100kHz (HC6) oscillator is stated to provide harmonics to at least 30MHz with this form of amplitude-modulator capable of 100 per cent modulation. When an unmodulated output is required the switch (S1) is closed and connects the base of the ujt to earth via the 10kΩ resistor, leaving about 3V positive applied to gate 2 of the mosfet. This type of low-power modulator can, apparently, also be used for a.m. transceivers, etc.

More on vmos power fets

Although the prime sources of supply of vmos rf power fets remain restricted, with Siliconix still dominating the scene, there can be no doubt that this type of field-effect device currently offers a most interesting challenge to the home constructor of amateur hf and vhf transmitters. So this month it seems worth looking a little more closely at methods of driving these devices, their use in audio amplifiers, and their frailties. Our notes are based partly on *Application Note AN79-4* by Dave Hoffman of Siliconix (which appears in the firm's *Vmos power fets design catalogue*) and partly on "Build a vmos audio amplifier", by Doug DeMaw, W1FB, in *QST* December 1979, pp22-3.

AN79-4 is concerned basically with driving vmos devices in switching applications, but most of the ideas are equally applicable to rf power amplification, etc. For example, it is stressed that all vmos devices have a cut-off frequency of several hundred megacycles, whereas designers of semiconductor equipment have become used to the steadily decreasing gain with increasing frequency of all bipolar transistors. This means that care has to be taken that vmos amplifiers do not "take off" in fundamental or vhf parasitic oscillation. The use of ferrite beads or low-value resistors mounted as close as possible to the gate connection with short rf leads is thus as important as it was in the old days of the 807 tetrode. Note that, to be effective, a ferrite bead must be very close to the gate, and that *unlike* the 807 it is very easy to destroy a vmos fet if it goes into violent self-oscillation.

The static input impedance of a vmos fet is extremely high (basically in excess of a million-million ohms!) and this makes for easy, non-critical impedance input matching. However, this impedance is capacitive, so that, as frequency increases, the dynamic input impedance falls rapidly (and at vhf may be only a few ohms), calling for more careful matching. At hf the high input impedance makes it all the more likely that positive feedback will occur and cause self-oscillation.

W1FB points out that vmos power fets have a frailty which is seldom mentioned in the manufacturers' literature. Despite their very welcome immunity to the sources of destruction that plague bipolar rf power transistors, including thermal runaway and secondary breakdown, vmos are highly sensitive to overvoltage excursions. In describing the work on polar-loop ssb transmitters at the University of Bath (*TT* September 1979, pp828-9) it was noted that while the biasing of vmos rf amplifiers is extremely simple, the value of the bias resistors *must* be kept low; a number of devices were destroyed before discovering the cause of the problem. In his notes on Class A audio vmos amplifiers, W1FB stresses that excessive voltage peaks only slightly beyond the published maximum safe values cause instant and permanent destruction of the devices. In his case he added protective zener diodes across the primary of the output transformer when it was found that transients from the function generator (when the switches were cycled) were causing high-voltage spikes across the primary of the transformer. While he recognizes that such transients would be unlikely during normal operation, he feels safer with those zener diodes in place.

Most, but not all, vmos power fets have built-in protection (zener diode equivalent) between gate and source to protect the input from static discharges. To quote *AN79-4*: "A last thing

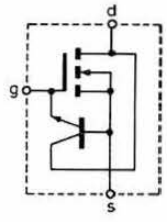


Fig 4. A parasitic npn transistor used to provide zener protection in mosfet and vmos devices

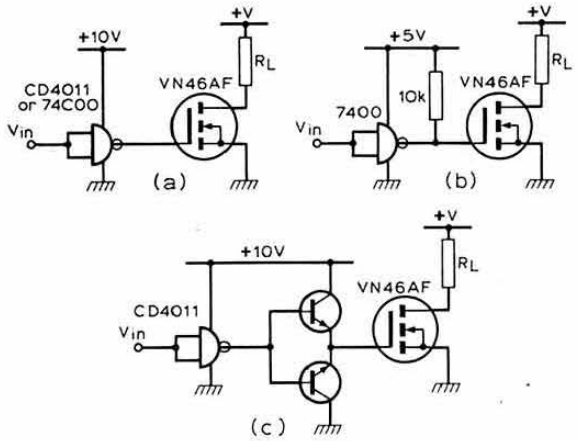


Fig 5. Drive arrangements used with vmos devices for switching applications. (a) Driving vmos device from a cmos gate; (b) "pulling up" a ttl output increases the sink current of the vmos device; and (c) an emitter-follower arrangement used to decrease vmos rise and fall times

to remember when you are driving vmos is the input protection zener diode. When putting a positive voltage on the gate with respect to the source, the maximum voltage rating of the zener diode should not be exceeded. It is more important, however, that you do not forward-bias the zener diode by putting a negative voltage on the gate while the vmos is operating in a circuit. The reason for this is most easily explained by referring to Fig 4. As can be seen, the zener diode is actually the base-emitter junction of a bipolar transistor. If a negative voltage greater than 0·6V is placed on the gate, the base-emitter junction of the bipolar will be forward-biased, which will turn on the bipolar transistor. When the bipolar is turned on, current will flow from the drain through the bipolar and out of the gate. This operating condition is very likely to be destructive. If negative voltages must be placed on the gate it is recommended to use a vmos device that does not have an input zener diode. Non-zenered equivalents are available for most of the Siliconix range of zenered devices." Clearly, if using a non-zenered device additional care will be needed in handling, etc, to avoid damage from static discharges (and see also below).

AN79-4 points out that vmos devices are most easily driven in the common-source configuration and can be directly driven from various logic families, including cmos and ttl: Fig 5. The 1·8MHz transmitter using two parallel low-cost VN66AF devices (*TT* September 1979, p830), for example, has an HEF4069UB ic as the driver. Because the output voltage from ttl devices is limited, maximum current in a vmos amplifier driven by such a device may be unduly limited unless a pull-up resistor is used (Fig 5(b)). VMOS devices are rather more difficult to drive in the common drain mode, although not so difficult as a bipolar common collector arrangement; various drive arrangements for this configuration are given in *AN79-4*.

VMOS and ic audio amplifiers

Although most amateurs might feel that there is very little point in using a vmos fet in an audio amplifier for a station receiver or as a general purpose unit, Doug DeMaw, W1FB, makes out a case for doing this based largely on the fact that conventional Class A bipolar power transistors are subject to thermal runaway and secondary breakdown, whereas the vmos device is immune to those forms of damage. Fig 6 shows his two-stage amplifier capable of delivering about 2·5W of audio output from a VN89AA device. We have already commented on the need for the two zener diodes across the primary of the output transformer. Additionally, W1FB stresses that while the VN89AA has a built-in 15V gate-source zener diode that will protect the gate from damage, it should not be forgotten when dealing with vmos devices (especially the un-zenered types) that they will instantly go "poof" from excessive voltage or current; only a few microamperes of abnormal gate current will destroy the device.

It is also important that the polarity of the output transformer windings be observed in order to ensure that feedback is negative and not positive. With positive feedback you may find yourself with a code-practice oscillator, but not one to be recommended since, as mentioned above, strong self-oscillation is likely to lead to immediate destruction of a vmos device. A TO3-size mica insulating washer is needed between TR2 and the heatsink: both sides of the washer should be

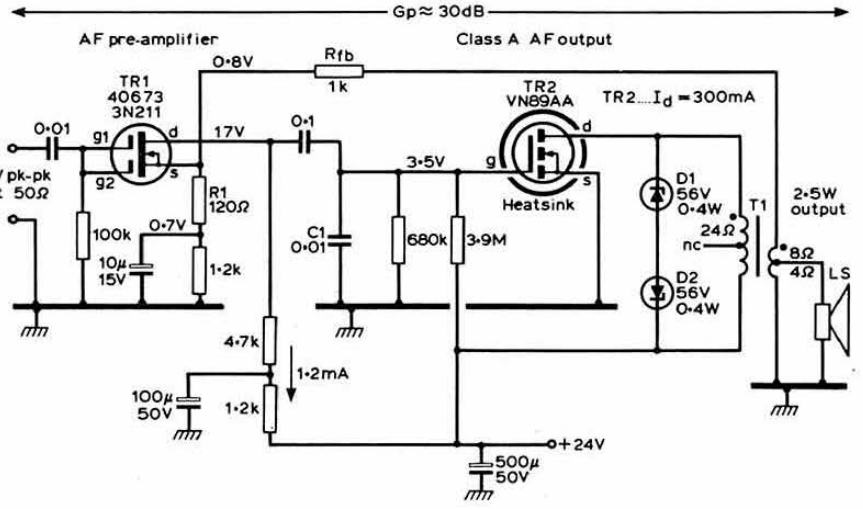


Fig 6. W1FB's audio amplifier with Class A vmos output. Note that primary winding of the output transformer must be capable of carrying at least 350mA, and that it is important to ensure that feedback is negative and not positive

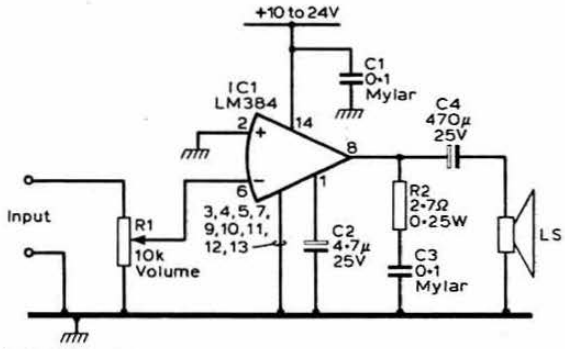


Fig 7. WA0UZO's miniature audio amplifier will work with supply voltages from 6 to 24V dc (above 10V recommended)

coated with silicone heat-transfer compound, and this should also be used between the heatsink and the pc board.

In the same issue of *QST*, Robert Shriner, WA0UZO, provides the circuit diagram for an af output stage based on the LM384 ic: Fig 7. This device embodies preamplification and contains the equivalent of a Darlington pair of output transistors. This ic has low quiescent (static) current drain, and the output is short-circuit proof. If built on a pcb the copper foil serves as a heatsink. Layout, however, is critical since some arrangements can be conducive to stray oscillation and noise. A 10kΩ volume control and shielded audio-input filter are suggested. A most useful feature of this general-purpose amplifier is that it will work happily with any supply voltage from 6 to 24V with minimal difference in output volume.

Multiband dipole with coaxial stubs

About 1950, W4JRW patented a method of making multiband (14/28MHz) dipoles by using decoupling stubs formed from tubular 300Ω twin feeder with the stub forming part of the dipole element on the lower-frequency band: Fig 8(a). This design has been included in all editions of *ART* but has never attracted (to my knowledge) much attention; possibly because of the relatively little use made in the UK of balanced feeders with their susceptibility (more especially the flat "ribbon-type" of feeder) to a change of characteristics in wet weather conditions. An alternative form of dual-band dipole, again using twin feeder but in a folded dipole configuration, was reported more recently by VK1PM (*TT* October 1979, p939).

Now Vincent C. Lear, G3TKN, has come up with a three-band (7, 14, 21MHz) version of the W4JRW dipole but using coaxial cable to form the stubs: Fig 8(b). He writes:

"It appears that W4JRW recommended tubular 300Ω line for the stubs. However, I have found this difficult to obtain, while in my experience the flat 300Ω ribbon can be affected by rain and damp. I decided to try the W4JRW principle, but using 75Ω semi-airspaced uhf tv coaxial cable for the stubs.

"I have found this works well, provided that the cable is accurately trimmed to $\lambda/4$ resonance using a gdo or noise bridge, and that the ends are suitably sealed to prevent moisture from entering the cable. Fig 8(b) shows the dimensions of my antenna, but it is strongly advised that the stubs should be carefully resonated; since manufacturing differences in the cable can result in slightly different velocity factors, and hence different lengths for accurate resonance.

"The $\lambda/4$ stubs act in the same way as parallel LC traps; the antenna functions as a $\lambda/2$ dipole on 14MHz. On 7MHz the stubs present an inductive reactance and, together with the end wires, resonate the system on that band; virtually unity swr can be achieved on both these bands. Although the stubs offer some capacitive reactance at 21MHz, the antenna operates satisfactorily as a $3\lambda/2$ element on that band, with an swr of about 1·4:1 achieved when using 75Ω feeder.

"I have run the antenna with 400W p.e.p. without observing any arcing at the open-circuit ends of the coaxial stub, where high voltage exists on 14MHz. However, if other types of coaxial cable were used this might be a point worth watching.

"With the help of G3FJ, some three miles away, I have carried out ground-wave tests. It was not possible to detect any noticeable drop in signal strength on either 7 or 14MHz when the antenna was restored to a normal dipole on either of these bands; so it seems reasonable to assume that this method of multibanding does not involve much 'compromise'. Because of the extra weight in the antenna element, such a system would be better suited to the 'inverted-V' configuration with centre support.

"I am hoping soon to experiment further with the system; for instance by attaching a pair of 7MHz stubs together with outer end wires and so resonate the system on 3·5MHz. The 7MHz stub should not only act as an isolator on 7MHz but also on 21MHz, so providing a 3·5/7/14/21MHz system.

"I would be interested to hear from anyone trying this system of multibanding." (G3TKN's address is 18 Alten Road, Waterlooville, Hampshire PO7 6DR.)

TTC-cut crystals

For many years most of the hf quartz crystals used by amateurs and professionals have been of the "at-cut" type; that is, crystals cut at an angle of about 35° 15′ to the c-crystallographic axis, rotated about the x-axis. Such crystals have a cubic form of frequency/temperature characteristic; this

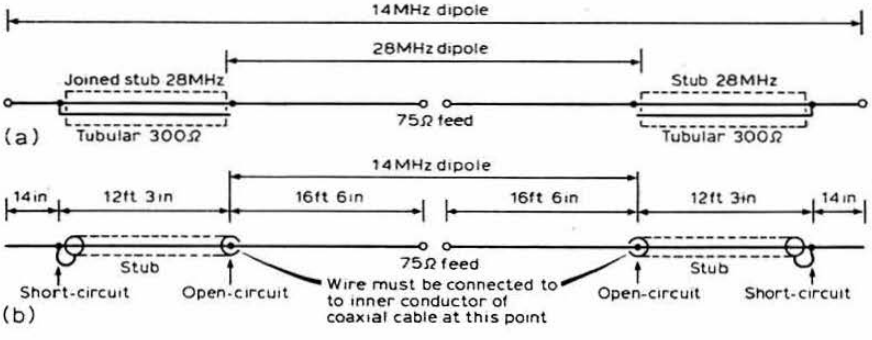


Fig 8. Multiband dipoles using stubs which also form part of the lower frequency radiating element. (a) W4JRW's original design for 14 and 28MHz using stubs made from 300Ω tubular cable; (b) G3TKN's 7/14/21MHz version with stubs using semi-airspaced uhf tv cable. The stubs should be carefully resonated at 14·2MHz

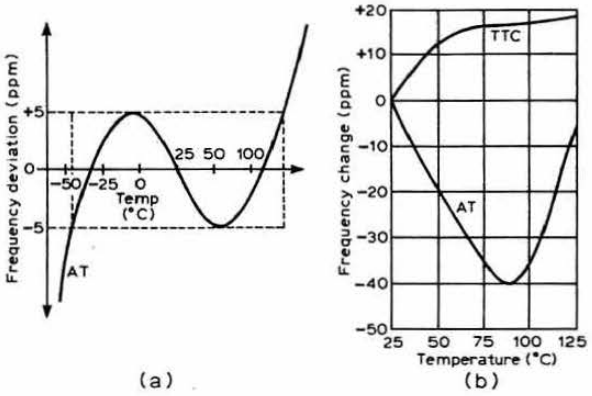


Fig 9(a). Cubic frequency/temperature characteristcs of at-cut crystals. (b) Comparison of frequency/temperature characteristics of at- and ttc-cut crystals over the temperature range 25-125°C

means that there are three specific temperatures at which the crystal has a "zero temperature coefficient": Fig 9(a). Unfortunately, without a good oven or proportionally-controlled heating element, crystals cannot be held at a specific temperature, and in practice at-cut crystals can be expected to have a deviation of ±5ppm at the peaks of the turnovers of the cubic curve, as shown.

A new series of "cuts", including ttc (thermal transient compensated), sc (stress compensated) and fc (presumably frequency compensated) have been under investigation recently; these are all doubly-rotated cuts with the cut rotated about both the x and y axes of the mother crystal.

Recently, Cathodeon Crystals Ltd, following research under Government CVD-sponsorship, have announced that they are providing 10MHz ttc-cut crystals for professional customer evaluation. Because manufacture is stated to be difficult, the price of such crystals is, and is likely to remain, higher than for at-cut units, but they are capable of superior performance in terms of:

(1) Extremely flat frequency/temperature curve at elevated temperatures (eg 90°C inflection temperature instead of the usual 25°C for at-cut units): see Fig 9(b).

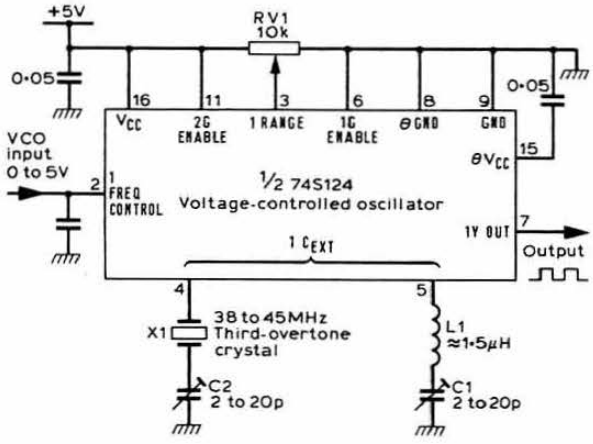


Fig 10. Showing how the addition of the L1,C1 series-tuned network enables the 74S124 vco ic to be used as a pll crystal overtone oscillator at up to about 60MHz

(2) Low sensitivity to mechanical stress.

(3) A double mode of oscillation (which has to be suppressed, or which can be utilized to provide a form of 'thermometer" for temperature compensation).

(4) Superior ageing performance compared with at-cut crystals (±1-3ppb/day for ttc, typically ±2-10ppb/day for at, after 1,000 hours).

TTC-cut crystal oscillators can have noise factors of about −130dB in a 1Hz bandwidth, or about −100dB in 50Hz.

So, although the use by amateurs of these new cuts seems likely to be limited to only the most demanding applications (eg high-performance reference oscillator for synthesizers) for some time, they appear to represent an advance in crystal technology.

Crystal-overtone pll oscillator

In *Electronics* (22 November, 1979), R. J. Athey notes that the use of the Texas Instruments 74S124 ic, which provides a crystal-controlled phase-locked loop, tends to be limited to fundamental-mode crystals with frequencies up to about 20MHz. When used with overtone crystals, problems arise from the tendency of the crystals to oscillate in the fundamental mode. However, he has found that it is possible to overcome this problem by adding a series LC network (L1,C1 of Fig 10) tuned to the required overtone frequency. This permits the use of the device as a pll oscillator up to about 60MHz. The resonant circuit provides sufficient system gain at the overtone frequency while damping oscillation at the fundamental frequency, forcing the loop to lock on to the third-order or overtone output. A disadvantage is that the locking range is limited to about 1kHz for a 0 to 5V dc input signal.

The Q of L1 and C1 should be reasonably high. C1, together with RV1, serves as a gross frequency control. The setting of both RV1 and C1 is rather critical, but a miniature carbon potentiometer should have sufficient resolution. C2 trims the crystal frequency.

Follow up

Bert Hammett, G3VWK, confirms the hazard presented by silicones to relay contacts (*TT* February). A handheld 144MHz transceiver was accidentally dropped into a salt-water pool; rapidly shaken out, opened and sprayed with an aerosol moisture repellant. When dry it resumed satisfactory service, but after a few weeks it became irregular in operation and this was traced to the send-receive relay. Apparently some of the chemical had remained on the chassis, vaporized and penetrated to the contacts of the semi-sealed relay. Cleaning the contacts failed to remove the silica, and the relay had to be changed; the transceiver was treated to remove all remaining traces of the moisture repellant. He also mentions that premature failure of contact-breaker points in cars has been caused by moisture repellant aerosols used to dry leads brushing over on a moist day.

Les Mitchell, G3BHK, mentions that the miniature 3·5MHz rig for df hunts (*TT* February) was designed, as mentioned, by LA7MO (a Norwegian Scout) and originally appeared in a book *Introduction to Scout Radio Orienteering—Fox Hunting*, by Nic Holter, LA5CH. G3BHK built two and they "worked like a charm"—he even reached Holland on one of them. The book also included full constructional details of a small df receiver and a higher-power transmitter (5W), etc. A few years ago the book was available from Nic Holter, Box 58, Oppsal, Oslo 6, Norway, priced about £2. □

microwaves

Charles Suckling, G3WDG *

A new 1·3GHz world record

What appears to be a new world record contact for the 1·3GHz band took place in Australia on 23 January. The holders of this new record are VK6KZ/P and VK5MC, who, incidentally, held the previous record! The path was 2,290km in length across the Great Australian Bight between Cape Leeuwin (Western Australia) to Haterleigh via Millicent (South Australia).

Following a close study of the prevailing weather conditions which suggested a likelihood of ducting across the Bight, VK6KZ drove 400km from Perth to Cape Leeuwin with his portable 1·8MHz-2·3GHz station. On arrival, the hope of good conditions was confirmed by the reception of the Adelaide 144MHz beacon, over 2,000km away. Following some contacts into this area on 144MHz, VK6KZ managed to exchange signals on ssb with VK5QR on 1·3GHz over a 2,146km path. This broke the previous world record by 39km. This new record was then broken on the following day, when he worked VK5MC.

VK6KZ's transmitter for 1·3GHz is of interest, as the 1·3GHz ssb is generated by using a different system to the 144/1,152MHz mixing technique normally used. A frequency of 21MHz from a TS120V transceiver is divided by three, mixed to 28MHz, transverted to 432MHz and finally multiplied using a varactor tripler to 1·3GHz. The power output is approximately 4W p.e.p. The same system is used by VK5QR, who described it recently in *VHF Communications* (2/1979). The remainder of the VK6KZ equipment of 1·3GHz consists of a 1m dish mounted just above the roof of the car, and a Microwave Modules converter preceded by two BFR91 preamplifiers.

More enhanced conditions on microwaves

Encouraged by his previous reception in south Wales of the Alderney 10GHz beacon, GB3ALD, GW3PPF has continued, with some success, his search for enhanced 10GHz propagation on overland paths during spells of good conditions on lower frequencies. On 28 January conditions were good on 432MHz and 1·3GHz, and GW3PPF travelled to his site near Cardiff (ST 106 832, 600ft asl). Listening commenced at 1300, but no signals were heard until 1600. By 1730 the beacon signal had reached 40dB above noise. A sked with GJ8KNV at 2100 proved unsuccessful, despite GB3ALD being as strong as ever. The signal was still very strong at 2200 when GW3PPF returned home, but had disappeared by 1100 on the next day, despite 432MHz being open until 1400.

This second observation of overland ducting by GW3PPF suggests that the phenomenon may not be as rare as previously thought, and emphasizes the need, especially during spells of good conditions on the lower bands, to check paths which would not normally be considered workable.

January was also a good month for G8BHH (Wolverhampton). On 13/14 January he worked, on 1·3GHz, G4BYV (AM), PA0EZ (Hilversum), DK3OL (DL), DL0SO/A (DL), DF7JX (EL), G3RQZ(AL), G8EVU (AL), G8DKK (ZL), G3TDG (AL), DF3XU (FN) and DB4LT (EO). The duct seemed to be very localized, as stations close to him were reporting only weak signals from the dx, while some were S9 at G8BHH's QTH. No doubt G8BHH's good results on 1·3GHz during this lift reflect the potency of his equipment—on transmit two 3CX100A5 tubes were used, one as a mixer, the other as a pa delivering 40W p.e.p, while on receive an MRF902 masthead preamp was used. His antenna is a pair of G3JVL loop-Yagis at 15m agl fed with 0·5in low-loss heliax cable.

*31 Oakwood Road, Chandler's Ford, Hants SO5 1LW.

10GHz news from VK

In a recent letter, Des Clift, VK5ZO (ex-VK2AMC, ex-G3BAK), mentions that he has now moved from VK2 to VK5 and is looking for contacts on 10GHz at his new QTH. His address is 6 Netley Road, Mount Barker, South Australia 5251. While in VK2, he, VK2ALU (of VK2AMW 432MHz eme fame) and VK2YCN were very active on 10GHz, using a mixture of Gunnplexer and homemade Gunn oscillator equipment, and had covered a number of paths up to 120km in length. VK5ZO anticipates that VK2ALU and VK2YCN will continue with the 10GHz tests, including some planned super-refraction experiments. Meanwhile VK5ZO hopes to stimulate activity in his new area, and he has a spare set of equipment available for loan. He also hopes to become operational soon on 24GHz, as this is the only amateur band on which he has not had a contact.

News about GB3BPO

The GB3BPO beacon on 1,296·830MHz (AM77j) has been fitted with its final antenna arrays and can now be heard over a much wider area. Each antenna, one pointing east and the other west, consists of two slotted-waveguide arrays, each with 16 slots. The overall height of the antenna system is 17ft and the waveguide dimensions are 6 by 3in. The forward gain is 16dBi with 3dB beamwidths of 90° and 10dB beamwidths of 190°, in the horizontal plane. With an rf input of 10W into each array, the beacon should be regularly audible over most of the south of England, and it has already been heard regularly as far as ZN square.

Initially many stations commented on the key clicks which were only about 30dB down on the main carrier. The reason was that two separate oscillators (mark and space) were used, and the pll reference inputs suffered from instantaneous phase changes. The problem was solved by going over to the more conventional single oscillator arrangement with fsk. The output frequency of the main oscillator at 64MHz is maintained to ±1Hz by referencing to a high stability 5MHz oscillator. This means that the output frequency of 1,296·830MHz, checked from time to time against a Caesium standard, should be within ±20Hz. Thus, not only should the beacon serve as a very useful signal source and propagation monitor, but it can also be used as an accurate frequency marker.

G4FSG would welcome any reception reports of GB3BPO.

Forthcoming round table

A round table meeting will be held at the usual Sheffield venue on 10 May. Main topic of discussion will be receiver optimization, and equipment will be on hand to measure noise figures in the 1–12GHz region. Further details from G8AGN, QTHR. □

swl news

Bob Treacher, BRS32525 *

February dx on the lower frequency bands

The 7MHz band maintained its excellent performance record during February, with much interesting dx audible in G-land on ssb between 1700 and 1930. Some of the better dx stations reported were: A4XIH, JY5MM, N4HX/TT8, UD6, UH8, UL7, UW0MF (zone 19), VS6DO, VU2RX, OE8JSK/YK, ZD7HH, ZE6JL, ZS3E, 9G1JX, 9J2BO and 9K2FO. In the late evenings Caribbean and Central American stations were good copy. In the mornings west coast USA stations were audible on a good many occasions, with K6MYC being probably the strongest signal reported. On cw many W7s and KL7s were reported around 0400. By the time this is read, conditions may not be as good but it may still be worthwhile to monitor the band at sunset to see what dx is audible.

On the 3·5MHz band the best dx of the season was W1CF/KH2 on Guam at 1825 on 3 February. Conditions also proved reasonable to Africa around 1900, with EA8, EA9, ZD7HH, 5T5CJ, 5Z4YV, 6W8DY, 7X2TZ and 9G1JX all being reported. Signals from VK were also audible on ssb—VK3XI around 1930, VK5MF around 2000, and VK6AS, VK6HD and VK6LK around 2120–2150. This was probably the best season for VK signals so far, with at least one VK audible every evening during the month. West coast USA signals were also audible before 0700, and ZLs could be heard via both short and long path on most days.

The 7MHz dx contests

The RSGB moved these two contests to February in the hope of tempting more participation among British stations, and also in the hope of finding better dx conditions. There did seem to be an increase in the numbers operating in the ssb event, and I am told there were sufficient Gs in the cw part. Conditions were certainly better than they would have been in November, and I am sure the leading stations in both events worked many dx stations. Hopefully there were sufficient entries so that the Society does not have to cancel these interesting contests due to lack of support.

SP DX Contest 1979

Your scribe has received the results of this contest, in which five G-land swls competed. Surprisingly, there were 62 entries in the ssb section, and scores and placings were as follows: BRS32525, 16,200 (13th); BRS34310, 15,210 (14th); A8808, 13,175 (16th); A9191, 12,855 (17th), and BRS40201, 4,200 (38th). This year's contest takes place from 1500 19 April until 2400 20 April. A pleasant certificate awaits the leading G-swl.

DX rumours

Rumours are rife concerning a number of dx trips to interesting places. 4Z4TT is planning a trip to ZM7—no dates, but the trip seems fairly definite. K1MM is also understood to be planning a trip there with VK2BJL, but this will not be until November.

*79 Granby Road, Eltham, London SE9 1EH.

1980 hf countries table

(starting score 150)

Station	28	21	14	7	3·5	1·8	Total	Mode
RS42604	126	123	107	91	84	16	547	ssb
ARS8841	54	51	111	56	68	0	340	ssb/cw
BRS43475	58	42	89	20	40	1	250	ssb/cw
BRS20185	47	37	67	16	27	2	195	ssb
BRS40293	30	45	50	20	20	0	165	ssb
BRS41992	33	32	50	11	31	7	164	ssb

Heard Is was being activated using the callsign VK0RM during mid-late March.

N2KK's trip to Africa and the Indian Ocean seems to have been delayed, possibly due to the monsoon season in the Indian Ocean.

HK6BJB/0 was active from Serrana Bank late in February, but it is believed that he did not have the necessary permission to operate from the island. If anyone heard or worked him, it seems unlikely that the QSL will be accepted by ARRL for DXCC purposes. In fact it is rumoured that this island group and Bajo Nuevo are to be deleted from the DXCC list in the summer. Hopefully some dx group will activate both islands before only the "island hunters" benefit from a dx trip there after DXCC status has been removed.

The Chilean expedition to CE0Z, Juan Fernandez, should have taken place by the time this is read, but there was much uncertainty about the actual dates of the trip.

Tromelin Is should be active about now, courtesy of FR7AI/T—check 14,130 and 21,275kHz as favoured QRGs.

Newcomers

Newcomers almost outnumber regular reporters this time. Your scribe welcomes Arthur Stutland, BRS42055; Bob Anderson, BRS42645; Alan Seago, RS43246; R. A. Jones, BRS43135; Mike Patrick, ARS42591; Mark Hattam, BRS43475; Derek Casson, BRS41992, and Callum Lawlor, ARS42922. Arthur has built a 3·5MHz receiver and has an R1000 receiver which has produced a number of interesting signals on the hf bands.

Bob, who hopes to take the RAE in May, uses an FRG7 with the filter modification published in this journal last year. He is keen to swop details of the receiver with any other FRG7 owners, and is particularly keen to get in touch with any other BRS members in Essex, especially on Canvey Is. Bob's address is 36 Sycamore Close, Canvey Island, Essex.

Alan lives in Great Missenden and is an ex-RN radio operator. He is sitting the RAE and has an SB310 receiver. R. A. Jones, who has a Realistic DX160 receiver, homemade atu and 132ft long-wire, enclosed a list of good dx heard on all bands, including VQ9DM and VP2MH on 14MHz and 8P6GG and VO2CW on 3·5MHz.

Mike is also taking the RAE in May. He too has built a 3·5MHz d–c receiver, and his best dx to date is JA6IEF, and since mid-December 1979 he has logged nearly 300 different stations in 34 countries on 3·5MHz.

Mark has been QSX for about one year and hopes to take the exam in May. He too uses a DX160 receiver with an indoor antenna system. So far he has 39 countries confirmed.

Derek comments on the complicated prefix system now in use in East Germany, but it is good business for the prefix hunters! His best dx to date includes YB0ADW, VS6CT and HM1QD.

Callum has recently started keeping a log of stations heard. He uses an FRG7-D and atu with a 33ft long-wire.

(Continued on page 387)

4-2-70

Graham Knight, GM8FFX*

Activity periods for 70 and 432MHz

"If you don't send a message you don't get an answer" is a quote from a well-known vhf operator who strongly supports the 432MHz activity periods which start at 2130gmt on Monday nights. These sessions show that there are plenty of stations around waiting to answer if only someone will stop listening and actually put out a call. The usual calling frequency is 432·200MHz and this period on 432MHz neatly complements the long-estabished activity sessions on Monday nights at 2000gmt, on 144·050MHz, cw of course.

A number of prominent vhf operators, including G3BA, G3FDW and G5UM, are participatng in activity periods on the 70MHz band. These sessions are proving to be very popular and a large number of stations are now joining in on a regular basis. There is activity every night at 2000gmt around 70·2MHz. This is proving that the old tvi bogey has disappeared and that many stations are now operating during television hours. These activity periods on 70MHz appear to be getting a considerable amount of support from all over the UK, with both Chris Tran, GM3WOJ, in Dumfries, and Brian Howie, GM4DIJ, in Edinburgh, reporting a large increase in the number of stations appearing on the band. Reports from stations participating in these activity sessions would be welcome for publication in *4-2-70*.

Phase 4 repeaters licensed

The following Phase 4 433MHz repeaters have been approved by the Home Office. The callsigns, channels and locations are:

Callsign	Channel	Location
GB3Gf	RB13	Guildford
GB3HN	RB11	Hitchin
GB3HO	RB14	Horsham
GB3HW	RB13	Romford
GB3LC	RB13	Louth
GB3MW	RB10	Leamington Spa
GB3ND	RB14	Ilfracombe
GB3SH	RB11	Honiton
GB3TH	RB13	Tamworth
GB3WN	RB0	Wolverhampton
GB3ZI	RB11	Stafford

The latest information about the dates on which these repeaters become operational will be given on the Society's GB2RS news bulletins.

50MHz beacon for the UK?

Following a great deal of groundwork by the beacon co-ordinator, Brian Bower, G3COJ, the VHF Committee and the Telecommunications Liaison Committee, the Home Office has granted permission for a 50MHz beacon to be established in the UK. The Society plans to establish this important beacon on a site which has been made available by Alan Mills, GW3NNF, on the Isle of Anglesey off the coast of north Wales. The proposed beacon will have the callsign GB3SIX and will transmit outside television hours. It will be most interesting to receive reports of the coverage of this important beacon.

Royal operator on new repeaters

HM King Hussein of Jordan, JY1, operated through the new London repeaters during his recent stay in London, operating from his hotel room and using his UK callsign G5ATM. Many UK operators who normally work JY1 on the crowded hf bands took the opportunity to renew friendship over the more leisurely 144MHz band. Despite the appearance of the famous callsign, *4-2-70* is pleased to report that the 144MHz operators keen to work G5ATM conducted themselves in exemplary fashion, waiting patiently to contact perhaps the world's most famous amateur radio operator.

Repeater news

The new 433MHz repeater GB3LC located in Louth, Lincolnshire, is now operational on Ch RB13. An information sheet and further details about this latest addition to the 433MHz units is available on request from G4IPE, QTHR.

Readers of *4-2-70* will remember that vhf repeater GB3WT suffered damage to its antenna and had been operating on a temporary antenna. The original antenna has now been repaired and GB3WT, which is located in West Tyrone, Northern Ireland, is now back to normal service on R7. Operators in Northern Ireland send good reports of the standard of operation through GB3WT, and they will be pleased to once again have good coverage to the east of the repeater site, as this was somewhat limited with the temporary antenna.

Repeater group newsletters

Your scribe receives many of the newsletters produced by the various repeater groups, and is full of praise for the voluntary work which produces these highly interesting publications. The Kent Repeater Group newsletter is always full of the latest technical developments to their repeaters, and it reports the repeater scene in a very professional manner. The UK FM Group's newsletter also keeps its members very well informed about the group's activities, and has printed many outstandingly good technical articles. Some newsletters are quite ambitious, with a recent edition of Grampian's including an article on Japanese morse, and, not to be outdone, the Edinburgh GB3ED Group's newsletter recently carried sections in Gaelic. Without doubt the newsletter your scribe looks forward to most is that produced by the UK FM Group (Western) which distributes *Talkthrough* free to its large membership. *Talkthrough* can be relied on to be the most stimulating reading for any vhf operator, and the latest issue is no exception. Details of all the group's many repeaters are given in full, along with a round-up of the popular repeater and simplex frequencies currently being used in the north-west of England. There are articles on df antennas and reports on the group's well-attended fox hunts, discussion on rtty/data repeaters, and a long article on illegal operation. Editor Gordon Adams, G3LEQ, has done very well over the last few years to produce a newsletter which is consistently good, and often the ideas discussed in the articles are way ahead of the current thinking of many vhf operators. Your scribe confesses to being a fan of *Talkthrough*, and vhf enthusiasts attending the Northern Radio Societies Association Exhibition at Belle Vue, Manchester, on 27 April will have a chance to pick up a copy or even to join the group and contribute to the maintenance of the many UK FM Group (Western) vhf and uhf repeaters.

*PO Box 49, Aberdeen AB9 8JA

Canadian vhf beacon

Phil Hobson, G8RBY, of Melton Mowbray, read the report on the Canadian beacon on 144·9025MHz and telephoned Dave Oldridge, VE1EI, for further details. The beacon is on and running, and G8RBY is now giving serious consideration to putting up a large beam to try for reception in the UK. Because of the interest shown in this beacon, G8RBY suggests printing VE1EI's telephone number again, but this time giving the international dialling code from the UK as well as the Canadian number. Just in case anyone does hear a signal from VE1EI on 144·9025MHz, the number to dial from Britain is 0101-902-477-1283. Please let *4-2-70* know too, as this will be an historic occasion in vhf history.

70MHz transatlantic possibilities

Considerable correspondence has flowed into *4-2-70* following publication of the "high-muf" item in February's *Radio Communication*. Propagation expert G8KG recently discovered that W2IDZ heard UK amateur signals on the 70MHz band for a brief period around 1445gmt on 23 November 1957, but he was unable to identify any of the callsigns. The date was of course right at the seasonal peak in the North Atlantic mufs and the monthly solar flux had then been above 250sfu since September, and peaked at 298sfu on 22 November 1957. The monthly mean sunspot numbers for September, October and November 1957 were all above 200. This tends to confirm that the threshold for transatlantic 70MHz possibilities is high, but G8KG now feels that his previously published figure of 400sfu may be a pessimistic one, and there remains at least a slight possibility that the right conditions might arise in late November or in early December of this year. This forecast from G8KG will no doubt hearten the efforts of members like GM3WOJ who still has his nine-element beam pointing towards the USA.

G8KG is also optimistic about the alternative possibility of bridging the Atlantic on vhf by multi-hop Es during the coming summer months. Operators in the highly active W1, W2 and VE1 areas would need three hops, although stations in the VO1 area may just be able to make contacts via a two-hop Es opening. G8KG estimates that the chances of success this year cannot be very high, but he thinks that someone with patience and luck might be able to make history by completing the first terrestrial transatlantic vhf QSO.

Several operators have written in to *4-2-70* to say they remember reading about previous 144MHz transatlantic contacts taking place in the 'fifties—one writer chastising GM8FFX in a good natured way for "forgetting it was all done long ago on an SCR522 just after the war". Memories are playing tricks this time, as an exhaustive search revealed that those stories emanated from a hoax. No doubt the SCR522 did play an important part in vhf history, but readers should be assured that so far the transatlantic path has not yet been spanned by a terrestrial two-way contact.

New Es theory

That well-known vhf operator and QTH square hunter, Geoff Brown, GJ4ICD, has been collaborating with F8SH on a new approach to the study of sporadic-E openings. F8SH has a wealth of experience in this interesting field, and has been the IARU sporadic-E co-ordinator for a number of years. Together with information provided by Dundee University, made up from weather satellite information and from data supplied by the Meteorological Office, GJ4ICD and F8SH have come up with a theory which could throw new light on the cause of those mysterious and, at times, tantalizingly exciting sporadic-E openings.

The data collated over the last two years indicates that Es openings occur shortly after known meteor showers. It is thought that the particles of dust formed by meteors slowly descend into the E-layer, and in certain weather conditions this results in the familiar Es type openings. The unusually early Es opening which occurred in January, reported in February's *4-2-70*, coincided with the Quadrantids meteor shower and with unusually high barometric pressures being recorded in the sections of Europe where Es contacts took place. This last opening clinched the theory for GJ4ICD and F8SH, and their combined results are now being studied by the members of the Propagation Studies Committee. Further details of this new approach to Es theories will be carried in future editions of *4-2-70*.

New transverter for 70MHz

Many Class B licensed operators have recently been taking and passing the morse test, and no doubt these new Class A amateurs will soon be experimenting with cw on the vhf bands. With the increased activity on the 70MHz band which is reported in this issue, many new Class A operators will be thinking of equipping themselves for 70MHz. The well-known firm of Microwave Modules has just introduced a new 70MHz transverter which is not driven by a prime mover on 28MHz. The MM70/144 transverter is a solid-state design and can be driven with an existing 144MHz transceiver. Tom Douglas, G3BA, has been using one now for a few months, and he reports that the output is very clean and that the receive section is particularly sensitive. He has worked lots of dx on the solid-state transverter, and is now using it to drive a QV06-40 power amplifier to 50W input on cw. Being a transverter, the MMT70/144 gives all the facilities of the 144MHz prime mover on the lower band. G3BA reports several stations using these transverters to conduct local contacts on 70MHz fm, and he is happy to note that many of these operators also tune for dx in the lower sections of 70MHz after their local contacts have been completed. Your scribe has had more letters and enquiries about 70MHz this month than in the past six, perhaps 1980 will be the year for a large growth in 70MHz activity; if this is to be the case the new MM transverter should sell well.

German cw contests

Every year the cw activity group in Germany (AGCW-DL) sponsors vhf cw contests, and these are excellent opportunities for UK stations to participate in periods of high Continental cw activity. The next AGCW-DL contests take place on 28 June and 27 September 1980. The contests are limited to single-operator stations, and there are three classes of entry. Category A is for stations running less than 3·5W; category B is for stations running less than 25W; and category C is for stations running more than 25W. The contest exchange consists of the usual RST plus QSO number commencing with 001/class/QTH locator—eg 589001/C/YR80j (note that the oblique strokes must be keyed). Scoring:

Class A with A1—9 points	Class B with B—4 points
Class A with B—7 points	Class B with C—3 points
Class A with C—5 points	Class C with C—2 points

Contacts with stations which do not send a complete contest report count one point only. Each new QTH locator square worked scores one multiplier point, and each new country

worked scores an additional five multiplier points. The final score is made up from the sum of the QSO points times the sum of the multiplier points.

Contest entries should be sent to Edmund Ramm, DK3UZ, PO Box 38, D-2358 Kaltenkirchen, Federal Republic of Germany. This RSGB member is thanked for sending these details to *4-2-70*, and for all the work he does in promoting activity on what is without doubt the best and most reliable transmission mode for vhf operation.

RTTY on 144MHz from YR square

Alec Allan, GM3ZBE, who is located on an excellent 200m asl site near Inverurie in square YR53a, has had a reawakening of interest in vhf operation. After a great deal of success on 144 and 432MHz from his extremely good QTH, GM3ZBE found that working dx stations on vhf had lost its former appeal. His interest has been reawakened by his new hobby, which is solid-state reception and transmission of rtty, and he has been greatly encouraged to get back on vhf again by David Beale, GM4AXB, and Bob Soutar, GM8MBP. Both GM4AXB and GM8MBP have been busy constructing similar equipment for rtty, and now all three can often be heard on the 144MHz band. A combined effort is being planned to put YR square on the map in the next big tropospheric openings. GM3ZBE and GM8MBP are particularly well placed for rtty contacts with stations in the south-east of England and along the Continental coast.

QTH squares—a parlour game?

As forecast, the letter from Bill Scarr, G2WS, published in February's *4-2-70*, suggesting that hunting QTH locator squares had reduced the hobby of vhf radio to the level of a parlour game, caused a huge pile of letters to arrive at Aberdeen. To date 43 letters have been received on this subject, and all but two disagree with the views expressed by G2WS.

It is impossible to quote all the letters, but these are a few of the comments received:

"I find the QTH squares to be far from unscientific and meaningless. If I read a report of an opening, or have participated in an opening and know that a vhf or uhf duct started in EK square, moved to EM, and eventually to EP, these locator references have a very special significance to anyone wishing to plot the ducting."—*John Tye, G4BYV.*

"There is too much emphasis on square chasing and I feel there is more to be gained from regular schedules. All too often one hears the comment 'I get the dx when it is coming in', but under lift conditions all signals will be far above the normal level and it is no sign of a station's efficiency to be able to communicate under these conditions. What matters is the performance under flat band conditions."—*David Taylor, GM8ARV.*

"Perhaps Bill Scarr is unaware of the size and the spirit of the international vhf/uhf dx community, whose friendship, technical standards and goodwill in rivalry are a credit to amateur radio. Yet in Europe it is these people who are also the keenest of QTH square hunters."—*Ian White, G3SEK.*

"I am sure G2WS would be deeply upset if the same were said about the Worked All Britain net, of which I should say I am a bookholder. One could even go further and say the same about DXCC. Surely countries are nothing more than artificial divisions of the globe, and do not hf operators strive to put signals into obscure coral reefs just to get a QSL card."—*Neil Whiteside, G4HUN.*

"I fear Bill Scarr takes life too seriously. The majority of us are in amateur radio because it is fun, and jolly good luck to them too. We who are no longer young should avoid putting ourselves on pedestals and be more tolerant of those whose enjoyments are not our own."—*Johnny Hodgkins, G3EJF.*

"Bill Scarr must be pulling our legs, but I feel I must rise to his bait. I have been an ardent QTH square hunter on 144MHz for some years. This harmless competition has brought me a couple of minor firsts which resulted from searching through auroral signals, looking for new squares, when I made contact with UP2BBC. This has turned out to be the Region 1 distance record for an auroral contact. While square hunting towards France, I have QSOs with hundreds of French stations in their own language. Many French amateurs contacted have subsequently visited my home with lots of animated discussions between us on almost any topic."—*G3CHN in Yankee Kilo.*

"I would challenge the claim that amateur radio is the finest hobby in the world. This is a selfish comment; ask any fisherman, photographer, philatelist, football enthusiast, or skydiver which is the best hobby and few members will answer amateur radio. As for friendship and goodwill, how many arguments, cold meals etc have resulted from our hobby? Ask the vast majority of people 'What is amateur radio?' And you may be surprised at their response. Amateur radio is just a hobby, not a religion; like Mr Scarr, I enjoy it, but I do not worship it."—*Keith Laws, G8RZC.*

G2WS certainly started something when he wrote his initial letter to *4-2-70*, and perhaps Martyn Philips, G3RFX/DJ0EQ, sums it up when he says "I entirely agree with Bill Scarr, but I could not help reflecting on the various games we can hear every day. The contest game, the WPX game, the worked all left-handed GMs game, the game where new countries are created specifically for amateur radio—4U1, IS1, 8Z4". No further correspondence on this matter please, but it may be just as well to note the comments of Gordon Smith, GM4DSZ, "Surely we are in amateur radio for fun and enjoyment—is this a revolutionary concept?"

All the award winners

During a recent 70MHz QSO, Jack Hum, G5UM, the RSGB vhf awards manager, was reminded that at one time we used to publish an annual listing of all the award winners. Unfortunately the awards have become so popular and have been attained by so many stations that, even using the smallest type which would be legible, the listing would occupy more column inches than *Radio Communication* can afford. G5UM made a count of all the winners at the end of February, and his researches revealed that no fewer than 1,234 awards have been issued in the various categories. As might be expected, the 144MHz Standard Award has been the most popular, with more than 500 having been issued. In fact, the most recent 144MHz Standard, No 542, went to G8GXE in February.

Questions sometimes arise about the ruling in November 1976 regarding changing home QTH locations while collecting cards for an award. This ruling proved to be very hard on an operator who was compelled to change QTHs while working towards an award. Members are therefore reminded that, with effect from 1 January 1977, claims are still valid if made from any permanent home locations. This change does not of course alter the fact that a separate claim can be made for operation from portable sites.

G5UM reports that some remarkable Senior Awards have recently been secured. Two went to G3AZI of Preston, No 146 for 144MHz and No 59 for 432MHz. Another 432MHz Senior

Award went to G4FMD in rural Essex. Russ Stewart, G8BHH, the well-known contest operator, attained 144MHz Senior No 145, and his claim interested the awards manager as all the QSL cards submitted with the claim were for contacts with stations in the old counties as they were before the changeover which occurred in 1975. G8BHH's claim read like a potted history of the 144MHz band containing many callsigns of people who are rarely heard on the band these days.

Before your scribe hands over the compiling of the *4-2-70* pages to another writer he would just like to take a paragraph to thank Jack Hum, G5UM, on behalf of all vhf operators, for his meticulous work in checking and awarding all the vhf awards, and from the point of view of this writer—for the very detailed reports he has unfailingly sent each month for publication.

Firsts and farthests

Some "first and farthest" information came to the Society's record co-ordinator via a most unusual route. From G3MHF came a letter telling of regular contacts he had been having with Peter Pollard, VK6IV, who was well known in the early days of vhf operating as G3DIV and who made many dx contacts from his /A location at Eastbourne. During these 28MHz QSOs he asked that the following information be passed on to G5UM so that it could be recorded and published in *Radio Communication* as believed "firsts".

UK to Belgium: G3DIV/A to ON4UV on 15 October 1951 on 432MHz.
UK to Holland: G3DIV/A to PA0PN on 15 October 1951 on 432MHz.
UK to France: G3DIV/A to F8GH on 6 September 1951 on 432MHz.
UK to Romania: G3DIV/A to YO9KPB/P on 4 July 1965 on 144MHz.
UK to Germany: G3DIV/A to DL4XS on 9 June 1950 on 144MHz.

If there are any prior claims please send them direct to the record co-ordinator Jack Hum, G5UM, 27 Ingarsby Lane, Houghton on the Hill, Leicester.

Schedules wanted from PA0

Stuart Larkin, G8PPS, of Harwich, recently visited Holland and met many of the Dutch amateurs whom he contacts on 144MHz. G8PPS has previously arranged schedules for Dutch stations with rare squares in the UK, but since his visit he finds that he has a list of PA0 operators who are anxious to work WL, WM, WP, WR, WQ, WS, XS, XR, XL, XH, and most of northern Scotland.

G8PPS asks any operators in these locations who are willing to keep schedules on 144MHz to write to him, as he is in daily vhf contact with the operators in Holland. G8PPS can be contacted at 14 Orwell Road, Harwich, Essex CO12 3LD.

Late news

The VHF Convention on 8 March 1980 was a great success. The President, Peter Balestrini, G3BPT, welcomed the record number attending with news of the final approval by the Home Office of a UK beacon on 50MHz. Nearly 1,000 attended the afternoon sessions, and more than 150 stayed on for the evening meal and entertainment.

At the beginning of March 50MHz was open towards South Africa, and excellent conditions coincided with the 144/432MHz Contest. Stations in Austria and Switzerland were much in demand for contest points, and were working G, GM and GI stations—high scores are expected. □

Special event stations

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

GB2GCR, 4–8 April
A special station will be in operation at the Road-Rail-Steam '80 Traction Engine and Steam Locomotive Rally. The rally will be held at Quorn and Woodhouse Station, Great Central Railway, Loughborough, Leics. Further details from G3AAQ, QTHR.

GB4CBS, 25–27 April
Misbourne Valley District Fun Camp is organized by Chesham Boy Scouts and will be held at Chalfont Heights Scout Camp, Denham Lane, Chalfont St Peter, Gerrards Cross, Bucks. In addition to a St George's Day Parade and other activities, there will be a special event station. Further details can be obtained from B. Hummerstone, G3HBR, QTHR.

GB4OOD, 2–19 May
A special event station will be included in the grand opening of the celebrations in Plymouth to commemorate the 400th anniversary of Drake's circumnavigation of the world. The station will be located in Smeaton's Tower, Plymouth, Devon. More details are available from R. Taylor, 9a Lower Westford, Wellington, Somerset TA21 0DN.

GB2BHS, 2–30 May
A spring fair at Balshaws High School will include a special event station. The event is to promote interest in, and raise money for the school, and will include many other sideshows. More information is available from G4BEE, 37 Daisy Hill Drive, Adlington, Chorley PR6 9NE.

GB2SCF, 3–5 May
There will be a special event station in operation at the Slough Canal Festival, a weekend rally organized by the Inland Waterways Association for both boat enthusiasts and other members of the public. The rally will be held on Bowyers Field, St Paul's Avenue, Slough, Berks. For further details contact G4HMG, QTHR.

GB2ECR, 16 May–9 June
The Elvaston Castle Mobile Radio Rally will be operating a special event station as one of its attractions. The station will be situated at Nunsfield House Community Association, Nunsfield House, Boulton Lane, Alvaston, Derby DE2 0FD, away from the rally site, and there will be some pre-rally day operation on some amateur bands. For further details contact Mr I. Cage, G4CTZ, QTHR, or Mr P. Neal, G3WFU, tel Derby 48494 (day time).

GB4WF, 22–24 May
Wolverhampton Fiesta, an annual festival for local societies and organizations, will include a special event station at West Park, Wolverhampton. Further information from G3UBX, QTHR.

SWL news

(Continued from page 383)

Other mail

Mark Mullins, RS42604, is the early pacemaker in the table (please note the starting score is 150 this year). Ken Sketheway, BRS20185, reports ZF2CI, FY7BC, WA4YVG/VQ9 and VU2HI as new country confirmations. Dave Stewart, BRS40293, reports DJ7SB/TJ1, 4S7EA, 9Q5GB and 9X5PM as his best dx this year.

Colin Baker, BRS39162, has recently returned from A4X. He now has an FR101 and multiband vertical. He learnt cw in A4 and hopes to take the RAE in May.

Robert Small, ARS884, reports an active month with his best dx being ZL2BCF/A on Campbell Is on 3·5MHz ssb. He also found six new countries on that band—five of them in 48 hours. They were TG, UJ8, UM8, ZD7 and 8R1.

Finally

Contributions for the June issue should reach your scribe by 21 April. □

the month on the air

John Allaway, G3FKM *

BETWEEN now and the end of the 'eighties we are going to have to decide how to make optimum use of the new hf bands at 10, 18 and 24MHz. In the case of 10MHz—which just possibly *might* become available to us in 1982—this is already a matter of some urgency and immediate thought is required. Taking into account that this band will be only 50kHz wide and will be shared with other services, with amateur radio as a secondary user, should it be retained for cw use only? If not, what modes should be allowed and how much space should be allocated to each? Your views and opinions would be very much appreciated, and the writer hopes to publish a summary of these at a later date.

G5RV

Louis Varney, G5RV, and holder of a household name in amateur radio, is an expert in the behaviour of wire antennas—as the users of a G5RV dipole will testify. The Committee HF has been fortunate to secure Louis' services to give a lecture entitled "Wire Aerials" on both days of the Alexandra Palace exhibition. For further details see enclosed programme.

Top band

VK6HD has kindly sent your scribe details of his activities on 1·8MHz during the period 23 November to 10 February. He was on the air on 64 days and made a total of 95 European contacts—69 being with different stations. Mick was delighted to find that no less than 54 of these were first VK6 QSOs. Ten countries, DL, G, GD, GM, HB, F, OK, SP, UT5 and OH, were contacted, and the UK stations logged were G2KI, G3FPQ, G3FXB, G3JMJ, G3KMA, G3LIQ, G3MXJ, G3RPB, G3RTY, G3SEF, G3SZA, G3YDX, G3YRO, G3YUV, G3YXM, G3ZEM, G3ZFC, GD4BEG, GM3ZSP and GM4ALK. Contact with GI and GJ has still to be made. It appears that there is a pirate VK6HD active, as reports have been received from listeners of contacts taking place one hour after sunrise in VK6. All contacts and listener reports will be QSLd.

News from overseas

Peter Reed, G4BVH, returns to Oman on 11 May for a six-months tour of duty. He will be located on Masirah Is and will have his FL/FR 101 equipment and a TA33 beam or quad for the hf bands. He also hopes to be active on the lf bands with dipoles. Most activity will be on cw, and A4XVK QSLs should be sent direct to the address in "QTH Corner" or via the bureau. They will be answered as soon as possible.

ZS6BEC (who was formerly G3TBG) has requested via G4JCC that publicity be given to the fact that he would like a QSL manager in the UK. Anyone who can help is asked to write to G. Goulborrn, 54 Beukes Road, Glen Marais, Kempton Park 1620, Tvl, Rep of S Africa.

*10 Knightlow Road, Birmingham B17 8QB.

DX news

ET3PG has been fairly active on 14 and 21MHz ssb, and seems to be operated by more than one person—the QSL route depending on the specific operator's name. QSLs for Esheta go to PO Box 21371, Addis Ababa, and for Bekele to Box 5327.

N4HX/TT8 may sometimes be found on 21,240kHz at 0930 on Sundays. He will be in Tchad for a few more months. TY9ER is also active on Sundays after 1030 around 29,150kHz. TN8AJ is said to keep a schedule with DK2OC almost every day at 1200 on 28,750kHz. It is said that a "list" is prepared at 1130 of up to 30 stations wishing to make contacts.

FB8ZO is now very active from Amsterdam Is and seems to keep schedules on 14,030 and 14,105kHz at 1100, 1700 or 2200. He also meets N1ACW on 14,260kHz at 0030 on Wednesdays. QSLs go to F6EYB.

Equatorial Guinea is now represented by at least five operators. 3C1NE, 3C1NM, 3C1AB and 3C1JP all use the same station and are constructing a television station in Bata. They sometimes appear at 2100 near 14,205kHz, and those who make contact should QSL via EA1QF.

D68AM returned to France in February but the *Long Island DX Bulletin* reports that Apache, D68AQ, and Roger, D68AR (formerly 5V7AR), are now fairly active on 14 and 21MHz. The same source also says that Jacky, 3B8CF, should be on St Brandon Is by now and using the callsign 3B7CF—this will probably be a cw-only operation. 3B6CD is frequently on 14,030kHz at 1300.

JX9WT is leaving Jan Mayen at the end of this month. He is the only station on the island at present and may be found on Saturdays at 1400 near 21,345kHz, and on Sundays around 28,570kHz from 1130. He is also on 14MHz—between 14,220 and 14,230kHz from 0100.

Belgian stations have been using the prefix letters OT to celebrate the 50th anniversary of the Belgian PTT department, and the OR prefix is also being used by stations in provinces AN, BT, HT, LG, LM, LU, NR, OV and WV to mark the 150th anniversary of Belgium.

JA7JT/JD1 has returned to Japan after having been on Ogasawara Is from 13 December 1978 to 10 May 1979, and again from 23 August to 14 December 1979, during which time he made 9,435 QSOs. He was on Minami Torishima from 17 May to 22 August 1979 and made 3,570 contacts.

G3GIQ reports that the present amateur radio operator on Marion Is leaves at the end of this month, and it may well be more than a year before ZS2MI is on the air again. During the few remaining weeks, G3GIQ is keeping a schedule with the station every Tuesday at 1500 on 28,770kHz. TZ4AQS is also due to leave Mali soon (on 17 April) and is making special efforts to work as many as possible before closing down. Much cw will be used and the station should be looked for near the following frequencies: 3,503, 7,003, 14,025, 21,025 and 28,025kHz (cw), and on 3,795, 7,085, 14,195, 21,295 and 28,595kHz (ssb).

Dxpeditions

The Noviomagnum DX Group from the Netherlands is to make another visit to Luxemburg. This will take place from 1800 15 May until 1200 19 May, and all bands 3·5 to 28MHz will be used by the expeditioners on cw and ssb. Calls will be as follows: PA0DUO/LX, PA0INE/LX, PA0KHS/LX, PA0VVH/LX, PA3ADJ/LX, PA3AIR/LX, WD6GET/LX and PA3ABA/LX. QSLs for all stations should be sent to the address listed for PA0KHS/LX in "QTH Corner".

Petr Doudera, OK1KIR, a keen supporter of QRP operation. Most equipment is home built, and Petr works on all bands 1·8 to 28MHz, and often enters RSGB contests

Iris and Lloyd Colvin made their last J7DBB contact on 6 February, having made 9,000 contacts with 134 different countries on all bands 1·8 to 28MHz, with cw and ssb used about equally. They report that Dominica is still devastated as a result of the hurricane which destroyed nearly everything last year. Amateur radio seems to have played an important part in disaster relief at that time, and several amateurs from nearby countries flew in to assist—the result was an enhanced view of amateur radio by the authorities and inhabitants. J7DBB operated from Marigot, 37 miles from Roseau, using the airport's emergency power supply. At the time of writing, Iris and Lloyd were at St Kitts as VP2KAH.

Dr George Collins, VE3FXT, who is currently on a two-year tour of duty in Thailand and on the air as HS4AMI, is hopeful that operation from Burma may take place as early as 15 April. An Educational Scholarship Foundation for Diseases of Children has been formed under UNICEF organization, and Burma is one of the countries involved. Any operation may have six operators and use the callsign XZ0ONU, and the equipment will largely be provided by Canadian amateurs. The activity should last for 90 days, and 14,160, 21,300 and 28,440kHz have been given as likely ssb frequencies, with cw transmissions expected to be about 6kHz above lower band edges.

LX1BW and DJ5CQ will be on the air from New Caledonia from 10 to 21 April as FK0BW and FK0CQ. After this they will visit Norfolk Is and will operate as VK9NM and VK2DIK/VK9 until 28 April when they move on to Lord Howe Is to be VK9NM/VK2 and VK2DIK/VK2 until 7 May. They will have two Drake T4XCs and R4Cs, together with an Astro-200 transceiver, and a three-element beam, and the intention to work round-the-clock using the following frequencies: 14,005, 14,195, 21,005, 21,295, 28,005 and 28,595kHz. They will listen for replies 5 to 10kHz higher on cw, and 15 to 25kHz higher when on ssb. QSL to the address given for FK0CQ in "QTH Corner" enclosing an sae and three ircs or US$1.

The expected Juan Fernandez expedition was delayed from January by changes in plans by the Chilean Navy. The operation may take place during April.

FR0ACB/G (cw) and FR0ACC/G (ssb) will be operated by DK9KX, DF3KX, DJ5RT, DJ6SI and DJ3NG for up to 10 days starting about 20 April. They then hope to go to Geyser Reef and Mayotte. Transmitting frequencies will be 3,525, 7,025, 14,025, 21,025 and 28,025kHz (cw), and 3,795, 7,048, 14,195, 21,245 and 28,495kHz (ssb). QSLs and donations should be sent to DK9KD.

VS6AG is hoping to go to Macao for three days to operate as CR9AK—this may commence on 20 April.

SV1DC and SV1JG have been given permission for a visit to Mt Athos this month.

There are rumours of three different sources of activity from Tokelau Is, ZM7, this year. Operators from C21AA may be there during Easter, and VK2BJL (of 1S1 fame) intends to go in November. 4Z4TT was due to arrive there in March or April.

W4MGN has told G3GIQ that he and C5ABK are planning an African expedition this summer and hope to visit Guinea-Bissau, J5.

Welcome

The following overseas amateurs joined the Society during January and February: A22ED, AE1D, AI7H, EI3ATB, EI3AYB, ES8LD, F6CER, HB9BTW, HB9PSX, I1BIN, I1TSQ, I2EAL, I7DLL, K3UKW, K5JIC, K6QEH, KA1CYW, KB2LF, KH6B, LA3WU, LX1RT, N8AVW, OH1ZG, OH3YW, ONs 1JB, 1JE, 4DU, 5CF, 5FF, 5GR, 5ID, 5MC, 5YG, 6IX, 7BW, 7CJ, 7CP, 7FM, 7GZ, 7LT, 7TH, OZ1GHQ, PAs 0QC, EJM, ETE, OCD, PA3AJA, PE1BDW, PE1BVE, PY2YUK, SM0KJD, SV1HA, VE7DZD, VK3SU, W9WIK, WA1ZXF, WB4LXU, WD6FWI, W7YV, WA8VZO, ZL3SW, ZL4TAY, ZSs 2AB, 5WT, 6ADC, 6ZH, 5N4BPC and 7X2AJ. Listener members include Messrs J. Noorman, S. Minderhoud, J. V. Dreunen, B. Hoekstra, A. Nyfeld, C. Slager, D. Nautad, J. Oudheusden, H. Spee, H. Bijdemast and J. Varossiea (PA); H. Deblier, R. Vanhoek, L. Princen, P. Samijn, F. Van Ingelom, S. A. Hewlett-Packard, M. Samyn, J. Spirlet and J. Van Holsbeke (ON); H. Crane, L. Costello, R. S. Smith, M. Chaikin, J. Combs, G. Schnepf, J. Waldrop and M. Wallace (W); M. Powell and D. Evans (VE); D. Schroeder and M. Rogers (DL); S. Griffin (VK); J. Garcia (EA); T. Kiely, D. Doran and N. Cameron (EI); R. Holloway (YB); R. Kumar (3D2); J. Jouenne (F); F. Crawford (ZS); and A. Kothari (A6).

Morokulien

Although mentioned in a previous *MOTA*, this is a brief reminder that LG5LG and SJ9WL are callsigns of the station in the "radio chalet" in the tiny "state" of Morokulien on the Norwegian/Swedish border. The name of the area derives from Norwegian and Swedish names for "fun" and originates from charitable events in 1959. The radio equipment is operated by visiting amateurs, and consists of a modern station with TH6DXX and 144MHz beams. QSLs for contacts with the station cost US $1 (or equivalent in local currency or mint stamps) and those for LG5LG come from LA2ZN (Ulf.A.Strandberg, Konglev 3, N-2200 Kongsvinger, Norway). The Morokulien Award is available to licensed amateurs and listeners who have contacted/heard both callsigns on two different bands on different days (four days needed). Non-Europeans need only one band on different days. All must have been since July 1968, and a list plus US $3 (or equivalent as above) should be sent to LA2ZN. A special philatelic envelope (price US $2) is also available from the same address. Information leaflets cost US $0.40 from SM7COS, E.Belrup, Hjortshog 4540, S-260 34 Morarp, Sweden. SJ9WL QSLs are issued by SM0BMG, Bo Danilesson, Skogstorpsv. 48, S-191 39 Sollentuna, Sweden. A "Certificate of Citizenship" is obtainable from SSA for $5.

Don Murray, W4WJ, who is a keen cw operator and who operates this neat array of equipment from his home in Miami

Note that all these proceeds are divided between Norwegian and Swedish funds for handicapped radio amateurs.

Beacons

An up to date list of active and under-construction 28MHz beacons shows that 24 are now planned. They are as follows—those listed in bold type are known to be on the air already:

VE3TEN	28,175kHz	**VP9BA**	28,235kHz
OA4VHF	28,185kHz	**LA5TEN**	28,237kHz
DL0IGI	28,205kHz	PY1CK	28,240kHz
WD4MSN	28,207kHz	ZS1CTB	28,242kHz
3B8MS	28,210kHz	**A9XC**	28,245kHz
ZD9GI	28,212kHz	EA2HB	28,247kHz
GB3SX	28,215kHz	**DK0TE**	28,257kHz
VK2WI	28,217kHz	TU?	28,272kHz
5B4CY	28,220kHz	DL?	28,277kHz
HA?	28,222kHz	**W6IRT**	28,888kHz
F?	28,227kHz	WD9GOE	28,894kHz
ZL2MHF	28,230kHz	DL0NF	28,992kHz

The reference to ZL2MHF in October 1979 *MOTA* has resulted in the arrival of a letter from ZL2AKV, secretary of the Upper Hutt Branch of NZART. He points out that the beacon site is not shielded by hills but is in fact at the highest point of the Rimutaka Range on Mt Climie. It is 890m asl and has a vertically-polarized omnidirectional antenna. There is also a 50MHz beacon on the site—on 52·51MHz; this has 5W input, whereas the 28MHz beacon has 60W dc input. Both have 800Hz usb and fsk A3 at 15wpm with a 5s carrier. All three equipments (there is also a 144MHz repeater) are contained in a vandal-proof concrete structure, and the common power supply is a heavy-duty 12V battery on float charge from the mains. QSLs for the beacon should be sent to the QSL Manager, PO Box 40-212, Upper Hutt, New Zealand.

Amateur Radio Awards

The second edition of this book, which lists in detail the world's major operating awards, is now available from RSGB HQ. There are many useful maps, pictures of awards, and answers to many of the queries which arrive in G3FKM's mail! A comprehensive list indicating block ITU prefix allocations, amateur prefixes, *CQ* and ITU zones, and beam directions enables the location of any station to be established, however "off-beat" the callsign. Complete DXCC, WAE and USSR countries lists, and an easy-to-identify Russian oblast listing are also included.

Awards

The White Rose Award

This is issued by the White Rose Radio Society for contacts with the stations in the area of the old county of Yorkshire. European applicants need 50 points and others 30. Contacts with club station G3XEP/G8LVQ count 10 points, with stations in the old Yorkshire Ridings (now North, South and West Yorkshire and Cleveland) three points. A certified list of contacts plus £1.50, US$3, or 12 ircs, should be sent to Gwen Thomas, 36 Chelwood Crescent, Leeds LS8 2AQ. The award is also available to listeners, and details of an rtty award may be obtained by sending a request and sase. Note that the White Rose Net meets on Thursdays at 2000 (local time) near 3,785kHz, with G3KWT as net controller.

Millenium Award

Issued by the Liege section of UBA to celebrate the millenium of that city. A minimum of six points must be scored—each contact with Liege province or the territory of the former Princedom of Liege counts one point. Contacts with ON5VL (the Liege club station) and ON5PL (the Verviers club station) count three points each. QSLs must be held but a list (certified by two licensed amateurs) plus five ircs should be sent to: Henri Stockmans, ON7HS, Vieille Voie de Tongres, 216 B-4000 Liege, Belgium. All contacts must have been made during 1980 and all applications made before 31 December 1981—note that contest QSOs are not valid.

The Helvetia 26 Award

A reminder that this is available to those who have proof of contact with all 26 Swiss cantons *since 1 January 1979*. Send a list, plus the QSL cards, to: Walter Blattner, Postbox 450, 6601 Locarno, Switzerland. There is no fee but it seems fair to include some ircs for return postage.

The DUF Award

Following publication of information about this award in February *MOTA*, a letter has been received from F8TM, traffic manager of REF, pointing out that these rules have now been changed. A silver medal is available to those who achieve the DUF IV—price 15 ircs. Other fees are: one part, six ircs; two parts, eight ircs; three parts, 10 ircs; and all four parts, 12 ircs. Applications for all French awards (issued by REF) now go to REF Secretary, Square Trudaine 2, 75009 Paris, France.

Contests

The Helvetia Contest

1500 26 April to 1500 27 April

1·8 to 28MHz cw and phone. Each station may be worked once per band on either cw or phone. Exchanges consist of RS/T plus serial QSO number from 001. Swiss stations also add two letters to indicate their canton. Each QSO counts three points, and the multiplier is the sum of Swiss cantons worked on each band (making a possible multiplier of 26 on each band). Final score is total points multiplied by total multipliers. Canton abbreviations are as follows: ZH, BE, LU, UR, SZ, OW, NW, GL, ZG, FR, SO, BS, BL, SH, AR, AI, SG, GR, AG, TG, TI, VD, VS, NE, GE and JU. Logs must be postmarked no later than 30 days after the contest and sent to: TM USKA K. Bindschedler, HB9MX, Strahleggweg 28, 8400 Winterthur, Switzerland. This contest is an excellent opportunity to work the rarer cantons for the beautiful H26 Award (see "Awards").

The Common Market DX Contest 1980
0600 to 2400 17 May (CW)
0600 to 2400 18 May (Phone)
3·5 to 28MHz. Single-operator low-band (3·5 and 7MHz), high-band (14, 21 and 28MHz) and all-band, and multi-operator single-transmitter multi-band categories. Exchange RS/T plus serial QSO number (from 001). Contacts with EEC countries count one point, with other European countries two points, and with others five. Own country may not be contacted. QSOs with ON4UB count 25 points. The multiplier for EEC countries is one for each DXCC country worked on each band. ON4UB also counts as a multiplier. Separate logs must be prepared for each band and should show date, time, serial numbers, points and new multipliers. They must include a signed declaration that the station has been operated in accordance with amateur spirit, amateur radio regulations and contest rules. Post by 30 June to: Common Market Contest Committee, Michel le Bon, ON4GO, Chee de Wavre 1349, B-1160 Brussels, Belgium. Listeners may enter and should log details of QSOs between EEC and non-EEC stations.

In the **1979 Helvetia 26 Contest, G4FDC** was top UK entry with 13,050 points. Other British scores were: **G3ESF** (12,690), G3SNN (8,241), **GW3INW** (5,445), G3XFW (3,870), G4CVZ (3,600), G4EOW (3,306), G8PR (2,958), **GD4GWQ** (1,440), **GM4FSA** (780) and **GI4GDV** (612).

The Ibero-American Contest
2000 24 May to 2000 25 May
3·5 to 28MHz. Phone only. Exchange RS and serial QSO number. Each contact with Ibero-America counts one point, and the multiplier is the number of Ibero-American countries worked on each band totalled together. Stations may be worked once on each band. Final score is total QSO points multiplied by total multipliers. Valid Ibero-American countries for this contest are: CE, CO, CP, CT, C9, CX, C31, EA, HC, HI, HK, HR, KP4, LU, OA, PY, TG, TI, XE, YS, YV and ZP. Logs should be posted to reach URE, PO Box 62, Moliet del Valles, Spain, no later than 15 July 1980. They should show band, date, time, callsign, exchanges sent and received, points and multipliers claimed, and an award will be issued to all who make more than 50 QSOs.

Band reports

The latest G8KG summary reads as follows: "Subject to confirmation when the final figures are published, the yearly mean sunspot number for 1979 was 156. It is interesting to note that this value has only been exceeded on three occasions in the 150 years for which reliable sunspot data is available, and probably not in the previous century either. The occasions were the three peak years 1957–59 of Cycle 19. How lucky we have been can be seen from the fact that the average of the peak years over that century and a half is less than 110.

"Since the sharp peak in November, mean solar activity has been on something of a plateau, with the 2,800MHz solar flux, averaged over the past 27 days, fluctuating gently between 200 and 210sfu, but falling below 200 at the beginning of March for the first time since late September.

"The provisional Zürich sunspot numbers for January and February were 162·2 and 159·3 so that the three-month mean values for December and January were 176 and 168 respectively. If these are added to Fig 1 on p834 of *Radio Communication* September 1979, it will be seen that we have passed through a sharp peak centred on October/November similar to the earlier one in January and February 1979. Another such peak could well occur later this year and could be of similar amplitude to the recent one.

"Once again 'Murphy's Law' tended to apply to major contests, with the strongest magnetic storm of the winter coinciding with the first day of the new-style ARRL CW Contest. However, the Phone Contest weekend was free, and gave an excellent demonstration of hf band conditions near a solar peak. In fact, conditions during the month were generally excellent, though with many near misses; the transatlantic muf only reached 50MHz for a few very brief periods."

Thanks to the following for information used in compiling the list which follows: G2HKU, G3s AAE, GIQ, GVV, HCT, IMW, KDB, KSH, LPS, GM3RAO, G3SZA, G3YHB, GM3YOR, GW4BLE, G4EAN, G4EKQ, GM4ELV, G4ETN, G4GXL, and RSs 17567, 25429, 31301, 36928 and 38934.

Stations listed in italics were using cw.

1·8MHz. 0000 *UL7OAO, 9H1BB.* **0200** *9L1CA.* **0500** KP4ES, KV4FZ, *VP2ML,* W1–W4, *W8–W9.* **0600** NP4A, VE3BBN, VP5EE, W1–W4, W8–W9, 4U1ITU. **0700** *AI9J, K9s EVB, UWA.* **2200** *UA9UUW.* **2300** *UA9MR, UL7IBN.*

3·5MHz. 0300 *W1–W4.* **0600** TG4NX, VP2ML, YS9RVE. **0700** HD5EA, *TI2PZ, VE5YA,* VP5EE, *W6NKR, N7RM, K7ZR, K7SS, W7VMF, ZD8TC, ZL4JO.* **1800** W1CF/KH2. **2100** UK9ADT, 5T5CJ. **2200** JW1SO, UH8HAI. **2300** UL7LCP, UJ8JCX.

7MHz. 0000 *TF3KCN, TI2PZ, 4U1UN.* **0600** *KH6IC, W6–W7, VE7, XE3LPV, ZL2RU.* **0700** *K7UR, VPs 2AZE, 2ML,* 5EE, *ZL3GQ, 5W1BZ.* **0800** VE7IG, VE7XR/8. **0900** *ZL1BEK.* **1600** *UA0ACJ.* **1700** AP2s KA, MQ, SA, ZS4PB. **1800** JA2BAY, ZE6JL. **2000** *PP0MAG, VK3MR.* **2100** HM1EJ, OX3ZM, *UJ8JAS.* **2200** J3AAG. **2300** VP2KAH.

14MHz. 0000 HS1WR, PY0JY, 9N1MM. **0700** FO8FO, FW8SC, KH0AC, VP8HZ. **0800** *FK8DD, HM1AQ,* W6ENK/KH4, *LU4ZS,* VK9NI, VK9NS/LH. **0900** T2AAA, T2XYL, VK9NS, VS5AM. **1000** JA, VK0KH. **1100** *P29BL,* 9N1MM. **1200** ZL1IB. **1400** S2BTF. **1600** FH8OM. **1700** FB8ZO, *KL7HF,* VS6CT, 9X5PP. **1800** FH8CL, FR7AI/T, HS1ABD, *KH6AK, VK0JC* (QSL to OZ8AE), *4S7RM, 8Q7AQ.* **1900** *FK8DD,*

QTH CORNER

A35AB	via K7CC, H. Paine, 4631 E 8th St, Tucson, Ariz, 85711, USA.
A4XVK	P. Reed, 73 Dudley Rd, Brighton, Sussex BN1 7GL.
FK0CQ	via DJ3CQ, K. Stock, Danzigerstr 6-A, 7500 Karlsruhe 51, W Germany.
FW8SC	BP15, Lano, Wallis Is, via Noumea, New Caledonia.
HH2VP	N4XR, V. W. Paounoff, 9861 NW 4th St, Pembroke Pines, Fla, 33024, USA.
J28AZ	via I8JN, PO Box 336, Naples, Italy.
J6LET	via WB2MMV, H. Schneider, 12 Carter Rd, E. Brunswick, NJ, 08816, USA.
PA0KHS/LX	Henk van Hensbergen, Smaragdstraat 53, 6534 WN Nijmegen, Holland.
OD5HQ	via DJ9ZB, F. Langner, C. Kistnerstr 19, 7800 Freiburg Breisgau, W Germany.
VP1A	via WB0TNY, R. L. Barnett, Box 4798, Overland Park, Ks, 66204, USA.
VP2A	via K4PJ, M. Wardell, 720 W. Vanderbilt Drive, Oak Ridge, Tenn, 37830, USA.
N6YK/VP2A	via N6NK, R. Deakin, 11097 Linda Vista Dr, Cupertino, Cal, 95014, USA.
VP2KAH	YASME Foundation, Box 2025, Castro Valley, Calif, 94546, USA.
VP9AD	via W3HNK, J. Arcure, Box 73, Edgemont, Pa, 19028, USA.
VQ9PC	via K9KLR, N. Lash, 458 W 900 S, Hebron, Ind, 46341, USA.
VU2RX	via W2LOG, R. Barton, 104 N Sunset Drive, Ithaca, NY, 14850, USA.
XT2AU	via WA1ZEZ, R. Siemann, Box 803-Sheraton Lane, Norwich, Ct, 06360, USA.
ZD8KM	via G3IFB, F. H. Bliss, Coppalex, North Rd, The Reddings, Cheltenham, Glos.
3D6BW	Jeff Wright, Box 99, Amsterdam, 2375 E.Tvl, Rep of South Africa.
5B4IF	via G6ZY, S. C. Ingram, 146 Marylebone Rd, London NW1 5PJ.
7P8AZ	via VE2JH, L. Walker, 8844 Notre Dame St E, Montreal, H1L 3M4, Canada.
9G1WA	PO Box 296, Accra, Ghana.
9Q5VT	via K5VT, Dr V. Thompson, 625 E. 35th, Baltimore, Md, 21218, USA.

RSGB QSL Bureau, G3DRN, 30 Bodnant Gardens, London SW20 0UD.

FR7BX, PP0MAG, S8AAP, *WA7JRL/SU,* ZD7AL, 8Q7AL, (QSL to SM3CXS). **2000** *HH2VP,* H44WH, P29JS, TR8DX, XT2AU. **2100** A7XD, SV8JE, *VK9RH,* VP8s PU, QG, SO, 9V1MQ. **2200** KP2A/J7, *UA1PAL* (QSL to UA1OSM), 3C1AB, *K9EF/8R1* (QSL to K1RH). **2300** *PJ2MI,* TL8JM, VP5BS, ZF1HJ.

21MHz. 0000 *W1FC/KH2.* **0800** JD1ALU, VK, ZL, 9G1WA. **0900** *HZ1AB,* KL7, VS5MS, ZL. **1000** J28AZ, N4HX/TT8. **1100** *PP0MAG,* TZ4AQS. **1200** *A35AB,* VK9NS. **1300** A9XBE, P29NRG, *UA1PAL,* VK9NNW. **1400** A51PN, YC1BZ, 6D2AF. **1500** FB8XV, VQ9JJ, VS6CT. **1600** A22GV, EP2TY, TR8DCD, VQ9PC. **1700** A7XD, J7DAO, ZL1BIO. **1800** *VP1HE,* 9L1SC. **1900** AH8A, FK8CR. **2000** W6ENK/KH4, *K4FW/VP2K.* **2100** DJ7SB/TJ1. **2200** W6-W7. **2300** KL7, VP1RLB, W6-W7.

28MHz. 0800 *HM0W,* JA, VK, ZL. **0900** HL9UG, UA0QDA, 9K2BE. **1000** FO8FU, HS4AMI, JW7FD, KH0AC, VK9NS, UA1PAL, *3B8FC.* **1100** *N4ADJ/KH2* (QSL to WB4CCT), VU2USE. **1200** *A4, C6,* H44WH, *HH2VP* (QSL to N4XR), JT1BG, P29KC, SU1BA. **1300** H31LR, VP2MFC. **1400** A7XB, *DJ1US/ST3,* VP1A, VP2KAH, W6-W7, 3V8AC. **1500** VK6PM. **1600** C5ABK, HH6SL, *VP1HE,* W6-W7, ZS2MI, 3C1AB, 6D2AF. **1700** FG7AS, W6-W7. **1800** AH8A, C5AAP, W9DCN/C6A, KH6IBA, W0RAN/K2TTI (Olympic station at Lake Placid), VE8. **1900** *KH6IJ,* VP8SB, VY1s AU, BR, 3C1MM, 4A2MX. **2000** CO2FRC, J3AAG, KH6IBA, NP2AB. **2100** *PP0MAG,* VE7, W6-W7, 5N0RNJ. **2200** EA8TY, HC6FC, VP2KAH, VK3, ZL2AUS.

Thanks to all correspondents, and also to the authors of the following for news items extracted: *DX'press* **(PA0TO)**, *CQ magazine* **(W1WY)**, the *Ex-G radio Club Magazine* **(W3HQO)**, *DX Bulletin* **(K1TN)**, the *Long Island DX Bulletin* **(W4UL/W2IYX)**, *DX News Sheet* **(Geoff Watts)**, and *Long Skip* **(VE3FRA)**.

All items to reach G3FKM no later than **30 April** for **June** issue please, and by **30 May** for **July**. □

HF propagation study

Predicted hpf + luf in megahertz for April 1980

	00	02	04	06	08	10	12	14	16	18	20	22
Suva (s)	1815	1815	2114	2411	2512	2713	2914	2814	2813	2611	2312	2114
Wellington (s)	1916	1916	2115	2512	2714	3215	3215	3016	2714	2613	2212	2015
Osaka	1812	2012	2312	2614	2915	3315	3315	2813	2612	2410	2110	2110
Hong Kong	1811	2012	2514	2816	3417	3817	3915	3713	3410	3307	2406	2108
Sydney (s)	1813	2017	2519	2821	3420	3818	3914	3311	2909	2706	2405	2108
Moscow	1704	1504	1905	2307	2808	3209	3309	3208	3207	3005	2304	1803
Bangkok	2109	2011	2613	3016	3618	4218	4216	3913	3910	3507	2706	2107
Singapore	2209	2011	2614	3117	3919	4318	4316	4112	4009	3506	2805	2306
New Delhi	2204	2006	2610	3112	3914	4315	4314	4111	3608	3106	2804	2304
Perth	2410	2214	2717	3321	4123	4521	4417	4013	3410	2807	2706	2407
Teheran	2504	2205	2707	3310	4112	4513	4512	4310	4208	3505	3004	2603
Colombo	2505	2208	2712	3315	4117	4518	4516	4313	4209	3607	3005	2604
Bahrain	2604	2405	2708	3410	4313	4614	4713	4411	4408	3605	3204	2803
Cyprus	2504	2304	2406	3008	3911	4312	4411	4110	4108	3606	3004	2704
Aden	3005	2706	2809	3612	4515	4816	4915	4613	4610	4008	3405	3105
Seychelles	3100	2900	2700	3500	3600	3700	3800	3900	4100	3900	3500	3300
Mauritius	3300	2803	2711	3713	4614	4814	5013	4813	4712	4110	3406	3303
Nairobi	3304	3105	2907	3610	4514	4915	5015	4913	4810	3907	3704	3403
Malta	2204	2003	2003	2405	3008	3409	3610	3410	3409	3206	2604	2404
Salisbury	3404	3403	2605	3610	4714	4916	5116	4915	4912	4408	3904	3603
Cape Town	3400	2600	1800	3510	4612	4813	5113	4913	4912	4510	3806	3703
Lagos	3605	3603	3004	3408	4513	4815	5115	5015	4913	4610	4106	3905
Suva (l)	3517	3517	3016	3212	3715	3016	2617	2517	2116	2414	4014	3816
Gibraltar	1902	1902	1702	1903	2405	2606	3007	2907	2905	2804	2402	2102
Ascension	3605	3504	3104	2609	4314	4716	5117	4918	4816	4611	4005	3804
Wellington (l)	3515	3415	3114	3111	3213	2715	2316	1916	1715	2313	3212	3814
Dakar	3400	3400	3000	3100	3900	4500	4900	4800	4600	4400	4100	3600
Las Palmas	2904	2803	2603	2705	3408	3810	4311	4012	4111	4008	3505	3104
Falklands	3407	3405	3106	2909	2014	3618	4822	4723	4621	4517	4112	3609
Rio de Janeiro	3406	3405	3105	2908	2613	4416	4819	4720	4619	4515	4111	3608
Buenos Aires	3406	3204	3105	2707	2912	3616	4719	4521	4520	4416	4112	3608
Sydney (l)	3113	3011	2910	2509	3310	2813	2518	2322	2123	2221	3317	3514
Lima	3100	2900	2800	2400	3200	2700	4000	4100	4300	4100	3900	3400
Barbados	3104	2803	2603	2305	2708	3612	3915	3916	4016	3913	3910	3407
Bogota	2906	2603	2500	2108	2810	3211	3612	3812	3813	3813	3712	3211
Jamaica	2700	2500	2200	2000	2600	3100	3300	3600	3600	3600	3700	3000
Bermuda	2705	2400	2200	1907	2309	3010	3210	3310	3411	3511	3510	2909
New York	2404	2106	1808	1811	1813	2414	2613	2811	3008	3006	3104	2703
Mexico	2311	2106	1903	1708	2310	2311	3012	3112	3113	3213	3213	2612
Montreal	2309	2008	1808	1809	1811	2413	2615	2716	3015	2813	3011	2610
Denver	1911	1808	1705	1809	1711	1813	2213	2413	2513	2614	2814	2313
Los Angeles	1911	1809	1705	1808	1810	1911	2012	2512	2711	2812	2812	2312
Vancouver	1812	1711	1707	1909	2111	1913	2113	2113	2213	2213	2513	2213
Iceland	1308	1308	1308	1508	1909	2110	2210	2210	2311	2210	2009	1608
Honolulu	1816	1715	1914	2110	2313	2614	2415	2215	2614	2613	2615	2216
Fairbanks	1811	1811	1909	2208	2410	2412	2312	2312	2311	2210	2311	2211

First two digits are hpf, last two luf. LUF 00 indicates data not available.

Propagation predictions

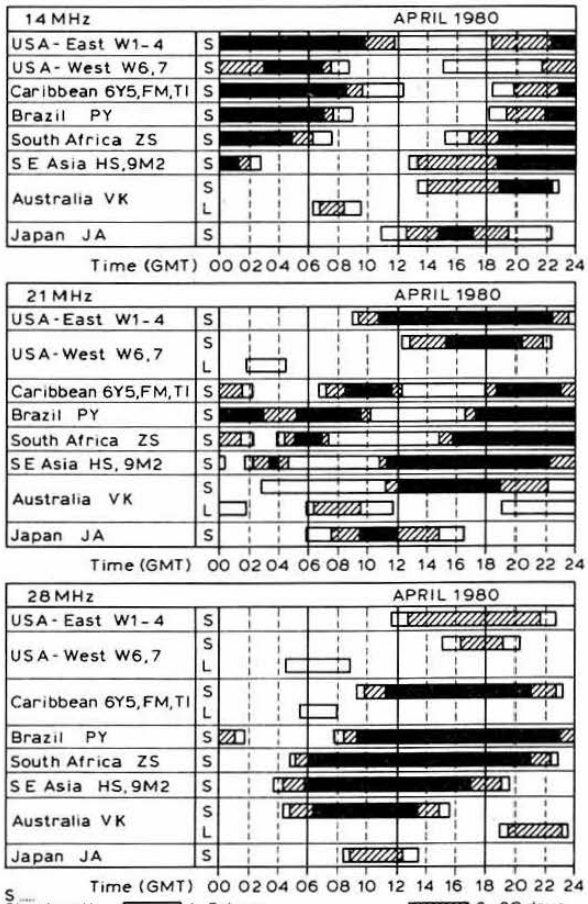
April sees the changeover from winter to summer conditions, and this will be noticeable on all bands, when daytime frequencies will change from their high winter to the lower summer values, and the exact opposite will happen to the night-time frequencies. For this reason dx conditions during the summer are worse during day-time and better at night than during winter.

The **21MHz** band will remain open longer in the evenings for traffic with North and Central America because of the longer days. During the early hours of the morning there may be a chance of traffic with Hawaii on favourable days. Towards the end of the month it may be possible to reach western North America via the indirect path during the early hours now and again.

The **14MHz** will become the main night-time dx band. Only in the early morning will day-time traffic with North and South America be possible. Traffic with East Asia and Australia, which should be possible according to propagation predictions, will be interrupted by QRM.

On **7MHz** there is a chance of dx if the longest part of the path lies in darkness. During day-time this band, as well as **3·5MHz**, will be ideal for local traffic without interruption by the dead zone. The maximum distances covered will be greater on **7** than on **3·5MHz**, and will generally decrease during the summer on both bands. During the night local traffic on **3·5MHz** will seldom be interrupted by the dead zone.

The provisional sunspot number from the Swiss Federal Observatory for January 1980 was 162·2. The period of greatest activity during the month was between 6 and 12 January when the daily numbers each exceeded 200. The predicted smoothed monthly numbers for May, June and July are 142, 139 and 136 respectively.



Amateur radio computer print-outs and maps

DX beam heading charts—great circle bearing charts

This print-out is custom-made by the computer for your exact QTH. It gives the great circle bearing in degrees from your QTH to each of 660 distant locations. Also shown are the distances (in miles and kilometres), as well as the return bearings for the 660 locations on the chart. The return bearing is the bearing to which the distant station sets his antenna to point towards you, and is not a simple 180° difference from your own bearing, but instead must be calculated through the use of spherical trigonometry. The computer does all this for you, and you get six double-width pages of print-out which may be folded or separated into 12 standard-width pages if you prefer. The 660 locations on the chart are evenly divided between dx and USA locations. The dx section is listed in alphabetical order according to radio prefix, and the USA section is listed alphabetically by state and city.

Cost: US$2 via 3rd class mail, worldwide.
US$3 via air mail, worldwide.

Super dx beam heading charts

Custom-made by the computer for your exact QTH. The format is exactly like the regular dx beam handling charts (see description above), but is much larger (over 1,300 locations), and contains dx listing only (listed alphabetically according to radio prefix). Its 12 double-width pages may be separated or folded into 24 standard-width pages. This is the ultimate dx beam heading chart for all dxers.

Cost: US$6 via 3rd class mail, worldwide.
US$7 via air mail, worldwide.

Super Foxhunt/Intruder Watch dx beam heading chart

Custom-made by the computer for your exact QTH. This print-out is exactly like the Super dx beam heading chart (see description above), except that the 1,300+ locations are listed in numerical order, according to the great circle bearing. When you hear a strange or unidentified signal, swing your antenna until the signal peaks at a maximum and look-up that bearing on this chart. The chart will tell you all of the countries and major cities that lie in that direction, as well as their distances.

Cost: US$6 via 3rd class mail, worldwide.
US$7 via air mail, worldwide.

Great Circle World Maps

This is not a print-out, but an actual map drawn by the computer, using an azimuthal equidistant projection, as described in *Ham Radio Horizons* (pp28-30, August 1978). Until now these maps were available centred on just a few of the largest cities in the world, but now you can have a map drawn by the computer for your exact QTH. The maps are drawn on 11 by 14in (28 by 35cm) paper, using a high-quality pen-and-ink plotter. In addition to geographical information, they show all major political (country) boundaries. In order to avoid clutter, and to eliminate the problems caused by ever-changing radio prefixes, geographical place names and radio prefixes are not put on the maps.

Note: These maps are personalized with your callsign. *Please include you callsign with your order.*

Cost: US£10 via 3rd class mail, worldwide.
US$12 via air mail, worldwide.

Oscar Satellite Communications Coverage Map

This is an actual map drawn by the computer, custom-made for your exact QTH. Using an azimuthal equidistant projection, the computer draws a map of the "hemisphere" of which your QTH is the centre. Then contour lines are added to show the maximum communications range possible with each of the currently operational satellites (Oscar 7, Oscar 8 and RS1 and 2). Size: 11 by 14in (28 by 35cm). Drawn on a high quality pen-and-ink plotter. No tracking information is shown.

Cost: US$10 via 3rd class mail, worldwide.
US$12 via air mail, worldwide.

Oscar Satellite Perpetual Az-El Orbital Prediction Print-out

Custom-made by the computer for your exact QTH, this print-out is good for the life of the satellite and never becomes obsolete or outdated. The print-out for Oscar 7 is between 75 and 100 pages long, depending upon your location. The print-out for Oscar 8 is slightly smaller, due to its lower orbit. The print-out for RS1 and RS2 is larger, due to the higher orbit. Each print-out consists of a series of tables of data for every possible equator crossing longitude, in 1° increments. (If a particular equator crossing does not result in a pass visible from your QTH, the table for that longitude is omitted.) Each table consists of a series of entries giving the time in 1min increments, plus the azimuth, elevation, and range of the satellite, at each 1min time interval. You simply start with the time and longitude of equator crossing and go to the table in the print-out that corresponds to that longitude. For the first entry in the table you add the number of minutes shown to the time of equator crossing to get the exact time of day corresponding to the listed azimuth, elevation and range at initial acquisition. Then you just follow the table, incrementing the time by one minute for each entry, and read the exact az-el data all the way through the pass. Be sure to specify which satellite you want the print-out made for. Print-outs are available for Oscar 7, Oscar 8, RS1 and 2, TIROS-N and NOAA-6, and will also be available for any future satellites put into circular orbits.

Note: The costs shown are for *each* print-out. The print-out for each satellite is different, except RS1 and 2 which both use the same print-out.

Cost: US$6 via 4th class mail, worldwide. (US$6.60 for RS1,2 print-out)
US$8 via air mail, worldwide, (US$8.50 for RS1, 2 print-out.)

Geosynchronous Satellite Antenna Pointing Charts

Custom-made by the computer for your exact QTH, this chart shows the azimuth and elevation angles for pointing your antenna at geosynchronous satellites, for every possible satellite location, in 1° increments. This is a handy aid for anyone interested in receiving weather satellite photos or other communications from geosynchronous satellites.

Cost: US$2 via 3rd class mail, worldwide.
US$2.75 via air mail, worldwide.

TO ORDER

(1) State exactly which print-out and/or maps you want.
(2) Include the name of the town that each print-out or map is to be based on (when applicable). If it is a rural area, or a town of less than 10,000 population, please describe the location carefully so that your latitude and longitude may be determined.
(3) Specify the type of mailing desired. We recommend air mail delivery, especially for the maps.
(4) Include the proper remittance. See (3). Costs shown are effective as of 31 October 1979. International Reply Coupons (ircs) may be substituted at the rate of 20 cents per irc.
(5) Include your name and mailing address. If at all possible, also include a self-adhesive mailing label with this same information on it.

Send your order to: Bill Johnson, N5KR, 1808 Pomona Drive, Las Cruces, New Mexico, 88001, USA.

Personal reflections on the World Administrative Radio Conference

Geneva
24 September–6 December 1979

by ERIC GODSMARK, G5CO

Introduction
It was at about 8.45pm on 4 December that I realized suddenly, or so it seemed, that the goal we had set ourselves for amateur facilities for the next two decades had been achieved. Moreover, not only had we in IARU Region 1 (Europe, Africa and Russia) lost nothing except a few unused megahertz of the 1,200MHz band, we had made gains at hf; substantial gains for the amateur and amateur satellite services in the microwave region at a time when so many services were clamouring for extra spectrum space; and we had preserved virtually intact the definition of the amateur service in the international radio regulations.

Now the months of study and analysis of almost 1,000 documents, the briefing meetings before and during the conference, the apprehensive moments of drama for us when nations spoke vigorously against us, and the interminable hours of "sitting it out" in the conference centre were over.

The IARU
The International Amateur Radio Union (IARU—speak the abbreviation as a word and it sounds like a new developing country) invited me in June 1977 to join the group for the conference. Fortuitously this fell into line with my intention to retire from the Radio Regulatory Department of the Home Office, ie about five months before the conference was due to start. The IARU is an unusual organization; it has no headquarters of its own although it has money. It "rests" on a host radio society that funds its day-to-day expenses, and it has representatives drawn from national amateur radio societies in each of the three regions of the world.

However, a most important aspect of the IARU is that it is "recognized" by the International Telecommunication Union, itself a specialized agency of the United Nations.

A favourite exposition of mine is that the newest and least-practised amateur has a link with the UN. He usually belongs to an amateur radio club; most of the clubs are affiliated to a national society; the society is a member of the IARU which has official observer status at ITU meetings; and the ITU conducts business as an agency of the UN. I wish more people both inside and outside our movement were aware of the prestige that this can bring us.

Setting off
Armed with a large box of documents and reference books, and, hopefully, enough clothes for autumn and winter—together with all the necessary papers for personal and vehicle insurance, French francs for motorway tolls etc—we made for the Dover hoverport.

At that time I felt confident that I knew the tendencies of most of the countries that had issued documents, but I was full of apprehension for the outcome. For example, bearing in mind that I was expected to concentrate on amateur requirements for *all* countries irrespective of my own views, an obvious problem looming was 7·1–7·3MHz enjoyed by Region 2 (N and S America). A large number of countries (including the UK) were strong for dislodging the amateurs from this band. Again, the 144 and 432MHz bands are so suitable for land mobile use that it seemed inconceivable that we should be able to retain them intact; and probable that the 435–438MHz segment for amateur satellite use would fall.

The Geneva scene
I must pay great credit to the permanent officers of the IARU on several counts; the accommodation reserved for me on the residential side of Geneva (as opposed to the prestige hotel side) was very comfortable, had a small kitchen, a car park at the rear, and was at a bus stop (buses—made by British Leyland—passed every four minutes). The IARU had also booked (two years in advance) an office comprising one small room and a larger room for briefing meetings, and the usual offices, situated immediately opposite the conference centre. We also had an excellent photocopier and sufficient cupboard space to store our documents and reference books. No other organization had facilities as good as ours.

The citizens of Geneva really have this conference business wrapped up. The Geneva Conference Centre is probably larger than the London Palladium, and can be divided into separate committee rooms by large sound-proof screens. When the screens are retracted, the whole seating area is opened for plenary meetings. On registration I was issued with a computer-processed car-parking card which gave me free (underground) parking for my car, 24 hours a day for the whole period. I was also issued with a voucher for exemption from tax when purchasing petrol. How I needed that concession! Boxed in with suicidal traffic racing between traffic lights to and fro across town several times a day, I seldom got into top gear. I was also given a box number, one of 2,200, so that I could claim my documents several times a day from the centre.

A slow start
I sincerely believe that the various political/geographical groups among delegations that emerged when the conference convened had set ideas as to their requirements for the outcome—and for the conference chairman. It was nearly a week before all could agree and Mr Severini of Argentina was elected chairman. So we began a week late.

A setback? Not for the IARU. This breathing space was extremely valuable to us for discussions among ourselves about opinions we had formulated before we assembled, and to cross the road to the centre to renew old acquaintances and to try to make new friends of delegates.

Getting acquainted
One would have thought that with nine weeks left for 10 weeks' work, delegations would have adopted a co-operative attitude towards others' requirements, but such was not the case. It soon became apparent that the "old-timer" delegations were not going to have things their own way, and that newer countries having equal voting and speaking rights frequently held opposing views on subjects such as aeronautical, broadcasting, fixed, mobile, radiolocation, satellite and amateur services. Hence it was possible to identify the different groupings—the African group, the Arab group, the non-aligned-countries group, the Latin-American group and the Russian bloc.

A few of the speakers from distant lands had great oratorial abilities, with excellent articulation and timing. On occasions when we heard such speeches I remarked to my colleagues that I was proud of their abilities because they were obviously Winchester or Eton—sadly I had to explain what I meant!

The author, right, with G2BVN studying documents in the IARU office at Geneva

It was difficult to obtain or maintain contact with some of the groups and delegations, but sometimes we were lucky. On one early day of the conference I was sitting at the back of a committee meeting of about 400 people when a delegate passed in front of me looking lost—not knowing where to sit. I found a place for him and showed him where to obtain his country's name-board. The next day he acknowledged me and I gave him my card and offered to give advice if he wanted to know about the amateur service. Nothing came of this for three days, and then, bingo!, he brought his country's spokesman to me to ask for a list of our total requirements. From then on I had an "in", which lasted through to the end, with one of the influential groups. Perhaps it would be unwise to say which one, as we persuaded them not just to abstain (which in itself was often helpful), nor merely to vote, but to speak in our favour.

Conference slog

It was clear that the main committees (2-9) were not likely to complete their work within the time now available, and that it would be necessary to devolve the work into working groups. Therefore Committee 5 (frequencies), for example, divided its work between Working Groups 5A, 5B, 5C, 5D and 5E. So diverse were the views of delegations that not even this dilution was sufficient, and chairmen of working groups set up their own ad-hoc groups, such as 5 ad-hoc 10, to deal with the many issues that clogged progress. With 1,500 proposals for frequency changes alone, this sort of thing was inevitable. By about the fifth week, everyone began to feel the strain of trying to keep abreast of all the decisions of all the committees, working groups and ad-hoc groups, and at the same time to attend the meetings and study the documents that continued to appear in the boxes.

At about this time receptions began to fade out and the odd evening meeting began to be posted. From this time onwards the work intensified, and we in the group arranged between ourselves to cover as many as possible of the meetings taking place—including some of the ad-hoc groups. I suppose that it was inevitable that I should be asked to look after the regulatory aspects, but I was shattered to have to attend briefing meetings with the group at 8am! What is the point of retirement with that imposition? However, that became the pattern almost daily for the duration, until we found that we also needed 1pm meetings.

I sat for hours in Committee 7, 7A, and a 7 ad-hoc waiting for the definition and description of the amateur service, amateur satellite service and amateur stations to be reached. Through the assistance of the UK-representative I was able to speak in this committee, not only to answer questions put by the chairman, but to say why we were there.

As the time wore on I was conscious of a fundamental difference between our organization and the delegations of most countries. Whereas delegations had a brief, and a fall-back position in the event of opposition—and could go home and say they were outvoted—and that would be that, we were personally involved. Any reverses to the amateur service would affect not only the text of future regulations, but all the world's amateurs including ourselves and our friends. Only now do I realize how humiliating it would have been to return home with news of amateur bands lost.

I found my efforts divided into three parts:

(1) Thinking about the problems that were approaching, and weighing the pros and cons of the line the group was adopting on the various issues, sometimes to such an extent that after studying a subject during the evening in my apartment I would take the matter up at the meeting at 8am the following morning—sometimes being the only one in step!
(2) Following the regulatory aspects of the work in committees and groups and discussing our problems with countries' representatives.
(3) Keeping a watching brief for hours on end in meetings where nothing of interest to us was due to come up, but one could never be sure.

The lighter side

No event of this stature can ever be bereft of humour—like the delegate who said "Now that I have the chair Mr Floorman . . .", and the one from South America who said in English "My opinion, which I value very highly . . .", and the chairman, having chosen a sub-committee that included a USA representative, who asked for a volunteer from an English-speaking country.

The IARU held two receptions in the second week of the conference, and they were well supported by leaders of delegations and other important conference members; much effort was made by the group at these affairs. We did not speak to each other, but addressed ourselves to our visitors to further our cause.

I have one regret, it seems unlikely that the amateurs who travelled so far to give their services—from Canada, Colombia, New Zealand, Poland, Singapore, UK, USA, Japan and Venezuela—will have cause to re-assemble in the foreseeable future.

Summing up

I believe that many more countries than before know of the existence of the IARU and what it represents. Although many sticks were raised against us we lost a few unused megahertz at 1,200MHz; the footnote for 14,250-14,350kHz (did you know there was one?) contains more countries using the fixed service; we gained frequencies for the future at 10, 18 and 24MHz; and we obtained new amateur and amateur-satellite bands in the microwave region. In other respects the amateur bands in our region are virtually unchanged.

It has to be remembered that our efforts will be reflected only in the Radio Regulations, and that national amateur radio societies may have to press their administrations for the new bands when the time comes.

I am indebted to my long-suffering wife who prepared meals for me at all odd times and at short notice; and to Roy Stevens, G2BVN, who read the draft of this article for me. See you on 10MHz. . . □

HOOKING UP

by M. G. Pritchard, G3VNQ*

IT is not widely known that Bert Firs, G2LPA, was a member of the research team responsible for one of the most exciting developments of the 20th century. Although the early work was cloaked in secrecy, Bert received special permission to take one of the first experimental devices home for use in his amateur radio station. The device—which looked like a large toroidal core—had the effect of completely reversing the direction of any field trying to pass through it. The mathematics of this phenomenon are very involved, but an important consequence is that gravitational attraction is completely reversed within the area of the device. Bert's first idea was to fasten a heavy weight to the toroid (it happened to be an old transformer) and attach around 330ft of 16swg copper wire. The device was switched on and the wire slowly paid out from the centre of Bert's back garden under cover of darkness. The result was a 5λ/8 vertical antenna for 1·8MHz which was nearly as stable in a high wind as if the transformer had been dangling downwards. With this arrangement, G2LPA worked all continents on 1·8MHz within a week. The only disadvantage was that the antenna had to be pulled down just before dawn in case any curious neighbours started wondering what was holding up the far end!

The strength of G2LPA's signal soon became a topic of conversation at Bert's local radio club. "Just how much power are you running anyway, Bert?" asked Ray, one of the younger Class B licensees (who nevertheless had his head screwed on the right way). "You'll have to let me see your 1·8MHz gear." A few evenings later Bert obliged, and Ray was amazed to see an old home-built valve transmitter with a 5763 in the power amplifier. "I don't believe it," said Ray, "you can't have a signal as strong as yours with only 10W."

"Wait and see!" was all that Bert would say, knowing full well that it was far too dark to see anything in the garden that night.

Shortly afterwards, in a conversation with the company research director, Bert received permission to take Ray into his confidence. After being sworn to secrecy, the magic of the vertical antenna was revealed. Ray was overcome with emotion. "Bert, you've just got to let me have one of those!" he said.

"Whatever for?" asked Bert.

"Well, I've always wanted a better 144MHz signal than old G3---. With my aerial 200ft up in the air, I could beat him hollow with only 10W."

"I'll see what I can do", said Bert.

So, one evening shortly afterwards, Bert and Ray were to be found in Ray's garden fastening another antigrav device to Ray's 144MHz beam. The antenna was "raised" into the sky with two nylon cords attached to opposite ends of the boom. The lightweight coaxial cable was allowed to dangle from the centre of the antenna. With Ray on one cord and Bert on the other, the Yagi could be rotated by the two of them walking around the garden. Levelling the antenna took a little time, but eventually the coaxial feeder was plugged into Ray's ssb transceiver and signals could be heard. The beacons were much stronger than usual, and before long Ray was enjoying himself working stations that he had never been able to hear before. All too soon, Bert indicated that he would have to leave and it was time for the antenna to be pulled in. "Never mind,

*142 Forest Road, Southport, Merseyside PR8 6HX.

Ray", said Bert, "the patent should be accepted before too long and we'll be able to carry out our tests quite openly then".

Bert was correct, because a few weeks later the patent was published and the scientific world found out that an antigrav device was possible. Even so, for a while the only antigrav devices in existence were to be found in Bert's laboratory and, since his company would not enter into licensing agreements with competitors, the devices were not available anywhere else. This explains how all the earliest application work for radio came to be carried out by Bert and Ray.

Before long, Ray had the permanent loan of one of the devices and was working out the best ways of raising multi-Yagi arrays and rotating them from the ground. To overcome feeder losses he tried to persuade Bert to lend him some more antigrav units so that these could be attached at intervals to a thicker coaxial cable. Bert refused to do this—"Use some 300Ω ribbon instead", he said, "the losses and the weight will both be less". Ray soon found that this was true. Meanwhile Bert was concentrating on large beam antennas for the other hf bands, and it was not long before the neighbours were amazed to see a 3·5MHz quad floating 250ft above Bert's house. The first complainant was eventually satisfied by Bert's explanation that the tv interference would now be considerably less with the antenna so much further away.

One evening at the radio club, Bert and Ray were in a corner chatting about the problems they were having with their new antenna systems. "It's no good, Bert", Ray was saying, "if you're operating on uhf then the feeder is still a difficulty. Above a few hundred feet, the advantage of the extra height is offset by the feeder losses, and the sheer cost of the cable is getting too much for me". G3---, who had been listening to their conversation, joined in. "Why don't you use a repeater technique? Send the entire transceiver into the sky, as high as you like. If it's battery powered, the height is only limited by the length of rope you can afford." G3--- was on the committee of the local uhf repeater group and so, a few weeks later after several 'phone calls to the RSGB and the Home Office, GB3AG became the first tethered 70cm repeater, operating at a height of 950ft above Bert's house. The range was increased to such an extent that overlap with distant repeaters was a serious problem until the Home Office agreed to a special frequency for the "aerial station" (as they insisted on calling GB3AG).

The first few days' operation was on battery power, with the whole station reeled in for recharging at night. Later on, a 1,000ft length of mains cable was acquired by Ray so that the battery could be float-charged as it floated!

The repeater had been covered with a large plastic bag to prevent low cloud getting into the electronics. Photographs of this weird object in a national newspaper raised objections from the Civil Aviation Authority who thought that there was a danger to aircraft. A blanket ban on all amateur experiments with tethered equipment was in fact threatened, until Bert's research director intervened to point out that conventional air traffic was about to be revolutionized just as soon as larger antigrav devices were developed by his company.

Although the supply of devices was severely limited during those early days, Bert and Ray pioneered several other important applications. Ray became the first human being to be lifted by an antigrav unit when he used the device loaned by Bert to carry out repairs at the top of his old antenna mast. Bert was completely unaware of this adventure. In fact his company had been carrying out secret tests on animals to make sure that the antigrav field had no harmful effects. When Ray told Bert about his exploits, he found himself rushed to the medical experts for a series of checks. Fortunately, there were no unpleasant side effects at all, and today we are all familiar with the controlled antigrav platforms which have replaced ladders and scaffolding throughout the Western world.

The first large-scale antigrav devices were tested by Bert's radio club during VHF NFD, when the entire operation was carried out at a height of 500ft above the club house. This feat has never yet been repeated, mainly because the yls and xyls objected to the oms being completely out of reach for a whole weekend. Besides, the RSGB has now altered the contest rules so that field day stations have to be in contact with a genuine grassy field.

By this stage, production of the smaller antigrav devices had expanded sufficiently to allow their commercial launch. The world-wide demand was phenomenal and had an immediate beneficial effect on Britain's balance of payments. Bert had suggested to his research director that a consultancy team should be set up to advise customers on the best ways to use the devices, and several members of the radio club found themselves offered new jobs—after all, they knew more than anyone else about suspending pieces of radio equipment in the air, and the professional engineers were showing great interest in the possibilities.

The subsequent growth in the use of antigrav devices is too well known to be described again, but the important role played by a few radio amateurs in the early development of what has always been known to the fraternity as a "sky hook" can only now be told.

(from *Radio Communication*, 1 April 1999)

council proceedings

A brief report on the Council meeting held on 12 January 1980

Present: Mr P. Balestrini (President, in the chair), Dr E. J. Allaway, Messrs D. J. Andrews, J. Anthony, R. G. Barrett, J. Bazley. R. Bellerby, P. F. D. Cornish, T. P. Douglas, Dr D. S. Evans, Messrs L. N. G. Hawkyard, G. R. Jessop, G. I. Knight, B. O'Brien, D. M. Pratt, G. M. C. Stone (members of Council), R. F. Stevens (telecommunications liaison officer), D. A. Evans (general manager), A. W. Hutchinson (editor) and Mrs H. M. Allin (minutes secretary).

Apologies for absence were received from Mr W. F. McGonigle, who was unable to attend because of ill-health.

Election of executive vice-President

Mr Douglas proposed that Mr B. O'Brien be elected executive vice-President for 1980. This was seconded by Mr Stone and agreed unanimously.

General manager's report

Mr Evans spoke of the current high levels of interest in amateur radio in the UK and the healthy membership position of the Society, and said that growth was remaining at around 10 per cent per annum.

The general manager gave a report on the new IBM34 equipment, which had been installed on 19 December. He estimated that it would take most of the current financial year to get the new system fully operational.

Mr Evans also reported on the arrangements being made for the Society's Alexandra Palace exhibition.

Presentation to Mr R. F. Stevens

The President welcomed Mr R. F. Stevens, G2BVN, to the meeting and said that the amount of work he had done for the amateur population, and the RSGB in particular, needed no further comment. The fact that the Society was now in a position of worldwide leadership owed much to Mr Stevens.

Mr Balestrini then presented Mr Stevens with an engraved silver salver, on behalf of the RSGB, in appreciation of his outstanding services to the Society.

WARC 1979

Mr Stevens began his report on the conference by expressing his thanks to those who had made it possible for him to attend it, particularly Dr Allaway and Mr Bazley. The UK delegation, led by Messrs Bantock and Baptiste, had also provided tremendous support. Mr E. Godsmark had also done a great amount of work, and he deserved the Society's thanks.

Mr Stevens answered many questions from members of Council. It was stressed that the Society should take the necessary steps to maintain contacts, and financial provision should be made for this work.

Financial report

Mr Cornish gave details of the financial situation at 30 November 1979, and answered questions concerning it. He also explained the purchase and lease arrangements for the IBM34, and he stressed the importance of showing the membership just how much the Society spent on amateur radio.

Review of committee business

Education (24.11.79)

Mr Anthony reported that a meeting of RAE instructors would be held at the Alexandra Palace exhibition. Some discussion took place on the new format of the RAE and methods of marking.

Finance & Staff (18.10.79, 22.11.79)

Some discussion took place on arrangements to provide facilities for committee and other meetings.

Committee HF (22.11.79)

The following recommendation was approved: "QSL cards from stations located in the Falkland Islands Dependencies which have not been licensed by the British administration should not be valid for Society certificates and awards."

HF Contests (1.11.79)

Mr Andrews asked for Council's advice on publicising the results of

NFD. It would not be possible for the results to be compiled in time to meet the deadline for the September issue of *Radio Communication*. After discussion it was agreed to mail the results to the participating groups prior to publication in the October issue.

IARU (6.9.79)

Mr Stevens confirmed that the venue of the 1981 IARU Conference had not yet been finalized.

Membership & Representation (3.11.79)

Mr O'Brien spoke of the demand for notes used for lectures on amateur radio.

Mr Stone raised the question of affiliated societies representatives, and said he hoped to see this post re-introduced following discussions at the next meeting of the committee.

Microwave (27.10.79, 25.11.79)

Accepted without comment.

Rally and Exhibition (9.10.79)

Accepted without comment.

Technical & Publications (26.10.79, 7.11.79)

Dr Evans referred to the satisfactory level of book sales, and added that with the number of new books planned it was hoped to maintain this level. It was also planned to increase the number of outlets for RSGB books in the USA and Canada.

In reply to a question from Mr Anthony, Dr Evans said that consideration would be given to publishing a revised *RAE Revision Notes*.

VHF (3.11.79)

Mr Douglas said that the work of this committee and that of the Repeater Working Group was progressing well. It was proposed to hold a meeting in Paris soon with PA0QC.

Dr Evans said that the London repeater system had been introduced as planned and that it was performing reasonably well.

VHF Contests (24.10.79, 21.11.79)

Accepted without comment.

Council vacancy

The President reminded Council of the casual vacancy arising from the resignation of Mr C. J. Thomas, G3PSM. Dr Evans proposed that Mr K. A. M. Fisher, G3WSN, runner-up in the Council election, be invited to fill the casual vacancy. This was seconded by Mr Hawkyard and carried.

Mr Bazley proposed that Mr Stevens, as telecommunications liaison officer, be invited to attend meetings of Council and should receive all minutes to keep him informed of committee business. It was agreed that Mr Stevens be invited to attend Council meetings as and when necessary during the next 12 months.

1980 committees

The lists of proposed committee members were examined, and after minor changes the constitution of various committees was approved.

Representatives on outside bodies

The following were appointed:
CCIR Study Group 2: M. Sweeting, G3YJO.
CCIR Study Groups 5 and 6: R. G. Flavell, G3LTP.
CCIR Study Group 8: D. A. S. Dryborough, G8HEV.
CCIR General Purposes: R. F. Stevens, G2BVN.
BSI Committees GEL 1/5, 1/30, EEL 25/6: R. S. Roberts, G6NR.
BSI Committee GEL 1/9: R. G. Flavell, G3LTP.
RAE Subject Committee: G. C. Oxley, G8MW; L. E. Newnham, G6NZ, and W. A. Scarr, G2WS.
BREMA ISC: J. Anthony, G3KQF.
IERE Telecom Group: G. R. Jessop, G6JP.

Honorary officers

The appointment of these officers was approved. *(See list on page 357.)*

CB working group

The President outlined the reasons for the formation of this group, which comprises the five managers and the telecommunications liaison officer. The group had produced a detailed report for consideration by Council, and it will meet as circumstances dictate.

Membership and representation

Council noted and approved that:
(i) Subscriptions had been reduced in respect of five members;
(ii) Subscriptions had been waived in respect of two members;
(iii) Affiliation had been granted to Sevenoaks School;
(iv) Mr F. A. Jefferies, G8PX, had been appointed area representative for Oxford. Mr Hawkyard reported receipt of a letter of resignation from the AR in Jersey.

Invitation to PA0AD

Following the visit of the RSGB President to VERON for the Day of the Amateur in October 1979, it was decided to invite PA0AD, president of VERON, to be the Society's guest over the period of the RSGB Alexandra Palace Exhibition.

RSGB committees, 1980

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

Education: J. Anthony, G3KQF, (chairman); D. H. Adams, GW3VBP; G. L. Benbow, G3HB; L. E. Newnham, G6NZ; G. C. Oxley, G8MW; D. M. Pratt, G3KEP; W. A. Scarr, G2WS; F. C. Ward, G2CVV.

Finance & Staff: E. J. Allaway, G3FKM, (chairman); J. Anthony, G3KQF; P. Balestrini, G3BPT; J. Bazley, G3HCT; P. F. D. Cornish, G3COR; D. S. Evans, G3RPE; B. O'Brien, G2AMV; R. F. Stevens, G2BVN.

HF: J. Bazley, G3HCT, (chairman); E. J. Allaway, G3FKM; R. J. Eckersley, G4FTJ; S. H. Jesson, G4CNY; J. D. Kay, G3AAE; D. J. Lawley, G4BUO; F. M. Smith, G8KG*; C. J. Thomas, G3PSM.

HF Contests: D. J. Andrews, G3MXJ, (chairman); E. J. Allaway, G3FKM; J. Bazley, G3HCT; D. S. Booty, G3KKQ; G. C. Dobbs, G3RJV*; R. L. Glaisher, G6LX; M. Harrington, RS20249; D. J. Lawley, G4BUO; P. A. Miles, G3KDB; E. L. Mollart, RS10977*; D. Thom, G3NKS; R. S. Unsworth, G3WPF.

IARU: R. J. Hughes, G3GVV, (chairman); E. J. Allaway, G3FKM; D. J. Andrews, G3MXJ; J. Bazley, G3HCT; T. P. Douglas, G3BA; D. S. Evans, G3RPE; C. E. Godsmark, G5CO; R. F. Stevens, G2BVN; R. M. Warner, G3SAR.

Interference: P. F. Jobson, G3HLF, (chairman); S. R. Allen, G4CYR*; J. Anthony, G3KQF; A. S. Kessler, G4DXA*; J. E. Martin, GU3YIZ*; K. H. Parker, G8HTA; J. E. Swayne, G3BLE*; J. W. Swinnerton, G2YS; C. L. Turner, G3VTT.

Membership & Representation: B. O'Brien, G2AMV, (chairman); E. J. Allaway, G3FKM; D. J. Andrews, G3MXJ; J. Anthony, G3KQF; R. G. Barrett, GW8HEZ; J. Bazley, G3HCT; D. S. Evans, G3RPE; L. N. G. Hawkyard, G5HD; G. I. Knight, GM8FFX; W. F. McGonigle, GI3GXP.

Microwave: C. W. Suckling, G3WDG, (chairman); B. Chambers, G8AGN; D. S. Evans, G3RPE; J. N. Gannaway, G3YGF; H. Griffiths, G4CNV; D. T. Hayter, G3JHM; K. S. Hutchinson, G4ALN; H. W. Rees, G3HWR; K. L. Smith, G3JIX; M. H. Walters, G3JVL.

Propagation Studies: R. G. Flavell, G3LTP, (chairman); L. W. Barclay, G3HTF; B. Chambers, G8AGN; T. Damboldt, DJ5DT*; W. M. Dunell, G3BYW; D. S. Evans, G3RPE; G. H. Grayer, G3NAQ*; M. Harrison, G3USF*; R. J. Hughes, G3GVV; C. E. Newton, G2FKZ; A. M. Pomfret, G3LZZ*; J. Spurling, G4AQI; G. M. C. Stone, G3FZL; A. Taylor, G3DME.

Rally & Exhibition: N. Miller, G3MVV, (chairman); L. N. G. Hawkyard, G5HD; R. S. Hewes, G3TDR; W. J. McClintock, G3VPK; G. W. Norris, G3ICI; E. W. Yeomanson, G3IIR.

Raynet: T. I. Lundegard, G3GJW, (chairman); P. Balestrini, G3BPT; M. G. Barker, G8CAC; E. R. L. Bassett, RS16075; G. Cluer, G4AVV*; L. A. Crane, G3PED; B. L. Goddard, G4FRG; G. B. Lear, GW2HPG*; D. J. Maud, G8MBB; E. W. Yeomanson, G3IIR.

Technical & Publications: D. S. Evans, G3RPE, (chairman); R. J. Eckersley, G4FTJ; T. G. Giles, G4CDY; P. J. Hart, G3SJX; J. P. Hawker, G3VA; R. S. Hewes, G3TDR; P. A. Holliday, G3UVZ; P. J. Horwood, G3FRB; A. W. Hutchinson, editor; M. H. McFadden, GI3VCI*; J. W. Mathews, G6LL*; R. O. Phillips, G4IQQ; H. W. Rees, G3HWR; R. F. Stevens, G2BVN.

Telecommunications Liaison: R. F. Stevens, G2BVN, (chairman); E. J. Allaway, G3FKM; P. Balestrini, G3BPT; J. Bazley, G3HCT; T. P. Douglas, G3BA; D. S. Evans, G3RPE; R. J. Hughes, G3GVV; D. M. Pratt, G3KEP; R. W. Price, G4BSO*; C. J. Thomas, G3PSM; F. C. Ward, G2CVV.

VHF: C. J. Morcom, G3VEH, (chairman); M. S. Appleby, G3ZNU; M. Dennison, G3XDV; A. H. B. Bower, G3COJ; G. Cluer, G4AVV*; M. T. Crampton, G8DLX*; A. H. Dormer, G3DAH*; T. P. Douglas, G3BA; K. E. S. Ellis, G5KW*; G. I. Knight, GM8FFX*; R. W. L. Limebear, G3RWL*; G. M. C. Stone, G3FZL; R. J. Taylor, G4BEL; I. F. White, G3SEK; E. W. Yeomanson, G3IIR*.

VHF Contests: R. J. Taylor, G4BEL, (chairman); L. N. G. Hawkyard, G5HD; W. J. McClintock, G3VPK; F. Mathews, G8ACJ; M. Pharoah, G3LCH; J. H. Quarmby, G3XDY; C. Sharpe, G2HIF; G. M. C. Stone, G3FZL; C. W. Suckling, G3WDG*.

*Corresponding member

Members of the Society who are interested in contributing to the work of the Society through its committees should write to the chairman of the appropriate committee c/o the general manager at RSGB HQ.

contest news

70MHz CW Contest January 1980 results

Yet again conditions were very poor for this event, but this did not prevent several stations remarking on how much they enjoyed the contest. Entries were a little down in numbers compared with last year, and the number of contacts made was reduced, both perhaps due to conditions. Most entrants lost some points, and one or two seemed to have elastic rulers! Two stations, not listed in the table, were disqualified for declaring powers in excess of the legal limit for 70MHz. Congratulations go to G3UKV, who also won this event in 1979, and G3XBY, both of whom will receive certificates.

Posn	Callsign	Points	QSOs	QRA	Best dx	Km
1	G3UKV	209	32	YM28	GM4IGS	327
2	G3XBY	160	34	ZM52	G3JYP	245
3	G3BA	131	31	ZM31	G3DAH	203
4	G3TCU	113	29	ZL58	G3JYP	387
5	GM4IGS	106	8	XP48	G3DAH	575
6	G3LVP	105	29	AL33	G3BOC	260
7	G3PGN	96	27	AL22	G3BOC	252
	G3SSO	96	20	YL10	G3JYP	290
9	G3PSP	89	32	ZL29	G3JYP	390
10	G3FIJ	76	18	AL05	G3UKV	260
11	G3TWG	73	27	ZL37	G3OHH	220
12	G5UM	72	18	ZM35	G3JYP	225
13	G3UGX	65	27	ZL30	G3BOC	221
14	G5DF	45	5	ZO51	G3OSS	360
15	G3LCH	32	17	ZL50	G3OHH	230
16	G4FKI	29	15	AL31	G3UKV	220
17	G3VCT	20	13	ZL37	G3SSO	106

The checklog received from G5DS is acknowledged with thanks.

G3XDY

432MHz Cumulative Contest 1979–80 results

Although the entries for the 432MHz Cumulative Contest were very much down on last year, the event aroused as much enthusiasm as ever in those taking part. The only complaints concerned the long intervals between sessions. Several contestants made a strong plea to return to eight-day intervals. It was not surprising, therefore, to find that there was little or no support for the sixth session on 27 December, and future cumulatives should be timed to avoid the holiday period. Conditions varied considerably throughout the event, sessions 1, 3, and 4 producing the best dx.

As might be expected, the leading places went to the portable stations, who suffered almost impossible hardships to gain a site advantage. The contest was most unusual in one respect for a 432MHz event, several stations actually lost points for careless and indecipherable logkeeping.

The winner and runner-up are to be congratulated, not only on their scores but also on their endurance in maintaining their portable stations on the air throughout the contest and in some really tough conditions.

G2HIF

Posn	Callsign	Points	QSOs	QRA	Best dx	Km	Sessions
1	GW8HZK/P	998	157	YL05	PA0EZ	575	1, 3, 4
2	G8PUB/P	985	209	ZL59	GD2HDZ	430	1, 3, 4
3	G8SFI/P	893	105	ZO55	G8ABP	415	1, 3, 7
4	GD2HDZ	694	60	XO68	G8EVU	448	3, 4, 7
5	G3TDG	685	141	AL51	GD2HDZ	441	1, 3, 7
6	G8DKK	541	129	ZL08	GD2HDZ	372	1, 2, 3
7	G3OUL	530	86	YN46	G8CTT	308	1, 3, 4
8	G3YTE	508	100	AL13	GD2HDZ	425	3, 4, 5
9	G3WHK	381	103	ZL49	GD2HDZ	417	3, 4, 7
10	G8FMG	330	112	ZM78	PA0EZ	392	1, 4, 7
11	G8IFT	262	66	YM50	G3BW	262	1, 3, 7
12	G5UM	227	66	ZM35	GD2HDZ	268	4, 5, 7
	G3KPU	227	45	ZN56	G8AGU/P	305	1, 3, 7
14	G8CTT	224	99	AL41	G8SFI/P	325	1, 3, 4
15	G8GXE	217	63	ZL48	G8SFI/P	–	3, 5, 7
16	G8KAX	204	76	AL32	G8SFI/P	318	1, 2, 7
17	G3XDY	199	39	AM76	GJ8KNV	391	1, 4, 5
18	G8AYY	187	51	ZM41	GD2HDZ	262	1, 3, 7
19	G8NDP	170	63	ZL10	G8SFI/P	271	1, 4, 7
20	G4AEZ	116	48	ZL30	G8SFI/P	295	1, 2, 7
	G3ZVW	116	102	ZL40	G3UBX/P	220	1, 3, 5
22	G3XWZ	105	35	ZN64	PA0EZ	440	3, 4, 5
23	G8LXY	68	35	ZL09	G3FIJ	87	1, 2, 5
24	G4EYV	50	26	ZL40	GW8HZK/P	206	1, – –

Check logs acknowledged with thanks from G3DVQ and G4EYV.

1,296MHz Cumulative Contest 1979–80 results

While there were only 11 entries, mainly from sessions 1, 2 and 6, nearly all the contestants said how much they had enjoyed the event. Conditions were only poor to average, and few contacts were made over 350km. The best openings during the weeks covered by the contest seemed to have been arranged for dates prior to, or just after, the scheduled activity sessions.

Very few portable stations were active, and this might be taken as an indication that the 1·3GHz cumulatives would attract more entries if the activity periods were confined to spring and autumn rather than winter. More opinions on this matter would be welcome.

Congratulations to the winner, G3TDG, who gained a convincing victory with more than twice the points of his nearest rivals.

G2HIF

Posn	Callsign	Points	QSOs	QRA	Best Dx	Km	Sessions
1	G3TDG	4,499	43	AL51	PA0EZ	367	1, 3, 6
2	G8DKK	1,931	29	ZL08	G8GDZ	121	2, 4, 6
3	G3XDY	1,780	16	AM76	G3AUS	370	1, 3, 6
4	G8ART	1,321	21	ZM45	G8EVU	147	1, 2, 6
5	G8GDZ	920	14	ZM41	G8EVU	205	2, 3, 6
6	G3TQF	914	11	ZM24	G8BIS	179	1, 2, 6
7	G8IFT	555	16	YM50	G8ART	68	1, 2, 5
8	G8CTT	464	17	AL41	G8DKK	62	4, 5, 6
9	G4AEZ	450	12	ZL30	G3XDY	98	4, 5, 6
10	G3XWZ	292	5	ZN64	G8FIS	85	4, 5, 6
11	G4EYV	100	10	ZL40	G3VOS	38	? ? ?

Logs are acknowledged from G6XM and G4EYV (wrong dates).

RSGB 21/28MHz Telephony Contest 1979 results

With fantastic conditions prevailing throughout the whole of the 12 hours, record scores were amassed. The 28MHz band took the largest portion of the traffic, being open right from the start, with Europe and Asia very prominent.

Unfortunately, as in last year's event, the entry from the British Isles was disappointing and this year it was lower still. The winner of the overseas section (C5AAP) made over 330 contacts on 28MHz, which means that around 300 G stations did not submit a log. Apart from that the contest was an outstanding success, with the leading British Isles stations making over 1,300 contacts, one with over 250 with Japan. A record entry came from overseas, with many from eastern Europe and the USSR, and a welcome number from Japan; some of these succeeded in working 20 or more G prefixes on each band.

The North American continent played its part as the day went on, with Africa and Antarctica also being contacted. All this, added to rare dx such as ZD7, HS, TG and 4S7, to mention but a few, enabled many G stations to obtain over 100 multipliers. On the debit side, with the large number of contacts made, the duplicates rose accordingly in some entries; these have been heavily penalized.

The HF Contests Committee is grateful for check logs from the following: G3MWZ, KH6HGL, LZ2KKZ, OK2SWD, UA3DCY, UA3DNK, UA3DPX, UA3PDA, UA3RFZ, UA3TCI, UA4ZA, UA6HCS, UA6PBR, UB5ZCE, UC2CEK, UK2PCR, UK5IAZ and UL7GBP.

A disappointing entry in the receiving section was won convincingly by BRS32525 who scored 56 multipliers on each band; he repeats his performance of last year in winning both trophies awarded in this event. As last year also, the overseas section was dominated by the USSR.

Looking ahead to next October it is difficult to imagine conditions could be even better, hopefully they will be as good.

UK TRANSMITTING

Posn	Callsign	Points	Posn	Callsign	Points
1	G3MXJ	525,553	20	G3TBK	163,836
2	G3FXB	492,909	21	G3SEM	153,459
3	G3OZF	452,844	22	G3MJT	140,094
4	G3YDX	440,104	23	G3XBN	113,784
5	G3ZQW	428,760	24	G2QT	107,730
6	G3RRS	336,660	25	G3VAO	80,088
7	G3TTJ	307,074	26	G4GVB	73,788
8	G3LDI	301,710	27	GD4HOX	56,700
9	G4BWP	270,504	28	G4IFB	45,900
10	G3VOF	257,088	29	G4DDL	37,635
11	G3XBY	248,184	30	GM3SKX	32,472
12	GI3IVJ	246,330	31	G4AZN	25,440
13	G4BUO	236,196	32	G4GNK	15,525
14	G5CMX	231,450	33	G3XTT	12,960
15	GU3YIZ	201,663	34	GM4FSA	11,844
16	G4APL	199,710	35	G3INL	5,814
17	G4AFJ	178,965	36	G2AJB	2,904
18	G4GUO	178,596	37	G3PDL	1,614
19	G3MGW	167,580	38	G3ILO	330

OVERSEAS TRANSMITTING

Posn	Callsign	Points	Posn	Callsign	Points
1	C5AAP	45,144	69	JA4XKL	1,620
2	LZ2VU	39,360	70	YU3TOJ	1,464
3	UQ2GFN	33,866	71	UC2AFA	1,392
4	9J2BO	26,112	72	W3MR	1,320
5	UW1AE	23,580	73	VE1BNN	1,242
6	G3VZT/W1	23,358	74	VE3DDU	1,240
7	HA5KFL	18,044	75	UA1AWZ	1,224
8	HA5NP	18,037	76	UA6LLT	1,221
9	UB5VAZ	16,536	77	UA6AKB	1,200
10	YO6KEI	16,120	78	LA9PT	1,196
11	UA3QDW	12,351	79	UI8ADC	1,080
12	WB2KTM	11,340	80	ON6JG	1,026
13	LZ1QV	11,304	81	JA0FMB	964
14	UO5OGE	11,109	82	HS1ABD	960
15	VP2ML	10,710		LA5NM	960
16	ZD7BW	10,260		UA4ACP	960
17	HA0KLF	7,860	85	UJ8JCL	945
18	YU1NZW	7,722	86	YO4UQ	912
19	UB5MCS	7,128	87	UA9FV	864
20	OH1KA	6,705	88	UA3ST	861
21	YO4BZC	6,660	89	UQ2GGS	856
22	UB5HDX	6,426	90	HA4YH	819
23	UW9CL	6,288	91	UB5QCK	816
24	HA5NK	6,000	92	JR3CVJ	780
25	OH2DN	5,820	93	VK3XX	768
26	HA5LX	4,902	94	UB5QAY	720
27	UA3TN	4,848		UD6DER	720
28	KB8JF	4,590	96	UF6QAC	648
29	JH7JGG	4,389	97	UA0SGL	630
30	UA6ACK	4,352	98	SP9PZF	604
31	UA0TO	4,251	99	OH5KJ/OH7	600
32	HA1ZD	4,212	100	UA0SJZ	594
33	OK1AGN	4,176	101	JH1UUT	546
34	YO5BQ	3,936	102	HA5HM	540
35	UL7GR	3,744	103	OK2KVI	486
36	JA6DHI	3,696	104	LA9HW	483
37	OK2SPS	3,672		WA8VZO	483
38	UP2AV	3,548	106	JA0ZGA	480
39	UA3SBW	3,402	107	JA7NFV	465
40	UB5LU	2,916	108	LZ2RF	462
41	SP9HWN	2,880	109	HA7KPL	450
	UB5QCQ	2,880		OK1PCL	450
43	OH7UV	2,814		UA0FCK	450
44	OH7NW	2,700	112	EA7ABV	396
45	OK1MGW	2,696		OZ8KU	396
46	UA9SBP	2,664	114	UA6AJF	375
47	RA3DQP	2,613	115	YO5AVP	345
48	UC2BF	2,592	116	OK1KZ	330
49	SP9AKD	2,565	117	OK3CFA	324
50	UA4CO	2,562	118	DL7QG	306
51	RA1ARX	2,541		PY1NEZ	306
52	RA3DKE	2,520	120	JR3CVO	303
53	OH4PW	2,478	121	CT1AIF	270
54	OK1MJL	2,424	122	ZL4IJ	204
55	UC2OAZ	2,376	123	OZ3KE	180
	UT5GP	2,376	124	UA3TAM	162
57	UA6LAP	2,271	125	JA1AAT	135
58	CT1AHG	2,268		JA3BVD	135
59	UB5MDI	2,229	127	ON5AZ	120
60	W9LKI	2,171	128	OH1EB	108
61	UA9FAT	2,100	129	OK1KIR	75
62	UB5EKG	2,079	130	JA1JIX	72
63	SP5JTR	2,013	131	JR1PUO	54
64	OK1DKS	1,989		UA1OAV	54
65	OH1ZU	1,950	133	UA6AJG	45
66	YU2RQX	1,772	134	OK2ABU	27
67	UA9CDZ	1,710	135	OH5YX	3
68	JF3KNQ	1,656		YU7NZR	3

UK RECEIVING

Posn	Station	Points	Posn	Station	Points
1	BRS32525	158,105	6	BRS26407	19,392
2	BRS33823	56,190	7	ARS41386	19,380
3	A9191	42,956	8	BRS20249	5,062
4	BRS40527	42,316	9	BRS42502	2,268
5	BRS35917	35,324			

OVERSEAS RECEIVING

Posn	Station	Points	Posn	Station	Points
1	OK3-915	13,932	9	NL-4276	3,590
2	UA3-127-376	10,725	10	UQ2-037-68	3,096
3	UB5-073-467	6,864	11	WDX9 JFL	2,400
4	UO5-039-27	6,348	12	F. Cerny	1,650
5	UA4-095-390	6,210	13	JA4-4665	792
6	UA3-155-163	5,058	14	NL-6268	684
7	UB5-068-494	4,752	15	DL-1693266	648
8	UA3-142-1256	4,401	16	UB5-073-875	570

21MHz CW Contest 1979 results

The committee has been staggered by the response to this new contest with an entry of just over 200 logs. The majority of the contestants have commented favourably on the contest with an overall plea to leave the rules exactly as they are. However, one exception is the QRP section which the committee will modify, taking account of the constructive comments made by the entrants from that section of the test.

Please note that next year the rules will require entrants to have a separate multiplier list, without which points will be docked from their score. Generally the standard of log keeping was very high, and very few points have had to be taken off claimed scores.

Many thanks for all the letters, anecdotes etc, included with your entries, they help to make the chore of log checking much more enjoyable. Hope to see you all again in 1980.

G3HCT

BRITISH ISLES SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	G3FXB	90,048	21	G4IFB	33,534
2	G3MXJ	88,641	22	G5PQ	31,584
3	G3VMW	81,405	23	G3SDC	31,500
4	G4BUO	79,569	24	G3KSH	24,492
5	G3NOM	76,428	25	GM4EJI	22,140
6	G3UFY	65,520	26	G3IMK	16,836
7	G4GIR	63,882	27	G3YMC	16,800
8	G3XXF	61,122	28	G4FAS	16,113
9	G4CNY	59,334	29	G3YBH	12,636
10	G2QT	51,336	30	G2FNK	9,600
11	GI3TAN	50,820	31	G8DI	8,910
12	G3VIP	48,546	32	G3AWR	8,277
13	G3PSM	46,458	33	GU3MBS	5,175
14	GW3MPB	43,512	34	GW4HBK	5,103
15	G3KKP	41,895	35	G3NKS	3,795
16	G3VLL	36,795	36	G3DQL	3,762
17	G3SNX	36,411	37	G2BJY	3,312
18	G3ESF	36,366	38	G3CWL	3,168
19	G3TVW	36,252	39	G2HDR	2,223
20	G4RS	35,037			

QRP BRITISH ISLES SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	G4BUE	33,417	9	G3LHJ	3,975
2	G3ILO	16,728	10	G8PG	2,907
3	G4DDL	12,969	11	G4ELZ	2,601
4	G3NIJ	10,296	12	G4IQM	1,998
5	G4CZB	9,360	13	G8IB	1,125
6	G3IGU	7,416	14	G4ETJ	792
7	G3KKQ/A	5,106	15	G4EFJ	12
8	G3BZG	4,050			

REST OF EUROPE SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	UP2BFE	5,376	36	DF2HN	1,620
2	YU78PQ	5,334	37	OH3TQ	1,560
3	9H1EL	5,076	38	OZ1LO	1,464
4	UA3EAL	4,644	39	LA3BO	1,458
5	UW3UO	4,368	40	LA2AD	1,440
6	OH2BFJ	4,329		UB5JIM	1,440
7	UA3DCY	3,888	42	UA3ACD	1,377
8	LZ2RF	3,816	43	UA4HBP	1,296
9	YU4PH	3,780	44	OE1TKW	1,269
10	SM0KV	3,744	45	OK3FON	1,215
11	OH6ZAB	3,729	46	UP2BF	1,155
12	OK1ABB	3,696	47	OK3TBN	1,128
13	UB5ZEL	3,399	48	OK3CFP	1,080
14	UA3DIW	3,384		UC2AS	1,080
15	UB5WAL	3,210	50	OZ5GY	1,008
16	YO3CR	3,204	51	OK1KZ	999
17	LZ1QG	3,102	52	OK1MWN	975
18	YU7PEP	2,988	53	UB5QCK	960
19	SM3VE	2,871	54	OK1MWD	792
20	OK1ATZ	2,673	55	OH3BP	791
21	LZ2KKZ	2,610	56	UA4CK	744
22	OH2PQ	2,574	57	PA5OVLA	666
23	OK1AGN	2,550	58	OK1TW	552
24	YU3NP	2,370	59	LA3UG	384
25	UB5VAW	2,270	60	UB5ZAT	378
26	UB5VY	2,190	61	OZ1BII	356
27	UB5VAN	2,160	62	HB7BOW	195
28	OK1DAV	2,100	63	OH7UV	180
	OK2PDL	2,100	64	OK1KCF	165
30	UB5LDP	1,998	65	PA0DIN	135
31	UB5VAA	1,971	66	UA4ACA	117
32	YU7SF	1,920	67	UA6ACK	75
33	HA6KVD	1,830	68	OH9AB	63
34	OH7NW	1,770	69	OH6DC	27
35	YU2HG	1,755	70	OH5YX	3

QRP REST OF EUROPE SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	OK1DKW	3,201	9	UY5ZM	768
2	DL7DO/P	2,160	10	SM7BNG	735
3	SM6AOQ	1,940	11	EA1QJ	396
4	SM6EUZ	1,485	12	HB9IK	342
5	SM0GMG	1,377	13	SM7CZC	144
6	DJ1ZB	1,800	14	OH6GO/8	78
7	DK5RY	1,161	15	YU3TMJ	60
8	DK6AJ	888		DK9FN	60

REST OF WORLD SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	VE3KZ	3,795	18	VK7BC	1,104
2	AC1O	3,696	19	K4VHC	861
3	C5AAP	3,366	20	UL7PA	684
4	9J2BO	2,970	21	VE1BNN	558
5	ZD8TC	2,280	22	ZL1AXM	555
6	UW9WB	2,040	23	VK6IE	504
7	K5ZD	1,815		UI8AAF	504
8	5Z4CW	1,749	25	VE2WA	480
9	W1AQE	1,683	26	G3VZT/KH6	315
10	HS1ABD	1,512	27	ZL1HV	300
11	W6KZV	1,323	28	UD6CN	273
12	ZL2TX	1,215	29	W3MR	255
13	UA9CAM	1,200	30	W6NNV	252
	VP9IB	1,200	31	UM8NNN	225
15	UV9DB	1,197	32	UA9QE	126
16	N2CQ	1,188	33	W84WHE	96
17	UM8MBA	1,080	34	W1OPJ	66

QRP REST OF WORLD SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	VE5JQ	840	3	K6EIL/7	285
2	WB9QPS	525	4	WA1JVY	9

SWL SECTION

Posn	Station	Points	Posn	Station	Points
1	UA3-127-376	4,836	8	YU1RS 300	1,080
2	UA6-101-88	4,446	9	UA1-143-103	1,068
3	UA3-137-508	2,805	10	UA9-145-197	960
4	YU1RS 302	2,580	11	OK1-19-973	948
5	OK1-11861	2,574	12	UO5-038-27	720
6	UA3-137-510	2,145	13	BERS 195	144
7	UA4-156-579	1,512			

Check logs have been received from the following: VP9JQ; UA6AJO; UB5EAX; UA4QK; SM6AYM; G2HLU; G3DNF, and G4QK. Among the late entries were: G3ZDW; YU3TOJ; and YU2CCB.

Is your callsign among those listed below? Further details from G3HCT, QTHR.

GM4AWA	G3DRQ	G4GRU	G3JHC	GM6NX	G3UYM
GM4AGS	G3DPS	G4GMZ	G3JKS	GW3NJW	GM3UM
G3APN	G4DIM	G6GH	G3JOT	GW3NYY	G2VA
GM4AEL	G3EBH	G3HVX	G3JQJ	GW3NWS	G3VQQ
G4AZN	G4EWU	G4NHF	G3KLH	G3OJM	G6VC
G3AAQ	G3EZZ	G3HRY	G3KDB	G3OZF	G3WPF
G8AB	G4EVP	G2HCP	G3KLX	G3PEK	G3WNR
G4BYG	GM4FDM	G2HLU	GM4KPB	G3PDL	G6WI
GI4BBE	G4FHF	G3IFB	G8KP	GM3PGO	G3XRX
G4BKU	G3FVC	G3IRM	G3LCH	G3RTE	GM3XNE
G4BBA	G3FYE	G3IDE	G3LPS	G3RJB	G3YVR
G3CEG	G4FKU	G3IY	G3MLN	G3RUJ	G3YDX
G6CJ	G2FLB	G3IZM	G3MRD	G3RFJ	GM3YYS
GI5CMR	G4GJT	G4IFB	G3ZDJ	G3SJX	G3ZPF
G3CRJ	G3ZFC	G3JJG	G3MZV	G3TMA	G6ZT
G3DNF	G4GML	G3JLB	G3NEO	G3TOE	

1979 Listeners' VHF/UHF Championship results—erratum

The chairman of the VHF Contests Committee apologizes for the wrong name being given in the results published in the January issue. The Hanson Trophy winner is David Hill, BRS34310, not David Green.

70MHz Contest rules

0900–1500gmt 1 June 1980

The following general rules, published in the January 1980 issue of *Radio Communication,* will apply: 1, 2, 3, 4a, 5a, 6a, 7a, 8, 9a, 10a, 11a, 12–22.

All entries and checklogs to: VHF Contests Committee, c/o Mr W. J. McClintock, G3VPK, Maple Leaf, Great Braxted, Witham, Essex CM8 3EJ.

144MHz Low Power Contest rules

0900–1700gmt 25 May 1980

The transmitter output must not exceed 25W p.e.p. There will be two sections: **(a)** Fixed, **(b)** Portable. The following general rules, published in the January 1980 issue of *Radio Communication,* will apply: 1, 2, 3, 5a, 6a, 7a, 8, 9a, 10a, 11a, 12–22.

All entries and checklogs to: VHF Contests Committee, c/o Mr M. Pharoah, G3LCH, 49 Streathbourne Road, London SW17 8QZ.

1980 RSGB Direction Finding Contests

The full programme of eight qualifying events is published in the contests calendar, and competitors' attention is drawn to a change in the rules which are distributed before the start of each event. Details of the first two events are given below.

DF Qualifying Event Coventry

Date: 20 April 1980.
Map: OS Sheet 139, 1:50,000 series, Birmingham.
Assembly: 1300bst for start at 1320bst.
Location: Hay Wood, car park and picnic area, ngr 207 707.

Competitors requiring tea are asked to notify Mr G. Whenham, 33 Chapel Street, Bishops Itchington, Leamington Spa (tel 0926 612806), not later than 13 April.

DF Qualifying Event Mid-Thames

Date: 11 May 1980.
Map: OS Sheet 186, Aldershot and Guildford.
Assembly: 1300bst for start at 1320bst.
Location: Picnic ground, N side of A30 east of Blackbushe Airport, ngr 818 592.

Competitors requiring tea are asked to notify Mr C. Plummer, 148 Porter Road, Brighton Hill, Basingstoke, (tel 0251 54981), not later than 4 May.

VHF NFD 1980 rules

Figures in square brackets refer to general rules for vhf/uhf contests published in the January 1980 issue of *Radio Communication.*

1 **Duration.** From 1600gmt 5 July to 1600gmt 6 July 1980.

2 **Bands.** Up to four separate stations can be used, operating on the 70, 144, 432 and 1,296MHz bands. Only one station can score or give points on each band. Single-band entries on 144MHz will not be accepted.

3 **Operators.** Any RSGB member or group of members operating from the British Isles may take part (*NB.*this excludes Eire). Two groups operating from the same site can combine their scores subject to Rules 2 and 4. Each group should send its own summary sheet.

4 **Stations.** All the stations forming one entry must operate from within a circle of 1km radius centred on the operating position of any of the stations. Proof of permission to use a site may be required. All equipment, including antennas, must be installed on the site during the 36 hours preceding the contest or during the contest. Only portable accommodation can be used to house the stations. The site may not be used for any transmitting activities by the group or member during the five days before this time.

Stations may not use public mains supply. Power for all equipment must be derived from an on-site generator or battery.

5 **Scoring.**
(a) On the 70, 144 and 432MHz bands, contacts will be scored by radial rings [7a].
(b) Contacts on 1,296MHz will be scored at one point per kilometre.

6 **Contest exchanges**
(a) Contestants must exchange both callsigns, signal report, serial number (starting at 001 on each band), QTH locator and QTH [11a]. Only one scoring contact on each band may be made with each station [10a].
(b) The QTH given on 1·3GHz must differ in form from that given on the other bands, eg a location given as "10km north of Marlborough" on 432MHz could be given as "8km south-west of Swindon" on 1·3GHz.

The 1·3GHz station may operate on any other band for the purposes of arranging a contact, but the exchange of contest information must take place on 1·3GHz only and may not be interrupted by recourse to another band. CQ calls on another band should clearly be "for 1·3GHz only"

7 **Entries**
(a) All entries must be postmarked not later than 20 July 1980.
(b) Separate sets of log sheets and 427 cover sheets are required for each band.
(c) A summary sheet (4422) must also be completed. Otherwise the scores on each band will be listed but the total will not appear in the overall results table.
(d) Entries must be addressed to: The Chairman, VHF Contests Committee, 12 The Rampart, Haddenham, Cambs CB6 3ST.

8 **Other rules**
The following general rules will also apply: 5a, 6a, 9a, 10a, 12–22.

9 **Awards**
The Surrey Trophy will be awarded to the overall winners, and certificates of merit will be awarded to the overall runner-up, the leading entry from each country and the highest scoring station on each band. The Tartan Trophy will be awarded to the leading Scottish entry.

Listeners' Contest rules
A listeners' contest will take place at the same time as VHF NFD. Each band will be treated as a separate event. Listeners' contest rules 1–3 (January 1980 *Radio Communication)* will apply.

Contests calendar

12 April	1,296MHz Trophy *(Rules in March issue)*
13 April	Low Power *(Rules in February issue)*
13 April	432MHz Trophy and SWL *(Rules in March issue)*
19–20 April	1st Spring BARTG VHF/UHF *(Rules in March issue)*
19–20 April	Polish DX SSB *(Rules in March issue)*
20 April	DF Qualifying Event Coventry *(Rules in April issue)*
26–27 April	HM The King of Spain Trophy *(Rules in February issue)*
26–27 April	Helvetia 26 *(Rules in April issue)*
3–4 May	144/432/1,296MHz and SWL *(Rules in March issue)*
4 May	Region Round-up *(Rules in March issue)*
7 May	Common Market DX (CW) *(Rules in April issue)*
8 May	Common Market DX (Phone) *(Rules in April issue)*
11 May	WAB CW *(Rules in March issue)*
11 May	DF Qualifying Event Mid-Thames *(Rules in April issue)*
24–25 May	CQ WW WPX CW *(Rules in March issue)*
24–25 May	Ibero-American *(Rules in April issue)*
25 May	144MHz Low Power *(Rules in April issue)*
1 June	70MHz and SWL *(Rules in April issue)*
1 June	DF Qualifying Event Rugby
7–8 June	NFD *(Rules in February issue)*
15 June	DF Qualifying Event Chelmsford/Colchester
22 June	WAB (Phone) *(Rules in March issue)*
28–29 June	Summer 1·8MHz
28 June	AGCW-DL *(Rules in April issue)*
29 June	DF Qualifying Event Burton-on-Trent
1 July	Canada Day
5–6 July	VHF NFD *(Rules in April issue)*
13th July	DF Qualifying Event Salisbury
20 July	3·5MHz Field Day
20 July	WAB CW *(Rules in March issue)*
3 August	144MHz QRP and SWL
5 August	DF Qualifying Event South Manchester
11–12 August	Meteor Scatter
16 August	10th SARTG WW RTTY
17 August	70MHz Trophy and SWL
17 August	DF Qualifying Event Slade
31 August	WAB VHF *(Rules in March issue)*
6–7 September	SSB Field Day
6–7 September	144MHz Trophy and SWL
14 September	DF Final Dartford Heath
27 September	AGCW-DL *(Rules in April issue)*
4–5 October	432/1,296/2,304MHz and SWL
12 October	21/28MHz
19 October	21MHz CW
19 October	70MHz Fixed
November–December	432/1,296MHz Cumulative
2 November	144MHz CW
8–9 November	Second 1·8MHz
7 December	144MHz Fixed

obituaries

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

Mr S. Ford, G4ACV
Mr Ford, who died early this year, was an outstanding cw operator. He was also an instructor for the RAE.

Mr K. E. Griffiths, RS36050
Mr Griffiths died just before Christmas 1979. At the time of his death he was studying for the RAE, and was keen to start transmitting. His membership provided him with much enjoyment during his retirement.

Mr E. G. Kendall, G3APA
Ted Kendall died on 16 November 1979, aged 61. He was well known for the help he offered to many beginners, and for the equipment he gave for first homebrew rigs.

He gave many their first top-band contact with the island of Sark, and in the 'seventies he arranged expeditions to the island. He helped to organize the highly successful GB3COV station in 1962, to celebrate the consecration of the new Coventry Cathedral, and in the same year he published a short history of amateur radio.

Mr W. McClymont, GM3JPK
Mr McClymont died in December 1979. He had not been active for some years, but still retained an interest in the hobby.

Mr A. J. Mitchell, G2DLX
Alfred Mitchell died on 8 August 1979. His main interest in amateur radio was antennas, in particular long-wire types, and he was a member of the Enfield Club.

Mr R. A. Pittock, G2CDB
Arnold Pittock, who died early this year, had contributed articles on high power amplifiers to *Radio Communication.* He was a member of the Bournemouth Radio Society.

Mr G. S. Southgate, G5SU
George Southgate died in June 1979. He had been a member of the RSGB for many years. He took great interest in all aspects of amateur radio, and continued operating his station until his death.

Mr F. Withall, G3XBU
Frank Withall, who died on 21 January, had been a member of the Chester Amateur Radio Society from its early days in the 'fifties. He was active on most bands.

We have also been advised of the deaths of:

Mr D. Cahill, G4FMP;
Mr S. Riesen, G5SR, in December 1979.

Looking ahead

11 and 12 April—RSGB Lectures, "Amateur radio—making a start", Science Museum, London, at 3pm on the Friday, and 11am and 3pm on the Saturday.
20 April—Plessey Amateur Radio Convention, Havant, Hampshire.
27 April—South East Raynet Symposium, Crawley, Sussex.
27 April—Northern Radio Societies Association Radio & Electronics Exhibition, Belle Vue, Manchester.
9–10 May—RSGB National Amateur Radio Exhibition, Alexandra Palace, London.
28–29 June—Jersey Radio Convention. Details from GJ4ICD, tel 0534 26788.
28 September—Welsh Amateur Radio Convention, Oakdale Community College, Blackwood, Gwent. Details from GW3KYA, QTHR
18–19 October—Jamboree on the Air.
24–25 October—Amateur Radio Retailers Association National Amateur Radio Exhibition, Granby Halls, Leicester.

members' ads

These subsidized flat-rate advertisements are accepted as a service to members of the RSGB. They must be submitted on the Members' Ads order form printed in alternate issues of *Radio Communication*, or on a postcard similarly laid out. Each **must** be accompanied by a **recent** *Radio Communication* mailing label addressed to the advertiser, as proof of membership, and a remittance by postal order or cheque for 75p (stamps not accepted) for every 40 words or part thereof. They will not be acknowledged. Those not clearly worded or punctuated will be returned. No correspondence concerning this service can be entered into.

Closing dates in 1980 for issues in brackets: **25 April (June), 23 May (July), 20 June (August), 18 July (September), 29 August (October), 26 September (November), 24 October (December), 21 November (January), 19 December (February).**

Trade or business advertisements, even from members, will not be accepted for Members' Ads but should be submitted as classified or display advertisements in the usual way. Traders who are members must enclose a signed declaration that the items for sale or wanted are part of, or intended for, their own personal amateur station.

The RSGB reserves the right to refuse advertisements, and accepts no responsibility for errors or omissions or for the quality of goods offered for sale. Advertisements may be edited or abbreviated as necessary.

Advertisements for 27MHz equipment will not be accepted.

Post to: MEMBERS' ADS, RSGB, 88 BROOMFIELD ROAD, CHELMSFORD, ESSEX CM1 1SS.

Do not post to RSGB HQ or Advertising Representative

FOR SALE

Marine vhf r/t STR28 c/w rcu, hmt, cabinet, handbook, xtals for 28 simplex/duplex channels, psu 200/250V, good cond, £65. C & S Antennas Ltd, marine dipole type GMII, 156–164MHz, £24.50. G3JMJ. Tel 0732 863467, after 7pm.

Shack or holiday cottage for bachelor amateur or young couple, terraced, one bedroom, modern bathroom, listed building, pp granted for improvements, exc nearby G, GW/P sites, overlooks bridge in picturesque Ironbridge Gorge, Shropshire. Details: G8IYK, 120 Birmingham Road, Redditch, Worcs. Tel 64885.

Versatower SP60, Autobrake Loughing, electrical hoist winches, spare cables, AR22 rotator, TA33Jr, 2Q6, cables, coaxial, £550. G3MTX, QTHR.

SW 717 Heath rx 550kHz–30MHz, good cond, ex demonstration model, £50 ono. Tel Accrington (Lancashire) 391101.

ARS42504, FR50B, good cond, £70. HW17A, £30. Eddystone 640 transformer, u/s, for parts, £5. 2·5Ω spkr, cast metal case, £10. Transformer, 240V/110V, £15. 33 Norton Avenue, Norton-on-Tees, Cleveland. Tel Stockton 533838.

Yaesu FRG7, no mods, fine tune, used little, FT200 forces sale, dusty but good cond, £140 ono. G4HWB, QTHR. Tel 061-205 3336.

FT200, FP200, 10–80m, all 10m, full set of spare valves except 7360, only used as base stn, £250. G3RGC, QTHR. Tel Grimsby 884060, after 5.30pm.

FR101D rx, £440 ono. Hy-Gain TH3Jr tri-band beam, £60 ono. Eddystone 898 dial, £10. Cambridge boards, parts, the lot £10, or split. Xtal filters 455/LQU/909B, 10·7MHz, £3 ea. GM4AJV, QTHR. Tel 031-334 8993.

FT101EE, FV101B, boxed, both in mint cond, comp with manuals, three matched pairs, 6JSC6 pa, two 12BY7A driver valves, dc leads, etc, £465. B40D min valves, hf comm rx, recently revalved, manual, spare valves, vgc, £65. R1155N comm rx, needs new mains, trans, int, psu, choice of two, £10 ea. Carr extra on all items. G4GQH. Tel 0202 522796, after 6pm.

TS700G vhf multimode, mint cond, no mods, as new, checked realigned by Lowe, November, S20, S22 xtal channels, reason for sale, want change only, £350. Ball, G8LZK. 46 Garnsgate Road, Long Sutton, Nr Spalding, Lincs. Tel Holbeach 363404, after 6pm.

SR9 MkII fm 2m rx fitted 10 xtals: S20, S21, R0–R7 incl, six months old, comp with orig packing, standard accessories, will accept £57 ono. Tel Paul, 0344 50831, after 6pm or weekends.

Comdel processor, mint, £25. R4C 1·5 filter, 160m, three 10m xtals, £35. Hy-Gain 400 starter, capacitor, pot, £4. Copal calendar clock, £8. Heath SB220 motor, fan, £6. *Wanted:* Collins 75S3-B/C mechanical filter, F455, FA31. G3DAM, QTHR. MM 144–28MHz converter, works ok, £12. Homebrew single 4CX250B linear, psu 250W, p.e.p. input, works ok, internal relays, changeover, etc. G4AKG, QTHR. Tel 657 7413.

FT200/FP200, exc, £235. Inoue IC700R, £65. Sola Reguvolt, 220VA, 220/110V, £12. Baird M685 23in dual standard tv, 12 vhf, 4 uhf, teak exc, shop manual, ideal tv, dx, etc, £75. Eddystone EC10, 12/24V dc psu, £75. G2ACT, QTHR. (Lancaster). Tel (0524) 823651.

Radio shack DX160 with spkr, USA model 117V lw, 535kHz–30MHz, £45, can ship. National NC100X, spkr, xtal, S-meter, selenium rectifier, £33. Buyer collects. P. Karagianis, 20 Lea Road, Sonning Common, Reading. Tel Kidmore End 2085.

UHER 4200 4-speed stereo portable tape recorder, leather case, ideal ms, £265. HR0, 7 coils, psu, spkr, £30. High band a.m. Pye Vanguard, comp, £50. Leak TL25 amp, preamp, £15. G4HFO. Tel Tiverton (08842) 2921.

SEM power amplifier, £40. Slim Jim antennae, £10. R. G. Roberts, 6 Seaburn Drive, Houghton le Spring, Tyne & Wear. Tel 0783 84 3563.

Trio TS510, vfo 5D, psu, all very good cond, £250. 26 Standards Road, Westonzoyland, Bridgwater, Somerset. Tel Westonzoyland 494.

Collins KWM-2 MP-1 mobile power supply, 351D-2 mobile mount, mobile mic, offers. Boxed Ham-m, £80. Hy-Gain 204BA beam, £75. Three Wilson mono beams, 10–15–20, the lot, £75. Buyer collects beams. New 4X150A, two used, offers. W2AU 4·1 Balun, £9. G3DAM QTHR.

FRG7, all purpose, comm rx, as new, manual, orig packing, narrow band filter fitted, £170. Godfrey, 72 Kingscourt Road, SW16. Tel 01-769 8705, any time.

Heathkit RG1 gen cov rx, £45 ono. Eddystone 888A, needs attention, £40 ono. G3JBU, QTHR. Tel 0604 401800.

Hallicrafters RBX rx, 130–210MHz, rough but wkg, £20. Heathkit RA1, needs checking, £30. *Radio Communication* mags, three years, offers. Earnshaw, 18 Hanson Street, Middleton, Manchester. Tel 061-653 9604.

Racking cabinet, 24 by 17 by 75in, needs refurbish, £15 ono. Buyer collects. G8UNO, 58 Orpin Road, Merstham, Surrey. Tel 073 79 2912, evenings.

Trio 9R59DS, vgc, manual, modded Q-mult only, £40. Buyer collects. G3CFO, QTHR.

Trio TS515 tx/rx, cw filter, £250. KW E-Zeematch, £20. KW lpf, £10. TCC swr bridge, £5. 2m h/brew transverter, 6–40 pa MM converter, £35. Comp stn, £300. BC221, £15. G3OIC, 16 Chesterwood, Hollywood, Nr Birmingham.

Standard C146A, 2W, 2m, hand-held, fitted 145, 145·15, 145·5, R6, helical 1/4 whip, nicads, charger, handbook, leads, case, £85. Heathkit RA1 amateur bands rx, handbook, Q-multiplier, £35. Two 10·7MHz filters, suitable for Echelford rx *(Radio Communication),* £5 ea. Pye Cambridge U10B, wkg on RB0, xtals, £40. Pye Pocketfones PF1: one set on SU8, nicads, £30; one set on RB0, nicads, £30. Homebrew PF1 charger, tx and rx plug-in, £4. Pye Cambridge AM10D, fitted S0, S20, S22, R6, S-meter, silicon rf board, dual-gate mixer, clean cond, fm tx and rx, £45. Sony hi-fi mic, model F99B, new, £10. All carr at cost. G8GON, QTHR. Tel 03954 3735.

Microwave Associates MA8105 varactor multiplier, X18 to 23cm, offers. Amateur band rx, 80–10m, HR10B, £40. Xtal calibrator No 10, £4. HW8 handbook, £1. 10V 2A psu, not stab, £5. Transformer 240V i/p, 240/110V o/p, 750VA, £5. Shaw, G4GAS, QTHR. Tel Swindon 750130.

Nikon F2 Photomic +1·4:50 lens, vgc, offers. ATU, 0–20MHz, long wire, takes 15 rf amps, £15. Hammarlund HK-1B keyer, £12. RTTY dual diversity (no QSB) tu, two 'scopes, manual, needs some attention, offers. Jackman, 33 Shrubbery Avenue, Worcester, Worcs. Tel 0905 20040.

TC9 tx, 2m, fm/a.m., vfo or xtal control, £20. CDR rotator, directional control, £25. Sentinel 2m preamp, £5. JXK fet 2m converter, £8. Imhof professional, four 19in racks in cabinet, rear door, all accessories, mint, £50. Tel 0843 31069, after 7pm.

Kenwood TR-7400A 2m tx/rx, 25W output, synthesized in 5kHz steps, normal and reverse repeater, includes mobile mount, mic, manual, £200 ono. G3OUF. Tel Amersham (02403) 5988.

Absolutely perfect 9R59DS, unmarked, unused, orig packing, matching spkr, literally as new, £75. Mizuho 2m ssb portable, extras, charger, exc cond, £100. GW8UBS, GW8UBR. Tel 0222 373302, early evenings.

Technical manual, bulletin 273B vol 2 (adjustments), 32 and 33 teletypewriter sets, KSR, R0, ASR, £7, post paid. G8AXK, QTHR. Tel 0279 723388, evenings.

TS120V solid-state digital hf tx/rx, immac cond, used less than one hour, £375. MC35S matching mic, £11. 12AVQ 3-band hf vertical antenna, assembled but not erected, £30. G4EWR, NOT QTHR. Tel 063 521 324, before 9pm.

FT200 tx/rx, FP200 psu, £200. Magnum Two 2m converter, £100 ono. Dixon, GM3ZDH. Tel 0631 2198, office; or 4597, home.

Trio custom special rx, 160–10, 4/2m, £175; FT277 (FT101), 160–10, cw filter, fan, new pa valves, no mods, £250; Barlow Wadley XCR-30 Mk2, £95; all fb cond. G3MXO, QTHR.

FT202R, case, two helicals, telescopic, nicads, charger, carrying strap, xtalled S20–22, R7, S0, free 20ft mast, guys, other things, rig in orig packing, manual, £110. SF1, xtalled SU8, nicad, £45. P. Wayer. Tel Horndean (0705) 592687.

FT200B hf tx/rx, 80–10m, good wkg cond, comp with psu/spkr, dynamic desk mic, £225. 3-band Cushcraft ATV-3 vertical, £25. 2m ground plane, used in loft only, £5. G4IZL, G8PPU QTHR. Tel Northwich 76732, evenings or weekends.

Decca RU4011 professional tv tuner, varicap tuned, 75Ω video, 600Ω zero level audio, 6MHz sound 19in rack model for British system, vgc, £100. H. Mountjoy, 21 Cowper Road, Acton W3 6PZ. Tel 01-992 9323.

Property of late GW4DWT, Yaesu FT401B, good cond, £300 ono. Contact GW4BIQ, QTHR. Tel Bishopston (044128) 3245.

KW2000A, overhauled, KW match, swr meter, psu, comp, £120. AR88, £30. Europa SS 2m transverter, 10W, £50. CDR rotor, Moseley TA33Jr, Jaybeam 2m four-over-four, 30ft tube mast, antennas etc comp, £50. Valve grid dip meter, 0·35/200MHz, £5. Army Class D heterodyne wavemeter, £5. G3TYX, QTHR. Tel Southwater 730 240, after 11 March.

Lowe ASV 1515 2m rx, 12 channels, eight xtalled R0 input, S19–23, R6 input, 145·8 mains car battery, £35. BC348, good cond, built-in mains and output, £15. Prefer buyer collects. Seymour. Tel Peterborough (0733) 268135.

Drake R4B amateur band rx, 80–10m, seven broadcast band xtals, manual, recently re-aligned by Radio Shack, vgc, £195. M. Welch, 35 Mercers Road, London N19 4PW.

Trio JR599 custom special S rx, 160–10m, including 2m, comp with orig instructions, accessories, packing, £160. G4CXJ, QTHR. Tel 0993 2573.

Yaesu FT201 tx/rx 80–10m vgc, 250Hz cw filter, twin swr bridge, £300. G3ZWH, QTHR. Tel Medway 240520.

FT101E, cw filter, FV101B vfo, both as new, mint cond, £500. G4ERZ, QTHR Hull. Tel 0482 856633.

KW2000E, psu, 444, manual, boxed, £225. G3CDC, QTHR.

TR2200GX xtalled R6–7, S20–22, S24, VFO30G batt holders, charger, cables, etc, £150 ono. GW4IXC. Tel 0222 708770.

Liner 2, 3N204 rf amp, psu, £110. Valradio transverter, 12V dc input, 110/240V ac output, 50Hz, 500W, £50. VDU and ASC11 keyboard, £50. G8NQS, QTHR. Tel 0763 42307.

Yaesu FT101E, mint cond, never used mobile, reason for sale, got 101Z, £420. FDK multi 2700 MkII, multimode vhf, 10m down link synthesizer, vfo, £380. G4FNI, QTHR. Tel Bournemouth (0202) 24848.

Package deal: Francis & Lewis 32ft ham tower, TA33Jnr, Ham M rotor, comp with 150ft rotor connecting cable, heavy duty coaxial, 150V heavy duty variac, £200. Buyer dismantles and collects. G3HUA, QTHR. Tel Lindfield 3158, evenings.

Late GU4BSI KW2000B, ac psu spkr, Comdel speech processor, good cond, offers around £200. Secretary, GU8KUT, GARS. PO Box 100, St Peter Port, Guernsey, Channel Islands.

Property of the late GW/G4EEX: KDK FM2016E fm digital synthesized tx/rx, power pack, less than one year old, £210 ono. Tel Eversley 734807.

FRG 7000, near new, used very little, still under guarantee, £300 ono. Will swop for Myford lathe or similar. Gregory, 75 Station Road, Belton, Norfolk. Tel Great Yarmouth 781035.

Radio Communication 1945–79, believed comp, free to enthusiast. Tel Pontefract (W Yorks) 0977 620786.

Yaesu hf/vhf comp stn: FRSDX400 160m–2m all mode rx, all options fitted; FLDX400 80–10m tx; matching spkr unit; contains Microwave Modules 28–144MHz transverter, mains psu; all immac, good wkg order, incl leads, manuals, mic, etc; £390 ovno. Icom IC22A 1W/10W fm tx/rx, 12½ popular channels, incl mounting bracket, well constructed rechargeable portable pack, helical whip, manual, etc, exc cond, good wkg order, £125. G8MGD, QTHR. Tel Tewkesbury 294082, after 6pm.

Antenna clearance: TH6DXX, 40ft triangular lattice guyed climbable tower, comp bearings, stub, mast, guys, £125. 20m 2-el Yagi, £20. G4ZU 10/15m beam, £15. Buyers inspect/collect during April. G8FF, QTHR. Tel 0452 812467.

Pye Compact wkg on RB0, incl nicads, toneburst, BNC quarterwave, £40 ono. R. Crowder, 216 London Road, Boston, Lincs. Tel 60801, after 5pm.

Very rare TX310/JR310 combination tx/rx, believed only pair in country, £200. Liner with PA3, £95. BC221, £20. Gertsch 20MHz–1GHz hfm, £50. AS33 triband beam, £40. 2m 4/4 slot beam, £10. Carr at cost. GM4GNJ. Tel 0292 43907, evenings.

IC202E, Modular Electronics 20225P 25W linear amp, preamp, homebrew psu for above, £180. Jaybeam 6-el quad, with 50ft plus, UR67, £20. G8PKN, QTHR. Tel Wantage 67550, evenings or w/ends.

KW204, KW202, spkr, vox, manuals, immac, both overhauled by Decca/KW, the pair £400 ono; may split. Will include mic, swr/pwr meter, h/b Z-match, if bought as pair. Any trial. G4GXM, QTHR. Tel Letchworth 72551, office hours.

"Boris" the chess computer, comp with playing pieces, board in solid walnut case, mint cond, £100. Frequency meter, 0–200MHz six-digit readout, £40. Isolation transformers, 240V in and out 2A, £10 ea. G3WCY, QTHR. Tel Ruislip 32341.

KW202 204 mic, manuals, exc cond, perfect wkg order, £320. G4GKC, QTHR (Walsall). Tel 0922 31675.

Datong rf clipper in neat case, £20. Latest G3ZVC board, SL1600s, XF9B, MD108, built, not tested, £50. Mizuho 7MHz QRP tx board, built and tested, £10. 70cm 18-el parabeam, £10. G4FMD, QTHR. Tel Malcolm, Great Dunmow (0371) 3119.

Magnum Two 10–2m, used little, £75. G4FFK, QTHR. Tel 073 087391.

KW2000A ac and dc power packs, £200 ono. Two KW2000A mobile power packs, negative earth, £25 ea. G3PHK, QTHR. Tel 0323 53233.

Yaesu FRDX400 all band rx, equipped with fm discriminator, filters, 2m, 4m converters, vgc, £150. GW8SLF, QTHR. Tel Cardiff 734346.

Western Electronics DX-5V trap vertical 80–10m, unused, in orig box, £50. Buyer collects. Tel 01-366 8106, evenings.

Drake TR7 tx/rx, digital readout, psu, a.m. filter, extended coverage board, rx 0–30MHz continuous, immaculate, £800. Mosley Mustang 3-el tribander, new cond, £100. Gem quad, 2-el, 3-band, £30. Hewlett Packard laboratory sig gen, a.m. type 608F, 10–500MHz calibrated, manual, excellent, £250. SSTV digital scan converter, 625 line in, sstv out, W6MXV kit, wkg well, in cabinet, £40. W6MXV sstv monitor, well built, £35. Microwave Modules 70cm varactor tripler, used little, £15. All ono. G3RDC, QTHR. Tel Rugby (0788) 823250.

FR101S/FL101, the famous Yaesu twins, full 10m coverage; 600Hz cw filter, tx has internal audio speech processor, can be heard any band 80m–10m, both immaculate. Will deliver 50m, £585 ovno. G3GOT, QTHR Chelmsford area. Tel Terling 229.

KW201 communications rx, xtal calibrator, Q-multiplier, late models, mint cond, £135. New, unused 2m Key Electronics, 2·5W transistor tx, £15. Eddystone EC10 Mk2 mains unit, £130. All manuals, drawings, all in unmarked cond. Buyer collects. Cash sale. G3FK, QTHR. Tel 07257 436.

Standard C828 2m tx/rx, manual, 5/8 whip, fully xtalled, £130 ono. Heathkit 10–12U oscilloscope, manual, £25. G8SEH (Croydon). Tel 01-689 2595.

Yaesu YO100 monitorscope, mint cond, boxed, £75 ono. Tel Great Missenden (024 06) 2008 or 5501, any time.

Pye Compact uhf, hand-held, xtals for RB4, RB6, multi-way charger unit, leather carrying case, vgc, the lot £40. G8KBW, QTHR. Tel Maidenhead (0628) 27105.

SSTV Robot 300, fast to slow, slow to fast scan monitor, exc cond, £300. Pye Lynx camera, £55. 10in fast scan monitor, £45. Carr extra. G3TRK, QTHR Lancs. Tel Colne 864187, evenings or weekends.

FT2FB, 12 channels, auto toneburst, £80 ono. Jenkins. GW3HXX, QTHR. Tel Aberdare 874448, evenings.

Lattice tower, galvanised steel, 30ft high, 3ft square base, 1ft square top, clamps, 15ft dural pole, fully dismantled, ready to take away, £70; or consider exch for uhf gear. Tel 028 883 453 (Cornwall).

BC221M, charts, stab, psu, recal by Bradleys, £25. Mobile dc/psu suitable KW2000, £20. Partly built G3RKK rx, incl Electroniques QP166 ham band front end (i.f. 1·62MHz), Eddystone 898 dial, all components, info for completion, offers. Photocopy AR88LF manual, £3. AR88LF cct diagram, 30p, plus large sae. Acoms two-channel digital proportional radio control system, unused, comp tx/rx, servos, accessories, boxed, £35 ono (rrp, £49). G4GXM, QTHR. Tel Letchworth 72551, office hours.

Racal MA79G universal driver, ssb, rtty, a.m., cw, 1–30MHz, matches RA117, cond as new, not surplus, in new black crackle cabinet, £550. Racal 1218 solid-state digital readout rx, 1–30MHz, superb stability, can be tuned to within 10Hz, performs similarly to RA117, modern convenience cond as above, makes Japanese sets seem like toys, £1,200. G4GEN, QTHR. Tel 082 571 2205.

Jaybeam 2m 6-over-6 Yagi, £3. Jaybeam 70cm 18-el parabeam, £5. *Wanted:* Kokusai filter MF455-15CK; gearbox from either scrap Collins CT12 tx or BC221 for G2DAF Mk3 tx. G8DHC. Tel 0908 77613, between 5pm and 8pm.

Nascom 2, full system, £320. Garex Two mobile, £55. Lafayette HE30, £8. Mosfets BF900, SD306, 60p ea. All items ono. *Wanted:* Good 4CX250Bs, air cooled. G8MAG, QTHR.

FRG7, fine tune, 2m converter, good cond, £150 ono. G8TRT. Tel 021-743 0859.

KW2000A ac psu, Shure ptt mic, circuit handbook, exc cond, £150. Prefer buyer inspects/collects. Carr extra. G3VET. 58 Woodland Gardens, North Wootton, Kings Lynn, Norfolk PE30 3PX. Tel Castle Rising 697, evenings after 7pm.

KW Atlanta, KW103, Z-match, Trio 9R59D, Trio spkr, Hy-Gain 18AVQ all-band vert, £350 ono. Prefer to exchange for KW2000B plus KW1000 linear, or similar, plus KW107/9. *Wanted:* sstv monitor, comp or parts, w.h.y? Prefer personal dealing. G3RCX, QTHR.

KW2000A owners: 80 serviceable, some new valves, batch consists of most types specified, incl two 6146s, mainly Mullard, £10. Purchaser to collect or pay carr. G3VPO, QTHR. Tel 0403 60216.

C146A 2m hand-held, 2W out, toneburst, nicads, charger, S20-23, R7, leather case, mic plug, as new cond, in orig packing, handbook, £80. G4FYY. Tel Crawley (0293) 514788.

TA33Jr, £50; 18AVT/WB, £40; both very good cond. HQ1 mini beam, comp but dirty cond, £20 ono. Shure 444 mic, vgc, £18. Buyers to collect. G4DXW, QTHR. Tel Peterborough (0733) 65213.

Trio JR599CS amateur bands plus wwv rx, cw, lsb, usb, a.m., fm, switchable selectivities 500Hz, 2·5kHz, 5, 25, fitted internal 2m converter, space, switching for 6m, many other features, orig manual, £175. G3USB, QTHR. Tel 0742 890970.

Uniden 2020 tx/rx 80-10m, 100W p.e.p., cw filter, comp with mic, dc power lead, instruction book, £300 ono. Drake SSR1 rx, good cond, £75 ono. G4HVO, QTHR. Tel Downland (71) 54883.

Atlas 210X tx/rx, mobile mounting bracket, immac cond, noise blanker 80-10m, £395. Digital display for Atlas DG1, can be used as separate frequency digital counter, £75. Power supply unit, £35. Elstree. Tel 01-953 6921.

Trio TR7200 tx/rx, 2m mobile, 24 channels, fitted with 18 xtals, 10W output, £150. Call and try it out. G8VEH NOT QTHR. 21 Victoria Road, Shoreham-by-Sea. Tel Shoreham 3706.

FT277 (Continental FT101), £225. YO100 monitor scope, hardly used, £130. IC201 vfo 2m cw/fm/ssb rig, vgc, £325. U10B, uhf Cambridge SU8, RB2, 4, 14, very good order, spare o/p valve, £60. Sensible offers considered. G8LII, QTHR Northants. Tel Rushden 57909.

FT101E Yaesu, used rx only, mic, £500 ono. SRX30, £145 ono. Buyer collects. Tel Carmarthen (0267) 6007.

Liner 2, 2m, ssb tx/rx, fitted preamp, comp with matching psu, all accessories, £100. Cash only, buyer collects or will deliver short distance. G4HZV, QTHR. Tel 0276 63728.

FLDX 400, FRDX500, rx, fitted 2m, 4m convertions, both good cond, wkg order, £250. No offers. G3VWQ, QTHR. Tel Norwich 37709.

Removed from Icom IC22A, xtal pairs R3-7, £5. Xtal controlled toneburst, £5. Yaesu FT2FB reverse repeater xtal pairs 5-7, £6. GM4DHJ. Tel 041-889 9010.

Yaesu FT101ZD tx/rx, beautiful rx, £540. FV901DM vfo, 40-channel scanning facility, £190. SP901 spkr, £23. All in orig boxes. Elstree. G4GPL. Tel 01-953 6921.

TS820S xtal filter, Shure mic, as new, £650. AR40 rotator, used little, £30. Tel Neath 59122.

Europa B plugs for FT101, £70. Avo 8X Panclimatic case leads, £50. Eagle 500C dual xtal mic, £10. 4CX250 and base, £10. European QQV0640, £5. Prescaler 8629, £3. Codar PR30 preselector, £10. Balun 1:1, £5. All plus carriage. G3IDW, QTHR.

1,296MHz transverter using high level mixing, incorporates xtal oscillator/multiplier to drive cascaded Modular Electronics PM70-4, PM70-10, works modified to give 10W at 384MHz, works modified MM tripler to 1,152MHz, 2C39A mixer cavity, circuits, silver plated brass, MM rx converter, coaxial change-over relays, purpose-built power supply, large blower, new valve, all fitted in steel weatherproof box, designed for masthead mounting at antenna, comp with all plugs, sockets, remote control/metering unit, needs 10W, 144MHz drive, 240V mains, absolutely immac, built to highest standards, £150 for quick sale. G4HYD, QTHR.

Icom IC240, immac cond, in orig packing, used very little, £165, plus carriage. G8PPM. Tel Worthing (0903) 38309, after 6pm.

TW communicator 2m tx/rx, nine tx xtals, £35. RCA 5A hf ssb tx/rx, £35. GEC TT21 valves, £2 ea. Hartley 13A 'scope, £10. Olivetti electric typewriter, 18½in carriage, continental keyboard, £80. Codar AT5, £10. Carr extra. G3ZBU, QTHR. Tel Reigate 47076.

Stolle Multimatic, as new, boxed, £42. Alignment bearing, £10. Q6/2M, 10Y/2M, both weatherproofed, orig packing, £18 ea. Unused 14ft by 2in 16 swg ali-mast, £12. Collins vhf/uhf high power coaxial relay, comp with N plugs, £9. All carriage extra. G3GUU, QTHR.

TA31Jr, 20, 15, 10, dipole, vgc, £30 ono. Buyer collects or pays postage. G4DLW, QTHR. Tel Helsby 5221.

Eddystone 730/4 gen cov rx, good cond, £65. Bantex 2m λ/2 mobile whip, base, £5. Class D wavemeter, mains operated, £5. 18V, 10A mains transformer, rectifier, £6.50. G8KER. Tel Rugby 832887.

Belcom FS1007P fm tx/rx, no mods, first class cond, £95. Decca KW103 swr meter, £15. 3-el beam antenna DX33, £75. G3NJU QTHR. Tel Wilmslow 524665.

Eddystone 888A amateur bands only rx, 160-10m, good performer on 10/15m, £75. G3JFC, QTHR. Tel Crayford 522489.

Pye Cambridge FM10D, fitted S22, R6, 144·25, 144·48, toneburst, immac cond, £75. Approx 50yds 50Ω 7/8in od coaxial, terminated in type N plugs, £45. Moseley Elan 2-el 21/28MHz beam, never used, £40. G3USB, QTHR. Tel 0742 890970.

2, 4, 6m fet converters, integral mains psu, £16 ea. 500ft, coils, insulated antenna wire 10/·01in, £5. 10A 800PIV stud diodes, 16/, £1. 38·666, 46·666MHz xtals, £1.25. ½in by 2000ft mag tapes, 30p. U450L tx/rx, £35. G3LGK, QTHR

Yaesu FT101, £300. FV101, £60. FT101E, £450. FT221R, £300. YO100, £100. Bird 43, £60. Elements: N100H, £25; 500C, £28; 100D, £25; Bird termaline 250W, £80. Claude Lyons stabiliser 240V ac 5A, £50. All exc. G8AJ, QTHR. Tel 059 068 2464.

HR0 coil packs, three gen cov; 100-200kHz, 180-340kHz, 3·5-7·3MHz, three bandspread, 1·7-4MHz, 7-14·4MHz, 14-30MHz, £15 ono. Carr extra. Hodgson, 18 Clayhill, Lyndhurst, Hants. Tel Lyndhurst 2127, evenings and weekends.

70cm transverter, MMT432/144R, £135. 70cm 8-over-8 Jaybeam, £12. Burns converter 10-2m, £15. Datong morse tutor, £35. Buyer collects. G8OVQ, QTHR. Tel Tiptree 816677.

Trio JR599 custom special rx, 160-10m, internal 2m converter, a.m./fm/ssb/cw, vgc, £150 ono. G8IHP, QTHR. Tel 0742 57189.

Pair 4-65A, Johnson bases, all new, £15.50; one 5-65A, used, £2.50; several 813, used, £2.50 each. Two 10 mfd 2kV wkg oil conds, £4 each. Post insurance at cost. *Wanted:* Datong FL1. G5CP, QTHR. Tel 0246 590253.

RTTY gear to get started: Creed 7ERP, silence base and cover, 6S6M tape reader, BARTG ST5 terminal in sloping front cabinet, six rolls paper, four rolls punch tape, all gear in vgc, the lot, £70. Dexion framed trolley table for above machines, £5. Genuine Creed spares, series 3000rpm motor, £4. Governor contact sets, £2.50. Governor brushes, £1.50 pair. Buyer collects machines. Postage extra on small parts. G3GOT, QTHR (Chelmsford area). Tel Terling 229.

AR240, 2m fm synthesized hand portable, incl nicads, charger, helical antenna, case, in orig packing, used little, £120 ono. G8SMJ, QTHR Basildon, Essex. Tel 0268 414713.

Collectors item: Burndept short wave rx, 12-100m, in beautiful cond, this is an early marine set in a mahogany case, full set of coils in draw, all valves, was wkg when stored 1948, offers. G4ILR, QTHR. Tel Pymore 341.

Heathkit SW717 gen cov rx, c/w Microwaves 2m converter, £25. Catronics xtal calibrator, £5. 27V 3A transformer, £3. 13V 7A unreg psu, £7. 15V 1A stab psu, £5. G8KWN, QTHR. Tel 0621 783119, after 6pm.

PA15/160BL 2m linear 13·8V minimum 160W output, new transistors, £150. Catronics CT103 comp tu unused, £80. Datong a.s.p., £60. Video monitor 9in direct video input, £20. No offers. Write giving phone number. G4IVH, G8OCC. c/o 46A Middletons Lane, Hellesdon NR6 5NG.

FT101E mint D-mic, full-5 manual, £460. FDK multi-U11 70cm fitted six rpts, three simplex, £210. Trio remote vfo-700S, £70. Icom IC201 2m multi-mode, £220. All prices incl carr. G3MWV NOT QTHR. Tel Cromer (0263) 512664, evenings or Sunday.

FT250/FP250 80-10m tx/rx, nine spare valves incl pas, £275. FV250, separate vfo, £25. Good wkg cond, all in orig boxes. G4EFY, QTHR. Tel Fleet (02514) 3814.

Petrol electric alternator, 110V, 1·5kVA, Jap 500cc self-governed engine, double belt drive, £50. Auto transformer 3kVA, with meters and four 13A sockets, £20. Buyer collects. G4EFP, QTHR. Tel 051-645 3826, 6-7pm only.

Expo Titan 12V drill, £9; drill stand, £9; both, £17. Virtually new. G4JFU. Great Pinnock, Fowey, Cornwall. Tel Fowey 3245.

Trio 2300, carrying strap, protective case, rechargeable nicads, operating manual, all packing materials, fully boxed, £185 only. Available for inspection and collection. G8RWY. 2 Coverdale Avenue, Bolton BL1 5HX. Tel 0204 41933, between 6-7pm.

Pair Pye PF1s on SU8, nicads, circuits, wkg, only need alignment, £30. HC6-U xtals, 8·043000, 8·063888, 8·065277, 8·066667, 8·077083, 16·952000, £1.70 ea. Boxed QQV03/20A, £3. Boxed crt, type VCR188, unused, £10. Offers welcome. G4FKA, QTHR. Tel 0438 59019.

Hammarlund HQ170 amateur bands rx, very good wkg order, handbook, etc, £75 ono. 8 Green Leys, St Ives, Cambs. Tel 0480 67447, evenings.

Heath DX-60B tx, 80-10m, 6146 pa internal power supply, fb cw rig, matching driftfree vfo HG-10B, 80-10m plus 2m, powered from DX60-B, both mint, manuals, spares. £65 comp. *Wanted:* KW E-Zee match or supermatch. Tel Frome (Somerset) (0373) 4694.

Trio JR310 rx, KW Mk 1 Vespa tx, Shure mic, exc cond, £130. G4HBD, QTHR. Tel 0202 749094.

FT101E, immac, orig packing, manual, £450. Moseley TA33Jr, brand new, orig packing, £60. G3PYN, QTHR. Holt (Norfolk). Tel 026 371 3460.

FT101E, as new cond, used very little, orig packing, manual, etc, bargain £395. G3TIQ, QTHR. Tel Great Dunmow (0371) 820770.

Deceased amateurs equipment (GM4DGC), Drake TR-4C ssb tx/rx, power supply, spkr unit MS-4, £300. Rotator CDE Ham 11 control unit, 38yd eight core cable, £80. New Jaybeam 88-el 70cm multibeam £15. All carriage extra, or collect. GM4HKW, QTHR. Tel 0324 25559.

TR7500 2m fm mobile tx/rx, comp, mint cond, only six months old, still under warranty, λ/4 mobile antenna included, £200. Joystick system J, used once only, £35. G3WBP. 12 Tern Close, Calne, Wilts. Tel 0249 815066.

Part exch: Pye Pocketfones, xtalled SU8, twin charger, spare nicads, handbook; for Liner 2, preamp or any Meccano items. G3KSU, QTHR, I.o.W. Tel Ryde 65551.

FT227R, memory scanner, £200. Datong active antenna, £28. Both in exc cond. G4GYB. 18 Market Place, East Finchley, London N2 8BB. Tel 01-883 2182 or 01-253 7677, ext 220, work.

Sommerkamp FT250/FP250, like FT200, brand new pas, many spare valves, relays, etc, vgc, orig packing, £270. Mains/battery tape recorder, Marantz Superscope C190, £30. Osker SWR200 power/swr bridge, £22. Genuine enquiries. Lemay. G8KAX, QTHR. Tel Chelmsford 67131, working hours.

Icom IC240, cond as new, orig packing, £160, including delivery charge. *Wanted:* Ten-tec Argonaut or similar QRP rig. G4HQJ, QTHR. Tel 0303 56318, evenings.

UGP/2M 1/4 wave ground plane antenna, as new, £5. C4, 6, 10, 15 and 20m vertical antenna, as new, £20. G8SUU. Tel Lancing 3102.

Lowe SRX30 rx, manual, 1979 model, exc order, £125. Austin. Tel Bedford 62557, business hours only.

TR7500 fm tx/rx, all accessories incl 5/8in whip, mag mount, £170 ono. Pye Cambridge a.m. 10 b/d converted to 2m, Garex a.m./fm conversion Lye Communications repeater toneburst, good wkg order, xtal operated on S20-23, R3-4 manual, conversion sheet, 6-el quad thrown in, £60 on exchange for hf beam, 15/20m. G4FYE, QTHR. Tel 0302 50517.

IC240, as new, £160. Jaybeam 2m, 10-el 75Ω, £6. 4m, 4-el 50Ω, £6. 70cm, 46-el multibeam, 75Ω, £6. 70cm 8/8 75Ω, £8. Buyer collects antennas. G4BWW. Tel Southport (0704) 29036.

MD35CB head mic set, footswitch, override vox, nicad, battery charger, SRC12, 2306, 12V, 500MAH, af speech processor, Bolex C85L camera, standard telephoto lens, Ilford sports camera 120, fan 136V ac 120mm square, 6KD6, 12AX7, 12AU7, offers. W.H.Y. G3JGC, QTHR. Tel Poole 1215.

My superb hf/vhf QTH. Detached bungalow, four beds, double glazed, fitted kitchen, garage, brick shack, etc, with 60ft Versatower TH3, 10 mins town, two mins countryside, five mins M4, neighbours docile and tvi proofed, £34,500. GW3NWS, QTHR. Tel Newport 422232.

Eddystone 680X, hf rx, 500kHz-30MHz, 2RF, 2IF, agc, bfo, xtal filter, S-meter, variable selectivity, noise limiter, standby switch, exc cond, manual, £120. Buyer collects. Cambridge. 41 Honeypots Road, Mayford, Woking, Surrey. Tel Woking 61590.

Eddystone EC10 Mk1, £45. Roband RO50 'scope, 5K plug in, £45. Three off QQV02-6, three off QQV03-10, two off QQV-0320A, £10. 2m converter, £8. Homebrew 2m a.m. rig, £10. All ono. G3XMB, QTHR. Tel Chelmsford 320747.

Eddystone 880/2, mint cond, just finished comp realign, re-valve, handbook, cheap, reason for sale, emigrating, £350. Jenkins. 76 Hillfield Avenue, Hornsey, London, N.8.

Trio TR2300 2m handy tx/rx, nicads, charger, etc, 5/8 whip, mag mount, absolutely mint, £199. BC221, ac, psu, charts, £20. Homebrew 80/160m 3W solid-state a.m./cw tx, suit beginner, £10. G3IBH, QTHR. Tel Hitchin (0462) 56714.

Package deal: Francis & Lewis 32ft ham tower, TA33 Senior beam, Ham M rotor, 150ft R680, 150ft connecting cable, 150V Variac, £200. Buyer dismantles and collects. G3HUA, QTHR. Tel Lindfield 3158.

IC202E, 25W, s/state, linear, h/b psu, mint, orig packing, £160 ono. FT207R, YM24 spkr/mic, h/b basemaster and mains charger, three months old, £180 ono. 2m synthesized tx/rx, based on *Wireless World* design, mint, works fb, £60 ono. G4GZS, QTHR. Tel Rugby 815506.

Radio Communication 1970-75 incl, 1977 and 1979 comp for each year. 1976 and 1978, 11 copies each year. G5HJ, QTHR.

TS510/PS510, in orig packing, £180. KW dummy load, £15. Both as new cond. G4ALQ, QTHR (1980 Call Book only). Tel Ashford (Middx) 44440.

Versatower, 60ft, winches, etc, £250. FT227R, £160. Lunar 160W 2m linear/preamp, £140. R. Smith. G4DQY. Tel 01-800 3026, daytime.

AR240 synthesized 144-148MHz helical, nicads, charger, boxed, mint, £135. Trio 3200, RB4, RB6, RB10, three simplex, helical, nicads, charger, boxed, mint, £140. Starphone SF1 handheld, SU8, case, nicad, charger, £35. Hudson FM208 mobile, S0, S21, £25. G8FHN, QTHR. Tel Medway 63365.

Trio 7010 ssb mobile, as new, orig packing, handbook, £110. FDK Palm II 2m fm handheld, S20-22, R3-5, charger, case, manual, etc, £85. G8MDP, QTHR. Tel 04447 2884.

Heathkit SB220 linear amp in good cond, £350 ovno. Ham 111 rotator and control box, £100 ovno. G8FG, QTHR. Tel (0202) 876018.

FT250 10-80m tx/rx, unmod, manual, £200. Vibroplex key, £20. BC221 freq meter, own p/s, £15. G3GWD, QTHR Kent. Tel 01-650 3163.

Yaesu FRG7 rx, exc cond, narrow filter fitted, Hodec psu, 144/28 conv, two atus, YH55 headphones, *Radio Communication* handbook vols 1 and 2, other technical books, the lot, £150. Jones. BRS40066. 6 Raynesfield, Grand Drive, SW20. Tel 01-540 1057.

Yaesu FT501 tx/rx and FP501 power supply, full coverage 80-10m, digital frequency readout, 500W p.e.p. input, in good cond, £350 ovno. G8FG, QTHR. Tel 0202 876018.

2200, R5-7, S20-22, nicads, toneburst, £85. G3OLB, QTHR. Tel 042-033649, 7-8pm.

CPU 2500RK 5kHz synthesizer, four memory channels, keyboard, mic, £230 ono. G8MCT, QTHR. Tel 021-523 5596.

Clearance: Icom IC210 vfo, fm, 2m, 1-12W, 12V/mains, good cond, £168. FTDX500, good cond, wkg well, £230. Heathkit HR1680, amateur bands rx, transistorized, vgc, £88. Coaxial lengths, IC215, IC202, all reasonable offers considered. Tel David, 021-453 5138.

Yaesu FT225RD 2m fm/ssb, tx/rx, £430. Icom IC710 12V 100W hf tx/rx, c/w, SM2 Electroset mic, £525. Icom RM3 remote-control unit, £75. All items used four weeks only on caravan holiday. Kyocuto SX144 2m mobile tx/rx synthesized, full digital readout, £145. Burns frequency standard, locked to Droitwich, £70. Ross illuminated bench inspection binoculars, ideal for printed-circuit work, £65. Storno 600, 12V fm radiotelephone, 12 channel boot-mounted 134-172MHz, £95. 88-el 70cm Yagi, £12. Two 100ft lengths UR67, £16. Standard C146A 2m handheld, helical, nicads, £85. *Wanted:* Datong morse tutor, single paddle key, spare plug-in modules for Bird Thruline wattmeter. Tel (Harlow) 027-982 291, 7-9pm.

FLDX500, £160. FRSDX400, £150; or £300 for pair. 2200GX c/w nicads, helical, fitted five channels, three rx xtals, £110. Eurocat synth for 2200 or 7200, 80ch, £35. G4FCN, QTHR Devon. Tel 0803 812117.

Yaesu FL110 hf linear amplifier, this is brand new, in orig box, designed to be driven by the FT7 hf tx/rx up to 130W output from 13V supply, £115. G3KLF. Tel Fareham 236906, weekends or evenings only please.

70cm fm mobile tx/rx, STC M5 Starphone, vgc, xtalled for 433·2MHz, SU8, 5W tx o/p, comp with mic, mobile mount, will deliver by arrangement, best offer over £50 secures. G8DAY. Tel Penn 5361.

Computer board, Ithaca S100, cpu Z80, 4MHz, new, tested, £110; or exchange 16K ram board. G4EGR, QTHR. Tel Bristol 772804.

IC215 R0, R2-9, S20-23, large U11 type nicads, charge from ext 12V supply, helical whip antenna, carrying strap, handbook, circuits, good cond, exc performance, £145, or any sensible offer considered. Ranyard. G8IGY, QTHR. Tel Coventry (0632) 664783.

Hustler mobile antenna, coils for 80, 40, 20, bumper mount, £30. DC psu, suitable for KW2000A/B, 12V dc input, 700V 30A output, circuit diagram, neg/earth, £30. G4HPU, QTHR. Tel S. Walden 40075.

QRT clearance: FT101E tx/rx, £425. FL2100B linear, £275. YO100 monitorscope, £120. SP101 spkr, £15. KW109 high power supermatch, £120. Weston PM2000 p.e.p./swr meter, £45. AR40 rotator/controller, unused, £40. CSC 100MHz counter, £60. Cambridge noise bridge, £5. Tradiper TE-15 grid dip meter, £25. Drake TV3300 low pass filter, £15. All in mint cond. Telomast, 40ft, comp with rigging, extra section, high power W3DZZ, balum, 75ft app UR67 coaxial, £60. Buyer to dismantle, assistance given. MIG standby mains generator, 240V, 50Ω, 1500W, Briggs & Stratton engine, mains changeover switch, unused, £225; ono and reduction where several items taken. Buyers to collect in all cases. G3DTX, QTHR. Tel Little Chalfont 3108.

G whip multi mobile 10-20m auto, plus 40m, 80m, 160m coils, MM whip, telescopic, Extendarod extension, bases, exc cond, £40. G5RV, made by G2DYM, 75Ω twin feeder, anti-tvi, £15. G4EOW, QTHR. Tel 0794 512475.

Eddystone EA12 rx, handbook, cond immac, reason selling, going deaf, buyer test, collects, £215 ono. No cheques. Graham. 67 Tregenna Avenue, South Harrow, Middx HA2 8QP.

Shack clearance: Heathkit tx, DX100U, SB10U ssb adaptor, ham band rx, Star-SR200 with Q multiplier, xtal, marker for band edges, all exc cond, manuals for all items, the lot, £100 ono. Will separate. G3YWB, QTHR. Tel 02774 4883.

Pye Pocketfone PF5, xtalled 433·2, nicads, £50 ono. Similar PF5, not converted 70cm, £30 ono. Two Starphones, SF1, suitable for 433MHz, £30 ono each. Panel meters, 50μa fsd, £2 ea. Large amount of various components for sale. SAE requirements. GI4FUE, QTHR. Tel 09603 65358.

FRDX500, cw, fm filters, Sentinel 2m conv matching spkr, £130. SB104A, HP1144, £350 ono. FT101ZD, SP901, FC901 tuner, offers. G whip flexi 10-80m coils, extenda std mount, offers. Ten rolls grade A t/p paper, £1 ea. Prefer buyers collect, carr extra. G4BGE, QTHR. Tel Bracknell 21502, after 6pm.

Liner 2, no mods, £100. Buyer collects. G8LCD, NOT QTHR. Tel 01-845 2711.

FT227R, fully synthesized tx/rx, 25 or 5kHz steps, reverse repeater, toneburst, scanner, suitable for use with transverter, orig packing, £160 ono. Homebrew transverter 2m to 70cm, £30. G8TQU, Hockley (037 04) 2350.

FRG7 and perspex hood, £145. MM144/28, 432/28, QM144/28 converters, £15 each. D8/70cm, £10. Creed 444 plus workshop manual, Spacemark SRD1 tu, 6S6 auto dual speed, PW66 auto-page winder, used rx only, will not split, £115. G4ISK, QTHR Camberley. Tel Crowthorne 71141.

FT101ZD, brand new, fan, mic, a.m., reason for sale emigrating, sensible offers considered. New multimeters, £6. Other items for viewing. Carriage extra. 13 Wood Lane, Isleworth, Middlesex TW7 5EF. Tel 01-568 1331.

BC221, h'book, phones, psu, vgc, £20. Components for QRO linear (813s), £20. 2m 14-el parabeam, £15. 8-over-8 slot, £8. End-fed atu, meter, dummy load, £5. S. G. Brown headphones, £2.50. Amplion h'phones, £3. In-line rf ammeters, measure power, £2 each. 70Ω hf dummy load, £5. Eddystone mains filter, £2. RSGB designs: Valve voltmeter, £5; 160–2m field strength meter, £5; swr meters, £2; xtal tester, £2; gdo (valve), £4; other gear including Eddystone vhf variables, vintage. Moving QTH. G2HCV, QTHR. Tel 01-954 2960.

FL110 linear 12V, 200W, 80–10m, new, unused, quad detectors, suitable Cambridge, quantity Pye Ranger and base manuals, *Radio Communication*, January '62–August '71, *Radio and TV Servicing*, Hawker, Vol 1–6 to 1960, offers. GW8OKR, QTHR. Tel Cardiff (0222) 67151.

KW2000A, spkr, psu, extra xtals, £175. AR88, spkr, overhauled and realigned, £60. Ernest Turner AR88 S-meter, £5. Taylor 45C valve tester, £15. Valves for pre and post world war two br rxs, sae for list. G3GGK, QTHR Cambs. Tel 0954 210374.

Magnum Six rf speech processor, £35. Bencher iambic paddle, deluxe model, new, £35. FR101DD, all extras, mint, £400. Various mobile antennas; 160–10m, G whip; Hustler, etc; 160–10m cw tx, full QSK, £35. *Wanted:* Drake TC-2, 2m transverter. G3XVF. Tel Norwich 56782.

Trio TS510/PS510, in good cond, comp with VFO5D ext vfo, still in orig box, recently revalved, £240 ono. Jaybeam UGP/2M 2m ground plane, still in box, £5. G4IDL, QTHR. Tel Rotherham (0709) 874100.

FRG7, gen cov rx, fine tuning, exc cond, used little, £150 ono. Prefer collect. G8DF, QTHR Epsom. Tel 01-393 3068, evenings.

FT202R 2m hand-held tx/rx, as new, S19–22, R0, R3, R5, two sets nicads, charger (not NC1), YM24 mic, 1/4 wave whip, £95. 2M5XY antenna with PH2 harness, as new, £10. Both items, plus carriage. G3WWL, QTHR. Tel 021353 8874.

FT207R 2m hand-held, mint cond, boxed, still under guarantee, £160. G8LGE, QTHR. Tel 0924 825025.

Short Wave Magazine, November '64–April '79, indexes, £15. Heath signal gen, rf, iu, £18. SMC (Decca) monitorscope, new, £60. Buyer collects. *Wanted:* tx/rx, must be fb cond, all letters answered. Pryse. G3WXT. 36 Hart Road, Byfleet, Surrey KT14 7NH.

FTDX401, vgc, used little, some spare valves, new pas, since used with linear amp, £270 ono. Grundig TK121, good cond, offers. Two new 1in 1,800ft video tapes, offers. Reason for sales, retired, need cash. G3EFK, QTHR. Tel Downland 51212.

FTDX100 tx/rx, 80–10m, £140. FL200B hf tx, £70. FR100B 160–10 rx, £70. These interconnect as tx/rx, Europa-B 28/144 transverter, homebrew psu, £65. Modular Electronics 28/432 transverter, homebrew p/sw/unit, £65. Handbooks available. Prefer buyer collects. G3EIW. Tel 0705 479148, evenings.

Eddystone EC10 Mk1, £55. G8JMF, QTHR. Tel Stowmarket 3870.

TC9 2m tx, vfo, seven xtal, toneburst, £50. Europa-B transverter, updated by SEM, £80. Collect or carriage extra. G5ZH, QTHR. Tel Southend-on-Sea 612 584.

Property of late G6WA: homebrew tiltover Dexion tower, 30ft, AR22 rotator, control cable, extension tube, 3-el triband hf beam, £120. Buyer collects. G8BNE, QTHR. St Ives, Cambs. Tel 0480 67538.

10W 2m fm tx/rx HW202, six channels S20–S23, S15, R5, toneburst, encoder, £110 ono. KW202 hf rx, 1·8, 30MHz, £140 ono. 6 Ashdale Road, Tamworth, Staffs. Tel Tamworth (0827) 4894.

Icom IC225 80 channel 2m fm synthesized tx/rx, £190 ono. G3DNX, QTHR. Tel 061-480 9994, evenings preferred.

FT101E, mint, perfect wkg cond, spare finals, driver, mic, manual, SP101B matching spkr, orig packings, £465. G4HAI, QTHR. Tel Rayleigh 774195, evenings.

FDK Multi 2000, 2m multimode, orig packing, SEM 2m auto pre-amp, £240 ono. Buyer collect. G8MXP, QTHR. Tel 0249 74283, after 5pm.

GEM quad, £70 ono. Buyer collects. BAY96 diodes, new, unused, £2.50 ea. *Wanted:* TH3 or TH3Jnr. G3RNV, QTHR Stockport.

FT202R, fitted R5, S20–23, comp with nicads, NC1 charger, mint, £90. FR101DD, all options, hardly used, mint cond, all books, £500. YO100 monitor scope, hardly used, mint, £100. G2AK, QTHR. Tel Aldridge 52518.

FRG7 rx, fine tune, vgc, £120. R300 Trio rx, vgc, £120. G3HSK, QTHR. Tel Burgh Heath 50622.

Icom 211E 2m all modes tx/rx, digital, virtually unused, boxed c/w mic, £460. Bryant. G4HQV, QTHR Hants. Tel 0590 77815.

Homebrew G3SQR five-band linear, 80 per cent completed, uses four PL500/PL504 in tcs case, must collect, £27. Few 6in × 3in marble morse key bases, £4 each. *Wanted:* ex-RN morse key, long grey case, adjustment 1–20. G4ISK, QTHR Camberley. Tel Crowthorne 71141.

FT200, FP200, £220. Buyer collects. G4FOL, QTHR. Tel Basingstoke 50142.

FR101D, FL101, all broadcast bands, filters and 2m/4m converters fitted, both with stove enamelled and silk screen printed front panels, £695. G8ART, QTHR. Tel Northampton 740633, evenings or weekends.

Fultaba four channel radio control, six channel rx, nicads, four servos, charger, good cond, recently serviced, sell, or swop for 2m ssb or fm equipment. G8SHN, QTHR. Tel 03844 5824, after 5pm or weekends.

Icom IC240, Superscan, FM40 linear, the lot, nearest offer to £200. G4HW, QTHR. Tel 0795 872157, evenings.

CR100 60kHz–30MHz, wkg order, six bands, continuous to 30MHz, slightly flaked paint on blue box, full valve complement, £23. Buyer collects. I have no transport. Bandridge multimeter, 200,000Ω/V, unused, in case, £10. G8VGR. 12 Maze Hill, St Leonards, E Sussex. Tel 0424 429757.

Going hf, 2m tx, £10. Avo transistor tester, £10. Microswitch, 15p. Teleph hndsts, £1.50. Games: Colditz; Subbuteo; £3.50. Multimeter, £6. 2m 5/8 whip, base, £5. Valves: ECC82, EF41, EF183, 6BA6, ECH42, UY41, 12BA6, 12p each. PO rlas, 20p. HT batts, 50p. Xtal filter 10·7MHz, £1.50. PCB 14MHz dcx, rx, £1.50. 19 set £10. 21MHz cw tx, £6. CR70A, £25. Xtals: 8·092, 8·007, 8·104, 1·621, 3072, 8100, 8075, 1088, Radio 1,100kHz, £1. VHF tx two miles, £1.50. 1·8MHz osb/cw tx, £4. Mains clock 60min timer, 75p. Mod rf unit, £2. Audio unit, £2. Amtron 10W stereo amp, £6. Murphy 2m £9. 12V 1A psu, £6. FT202R S20–22, R2–3, £95. YM24 mic, £5. Nicad charger, £10. Various books, 10p–£1. Many more items. G4IJI, QTHR. Tel 0532 822968.

15W tx, 2m multimode, FT221, clean, unmodified, six months use, £285, or part exchange portable rig, sstv, or test equipment. FRG7, as new, £135. SAE, J. Woodcock. 216 Henson Park, Chard, Somerset TA20 1NP.

Lightning Bug Vibroplex key, fb cond, £25. Cmos keyer el-bug, paddle, £8. G3WNI, QTHR. Tel Alton 84499, after 7.30pm.

FT101E, vgc, spare finals driver manual, packing, £375 cash, no offers. Buyer inspects, collects. SSM Europa 2m transverter, £45. G3JYJ, QTHR. Tel Thanet 53279.

Swan 240 tx/rx, psu, 200W p.e.p. 80, 40, 20, £80. Pye Cambridge U10B, boot mount, control box, £25. 898, £10. Filters, XF9B, xtals, £25. XF9M, xtals, £20. Kokusai MF45515CK xtals, £15. 10·7MHz lsb/usb, £25 pair. G3YGR. Tel Tadley 5110, evenings.

Icom IC202 ssb/cw tx/rx, 144–144·4, £130. MEL 202–25–9 25W linear for IC202, fitted pre-amp, £35. Sampson ETM3C keyer, £47. All in exc cond. G4FYS, QTHR. Tel Yeovil (0835) 4773.

FRG7 digital, fitted ssb filter, fm disc, £200. ITT Starphone 2m, fm, 10W, tx/rx, mobile, Ch S0, S20–22, R6, £50. MM 432–144 rx conv, £18. MK Products sstv, pre-amp, comp, wkg, psu, requires mains transformer, rec or dc, 18–0–18V, £8. G8JXK, QTHR. Tel Taunton 79948, after 6pm.

Trio TR2200G, 10 channels, xtal toneburst, time-out indicator, mains psu/charger, perf cond, £100. G4HZO. Tel Burton-on-Trent 41766.

Icom IC211E 2m multimode, exc cond, reason for sale, going hf, £470 ovno. Trio 9R59DS gen cov rx, good cond, £50. G8LFP, QTHR.

Valves: TT14 (CV415), 5R4 WGA, A2426, 807, 1625, 5933, OD3W, 6080, CV2453, 832, 4X150D, 13D6, 6BH6, STC CV261, 5A/170K (CV3998), 5687, 6111, A2521 6C5, 6B8, ECH21, EF22, UY21, EBL21, UCH21, 6V6, several small loudspkrs, offers. G3MBL, QTHR London. Tel 01-445 4321.

SB220 tubes, perfect, guaranteed kilowatt, built by Heathkit technician, £400. Will deliver within 40 miles. Craw. G3CCX. 117 Sea Lane, Rustington, West Sussex BN16 2RU. Tel 09062 3953, between 10am–2pm, weekdays.

FT200B/FP200B, 10–80m, all 10m, orig packing/manual, £250. FV200 matching vfo, manual, £40. Both items mint. Collect or carr extra. G4GIZ, QTHR. Tel 028284 2776.

ARAC 102 rx, £60. ZVC module, built, untested, £60. Heathkit 1018U 'scope, £30. AL8 10W 2m linear, unused, £20. Kent six ch oscillator, unused, £8. *Wanted:* 70cm ATV tx and camera, w.h.y.? G8JUU, QTHR. Tel 01-951 0124, after 8pm.

FT301S, all xtals, aux bands, cw filter, rf processor, built-in HB9ABO mini-keyer, FP4 ac psu, £450 ono. Tel 0474 4694.

Yaesu FT101EE, as new, matching spkr, set, spare valves, £400. Trio TS700S, as new, £400. *Radio Communication/RSGB Bulletin*, 11 years, 1960–70, £10. *Wanted:* heavy duty tripod, tv camera type, pan, tilt head if poss. G6XM, QTHR. Tel Swindon 762540.

Trio TS520, used little, £290. Trio TS700, £290. Honda 300E ac or dc generator, £90. Carriage extra or buyer collects. G3GVV, QTHR. Tel Tonbridge 353360.

Hy-Gain 18HT 10-80m tower, £95. G-whip multi-mobile, inc 80m coil, £15. G3XVH, QTHR.

Microwave Modules 144/28 transverter, mint, £65. G3MJT, QTHR. Tel Harrogate (0423) 886505.

Icom IC202E, 144·0-144·4, 144·8-145MHz vgc, £140. Icom IC215, R0-9, S20, S22, vgc, £110. G4CVC, QTHR. Tel Swanley 65052.

Drake TR4 noise blanker, matching psu, spkr, remote vfo, Electro-Voice mic, connecting leads, manual, £300: with matching MN4 atu, £360. (ATU not sold separately). MM 2m converter 144/28, £10. Buyer collects. G4EOI, QTHR. Tel 01-648 6117.

Tektronix 545A oscilloscope, type B plug-in, comp with Tektronix trolley, probes, manuals, 1A2 dual trace plug-in, 30MHz, needs attention, some spare valves, £150 ono, or swop. B. Hayward. Tel Great Leighs (Essex) 509.

FT401, exc cond, 600Hz cw filter, fan, YD846 mic, three pairs matched spare 6KD6 finals, two pairs new, £285. TR7010, 2m ssb, 8W p.e.p. output tx/rx, good cond, additional xtals giving range 144·095-144·345MHz, mic, mobile mount, accessories, vgc, £135. Jaybeam 8Y/2M 2m 8-el Yagi, 30ft, UR67 attached, PL259, portable 20ft rotatable mast in five 4ft sections, comp with guys, pickets, hinged base-plate, all above as new, £17. Stolle 2010/220 automatic rotator, control box, indicator, good used cond, £20. Geloso G4/105 xtal/mixer, high stability vfo, all xtals giving coverage 3·5-28MHz, escutcheon assembly, valves 6CL6, 6AH6, matching switched pa pi-tank coil, detailed alignment data, brand new, boxed, £18. Superex (USA), professional quality padded 600Ω communication headset, matching fully adjustable high impedance boom mic, ideal for contest operation, new, boxed, £15. Morse key, heavy duty marine, ball race bearings, dust cover, £6. G3PVA, QTHR. Tel 01-646 3738, after 6pm.

Europa C transverter, repeater shift, G3LLL fm discriminator, fm tx board, toneburst, for FT101E, all exc cond and still in use, £130. Liner 2 with pre-amp, £100. Sentinel Auto 2m pre-amp, duff transistor, £10. Will consider exchange for NAG 2m linear or 70cm ssb gear. G4IGZ, QTHR. Tel Nelson 691165.

PET 2001 8k computer, £495 ono. Liner 2, £100 ono. Tel 0501 30819, evenings only.

Multi 2000, multimode synthesized rig, mic, pre-amp, £190. G8LXW, QTHR. Tel Peterborough 45571, evenings and weekends.

G3RKK type rx, needs little attention, £25. Marconi b/w monitor, £5. Bootmount W40FM, 10-channel, new but less control box, pa stages, tuned 2m, £60. Part-built phasing tx 898 dial, cased, £10. G4EMB, QTHR. Tel Tiptree 816459.

Micro-processor Mk14, i/o, extra ram, psu, better keyboard, £60. Solartron 'scope, CD523S, £50. Liner 2, pre-amp, £100. All ono. G4HBO, QTHR. Tel Telford, Salop (0952) 461394.

Heathkit signal generator, RF1U, 100kHz-100MHz, to 200MHz on harmonics, comp with manual, £25. *Radio Communication Handbook*, 5th edition, Vol 1, £5. Both items mint. G3HVA. Tel Tadley 6106.

QRT Sale: Immac Icom IC701, hf, psu, used on rx only, £750. G3ZDR, QTHR. Tel Gravesend 63284, evenings.

HW8, £80. KW107, £70. Z-match atu, £5. Ameco PM2, £16. Newnes radio t/v servicing, nine vols, £7. Shack clearance. SAE for lists. Collect or carriage extra. G2HKU, QTHR. Tel 0795 873100.

Atlas 210X, noise blanker, mobile mount, hb psu, £300. C. Baker, GM4GMR. c/o MTL, Power Court, Luton LU1 3JJ.

FT200 tx/rx, 240W p.e.p., ac power supply, manual, exc cond, £265. G4IBG. Tel Hove, (0273) 731391.

Programmable calculator, Texas SR56, 100 step, full function, rechargeable, charger, case, manuals, believed perfect cond, £45 ono. G3VYV, QTHR. Tel 0772 600234.

TR2300, nicads, charger, telescopic whip, case, carrying strap, £160. Belcom Liner 2, £70. G. Gibson. 9 Cheltenham Street, Barrow-in-Furness, Cumbria LA14 5HP.

FT202R, hand-held, nicads, charger, extra channels R6, R7, spkr, mic, £110. Pentax ME camera, motor drive, Vivitar flash, telephoto lens, extras, £300 ono. G8LXW, QTHR. Tel Peterborough 45571, evenings and weekends.

Liner 2, matching psu, pre-amp, £110. B41 lf rx 15-700kHz, £25. HW8 QRP tx/rx, £99. Pair pfi pocket phones, car adaptor, brand new nicads on RB6, £40. G4DTB, QTHR. Tel Hereford 4971.

Scope tubes 1½in DH391, 1½in E4103/E/4, 2½in DP75, 3½in VCR138A, £10 each. 3½in flat-face double gun, £15. Mains filter unit, £6. Various meters, transformers, glass dome aerial lead-in insulators, £2. *Wanted:* TA12B. G4DVH, QTHR. Tel Ulverston 54466.

FT101EE, 350Hz filter, only used few hours by swl, £400. FL101 tx, 160-10, £290. AEC swr/pwr meter, £10. Microwave Modules 144MHz converter, £12. All ono. G3RCE. Tel Titchfield 42022.

Sansui TU217 stereo tuner, fm and mw, new, unused, in orig packing, cost £105, £75 ono. G4CZP, QTHR. Tel Woking 21147.

WANTED

VFO for FDK Multi-11. Details to J. B. O'Kane, 45 Wolverton Gardens, Horley, Surrey RH6 7LZ.

Large binoculars, 20×80 or similar ex-tank, battleship, etc, preferably with mount. Valves for Eddystone 840C rx: UAF42 (4); UCH42; UL41; UY41. GM4MF, QTHR. Tel Falkirk 24832.

Handbook or circuit diagram for Hallicrafters SX-28 rx, buy or borrow to copy. R. Botterill, G4EPO, QTHR. Tel St Albans (0727) 59789.

SOS, any info on mobile tx/rx Traveller No 1, Japanese make, probably marketed through Germany, require one each: AN315 sound output chip; TA7120P preamp ic; 2SC1946, 2SC1971 rf transistors for above set. All expenses refunded. G3LSD, QTHR. Tel 0752 51245.

Vacuum variable capacitors up to 10kV. W. Sicke. Decca Navigator Co Ltd, 5790 Brilon Madfield, W Germany.

70MHz equipment: converter for 28/70MHz or transverter such as Europa/MM or w.h.y.? G3TKF, QTHR. Tel Keynsham (02756) 3965.

Suitcase type tx/rxs, especially: Mk119, Mk122, Mk128, Mk217, BP5 or T5, AR11, A3, B2 (type 3 Mk2), B2 minor (type A Mk3). Any manuals or literature, incomplete or damaged items welcome. M. G. Taylor, G3UCT/DA2QU, 3 Sqn, 13 Sig Regt, BFPO 45.

Buy or borrow for photostating, operating manual for tele equipment service scope type S32, will exchange for x-band radar detector if required. G3HSC, QTHR. Tel 01-660 2896.

KW 109 atu, Samson ETM-3C keyer, set of coils for Eddystone rx 358X, by senior citizen swl. G3XSN, QTHR. Tel 051-722 3644.

QSL cards used before 1930 urgently sought for research by amateur collector who will make super offers for really old foreign or British examples. Help me assemble some real history before it is too late. G3BDQ. Whitefriars, Friar's Hill, Guestling, Hastings.

Manuals for Trio rx J310, Lafayette HE30, buy or borrow, postage refunded. P. Major, Field House, Quay Lane, Kirby-le-Soken, Essex. Tel Frinton 6399, reverse charges.

Eddystone 740 and similar. High power a.m. tx, instruments: meters, decade boxes, capacitors, etc, in wooden cases, circa 1930-40 gear for collection. Rayer. Reddings, Longdon Heath, Upton-on-Severn, Worcs, WR8 0RJ.

Copy or borrow circuit handbook for Oscillator Test Set No 1, CT212, covering 0·085-32MHz. G3PTU, QTHR Yorkshire. Tel High Flatts (0484 88) 506.

KW2000 A, B or E, psu, KW107 or equivalent in units. Low-pass filter, 2m transverter, bandpass filter. Inspect/collect London area. Dainty. 43 Copse Avenue, West Wickham, Kent. Tel 01-777 2340.

HR0 band-spread coil for 28MHz. G2GA, QTHR. Tel 061-764 6266.

CRTs type 3BFPZ, 3XP1, Dumont, coaxial switches, relays, to 1GHz, Nuvistors 7587, rx 500MHz-1000MHz, spectrum display units: NEMS Clarke, General Dynamics, Vitro, CEI, DEI, large gold plated TMC? Plugs. A. Fletcher. 62 Moorbridge Lane, Stapleford, Nottingham. Tel 0602 397446.

Drake spkr enclosure MS4. Auxilliary i.f. filters. Yaesu tx FL50B. *For sale:* Heath pair SB301E, SB401, extras, spare valves, £300. C. Newby. G3EBH, QTHR.

Creed teleprinter 7B, 7E, 75S, or similar. Perfect wkg cond essential. G4BVC. 61 The Fairway, Oadby, Leicester.

Valves, type ESA 1500, AH238, BR1126, as used in industrial rf induction heating machines. G3SMK, QTHR Warks. Tel Earlswood 3423, after 7.30pm.

Transformer, 240/10V 10A for two 813 filaments. Full details, price, etc, to G3ISD, QTHR. Tel Sittingbourne 77431.

Trio 9R59DS operating manual or one to copy. G3ZOG, QTHR. Tel 0783 280080, 6-8pm.

Mains pack for EC10 MkII Codar pre-selector. G3JIC, QTHR. Tel 0744 23916.

Keen collector seeks vintage xtal sets, 1920s period valve rxs, horn spkrs, ST100 Marconi V1, V2, V3, Mullard Master Three rxs, Bright emitter valves, components, magazines, pre-1939 Mullard valve tester, all cards, best prices. N. Richardson, 2 Edna Road, Maidstone, Kent ME14 2QJ.

2m tx, suitable for base stn, both a.m., fm, any make accepted, or will consider homebrew. Must be cheap. Signal generator. G8SAN, QTHR. Tel Derby 513224.

Urgent: minimum 10 f/thru 4·7nF, nut fixing type. Four Oxley Tempatrimmers, 6·5pF. G3ICB, QTHR. Tel 0635 64345, mornings.

Contact with anyone who has purchased units that are part of satellite diversity telemetry receiver, sold by A. H. Supplies and others. Fletcher. 62 Moorbridge Lane, Stapleford, Nottingham. Tel 0602 397446, reverse charges.

Cowlgill motors, will collect within reasonable distance. 2m crossed dipoles. Early radio gear, bright emitter rxs, horn spkrs, xtal rxs. *For sale:* Icom IC260E 2m, multimode, new, £235. G3AYA, QTHR. Tel Ware 870010.

18AVT/WB vertical Hustler mobile antenna, comp. 2kW linear. ATU Drake separates. GW8OKR, QTHR. Tel Cardiff (0222) 67151.
Wireless World Oct '66, Mar'65, Oct '64, Jul '63, Sep '58, Jan '43, Feb '43, Mar '43, all 1940 except Apr, May, Dec, any 1939, any pre-'39. I have many duplicates and can exchange. BC348 for parts, especially xtal filter. G8PWO, QTHR. Tel Sevenoaks 62481.
Trio amateur band JR310 rx, fitted narrow band filter, 1·8MHz band, manual, immac cond, £95 ono. Consider exchange all-band rx or stereo cassiever. Dunne. 19 Fox Street, Edgeley, Stockport, Cheshire. Tel 061-480 1549.
455 ICC ssb filter type 10AZ, preferably with input-output transformers. Good price paid, or w.h.y. suitable for cw JR310. Wilson. 35 Charlotte Street, Rochdale, Lancs. Tel 061-330 1182 (not Tuesday), business hours.
Coil pack, or scrap AR88D with osc section intact, plus any parts for above. G8GOA. Tel Rotherham 896607.
Xtal filter, 10·7MHz, bandwidth ± 7·5kHz. ITT type 024B6/923B or equivalent, suitable for Echelford 144MHz fm rx (*Radio Communication* Sept '79). C. Sedgwick. 38 Eaton Road, Kempston, Beds. Tel 0234 851129.
Heathkit SB104, 101, 102, HW101 or similar hf tx/rx. Doyle, 4 Wricklemarsh Road, London SE3 0NF. Tel 01-856 7478, evenings.
Rotator for light 2-el hf quad, 10, 15m, AR22, AR40, CD44 or similar, must be in good cond. G3HIH, QTHR. Tel 051-226 4212.
Suitcase-type sets, miniature tx/rxs, eg type 3 Mk2 (the "B2"), type A Mk3, Mk119, Mk122, Mk128 A/B, Mk217, BP5/T5, AR11 and A3; Mk301PP (psu for Mk301 miniature rx). Does anyone have any valves, type 117L7? Incomplete/damaged sets, any odd bits welcome, any associated literature, manuals etc. Letters only please. Taylor. G3UCT. c/o 31 Willow Walk, Culverstone, Gravesend, Kent.
Digital frequency readout for FTDX560, YC601 preferred but homebrew unit considered, or full details to enable me to construct. All expenses refunded. GW3YJL, QTHR. Tel Tredegar (049525) 2049.
Junior new member seeks good secondhand sw rx to help launch career. Gainer will help with expenses. Mersereau, 23 Benton Park Road, Newcastle Upon Tyne. Tel 0632 844738, after school or weekends.
RX pcb for Burndept BE448 uhf mobile and pfi Pocketfone. G3UYM, QTHR. Tel 0462 33878.
Manual or circuit for Hammond T500. G8LYW, QTHR. Tel 03708 5369.
HF tx/rx in fair cond, must be cheap. £0-£150. 41 Cwmcelyn Road, Blaina, Gwent, S. Wales. Tel Jon, 0495 290139.

Mobile rallies calendar

All information for inclusion in this column must be sent to the editor, not to RSGB HQ.

13 April—North Midlands Mobile Rally, Drayton Manor Park, Tamworth, Staffs, (on A4091, well signposted, and within easy reach of M1, M5 and M6 motorways). Open 11.30am. Talk-in stations on 144 and 432MHz. Further details from G8BHE, tel 021-422 9787.
20 April—Southend & District Mobile Rally, Southend Airport Exhibition Centre, Aviation Way, Southend-on-Sea, Essex. Many attractions, licensed bar, refreshments, parking for 300 cars, aircraft museum, talk-in station, and bring and buy stall. Details from F. Thorogood, G8ORV, 30 Grange Gardens, Southend-on-Sea, Essex.
20 April—Welsh Amateur Mobile Rally, Barry Memorial Hall. Further details from K. B. Hodge, 16 Claude Road West, Barry, S Glam.
4 May—Spalding & District Amateur Radio Society Tulip-time Rally, Spalding Grammar School, Details from G. Parker, G4EMK, 33 Beech Avenue, Bourne, Lincs. tel 07782 2649.
18 May—Northern Mobile Rally. Victoria Park Hall, Keighley. Open from 11.30am.-5.30pm. Talk-in stations will be operating on 144MHz fm S22 and 432MHz fm SU8. There will be trade stands, children's films, and bar and refreshments will be available. Details from G8DFZ, QTHR.
18 May—Mid-Ulster RSGB Group Parkanaur Rally. Trade stands, bring and buy stall, and many attractions for all the family. Further details from B. Edmondson, GI8RJW, tel Armagh 524453, after 7pm.
25 May—Plymouth Radio Club Rally, Tamar Secondary School, Plymouth, Devon. The route will be well signposted. Talk-in and demonstration stations will be on hf, 144 and 432MHz, special callsign GB2PRC. There will be trade stands, raffles, lucky dip, programme prize, Raynet, Devon Emergency Volunteers, and rtty, plus demonstrations of various kinds. Further details from G4GWJ, QTHR.
25 May—East Suffolk Wireless Revival, Foxhall, Nr Ipswich, Suffolk. All usual attractions, plus improvements, as well as transceiver clinic, antenna testing range, trade stands, and a special event station, GB4SWR, which will be set up on 24 May to operate on the next day. Further details from Jack Toothill, G4IFF, QTHR.
1 June—Hull & D ARS Mobile Rally, Hull University. Would traders please contact G8EAH, QTHR, for details of discounts for advanced booking. Further details nearer the date.
1 June—Sussex Mobile Rally, Brighton Racecourse, Brighton, Sussex. Free car parking, close to main buildings. There will be talk-in stations on 432, 144 and 3·5MHz, and a special QSL card will be available to callers at the station, which will be using a special GB callsign. Attractions will include the usual trade stands in covered accommodation (most of the well-known traders will be present), and demonstrations by specialized groups covering subjects such as Raynet, amateur television, rtty, satellite communications, microwaves and repeaters. It is also planned to have a working amateur radio station to interest the more uninitiated. There will be dog handling and gymnastic displays, police and Post Office stands, a bring and buy stall, lucky dip, yl stall, and lucky programme draw. A free mini-bus will take people to and from Brighton Beach.

This rally is a first for Sussex, and it is intended to make it an overwhelming success. For further details contact the hon sec, Sussex Mobile Rally, 7 Dale Crescent, Patcham, Brighton, Sussex BN1 8NT, tel Brighton 693655 ext 2266 (office hours).
1 June—East Anglia Radio Amateurs Picnic, East Anglian Transport Museum, Nr Lowestoft. Further details from G3LYX, QTHR.
8 June—Elvaston Castle Mobile Rally, Nunsfield House, Alveston, Derby. Further details from G4CTZ, tel Derby 71875.
15 June—RNARS Mobile Rally, HMS *Mercury*. 10am to 5pm. All usual trade stands and many attractions for the family. Further details from Wally, G4DIU, QTHR, tel 0705 479464.
29 June—Longleat Mobile Rally, Longleat Park, Warminster. Trade stands, RSGB bookstall, bring and buy stand, plus the facilities of Longleat Park for the family. Special event station GB3LMR will be operating on vhf and hf from Friday 27 June, with talk-in on S22. Special Longleat QSL cards will be sent as acknowledgement. Further details from G4FRG, QTHR.
13 July—Upton Mobile Rally, Upton-on-Severn, Worcs. Further details from G8NSL, QTHR, tel Worcester 620507.
13 July—The Knowlsley Safari Park Rally, which was to have been held on this date, has been cancelled due to clash of date with the Upton Mobile Rally.
20 July—Cornish RAC Mobile Rally. The Technical College, Cambourne, Cornwall. Further details from G4BHD, QTHR, or G3VGO, QTHR, tel Truro 864255.
27 July—Scarborough ARS Mobile Rally, Technical College, Scalby Road, Scarborough. Further details from G4JAQ. 43 Broadlands Drive, East Ayton, Scarborough, N Yorks YO13 9ET, tel Scarborough 862638.
3 August—RSGB National Mobile Rally, Woburn Abbey. Details from N. Miller, G3MVV.
10 August—Derby Radio Rally, Lower Bemrose School, St Albans Road, Derby. Open at 11am. Admission and parking free. All the usual attractions. Details from Jenny Shardlow,-G4EYM, QTHR, tel 0332 56875.
24 August—Torbay ARS Rally. Further details from Mrs Ged Coker, c/o G4FCN, QTHR, tel Ipplepen 812117.
7 September—Vange ARS Mobile Rally, Nicholas School, St Nicholas Lane, Basildon, Essex. Details from G4FMK, QTHR.
7 September—Telford Amateur Mobile Rally, Telford town centre, Salop. Excellent indoor venue, with full facilities as previous years. Further details from G3UKV, tel Telford 55416; G8DIR, tel Shrewsbury 64273; or G8UGL, tel Telford 584173; (all QTHR).
28 September—Harlow & D ARS Mobile Rally. Nettleswell Comprehensive School, Harlow, 10am. Details from P. Turner, G4IJE, Gladwin Cottage, The Street, Sheering, Bishops Stortford, tel Sheering 482.

RNARS Easter activity

The RNARS will be operating on board HMS *Belfast*, moored in London's Upper Pool, from 0001gmt Friday 4 April to 1800gmt Sunday 13 April. Primary operating frequencies will be as follows:

CW: 1,828 (QSX 1,802), 1,838, 1,858, 3,520, 7,020, 14,052, 21,052, 21,120, 28,052, 28,152.

SSB: 1,875, 3,660, 3,780, 7,070, 14,140, 14,245, 14,340, 21,175, 21,433, 28,470, 28,933.

Schedules are welcomed, especially with other stations of special interest, and can be arranged via G3HZL, QTHR, tel 01-892 3239; or via RNARS, Bridge Wireless Office, HMS *Belfast*, Symons Wharf, Vine Lane, London SE1 2JH, tel 01-407 6434 ext 39. QSL cards are answered only on receipt of incoming cards. All cards should be sent via the RSGB QSL Bureau. Direct requests will only be answered if accompanied by an sase, or one irc for surface mail or two ircs for airmail reply.

The operators of GB2SMR would like to meet you at:

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and many other attractions, too numerous to mention, in fact everything you could wish to find at a rally, and MORE!

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Talk in on 80m, R3 + S22, and RB6. See next month's issue for details of how to get there. Enquiries to J. Trimmer, G4JDM—Brighton 693655, extn 2266 (office hours)

MEMBER'S AD ORDER FORM

FOR SALE ☐ WANTED ☐ (Tick as appropriate)

- **See Members' Ads page for conditions of acceptance.**
- **Not more than 40 words, including name, address, etc, for 75p.**
- **Do not forget to include remittance and a *Radio Communication* mailing label.**
- **Please write in block capitals, or type.**

Licensed members are asked to use their callsign and QTHR, meaning that their address in the current *RSGB Amateur Radio Call Book* is correct. BRS and A members will, of course, have to provide their name and address.

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FT-901DM

FT-901DM. YAESU's Competition Grade Transceiver—without doubt the ultimate in all-mode HF rigs irrespective of manufacturer. An absolute delight to operate as any user will confirm and the owner can build up a very impressive station by adding from the comprehensive range of interfacing ancillary units.

ALL SOLID-STATE FT-107M ▶

FT-107M. This is the brand-new solid-state HF Transceiver which has just been included in the ever-growing range. The receiver performance is comparable to the FT-901 (which says everything) and a memory option is provided of 12 programmable channels plus fine tuning. Add to this the ease of tuning, 240 PEP input, superb low-profile styling and here is the rig for the Eighties.

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FROM SOUTH AND EAST. We are located approximately two miles from Junction 5 of the M6 from which follow signposts to Birmingham. Within ¼ mile turn right at Clock Garage and proceed towards city. After one mile look for traffic lights at Fox & Goose and immediately over the lights take minor left fork into Alum Rock Road. We are located one mile from this point.
FROM NORTH. Leave M6 at Junction 6 (Spaghetti) and follow left fork down to traffic island beneath motorway complex. Take third turning off to Lichfield. One mile further on follow A4040 to the right and within 100 yds. veer again to the right, approximately one mile further on brings you to the Fox & Goose. Turn right and see preceding directions.
FROM THE WEST AND SOUTH/WEST. Follow M5 then M6 to Spaghetti Junction (see above). Alternatively, leave M5 at junction 4 or 3 and proceed to inner ring road. Turn South on ring road and leave on A47 (East). We are located three miles from this point.

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YAESU FT-101ZD

FT-101ZD. When YAESU first introduced the original FT-101 this was the trend setter of the day and so it has been with each succeeding version of this world famous transceiver. Countless thousands have been purchased around the Globe and the reputation which these rugged rigs earned for performance and reliability operating under every form of adverse condition went a long way towards establishing the YAESU MUSEN name. When the latest model, the FT-101ZD, was launched last year we knew as soon as we saw the first delivery that once again YAESU had a winner and the sales that have followed have proved this beyond any shadow of doubt. There is simply nothing on the market that can match the FT-101Z and FT-101ZD for value for money and—as we keep saying—the performance outstrips many a rig with a fancier price tag.

THE ABOVE IS ONLY PART OF THE YAESU STORY—FOR FULL DETAILS OF ALL THE MODELS 36p IN STAMPS WILL BRING YOU THE LATEST GLOSSY CATALOGUE OF THE FULL PRODUCT RANGE TOGETHER WITH OUR CREDIT VOUCHER FOR £3.60—A 10-1 WINNING OFFER!

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ATTENTION BARGAIN HUNTERS! A large SAE will bring you our latest used equipment list and our special offers on discontinued new gear and new demonstration models.

AGENCY APPOINTMENTS

We are pleased to announce that we have extended our service to out-of-town customers with the appointment of two new agents in areas which are, in our view, lacking in amateur sales facilities at the moment. AMATEUR ELECTRONICS UK is now fully represented by the following additional AGENTS and the personnel involved, named or otherwise, are fully licensed operators who have been selected for their interest in and knowledge of, the hobby not to mention their impeccable bona fides.

EAST ANGLIA—Dr T. THIRST (Tim) G4CTT, NORWICH. 06925 403

NORTH EAST—NORTH EAST AMATEUR RADIO, DARLINGTON. 0325 55969

We hope customers in the above areas will avail themselves of the service now offered and we are sure they will derive great benefit from expert local help.

Our existing representatives remain, of course, as below.

BRANCH: AMATEUR ELECTRONICS, UK—COASTAL, CLIFTONVILLE, KENT, KEN McINNES, G3FTE, THANET (0843) 291297. 9 a.m.-10.30 p.m.

BRANCH: AMATEUR ELECTRONICS UK-SCOTLAND, 287 MAIN STREET, WISHAW, LANARKSHIRE, GORDON McCALLUM, GM3UCI. TELEPHONE WISHAW 71382. (EVENINGS CARLUKE 70914)

AGENT: WALES & WEST—ROSS CLARE, GW3NWS, CAERLEON, NEWPORT. (CAERLEON 422232)—ONLY 20 MINUTES OVER THE SEVERN BRIDGE.

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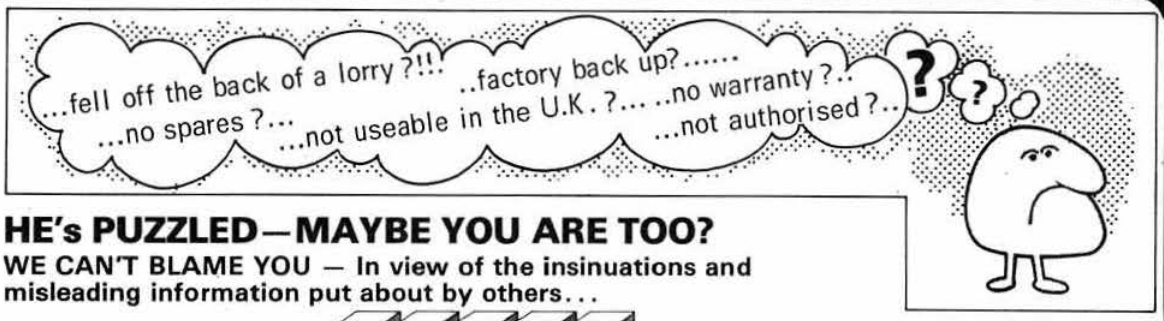

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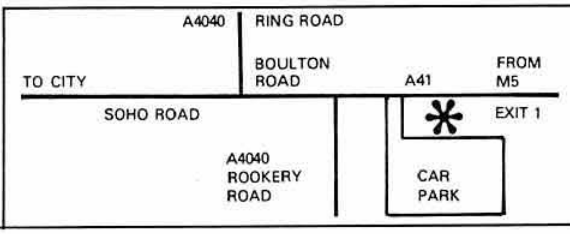

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RECEIVERS—All for 250V ac and overhauled and in good order.

TESTMETERS. AVO Model 7 Mk II, with Power Factor scale, **£31.** Ex-ministry complete with case and either used AVO leads as they come or new Jap leads. Clean and fully checked. AVO 8 movements, 37·5 μA with dial, overhauled, **£20.**

PYE BANTAM. Single channel HB FM with leather case and mike. Complete with used battery and AC charger, **£60.** Additional used batteries **£6.**

HANDY PORTABLES, Redifon GR336 Mk II. High band FM. Solid state Rx, valve Tx, uses U2 batteries. 4 channel, with handset and aerial, **£15.**

SPEAKERS. 5–8 ohm wall mounted Marine type. 6in unit and rugged die-cast case, **£6.**

EDDYSTONE 730/4. Covers 480 kc/s to 30 Mc/s. "As new" condition. Unrepeatable at **£185.** 770U covers 150 to 500 Mc/s, **£140.** B40D (the miniature valve latest type) **£85.** £10 deducted on the above if collected. MARCONI ATALANTA. Covers 15 kc/s to 28 Mc/s, **£115** PLUS carriage at cost.

SIGNAL GENERATORS TF801D/1/S covers 10 to 485 Mc/s, **£90** and R.C OSCILLATOR TF1101, covers 20 cycles to 200 kc/s, **£40.** Both are clean and complete as received from Ministry and untested.

AERIAL EQUIPMENT. Nice quality Australian made for 510 5 watt manpack set. 68ft wire on neat metal reel, 2 for **£2.50.** Ball jointed bases (made for 8ft whip) integral loading coil tunes 2 to 10 Mc/s, **£1.50** or 2 for **£2.50.**

STC T4188 transmitter PA units, last few at **£15.**

MOTOROLA chargers, 250v type NLN8464A believed for HT200/220 series. New and boxed, **£20.**

FREQUENCY METERS BC221, clean and working, need 6.3V and 150V. Wood cased type, **£23.50.** Purpose built regulated power supply, in Ministry packing, **£8.75** or loose stored but tested and working, **£6.50.**

POCKETFONES PF1, Tx and Rx, **£21.25.** Car adaptor, receiver plugs in, battery is charged and output taken to 3W amplifier into 3 ohm speaker (not supplied), **£8.50.** Chargers, for one Tx and Rx (complete hand held plugs in) **£10.50** or for 12 of each battery, **£17.**

ITT STARFONES SF1 UHF FM handhelds, used battery included whilst stocks last, **£35.**

HANDY PORTABLES ULTRA 3A4AZ3. LB AM 3-channel. Complete with SGB fist mike and compact helical whip aerial. LESS 15V battery. Clean and straight from Government, **£25.**

Carriage charges are for England and Wales only.

Terms: Cash with order **Early closing Wednesday**

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NICOMTECH

What an Apple II Computer can do for a Radio Amateur:

1) Send and Receive Morse, RTTY/ASCII/SSTV
2) Work out QTH Codes/Scoring
3) Work out beam headings (it could even turn it)
4) Keep an index file of stations worked (Disk)
5) Work out Antenna Calculations and even draw graphs.

Outside the shack it can become a powerful learning aid for your children.

The Basic Apple II (16k Ram B/W) starts at **£799** (including VAT) (**£695** ex VAT).

Should you purchase an Apple II from us then we provide you with the Communications and SSTV tapes.

For further information—SAE PSE.

Macrotronics Interfaces still available for Pet, Tandy, Sorcerer—see advert last month.

Nigel G4CDU **(N. R. HUNTLEY)**
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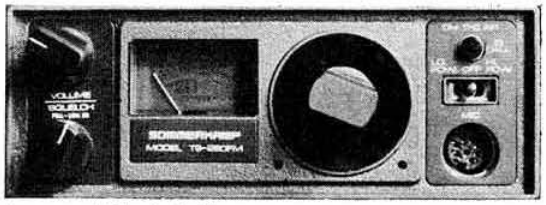
THE WORLD'S MOST COMPACT
2m 80 channel 50 watt TRANSCEIVER



Just stop and think what it will cost you to buy the average 2 metre synthesized rig to replace your crystalled job? Then look at the cost of a 50 Watt Burner? Doesn't it make sense to grab one of our **TS280FM's at £203.55 all in!** And you can have a telephone handset for privacy in the car, or a selective tone mic. etc etc. And it's a rather nice shade of blue!

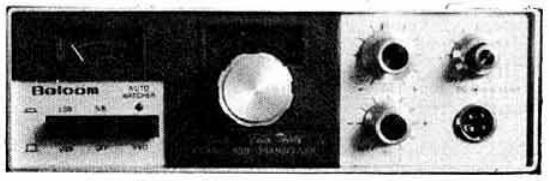
"LINER 10" FIRST EVER 28MHz SSB MOBILE is now freely available to class "A" licensees. It's about the size of a 2 metre box and has excellent performance.

Both Liner 10 & 15 (21MHz version) at £167.90

SOMMERKAMP FT7B just arrived—your very best buy for this excellent HF set—**£395 OR SPECIAL OFFER, £439 incl. FP12 PSU.**

TS802 SOMMERKAMP brand new 80 channel 2 Watt 2 metre handheld with built-in toneburst and repeater shift plus DIGITAL CHANNEL READOUT. Optional telephone handset for privacy on the bus! Robust aluminium case—**£172.50.**

FRG-7 ANALOGUE READOUT SOMMERKAMP Lowest price in UK **£195.00. £188** if you collect.



LINER 430 70cm SSB MOBILES STILL EX-STOCK—£212.75 including VAT & delivery.

FT101ZD. If you are thinking about one of these excellent HF rigs think about FT277ZD SOMMERKAMP at **£661**—the price includes VAT/carr, and you get the microphone, CW filter and cooling fan **at no extra.** Discount if you collect.

LITERATURE: Please send a SAE for a quick reply with our literature, price lists. If you want one of the 1980 Sommerkamp colour brochures please ask. We will buy or trade your clean secondhand gear at good prices. Open 6 days per week.

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SWAN 100MX 80-10m solid state compact HF Transceiver 235 watts I/P—send for details. NOW AT A PRICE YOU CAN AFFORD **£450.00 inc VAT.** Limited period offer. Send for details.

CUSHCRAFT—power and performance **ANTENNAS**

ATV3 Vertical 10/15/20	(a)	£35.40
AT55 Vertical 80-10m	(b)	£78.00
A144-11 11 element 13dB yagi 144MHz	(b)	£27.85
214B 14 element 15dB long yagi 144MHz	(c)	£45.00
A3219 19 element "Boomer" 16·5dB long yagi 144MHz	(c)	£64.00
ARX2 Ringo Ranger 6dB 144MHz	(a)	£26.50
DX120 20 element stack, 13·2dB gain, 144MHz	(c)	£50.00
AR10 Ringo Ranger 3·7dBi, 10 metres	(a)	£22.00
A10/3 3 element yagi 7·6dB, 10 metres	(b)	£52.00
A15/3 3 element yagi 7·6dB, 15 metres	(b)	£72.00
A20/3 3 element yagi 7·6dB, 20 metres	(c)	£139.75
ATB34 3-band HF yagi 7·5dB 10/15/20	(*)	£235.75

Prices include VAT, carriage extra

(a) = **£1.00**, (b) = **£2.00**, (c) = **£3.00**

OR our very own 2m 12 element **ZL SPECIAL**—13dB gain from a 10ft 6in long split boom, **£25.00**+VAT.

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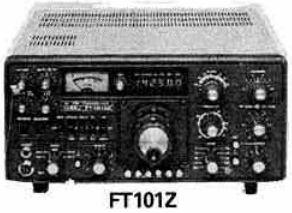
YAESU MUSEN

FT-101Z
FT-901
FRG-7000
FT227RB
FT-7B



FT-101ZD
FRG-7
FT225RD
CPU-2500R
FT207R

FT101Z

All ex-stock and FREE SECURICOR DELIVERY

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ASP MOBILE ANTENNAS. SEM PRODUCTS STOCKED
FULL RANGE OF AMIDON TOROIDAL CORES IN STOCK

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BOOMLESS CUBICAL QUAD SPIDERS. Aluminium	£32.00
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SEM Z MATCH. Will handle 1kW	£45.00
LOW PASS FILTER. Nye-Viking 2-3MHz	£19.50
MULTIMETERS ME-221	£17.00
FERRITE RINGS Mullard FX 1588 for TVI/AFI	£0.67

All prices include VAT and carriage

PL259, SO239, REDUCERS, COAX, ROTATORS, ETC. ETC. ETC

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Clwyd CH7 4SD
Tel: Pontybodkin 846 (035287)

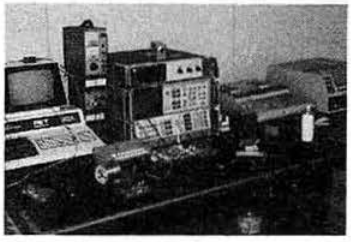
Business hours: 9.30-5pm Mon, Wed, Thurs, Fri; 9.30-1pm Tues & Sat

The story behind the SUGIYAMA F850

YOSHIO SUGIYAMA (JA2FOX), the designer of the F850 gained a thorough training in communications equipment with Fujitsu, the major suppliers to Japan's police force. He owned his own company for 15 years, specialising in the design of electronic equipment for the control of precision machine tools. He sold this company and formed Sugiyama Electric Company to develop equipment for the amateur market.

Yoshio Sugiyama (JA2FOX) K Kahihara (JA2HAQ)

Sugiyama Factory



Computerised Test Station

Assembly of Individual Circuit Boards

The F850, the long awaited answer to the requirement for an all band — all modes transceiver, was the first item to be developed. Three years after its conception, production under the supervision of his chief engineer Ken Kahihara (JA2HAQ) was started, in a custom built factory using computerised production facilities and graduate engineers. The influence of Yoshio's previous experience will be readily apparent from the functional modular layout of the F850.

The factory is at present being extended to house the production facility for their next exciting product — aimed at a different facet of the hobby — which will be announced later this year.

Finished F850's awaiting fitting of covers

Please send SAE for leaflet

Good News on Prices

The strength of the pound against the yen enables us to hold the regular list price with all filters fitted virtually at the introductory price.*

Brief Specification

- Covers all current amateur bands 1.8-144 MHz, including 4m
- All popular modes USB, LSB, car FM and AM
- Easy to read digital display
- Switched selectivity 0.4, 1.2, 1.8 and 2.4 KHz
- AC or 12V DC powered for base station or mobile/portable operation
- Built in VOX, speech processor and 25 KHz calibrator
- Power output 10 watts min SSB/CW/FM (Typical 15 watts) — 5 watts AM

LIST PRICE*— Fitted all filters £899.00 inc. VAT

432 MHz Transverter (ordered with F850) £99.00 inc. VAT

220 Watt Solid State Linear (up to 30 MHz) £80.00 inc. VAT

* based on exchange rate operative on 20-2-80

Zycomm Electronics Ltd.

G3ZYC G8CNB G3NJX

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DATONG ELECTRONICS LIMITED

IMPROVE YOUR DX POTENTIAL!

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

Model A.S.P.

NEW

Firstly it allows your transmitter to radiate more useful average power and **secondly** it improves the intelligibility of your speech in difficult conditions.
The renowned fully automatic R.F. clipper **MODEL ASP** is now joined by a new manually operated R.F. clipper **MODEL D75.** This supersedes our original manually controlled unit, MODEL RFC, and offers the following additional features

Model D75

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

Remember: all Datong R.F. clippers connect in series with your microphone. No internal connections are required. For R.F. clipping at minimal cost our MODEL RFC/M is still available. MODEL RFC/M is a fully assembled and tested R.F. clipper in PCB module form. You provide controls, case and power source.
Data sheets on all three R.F. clippers, including the new MODEL D75, are available on request.
Price: Model D.75 £49.00 plus Vat (£56.35 total). Model A.S.P. £69.00 plus VAT (£79.35 total).

MORSE TUTOR

Morse Tutor has a calibrated speed control **plus**, and this is vital, a separately adjustable delay between letters.
Start at, for example, 12 words per minute but with a two second delay and just reduce the delay as you improve. It delivers five character groups of letters, numbers, or both together. The sequence is random so the supply is unlimited!
All this plus portability, built-in loudspeaker, personal earpiece and key jack. Only £43.00 plus VAT (15%), inclusive price £49.45. Full data sheet free on request.

MODEL UC/1 UP CONVERTER

If you already own a good quality ten-metre or two-metre receiver or transceiver you are only £118 away from a really high performance general coverage receiver. Just add the magic ingredient, MODEL UC/1 from DATONG!
You get full coverage in thirty synthesised 1 MHz segments from 60kHz (Rugby MSF) to 30MHz, at high sensitivity and with all the facilities and high performance of your existing rig!
For good measure UC/1 also adds two-metre coverage to ten-metre receivers. Price: £119.00 plus VAT (£136.85 total).

MODEL FL1

Frequency
Agile
Audio
Filter

AS REVIEWED IN AUGUST ISSUES OF "QST" and "73"
A versatile add-on unit for communications receivers which helps to extract wanted signals from background interference. It connects in series with the loudspeaker or headphones. The effect is similar to "I.F. pass-band tuning" for SBB/ or RTTY reception, and bandwidth down to 20Hz (with limited a.f.c.) gives an amazing capability for pulling weak CW stations out of the QRM. Model FL1 is unique in being able to tune itself when notching out unwanted whistles.
Price: £59.00 plus VAT (£67.85 total).

MODEL AD170 ACTIVE ANTENNA

For sensitive reception right through from MSF at 60 kHz to Band 1 TV DX around 50 MHz, without the need for an antennae farm, MODEL AD170 has no adjustments and needs no external tuning units.
Although only three metres long, MODEL AD170 has the same directional properties as a full size dipole, even at 60 kHz.
Price: £33.00 plus VAT (£37.95 total); Special price complete with mains power unit: £37.00 plus VAT (£42.55 total).

NEW SHORT FORM CATALOGUE AVAILABLE FREE ON REQUEST (QUOTE REF. RC12)

ALL PRICES QUOTED INCLUDE POST & PACKING

If you wonder how our products blend into a station, October's Rad. Com. gives some nice examples; out of the 7 photographs of members shacks, 4 show Datong equipment in use – (three FL1's, two RFC's and a UC1)

DATONG ELECTRONICS LIMITED

Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE, England. Telephone: (0532) 552461

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PRICES SHOWN EXCLUDE VAT; UK CUSTOMERS PLEASE ADD 15%

S18 AND S19 ARE NOW ADDED TO OUR STOCK RANGE

CRYSTAL FREQUENCY RANGE USE (TX or and HOLDER) / OUTPUT FREQUENCY	4MHz-TX-HC6U	6MHz-TX-HC25U	8MHz-TX-HC6U	10MHz-RX-HC6U	11MHz-RX-HC6U	12MHz-TX-HC25U	14MHz-RX-HC25U	18MHz-TX-HC25U	36MHz-TX-HC6 & 25U	44MHz-RX-HC6U	44MHz-RX-HC25U	48MHz-TX-HC6 & 25U	52MHz-RX-HC25U	72MHz-TX-HC25U
144.4 (433.2)	b	e	b	e	e	b	e	e	e	e	e	e	e	e
144.480	e	e	e	e	e	e	e	e	e	e	e	e	e	e
144.800	c	e	e	e	e	c	c	c	e	c	c	e	e	e
144.850	e	e	e	e	e	e	e	e	e	e	e	e	e	e
145.000/R0T	a	b	a	c	c	a	b	b	c	a	a	c	b	e
145.025/R1T	a	b	a	e	e	a	e	b	e	e	e	e	e	e
145.050/R2T	a	b	a	e	e	a	e	b	e	e	e	e	e	e
145.075/R3T	a	b	a	e	e	a	e	b	e	e	e	e	e	e
145.100/R4T	a	b	a	e	e	a	e	b	e	e	e	e	e	e
145.125/R5T	a	b	a	e	e	a	e	b	e	e	e	e	e	e
145.150/R6T	a	b	a	e	e	a	e	b	e	e	e	e	e	e
145.175/R7T	a	b	a	e	e	a	e	b	e	e	e	e	e	e
145.200/R8T	a	b	a	e	e	a	b	b	e	a	a	e	b	e
145.300/S12	e	e	e	e	e	e	e	e	e	e	e	e	e	e
145.350/S14	e	e	c	e	e	c	c	c	e	c	c	e	e	e
145.400/S16	e	e	e	e	e	e	e	e	e	e	e	e	e	e
145.425/S17	e	e	e	e	e	e	e	e	e	e	e	e	e	e
145.450/S18	a	e	a	e	e	a	b	b	e	a	a	e	e	e
145.475/S19	a	e	a	e	e	a	b	b	e	a	a	e	e	e
145.500/S20	a	b	a	c	c	a	b	b	e	a	a	e	b	e
145.525/S21	a	b	a	c	c	a	b	b	e	a	a	e	b	e
145.550/S22	a	b	a	c	c	a	b	b	e	a	a	e	b	e
145.575/S23	a	b	a	c	c	a	b	b	e	a	a	e	b	e
145.600/R0R	a	b	a	c	c	a	b	b	e	a	a	e	b	e
145.625/R1R	e	e	e	e	e	e	b	e	e	a	a	e	b	e
145.650/R2R	e	e	e	c	e	e	b	e	e	a	a	e	b	e
145.675/R3R	e	e	e	c	c	e	b	e	e	a	a	e	b	e
145.700/R4R	e	e	e	c	c	e	b	e	e	a	a	e	b	e
145.725/R5R	e	e	e	c	c	e	b	e	e	a	a	e	b	e
145.750/R6R	e	e	e	c	c	e	b	e	e	a	a	e	b	e
145.775/R7R	e	e	e	c	c	e	b	e	e	a	a	e	b	e
145.800/R8R	a	b	a	c	c	a	b	a	e	a	a	e	c	e
145.950/S38	a	e	e	a	e	e	e	e	e	a	e	e	e	e

TWO METRE CRYSTAL RANGE

PRICES: (a) **£1.95**, (b) **£2.32**, (c) **£2.80**, (d) and (e) **£3.94. AVAILABILITY:** (a), (b), (c) and (d) 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 supply from stock. **N.B.** Frequencies as listed above but in alternative holders and/or non stock loadings 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 EQUIPMENTS

We can supply crystals for **YAESU** FT2F, FT2FB, FT2 Auto, FT224, most of the **ICOM** range and the **TRIO-KENWOOD** range. We can also supply from stock crystals for the **HEATHKIT** KW202 and HW17A.

CRYSTALS FOR THE BRITISH 70CM CHANNELS

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

We are stocking the following channels: RB0 (434·60/433·00), RB2 (434·65/433·05), 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 (PF1) and STORNO CQL/CQM 662 all at **£2.32**. For the U450L Base Station we have the TX crystals for all the above channels **£2.32**. 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.

4m CRYSTALS FOR 70·26MHz – HC6/U

TX8·7825MHz and RX6·7466MHz or 29·7800MHz **£2.32**

10·245MHz "ALTERNATIVE" I.F. CRYSTALS-£2.32 For use in Pye and other equipment with 10·7MHz and 455kHz I.F.s to get rid of the "birdy" just above 145·0MHz. In HC6/U, HC18/U and HC25/U.

CRYSTAL SOCKETS – HC6/U. HC13/U and HC25/U (Low loss) 16p each. **10p** P. & P. per order (P. & P. free if ordered with crystals).

CONVERTER/TRANSVERTER CRYSTALS – HC18/U

All at **£3.00**, 38·6666MHz (144/28), 42MHz (70/28), 58MHz (144/28), 70MHz (144/4), 71MHz (144/2), 96MHz (342/52), 96MHz (1,296/432/144), 101MHz (432/28), 101·50MHz (434/28), 105·6666MHz (1,296/28) and 116MHz (144/28).

TEST EQUIPMENT FREQUENCY STANDARD CRYSTALS

100kHz in HC13/U and 200kHz and 455kHz in HC6/U, **£2.95**.
1MHz and 5MHz in HC6/U and 10MHz and 10·7MHz in HC6/U and HC25/U, **£2.80** (£3.02).

ANZAC MD-108 DOUBLE BALANCED MIXER

5-500MHz supplied with full details for only **£5.95**.

CRYSTALS FOR PROFESSIONAL USE

We can supply crystals to most commercial and MIL specifications, with an express service for that urgent order. Also for commercial use, eg TV or computer crystals, etc, we can supply at very competitive prices. Please send S.A.E. for details or telephone between 4.30-7pm and ask for Mr Norcliffe.

EXPRESS SERVICE

Many types of made-to-order crystals are available on our "EXPRESS SERVICE" – with delivery of three days on our class "A" service. Telephone or Telex for details.

TERMS: CASH WITH ORDER – MAIL ORDER ONLY – S.A.E. WITH ALL ENQUIRIES – PRICES INCLUDE P. & P. (BRITISH ISLES) EXCEPT WHERE STATED – OVERSEAS CHARGED AT COST.

CRYSTALS MANUFACTURED TO YOUR SPECIFIC REQUIREMENTS

Prices shown are for one off to our amateur specs; 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 19·999kHz	**£28.12**	80 to 99·999kHz	**£7.30**
20 to 29·999kHz	**£17.75**	100 to 149·99kHz	**£6.68**
30 to 59·999kHz	**£15.51**	150 to 499·99kHz	**£6.20**
60 to 79·999kHz	**£12.41**	500 to 799·99kHz	**£7.30**

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

Adj. tol. ±20ppm, Temp. tol. ±30ppm – 10 to +60°C

†800 to 999·9kHz (fund)	**£9.50**	*25 to 30MHz (fund)	**£7.56**
*†1·0 to 1·499MHz (fund)	**£9.45**	*15 to 20·99MHz (3 O/T)	**£4.72**
*†1·5 to 2·599MHz (fund)	**£4.21**	*21 to 62·99MHz (3 O/T)	**£3.94**
*†2·6 to 20·99MHz (fund)	**£3.94**	*60 to 105MHz (5 O/T)	**£4.53**
*ø3·4 to 3·999MHz (fund)	**£5.43**	*105 to 125MHz (5 O/T)	**£7.09**
*ø4·0 to 5·999MHz (fund)	**£4.21**	125 to 180MHz (O/T)	**£6.48**
* 6·0 to 20·99MHz (fund)	**£3.94**	180 to 250MHz (O/T)	**£10.64**
* 21 to 24·99MHz (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.
Mid and High frequencies are available in HC6/U, HC18/U or HC25/U unless marked † only available in HC6/U or ø only available in HC18/U and HC25/U.
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BC157	9p	4002	22p	7402	15p	·047 mfd 1·25KV poly	5p
BC179	14p	4007	28p	7404	13p	·1 mfd 100v poly	4p
BC182	9p	4011	20p	7405	13p	·1 mfd 1KV cased paper	9p
BC183	8p	4012	22p	7406	24p	·22 mfd 100v poly	6p
BC184B	8p	4013	45p	7408	13p	·22 mfd 250v poly	6p
BC209C	8p	4015	80p	7409	16p	·47 mfd 50v poly	6p
BC213B	8p	4016	40p	7410	13p	·47 mfd 300v ceramic	3p
BC261	14p	4017	90p	7413	23p	2·2 mfd 25v elect.	7p
BD136	35p	4018	90p	7414	55p	10 mfd 16v elect.	7p
BD139	40p	4020	99p	7420	13p	10 mfd 25v elect.	8p
BF257	45p	4022	80p	7430	14p	22 mfd 16v bead tant	14p
BFT40	60p	4023	22p	7432	20p	22 mfd 25v elect.	7p
MPS2369	9p	4024	66p	7440	13p	25 mfd 25v elect.	7p
MPS6561	8p	4025	18p	7442	40p	47 mfd 25v elect.	7p
OC25	90p	4026	115p	7445	65p	50 mfd 50v elect.	5p
OC84	35p	4027	40p	7447	50p	68 mfd 25v elect.	7p
OC204	190p	4028	115p	7448	50p	1500 mfd 16v elect.	9p
OC207	150p	4029	59p	7472	21p	**Diodes**	
TIP31	40p	4030	60p	7473	23p	AA119	13p
TIP33A	85p	4033	121p	7474	22p	BAX16	5p
TIP33C	140p	4040	85p	7475	30p	BYX22-400 1·4A 400v	25p
TIP41A	70p	4042	75p	7476	23p	BYX38-600 6A 600v	25p
TIP121	60p	4043	60p	7483	58p	BYX42-300 12A 300v	98p
TIS74	45p	4044	80p	7486	23p	OA10	60p
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2N709	25p	4049	39p	7490	30p	1N539	30p
2N914	25p	4050	35p	7492	35p	1N1201A 12A 150v	60p
2N930	18p	4051	60p	7493	37p	1N3004	120p
2N1131	15p	4052	60p	7496	55p	1N3889 18A 50v	150p
2N2297	29p	4053	75p	74116	125p	1N4001	5p
2N2905	16p	4060	90p	74121	28p	1N4002	4p
2N2905A	22p	4066	53p	74122	45p	1N4003	4p
2N3054	45p	4068	29p	74123	40p	1N4004	4p
2N3114	99p	4069	18p	74125	55p	1N4005	5p
2N3444	65p	4071	20p	74126	35p	1N4006	5p
2N3567	35p	4072	29p	74132	45p	1N4007	6p
2N3585	109p	4073	16p	74141	55p	1N5407 3A 800v	12p
2N3638	8p	4075	16p	74150	65p	1S923	10p
2N3645	11p	4077	16p	74151	45p	1S3051A	18p
2N3707	10p	4078	29p	74157	45p	**Zener's**	
2N3789	130p	4081	19p	74161	65p	BZY88 Series 2v7, 3v, 3v3,	
2N3962	60p	4082	29p	74164	64p	3v6, 3v9, 4v3, 4v7, 5v6, 6v8,	
2N4032	45p	4093	60p	74165	64p	7v5, 9v1, 10v, 12v, 15v, 16v,	
2N4036	20p	4502	85p	74190	75p	18v, 20v, 22v, 24v, 27v, 30v, 33v	7p
2N4122	10p	4510	75p	74191	70p	10 off any value/comb.	55p
2N4124	7p	4511	115p	74196	60p	BZY95 33v 1·5 watt	40p
2N4249	7p	4512	85p	**Linear's**		ZPY27 25v 1·37 watt	16p
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2N4858A	45p	4515	190p	LM312	190p	1N4732 4v7 1 watt	12p
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2N5246	30p	4528	115p	709	30p	1N4737 7v5 1 watt	12p
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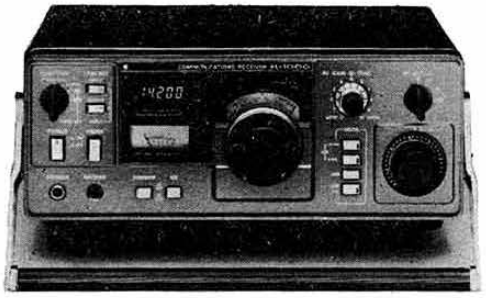

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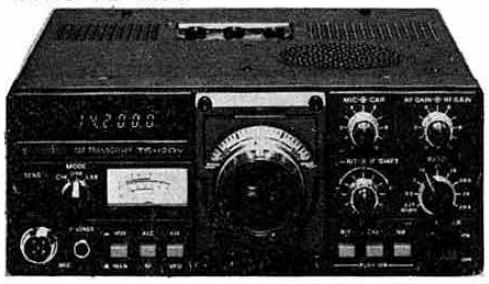

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