August 1980

radio communication

journal of the Radio Society of Great Britain

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TRIO PRICE LIST (inc VAT)

TS820	160-10m transceiver 200W PEP	£669.30	TR9000	2m synthesised multimode mobile	£345.00
DG1	Digital readout to 100Hz	£121.90	BO9	Base plinth for TR9000	£32.00
SP820	Speaker	£37.95	TS770E	2m/70cm all mode dual bander	£763.00
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R820	The ultimate matching receiver to the TS820	£690.00	RM76	Microprocessor control unit	£40.00
YG455C	CW filter 500Hz	£58.65	TR2300	2m FM portable transceiver PLL with all 80 FM channels	£166.75
YG455CN	CW filter 250Hz	£60.95	VB2300	10W booster	£49.45
YG88A	AM filter 6kHz	£34.50	MB2	Mobile mount	£17.25
TS520SE	160-10m Transceiver	£437.00	RA1	Helical rubber antenna	£6.90
SP520	Speaker	£17.25	PS1200	Power unit and charger TR2300/3200/2200GX	£29.50
VFO520S	External VFO	£98.90	TR2400	2 meter synthesised handheld transceiver	£210.45
YG3395C	8 pole CW filter	£37.95	ST1	Base stand and quick charger	£43.70
DG5	Digital display/counter	£103.50	BC5	12V quick charger	£17.25
TS120S	80-10m mobile transceiver 200W PEP	£432.40	SC3	Carrying Case	£11.50
TS120V	80-10m mobile transceiver 20W PEP	£347.30	TS180S	160-10m solid state transceiver	£589.95
PS20	AC power supply for TS120V	£44.85	TS180S	As above but with digital frequency control	£679.65
MB100	Mobile mounting bracket	£17.25	VFO180	External VFO	£96.60
YK88C	500Hz CW filter	£28.75	SP180	Speaker	£36.80
SP120	External speaker	£25.30	DF180	Digital frequency control	£104.65
VFO120	External VFO	£89.70	AT180	1·8-30MHz antenna tuner	£95.45
AT120	Antenna tuner (100W)	£55.20	PS30	AC power unit for TS180S	£85.10
PS30	AC PSU for TS120S	£85.10	TR8300	70cm FM mobile 10W transceiver fitted 4 channels	£225.00
AT200	1·8-30MHz antenna tuner	£82.80	TR3200	70cm FM handy transceiver fitted 3 channels	£164.45
SM220	Monitor scope	£197.80	PB10	Pack of 10 ni-cad batteries	£10.35
BS5	TS520 scanboard for SM220	£48.30	R1000	0·2-30MHz receiver	£297.85
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TL120	80-10m 200W linear	£128.80	R300	General coverage receiver	£149.50
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MC50	De luxe desk microphone dual impedance PTT locking bar	£24.15	HS4	Communications headphones, tailored response	£10.35
MC35S	50K fist microphone	£13.80	LF30A	HF low pass filter 1kW 90dB, stop band rejection	£18.40
MC30S	500 ohm fist microphone	£13.80	RD300	High power dummy load	£48.30

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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

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ABC
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

23,743 copies per issue average circulation in 1979

Closing date for contributions unless otherwise notified: five weeks before publication date

ANNOUNCING A NEW COMMUNICATIONS COMPUTER

TONO THETA 7000E

The new Theta 7000E means that every Amateur can enjoy the visual display of CW, RTTY, and ASCII in both transmit and receive modes. Just connect the TONO to any TV set via the antenna terminals or to a page printer from the parallel port provided. Bring up your CW speed in receiving or sending by either watching receiver sent or from recorded cassettes. Connection to the transceiver is via the key, phone and mic sockets.

THETA 7000E. SOME OF THE OUTSTANDING FEATURES
VHF and Composite video output provided

Printer interface
Wide range of transmitting and receiving speeds—10CW speeds + 8RTTY
Built in demodulator for high performance for 170, 425 & 820Hz shift
Crystal controlled modulator for AFSR—Hi or Lo tone
Convenient ASCII key arrangement
Large capacity display memory—2 pages 32chr × 16 lines split screen for Rx & Tx if required
Automatic transmit/receive switch
Anti noise circuit
Battery backed-up memory 7 channels of 64 chrs
Send function
Buffer memory—53 character type ahead
Rub out function
Simultaneous access of the memory
Pre-loading function
CR (carriage return) LF (Line feed) cancel function
Cursor control function
Word Mode operation
Automatic CR/LF (72, 60 or 80 chrs per line)
Echo function
Word Wrap around function
Transmit/receive in ASSCII mode in RTTY
CW identification function
Mark and break (space and break) system
Monitor circuit
CW practice function
Variable CW weights
Cross pattern checking output terminal
Log computer output provided
Test message function (Ry and QBF)

£640.00 inc

THE ICOM SIDEBAND PORTABLES

IC-202S
£169 inc VAT

IC-202S

The IC-202S is a very well designed 2m SSB portable. It offers: 3W pep output on USB, LSB and CW. * Large Battery capacity (HP11 type) or Nicads if you wish * A special VXO circuit to provide smooth tuning and crystal stability needed for SSB operation on 2m. * Each of the four 200 kHz band positions allows operation anywhere in 2m. (Supplied with 144·144·2 and 144·2–144·4) * Top of the band Oscar xtals available for "cross-pond working" * It has a DC socket and SO239 sockets for mobile or base station working, barefoot or as a prime mover. * Mobile mounting brackets, Nicad packs, chargers, cases all available options. You must agree, a very versatile well proved rig.

IC-402
£242 inc VAT

IC-402

The 70cm twin of the 202S having very similar features, covering the frequency range of 432–435·2 MHz.

BARCLAYCARD VISA

FROM **THANET** OF COURSE

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 TW 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

Please note that from THANET you get a full year's warranty on *all* parts and labour (including PA's). Orders direct to us are despatched free using registered first class post.

FROM THANET OF COURSE

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.

APPROVED TRIO DEALER

7. Power output of over 1·5W 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 TS180S

APPROVED TRIO DEALER

£679.65 inc VAT
(including DFC memory unit)

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.

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

APPROVED TRIO DEALER

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

R1000

APPROVED TRIO DEALER

£298.00 inc VAT

THIS PRICE INCLUDES DC KIT FITTED

The R1000 uses an advanced PLL system in an up-conversion scheme to a high (48MHz) first IF to remove any possibility of image responses. The receiver covers the entire frequency range from below 200kHz right up to 30MHz in 30 bands, each 1MHz wide. The bands are selected, not by ambiguous knob twiddling as in receivers using the Wadley loop but by a 30 position band switch which controls the PLL system.

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

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

As for what else is inside this superb instrument—selectivity is catered for by three custom made IF filters; a 12kHz wide AM filter; 6kHz narrow AM filter; and a new 2·7kHz SSB filter with a shape factor of better than 1:2 6:60dB. Selectable sidebands are available at the touch of a switch. As an option, on request, you can have 6kHz AM wide, 2·7kHz AM narrow and 2·7kHz SSB. The 12kHz filter remains in the set for use if required.

For the first time in mid-price receiver, a true noise blanket is provided to remove pulse type ignition noise.
To minimise front end overload, a step RF attenuator is included which gives 0·6dB attenuation in four steps.

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

TRIO

R820

APPROVED TRIO DEALER

£690.00 inc VAT

The R820 represents the ultimate receiver for the amateur radio operator, with more facilities than ever before available in a ham band receiver. The R820 covers all current amateur bands from 160 to 10 metres as well as the 49, 31, 25, 19 and 16 metre broadcast bands. Typical sensitivity of 0·15 microvolts for 10dB S/N ratio gives you an idea of its performance, and the combination of the famous Trio passband tuning (IF shift) system together with fully variable bandwidth makes it easy to dig down in the noise and hear signals that the others can't.

Using a separate IF system at 50kHz to provide a stable notch filter gives the operator a guaranteed 50dB notch depth (minimum), and using a further IF shift system makes the notch frequency tunable without degrading its performance.

Everything that you need in a receiver is given to you in the R820—switchable AGC time constants, RIT, noise blanker, adjustable noise threshold, all mode AM, CW, USB, LSB, RTTY provision, RF attenuator in 10dB steps, full tranceive operation with the TS520 or TS820 series equipment, digital readout with hold facility, true S meter calibration in S units *and* microvolts, and so much more.

A detailed leaflet is available from your authorised Trio dealer and we can supply an unbiased test report from QST. Contact us now for full information on the superb R820 from Trio.

THE FINEST RECEIVERS AROUND

LOWE ELECTRONICS Ltd

TRIO TR9000

APPROVED TRIO DEALER

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

NEW! TS770E

2 metre and 70 cm MULTIMODE

£763.00 inc VAT

The only dual band high performance transceiver available today. The TS770E 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 TS770E 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 TS770E.

Fitted with repeater shifts of 600KHz for 2m, 1·6MHz and 7·6MHz for 70cm. Repeater shifts are automatically correct for the band in use, even on the memory channels.

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

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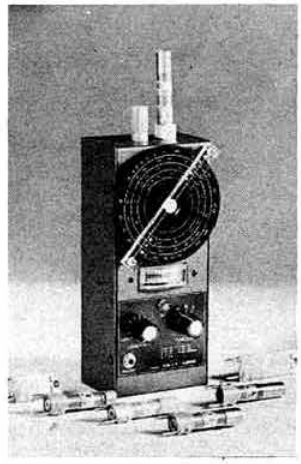
THE COMPLETELY NEW APPROACH TO VHF/UHF

LOWE ELECTRONICS Ltd

FX1

STATION WAVEMETER

£28 inc VAT



The Lowe FX-1 wavemeter is a totally new instrument which will form a necessary part of every amateur station. Covering the range 700kHz to 250MHz in seven bands, the FX-1 has high sensitivity meter indication, amplified LED indicator, and audio output for headphone monitoring of the signal. A separate antenna terminal is also provided for connection of an external pickup antenna if it is required.

The set of seven coils are all enclosed in protective sleeves, and the coils for the ranges 42–110 and 83–250MHz are of printed construction for real stability. The tuning dial is easy to read and is colour coded to match the coils. The complete coil set is housed inside the unit so you should never encounter the irritating situation when the coil you need has been mislaid.

Housed in a rugged metal case measuring 176 × 74 × 65mm, the FX-1 is a good looking, high performance wavemeter and should certainly be in every amateur radio station.

CNA1001 ANTENNA TUNER £129.95 inc VAT

The new CNA1001 antenna tuner from Daiwa has already changed the whole concept of antenna tuning in the amateur radio station. No longer do you have to fiddle with this control and that control in order to reach a match condition, simply push a button and let the tuner do it for you.

The CNA1001 incorporates a sensitive reflected power detector which monitors SWR all the time. At the first push of the operate button, a motor driven gearbox drives the load and match variable capacitors through their entire range in overlapping small increments seeking a correct match. When matching is achieved, the motor drive stops and that's that. The CNA1001 needs only a small sniff of RF to work on (typically 5 watts) so you needn't worry about blowing up your PA, and it covers all the current and future amateur bands from 3–30MHz, includes switching for two antenna systems, a 10 watt (50 watt 1 minute) dummy load and best of all includes a CN620 cross needle power and SWR meter.

The CN620 section measures power from 0–200W in two ranges and reflected power from 0–40W together with the unique Daiwa cross pointer SWR system. All this in one compact unit requiring only 12V dc to drive the tuning motors.

CNA1001 Specification

SWR/Power meter.	Frequency range	3–30MHz
	Line impedance	50 Ohms
	Power ranges Forward	20/200 Watts
	Reflected	4/40 Watts
	Meter accuracy	± 10% of full scale
	Power rating	500W pep
	Input power for auto tune	1–10W
Tuner	Frequency	3·5,7,10,14,18,24,28MHz
	Input impedance	50 Ohms
	Output impedance	10–250 Ohms
	Operate time	45sec maximum

Size 225 × 90 × 245mm Weight 3·6kg Dummy load 10W (50W 1 minute)
Outputs for two antenna systems SO239 connectors

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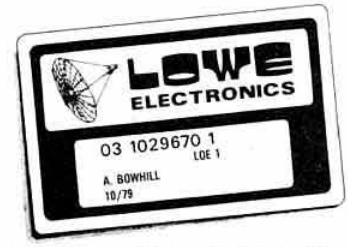
APPROVED TRIO DEALER

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

TS520SE

In the face of ever increasing complexity in amateur radio equipment, it's comforting to know that the TS520SE is still in volume production. Radio amateurs all over the world (and dealers too) have voted the TS520SE "my favourite transceiver" because of its astounding reputation for reliability, high sensitivity receiver, and of course the unequalled Trio audio quality coming from the transmitter. The TS520SE incorporates all of the features demanded by today's amateur, and at an outstandingly low price. No wonder it's top of the list in popularity, and comparison with other transceivers will convince you that the TS520SE is the best value for money on the market today.

Of course, the bare figures cannot tell you just how nice the TS520SE feels in use, nor can they tell you the pleasure of hearing other operators saying "never heard better audio OM, what rig are you using?"

The TS520SE standard specification includes CW wide/narrow switching (using the optional 500Hz filter), semi breakin keying with sidetone, PTT or VOX operation, really effective noise blanker, switched AGC time constants, 5 function metering, switched RF attenuator, RIT, speech processing for punchy transmit audio, fixed channel facilities, 25kHz calibrator, fan cooled PA, internal loudspeaker, and of course the TS520SE will take all the wide range of current matching accessories including the DG5 true frequency digital readout, the VFO520S remote VFO unit, the SM220 station monitor scope and panoramic display and so on.

When talking to prospective purchasers of the TS520SE, the question we are most often asked is "how does it compare in price to its rivals?" and the transceiver it is most compared with is the Yaesu FT101Z series. The price for the **FT101Z** taken from March 1980 RadCom is **£575** including VAT and you also should add PA fan at **£13.80** (the fan is standard on the TS520SE) making a grand total of **£588.80.**

THE TS520SE COSTS £437 INCLUDING VAT.

Now tell me if that's not value for money .....

VOTED "MY FAVOURITE TRANSCEIVER" BY RADIO AMATEURS WORLDWIDE

SPECIFICATIONS

GENERAL

Frequency Range:	160 meter band-1·8 to 2·0MHz 80 meter band-3·5 to 4·0MHz 40 meter band-7·0 to 7·5MHz 20 meter band-14·0 to 14·35MHz 15 meter band-21·0 to 21·5MHz 10 meter band-28·0 to 28·5MHz 28·5 to 29·1MHz 29·1 to 29·7MHz WWV -15·0MHz (receive only)
Mode:	SSB (USB,LSB), CW
Antenna Impedance:	50 to 75 Ohms
Frequency Stability:	Within ±1KHz during one hour after one minute of warm-up, and within 100Hz during any 30 minutes period thereafter
Tubes and Semiconductors:	Tubes. .3(2 × 6146B, 1 × 12BY7A Transistors..... 52 FETs..... 19 Diodes..... 101
Power Requirements:	120/220 V AC, 50/60Hz
Power Consumption:	Transmit: 280 Watts Receive: 26 Watts (with heater off)
Dimension:	333 (13·1/8) wide × 153 (6·0) high 335 (13·3/16) deep mm(inch)
Weight:	16·0kg (35·2lbs)

TRANSMITTER

RF Input Power:	SSB:200 Watts PEP CW: 160 Watts DC
Carrier Suppression:	Better than 40dB
Sideband Suppression:	Better than 50dB
Microphone:	High impedance microphone (50k Ohms)
AF Response:	400 to 2,600Hz

RECEIVER

Sensitivity:	0·2μV for 10dB (S + N)/N
Selectivity:	SSB: 2·4kHz/-6dB, 4·4kHz-60dB CW: 0·5kHz/-6dB, 1·5kHz/-6dB (with optional CW filter)
Image Ratio:	Better than 50dB
IF Rejection:	Better than 50dB
AF Output Power:	2 Watts (8 Ohms load, with less than 10% distortion)
AF Output Impedance:	4 to 16 Ohms

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! £168 inc VAT

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

WATERS & STANTON ELECTRONICS

18/20 MAIN ROAD, HOCKLEY, ESSEX. Tel: (03704) 6835

FDK VHF/UHF FACTORY FRESH IMPORTED DIRECT BY US

FDK MUTLI-700EX

2m 25W OUTPUT
+ PRIORITY SCANNING

COMPARE THE PRICE **£199 inc VAT**

- Full coverage of the 144-146MHz band with facilities for 12·5kHz steps anywhere in the band.
- Large four digit LED frequency display tuned in 40 × 25kHz steps in each 1MHz range.
- A specially designed five stage helical-resonator assembly together with the latest dual-gate MOSFET front end ensures excellent cross-modulation characteristics.
- Built-in crystal controlled automatic tone-burst with ±600kHz shift for repeater operation and optional + 1·6MHz shift for use in conjunction with FDK/MUV-430A UHF transverter.
- Four additional priority channels-two diode matrix programmable in 12·5kHz steps and two crystal controlled for any frequency between 144-146MHz.
- Channel scanning of two chosen channels either synthesizer/matrix or matrix/crystal.
- Continuously variable RF output control from 1-25 watts.
- Advanced PLL technology provides good stability with low spurious output; integral power supply noise filter eliminates vehicle line noise and an automatic protection circuit protects the RF output power module against poor SWR, open or short circuit.

£199 inc VAT

MOBILE SAFETY MICS

We have a shipment of safety mics due in by the time you read this advert. The model 202S clips onto the lapel and comes with gear lever control box at £20.95. Also coming is model 202H which has a neck band and boom plus gear lever control box, incorporating up/down frequency control and tx/rx switch. £29.95. These mics suit all transceivers except the ICOM IC255.

FDK MULTI-750E

2m (& 70cm) ALL-MODE

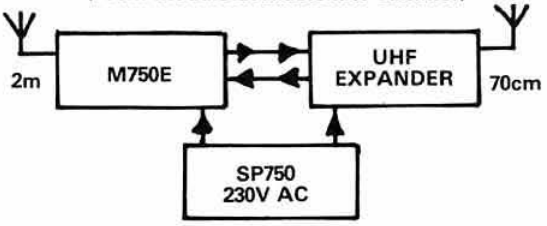
AMAZING VALUE **£299 inc VAT**

- Simple and smooth VFO control gives either 100Hz or 5kHz steps on both FM and SSB modes for optimum convenience.
- The large green fluorescent display tube gives full frequency readout to 100Hz and provides safe and clear readout for both night and day operation.
- Standard features include noice-blanker, RIT control with switch, RF attenuator gain control, automatic crystal controlled tone-burst, high and low power switching and remote up/down frequency control microphone unit.
- Compare its compact size and light weight, its smart appearance and comprehensive front panel controls. Simple and reliable operation is made possible by employing advanced solid-state and logic techniques.
- A dual VFO is employed for the selection of two independent frequencies anywhere in the band. This also enables split frequency operation, particularly useful when used in conjunction with the optional "UHF-EXPANDER" transverter.

For normal repeater operation a pre-programmed shift is selected by front panel selector.

M750 BUILDS INTO A 2m & 70cm PACKAGE

(70cm module available late summer)



FDK products are distributed by:

FDK UNITED KINGDOM, WARREN HOUSE, MAIN ROAD, HOCKLEY, ESSEX, ENGLAND.

WATERS & STANTON ELECTRONICS

FDK

VHF PRODUCTS

12 MONTHS WARRANTY PARTS & LABOUR

Send SAE for full details

FDK **VHF TM56B MONITOR**

CHANNEL SCANNING

230VAC/12VDC

The TM56 is one of our most popular models, combining great performance with modest price. The TM56B has the basic receiver design of our mobiles and includes its own 230 volt AC supply, plus external 12v DC input. 12 fixed channel positions are included, plus 4 autoscan positions. Any one of the Autoscan channels can be cancelled. Price includes 10 channels, R3, R4, R5, R6, R7, S0, S20, S21, S22 and S23, necessary leads, etc, and 12 month guarantee. At **£106** it is unbeatable! 10 channel marine version **£115** inc VAT.

MULTI-3000 2m ALL MODE £395 inc VAT

£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

FDK **PALMSIZER**

40 × 25kHz Channels 145–146 MHz
BULK SHIPMENT AT SUPER PRICE!
£149 inc. VAT buys this. . . . . .

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

A complete station in one package. Over one watt of FM capable of operating on any frequency in the FM band-plan. The convenience of changing frequency in 25kHz steps and selecting any frequency either simplex or repeater wherever you happen to be in the UK. Surely a must for the travelling man. It's as much at home in a hotel bedroom as it is in the home QTH on the main aerial. If you want the added convenience of an external microphone, this is available at £11 and the matching case with external battery pouch is £9.75. Whichever way you look at it you have to admit that a synthesized 40 channel handheld with ni-cads charger and helical whip for £149 has to be an absolute bargain—plus our 12 month parts and labour guarantee—send for yours now.

WATERS & STANTON ELECTRONICS

REMEMBER—WE CAN SUPPLY MOST MAKES OF EQUIPMENT —CASH/CREDIT CARD OR HP—AND WE DO HAVE A FULLY STAFFED SERVICE DEPT.

TELEPHONE SALES (03704) 6835

YAESU—SALES PLUS
AFTER SALES SERVICE !

(NEW FT480 2m SSB transceiver in stock)

FRG7
RECEIVER
£189 inc. VAT
0·5–30MHz
Securicor Delivery £4.50 extra

FRG7000
RECEIVER
£339 inc. VAT
Digital readout
0·2–30MHz

FT707 (10W) £472
FT707 (100W) £499 inc. VAT
12v DC transceiver
80–10 metres
plus New bands!
Free Securicor delivery

FT101Z £546 inc. VAT
FT101ZD £628 inc. VAT
160–10M transceiver
230v AC operation
Free Securicor delivery

ROTATOR OFFER

SU2000
VHF LIGHTWEIGHT ROTATOR
Ideal for small VHF/UHF beams
Uses 3 core cable — look at the price!

£29.95

carriage £2.00 extra

DenTron . . .
WE ARE SOLE FACTORY APPOINTED DISTRIBUTORS

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 5¾" × 14" × 14"
- Weight 47lb.
- Ideal for SSTV/RTTY
- 3rd order down 30dB +
- 40 watts drive for 1kW

160–10m ATU's also in stock

DenTron GLA1000

£295
inc VAT
& DELIVERY

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.5$\frac{3}{16}$" × 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.

CLIPPERTON "L"
160–10 METRES
2kW INPUT

£495 inc. VAT

Free Securicor delivery

The Clipperton 'L' amplifier is a completely self-contained unit covering all amateur bands and uses 4 × 572B tubes. Forced air cooling ensures long tube life and makes it ideal for contests, RTTY, SSTV etc. This linear was used in the famous Pacific Clipperton expedition and as sole authorised UK importers, our stock comes direct to us from the factory in the USA.

WATERS & STANTON ELECTRONICS

TRIO

APPROVED TRIO DEALER

NEW LOW PRICES ALL MODELS STOCKED

24 HOUR DELIVERY—
—FROM THE PEOPLE YOU CAN TRUST

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
(Limited stocks at this price)

NEW LOW PRICE UNBEATABLE

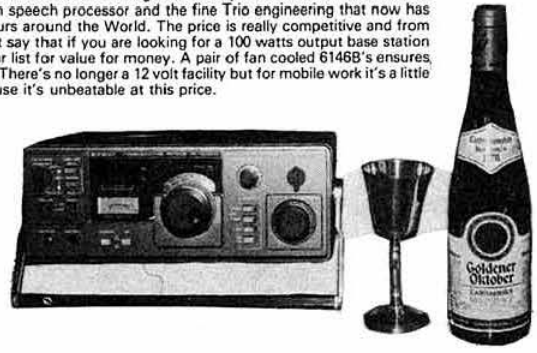
For the operator that wants an HF transceiver on a budget this surely must be the answer. 160–10 metres (full coverage) with built-in speech processor and the fine Trio engineering that now has become a legend amongst amateurs around the World. The price is really competitive and from tests we have carried 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 RECEIVER

YOUNG—BUT VERY MATURE!

Every one is individually tested by us and despatched by Securicor

£298 inc VAT—A REAL WINNER



REMEMBER—WE CARRY THE FULL TRIO RANGE AND ALL STOCK COMES FROM THE APPOINTED UK DISTRIBUTOR. DON'T TAKE CHANCES—BUY FROM WSE

NEW TRIO TR9000

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.

2 METRE FM/SSB/CW MOBILE OR BASE ONLY

£345 inc VAT

NEW TS770E
2m/70cm IN STOCK £763
NEW TR7800
2m FM-25W IN STOCK £268

The new Trio TR9000 heralds the beginning of a new era in 2 metre mobile or base station operation. A host of new features that makes its direct competitor look pretty expensive! FM has two tuning rates either 25kHz or 12½kHz per step. On SSB the tuning rate is in 100Hz steps or with the search button depressed, it will step in 10kHz at the same time searching for signals within each 10kHz segment. Dual VFO enables the operator to hold one frequency whilst searching for another. The inclusion of five memory channels provides for the storage of your five favourite frequencies.
Built-in scan permits FM scanning 25 or 12½kHz steps with momentary pauses on busy channels whilst providing continuous scanning of SSB/CW over 2MHz. Positive or negative repeater shifts are already programmed into the unit. For base station use, the PS20 AC supply can be used plus the SP120 external speaker and the BO-9 system base plinth. An exciting rig at a very reasonable price. Send today for details.

DELIVERY BY SECURICOR
Order by post or telephone with confidence – you'll receive your order in 72 hours by Securicor or post (aerials excepted).

'Such nice people'

WATERS & STANTON

OUR BEST ADVERTISEMENT . . . IS OUR NAME!

MAIL ORDER – Anywhere in UK
HEAVY PARCELS – Securicor
OTHER PARCELS – Parcel Post or British Rail
All goods sent are covered free by our own insurance
PLEASE PHONE FOR QUOTATION ON ANY ITEMS NOT LISTED
COMPETITIVE PRICES ON ALL YAESU ITEMS

TRIO

TS820S 160-10m transceiver 200w digital	£791.00 (3.75)
TS820 160-10m less digital	£669.00 (3.75)
SP820 External speaker	£37.95 (1.50)
TS520SE 160-10m transceiver 200w	£437.00 (3.75)
SP520 External speaker	£17.25 (1.25)
VFO520S External VFO	£98.90 (3.75)
TS120S 80-10m Solid state 200w	£432.00 (3.75)
TS120V 80-10m Solid state 10w	£347.30 (3.75)
PS20 AC PSU (TS120V)	£44.85 (3.75)
PS30 AC PSU ITS 120S & TS 180S	£85.10 (3.75)
MB100 Mobile mount	£17.00 (0.75)
AT120 3-30MHz ATV	£55.00 (4.50)
AT200 1-8-30MHz ATU	£82.80 (1.50)
MC50 Desk microphone (Super!)	£24.15 (1.50)
MC30S Noise cancelling hand mic.	£13.80 (0.50)
TR7600 2m FM + RM76	£220.00 (4.50)
TR2300 2m FM portable 80ch	£166.75 (3.75)
MB2 Mobile mount (2300)	£17.25 (1.00)
TS180s 160-10m solid state transceiver	£679.00 (3.75)
TS770E 2m/70cm transceiver	£763.00 (3.75)

YAESU – FULL RANGE STOCKED

AMAZING VALUE 4 amp PSU

We've bought a quantity of really superb 4amp 12v power supplies at a super price. These are fully protected and have a transformer 50% larger than anything similar. Send for yours today. **£22.95** inc. VAT. Carriage £1.50

MICROWAVE MODULES (NEW PRICES)

MMT 432/28-S transverter	£136.75 (N/C)
MMT 432/144-R transverter	£173.50 (N/C)
MMT 144/28 transverter	£90.75 (N/C)
MMC 144-28-30 converter	£21.85 (N/C)
MMC 144-28 LO converter	£24.15 (N/C)
MMC 70/28 converter	£21.85 (N/C)
MMC 70/28 LO converter	£24.15 (N/C)
MMC 432/28 S converter	£29.90 (N/C)
MMC 432/144 S converter	£29.90 (N/C)
MMC 1296/144 or 28 converter	£32.00 (N/C)
MMC 28/144 10m up converter	£20.70 (N/C)
MMD 050-500mHz counter	£69.00 (N/C)
MMA 144 2m pre-amp	£14.90 (N/C)
MMD 500P 500mHz pre-scaler	£23.00 (N/C)
MML 144/40W linear amplifier	£69.00 (N/C)
MML 144/100w linear amplifier	£142.50 (N/C)
MML 432/100w linear amplifier	£228.00 (N/C)
MML 144/25w	£48.30 (N/C)
MML 432/50w	£113.75 (N/C)

DENTRON

MLA 2500 160-10m 2Kw linear	£699.00 (N/C)
MT3000A 3Kw 160-10m tuner	£275.00 (N/C)
MT2000A 3Kw 160-10m tuner	£175.00 (N/C)
Clipperton 'L' 160-10m linear 2kW	£459.00 (N/C)
JR Monitor 160-10m tuner 300w	£59.95 (N/C)
W-2 160-10m PEP/SWR meter	£59.95 (N/C)
MT 200A Transceiver	£399.00 (N/C)
1Kw 80-10m linear 240v GLA 1000	£295.00 (N/C)

VHF MONITOR Rx's

TM56B 12v/240 AC auto scan 10 ch's	£106.00 (N/C)
TM56B Marine model	£115.00 (N/C)
SR9 12v DC Marine model	£48.00 (N/C)
Extra xtals	£2.45 (N/C)

FDK

Multi 3000 2m All mode	£395.00 (N/C)
Multi-750 2M FM/SSB/CW	£299.00 (N/C)
Multi 700EX 2m 25 watts	£199.00 (N/C)
Multi Palm II 2m hand-held special package	£99.95 (N/C)
M-11/Q16 xtals	£5.00
Palm II xtals	£3.00
Multi-Palmsizer 2m synthesised 40 channel hand-held	£149.00 (N/C)
Multi Palm IV 70cms	£159.00 (N/C)

AR

AR240A Synthesised hand-portable	£168.00 (N/C)

MIZUHO

2m SSB 1 watt portable	£135.00 (N/C)
Extra xtals	£3.00

NAIGAI

2200 2m 500w PIP linear	£429.00 (N/C)

ADONIS MICROPHONES

AM802G Compressor - 3 outputs	£59.95 (N/C)
AM502G Compressor - 1 output	£39.95 (N/C)

ASP MOBILE ANTENNAS

201 - 2m ¼ wave	£3.50 (1.00)
2009 - 2m 5/8th wave	£9.25 (1.00)
677 - 2m 5/8th wave deluxe	£14.95 (1.00)
452-70cms colinear	£8.25 (1.00)
667 - 70cms colinear deluxe	£17.95 (1.00)
Magnetic base and cable	£8.50 (1.00)
"No-hole" boot mounts	£3.75 (0.50)

JAYBEAM (HF)

TB 3 ele 2kW Beam	£155.00 (2.00)
VR3 Triband vertical	£39.00 (2.00)

HF ANTENNAS

HQ-1 20-15-10m mini-quad	£96.50 (2.50)
C4 20-15-10m vertical	£48.50 (2.00)
Mosley Mini beam 600W 10-15-20	£99.00 (2.00)
Mosley 20-15-10m mini-beam 600w	£99.00 (2.00)
Mosley 2kW version	£129.00 (2.00)
TA32 600 watts 20-15-10m	£89.00 (2.00)
TA33 600 watts 20-15-10m	£133.40 (2.50)
Hy-gain 14 AVQ 40-10m	£60.00 (2.00)
Hy-gain 18 AVT/WB 80-10m	£87.00 (2.25)
Mosley TD3JR 20-15-10m dipole	£35.00 (1.00)
Mosley RD5 SWL ham dipole	£36.30 (1.00)
EL-40X 80-40 Mini dipole	£27.50 (1.00)
HF5 5 band vertical	£41.50 (1.00)

All prices include VAT at 15%
Carriage costs shown in brackets

Here's a photograph of our new premises at Hockley. Two storeys of warehousing and showrooms – certainly the best in the South.

VHF ANTENNAS (JAYBEAM)

4Y/4M 4el yagi	£17.20 (2.00)
C5/2M 5db colinear	£40.00 (2.00)
5Y/2M 5el yagi	£10.25 (1.50)
8Y/2M 8el yagi	£13.25 (1.50)
10Y/2M 10el yagi	£28.40 (2.00)
PBM10/2M 10el parabeam	£33.60 (2.00)
PBM14/2M 14el parabeam	£40.80 (2.50)
5XY/2M X'd 5 element	£20.70 (1.50)
8XY/2M X'd 8 element	£25.80 (2.00)
10XY/2M X'd 10 element	£34.30 (2.00)
Q4/2M 4el quad	£21.50 (1.50)
Q6/2M 6el quad	£28.50 (2.00)
D5/2M 5 over 5	£18.30 (1.50)
D8/2M 8 over 8	£24.85 (2.00)
SVMK vertical Kit	£6.60 (1.25)
UGP/2 Ground plane	£9.35 (1.25)
HO/2M 2m halo	£4.25 (0.75)
HM/2M Above with 24" mast	£5.05 (1.00)
C8/70cm 8db colinear	£45.40 (2.50)
D8/70cm 8 over 8	£20.45 (2.00)
PBM18/70 18 el parabeam	£24.75 (2.00)
MBM/48 70 el Multibeam	£28.20 (2.00)
MBM88/70 88 el Multibeam	£37.50 (2.00)
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12XY/70 12 el X'd yagi	£38.50 (2.00)
D15/1296 15 over 15	£30.95 (1.50)

ACCESSORIES

9502 rotator	£43.50 (2.00)
KR400 rotator	£105.80 (2.00)
AR40 rotator	£59.80 (1.50)
Stolle 2030 rotator	£55.00 (1.50)
Stolle 2010 rotator	£50.00 (1.50)
Stolle 2050	£40.75 (1.50)
SWL ATU	£16.50 (0.75)
Shure 444 microphone	£27.50 (0.75)
Shure 201 microphone	£11.75 (0.75)
Shure 526T microphone Type II	£36.35 (0.75)
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MM202S Safety microphone	£20.95 (0.50)
50ohm balun	£11.25 (0.50)
UR67 per metre	£0.69 (0.05)
UR43 per metre	£0.22 (0.03)
5 core cable per metre	£0.30 (0.03)
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Twin SWR meters 3-150mHz	£12.95 (0.50)

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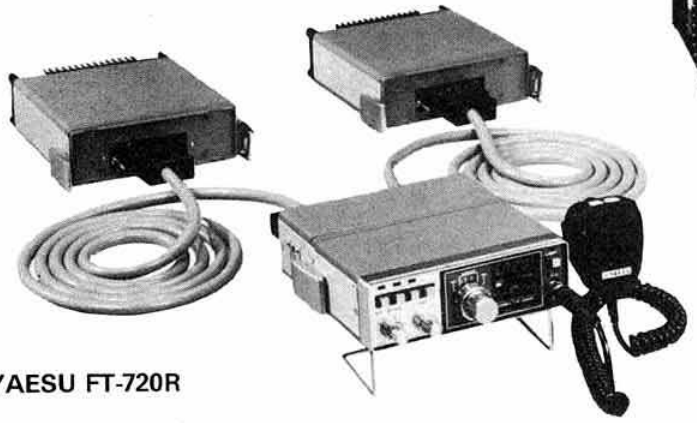

YAESU FT-720R

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

Access

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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.

AMATEUR ELECTRONICS UK

source for YAESU MUSEN

YAESU FT-101ZD

YAESU FL-2100Z

Keep ahead with Yaesu—not just a typical advertising slogan or empty phrase but a fact of life that when you buy Yaesu Musen equipment you get the benefit of the superb Research and Development Department which is located at the Yaesu headquarters in Tokyo. This is quite separate from the extensive Yaesu manufacturing facilities elsewhere in Japan and has to be seen to be believed, but then again what else would you expect from the world's largest manufacturer of amateur communications equipment.

Hard on the heels of last month's announcement of new Yaesu products comes the very latest release by Yaesu—the brand new FT-480R 2 metre all-mode mobile transceiver. By the time this appears in print we hope to have stocks of this exciting new model which will set new standards for 2 metre mobiles.

On the facing page we also feature the fabulous new FT-707HF mobile together with it's matching ancillary units in a base-station configuration and another view of the Yaesu FT-720R VHF/UHF mobile—a complete innovation in mobile rigs with it's options for 2m or 70cm operation.

On this page is the unbeatable Yaesu FT-101ZD HF band transceiver which is without competition in it's price range or, for that matter, cannot be bettered by equipment costing very much more. Last but not least, is Yaesu's FL-2100Z 1200W Linear Amplifier—a fine piece of equipment and a handsome complement to the 101 or 901 series of course.

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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YAESU FT-707—THE WAYFARER

The introduction of the "WAYFARER" by Yaesu is the beginning of a new era in compact solid-state transceivers. The FT-707 "WAYFARER" offers you a full 100 watts output on 80 10 metres, including all three new bands factory fitted, and operates SSB, CW, and AM modes. Don't let the small size fool you! Though it is not much larger than a book, this is a full-featured transceiver which is ideally suited for your home station or as a travelling companion for mobile or portable operation.

The receiver offers sensitivity of 0·25μV/10dB SN as well as a degree of selectivity previously unavailable in a package this small. The "WAYFARER" comes equipped with 16 poles of IF filtering, variable bandwidth and optional crystal filters for 600Hz or 360Hz. Just look at the additional features below:

Impressive as the "WAYFARER" is its versatility can be greatly increased by the addition of the FV-707DM (optional). The FV-707DM, though only one inch high, allows the storage of 13 discrete frequencies and with the use of "DMS" (Digital Memory Shift) each memory can be band-spread 500kHz. These 500kHz bands may be remotely scanned from the microphone at the very smooth rate of 10Hz steps.

FT-707 with Standard Features
- Fast/slow AGC selection
- Advanced noise blanker
- Built-in calibrator
- WWV/JJY Band
- Bright Digital Readout
- Fixed crystal position
- 10, 18 and 24MHz bands fitted
- Unique multi-colour bar metering – monitors strength, power output, and ALC voltage.

FT-707 with Optional FV-707DM and Scanning Microphone
- Choice of two rates of scan
- Remote scanning from microphone
- Scans in 10-cycle steps
- Synthesized VFO
- Selection of receiver/transmitter functions from either front panel or external VFO
- "DMS" (Digital Memory Shift)

FT-707 Transceiver	**£523**
FP-707 Power Supply	**£105**
FV-707DM VFO	**£180**

(Prices include VAT and carriage)

YAESU FT-107M HF TRANSCEIVER

The FT-107M is the all "SOLID STATE" transceiver that you've been waiting for. The fan-cooled "no tune" broadband PA delivers 75% power output into 3:1 VSWR.

Coverage is 160–10 (+ WWV Rx and 2Aux)

Standard features include:- ● audio peak and notch filters plus the now famous Yaesu variable IF bandwidth ● RF speech processor ● Noise blanker ● Memory for 12 channels with fine tuning. Why not check these features and see the host of others by visiting our showroom today?

FT-107M Transceiver £859: FP-107E PS £103: SP-107 Spkr £27: FV-107 VFO £92: FC-107 ATU £103. (inc VAT and carr).

YAESU FRG-7 RECEIVER

Despite all the new competition, the FRG-7 general coverage receiver is still a best seller! The high stability, high sensitivity and general performance are maintaining its position as the "STANDARD" receiver for amateur and short wave enthusiasts.

NEW LOW PRICE £199

(incl VAT and carriage)

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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.
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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

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BP = Baseplate mount
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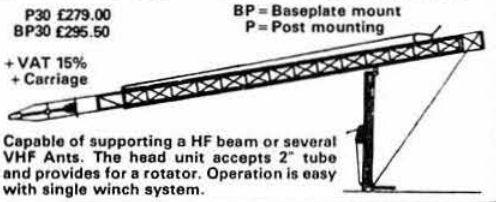

Capable of supporting a HF beam or several VHF Ants. The head unit accepts 2" tube and provides for a rotator. Operation is easy with single winch system.

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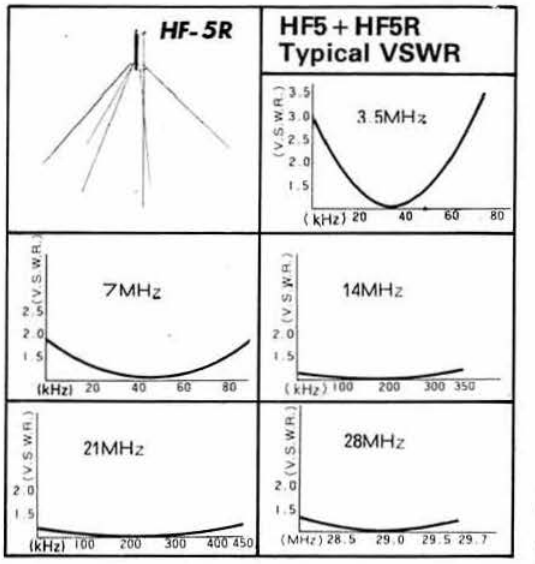
SMC-HS

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
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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 (10W 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 Turner	£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	£18.50
MEM/DMS Memory	£87.00	FC107 Antenna Tuner	£92.50	430-440 70cm module	£158.50	YM35 Mic. hand. scan	£12.50
FP107E AC PSU Extnl.	£92.50	SP107 External speaker	£24.00	144-148 2m module	£88.50	YM36 Mic. noise cancel	£11.75
FP107 int. AC PSU	£85.00	FTV107(2) Transverter	£181.50	50-54 6m module	£68.50	YM37 Mic. Hand	£7.50

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, ¼µV 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 pan	£280.00	50-54 6m module	£60.00	FV901DM Synth. Ext. VFO	£215.00
YR901 Morse/TTY reader	£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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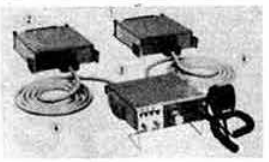
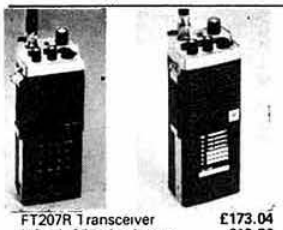


FT720R NEW 'REMOTABLE'

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	E72S 2m cable	£20.00	E72L 4m cable	£23.50		
S72 Switching box	£47.50	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-9C Small charger	£6.50	YM24 Speaker/mic	£14.50	FT202R Transceiver	£103.50
NC-1A Slide-in charger	£16.50	NBP-9 Nicad pack spare	£14.50	FLC1 Heavy duty case	£18.00	NC-1 AC charger '202	£16.50
NC-2 Charger eliminator	£34.50	FBA-1 Pack/charger adaptor	£2.25	AA Nicads, each	£0.87	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	CPU2500RKS 10W key mic	£292	CPU2500RK 25W key mic	£308	CPU2500RS 10W standard	£272
CPU2500St 25W c/w stepper	£319	CPU2500RKSSt 10W key, stepper	£319	CPU2500RKSt 25W key, stepper	£335	CPU2500RSSt 10W c/w stepper	£299

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

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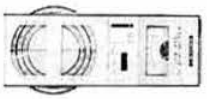

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QTC
amateur radio news

Holiday closures
The *Radio Communication* editorial office in Chelmsford will be closed from 16 to 25 August, inclusive.

The RSGB QSL Bureau in London SW20 will be closed for the whole of August.

QSL Bureau
Mr G. Thompson, G8KLI, who relinquished the post of sub-manager for the G4H series in January because of ill-health, is still receiving packets of envelopes and cards from overseas. He will, in future, return all such cards and envelopes to the senders.

G3LAA-NZZ series. Due to pressure of business, Mr P. Farquhar, G4FYA, is no longer able to act as sub-manager for this callsign series. The new sub-manager for this series is Mr J. G. Holland, G3GHS, 26 Grand Avenue, Surbiton, Surrey KT5 9HU.

December 1980 RAE
The next Radio Amateurs' Examination will take place on Monday 1 December 1980. RSGB examination centres are again being arranged in London and Derby, and candidates wishing to enter at either centre should write for an application form to "The local examination secretary" at RSGB HQ, and enclose an sae. Early application is advised, and the final date for receipt of completed application forms at RSGB HQ is 20 October.

Negotiations to establish an examination centre in the Plymouth area are taking place, and if arrangements can be completed in time for the December RAE to be taken at a centre in that area, an announcement will be made on the GB2RS news bulletin.

Callsigns
The ITU has recently published amendments to the table showing callsigns assigned by the following administrations to their amateur stations:

Bahamas (Commonwealth of the) ..... C62AA-C69ZZ.
Botswana (Republic of) .. A22 followed by two or three letters.
Sao Tome and Principe
(Democratic Republic of) ..... S92AA-S92ZZ.

Stolen equipment
From a car in Birdlip, Gloucester, in mid-June: IC280E, serial number 8901480, with accessories. Set modified and does not operate in standard way. Any information to Cheltenham CID, tel Cheltenham 28282.

G5 ARC
The G5 Amateur Radio Club will provide talk-in on S22 and SU8 for amateurs visiting the "open house" to be held at RAF Mildenhall, Suffolk, on 23/24 August.

3·5MHz dx antennas for a town garden

S. J. M. WHITFIELD, BSc (Eng), MSc, CEng, MIEE, G3IMW*

IT is not necessary to have a very large antenna system or high power to work dx on 3·5MHz phone, though these can certainly help if properly used. Early 3·5MHz dx phone work is described in an article by G8VB [1], who, as ON4HS in 1937, had worked all nine USA call areas, and between 1946 and 1948, as G8VB, he worked all USA states. The antenna he used in England was a λ/2 centre-fed with tuned feeders (height not stated).

In February 1953, when ssb was just coming into use in Europe, the author made the first G–W and Europe–VE two-way ssb contacts on 3·8MHz [2]; the antenna used being a λ/2 centre-fed at about 25ft (7·5m), with a power output of 90W p.e.p. The most distant station worked that winter was YN1WC, while from Epsom in January 1959 4X4DK was worked using a λ/4 centre-fed with tuned feeders at 35ft (10·5m). The power output was 150W p.e.p. Reports sent and received were 4–5 and 5–6.

The author returned to active amateur radio in June 1978 after a break of 14 years, and in order to get on the air quickly he erected a rooftop antenna (Fig 1). With 100W p.e.p. output he worked stations up to 700 miles (1,100km) distant quite easily, with S9 reports, but beyond that distance things became difficult, even when rf peak clipping worth an extra 6dB of output [3] was added. On a "list" taken by DF3TJ/P, VE3BWK/4U (in Syria) using a three-element Yagi was only just workable—reports were 5-9 and 3-5, while other British stations were working him with ease. Examples of unsatisfactory performance were: failure to work UL7LA (5-7), UK9ADT (5-8) and 4X4YM (5-7). In each case no other European was calling, so, as the antenna was obviously not working too well for dx, thought was given to what could be done to improve it in a town garden only 25ft (7·5m) wide.

*100 Stapleton Hall Road, London N4 4QA.

Criteria for an effective 3·5MHz dx antenna

The antenna must radiate a major part of the transmitter output power at suitable elevations, which are probably within the range 0° to 50°, and to achieve this:

1. The antenna and feed system must be efficient.
2. Unless the antenna is high, say at 120ft (36m), a major part of the current in it must flow in a vertical direction, or have a substantial vertical component, in order to produce useful radiation at low angles.
3. The vertical current maximum should be as high as possible. An increase in low-angle radiation of approaching 2dB may, theoretically, be achieved by raising the height of the current maximum from zero to 20m, but more importantly the effects of screening by buildings will probably be reduced.

A suitable elevation will depend on conditions and the particular path. It seems to be generally accepted by experienced 3·5MHz dx operators that the lowest wave angles are not always involved, which is fortunate for people living in built-up areas. However, for the longer paths, over perhaps 6,000km, and for paths passing near or through an aurora zone, angles below 20° seem to be used. ON4UN, who has worked over 300 countries on 3·5MHz, and has compared various antenna systems, gives some indications on this subject in his book [4].

It is easy to make the antenna itself efficient even if it is made of thin wire (say of 1mm diameter) and it is possible to make the losses in the feeder and coupling networks low enough to be unnoticeable. When the antenna is fed against ground, unless an elaborate system of radials is used (not practicable in most town gardens) the resistance of the earth connection can exceed the feedpoint impedance of the antenna and cause an easily noticeable reduction of efficiency. Whether a major part of the antenna current is flowing vertically depends on the layout used, and in the case of the antenna in Fig 1 this certainly was not so, since the current maximum was at about 20ft (6m) in the horizontal part of the wire.

Modifications to the end-fed wire

With these criteria in mind the following modifications were made. First, to eliminate the earth connection, the top was reduced to λ/2 and was end-fed with a Zepp feeder of 300Ω ribbon; the web was cut away for 30mm every 50mm. After a few days the top was further reduced to λ/4. The lengths were calculated from the usual formula [5]:

$$\text{length} = \frac{492 \times 0{\cdot}95}{f}\text{ft}$$

where f is the frequency in megahertz

The feeder was pruned to λ/4 and one wire was left disconnected at both ends. Originally the antenna was cut for 3·7MHz.

By this time a telescopic mast antenna, insulated at the base and top-loaded with a three-band Yagi, had been mounted on the attic floor of the house and the 3·5MHz antenna was suspended from the top of the mast. The layout of the antenna

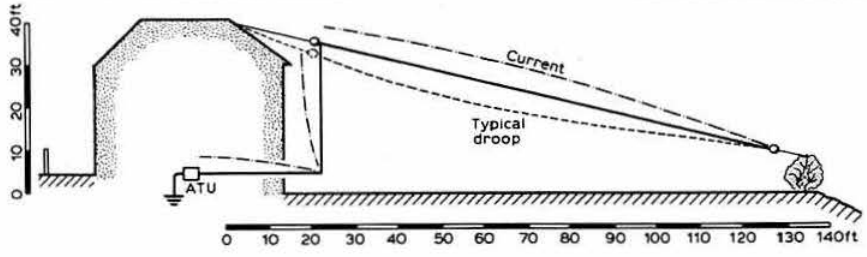

Fig 1. Original end-fed antenna

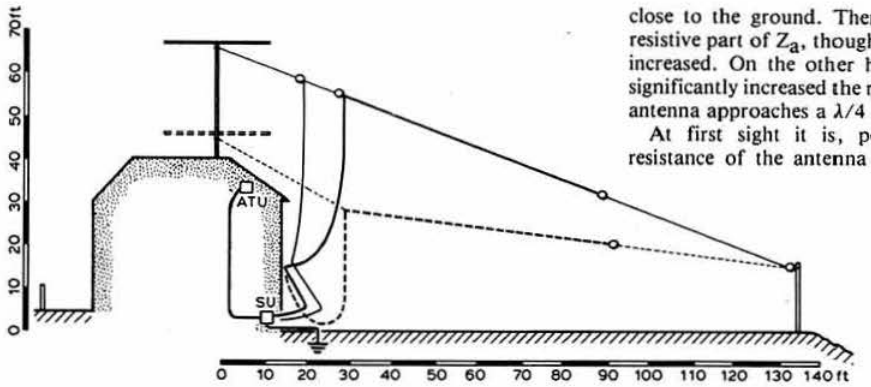

Fig 2. Inverted-L and λ4 vertical

with the mast in the raised and lowered positions is shown in Fig 2. The feedpoint impedance at the bottom of the 300Ω ribbon was very high. It was found possible to use a Zepp feeder of 300Ω ribbon up to the attic radio room; the feeder being cut to an electrical λ/4 (using a velocity factor of 0·82 [6]) and transposed every 2m (ie twisted through 180°). To obtain an impedance which could be matched by the KW109 ("Z-match"), 2m of 300Ω ribbon had to be added. The balance in the feeder currents at the Z-match was checked with rf ammeters, which were interchanged to eliminate meter errors, and was found to be within three per cent. The Zepp feeder must be used with caution and may not work [7], but if the length and method of feed are chosen, as in this example, so that there is no easy path for in-phase currents, it certainly can work although its narrow bandwidth is a disadvantage.

Comparison of a λ/4 vertical and λ/2 inverted-L

To simplify the discussion, the inverted-L is assumed to have a horizontal top, and the λ/4 vertical to have an earth connection resistance equal to the radiation resistance (36Ω). Without the use of long radials this is probably a realistic assumption. Measurements of the actual feedpoint impedances of the author's antennas were made using a Q-meter, and are shown in Table 1. Fig 3 shows the antennas at resonance with their equivalent circuits. The efficiency of the λ/4 vertical and ground system in this example would clearly be 50 per cent. The efficiency of the inverted-L fed against ground would be:

$$\frac{I^2 \times 5{,}000 \times 100}{I^2\ (5{,}000+36)} = 99{\cdot}3\%$$

So for practical purposes the efficiency of the inverted-L could be said to be 100 per cent. Admittedly this argument ignores the effects of ground losses in the immediate vicinity of the antenna which are not due to Re, but there is no reason to suppose that these losses seriously modify the argument. There certainly will be earth dielectric losses, and although perhaps not entirely convincing, it seems that the effect of these cannot be significant compared with the radiation resistance part of the antenna input impedance, because the resistive component of Z_a changed so little with height (Table 1). This observation suggests that most of the power fed to the antenna is actually predominantly radiated from the high current region whose configuration stays much the same as the antenna is raised and lowered (Fig 2). As a further check the arrangement of the zig-zag at the bottom was altered so that more of the antenna ran close to the ground. There was no dramatic change in the resistive part of Z_a, though the shunt capacitive reactance was increased. On the other hand, reducing the angle θ to 45° significantly increased the resistance. (As θ approaches zero the antenna approaches a λ/4 line shorted at the far end.)

At first sight it is, perhaps, surprising that the input resistance of the antenna changed so little with height. An interesting, though mathematical, study of the impedance of short antennas over lossy ground has been done by James R. Wait [8]. His results indicate, when applied to this system, that on lowering the antenna the loop radiation resistance of the "horizontal" part would fall slightly, while the associated ground losses would rise drastically. The "vertical" part would show an increase of loop resistance while the ground losses woud increase relatively little and remain small. (The effects of dielectric losses due to the proximity of the high voltage parts to ground are not considered.) These results seem to explain the observations. The subject of radiation resistance of antennas over a lossy earth is also discussed in [9].

It is intended to do more work on quantifying the ground losses of voltage-fed antennas. The author would like to hear from anyone with information on the subject, or with a similar interest.

The author's inverted-L, when installed, used a λ/4 Zepp feeder. Even under these ideal indoor conditions, 300Ω ribbon is really unsuitable; a recent measurement has shown a loss of about 4dB. In January 1980 the feed system was changed to 50Ω coaxial cable into a pi-network with a loaded-Q of four; the measured overall loss was then less than 1dB.

The general form of the polar diagrams for the two antennas is shown in Fig 4, drawn to the same scale (linear field strength, or voltage). Half the power fed into the inverted-L is radiated by the horizontal part and is horizontally polarized (hp). The hp polar diagram is similar to that of a λ/2 dipole λ/4 high; the two curves a and b represent the two extremes, in the plane,

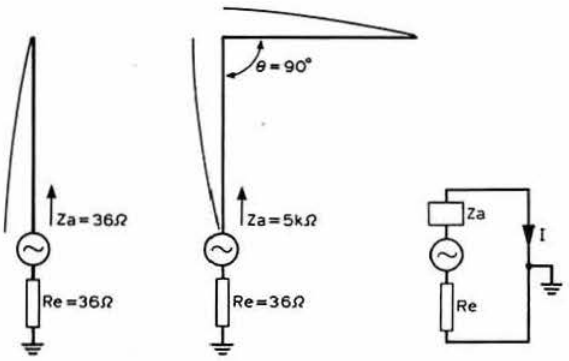

Fig 3. Comparison of inverted-L and vertical

and at right angles to the plane, of the antenna, respectively, while for other directions there will be intermediate curves. In addition, the inverted-L radiates half its input power with vertical polarization (vp). The vp polar diagram (d) applies to all azimuthal directions. The $\lambda/4$ vertical itself received only half the power coming from the feeder and radiates it all with vp; the vp polar diagram of Fig 4(c). Fig 4(d) lies in an intermediate position between that for a $\lambda/4$ vertical, 4(c), and that for a $\lambda/2$ vertical (not shown).

The two antennas (Fig 3) put out very similar signals over much of the lower angle region needed for dx, although the inverted-L will put out a slightly stronger signal at very low angles. In this region the closeness of the curves to the horizontal axis will be very dependent on the ground properties at many wavelengths from the antenna, being closer to the axis for wet ground than for dry, and for this reason the curves are shown dotted. At higher "dx angles" the $\lambda/4$ vertical would be better, were it not for the hp component of the inverted-L, curves (a) or (b). The inverted-L will put out a strong local signal at elevations 90° to 45°, corresponding to day and night distances of zero to 200 miles (320km) and zero to 600 miles (960km) (average figure) respectively. This can be a disadvantage on reception, but on transmission at night it is a mixed blessing! For daytime working it is definitely helpful. The effect of screening by buildings is not shown, but it is worth noting that 70 per cent of the power radiated by the vertical run of the inverted-L comes from the upper half, unlike the $\lambda/4$ vertical where 30 per cent comes from the upper half.

In any discussion of 3·5MHz dx antennas, the T configuration should certainly not be neglected. A T with a $\lambda/2$ top and $\lambda/4$ vertical should have a polar diagram like Fig 4(d), but 3dB larger because both ground losses and radiation from the top are largely cancelled. Unlike the L, the T is not really suitable for use with only one high support, unless the top is folded.

Effects of a sloping top

To simplify the argument in the preceding paragraphs, the "top" was made horizontal, but in the average location it may be necessary to slope it. The principal effects of sloping the top are: (a) to change the radiation resistance (see Table 1); and (b) to distort the azimuthal distribution of vp radiation with a maximum in the plane of the antenna, and a minimum in the plane at right angles to the plane of the antenna.

The efficiency of the antenna will not be significantly reduced down to $\theta = 45°$, although at that angle the current-loop radiation resistance will be reduced to such an extent that wire of at least 20swg (0·8mm diameter) should be used. The author has done some calculations on the case where $\theta = 45°$, and has found that the general form of the hp and vp polar diagrams, Fig 4(a), (b) and (d) are unchanged. The distortion of azimuthal vp radiation is such that the ratio of the "end-fire" to "broadside" radiation at low wave angles is about 3·5dB.

If both wires are sloped with the same inclination (the popular inverted-V) a null will occur in the vp azimuthal distribution in the plane at right angles to the plane of the antenna. This null may not be noticed because the hp radiation has its maximum in this direction, but very long distance working could suffer in this direction. It is worth noting that well over half the dx stations worked by the author used an inverted-V, typically at 40 to 50ft (12 to 15m). A central support at such heights is not likely to be possible in a town garden.

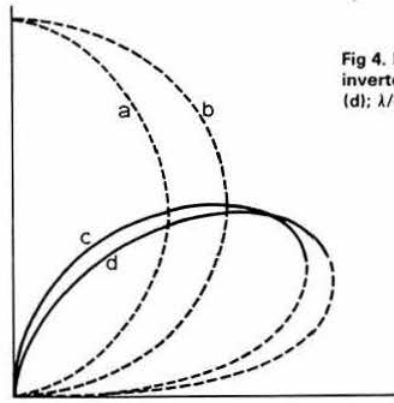

Fig 4. Polar diagrams: inverted-L hp (a) and (b) vp (d); $\lambda/4$ vertical

Results obtained

The inverted-L was put into service in December 1978. At this time an old home-made linear amplifier was rejuvenated and the output power for dx working was increased to 400W p.e.p.. The first dx station called, UK9AAN, came back with an S9 report.

Traditionally, times of high solar activity are not considered good for 3·5MHz dx, and in the northern hemisphere the short nights of the summer months do not give long-distance openings for E–W and W–E paths. Bearing these points in mind, results have been encouraging. Generally in the summer the contacts were made within an hour of dawn at the eastern end of the path into North America or Asiatic USSR; for contacts with North America this meant setting the alarm clock for 0215gmt in June and July. Contacts with South America were also made during these early morning sessions. It was clear that openings at dusk at the western end of the path were far less effective than those at dawn at the eastern end.

From January to August 1979, stations worked, with typical reports sent and received, were: at 12,700km great circle distance, VP8ML, 45,55; at 10,000km, PY3, 45, —; at 9,000km PY4, PT2, PY2, 45, 55; at 7,500km PY7ZZ, 46,56; at 7,000km, FM7WS, 58,57; at 6,500 to 5,000km, W4, W2, W1, 45 to 59, 46 to 59; at 4,700km, UL7EAJ, 58, 46; at 4,500 to 4,000km, UA9, VE1, VO1, 56 to 59, 46 to 59; and at 2,700km UA1ODE 59, 58.

Although not strictly dx, ssb contacts were made with 46 oblasts in the USSR, with nine USSR stations in Asia being worked (seven in zone 17 and two in zone 21). Notable is UK9CAE (Sverdlovsk), which was contacted five times on 3·5MHz ssb; its antenna is an inverted-V, included angle 100°, at 20m high, running E–W. UA1ODE (Archangel) was frequently heard, even during auroral events. Not one of the contacts made during these tests was the result of a CQ dx call. When these calls were made, at least one European replied! Operating techniques are hardly within the scope of this article, but these facts speak for themselves; in a far-from-rare country, the benefits of careful listening cannot be overemphasized.

Assessing results

It might be useful to know what wave angle is involved in making a particular contact. The simple theory of multiple hops seems to be applicable only to shorter distances. Distances of over 10,000km, or perhaps over 5,000km around times of

Table 1: Antenna and ground impedance measurements

Antenna	Frequency	θ°	Z_a R_p	C_p	R_s	X_s
	MHz		(kΩ)	(pF)	(Ω)	(Ω)
1	3·50		5·2	−12		
(Down)	3·65	80	5·2	+ 1		
	3·80		5·1	+13		
1	3·50		4·9	− 5		
(Up)	3·65	75	4·9	+ 7		
	3·80		4·8	+20		
2 (Up, Note (a))	3·65	—			90	jo
3	3·50		5·2	− 8		
(Up)	3·65	75	5·1	+ 2		
	3·80		5·1	+14		
3	3·50		6·9	−13		
(Up)	3·65	45	6·8	+ 4		
	3·80		6·7	+ 6		
1 (Up, Note (b))	3·65	75	5·1	+11		
1 and 2 (Up)	3·65	75			90	j5

Details of antennas

1. Top 62·5ft (18·7m) 20swg (0·8mm). Vertical 60ft (18m) 300Ω ribbon (originally 62·5ft, see text).

2. Vertical 62·5ft, 16/0·2mm pvc insulated.

3. Top 62·5ft 20swg. Vertical 67ft (19·9m) 20swg.

(all enamelled copper wire unless stated otherwise)

Notes:

(a) Measured at SK1 (Fig 5) with 50Ω cable disconnected.

(b) Zig-zag close to ground (see text).

sunspot maxima, appear to be achieved by ionospheric tilts and chordal hops [10]. When tilts are involved the wave angles are hard to predict, and may well be different at each end of the path. As mentioned earlier, practical assessments of the angles used in various situations are given by ON4UN [4].

It was pointed out in connection with Fig 4(c) and (d) that the shape of the vp polar diagram at low angles is very dependent on ground properties. For example, at an angle of a few degrees a station with an antenna over sea water could put out a signal of 10dB or more stronger than one inland, for the same total power. It might not be necessary for the seaboard station to have the antenna surrounded by sea, provided that the "ground image" in a particular direction was formed by reflection from the water. One would expect that a station located in an urban area would achieve less good results, at certain times, than a station on the coast, or in a damp area, when both have efficient antennas and equal power. Certainly, on reception, the very distant stations, such as ZL and W6 (long path) have been barely detectable by the author when certain other stations in south-east England have been reading them at good strength.

An illustration of the kind of difference that can occur was noted in June 1979. K1ZM (Cape Cod) was contacted with reports 58, 59. During the contact G8PO joined in and received 59+20dB from K1ZM. G8PO uses a vertical antenna overlooking the sea, and he has reported contacts with ZL4AP on 3·5MHz ssb, under favourable conditions, each station using an output of only 1W [11]. On this particular morning an example of "coastline conditions" occurred. When such conditions have been noted over the years VO1, VE1, W1 and W2 could be heard simultaneously, but only those stations close to the sea. The author has been led to speculate whether it is the proximity of the ocean that is a factor, or alternatively that paths from stations inland are cut off by passing closer to the aurora zone.

An article by UL7GW [12] describes the locations of stations which have made particularly successful dx contacts with his station. Some of these stations are grouped along coastal regions and the author speculates if these groupings could be related to the presence of a coastline at one end of the path, at least in some instances. It might not be necessary for a station to actually see the ocean. There is evidence that tropospheric super refraction over the sea can take place at frequencies as low as 3·5MHz [13], which might enable a very low launching angle to be achieved as the signal leaves the troposphere.

It appears that openings on 3·5MHz can be quite localized. Even if a dx station can be heard at low strength working other Europeans, the path to England may be relatively poor. In the author's experience this effect is noticeable at times when the great circle path from the dx station to London passes through an aurora zone. In assessing one's results, the only satisfactory criterion seems to be the ability to establish contact, although comparative reports from a dx station of contacts with another station in one's own town may be useful. A satisfactory result with the inverted-L is that it has often been possible to break into contacts between North American stations. In fact, some restraint had to be exercised to avoid breaking up "rag-chews"!

Further developments

A situation was reached where the limitations of the station were often in the reception of weaker signals, perhaps because the lack of a null in the polar diagrams at high wave angles was bringing in interference from comparatively local stations, and it seemed worth trying a λ/4 vertical for reception. The easiest way to achieve this seemed to be to use the now unused wire in the 300Ω ribbon which formed the vertical run of the antenna. If there were no coupling between the two ribbon conductors one would expect the input impedances shown in Fig 3. Joining both conductors at the bottom end only, one would expect that the λ/4 would do all the work. A 1·5m by 22mm earth rod was driven into the ground close to the feedpoint, and a feed system designed to facilitate switching was installed, (Fig 5). Changeover was controlled by the send/receive switching of the KW2000E transceiver, so that either configuration could be selected in send and receive modes.

The atu enabled the 50Ω cable to be matched to the transmitter, and to check what was happening a neon lamp was hung from the far end of the inverted-L. With RLA unenergized, the neon lit at a power output of 20W, while with RLA energized, after matching, a power output of 100W lit the neon! The λ/4 vertical was being detuned by the inverted-L. A separate λ/4 wire was suspended 10ft (3m) away from the ribbon towards the house (Fig 2), and was connected in place of the spare wire in the ribbon. After loading, the neon did not light at 400W peak output to the vertical, so one could assume that vertical-incidence signals received on the vertical would be at least 13dB down compared with their reception by the inverted-L. (The reason for not earthing the inverted-L is that the parallel combination is used as a λ/4 end-fed on 1·8MHz.)

λ/4 vertical results

Comparison of reception in the two relay positions (Fig 5) has shown some improvement in the readability of all dx signals, except in the presence of local electrical interference. The same improvement is not achieved by using the receiver input attenuator. Usually the improvement is only marginal, but in one case it was dramatic. Listening to a contact between ZS6DW

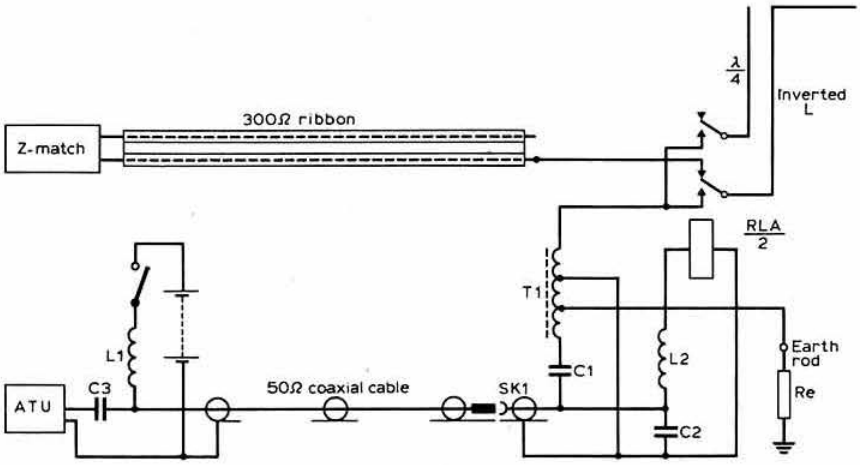

Fig 5. Antenna switching

C1 10,000pF polystyrene
C2 75pF 5kV ceramic (tunes L2)
C3 3,000pF polystyrene
L1 77t on 1in diameter former 1·25in long close-wound with 0·375in gap
L2 95t on 1·125in diameter former 2·125in long close-wound
T1 9 trifilar turns on two FX1588 ferrite torroids (see *Radio Communication Handbook* [16])
RLA High voltage relay; contact spacing about 0·1in (2·5mm)

and VE3BBN every other word of ZS6DW was lost under static on the inverted-L, yet on the vertical he was 95 per cent readable; VE3BBN was readable on either antenna. Signals are generally two S-points weaker when received on the vertical. During the day the difference may increase to four S-points. On transmission only four comparisons have been made, when the vertical was down by one to two S-points.

Effect of antenna height

The inverted-L has the fortunate property of operating without retuning with the mast up or down. The swr changes from 1·0 to 1·1, so it has been possible to raise the antenna during a contact. As this operation takes 5min it has only been possible to get a few reports: UA2FBJ reported an increase of 9dB on raising the antenna; UA1CAG reported an increase of two S-points; while UL7EAJ and other USSR stations did not reply until the antenna was raised.

Possible modifications for other sites

Suggestions for saving space are shown in Fig 6. For the reasons mentioned earlier, it is desirable to get the apex as high as possible, folding the lower, high voltage part in a zig-zag, as required. The 45° version was tried out briefly, using 20swg (0·8mm) copper wire throughout, with a maximum height of 45ft (13m). On a poor night in September contacts were made with W1 and W8 (also with SV and eight OHs). The diamond configuration is interesting (Fig 6(c)), and it should give good results on 1·8, 3·5 and 7MHz. The feeder length must be chosen to discourage in-phase currents [14], and it would be essential to use open-wire line.

Conclusions

The λ/2 inverted-L is a simple and inconspicuous antenna and is likely to be much more efficient than λ/4, or shorter, verticals fed against ground in a town garden. If a certain amount of clutter can be tolerated, a voltage-fed T with the top folded up as described by DL1VU might be better [15]. The shape of the polar diagram would be like Fig 4(d), but 3dB larger. The benefits of a vertical on reception would be experienced without switching.

One warning: the voltage at the ends of all these antennas can be over 2,000V: suitable precautions must be taken to avoid rf burns to people and animals.

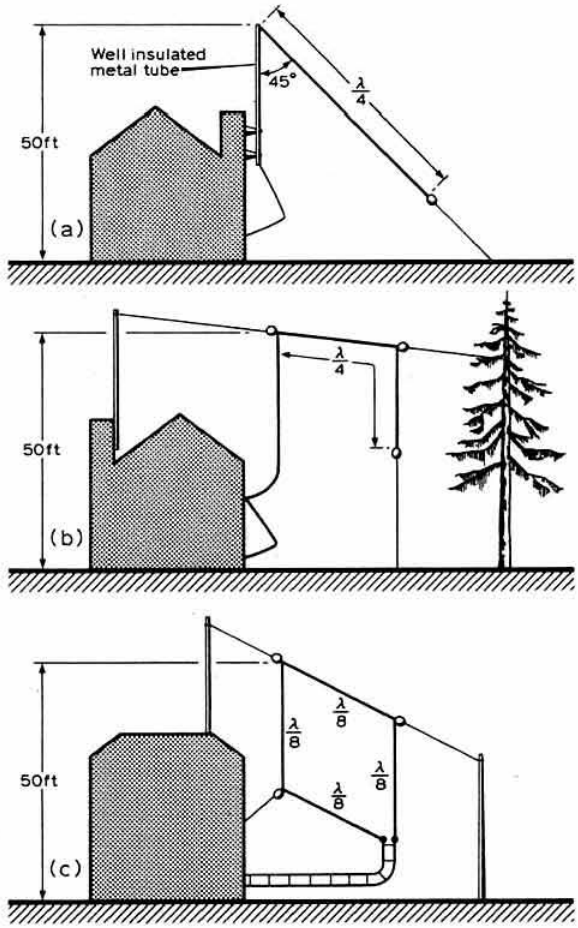

Fig 6. Suggestions for saving space. Total length of (a) and (b) is λ/2

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Appendix

Antenna equivalent circuits used in Table 1

Voltage feed (inverted-L)

$$\frac{1}{Z_a} = Ya = \frac{1}{R_p} + jwCp$$

R_p and C_p were measured directly (C_p positive or negative).

Current feed ($\lambda/4$ vertical)

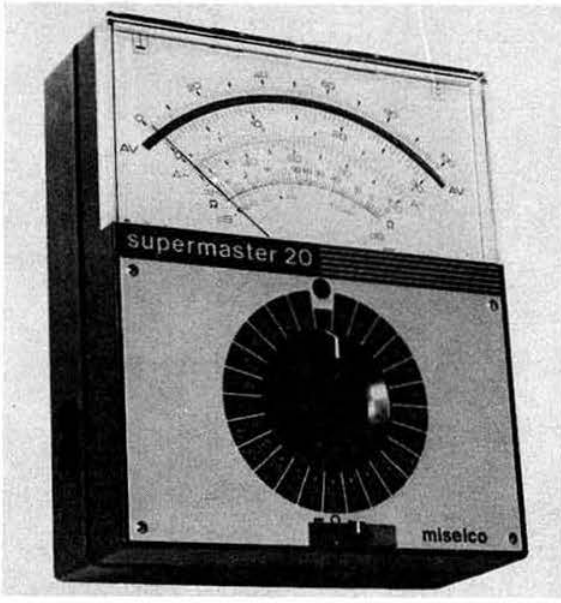
$$Z_a = R_s + jX_s$$

Parallel parameters were measured, and parallel to series conversion gave R_s and jX_s. □

NEW PRODUCTS

Supermaster 20 20kΩ/V multimeter

The latest instrument to be introduced by Alcon Instruments from the Italian Miselco stable is the Supermaster 20, a 20kΩ/V (ac and dc) unit with 1·5 per cent dc and 2 per cent ac accuracy figures. This general-purpose instrument can cope with dc voltages from 100mV to 1,000V, and currents from 5μA to 3A; ac voltages from 10V to 1,000V and currents from 1mA to 3A (fsd). With resistance ranges from 200Ω fsd up to 20MΩ fsd in six ranges, and power measurable from −10dB to +61dBm, the Supermaster is capable of coping with most general measurement problems met today.



Range switching is effected by using a simple slider switch to select dc, ac or resistance ranges, while a single main ceramic rotary switch selects the actual range desired. The most important advance which this instrument represents is the inclusion of an electronic cut-out module, itself replaceable, capable of providing movement protection both simply and reliably. As the name implies, the cut-out is resettable by returning a small red button to the reset position. Operation of the cut-out occurs when the applied energy exceeds that which the meter range identifies by a factor, and the same action releases the reset button to indicate activation. This cut-out can be tested in-situ simply by pressing a second (black) button marked TEST which promptly causes the cut-out to actuate, provided the 15V battery powering the cut-out is in good order.

Power is by internal batteries for both resistance and the cut-out system. Meter protection diodes are also provided and the equipment is fused in the resistance and current ranges.

The Supermaster 20 measures 170 by 140 by 62mm (7 by 5½ by 2½in) and weighs some 700g excluding batteries. It is supplied with leads and prods and instructions, at a price of £65.96 inc VAT. Further information from Albert Coniglio, Alcon Instruments Ltd, 19 Mulberry Walk, London SW3. Tel 01-352 1897.

Monitor DX3 rotator readout system

The DX3 converts a rotator control into an easy-to-read, digital readout system. Accurate to 1°, this low-cost kit assembles in minutes, and installs with just three wires into Ham II, III and IV units without cabinet modifications. Easily adaptable to other systems, or makes an ideal workbench digital voltmeter. Only £19 money order direct from Monitor, Box 55, Agincourt, Ontario, Canada, MIS 3B4.

"T" network design and analysis using a programmable calculator

by A. B. PLANT, BSc, CEng, MIEE, G3NXC*

ONE of the more popular networks used in the tank circuits of transistor power amplifiers is the "T" network (Fig 1), but calculation of the component values from the circuit equations, while fairly straightforward, is rather cumbersome, particularly if the calculations have to be repeated for several different sets of conditions. A further complication is that the transistor parameters needed for the calculations have to be in series form, whereas the data are usually available in parallel form, so that a parallel-to-series conversion has to be carried out. Table 1 shows the step by step procedure for designing a "T" network.

A disadvantage of the "T" network is that it is a narrow band circuit. If it is necessary to operate the amplifier over a wide range of frequencies, as would be the case on, say, 28MHz, then it will be necessary to provide some adjustment capability. In the usual arrangement the inductor is made constant and capacitors C1 and C2 are varied to maintain the correct impedance transformation as frequency is varied. C1 and C2 will also need to be varied to cope with the tolerances associated with all of the other parameters, eg the transistor output capacitance, the inductor value, load resistance etc.

Although satisfactory impedance transformation can be achieved over a wide range of conditions, it will be necessary to establish the range of values required for C1 and C2 so that suitable components can be chosen. Similarly, the circuit Q will vary as the conditions are varied, and it is necessary to ensure that its value does not become either too high or too low.

It is possible to carry out all the calculations required for both design and analysis by manual methods, but this is very time consuming and laborious. What usually happens is that the circuit values are calculated for a single set of conditions, and then cut-and-try methods are used on a prototype in an attempt to establish the optimum component values. However, the advent of the programmable calculator has provided an economic means by which repetitive and complex calculations may be carried out rapidly and easily.

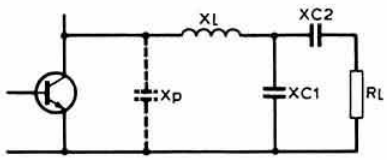


Fig 1. "T" network circuit diagram

This article presents two programs; the first allowing the values of XL, XC1 and XC2 to be calculated given the transistor parameters, the load resistance and the circuit Q required. Analysis of the circuit to assess the effects of parametric variations can be carried out using the second program.

Design program

The flow chart for the design program is shown in Fig 2. The reference figures to the right of each block relate to the program listing (see later). Provision has been made for the transistor data to be entered either in parallel or in series format. Usually the data are available in parallel form for output parameters and in series form for input parameters. In both cases the reactive element of the impedance must be entered as a reactance, not as a capacitance or inductance. Also, the sign of the reactance, ie negative for capacitive and positive for inductive, must be included.

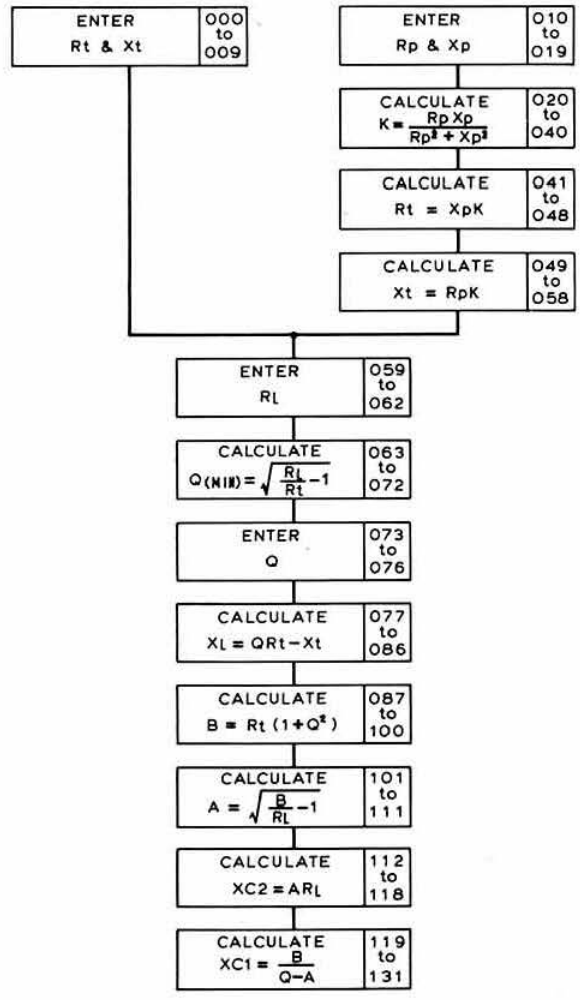


Fig 2. Design program flow chart

*178 Clay Lane, South Yardley, Birmingham B26 1DY.

Table 1. "T" network design procedure

1. Establish the transistor output capacitance from the data sheet and calculate the reactance at the required frequency (Xp).
2. Calculate Rp from $Rp = \frac{(VS - V_{CE(SAT)})^2}{2W}$ where W is the output power required.
3. Calculate Rt and Xt (the series equivalents of Rp and Xp) from
$$Rt = \frac{RpXp^2}{Rp^2 + Xp^2}$$
$$Xt = \frac{Rp^2Xp}{Rp^2 + Xp^2}$$
4. Calculate Q minimum from $Qmin = \sqrt{\frac{RL}{Rt} - 1}$ where RL is the antenna load impedance. Check that Qmin is less than the Q required and that Rt is not greater than RL
5. Calculate XL from $XL = Q.Rt + Xt$
6. Calculate XC2 and XC1 from
$$XC2 = A.RL$$
$$XC1 = \frac{B}{Q - A}$$
where
$$A = \sqrt{\frac{B}{RL} - 1}$$
$$B = Rt(1 + Q^2)$$

The minimum Q calculated is an indication of the probability of success of the circuit design. Ideally the minimum Q should be appreciably lower than the actual Q required. Should the minimum Q be too high, the network is not capable of achieving the required performance. One way of reducing the minimum Q is to use a broadband transformer to reduce the load resistance seen at the output of the network.

Should the load resistance be lower than the real part of the effective transistor load impedance, the program will attempt to take the square root of a negative number when calculating minimum Q. In such cases, the circuit will have to be reconfigured so that an acceptable minimum Q is achieved.

Although, as mentioned previously, the reactance values fed into the program must have the correct sign associated with them, the program output for XC1 and XC2 is positive if these components are capacitive. If any of the reactances calculated by the program are negative, this indicates that it is not possible to achieve a sensible circuit design with the defined parameters.

To ease the readability of the output, it is worth using the fixed decimal format of the calculator to restrict the display to two decimal places.

Analysis program

The flow chart for the analysis program is shown in Fig 3. For this program, the transistor load impedance must be entered in parallel form and, as for the design program, the sign convention for the reactive portion must be observed. The frequency information is only used in ratio form so that the actual units do not matter; ie 2MHz can be entered as 2 or 2000000 or anywhere in between—the only requirement is that both frequencies must be entered in the same units.

Worked example

The worked example below illustrates the use of two programs, it can also be used to prove that the program has been entered correctly. A 2N5070 is to be used to deliver 25W to a 50Ω load using a "T" network tank circuit. The operating frequency range is to be 28 to 29·7MHz and the loaded Q is to be 10 at the design centre frequency of 28·5MHz. A 28V supply is to be used and the transistor's $V_{CE(SAT)}$ is 2V.

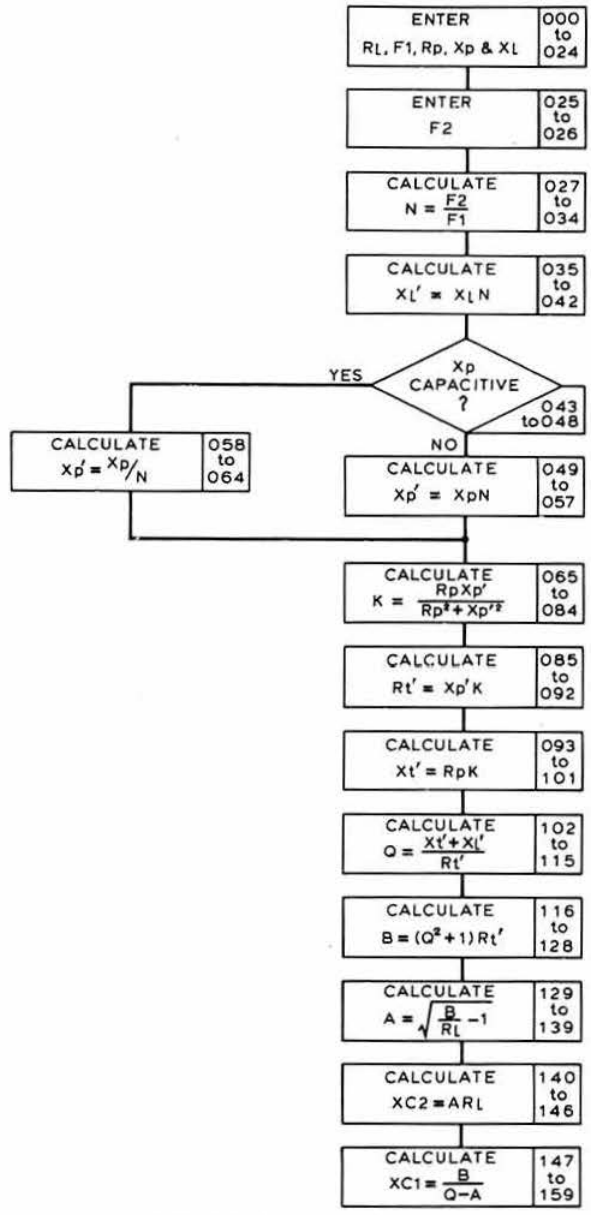


Fig 3. Analysis program flow chart

First calculate

$$RP \text{ from } Rp = \frac{(V_S - V_{CE(SAT)})^2}{2W} = \frac{26^2}{2 \times 25} = 13{\cdot}52\Omega$$

From the data sheet for the 2N5070 the output capacitance is 170pF at 28·5MHz, ie Xp = −32·85 at 28·5MHz.

Having established the basic data above, the design program can be used to determine the values of the components. The minimum Q is the first parameter calculated; this, for the example, is found to be 1·82. Since this gives a reasonable margin

compared with the required Q, calculations for X_L, XC1 and XC2 can be carried out. The results achieved are: $X_L = 120{\cdot}37$ ($L = 0{\cdot}672\mu H$), XC1 = 221·50 (C1 = 25·21pF7) and XC2 = 236·40 (C2 = 23·62pF). If required, the calculations can be repeated for different values of Q, RL, Rp or Xp.

With a satisfactory design having been achieved, the effects of parametric variations can be established using the analysis program. The results of a series of calculations are summarized in Table 2; obviously additional calculations could be carried out, if required, to yield the worst case minimum and maximum values for C1, C2 and Q. If the results are satisfactory, appropriate components can be chosen and the circuit constructed.

Conclusions

The run time for the design and analysis as presented above, including manual program loading, was about 15min. As can be seen, an appreciable amount of information has been gained for very little expenditure of time. Also, perhaps more important, the constructor will have a high confidence in the successful operation of the circuit when it has been built.

Detail listings for the programs, appropriate to the TI58/59 series of calculators, are available from the author (on receipt of an sase). By reference to the flow charts, Figs 1 and 2, the programs can easily be rewritten for other scientific programmable calculators or for a home computer. To give some idea of the store requirements, the design program uses 132 steps and nine data registers, and the analysis program uses 160 steps and 14 data registers—these figures being for the TI58/59 calculators. □

Table 2. Analysis program results

INPUT				OUTPUT				
Freq (MHz)	RL (Ω)	Cp (pF)	Xp (Ω)	Q	XC1 (Ω)	C1 (pF)	XC2 (Ω)	C2 (pF)
28				9·77	218·02	26·07	231·45	24·56
29·7				10·56	229·74	23·33	248·38	21·57
28		340	−16·43	13·66	186·70	30·45	272·28	20·88
29·7		340	−16·43	15·24	195·56	27·40	297·32	18·02
	33			10	280·29	19·92	194·44	28·72
	75			10	188·85	29·57	286·26	19·51

Q variation = 9·77 to 15·24
C1 variation = 19·92 to 30·45pF
C2 variation = 18·02 to 28·72pF

Notes: 1. Blank input entries mean that the nominal value is used.
2. Xp is the reactance of Cp at the nominal frequency (28·5MHz).

An 80-channel selector system for the IC240

by A. DAYKIN, TEng, MIE, MIMGTE, G8JCA*

Introduction

Having acquired an IC240 for mobile use, the author gave some thought to the possibility of increasing its capabilities for fixed station use, particularly when not QTHR. The accessory described below was not intended for mobile use, as a change in frequency is not easy to implement without looking at the switch positions; with the inevitable distraction from the road when mobile.

Design

Examination of the circuit diagram and the diode matrix tables indicated that a binary coded input was required on the coding input lines, with a lowest input N of 64. The input N is increased by one for every 25kHz step above 144MHz. The section of the IC240 circuit diagram used for the addition of the duplex shift gave a good indication of a method by which a logical system of switching could be utilized, and the addition of binary numbers achieved to obtain the correct inputs to the coding lines.

The circuit (Fig 1) was designed from basic principles, and the choice of cmos devices was made to ensure compatibility with the existing IC240 circuit elements. An added bonus is a saving in cost and complexity in respect of voltage regulation; this would have been necessary if ttl packs had been used, with little saving in device costs.

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Construction

The circuit was designed for use with three single-pole rotary switches, which were used to select and display: units of megahertz, switch A; hundreds of kilohertz, switch B; and twenty-fives of kilohertz, switch C. The author preferred this "frequencies" method of presentation rather than channel numbering. The UK standard of having no designated channel numbers below 145MHz, and channel zero starting at 145MHz, inhibited the channel method of presentation. (The frequency channels below 145MHz are required for Raynet groups, which also use the "beacons only" section of the band) [1].

Any constructor wishing to use rotary switches for selection and indication, should use the entire circuit. The switches are wired through the diodes, in the positions indicated in the circuit diagram, to the printed circuit board (Fig 2) which has its inputs coincident with points A4, A1, B8, B4, B2, B1, C2 and C1 of the circuit diagram. The use of bcd thumbwheel switches will allow for dispensing with all the diodes, shown within the dotted lines on the circuit diagram, which are external to the pcb. The connections from the switches to the pcb are made directly to points A4 to C1, respectively, from the appropriate bcd outputs of the switches.

The 9V line should be connected to the rotary switch wiper tag or the thumbwheel switch common terminal from the input side of the pcb. The output points of the pcb are connected via a multiway flexible cable to the nine-pin accessory plug. The nine-pin socket at the rear of the IC240 has the centre zero meter lead and the earth connections removed. The active lead

for the meter should be isolated or fixed to an insulated post within the equipment. The internal connections of the socket are now hard-wired to the 1 to 128 diode matrix lines and the +9V line. One other connection must be made to the pcb; the upper earth plane, which is used as electrical ground, must be connected to the earth line or chassis of the IC240 or its power supply. In constructing the prototype the pcb and switches were housed within the mains psu, and the earth connection derived directly from within this unit.

Surplus thumbwheel switches were used in the prototype unit, and the total cost was less than £2. Without using junk box items, or even shopping around, the total cost, excluding a special case, should not exceed £10. The 0, 1, 2, 3 digits on the lsd thumbwheel switch were painted over with black enamel and the positions relabelled 00, 25, 50, 75 respectively, using transfer lettering of the appropriate size. Limiting pins were inserted in the arcs of the lsd and msd switches to prevent the selection of invalid numbers.

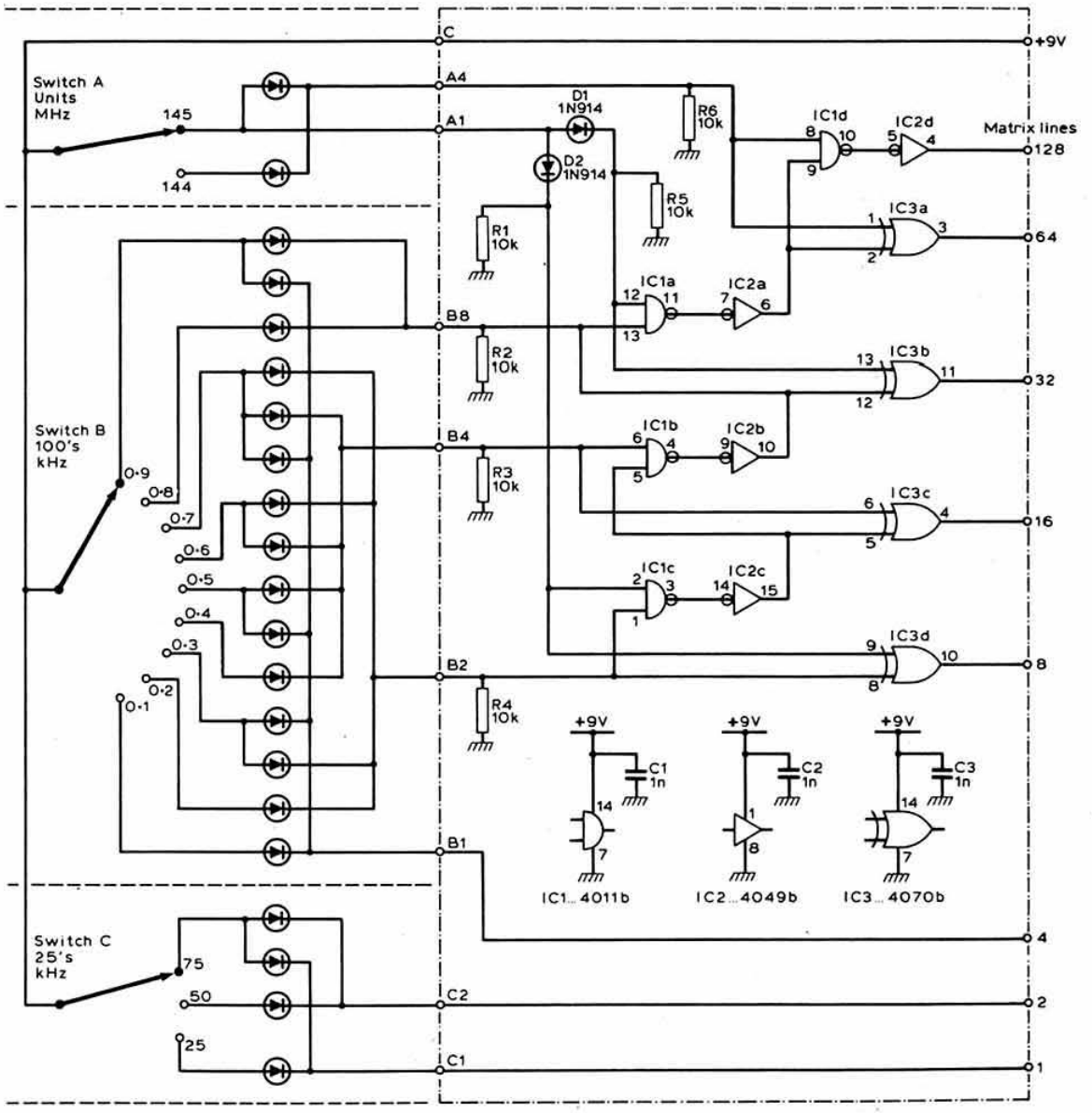


Fig 1. Full circuit diagram. IC1, 4011b; IC2, 4049b; IC3, 4070b; D1, 2 1N914 or similar; pull-down resistors all 10kΩ approximately; C1, 2, 3, 1nF disc

Conclusions

The prototype and a second example have both proved the action and reliability of the circuit. The use of thumbwheel switches allows for a very neat selection/display of frequency, but lacks the ability to scan the band quickly. The Duplex A and Duplex B facilities of the original equipment are not affected and continue to add 600kHz as desired. This accessory in conjunction with the Duplex A mode extends the listening range of the set to 146·575MHz. Care should be taken, when using the accessory and transmitting, not to encroach on segments of the band which are designated for other modes or services [1].

Following the principles of the circuit given, the accessory could be expanded to receive above and below the amateur band. The IC240 will perform quite well in the receive mode up to the maximum binary input on the matrix, N-255, which generates a receive frequency of 148·625MHz. Below 144MHz the minimum operating frequency has not been determined in practice, but full function is maintained at least down to 143MHz.

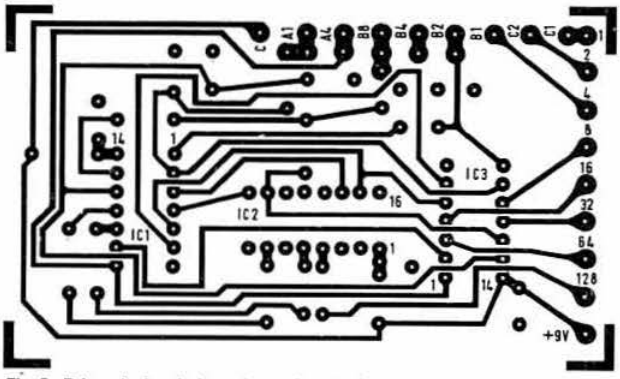
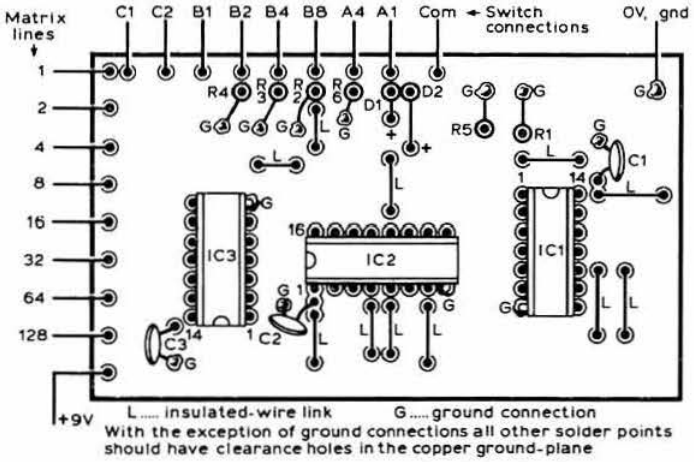


Fig 2. Printed circuit board, track side (top side plain copper with clearance holes)



◀ Fig 3. Component locations

Special note

Whenever the accessory is used, the channel selector switch on the IC240 should be placed in one of the two unconnected positions, indicated by a dot appearing in the indicator window. If this precaution is not observed it may prove difficult or even embarrassing to predict the frequency of your transmission.

Reference

[1] *Radio Communication* April 1979, p340. □

NEW PRODUCT

Havant Instruments 820 portable capacitance meter

The new Model 820 portable capacitance meter from Havant Instruments Ltd is a multi-range instrument combining digital accuracy with complete portability. Its 10 ranges cover capacitances from 0·1pF to 2F. Accuracy is 0·5 per cent or 1 per cent of full scale, and resolution down to 0·1μF, according to range.

In use the capacitor leads are inserted into a pair of slots and the capacitance is indicated on the clear four-digit l.e.d. display. A flashing display provides over-range indication. Provision is also made for using jack plugs when measuring in-circuit capacitances. The Model 820 has a robust and attractive moulded case but weighs only 675g (1·5lb). It will operate with rechargeable or disposable cells, and there is provision for a charger. A tilt stand, spare fuse and 26-page operating manual are supplied.

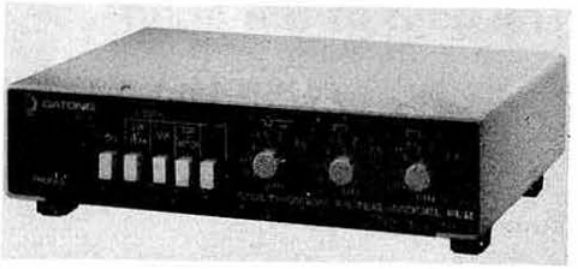
The Model 820 portable capacitance meter

Further information from: Havant Instruments Ltd, Unit 3, Westfields, Portsmouth Road, Horndean, Hants. Tel Horndean (0705) 596020.

EQUIPMENT REVIEW

The Datong multi-mode filter FL2

by JOHN BAZLEY, G3HCT*



Manufacturers' typical performance data

Input impedance 5,000Ω
Nominal overall gain Unity
Low-pass and high-pass filters
Frequency range 200 to 3,500Hz, linear tuning
Minimum stop band rejection 40dB
Rate of cut-off 40dB in 500Hz at 2kHz, 40dB in 120Hz at 500Hz
Notch and peak filter
Frequency range 200 to 3,500Hz, linear tuning
Notch width at −6dB in SSB + NOTCH mode 200Hz
Notch depth 30dB
Bandwidth range in CW [2] and RTTY modes 100 to 1,750Hz at 6dB
Bandwidth range in CW mode 70 to 700Hz at −6dB
Power output 2W into 8Ω with 18V supply. 1·5W into 4Ω with 10V supply
Output protection The output stage (LM380) is short-circuit proof and over-dissipation proof
Supply current 50mA zero volume. 350mA max output
Supply voltage 10 to 20V dc. Protected against reverse polarity
Size 184mm wide by 153mm deep by 44mm high (7·2 by 6 by 1·7in). Feet add 10mm (0·4in) to height
Weight, including packing 1,100g (39oz)
Finish Anodized aluminium wrap-around case. Panels printed white and yellow on black
Accessories Supplied complete with input lead and output lead (Phono to bare end)
Optional extra Mains power unit for 220–240V ac. Order Model MPU or MPU/1.

It is now nearly four years since Datong first introduced their FL1 audio filter. During that period we have seen several new models of amateur equipment introduced with various improvements, particularly in receiver performance—essential as band occupancy has increased. Today there is still a very real need for a multi-mode audio filter with an adjustable rejection notch, and the new FL2 neatly meets these requirements. It is smaller than the FL1, which is still the only filter with automatic notch tuning, and is housed in an anodized wrap-around case with a black front panel printed in white and yellow to differentiate between the different modes. A lot of thought has obviously been given to the panel layout and the marking of controls to simplify operating the unit when switching from one mode to another.

The reviewer used the FL2 extensively over a three-week period, mainly on cw with a commercial transceiver fitted with an excellent 300Hz crystal filter. On several occasions the cw position of the FL2 markedly improved copy, particularly on very weak signals. On ssb the ability to move the upper and lower edges of the passband independently *and* operate the notch filter enabled one to achieve 100 per cent copy of signals that would have otherwise have been very marginal. Under extreme conditions the passband can be reduced to under 1,400Hz to copy ssb, and although the speech quality is poor intelligibility remains good.

The FL2 was then used with a commercial direct-conversion receiver. As one would expect, the performance was very impressive, for the receiver had relatively little selectivity compared with the previous transceiver. One could obtain 100 per cent copy of both ssb and cw signals that were absolutely unreadable when the unit was switched out.

Facilities available

On ssb. Three positions are available:

(1) SSB WITH NOTCH. Two of the three controls adjust the lf and hf passband edges independently to help remove chatter from adjacent ssb signals. The third control can be adjusted within the passband to reject interfering heterodynes.
(2) SSB as above without the notch filter.
(3) SSB WITH PEAK as (1) above, but the third control *peaks* the heterodynes to assist with tuning before operating the reject button.

On cw. Two positions are available:

(1) CW. Only two of the controls are used in this mode: one to adjust the pitch of the cw being copied; the second to adjust the bandwidth. As bandwidth is adjusted the tone received automatically remains in the centre of the bandwidth selected.
(2) CW [2]. This is as above but has a "flat" rather than peaked passband.

On rtty. The reviewer did not test the unit in this mode, but very detailed instructions are included in the instructions leaflet.

General comments

The input and output leads supplied with the unit have a black tracer which the reviewer "naturally" assumed was earth—it turned out to be the "live" side!

When operating the FL2 on cw with the passband width fairly narrow and the centre frequency 200–300Hz, the FL2 will completely reject any sidetone that would normally have been passed to the headphones or speaker. The reviewer "opened up" the passband during transmit on these rare occasions when copying a cw signal under very marginal conditions. When the centre frequency selected is similar to the sidetone frequency being used there will be no problems.

To summarize: this is an excellent, well-constructed unit, although a few hours' use is required to obtain the maximum benefit possible under adverse operating conditions. □

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The gain of the quad

by F. RASVALL, SM5AGM*

Introduction

An old matter in dispute among radio amateurs is the difference in gain between the quad and the Yagi. The supporters of the quad are convinced that the difference amounts to several decibels, while the Yagi supporters consider the difference insignificant. Many articles have been written during the years and lots of curves have been presented, but most seem to be the result of practical measurements.

Having bought a home computer with considerably larger and more rapid calculation capacity than his old pocket calculator, the author decided to spend a few days making a theoretical calculation of the difference for various forms of a quad element. The result was very interesting.

Theory

A traditional quad element consists of a 1λ long wire that has been given quadratical form and is fed either in the middle of one side or in one corner. The feedpoint is normally placed symmetrically downwards towards the earth, which gives horizontal polarization in both cases. In the main lobe the vertical components are in opposite phase and cancel out in pairs. A quad element can therefore be compared to two stacked λ/2 dipoles where the ends two-by-two have been bent towards each other. The result is two λ/2 elements too closely stacked compared to what could be obtained from two free λ/2 elements at optimum distance from each other.

The current distribution can be regarded as sinusoidal at a first approximation, which means that the current has its maximum in the feedpoint, reduces as the amplitude of a sine curve to zero at λ/4 and increases in the same way to a maximum λ/2 from the feedpoint. As the element is bent to different forms, a greater or smaller deviation from the sinusoidal current distribution might result, but the calculation is made on condition that the normal sinusoidal current distribution is preserved.

The gain calculation was made in two steps. First the field strength in each direction in space was integrated, then a new integration was made over a sphere surrounding the antenna to get the total amount of power radiated, after which this was divided by the area of the sphere to get the mean power. Finally the power at the top of the main lobe was compared to the mean power, which equals the gain.

The calculation was made on a Commodore PET2001 personal computer and printed on a 3022 matrix printer with individually programmable characters.

Results

Three fundamentally different forms of the quad element have been studied: rectangular, rhombical and elliptical. For each form three different ratios between the axes have been included, 1:3, 1:1 and 3:1. The circumference was constantly one wavelength. The gain has been given relative to a λ/2 dipole and an isotropic source, ie a fictitious antenna that radiates equally well in all directions. The difference was 2·15dB, which represents the gain of the λ/2 dipole over an isotropic source.

Co-ordinated system	Gain relative to half-wave dipole	Gain relative to isotropic source
Y/X = 0/1	0·00dB	2·15dB
Rectangular Y/X = 1/3	0·21dB	2·36dB
Rectangular Y/X = 1/1	0·98dB	3·13dB
Rectangular Y/X = 3/1	2·37dB	4·52dB
Rhombic Y/X = 1/3	0·20dB	2·35dB
Rhombic Y/X = 1/1	0·98dB	3·13dB
Rhombic Y/X = 3/1	1·69dB	3·84dB
Elliptical Y/X = 1/3	0·28dB	2·43dB
Elliptical Y/X = 1/1	1·34dB	3·49dB
Elliptical Y/X = 3/1	2·61dB	4·76dB

Fig. 1. Theoretical gain of quad elements

(Continued on page 789)

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TWENTY-ONE YEARS OF TE

(PART 2)

by R. G. CRACKNELL, ZE2JV ex-G2AHU, and R. A. WHITING, 5B4WR ex-G3UYO

Theories of tep

Transequatorial scatter

Before the IGY the abnormal 28, 50 and 56MHz propagation which had been observed by amateurs to take place across the equator was termed "transequatorial scatter propagation". Since forward and backscatter were frequently in evidence, the tropical ionosphere at night was thought of as a turbulent zone rather like the auroral zones. With the discovery that not only weak and fluttery, but also abnormally strong signals sometimes appeared in the early morning, and from midday and persisting late into the night on frequencies as high as 90MHz, the term "scatter" became clearly inappropriate and it was dropped from the amateur terminology.

With the advent of 144MHz QSOs across the equator, the scatter mode has been revived, notably in articles by W1JR [7] and DJ3KR [8], and the presence of abnormally strong signals either ignored or dismissed as an entirely different mode of propagation.

Reflection from a single scattering zone even 1,000km high could not account for propagation between Athens and Pretoria, or between South-West Africa and northern Italy, and would require very low angles of radiation between Salisbury, Cyprus and Athens (which is clearly not the case). Evidence of sufficiently dense ionizations to reflect, rather than just scatter from irregularities, at 144 and 432MHz at any altitude over the magnetic equator, is lacking. Further, if either a single or multiple scattering were the supporting mode, then the power required would increase rapidly with frequency, as it does with meteor scatter signals, and this was comprehensively proved not to be the case when communication between Salisbury and Athens took place using a mere 40W and the tiny antenna shown in the photograph in Part 1.

The billiard ball mode

Observations from a ground backscatter sounder operated from the Virgin Islands in 1956 were noted by Professor O. G. Villard Jnr, W6QYT. These led him to propose a mode of propagation whereby successive reflections could take place from the F2 layer without intermediate ground reflections, as a result of tilts in the height of the F2 layer caused by the post-sunset rise in the ionosphere over the magnetic equator [9].

The ray geometry so proposed represented a considerable advance over the earlier scattering theory and could be used to explain most of the phenomena being observed and the geographical distribution of the te zones. If an optimum tilt could be found in the layers on either side of the magnetic equator, then the angle of incidence was much lower than with normal nF2 reflections and the frequencies propagated would be higher. However, there were obvious snags with the theory; as any billiard player will point out, the angles are very critical. Villard claimed to have found the requisite tilts to exist in small appropriate areas of the ionosphere around 1700 local time. There is most certainly a rise in the tropical F-region after sunset, and a maximum is reached about 2000 local time, after which the F-region over the magnetic equator descends. Height variations sufficient to give the minimum required 13° tilts for propagation between Salisbury and Cyprus are indeed difficult to find, and the chances of their persisting from early evening through to the early hours of the morning are quite negligible.

However, a variation suggested by ZE2JV in 1960, namely that the ionization gradient rather than the variation in virtual height of the F2 layer provided the necessary tilts, may be combined with Villard's theory to provide a plausible concept to explain the strong signals received by F-type te.

The exospheric mode

As a result of backscatter soundings southward from Japan, Professor T. Obayashi proposed in 1959 that, as 28MHz transmissions would penetrate the ionosphere, tep could take place in a similar manner to vlf whistlers, along field-aligned ionizations in the exosphere (now termed the magnetosphere) [10]. The suggestion was taken seriously at the time and it focussed attention on the work being done by the authors of this article. According to this theory, te signals should come down at the geomagnetically conjugate point, and there is indeed a tendency for them to do so. However, due to the magnetic anomaly, Cyprus and Salisbury are certainly not geomagnetically conjugate. Further, assuming a perfect dipole magnetic field for the earth, the authors calculated that the return trip by the exospheric mode should take about 58ms. They thereupon set up their first time-delay experiment, but the results listed in Table 1 in Part 1 discredited the suggestion.

However, Obayashi's suggestion cannot simply be discounted. He was evidently aware of the relatively high angles at which te takes place (as against the very low angles required by Villard's suggestion). Field-aligned ionizations are really present, and the only error is that the alignment and the ducting of signals takes place within the ionosphere, rather than through the magnetosphere. The discovery of 144MHz propagation caused the authors to look at Obayashi's theory again, and once again prompted interest in time delays. They were reminded that tep does show an extra time delay, which undoubtedly leads to errors with backscatter sounders, and the only explanation they can offer for this extra delay is ducting along field-aligned ionizations, as suggested by Obayashi.

Towards a better understanding of tep

Large scale events in the ionosphere

The ionosphere is directly influenced by solar radiation, and it might be expected that the density of ionization should show a maximum over the equator at the equinoxes. In practice, as far as the tropical ionosphere is concerned, there is very considerable modification. At the equinoxes there is not one maximum but two. These maxima begin to form in the morning, and a pronounced "bite-out" between them becomes well-established by noon and lasts until after midnight [6]. Further, this system is centred not over the true equator but over the line of zero magnetic dip, or magnetic equator.

The system does not, as might be expected, move north and south with the seasons, but with the migration of the vertical sun in summer and winter the system becomes unbalanced, with considerable differences in the electron densities in the high density areas which form in the regions approximately 10°–15° from the magnetic equator. At the equinoxes electron densities in these zones are comparatively very high, and critical frequencies at vertical incidence (foF2) of up to 20MHz and more were recorded in South America during the IGY.

The influence of the earth's magnetic field is marked. Not only is the anomaly symmetrical about the magnetic equator, but the ionosphere is upset by magnetic storms and influenced by changes in the magnetic field. Results from satellites have revealed the surprising information that the earth's field in space is not the neat dipole field it was presumed to be but is compressed against the earth on the sunny side by the solar wind and is extended far into space on the side away from the sun. The earth and its ionosphere rotating within this field thus encounter a rapid change shortly after sunset. The resultant dynamo action sets up strong electric fields, the lower levels of the ionosphere are sucked up, and the upper levels bulge outwards and reach a maximum about two hours after sunset. The plasma then shatters, the turbulent regions subside and the irregularities so formed align themselves with the earth's magnetic field. Meanwhile at lower levels the absence of a coherent bottom in the E-region prevents the shorting out of electric charges and hence inhibits recombinations so that ionizations persist until very late at night.

Smaller-scale events and the propagation of vhf/uhf signals

The size of the irregularities may vary considerably and kilometre and metre sized irregularities may co-exist; they are mobile and drift about in clouds which may be kilometres in length and only a few metres in width. In addition they are responsible for the scintillation of radio stars, and have been found to produce rapid fading on frequencies as high as 2,000MHz of signals coming through the ionosphere from stationary satellites. As well as the irregularities, plasma bubbles are known to rise through the turbulent regions of the ionosphere, and these have been shown to cut off signals from exploratory rockets as they pass through the plasma.

Except in years of exceedingly high solar activity (such as experienced during the IGY when signals in the lower vhf range could be propagated like hf signals by multi-hop F-layer reflections) vhf and uhf must be considered as frequencies which will penetrate the ionosphere. Reflections in the normal way cannot be considered, but bending or refraction may take place where steep horizontal ionization gradients are encountered and ducting is also possible.

Such horizontal gradients are known to exist on either side of the magnetic equator on the verges of the high-density zones, so that at vhf these zones may function more like lenses than mirrors. Thus a wave entering a high-density zone where there is no gradient and leaving where the gradient is steep will be bent and, when the bending is sufficient, the wave will be propagated across the magnetic equator to meet a similar lens on the other side where, if the electron density is sufficiently high, it will be refracted back to earth.

When the "lenses" are clear, like polished glass, very strong signals and a degree of focussing can be expected. One can also expect to find a clearly marked muf and, within the vhf range, a hierarchy of signals whereby the lower frequencies appear sooner and disappear later than the higher frequencies. This is exactly what the authors found in the ZE2TEP experiment [2] and the system, which is illustrated in Fig 12, is probably responsible for most of the signals which they label "F-type te", and is capable of propagating signals up to 90MHz under the most favourable conditions.

Spread-F phenomena have a particular relevance to tep. Like many other ionospheric phenomena, the appearance of spread-F varies considerably with the seasons and the sunspot cycle, and the distance away from the magnetic equator affected by it also varies sporadically. With its appearance, the underside of the F-region undergoes a change, as it were, from clear glass to frosted glass. Its name is derived from its effect upon vertical incidence ionosphere sounders upon which all evidence of a sharp critical frequency disappears. Just as light is scattered from frosted glass, so vhf signals penetrating the ionosphere tend to be scattered so that, instead of strong signals, weak signals emerge at the far end of the te circuit and forward and backscattering become prevalent.

About two hours after sunset the rise and break-up of the F-regions of the tropical inonosphere result in stratification of the high density areas along the lines of the earth's magnetic field. These ducts are of gentle curvature and tend to propagate signals, and if the signals are well above the cut-off frequency the ducts so formed will be insensitive to frequency. Thus the clearly-defined muf and hierarchy of signals which characterize "F-type te" disappear, and give way to the type of propagation the authors call "pure te".

The roughened undersurface of the F-region is thought to play a dual role. It seems to play the part of a receiving and retransmitting area, so that, if energized, it retransmits the signal into the field-aligned ducts and, on receiving a signal from the ducts, seems to spread it in all directions. At times, as evidenced by the beam rotation tests, the signal appears to come from the whole of the visible sky, as if it were all illuminated by the signal. Where the spread-F is patchy, off-line transmission would seem to be probable, and it is thought that very strong signals that sometimes appear late at night may result from the absence of spread-F.

Apart from this specular action, the "frosted glass" effect is frequency sensitive and higher frequencies show a greater penetration. Hence it is a common occurrence for F-type te signals on 50MHz to fade out or to become very weak from about 1930 to 2030 local time, during which time 144MHz and higher frequencies are often propagated, and for the 50MHz signals to reappear later as "pure te".

Whether or not te signals continue to thread their way through the field-aligned ionization as they pass between the

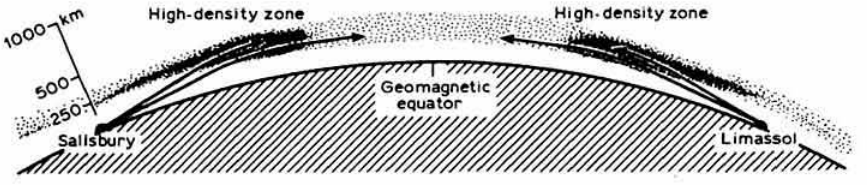

Fig 12. Propagation via the high density zones 10°–15° from the magnetic equator (F-type te)

high-density zones is again a matter for conjecture. It is evident, as illustrated in Fig 13, that the high density zones, while providing sufficient bending for the reception of satellites below the radio horizon, would not by themselves provide quite enough for the ray to encounter the opposite high-density zone. The extra bending is not great and DJ3KR [8] proposed a "bubble" to account for it. If this were the case the authors theory would approach very closely to his, since DJ3KR accounts for the geographical spread of tep by additional bending in the ionosphere and their difference would be merely one of emphasis.

However, the case for ducting is a very strong one. Over the geomagnetic equator the lines of force (along which the ionizations stratify) are parallel to the surface of the earth, and a system is required which (a) propagates signals over a wide frequency spectrum (28–432MHz), and (b) provides an extra but equal time delay (within the acuracy of the measurements) over the whole of this spectrum. It is doubtful if DJ3KR's bubble could satisfy either of these criteria, and a simple scattering model would suffer from the same defects. Nevertheless a plain ducting model would involve exospheric propagation on Obayashi's model [10], even allowing for the greater height of the F-region over the magnetic equator during the evening hours, and considerable modification is necessary.

First, the geomagnetic co-ordinates of the sending and receiving stations are relatively unimportant. Instead one must consider the magnetic lines of force operative in the area of the ionosphere illuminated by the signal. This may be 1,500–2,000km nearer the magnetic equator than the stations operating the circuit.

Second, the specular or "frosted glass" effect of spread-F enables the signal to be transmitted into ducts running more nearly parallel to the earth's surface than would otherwise be possible.

Finally, the whole area of the tropical regions of the ionosphere at night is turbulent, and the irregularities, although field-aligned, are mobile. What is a good duct one moment may disappear the next, so that a signal may switch its course very rapidly, an effect which may account for the on-off switching of the fading pattern and the frequency spreading, as well as allowing some of the signal to remain in ducts staying within the ionosphere instead of escaping into space.

The complicated flutter fading pattern of te signals may not be due solely to spread-F, although this undoubtedly does impart such characteristics to hf signals reflected from affected areas and to vhf/uhf signals propagated through them. A combination of spread-F and duct-switching must allow for a multiplicity of propagation paths varying in length (and time delay) by several wavelengths. With the complication of all these effects it is perhaps surprising that signals are even as coherent as they are and that signals are detectable at the power levels available to amateurs (which one hesitates to express as erp since antenna gain is seldom realized over te circuits).

The future programme

Much remains to be done. Ed Tilton, W1HDQ, who over the years gave the authors much help and encouragement, wrote an article in *QST* April 1963 entitled "TE propagation—vhf discovery extraordinary" in which he paid tribute to te as a totally amateur discovery. It has continued that way. For many practical reasons much of the academic effort has concentrated on backscatter sounders, spread-F phenomena and topside ionosphere sounding from satellites. The difficulties of mounting long-range experiments over a considerable period of time on a professional basis are evident, but this is exactly what the amateur can do, with no extra cost except the expenditure of his time, which he willingly gives, and the use of his equipment, supplemented by loans from universities and professional sources when required.

The more immediate tasks which amateurs can undertake to further the knowledge of tep are as follows.

1. A full exploration of the possibilities of longer-range te, particularly at 144 and 432MHz.
2. Confirming or disproving the impression that stations must be equidistant and at right angles to the magnetic equator in order for tep to work.
3. A determination of whether tep will work at even higher frequencies. (Is it more ridiculous to try 1,296MHz than it seemed it would be to try 432MHz only a few years ago?)
4. The development of much more precise time-delay measurements than were possible some 20 years ago. These delays need to be measured with accuracies of the order of 0·5ms (ie ±150km or better) before what the authors have intimated in this paper as their impressions can be asserted with authority, namely that there is no significant difference in delay times from 28 to 432MHz.
5. The investigation on a systematic basis of the problem of angles of arrival. This task is of particular importance at locations further removed from the magnetic equator than Salisbury, Limassol and Athens. Such knowledge will not only confirm or refute the theory advanced but will also pave the way for amateurs to achieve the ultimate limits of the possibilities of long-distance tep.

Acknowledgements

This report and the suggestions made to explain te phenomena are based on the combined efforts and willing co-operation of many amateur operators and experimenters over a long period of time, together with a study of the increasing volume of academic and technical literature dealing with the tropical ionosphere. It is not possible to mention all by name, but special mention must be made of Dr Fred Anderson, ZS6PW, for his technical advice and assistance in the timing experiments, and Professor Martin Harrison, G3USF, who undertook a search and supplied the authors with much of the literature.

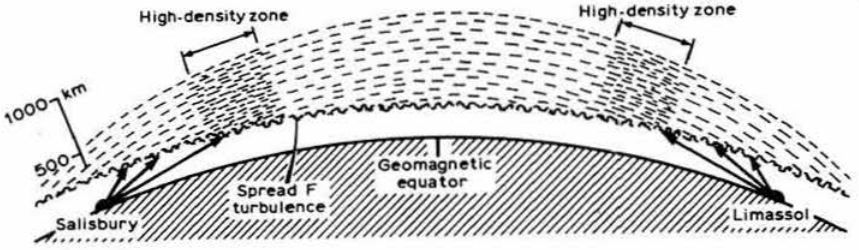

Fig 13. Night-time development of spread-F and field aligned irregularities in the tropical ionosphere (pure te)

The authors are also indebted to professional and university departments for their advice and assistance, and especially to the universities of Rhodesia and Athens, the BBC rebroadcasting station in Cyprus, the South African CSIR, and the Rhodesia Electricity Supply Commission.

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Universal joint to prevent feeder breakages

by B. CASTLE, G4DYF*

ANYONE who has used white plastic 300Ω twin feeder out-of-doors will know how quickly it deteriorates; most troublesome of all is the tendency of the wire to break within the insulation at any point where it flexes in the wind. After several attempts to overcome the problem, the author developed the simple device described below which appears to overcome this fault liability. The device would be equally useful with the better-quality black plastic twin feeder which resists the effects of sunlight. If suitably modified to provide a suitable make-off, it could be used with coaxial feeders.

The cause of breakages

When 300Ω twin feeder is hung from the centre point of antennas such as the G5RV, the Windom or folded dipoles, it is terminated at the top end on a T-shaped centre insulator and at the bottom end on the ground, a building, or on a vertical pole intended to remove some of the weight from the antenna.

When the wind blows, the feeder flaps about wildly, and if this movement is unrestrained the feeder will hinge at the lower fixed point. At the top end the flexure of the feeder is so slight, because the T-piece is free to twist axially from side to side with the antenna, that, in the author's experience, it does not lead to breakage of the conductors.

The ideal device

The ideal device for damping the movement would have gradually increasing stiffness from the tip to the base, would be easy to fasten to the feeder or would enclose it, and would have negligible effect on the impedance of the feeder by its proximity. This last condition rules out metal or materials which

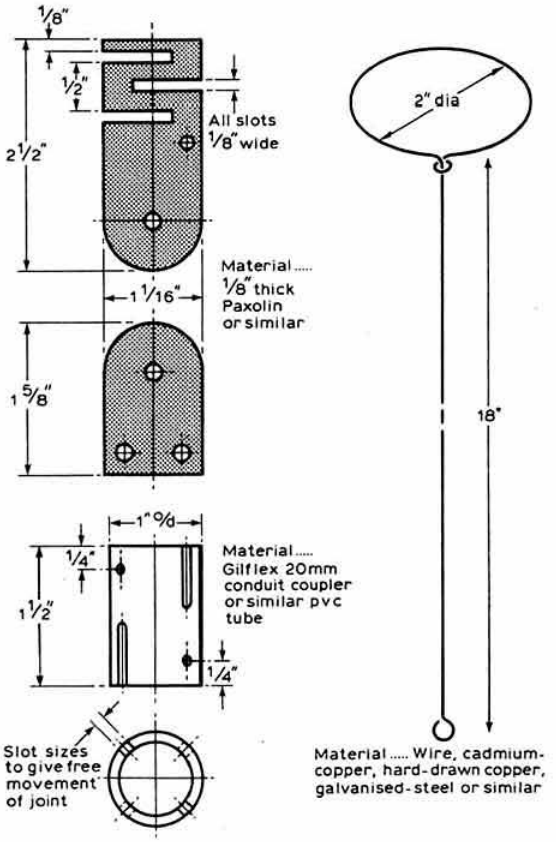
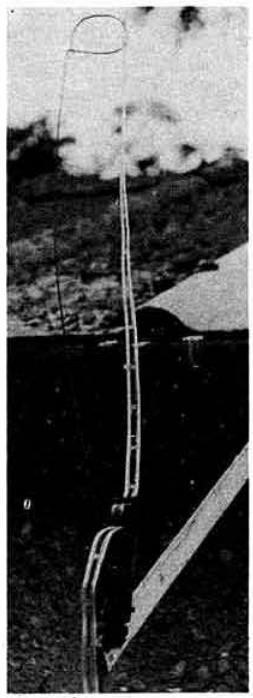


Fig 1. Details of the joint components

*6 Pinewood Avenue, Sevenoaks, Kent TN14 5AF.

The joint in use at the author's QTH



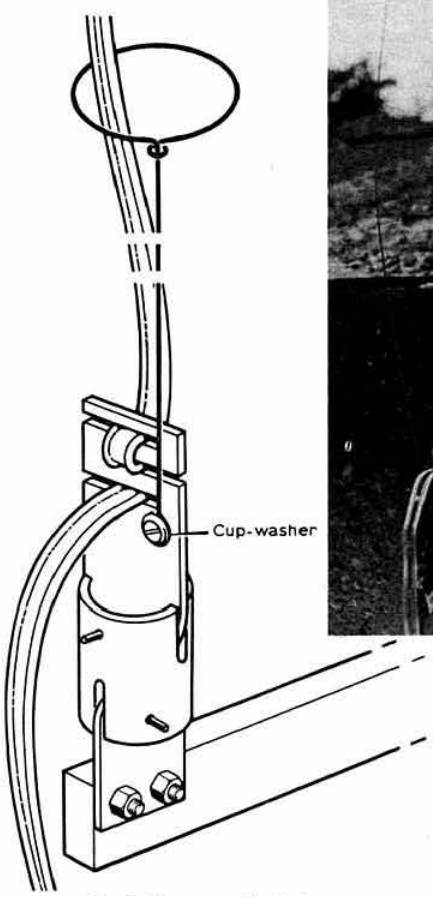


Fig 2. The assembled joint

conduct by virtue of absorbed moisture. A spiral plastic spring of graded stiffness through which the feeder passed would perhaps be ideal, but a source of such a spring has not been found; it would need to have negligible restraining influence at its top end.

A practical device

The device which has been in use at the author's station for about two years is a simple universal joint with a springy wire extension, and this has prevented further breakages. The joint is made from a plastic conduit coupler of 1in outside diameter (Gilflex coupler for 20mm conduit) and two pieces of 0·125in thick Paxolin, plus a piece of stiff cadmium copper wire. Galvanized wire would no doubt serve equally well. Cutting details are given in Fig 1, and the assembled joint is shown in Fig 2.

The prototype was assembled using steel roll pins which were a tight fit in the holes drilled through the plastic tube; screws and nuts, plus lock-nuts should be just as satisfactory. The slots in the tube section must give sufficient clearance so that the Paxolin end pieces are free to swivel. The slots were made with a fine hacksaw and file.

The wire loop through which the feeder passes plays a vital part in the action, and without it the device would be completely ineffective in preventing fracture of the conductors. The wire acts as a lever to convey the movements of the feeder to the top part of the joint; without it, flexure at the make-off point would still occur because friction and inertia would not permit the joint freely to follow the feeder movements. There is some flexing of the feeder where it passes through the wire loop, but this is minimal and is spread over an appreciable length of the wire. The zig-zag fastening of the feeder to joint permits easy removal or adjustment.

Incidentally, it may be noticed that the feeder sags more at one time of day than at another. This appears to be caused by a change in the moisture content of rope halyards; even nylon ones are subject to this. A fraction of an inch change in the length of a tightly stretched halyard will cause perhaps an 8in change in the height of the feed point above the ground. □

The gain of the quad

(Continued from page 784)

Hardly surprisingly it was found that the gain increases when the elements are vertically extended, since the distance between the points for maximum current then reaches its maximum. On the other hand it came as a surprise that the gain of the normal quadratical element is only 0·98dB over a $\lambda/2$ dipole. Since the distance between the two points of current maximum does not increase when the antenna length increases, this means that a long quad antenna can be regarded as two Yagis much too closely spaced where the gain difference of 0·98dB continuously reduces. The gain difference between a quad and a Yagi of equal length could therefore be expected not to exceed 1dB throughout.

When comparing the different forms between themselves it was noted that the elliptical form is somewhat better than the rectangular, which in turn is better than the rhombical. It must be remembered, however, that this is mainly a reflection of the distance between the feedpoint and its diametrically opposite point, and also to some extent of the inclination of the element part.

If more gain is wanted it is thus recommended that the elements be extended vertically, but it must be remembered that the more gain one tries to press out of an antenna of given size, the more the impedance and the bandwidth will decrease. The antenna will become more and more critical and the risk of failure will increase.

Conclusions

The difference in gain between a quad with quadratical elements and a Yagi of equal length with an equal number of elements is approximately 1dB for short antennas. For long antennas the difference can be expected to be smaller.

The gain can be increased at the expense of bandwidth, impedance and, to some extent, efficiency (gain will be lower than directivity) by extending the elements vertically. □

technical topics

Pat Hawker, G3VA

SOME time ago one of the American electronics magazines presented all of its readers with a plastic disc which demonstrated that with modern audio-processing techniques it is possible to increase appreciably the rate of speech without changing the pitch of the recorded voice (a boon for "talking books for the blind" it seemed at the time).

Now I read that the makers of radio and television commercials are experimenting with methods of "time compression", speeding up the sound and action by as much as 25 per cent by taking out all the pauses and "dead bits" without this being detectable by listeners and viewers. The advocates say that speeded-up communication not only provides more information but also increases the power of persuasion, makes the message easier to remember, does not encourage "mental counter-argument", or provide time for the audience to be distracted.

Well, well, that could be a hint to all pen-pushers. I wonder if I pack more and more information into *TT* and remove all the dead bits, you, the readers, won't even have enough time to argue back! But, on second thoughts, let's leave that to the fast-talking salesmen.

144 and 432MHz crystal oscillator/multipliers

The subject of vhf overtone crystal oscillators is of considerable interest to many amateurs, and this is reflected in the journals: a number of general hints and circuits were given by WB2EGZ in *Ham Radio* February 1979, and some of these were included in *TT* May 1979, pp422-3. More recently, A. L. Mynett, ZS6BMS/G3HBW (a one-time frequent and much respected contributor to *Radio Communication*) has provided a useful survey, "Overtone crystal oscillators" in *Radio ZS* March 1980, pp12-3, which includes information on the efficiency of a number of overtone oscillators based on measurements made with a low-power rf wattmeter. He tested seven arrangements using bipolar transistors: basic Pierce overtone; Squier; basic Butler; Butler oscillator-multiplier; pretuned Butler; Butler oscillator-multiplier with idler tuned circuit; and the Robert Dollar overtone oscillator. All these circuits include at least one tuned circuit, partly to suppress the crystal fundamental frequency and partly to improve efficiency; otherwise this can be very low when a crystal is used in the higher modes such as fifth and seventh overtones.

For these experiments he used a 103MHz (fifth-overtone) HC-18/u crystal on its seventh overtone, producing an output directly in the 144MHz band and (with the oscillator-multiplier arrangements) in the 432MHz band.

Of these various arrangements, the two which appear to have given the most satisfactory results are the Butler oscillator-multiplier with idler tuned circuit (Fig 1) and the Robert Dollar oscillator shown in Fig 2.

With BFY90 transistors, an idler circuit (L1-C6) series-tuned to 288·4MHz and dc input of 120mW, simultaneous outputs of

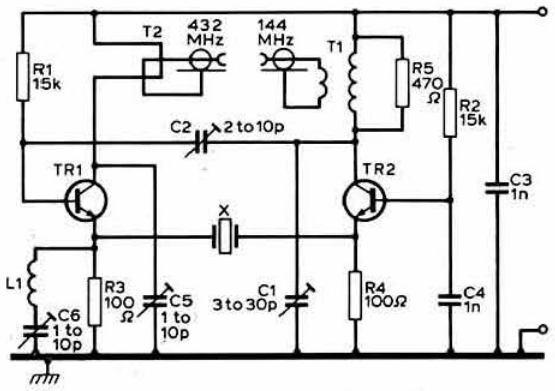


Fig 1. Butler overtone oscillator/multiplier providing outputs on both 144·2 and 432·6MHz from a 103MHz (fifth-overtone) crystal as described by G3HBW. The series-resonant idler circuit (L3, C6) is tuned to 288·4MHz. T1: primary 4t, 0·5mm enam, 7mm id, 9mm long; secondary 2t link winding. T2: both primary and secondary formed by loops of wire 4·3mm long. L1: 3t, 0·5mm enam, 6mm id, 10mm long. TR1, 2: BFY90 (BSX20 etc can be used with reduced output)

30mW on 144·2MHz and 10mW on 432·6MHz were measured—representing a conversion efficiency of 33 per cent for a combined seventh overtone oscillator and tripler. The inclusion of an idler circuit was based on the appreciation that transistor frequency-multipliers tend to operate in a varactor-like manner. It was found to increase the output on 432MHz by a factor of about four.

For output on 144MHz only, the single-transistor Robert Dollar arrangement of Fig 2 gave 25mW rf output for only 74mW dc input "with excellent frequency stability and little or no tendency to spurious oscillation, provided that the quite-critical value of R2 (between 47 and 80Ω) was adhered to. The bypass capacitor C3 was also found essential because it, in company with R1, helps greatly to suppress undesired lower-frequency modes. C1 is the main tuning control while the ratio of C2 and C1 controls the degree of feedback, higher values of C2 *reducing* feedback. In practice C1 was 20pF and C2 about 75pF for best results."

G3HBW noted that this oscillator works with supply voltages down to 1·5V. There was only about 100Hz frequency shift when the voltage was varied between 1·6V and 9V. He highly recommends this semiconductor version of the Robert Dollar oscillator for use between about 30 and 150MHz (and,

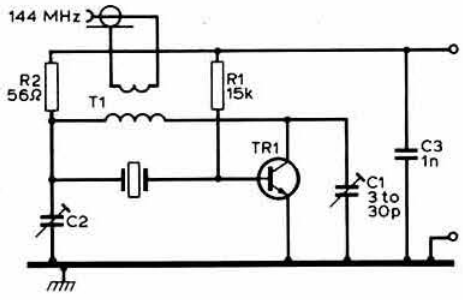


Fig 2. G3HBW's Robert Dollar overtone oscillator providing output on 144·2MHz. T1 as in Fig 1

he adds, probably higher, although this has not been investigated).

Incidentally, for vhf QRP enthusiasts, G3HBW finds that 10mW on 144MHz can be quite easily received over clear (but not optical) paths up to 45km using only dipoles at each end, with a strength that suggests that at least 70km could be covered in this way; these results, he notes, agree substantially with standard propagation theory.

Solid-state t/r switch

Despite the well-recognized advantages of full-break-in cw operation (by which I mean the ability to hear incoming signals between out-going letters and words, and not just rapid key-operated changeover) this mode is still the exception rather than the rule. Indeed, the widespread adoption of hf transceivers seems to have pushed into the background the once popular electronic transmit-receive (t/r) switch that enables the same antenna to be simultaneously connected to a transmitter and a receiver without the use of any antenna changeover relays. The basic purpose of any t/r switch is to block, during transmission, the path between the antenna and the receiver, at least to the extent necessary to prevent any damage to the receiver which might otherwise be caused by seriously overloading its input circuits.

In practice several problems can arise: most t/r switches function by biasing active devices into a highly non-linear "cut-off" state, and/or include back-to-back diodes as a means of limiting the signal; however, such non-linear devices energized by the transmitter output inevitably generate harmonics. The removal of a t/r switch was at one time regarded as standard anti-tvi practice. Then again, the development of hang-age systems used on both ssb and cw means that receiver sensitivity may not recover sufficiently quickly for the operator to hear incoming signals in the short pauses between words or letters. There is also the feeling that solid-state front-ends and/or solid-state t/r switches are more vulnerable to strong signals than was the case with thermionic valves. And finally, there remains the problem that the technique is really suitable only for use with Class C power amplifiers since, with any current flowing, the pa becomes a wide-band noise generator. For all these

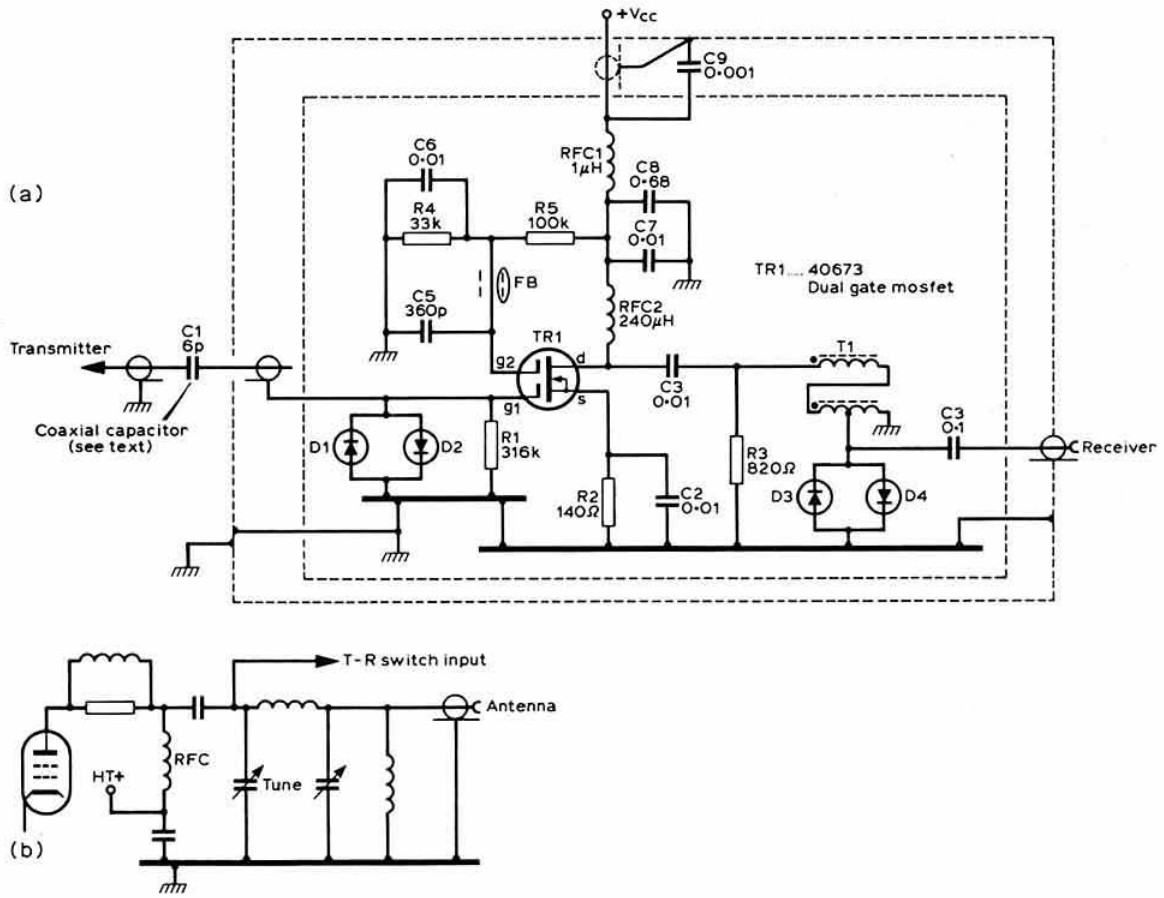


Fig 3. (a) Solid-state t/r switch suitable for use with moderate-power valve-pa transmitters. FB: ferrite bead with one turn of wire. T1: 12t bifilar-wound on FT50-61 core tapped at 6t. D1-4: silicon high-speed switching diodes such as 1N914, 1N4148. (b) Preferred method of connecting t/r switch to "hot" side of the transmitter's pi-network. A suitable high-voltage capacitor (about 6pF) can be formed using a length of coaxial cable (see text)

reasons, the t/r switch was far more popular in the 'fifties than in the 'seventies.

Nevertheless there are signs of a recent revival of interest in this technique. Malcolm Crawford, K1MC, describes in *Ham Radio* June 1980, pp58-61, a "solid-state t/r switch for tube transmitters" using a 40673 dual-gate mosfet protected by back-to-back diodes as the switching element in a fairly orthodox arrangement (Fig 3), except that he advocates the connection of the t/r switch to the *high-impedance* side of the pi-network in the transmitter pa; this enables the pi-network and tvi filter to act as a harmonic attenuator to any harmonics generated by the device, as well as providing a preselector/matching arrangement during reception. This requires the use of a low-capacitance high-voltage capacitor, and he suggests that this can be made from a short length of 50Ω coaxial cable (RG58/U is suitable for transmitter pa voltages up to 500V dc, but RG59/U is recommended for voltages up to 900V). These cables have an internal capacitance of about 1pF/cm, and about 60mm of cable will form a suitable capacitance of about 6pF.

PIN diodes replace coaxial relays

An alternative approach to t/r switching, although this time directed more to their use as a direct replacement to coaxial relays than specifically for cw break-in, appears in *Break-in* January-February 1980, pp10-3, where Ian Redpath, ZL1BCG, advocates "Use p-i-n diodes for t/r switching and throw away your coaxial relays". He takes advantage of the good switching characteristics of p-i-n diodes at frequencies between hf and uhf; typically 0·8Ω "on" and 40,000Ω "off" (1-2pF leakage capacitance) at 30MHz. Reasonably effective isolation of a receiver can be achieved at frequencies up to uhf, using two or three diodes in connection with $\lambda/4$ lines (or "lumped" LC circuits at hf): Fig 4. At 430MHz the transmitter power loss is only about 0·4dB when using Unitrode UM-9401 p-i-n diodes. These diodes have a typical free air power dissipation of 1·5W. In conjunction with a 25W uhf transmitter, a theoretical isolation of about 55dB should be possible with two diodes, but in practice, because of stray leakage etc, an altogether more realistic figure would be 30-40dB, with possibly a further 10dB achievable with an extra diode, which is more than sufficient to prevent burn-out of the input stages of a receiver. This form of t/r switch has a restricted bandwidth, but this should prove sufficient to cover an amateur band.

No mention is made by ZL1BCG of transmitter powers greater than 25W. Manufacturers' application notes on this technique are available from Unitrode and Motorola: [1] "PIN diodes for two-way radio antenna switching" from Unitrode Corporation, 580 Pleasant Street, Watertown, Mass, USA 02172; and [2] Motorola Application Note AN-584A from Motorola Semiconductor Products Inc, Box 20912, Phoenix, Arizona, USA 85036. Although p-i-n diodes of this power rating are not exactly cheap, the system is less expensive than using a uhf coaxial relay.

PL259-plug soldering hint

A note from E. J. Hatch, G3ISD, reports that after a series of frustrating attempts to solder the braid of coaxial cable through the holes in PL259-type plug connectors he adopted a simple and effective method (indeed, so simple that he feels it must have been thought of before although he has never seen it recommended in print):

"Join two of the holes by sawing through with a junior hacksaw, thus forming a slot. Pull the teased-out braid through the slot thus formed and solder the braid in the circumferential groove. Before threading the braid, the nickel plating should be filed away at the point of soldering, using a fine file, and the exposed brass tinned."

Low-profile 1·8 and 3·5MHz antennas

For extended ground-wave coverage and for low-angle dx operation on 1·8 and 3·5MHz it is desirable to transmit vertically-polarized signals; however, since a $\lambda/4$ monopole on 1·8MHz requires a mast some 130ft (40m) high, most amateurs need to adopt some form of loading to bring the height down to manageable dimensions. The extreme would be a ddrr "hula hoop" which would need a height of only about 1·5m (but would require a large "low-resistance" ring and a very good earth plane); more practical alternatives include various forms of "umbrella", "Nord" and "UG" top-loaded antennas. While these have appeared in various anthologies etc, they have received comparatively little attention from amateurs.

The Marconi "folded-umbrella" antenna was noted in *TT* July 1974, pp445-6, and is shown again in Fig 5 (a). The technique permits mast radiators of down to $\lambda/10$ to be fed directly from low-impedance coaxial feeder, with a resistive feed achieved by making the inductance of the mast and cage of "guy wire" loading wires tune to the transmission frequency. The same top-loading technique can be used without "folding"

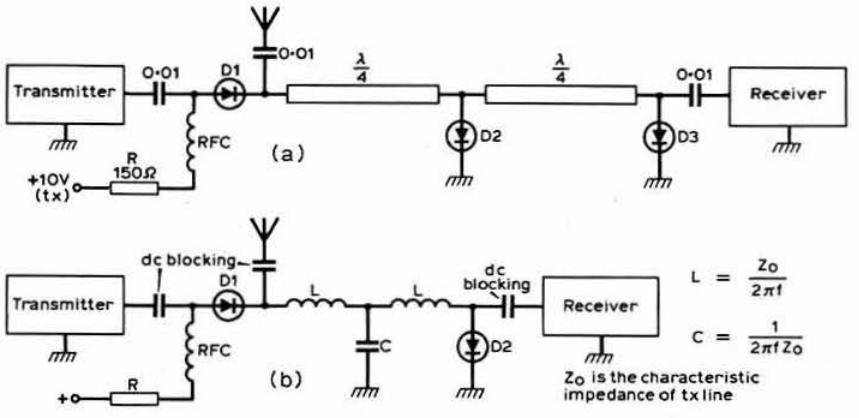


Fig 4. (a) Use of three p-i-n-diodes for uhf transmit/receive switching and providing about 40dB isolation. The $\lambda/4$ sections can be formed using strip-line techniques with lines formed on double-sided printed circuit board. Taking into account the velocity factor etc, a $\lambda/4$ section for 430MHz using glass epoxy board would be about 120 by 6mm. Note that it is vital that the diode leads are kept very short. This can be done by cutting a small rectangle in the pcb and placing the diode in the cut-out so that the leads are flush with the plane of the board. The leads can then be sweat soldered to the line and the earth plane. (b) Two-diode arrangement for hf using lumped L and C

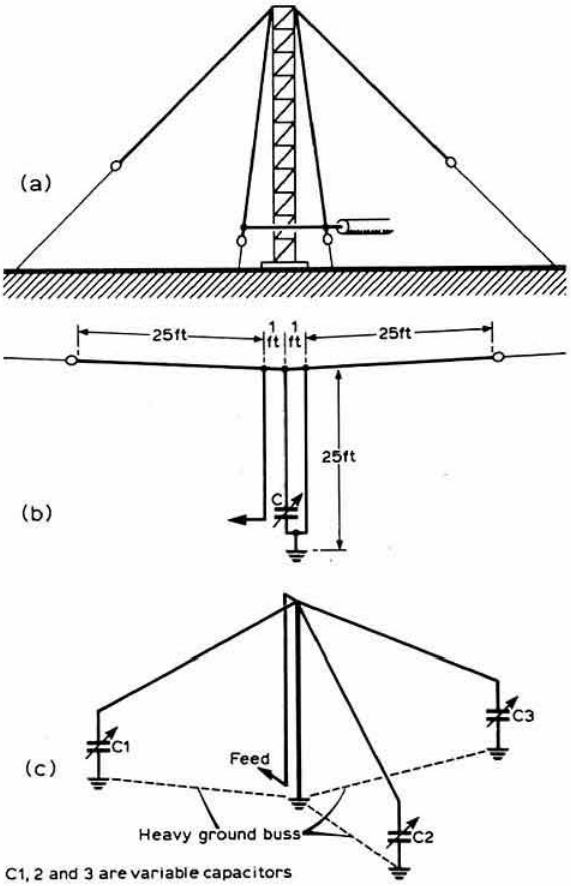


Fig 5. Low-profile short vertical antennas. (a) "Folded umbrella" antenna as developed by The Marconi Company can provide a resistive match directly to low-impedance coaxial cable with a grounded λ/10 mast. The folding "element" consists of a cage of wires running parallel to the mast with the wires connected together near its base; matching can then be adjusted by altering number and spacing of wires forming this cage. Top loading consists of a number of sloping "guy wires" with the whole system resonated to the transmission frequency. (b) "UG" antenna showing typical dimensions for 2MHz. (c) Nord antenna. For all short vertical antennas a good earthing system is essential. Bandwidth will be narrow so systems should be resonated to the required "dx" frequency in the 1·8 or 3·5MHz bands

the radiator, in which case the base impedance is about 15Ω resistive.

A number of folded umbrella mf antennas are being installed by the IBA for the current extension of independent local radio services, and the first of these came into use at Cardiff last April. The station operates on 1,359kHz (221m) with a mast height of only 22m (72ft). This would be equivalent to under 50ft on 1·8MHz and 25ft on 3·5MHz.

The "UG" and "Nord" antennas were included in a comprehensive survey of vertically-polarized antennas in a series of articles in *CQ* in 1968 and again, recently, in *rf design* March 1980, pp16, 19.

The UG antenna is a variation of the well-known T top-loaded antenna, and the dimensions shown in Fig 5 (b) are for 2MHz operation. The only information given on matching is that "capacitor C is varied until a favourable feedpoint impedance is developed". Information on the Nord antenna is even more sparse, the recent article stating only that: "The Nord is a short vertical antenna used at lf and mf. It has a sufficiently high bandwidth and radiation efficiency for its intended use. It is basically three over-coupled tuned circuits. A centre tower is used as a common element."

Radio control of models

Although radio control of models is a hobby in its own right, there is some overlap of interest with amateur radio, and indeed some of the first articles on 27MHz radio control were published in this journal about 30 years ago.

Electronics 5 June 1980, pp145–9, brings the subject up-to-date by showing how new special-purpose integrated-circuit devices made by National Semiconductor Corporation make it possible to build complete, multi-channel, proportional-control systems with a range of about 100m for just a few dollars, compared with the £100-plus cost of many present systems offering comparable facilities. American modellists use frequency bands around 27, 49·85 and 72MHz, with some channels available without any licence but all with fairly stringent power limitations that tend to be either "maximum of 10,000μV/m measured at 3m" or "0·75W". In the UK, licences are issued by the Home Office (27MHz) although these do not cover such applications as the opening of garage doors by radio control.

The new ics, only recently available in volume, include the LM1871 encoder-transmitter and the LM1872 receiver-decoder. The LM1871 contains the circuitry needed to modulate an rf carrier (up to 80MHz according to crystal) with up to six analogue channels of control information. In effect it includes circuitry for oscillator, modulator and encoder logic for a combination digital and proportional control system: analogue information is converted into a train of pulses whose widths are proportional to the corresponding channel inputs. The LM1872 is intended to form the heart of a single-conversion superhet with 455kHz i.f. and wide-range agc system for use with a wide range of supply voltages and with a high-gain precision comparator, a 30μs integrator, and a 25mV reference making up a unique detector which feeds a suitable signal into the decoding logic that supplies digital or analogue outputs to the model's servos.

The article includes typical circuits for both transmitter and receiver, and forecasts that the price of radio control equipment may drop sufficiently to spur a consumer boom in this field.

Dual-frequency signal injectors

For many years the simple multi-vibrator type of signal injector has proved a useful aid to fault-finding and in servicing receivers and audio equipment—a worthy successor to the old "finger on the grid" technique. The usual practice has been to use a simple RC oscillator at af producing harmonics that extend some way into the rf range. Recently, a more versatile approach has become popular: the use of dual oscillators, one running at af, the other at rf. Not only do the harmonics then extend much higher in the radio spectrum, but, in effect, the rf signals are "modulated" by the af oscillator, even if only crudely. A dual-frequency probe can be useful all the way from dc to vhf.

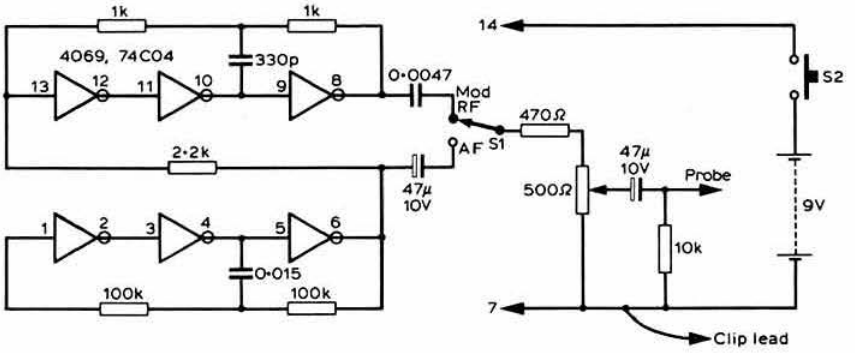


Fig 6. Modulated dual-frequency signal injector as described in *Electronics Australia* using cmos hex ic. The af oscillator has a frequency about 300Hz, the rf oscillator about 700-800kHz

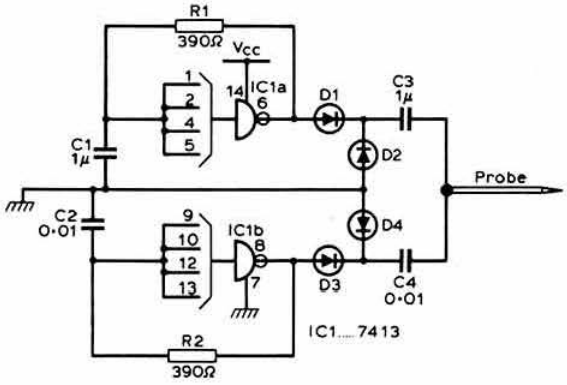


Fig 7. G4BXX's dual-frequency signal injector using 7413 dual Schmitt trigger ic

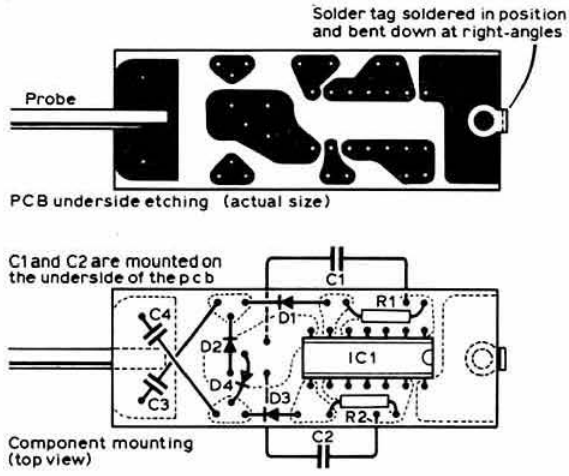


Fig 8. Printed circuit board layout for the G4BXX injector

A design of this type by Ian Pogson, VK2AZN/T, appears in *Electonics Australia* February 1980, pp46-7, based on a hex inverter cmos ic such as the 4069 or 74C04, with three inverters used in each section to provide oscillators running at about 300Hz and 700kHz. This is stated to provide a probe usable to 100MHz or so. The article includes full constructional details, but only the basic circuit arrangement is shown in Fig 6.

A rather similar but smaller device (although possibly not intended for vhf) has been used successfully by G. Monkman, G4BXX, since about 1976. This is shown in detail in Figs 7 to 9. The combination of C1, R1 and C2, R2 provides pulse repetition frequencies of about 2·3kHz and 230kHz respectively, each with a duty cycle of about 25 per cent. IC1a and IC1b are the two halves of a 7413 dual Schmitt trigger device. Diodes D1-4 are purely for protection and could be omitted if the device was intended for use only on low-voltage transistor equipment; any general-purpose silicon diodes are suitable. C3 and C4 should be rated 250V or above if the probe is used on valve circuitry.

G4BXX made his pcb small enough to fit into an aluminium cigar tube, and the device is powered from four 1·5V hearing-aid cells housed in a section of plastic garden-hosepipe. The push button was of the panel-mounting type and fitted through a hole drilled in the plastic cigar-tube lid. By choice of R and C almost any frequency between 1Hz and 1MHz can be generated: Fig 10.

Japanese semiconductor code

Amateur Radio May 1980 provides a useful guide to Japanese semiconductor coding which has similarities both to the European and American systems. All diodes, transistors etc are registered with the Electronics Industries Association of Japan (EIAJ) and receive a type number such as 2SC2800. The first figure is 1 for a diode; 2 for a bipolar or field-effect transistor; 3 for a dual-gate fet. The second character, S, means simply that it is a semiconductor device. The third character is more useful and is in accordance with the following letter code: A for

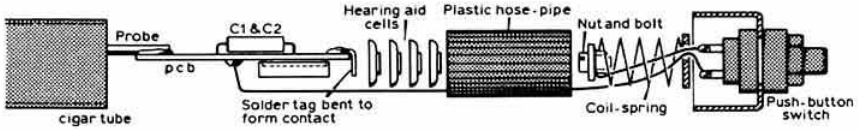


Fig 9. How the signal injector is assembled to fit an aluminium cigar tube

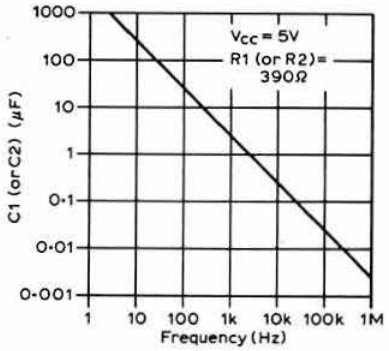


Fig 10. Oscillator frequency graph using fixed 390Ω resistors (R1 or R2) for various values of capacitor (C1 or C2)

pnp-type device for rf applications; B for pnp-type device for af applications; C in npn-type for rf; D is npn-type for af; F represents thyristor (scr); H is a unijunction transistor; J is a p-channel fet; K is an n-channel fet. The final figures represent the registration serial number.

Of roughly 4,000 registrations, the 2SC (npn rf devices) category accounts for about 60 per cent; there are possibly 1,000 different types of semiconductor device currently in production. Integrated circuits are not type-registered with EIAJ. *Amateur Radio* mentions that a "Japanese Transistor Manual" and a "Japanese FET Manual" are available from CQ Publishing Company, 1-14-2 Sugamo Toyoshima-Ku, Tokyo, Japan, priced at 500 Yen each.

Tunnel-diode wobbulator

It seems a long time ago, in the days when few semiconductor devices would work at uhf or shf, that the Esaki tunnel diode was hailed as the sliced-bread of the new technology—though it is worth remembering that tunnel-diode amplifiers were playing a very important role in professional satellite communication systems long before the days of the gasfet.

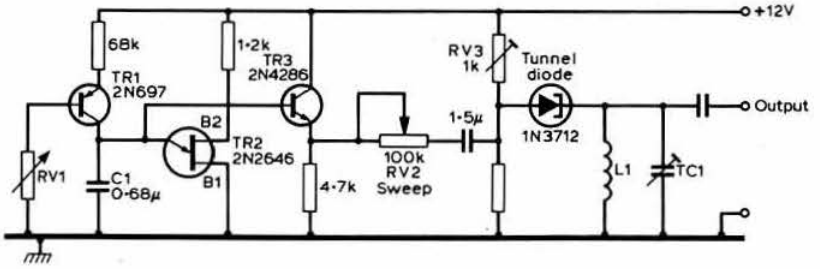


Fig 11. Low-cost tunnel-diode wobbulator suitable for use from 10 up to several hundred megahertz *(Electronic Engineering)*

G8GEF draws attention to a "cheap and effective tunnel diode wobbulator" that appears in the "Applied Ideas" section of *Electronic Engineering* May 1980, p21, originally contributed by H. Shelley, of Huddersfield: Fig 11.

This is claimed to provide an effective method of obtaining a sweep frequency source throughout the range from 10 to several hundred megahertz. It relies on the stable characteristics of a 2N2646 unijunction transistor and the 1N3712 tunnel diode to perform "with no compromise" a function that usually requires an expensive piece of test equipment.

The linear sweep is set by RV1, sweep depth by RV2, while RV3 adjusts the bias to the negative resistance region of the tunnel diode hf/vhf oscillator in order to accommodate the characteristics of the particular tunnel diode. The resonant circuit, L1-TC1, tunes to the required centre frequency.

Follow-up forum

W. A. Roberts, G2RO, is a little doubtful about G6XN's recommendation (*TT* May) of always using a balun with a coaxial-fed beam. He writes:

"There are powerful theoretical arguments for introducing a balun at the junction between a coaxial cable and a beam. In practice many of us have found that the advantage is quite dubious.

"From recent measurements I can suggest why this is so: we take commercially-made baluns for granted, assuming them to be non-reactive impedance transformers over a wide hf range. Under test they do *not* have that perfect performance.

"A simple test is to put the balun in circuit between the transmitter output and a non-reactive load such as the Cantenna. Use an swr meter as a convenient reactance-change indicator and tune across each of the bands in turn. Change the swr indicator if possible and also the coaxial connections to make sure that you are not yourself introducing reactive elements.

"Having done that test on three well-known commercial baluns I have decided that the uncertain risk of omitting a balun is no worse than the uncertain risk of inserting one."

Of course it could be said that this is primarily an argument against the wideband ferrite-type of balun, and that there are other types. Admittedly, some years ago attention was drawn in *TT* to the fact that professional wideband ferrite-type units fit large cooling fins, suggesting that such designs do not behave perfectly at all frequencies!

Mick Hall, G3VQQ, points out that there are still differences of opinion among electrical engineers about the use of "chemical earths" (*TT* May) for power applications and that there may be additional problems when these are used for rf applications. For instance, is there any likelihood of an increase of harmonic radiation due to the possible creation of semiconductive layers near the electrode? Or could such a technique have a detrimental effect on other parameters (dielectric constant, effective depth of earth plane etc)? I suspect that it would need some careful investigation to find this out—nevertheless I still feel it would be worth trying in areas of poor earth conductivity such as sandy or urban soils, especially where there is no room for a good earth mat or radials. □

swl news

Bob Treacher, BRS32525 *

AT the time of writing, your scribe is almost "QRT" in the swl sense, being a victim of the summer conditions and alternative hobbies. This page is totally contributed by readers.

Forthcoming events

Rumours which are circulating suggest that N4HX should be active from TY for two years from early August. There is still a good demand for TY among many G-dxers, so he should be very popular and certainly will not be short of contacts. We have no details of any other trips contemplated for August but, for those who like to plan for the future, we have news that VK0JS has been reserved by the group planning to visit Heard Is in January/February 1981. This is certainly one not to miss.

Looking forward again, but not so far into the future, we have Cray Valley's 10th SWL Contest. This year's event takes place on 13/14 September. This is both a single-operator or multi-operator event and is still the only swl contest in the British Isles. The full rules are published in "Contest news" this month. The event was a moderate success last year, but G4DFI, who runs the event, says that much more publicity has been given this year and Cray Valley RS is hoping for a really good response this time. Readers who have little or no experience of contest activity should have a go and support a really good cause. After all, a low participation rate may encourage the organizers to scrap the event, which would certainly not be a good move. It is unfortunate that other groups do not promote swl-only activities, as there are so many to cater for.

Mid-summer news

KP2A has been on his travels again; this time signing CR9A towards the end of June. He has been reported on ssb on "even" days and on cw on "odd" days.

FW0DD was also to have been active from the Wallis and Futuna group at the end of June. OH2BH was to have been semi-rare dx from ST2 signing 6T1YP, while ST2FF/ST0 was to have appeared from southern Sudan at around the same time.

Despite the lack of a published deadline date for this issue, a number of readers used their initiative and sent contributions, which are gratefully acknowledged. However, many had little to report, due to summer inactivity, but took the opportunity to update their table scores. Those who must be saving themselves for the autumn and winter dx seasons are John Doughty, BRS40705; Larry Hoult, BRS42559; Derek Casson, BRS41992; Ken Sketheway, BRS20185; J. B. Welch, BRS40814, and Michel Delvaux, ARS42503.

Nevertheless several members were monitoring the bands in the hope of some choice dx appearing. Mike Patrick, ARS42591, recently purchased a Heathkit GR54 receiver at his club's junk sale, and this has given him coverage of the 7–28MHz bands in addition to the 3·5MHz band which he could receive on his earlier set. He has obviously enjoyed the chance to tune the more active bands, and reports a number of interesting callsigns: VK2AGT/LH, YB0WR, TN8AJ, VK9CCT and 9Q5GB. Mike has been sending listener reports to a number of stations and he is now awaiting replies from the bureau. Last month's *SWL news* gave some insight into obtaining cards direct, but those using the bureau must be patient.

Harold Moss, BRS18529, reports again. His best dx was ZD7HH, but he also mentions a station signing IJ7DMK operating from St Peter's Is in the Ionian Sea. QSLs were requested via I2DMK. E. Spear, BRS41147, reports receiving the RSGB DXLCA certificate for having 100 countries confirmed. This was his seventh award and he had purchased the RSGB *Amateur Radio Awards* book with a view to trying for a few more. He has an FRG7 receiver and is very happy with its performance; he mentions dx from 9L1, KH4, HH2 and ET3.

Robert Small will no doubt be losing his ARS8841 as he has reached the ripe old age of 21. He reports a mixed month with some good periods, especially on 14MHz, followed by very indifferent conditions. Early mornings were considered the best time to be at the rig. He even reports good signals on 3·5MHz from PY, YV and LU just after midnight gmt. The 7MHz band also produced good dx in the shape of CE6CVO, ZP5WC, OX3HA, LU4DYS and ZB2BL. On 28MHz, signals were copied in mid-June from A6, TN8, VP5, ZE, 3B6 and 5Z4.

1980 hf countries table

Station	28	21	14	7	3·5	1·8	Total	Mode
RS42604	179	174	130	114	108	17	722	ssb
BRS43475	118	153	192	86	74	10	633	ssb
ARS8841	108	109	170	84	82	0	553	ssb/cw
BRS35943	97	97	93	76	85	5	453	ssb
BRS18529	37	80	133	52	51	15	368	ssb
BRS41992	50	61	125	42	12	0	315	ssb
BRS40705	94	82	67	45	22	0	310	ssb
BRS20185	81	85	94	20	27	2	309	ssb
BRS43273	96	75	74	26	13	0	284	ssb
ARS42503	39	79	72	46	20	0	256	ssb
BRS40293	44	79	82	30	25	0	255	ssb
ARS43261	54	50	75	20	18	0	217	ssb
BRS42559	36	58	72	26	18	4	214	ssb
ARS42591	23	36	70	22	63	0	214	ssb
BRS43135	22	34	58	23	28	8	173	ssb
BRS40814	42	21	57	26	15	4	165	ssb
BRS41992	33	32	50	11	31	7	164	ssb
ARS43496	1	38	66	22	21	2	150	ssb

Newcomers

Again it is my pleasure to welcome two new faces to this page. First, Ray Howes, who was still awaiting his BRS number. He runs a JR599CS and an AR88D for hf reception, and an SR9 to monitor the fm part of 144MHz. Antennas are a 132ft long wire into an atu, and for 144MHz an eight-element beam at 25ft pulls in the "goodies".

Second, Harry Cutter, BRS43882, in Middlesbrough, who was a radio mechanic in the Forces, runs a Trio 9R59DS with an atu and a 200ft long wire. He has been interested in the hobby for only six months and has already received the White Rose Award and the All Gozo Award—being the first G listener to receive the latter award—and he entered the recent SP-DX Contest with pleasing results.

Late news

One item which arrived just in time for inclusion in this issue was another interesting contribution from Brian Russell, BRS33915. To brighten up his listening habits he is currently chasing yls—for YL-DXCC that is!, and countries for the IOTA Award. This latter one appeals to him as it requires careful tuning to ascertain on which island in a large group the station is located, as each island would count for IOTA points.

(Continued on page 805)

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microwaves

Charles Suckling, G3WDG *

EME for everyone on 1·3GHz?

A superb opportunity for many stations to achieve a successful moonbounce contact will happen soon, if the plans of the Kiruna Radioklubb (SK2GJ) come to fruition. They have been offered the use of a 32m dish for a short period, prior to it being used for professional radar studies of the auroral zone on 900MHz. It is hoped to assemble a 1·3GHz eme station, and plans are for a 200W output transmitter and a 0·7dB nf parametric preamplifier.

This is indeed a most exciting prospect. Calculations indicate that SK2GJ should be audible by anyone with only a 20dBi gain antenna (eg a 1·5m dish or two loop Yagis) and a 3dB nf receiver, and that they should be able to receive stations running as little as 50W to the above-sized antenna. Linear polarization will be in use, instead of the standard circular polarization normally used for 1·3GHz eme.

A lot of work on the system still remains to be done, and SK2GJ will certainly not be on before the end of August. Last-minute information regarding frequencies, polarization, times of operation, skeds etc will be available from Gudmund Wannberg, SM2BYA, Gruvvägen 22 7tr S-98135 Sweden, or from the writer (Tel 0327 830537). When operating times have been decided, the writer will be happy to pass on moon-tracking data to anyone interested.

1·3GHz eme news

As reported briefly last month, the Oxford eme group achieved some degree of success on 1·3GHz eme during the second half of the ARRL International EME Competition. Much last-minute work on resurrecting the writer's old 1·3GHz transmitter enabled some transmitting tests to be carried out. An rf output of 50W was coaxed from the single 2C39 pa, but losses in the 100ft of 7/8in heliax cable to the dish resulted in only 30W arriving at the feed. System calculations indicated that echoes should nevertheless be just obtainable at this power level, provided that the dish would give its full gain.

At first no echoes could be heard, and errors in dish pointing were suspected. The moon was behind clouds, and the group was relying solely on the elevation and azimuth position readouts on the dish. Recalibrating these using sun noise showed up a 2° error in azimuth and a 1° error in elevation. After allowing for these errors when the dish was moved back on to the moon, weak, but consistent, echoes were received. It was surprising just how accurate the pointing had to be; moving the dish only 1° resulted in the echoes disappearing entirely!

Later the clouds disappeared and the dish could be sighted visually. While testing for echoes again, signals from VE7BBG, PA0SSB, K2UYH and LX1DB were copied, but the 30W was insufficient to attract their attention. Eventually a sked was fixed by telephone with LX1DB, and 15min later a successful contact had been completed. LX1DB's signals were very good (he was running 300W output) and even readable on ssb. LX1DB reported later that the signals were very weak, but that he could have identified callsigns, even had he not known to whom he was listening beforehand!

These preliminary tests with low power confirm the advantages that 1·3GHz has to offer for eme work, as previous tests on 432MHz at similar power levels have been completely negative. Of course 30W is too low a power for regular eme work on 1·3GHz; the Oxford group had the benefit of a particularly low-noise preamp (0·9dB nf) for hearing echoes, and LX1DB was using a very large antenna for this frequency (a 30ft dish). More practical systems would probably use dishes somewhat smaller than 20ft to make pointing easier, and this would necessitate the use of higher power. The fact that other stations using 20ft dishes did not hear the group's signals confirms that more power will be needed. Work is progressing on a larger pa.

Alpha Award

Alpha (UK) Ltd have very kindly offered to contribute an annual award, starting this year, to the leading UK station in the 10GHz Cumulative Contest. This award will take the form of a miniature cup, which is to be retained by the winner.

Microwave expeditions

Two expeditions equipped with 10GHz will be active during August. The Oxford University RS (G3OUR) is again visiting Scotland, and will be active during the period 9–28 August from near Peterhead (ZR square). It will be taking wideband and narrowband equipment, including a 4ft dish and 10W twt. Schedules may be arranged by writing to G3YGF (J. N. Gannaway, Dept of Engineering Science, Parks Road, Oxford) before departure, or by contacting the group on 144MHz during the expedition. Skeds would be very welcome, including any with Continental stations.

A group of Belgian amateurs using the callsign EI2VAH will be travelling to the west coast of EI (UO80g) on 30/31 July, and expect to be active a few days later until 14/15 August. For further details see *4–2–70* this month.

IARU Region 1 microwave records

The following table, supplied by SM5AGM, gives the distance records (at 31 December 1979) for Region 1 on the microwave bands.

Band	Propagation Mode	Stations	Date	Mode	Km
1·3	Tropo	GD2HDZ-HB9AMH/P	1975	CW	1,131
1·3	Eme	PA0SSB-VK3AKC	1975	SSB	16,640
2·3	Tropo	G3LQR-OZ9OR	1976	CW	764
3·4	Tropo	G3LQR-DC0DA	1979	CW	430
5·7	Tropo	G3BNL/P-G3EEZ/P	1973	CW/FM	152
10	Tropo	I2FZD/2-I4CHY/7	1979	FM	633
24	Tropo	HB7AKR/P-HB9MDN/P	1979	FM	177

New IARU Region 1 2·3GHz record

G3LQR continued his progress on 2·3GHz by a recent QSO with SM6ESG (GR square) at a distance of approximately 900km. Not only is this a record, but it is also the first G–SM QSO on 2·3GHz. Shortly after this contact G4BYV also worked SM6ESG. Congratulations to both stations.

G4FSG also reports that during the same opening the Martlesham 1·3GHz beacon GB3BPO was audible in PA0 at 30dB above noise on a screwdriver, and at 40–50dB above

(Continued on page 801)

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

4-2-70

John Morris, G4ANB*

Repeater news

The latest batch of 145MHz repeater proposals, vhf Phase 4, has been submitted to the Home Office to be considered for licensing. The proposed callsigns, locations and channels are:

GB3AY	Ayr, Strathclyde	R2
GB3BP	Near Crawley, Sussex	R6
GB3BT	Berwick on Tweed	R2
GB3DA	Near Chelmsford, Essex	R5
GB3FF	Fife	R4
GB3KN	Maidstone, Kent	R4
GB3LD	Barrow in Furness	R3
GB3LY	Limavady, Co Londonderry	R0
GB3SB	Jedburgh, Borders	R0
GB3SI	St Ives, Cornwall	R1
GB3SS	Near Elgin, Grampian	R0
GB3VT	Stoke on Trent, Staffs	R1
GB3WR	Wells, Somerset	R0
GB3YJ	Leamington Spa, Warwick	R7

If the Home Office approves these units, licences could be issued towards the end of this year. If and when GB3KN is licensed, GB3KR, near Dover, will be moved to Ch R1.

Several 432MHz repeaters are awaiting permission from the Home Office to change site. These include GB3HO near Horsham, GB3NX near East Grinstead, and GB3HE in Hastings; the last being temporarily off the air. The Portsmouth uhf repeater, GB3PH, is now operational from a new and better site. GB3BK at Reading is to move from RB6 to RB11 to avoid co-channel interference with GB3LW in central London.

Repeater channels

The problem of finding adequate channels on 144MHz for a comprehensive repeater network has been occupying much of the time of the Repeater Working Group and the VHF Committee over the past few months. Channel spacing of 12·5kHz has been rejected, as has the introduction of extra channels outside the fm portion of the band. It is possible that some European countries may introduce 25kHz specification channels interleaved between the existing ones, but there are no immediate plans to use this system in the UK. It has been concluded that eight channels should suffice, provided that some groups are prepared to change frequency to accommodate new units.

Groups holding 144MHz licences have a responsibility to cover a wide area, and some time in the future the RSGB may have to insist on an operational repeater changing channel to allow for a new unit many miles away. It is important to realize that *almost all co-channel interference is caused by fixed stations*, often running high power to omnidirectional antennas, rather than those for whom the repeaters are built and licensed—mobile and hand-portable stations. If a change to 12·5kHz spacing is to be avoided, together with the expense of new crystals, filters and synthesizers, then fixed stations must use the least possible power and avoid "repeater dxing". Better still, they should leave the repeaters for the mobiles.

*120 Whitehorns Way, Drayton, Abingdon, Oxon

Requests are received from time to time for repeaters to use the odd numbered channels on 432MHz, RB1, 3, 5, 7 and 9. These are not being allocated because the internationally agreed uhf channels, RU0 to RU9, are the exact inverse of ours, and these odd numbered channels are being left vacant to avoid interference with European repeaters. In the same way, the Dutch, for example, are deliberately avoiding the even numbered channels, RU2, 4, 6 etc. A proposal to introduce RB15 was recently discussed by the Repeater Working Group and rejected on the grounds that until synthesizers become more widely used on uhf the number of channels should be kept to a minimum.

Wigtown repeater appeal

Bill Jarvis, G8APX, is canvassing support for the 145MHz repeater in the Wigtown area of southwest Scotland. He would like to see a repeater in this area to serve the many mobiles using the A75 trunk route, and to provide a link between Northern Ireland, southern Scotland, the Isle of Man, parts of Wales and the northwest-facing Lakeland towns. Bill believes that several hundred people would make good use of such a repeater, and he would be helped by promises of support from some of them. In particular someone is needed with a favourable site near the coastal road able to act as first in charge of switch off. Readers interested in supporting such a project should contact G8APX, Salewheel House, Salesbury Hall Road, Ribchester, Preston, Lancs PR3 3XU.

An RSGB document called *Guide to Repeater Licensing* is available from RSGB headquarters for those contemplating building a repeater.

Vale of White Horse Repeater Group formed

About 30 people attended the inaugural meeting of the Vale of White Horse Repeater Group on 12 June in Oxford. The objectives of this new group are to provide, maintain and finance repeaters for the RSGB in the Vales of White Horse and Aylesbury, Oxford and the surrounding districts, and to promote and further the interests of repeaters in the area. Geoff Austin, G4DPA, chaired the meeting and gave a brief history of the GB3WH repeater on R4. The draft constitution and committee proposed by the outgoing GB3WH repeater group were accepted by the meeting, and control of GB3WH was formally handed over to the new group. The annual subscription has been set at £5, with a special introductory offer of £20 for the first five years' membership.

As mentioned previously in *4-2-70*, the move of GB3WH is being forced by building work on the present site at the Culham laboratories in southern Oxfordshire, where it was built by members of the Culham Radio Club. An application for planning permission to use Shotover Hill, 5km to the east of Oxford, has been made, and it is hoped that work can start on the move as soon as this is received. The new group will also take responsibility for the uhf repeater GB3OX which is licensed but not yet operational. Readers interested in joining or receiving more information about the Vale of White Horse Repeater Group should contact its chairman, G4DPA, QTHR.

Top Squares Award claimed

The top 144MHz Squares Award for working 100 squares and 20 countries has been awarded to two stations within a few days of each other. Mike Lee, G3VYF, of Essex, turned in a batch of cards from rare squares and just pipped John

Hunter, G3IMV, of Buckinghamshire, at the post for the first of these top awards. Now stickers Nos 1 and 2 have gone to Mike and John respectively to be affixed to the existing 4-2-70 certificates. These two operators are to be congratulated on not only working such a variety of dx, but also for managing to get the QSL cards in a mere 18 months.

An enquiry has been received from a listener member asking if the FMD and QTH Squares Awards are available to swls. They are indeed, and all too few have been claimed—no Squares Awards at all. The appropriate forms are available from G5UM. It is also possible for both listening and transmitting stations who change QTH to start collecting cards from scratch to earn a second certificate. Several people have done this, including Vernon Cracknell, G8GNE, in Huntingdon, who has received 432MHz Senior No 63. On the same date he also claimed 144MHz Senior No 151 from the new QTH, and 432MHz Seniors Nos 62 and 64 went to G4AEZ and G3XDY respectively.

IARU Region 1 dx records

Folke Rasvall, SM5AGM, the IARU Region 1 co-ordinator of "firsts and farthests" above 30MHz, has produced the compilation shown in Table 1 of the best dx worked on vhf and uhf by amateurs in the region. The list contains all of the information received by Folke relating to contacts made up to the end of 1979. The next edition of the record table will show the situation at the end of this year, and will be published early in 1981 when all changes have been received. Readers who think they can better these records should send the details to Jack Hum, G5UM, 27 Ingarsby Lane, Houghton-on-the-Hill, Leicester LE7 9JJ. For a QSO to enter the record table, QSL cards must have been exchanged. The same comments apply to any claim for the 70MHz sporadic-E record, which is conspicuous by its absence from the present version of the table.

Table 1. IARU Region 1 vhf and uhf dx records

Band (MHz)	Prop mode*	Callsigns and locations	Mode	Date	Km
70	tr	GM3WOJ/P(XO26e)-GJ3WMR/P(YJ60e)	ssb	12/8/78	628
70	as	G3OSS(ZL40h)-GM3JFG(XR40c)	ssb	28/8/78	709
70	ms	G3SPJ(AL41h)-GM3JFG(XR40c)	cw	13/12/78	728
144	tr	IT9KSO/IG9(GV44h)-4Z4AQ(RR19f)	ssb	26/8/77	2,168
144	as	G3CHN(YK61b)-UP2BBC(LP07d)	cw	26/3/76	1,915
144	ms	GW4COT(YL25d)-UW6MA(TH69c)	cw	12/8/77	3,099
144	es	CT1WW(WB63b)-OD5MR(35·8°E 33·9°N)	ssb	28/6/79	3,864
144	te	I4EAT(FE60f) ZS3B(15°E 26°N)	cw	30/3/79	7,788
144	eme	SM7BAE(GP26D)-ZL1AZR(175°E 37°S)	cw	4/3/69	17,525
432	tr	DK2NH(FN31a)-EA1CR(XD32d)	ssb	29/11/79	1,608
432	as	SM5CUI(IT09b)-UA3ACY(SP28j)	cw	9/11/75	1,260
432	ms	SK6AB(FR30c)-SM2AID(LZ32h)	cw	12/8/77	1,033
432	eme	I5MSH(FD17f) ZL2BCG(172·5°E 40·55°S)	cw	6/10/79	18,437

*tr = tropo, as = aurora, ms = meteor scatter, es = sporadic-E, te = transequatorial, eme = moonbounce

Transequatorial record on fm?

Albert Woodward, G4EGT, and his wife, G4ETT, of Buckinghamshire, recently returned to the UK after a spell of service in northern Australia, where their callsigns were VK8EW and VK8HW. Operating from Darwin on 144MHz they both made contacts with Japanese stations at a distance of 5,200km, and have the QSL cards to prove it. They wonder if this is a record for 144MHz fm, although of course, as they say, the record for ssb is over 7,000km. Exceptional coverage on vhf is favoured by sites where transequatorial propagation is possible, and it may be that other operators have performed a similar feat to the Woodwards. If so it would be valuable to hear from them.

VHF convention Belgian style

The Ghent vhf/uhf convention entered the amateur calendar for the first time on 31 May this year, and looks set for a long stay. Over 200 vhf and uhf enthusiasts attended the one-day event, including amateurs from France, Holland, Spain, and a party of 10 from the UK. The trip by G3WDG and yf, G3YGF, G4ANB, G4CNV, G4DEZ and yf, G4DGU and yf, and G4IJE was enlivened by some confusion over the ferry departure time, which led to an overnight dash from Felixstowe to Dover to catch the 5.30am sailing to Zeebrugge. An invitation from the ship's radio officer during the crossing enabled the party to see how vhf is used by the maritime service. Particularly impressive was the speed with which a working channel was agreed and moved to after the ship's callsign, GUEN, had been sent only once on the calling frequency.

At the convention a varied and interesting lecture stream was backed by an exhibition of commercial and homebrew gear. A moonbounce symposium in the morning was jointly chaired by ON4DY and PA0SSB. The afternoon session included a lecture by the Belgian vhf manager, ON4ZN, on home-made Yagi antennas for vhf and uhf, and a short talk by your scribe on the satellite scatter experiments between G4DGU and SM6CKU described last month.

In the evening, after the close of formal proceedings, an unusual 144MHz foxhunt was held. A total of nine "foxes" were concealed in and around the city, the object being to find as many as possible in the 3·5h available. The difficulty of this contest is illustrated by the fact that the winning entrant tracked down only four of the hidden stations, and two of the "foxes" managed to avoid being found by any of the hunters. The evening ended at the Ghent club shack, where the UK party were amazed by the facilities available, including not only the operating shack itself, but also workshops, a lecture theatre, classrooms, and a very well stocked bar.

The excellent hospitality and friendship shown by the convention organizers and members of the Ghent club persuaded several of the visiting British amateurs to join the Oost Vlaamse Radio Club. The organizers are hoping to build this event into a full international convention, and it seems certain that they will receive support once again from the UK next year.

ON expedition to EI

Just too late for inclusion in last month's issue came news of an expedition to the rare UO locator square on the west coast of Ireland. A group of Belgian amateurs led by ON5FF were due to set off for locator UO80d on 30 or 31 July, and should be operational by the time this is published. The callsign EI2VAH will be used, and the expeditionaries hope to be on the air every day until their departure on 14 or 15 August. The team will be equipped for dx operation on 144 and 432MHz, and the 14MHz vhf net will be used for setting up skeds.

144MHz sporadic-E

The sporadic-E season seems to be getting off to a slow start on 144MHz this year, with few reports of contacts via this mode reaching your scribe. More and more people are getting into the habit of monitoring the frequencies between 28 and 100MHz for broadcast dx, which can provide a useful early warning of these events. Several times during May the 100MHz fm broadcast band has been filled with exotic dx, and on each occasion the bottom end of 144MHz has been well populated

with hopeful operators awaiting "the event". Unfortunately they have for the most part been disappointed, with the Es seeming very reluctant to rise to 144MHz. Some of these near openings have been sadly marred by the activities of a station in southeast England, who on several occasions has been heard calling "CQ ES" in rather shaky cw using a variety of east and south European callsigns. Experienced dx operators rapidly recognized the signal as having none of the usual sporadic-E characteristics, and amateurs around the country have been co-operating in dfing the culprit, whose location has now been fairly closely established.

On a happier note, news of an excellent sporadic-E opening from Scotland to Poland and Czechoslovakia on 10 June comes from John Branegan, GM4IHJ, in Fife (locator YQ73h). John's activities provide an excellent demonstration of the utility of monitoring the low vhf bands, and his report gives an almost classic picture of the build up of a 144MHz sporadic-E opening:

1452gmt. The event started on 49MHz tv with good pictures from Russia and Czechoslovakia.
1518 Spanish tv on 48MHz and Russian pictures on R2, 59MHz.
1550 Over 60 east European fm stations audible between 66 and 74MHz.
1610 East German fm on 100MHz, fading after 3min.
1621 East German fm audible again. A weak unreadable reply came to a CQ on 144MHz cw.
1713 Heavy co-channel interference on all fm channels up to 105MHz.
1722 Five very loud German fm stations around 100MHz. Started calling CQ on 144·05MHz again.
1742 CQ answered by SP9GVD, but not a good QSO.
1746 Answered OK2SUP (JJ13g). 559 sent, 549 received.
1753 Answered OK2ES(?), but had difficulty copying.
1756 Called by UB5DL (LI22c). 559 received, but only 429 sent due to heavy QRM from OKs.
1758 No replies to CQ, and 100MHz fm dx faded out.
1810 100MHz fm dx back up.
1812 Answered OK2BFH (JJ13b). 599 sent and 559 received.
1820 Still hearing OK2SUP.
1826 All 144 and 100MHz signals faded quickly. 70MHz and lower are still strong.
1900 All 70MHz and tv, except Hungary on 49·728MHz, faded.
1920 Hungarian tv faded.

GM4IHJ was running an FT221R into a five-element beam. He comments that several other GMs made contacts with stations in JJ, JK and LI locator squares, and at least one GM mobile worked into Czechoslovakia.

Transatlantic meteor scatter tests

The Lizard Expeditionary Group will be setting off for north Devon on 9 August to prepare for an attempt to make transatlantic QSOs on 144MHz by extended meteor scatter. The expedition by G4ANB, G4ASR, G4DEZ, G4DGU, G8AGU and G8KQB follows a partially successful test by the group from Cornwall in August 1979, when G4DGU/P ran a 6h sked with VE1ASJ. On that occasion signals were heard in each direction, but no complete contact was made. This year the tests will be run continuously for 48h over 11/12 August, which covers the peak of the Perseids meteor shower. Eight 6h skeds are being arranged with amateurs on the east coast of the USA and Canada. Paul Widger, G8AGU, has located an ideal west-facing cliff-top site, with a 15° slope towards the Atlantic. This should provide an excellent take-off for the large rhombic antenna which is to be erected. At the other end of the path VE1ASJ is planning to use four 19-element Boomer antennas. These two antenna systems should between them provide a path loss capability some 10dB better than for the 1979 test. Standard meteor scatter operating procedures, as described in the *Amateur Radio Operating Manual* will be used, with 5min periods of high-speed cw at 600 letters/min. The exact frequency and times to be used have yet to be decided. The results of these tests will be fully described in a future *4-2-70.*

Handhelds reviewed

A useful review of 144MHz fm handheld tranceivers appeared in the May issue of *FM News,* the magazine of the UK FM Group (London). The authors, Kai Chandler, G4FIR, and Mike Schwartz, G8SYB, have included most of the popular handhelds on the market, and their main aim has been to assess rigs for value for money. The facilities offered by the various makes and models are described, and a useful table shows which of them come with nicad batteries and chargers, and which need these as extras. Channel spacing, number of channels, physical size and antenna type are given, as well as prices for the rigs in both their basic form and with options to bring them up to a designated standard. Information about *FM News* and the UK FM Group (London) may be obtained from the membership secretary, G8LZA.

Beacon news

Reception reports from GB3SIX, the RSGB beacon on 50·020MHz, are starting to come in, including one from G3WBQ, in Surrey, who has been hearing the beacon by meteor pings, and who received a complete identification at 0715gmt on the third day of operation, 20 May. He comments: "It is a pleasure to find a beacon which is exactly on its nominal frequency—congratulations to the constructor."

GB3SU, on 70·698MHz, has been fitted with a new pair of turnstile antennas to replace the original ones which were wrecked in a gale 18 months ago, since when the beacon has been subsisting on a dipole. Tony Whittaker, G3RKL, the beacon keeper, remarked during a QSO with G5UM that ". . . Jaybeam came up trumps" with several components for the new antennas to hasten their commissioning. GB3SU, which runs 20W erp from Harpur Hill in north Derbyshire, is fitted with a battery back-up power supply because of occasional mains drop-outs.

Gordon Pheasant, G4BPY, reports from Walsall that permission has been granted for a 70MHz beacon in Cyprus, to be given the callsign 5B4CY. This follows a QSO between G4BPY and 5B4AZ during which Gordon asked about the possibility of such a beacon, and offered to build the transmitter. The speed with which the go-ahead was given took Gordon by surprise, but he is trying to get the hardware together as quickly as possible for installation in Cyprus before the end of this year's sporadic-E season. The transmitter has now been built, and the initial frequency will be 70·040MHz. The licence apparently allows the beacon to be placed anywhere in the band, and G4BPY suggests that somewhere between 70·10 and 70·15MHz would be ideal, as this region is reasonably clear of broadcast stations.

70MHz crossband

Other news from G4BPY (YM30d) includes details of a crossband contact between himself on 70·160MHz and SM6PU (GR27f) on 28·885MHz at 1649gmt on 10 June. Gordon was given a 549 report, and later at 1709 received 59 on ssb. He thinks that this may be a first from G to SM on 70MHz. Do any readers have prior claims? SM6PU also had crossband contacts with G4IDG in Wolverhampton and EI6AS. G4BPY

has been having some success in persuading amateurs abroad to listen on 70MHz, with SV1DH, 5B4BL and 5B4AZ now listening on the band, and a converter is being sent to ZE2JV. He thinks that 70MHz should be promoted abroad, as there may be several countries within sporadic-E range whose authorities might be willing to give a small allocation if the right pressure was brought to bear.

News in brief

ZB2BL appeared on 70MHz during the contest on 1 June, and worked several G stations, including G2YS, G3BHW, G3COJ, GJ3YHU, GW4ALE and G4BPY. Operators on 432MHz who are experiencing trouble with the Syledis navigation system are asked to send details to the general manager at RSGB headquarters, who is collating this information. EI6AS has worked ZS6LN on 50·1MHz using both cw and ssb.

432MHz opening

Mike Dennison, G3XDV, in Kent, found 432MHz much better than 144MHz for dx during the good vhf and uhf conditions on 18 and 19 May. Running 10W of ssb into a 12-element Yagi at 30ft, Mike worked OZ1FKZ/A, OZ1OF, OZ2BB and OZ9FW in locator GP31b at a distance of 825km. During this period the OZ2UHF beacon on 432·450MHz was audible for 48h, peaking at 20dB over S9 on the morning of 19 May. On fm during the same opening Mike worked through the Dutch uhf repeater, PI3HVH, on Ch RU1. PI3HVH, the first and, so far, only Dutch uhf repeater, runs 1W to a Ringo Ranger from its 150ft asl site at CL01a, but is screened to the UK. G3XDV also saw fast-scan tv pictures from PA3ATP during the lift, and comments that 432MHz was full of very strong Dutch stations on the fm simplex channels.

Late sporadic-E news

More reports have been coming in about the 144MHz sporadic-E opening on 10 June, which seems to have been briefly audible over a large part of the UK. Vernon Boldy, G8SVG, in West Yorkshire (locator ZN23e) had an incomplete contact with YU2CBE at 1600gmt. Forty-five seconds later he had a complete QSO with HG8ET in KG locator square, at a distance of 1,725km. From Gloucestershire S. G. Spencer, G3ILO (YL29g) exchanged 5/7/9 reports with RZ2AAB (NN18c) at 1755gmt, and also heard RZ2ABR. G3ILO was running 80W dc input, and his antenna was a six-element quad, which was pointing north for the contact.

T. J. Hook, G8DPB, in Essex, has reported details of a short sporadic-E opening to Finland on 1 June. At 1800gmt he worked OH2BRW near Helsinki, with 5/9 reports in each direction. He was running 10W p.e.p. from a homebrew transceiver. □

Microwaves

(Continued from page 797)

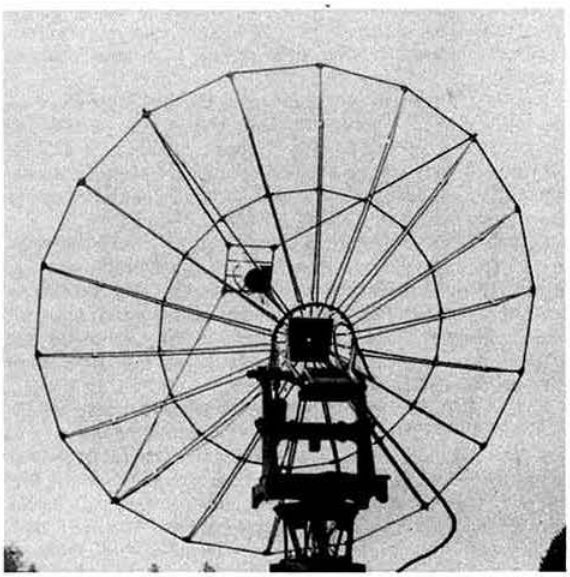
noise in OZ (EQ square). He notes that GB3BPO is now being continuously monitored in PA0, and that much interesting propagation data has already been collected.

Martlesham round table

The second round table meeting to be held at the Post Office Research Centre, Martlesham Heath, will be on 19 October. As last year this will be a ticket-only meeting, and anyone thinking of going should obtain a ticket beforehand. As before there will be an extensive range of test equipment, as well as an interesting lecture session. Further details may be obtained from Graham Murchie, G4FSG, on Ipswich 642154 (work) or Woodbridge 4199 (home).

Microwave "area representatives"

One of the biggest problems facing the beginner to microwaves is in obtaining first-hand information and advice. This is something which the written word can only go so far in solving, and a much better way is personal contact, as has been found at many round table meetings and exhibitions. However, not everyone can attend such meetings, and often advice is required quickly. One solution would be if a number of relatively experienced microwave operators were prepared to act as sources of help and advice for newcomers. If you are prepared to contribute to this scheme, please contact the writer, or any other member of the Microwave Committee, so that a list can be compiled and published soon in this column.



The VE7BBG dish

Photo feature

A view of VE7BBG's el/az mounted 20ft dish antenna for eme, taken from the rear, showing the W2IMU dual-mode feed horn facing back into the dish. Using this dish, VE7BBG in the last few months contacted W6YFK, VK5MC, PA0SSB, LX1DB and K4QIF on 1·3GHz, and has been heard by G3WDG and G3LTF. □

the month on the air

John Allaway, G3FKM *

RADIO COMMUNICATION is now posted to over 160 different countries each month, and your scribe often wonders how he can persuade readers living outside Britain to send in what would be most interesting information to readers of MOTA—namely, how amateur radio is organized in *their* country! Types of licence, power limits, and unusual band allocations are three examples of the kind of data required. Can you help—if so, please do!

DX news

Dave, formerly 8R1S/5H3MA/ET3DS, is now in Thailand and has the callsign HS1AMM. He has a KWM2 transceiver with 30L1 linear and a TH6DXX beam.

YB7ACZ was due to appear on the air from Borneo during June, and his wife was scheduled to join him in July. He is KA5KKG, and Priscilla is KA5EIW—she will be the first lady operator to have a YB7 prefix. Their proposed operating schedule is published as 14,240 or 14,280kHz on weekdays after 1230, and in the 28,550-28,600kHz area at weekends from 2300. Some 21MHz activity will also take place at weekends.

VS5RP, Bob Parkes (G3REP) and VS5SR (Steve Roberts) are looking for UK contacts. They use 14,008, 21,008 and 28,008kHz on cw, and 14,175, 21,150, 21,175 and 28,475kHz ssb, and they are on the bands listening on the long path between 0630 and 0830 and from 1000 to 1200. They listen on the short path from 1400 to 1630 and from 2130 to 2300.

OE3REB/YK has returned home to Austria but is expected to be back in Syria next month. He has a rhombic antenna directed to Europe, and operates on all bands 1·8 to 28MHz cw and ssb, and rtty working is contemplated soon after his return. Rasheed, YK1AA, has been suffering from tvi and antenna rotator problems, but nevertheless has quite often been on 14,225kHz at 2200 in company with JY3ZH.

The *DX Bulletin* has provided some information on the situation at HZ1AB, Dhahran, Saudi Arabia. The station was first licensed after the second world war when the USA was constructing the air base (now the international airport). It is the only station in the country where USA citizens may legally operate, and in fact no licences are currently issued to non-Saudi citizens. In 1977 K8PYD was elected as QSL manager and he has copies of most logs since 1976; all QSLs should be sent via him.

Those looking for a contact with Mongolia should listen between 14,030 and 14,040kHz after 0800 when JT1AO and JT1BH are often to be found.

LA5KC visited Guinea during May and was given permission to go on the air as LA5KC/3X to talk back to Norway. It seems that the climate there is not too healthy for outsiders, especially those with radio sets. He made about 80 QSOs, and there is a possibility that he will return to the area for a week or so in late summer.

K5LBU/ST0 expects to be in southern Sudan for a year at least. He has a 25W transmitter and does not operate on cw. DJ1US/ST0 has returned to Medani and is active on 3·5 to 28MHz on cw and ssb.

5V7HL has been worked on 14,220kHz and asks for QSLs via Box 8062, Lome, Togo. Another Togolese station is 5V7GE who is most often found around 14,260kHz from 0000.

The *DX Bulletin* notes that ET3PG QSLs are being delivered and that it is important to observe the operator's name and his individual post box number when in contact as each deals with his own QSLing.

TL8WH is an American at the USA embassy in Bangui, and expects to be there for a couple of years. So far he has mostly been heard using ssb at weekends, but some cw operation is promised. TN8AJ is expected to be at home in the German Democratic Republic at the time this is read but should return to Africa in the autumn, if not to Congo then perhaps to the Malagasy Republic. All QSLs should go via Y25LO (ex-DM2XLO) except those made through one of WB9TTM's nets which should be sent via WB9TTM.

FH8CY is quite often near 14,220kHz after 0300 with 11KFB. Rodriguez Is is currently represented by 3B9AE who is now said to be crystal controlled on 14,241kHz and who has been heard working a list of European stations made by F6EWE at around 1700. (This information appears to conflict with that given in last month's *MOTA*.)

Expeditions to the Cocos Is are rather unpredictable due to the transport problems but it seems that a ship visits there monthly and both TI9XXX and TI9CC have been worked. TI9CN lives on the island and will be found sometimes around 14,210kHz after 0100.

Another Wallis Is station—FW8BA—has been active on 21MHz ssb and working into the UK around 0800. A35JL keeps a schedule with his QSL manager, K9AUB, at 0700 each Sunday on 14,227kHz. VK3OT is expected to be on Willis Is by now and using the callsign VK9ZG. K6LPL made 12,180 contacts from Johnston Is as K6LPL/KH3 and says that he will be there again for the CQ WW DX Contest in October.

To mark the 1,300th anniversary of Bulgaria, LZ stations may use the LZ13 prefix during 1980-1. A special award is being given in three classes for those gaining 1,300 points (1st Class), 1,000 points (2nd Class), or 500 points (3rd Class) by working LZ13 stations (which count 30 points) or LZ1 or LZ2s which count five points. Each station may be worked once per band.

Spanish stations using the EC prefix are novice licensees and are only allowed to use cw.

Those looking for a contact with Malta on 3·5 or 7MHz might look for 9H1FN who operates on both bands sometime after 2300 on Friday and Saturdays. QSOs for credit for the Gozo Award may sometimes be obtained by joining the Gozo Net which takes place at 0530 on 14,280kHz.

UK1PGO is located on Franz-Josef Land and asks for QSLs via UA1OSM. He has been worked on 14MHz cw around 1800. 4K1A in Antarctica is sometimes on 14,020kHz between 1500 and 1700, and also operates on 3,502kHz or between 7,005 and 7,020kHz between 2100 and 2400. He is located in ITU zone 69.

G3AAE has informed your scribe that there are now three types of callsign being issued in Bermuda. Permanent residents are being given normal VP9 calls, long-term non-residents

*10 Knightlow Road, Birmingham B17 8QB

receive VP9 calls with a three-letter suffix beginning with the letter T, and short-term visitors use their home callsign followed by /VP9.

DX' press draws readers' attention to the fact that PJ2CC is the callsign of a station located in the Coral Cliff Hotel on Curaçao, and that it is used by visitors who have licences. This means that it is important to follow QSL instructions given at the time of any contact.

Iceland has now been split up into call areas TF1 to TF0. The latter covers the large uninhabited area in the centre of the country. TF1 consists of Arnessysla, Rangarvallasysia, and W Skaftafellsaysia. TF2 is Borgarfjarsysla, Myrarsysla, Snaefells and Hnappadalssysla, and Dalasysla. TF3 covers Reykjavik, Kjosarsysla, Kopavogskaupstadur, Gardakaupstadur, Hafnarjardarbair and Seltjarnarnesskaupstadur. TF4 is E and W Bardastrandarsyslur, W and N Isafjardarsyslur and Starandasysla. TF5 covers Eyjafjardarsysla, and N and S Thingeyjarsyslur. TF6 is N and S Mulasyslur, and W Skaftafellssysla. TF7 applies to the Vestmannaeyjar Is. TF8 is allocated to Gullbringusylsa, and TF9 refers to W and E Hunavatnssyslur and Skagafjardararsysla.

According to the *Long Island DX Bulletin* EL2AV has advised his QSL manager that all amateurs in Liberia were directed to cease operating following the military coup on 12 April.

G4DYF recently spoke to Alex Mootoo, 3B8DA, who is currently studying in England. Alex has of course spent a great deal of time on various Indian Ocean islands (3B6, 3B7 and 3B9, as well as Mauritius) and has already sent out over 20,000 QSLs at his own expense. He has no QSL manager and has heard that there are 12,000 cards waiting for him at home already! Alex is anxious to let those who are waiting know that all requests will be answered as soon as possible.

QRP

G4DF reports the satisfactory results of building a transceiver using the G3ZVC (Plessey ic) board. Using a 2N918 transistor in Class A on 3·5MHz, and with about 20mW output, he has managed to work over 30 stations within a 100-mile radius using cw, and even, in some instances, ssb.

A reminder that the next G-QRP Club cw activity weekend will take place on 3/4 November. Full details will be published later. The club meets every Sunday on 7,030kHz from 1100 to 1230 (on cw), from 1400 to 1500 on 3,560kHz (also on cw), and from 1600 to 1700 on 7,090kHz ssb.

International QRP frequencies (for calling) are 3,560, 7,030, 14,060, 21,060 and 28,060kHz (cw), and 3,690, 7,090, 14,285, 21,285 and 28,885kHz ssb.

Full details of the G-QRP Club may be obtained from Rev G. Dobbs, G3RJV, 17 Aspen Drive, Chelmsley Wood, Birmingham B37 7QX.

Ex-G Radio Club

Reg Cherrill, W3HQO, hon general secretary and treasurer, has now moved, and his new address appears in "QTH Corner". The club does a great deal to keep "Radio amateurs born in the UK and domiciled abroad" in touch with each other and the country of their birth. The latest issue of the *Ex-G Radio Club Bulletin* mentions the Davies family of Marlborough—all five are licensed—and wonders whether this is a record?

Club nets are held at 1900 on Sundays on 14,346kHz, and there is a family net at 1130 on 21,415kHz daily—on Mondays and Fridays these are beamed towards Australasia.

Welcome

A rather belated but nevertheless sincere welcome to the following who joined the Society during April and May and whose callsigns were held back by the recent printing problems: A4XIU, DA2EJ, DC7AS, DG5DT, EA2AIR, EA3LL, EI3AXB, EI5DP, F2KC, F6BRT, F6GIZ, H44HB, H44SI, J6LOU, JF1WQU, K0EJ/4, N4VF, N5BEA, K7RDH, OH9SV, ON6JF, PY2WTI, SM0BHF, VE4DE, VE5JQ, VE7DJ, VK2NXD, VK4KT, VK6NFI, VS6HP, W1PLH, WA1ZPG, WA2ENF, W4OWJ, W4WAL, WB4ZDU, W0TN, ZL1ADI, ZL1AOM, ZL1AVK, ZL2ST, ZL3IL, ZL4AS, ZL4DE, ZL4JW, ZL4THM, ZS2ND, ZS6BUF, 5B4IT, 5B4JC and 9Y4FS. New listener members included: I. Aziziyeh (9K), P. Beeson·(5N), P. Buckley (EI), T. Clarke (EI), R. Cowan (W), E. Deighton (S2), R. Durston (VS6), C. Davis (W), G. Gudes (W), J. Hook (YB), M. Lattore Marti (I), H. Melton (W), W. Montagu (8P), M. Mor (VS6), H. Nelissen (ZS), W. Nilson (W), F. O'Donoghue (EI), I. Rawls (DL), A. Roberts, R. Spieker, H. Sterkenburg (PA), and R. Whiteley, T. Wilmott and H. Winard (W).

Dxpeditions

Tony, VS6AG, succeeded in making 4,000 contacts using his CR9AK callsign during his 58h stay in Macao. He worked 125 different countries but was disappointed in only managing to make 104 UK contacts. QSLs for the operation may not be in the mail until sometime during August due to printing delays. Tony is now in Sydney, Australia.

F8EX expects to be in Corsica from 10 to 20 August, when he will be on the air as FC8EX.

There is a rumour that ZS5UU and a number of other operators may visit Mozambique during September.

The Arctic expedition celebrating the discovery of the Northeast Passage in 1880 is now under way. The callsign used is SL8AEN/MM, and likely frequencies are listed as 3,760, 7,060, 14,260, 21,360 and 28,660kHz on ssb, and 25kHz above lower band edges for cw operation. QSLs should be sent c/o SK0AR, via SSA.

Expedition to North Pole

G3RUR has kindly sent along details of the recent attempt by a 17-man amateur radio/sky-diving expedition to reach the North Pole and stay for four days. The amateurs were K2BPP, N4ZG and K0BJ, but unfortunately their attempts were thwarted by unseasonably warm weather at the pole—it was only just below freezing point, and this produced fog which meant that they could not find a suitable landing place at their destination. They reached a point only 30 miles away. The expedition called at Resolution Bay, where VE8MB, the club station of the High Arctic Weather Service, was using the CK8 prefix to mark the 100th anniversary of Canada's ownership of the NW Territories (other than Baffin Is).

Contests

The European DX Contest

0000 9 August—2400 10 August (CW)

0000 13 September—2400 14 September (Phone)

Europe works the rest of the world on all bands 3·5 to 28MHz. Single- and multi-operator (single-transmitter) both multi-band classes. Single-operator entrants may only operate for 36h, and the 12h break may be taken in not more than three periods. Multi-operator stations may change bands once only within a

QTH CORNER

A4XCA	via G4BWP, F. C. Handscombe, 24 Hitchin Road, Henlow, Beds SG16 6BB.
A4XIH	(QSOs after 1 April 1980) via G4BWP (see above).
A9XCX	R. McVreedie, Box 702, Manama, Bahrain.
BV2B	(new) Tim Chen, PO Box 30547, Taipei, Taiwan.
CR9A	via WB2KXA, J. N. Grauser, RFD 1-Box 161, Allantown, NJ, 08501, USA.
CT2DE	via WB3IFD, J. Lindvag, 908 W 9th St, Erie, Pa, 16502, USA.
FW0DD	via Canad-X, PO Box 717, Station "Q", Toronto, Ont, M4T 2N7, Canada.
JX9JJ	c/o LA9YY, via NRRL.
KC4AAA	Nav Support for Antarctica, FPO, San Francisco, Cal, 96629, USA.
KH4AB	Box 16, Midway Is, FPO San Francisco, Cal, 96614, USA.
OH2BDA/OH0	S. Kaariainen, Laajalahdentie 18 A 15, SF00330 Helsinki, Finland.
T3AT	via G3XZF, W. Felton, 7 Riverton View, Lincoln.
VP5JAX	via JA2VUP, Osamu Uchida, 2840 Aioicho, Ueno, Mie 518, Japan.
W3HQO	(new) R. Cherrill, 101 Lockart Plaza, Philadelphia, Pa, 19116, USA.
YB7ACZ	via AG5X, PO Box 57304, Webster, Tx, 77598, USA.
ZF2BN	via W4HET, P. Schmid, 8703 Westwood Dr, Vienna, Va, 22180, USA.
ZK1AC	R. N. Francis, PO Box 529, Avarua, Rarotonga, Cook Is.
5V7GE	Garland Edmonds, BP 3078, Lome, Togo.
5W1CR	ZL1BCG, J. Ridpath, 50 David Av, Manurewa, Auckland, New Zealand.
6T1YP	(Dxpedition activity) via OH2BH, M. Laine, Pyorrekuja 4 C 43, SF-01600, Vantaa 60, Finland.
9K2DR	R. Roberts, Box 21944, Kuwait.
9N1MM	(Op'n by KP2A) via K2UQ, G. Katona, 1049 Hughes Dr, Trenton, NJ, 08690, USA.

RSGB QSL Bureau, G3DRN, 30 Bodnant Gardens, London SW20 0UD.
(Closed during August)

15min period, except for working a new multiplier. Exchange consists of RS/T plus serial QSO number (from 001). Each contact counts one point as does each "QTC" reported. A QTC is a report of a QSO made earlier in the contest by a non-European station and given back to a European, it consists of time, call, and QSO number of the station reported. It may be given only once, and not more than 10 QTCs may be passed to any one station. The multiplier is four on 3·5MHz, three on 7MHz, and two on 14, 21 and 28MHz, for each DXCC country, JA, PY, VE/VO, W/K, ZL and ZS call area and UA9/UA0 worked. Official log and summary forms are advisable and may be obtained from WAEDC Committee, PO Box 1328, D-895 Kaufbeuren, Fed Rep of Germany—please send sae plus ircs. Log sheets should have 40 QSOs per page, and separate logs should be submitted for each band. Post before 15 September for cw logs, and before 15 October for phone entries.

The 21st All Asian DX Contest
0000 23 August to 2400 24 August (CW section)
Rules of this contest were included in the June/July *MOTA*. Copies of the official rules are obtainable from the membership services officer at RSGB headquarters in exchange for an sase.

2nd International Contest (for 28MHz portable stations)
1200 13 September to 1600 14 September
This contest has been organized by the Sanremo section of ARI. Entrants must observe a 4h rest period during the contest, and contacts may be made on phone or cw but not by mixed mode. Activity must be confined to the sections 28,000-28,200kHz (cw) and 28,500-28,700kHz (phone). Portable stations are defined as those which are operating "in localities with features different from the usual ones". Fixed stations may also participate and will be listed separately. Exchanges consist of RS/T plus serial QSO number (from 001) and ITU zone number (UK is 27). A station may be worked once only—not on both modes. The multiplier is the number of different ITU zones contacted, and 10 points are gained by working stations outside one's own continent, five for contacting stations in a different ITU zone in one's own continent, and two for QSOs with one's own country and ITU zone. Listeners may enter and should list callsign, report and zone given, and callsign of station being worked. A station may only be listed once as a station heard, and only five times as a station being worked. Official entry forms may be obtained from the Sanremo Section ARI, PO Box 114, 18038 Sanremo, Italy (please send at least one irc). Entries must be posted by 31 December to the same address.

In the **1979 Concurso Independencia de Venezuela, G3ESF** came sixth in the single-operator multi-band category with 31,878 points.

The Bulgarian DX Contest
0000 to 2400 7 September
CW only. Each station may be worked once per band. Single-operator single- and multi-band, multi-operator multi-band, and listener categories. Activity should be confined to the areas 3,510-3,590kHz, 7,005-7,040kHz, 14,010-14,090kHz, 21,010-21,125kHz, and 28,010-28,125kHz. Exchanges consist of RST plus ITU zone (UK is 27). Contacts with LZ count six points, with stations outside one's own continent three points, and with others one point. Listeners count three points for two callsigns and two exchanges received, and one if only one exchange is received. The multiplier is the number of different ITU zones worked on each band added together (maximum 375). Separate log sheets should be submitted for each band, and should be accompanied by a summary sheet showing zones worked on each band and the usual signed declaration. Please also indicate participant's continent. Post entries within 30 days of the contest to BFRA, Contests, PO Box 830, Sofia 1000, Bulgaria.

Radio Amateur Prefix-Zone-Country List

A reminder that this list is invaluable to all who work or listen on the hf bands, and that with it most questions can be answered concerning normal and strange prefixes. Other information includes *CQ* and ITU zones, continents, the location of Antarctic stations, USSR stations, and obsolete prefixes used within the past eight years. Space is provided for adding changes. The list costs 50p, or US$2 (or six ircs) by airmail to overseas applicants, and orders should be sent to Geoff Watts, 62 Belmore Road, Norwich NR7 0PU. (Note that this list has been updated to show the *CQ* zones of stations in Antarctica following the recent revision of the rules affecting this area for WAZ purposes.)

RSGB hf awards

At the Council meeting on 31 May it was decided that the RSGB Country List should follow the ARRL DXCC list in future for the purposes of hf certificates and operating awards. This should simplify matters for overseas amateurs applying for the Society's awards.

Awards

The UN-DU Award
This was first launched by the Philippine Amateur Radio Association in late 1977 to mark its 45th anniversary and the 32nd birthday of the United Nations. It is awarded to any amateur who has confirmed contacts with at least 100 members

of the United Nations since 24 October 1945. Single or mixed mode endorsements are issued, and applicants should send their QSL cards plus US$6 (or equivalent) together with a photocopy of their own licence to PARA, Philcomcen Building, Ortigas Avenue, Pasig, Metro Manila, Philippines. Additional stickers are issued free for every additional five countries worked after the basic certificate is acquired. Completion of contact with all UN members issuing amateur licences will merit receipt of a gold medal upon payment of a small fee.

The CRV Award

Issued by the Centro Radioveteranos of the Argentine Republic for a minimum of 10 confirmed contacts with members of CRV since 1 January 1978—members are identified by seals printed on their QSLs—with no restrictions as to bands or modes. Send a list of QSLs (certified by a radio club), 10 ircs, and own QSL (for CRV records) to CRV, Carlos Calvo No 1424, 1102 Buenos Aires, Argentina.

SE Queensland Teletype Group Award

To qualify a station must, where possible, copy the official station of the group, VK4TTY, during a news broadcast and, in the case of a transmitting amateur, participate in the call back (for two award points). A portion of the printout of the news broadcast with date, time, frequency and broadcast number, must accompany the award application. Additionally non-Australian amateurs need to work one member of the group on rtty and log extract and or printout of this QSO must also be submitted. Listeners may apply with recordings of QSOs made by three different group members. All applicants should send the required information, together with A$1 or five ircs to: The Secretary, SEQTG, PO Box 274, Sunnybank, Queensland, 4109, Australia.

Zwolle 750 years

Zwolle is a city in NE Holland which celebrates its 750th anniversary this year, and a special award is being given to commemorate this. A special station—PA0JA/A—will be on the air, and QSOs with it count two points. Contacts with other Zwolle stations count one point, and the award is made to those who have five points (for European applicants) or three for others. Listeners may also apply. Zwolle stations must be worked between 1 May and 31 October, and PA0JA/A between 23 and 27 August. Send certified list plus log data and 10 ircs before 31 December 1980 to Zwolle 750 Award Manager, PO Box 1253, 8001 BG Zwolle, Netherlands.

Band reports

G8KG was taking a well-earned break at the time that *MOTA* was going to press, and his usual monthly summary was not available. However, it is hoped to be back to normal next month. General impressions are that the quality of propagation on the hf bands has made the expected summer deterioration, this being noticed even more because of comparisons with last winter and spring.

Thank you to the following for sending in items for this part of the column: G2HKU, G3HB, G5JL, G3s AAE, GHY, KSH, GVV, IGW and IMW, G4s BWP and EHQ, G8WEE, and RSs 17567 and 31301.

As usual, stations listed in italics were using cw.

3·5MHz 0200 PY1, PY2, W3AHZ.

7MHz. 0000 *FM7AV* (QSL to F6BFH), VP8QG. **0400** *VP2VGF.* **0600** *EA8RL* **0800** *DA1WA/HB0* (QSL to DJ0LC). **2000** *VK, ZS, 5Z4YT.* **2100** *A4XIH, KP4KK/DU2, DJ1US/ST0.* **2200** *A7XE, G6ZY/CN, 7X5CN.* **2300** *PYs, VU2YBZ, ZD8TC, 6T1YP, 6W8IH, 9X5LE.*

14MHz. 0000 *ZF2CD.* **0700** C5AAT, FK8CR, FO0RS, W6-W7, *ZF2BN,* ZL, 5W1AN. **0800** N6IV/KL7, KS6DV, G3JKI/5A (?), 5W1BZ. **0900** KC4USV, VK0RD. **1000** CR9A, KH6FKG. **1400** 8Q7AB/MM (off 8Q7). **1500** *UA0YAD.* **1600** ST2FF. **1800** C31TT. **1900** TL8JM, *4S7EC.* **2000** *K0AX/DU2.* **2100** FK8CR, LU, TJ1GC, *VK, ZL 4U1UN.* **2200** FM7ITU (QSL to F6BFH), *PJ7VL, VP2AJ* (QSL to WB2TSL), VP8ML, *7X2ED.* **2300** *KL7MF,* 5U7AG, *8P6JA.*

21MHz. 0000 6T1YP. **0500** *FG7AM, JT1KAA, 9N1MM.* **0600** *FO8GH, KX6QC, ZK1AC, 5W1CR.* **0700** *C31TO, FO8EW, HC0E, KH6, VK,* W7, *VS6IJ,* 7X4BL (QSL to VE2LQ), 3D2CS. **0800** *HZ1HZ,* KH6, KL7, ST2MM, *ZK1BD,* **3D6bp** (Via LP). **0900** FW8BA, JA, KH6, VK, VU, ZL, 3D2CC. **1000** *A7XE,* H44s DX, LW, HK0BEH, KX6PJ, P29CC, TR8GM, G4EKF/5N8. **1100** H44CF, *HS2VP, JW2CF,* KL7IB. **1200** P29GC, W6, G3JKI/5A. **1300** AP2SA, FR7BT, *J28CB,* VS6GY, W6-W7, YB. **1400** H44JB, JA, P29NRL, W6-W7, 9V1UH. **1500** *K5KG/OH0,* TA1MD, TL8CR, VU2DK, W6-W7, *4K1A.* **1600** *HZ1SH, K2WR/PJ7,* VQ9SL (QSL via VQ9CI), YC6HS, 5H3KS. **1700** A9XC, CR9A, HS4AMI, KH6BB, VQ9DJ, VS6, *9U5D* (QSL to ON5TO). **1800** *FY7BF, HS5ABD.* **1900** AP2MQ, *JD1AME, ZD8s KM, TC,* 5T5CJ, *9U5DS.* **2000** J6LOU, *N6DY/KH2, VP8AI.* **2100** *HM1BM, JA, KV4,* DJ1US/ST3 (QSL to DF2RG), VP8IB, W6-W7, 6T1YP. **2200** *HM1KR, HP1AC,* JA. **2300** DF3NZ/ST, VR6TC.

28MHz. 0500 KP4KK/DU2, HS1ABD, HS1AMM, JA. **0600** VK. **0700** VK, 3B8BZ, 4S7FG. **0800** A4XGY, TL8WH, VK, ZL, ZS. **1000** CR9AK, XT2AU (QSL to WA1ZEZ), *ZD8TC.* **1100** T2XYL. **1200** JY5ZM, VQ9TT, W1-W4, YB0ACL, 4S7DJ. **1300** FB8XY, FH80M, *FP8HL,* KP4, KV4, YP0ACC, 8Q7AR, 9K2DR. **1400** A22AJ, ZD8MH. **1500** FR7BT. **1600** FP8BT, KG4WM. **1700** KP4AF, VP8SB. **1800** CX, ZP. **1900** KV4GD, LU, PY, VU2MKS, ZP, 8P6NN. **2000** LU, PY, VP5WJR, YS9RVE. **2100** PJ2KI.

Finally, thanks to all who sent in information this month, and to the authors of the following for items extracted: the *DX Bulletin* **(K1TN),** the *Long Island DX Bulletin* **(W4UL/W2IYX),** *DX News Sheet* **(Geoff Watts),** *Long Skip* **(VE3FRA),** *DX'press* **(PA0TO),** *CQ Magazine* **(W1WY),** and the *Ex-G Radio Club Magazine* **(W3HQO).**

Please send everything for the **October** issue to reach G3FKM by **5 September** and for **November** no later than **3 October.** □

SWL news

(Continued from page 796)

On the QSL front Brian has received a card from UA1PGO via UA1CK, and he was the first swl lucky enough to obtain a card from this rare station. He also has a VK0RM card but, alas, only a sample from VK3AKK, the manager. Not many Gs worked the VK0, but one guy apparently sent a QSL for an R1-S1 contact which he managed after many, many attempts via another station. As Brian says, if the manager QSLs that it will leave much to be desired!

Brian very kindly sent a copy of K6GO's QSL directory. He is the European agent for the publication and, if anyone is interested in obtaining one, each issue costs £1 (or $2.50 or eight ircs). The publication lists many hundreds of managers, many with full addresses, and is obviously superb value. Brian's address is 163 Halton Road, Runcorn, Cheshire WA7 5RJ.

Following the increase in *DX News Sheet* subscription rates, subscribers have been asked if they would prefer weekly or fortnightly issues in future. A fortnightly issue would certainly defeat the object of such a superb news-sheet, whose main aim is to provide up-to-the-minute information regarding dx trips etc. Much information in *DXNS* is only current for a few days. A fortnightly publication would be of little or no use to those dxers who rely on up-to-date dx information. A

subscription to *DXNS*, a year's supply, costs £12. Enquiries should be sent to RSGB HQ.

Finale

Deadline for the next October *News* is 21 August. Please keep the news flowing. □

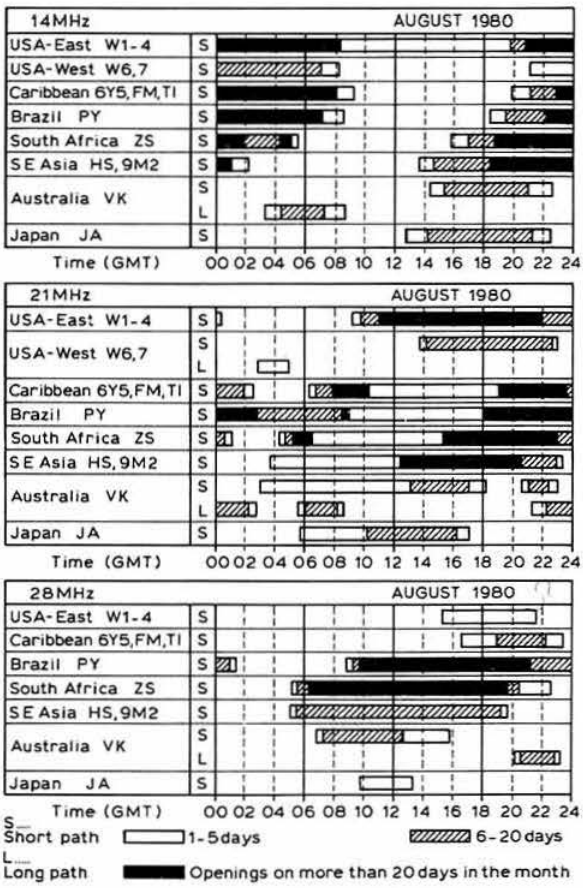
Propagation predictions

August is the last month with summertime dx conditions, which are much worse than last winter, especially on **28MHz**. The F2 mufs will remain relatively low this month, but will start to rise again steadily from September to their maximum height about the end of October/beginning of November.

Traffic with North America will remain an exception on **28MHz**. More certain on this band is traffic with Africa and South America. Because of seasonal changes from winter to summer conditions in the southern hemisphere, **28** and **21MHz** will remain open a little longer for traffic with Australia and South Africa. Apart from this there will be little change in conditions on **21MHz** compared with last month. One compensation for the poor summertime dx conditions remains the possibility of short-skip. This will occur at random and facilitate traffic with the rest of Europe on **28** and **21MHz** caused by reflection of high frequencies by sporadic-E.

The **14MHz** band will remain the night-time dx band. Traffic which will sometimes be possible during the afternoon on **14MHz** with Australia and Asia will mostly be interrupted by European QRM.

There will be no noticeable change on **7** and **3·5MHz** compared with last month. During the second half of the night, local traffic on **3·5MHz** will only be interrupted by the dead zone.



HF propagation study

Predicted hpf + luf in megahertz for August 1980

	00	02	04	06	08	10	12	14	16	18	20	22
Suva (s)	1800	1800	2200	2300	2600	2600	2600	2700	2700	2500	2400	2000
Wellington (s)	2200	2000	2400	2400	2700	2800	2700	2300	2000	1800	2300	2200
Osaka	2012	2012	2313	2514	2815	2815	2815	2814	2513	2311	2110	2111
Hong Kong	1912	1813	2414	2916	3118	3018	3016	2914	3011	2908	2507	2109
Sydney (s)	1913	1817	2419	2921	3120	3018	2915	2613	2310	2006	1905	2108
Moscow	1604	1504	1706	2307	2509	2509	2509	2509	2508	2806	2104	1904
Bangkok	1810	1812	2514	3017	3119	3218	3117	3014	3111	3308	2606	2207
Singapore	2009	1911	2514	3117	3219	3318	3216	3113	3310	3307	2605	2306
New Delhi	2005	1907	2510	3112	3214	3315	3214	3112	3309	2906	2605	2304
Perth	2210	2014	2618	3121	3423	3421	3317	3014	2511	2107	1906	1707
Teheran	2304	2005	2608	3210	3512	3413	3312	3211	3409	3106	2604	2403
Colombo	2305	2008	2612	3215	3517	3418	3316	3213	3410	3107	2605	2404
Bahrain	2404	2105	2608	3211	3513	3514	3513	3311	3509	3106	2704	2503
Cyprus	2204	2005	2306	2909	3211	3212	3212	3111	3209	2907	2704	2304
Aden	2505	2407	2609	3312	3715	3616	3716	3614	3611	3308	2905	2705
Seychelles	2600	2400	2600	3400	3700	3600	3600	3600	3300	3100	2900	2800
Mauritius	2300	2000	2600	3400	3700	3700	3800	3700	3800	3600	3100	2800
Nairobi	2604	2605	2607	3311	3714	3715	3815	3614	3811	3307	2804	2503
Malta	1904	1704	1805	2207	2609	2610	2710	2510	2609	2407	2405	2004
Salisbury	2904	2804	2506	3310	3815	3816	4016	3915	4312	4009	3305	3104
Cape Town	2600	1800	1300	3200	3700	3700	4000	4100	3800	4200	3400	2800
Lagos	3105	2803	2604	3008	3613	3715	3915	4015	4314	4310	3605	3304
Suva (l)	3300	2900	2600	2900	2900	2400	2200	1900	1800	1600	3600	3300
Gibraltar	1702	1502	1502	1704	2105	2206	2207	2207	2206	2105	2102	1802
Ascension	2605	2704	2604	2409	3514	3716	3817	3817	4116	3712	3508	2706
Wellington (l)	3100	2800	2600	2600	2100	1900	1600	1300	1300	1700	3200	3200
Dakar	2906	2805	2505	2609	3413	3615	3616	3717	3816	3811	3507	3106
Las Palmas	2504	2303	2203	2306	2909	3110	3111	3112	3111	3108	3006	2705
Falklands	2807	2405	2506	2409	1614	3118	3521	3622	3621	3617	3512	3109
Rio de Janeiro	2906	2805	2505	2509	2013	3517	3519	3620	3619	3615	3511	3108
Buenos Aires	2806	2704	2505	2408	2212	3116	3520	3620	3619	3516	3512	3108
Sydney (l)	2712	2510	2309	2209	2810	2313	1818	1721	1522	1420	2516	3114
Lima	2700	2400	2300	2200	2700	2000	3300	3300	3200	3200	3300	3100
Barbados	2604	2303	2203	2105	2409	3112	3215	3116	3116	3114	3311	3007
Bogota	2600	2300	2000	2000	2400	2500	3100	3000	3100	3100	3200	2900
Jamaica	2500	2200	2000	1800	2200	2400	3000	3000	3000	3000	3100	2800
Bermuda	2400	2200	1900	1700	1900	2700	3000	2900	3000	3000	3100	2700
New York	2307	2106	1906	1507	1710	2412	2814	2815	2915	2913	2911	2609
Mexico	2200	2000	1900	1500	2200	1900	2500	2900	2900	2900	2900	2600
Montreal	2209	2008	1808	1509	1811	2513	2715	2716	2815	2913	2911	2510
Denver	2000	1900	1800	1500	1500	1600	2200	2400	2600	2700	2800	2400
Los Angeles	1800	1900	1800	1700	1500	1300	1800	2300	2600	2700	2700	2400
Vancouver	1600	1800	1800	2000	2000	1900	2100	2200	2000	2300	2400	2200
Iceland	1509	1408	1308	1609	1910	2010	2011	2011	2011	2111	2010	1609
Honolulu	1500	1700	1900	2200	2300	2300	2000	1900	2200	2600	2500	2200
Fairbanks	1500	1800	1900	2300	2300	2300	2000	2200	2200	2100	2000	2000

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

RAE courses 1980–81

Bath. Venue not yet confirmed. Further details from Peter Bubb, G3UWJ, 58 Greenacres, Bath BA1 4NR, tel Bath (0225) 27467.

Belfast. College of Technology, College Square East, Belfast BT1 6DJ. Licensing conditions, operating practices, procedures and electronic theory, Tuesdays 5.30–8.30pm; morse instruction and practice for prospective GI4s, Thursdays 6–8pm; commencing 16 September. Enrolment early September. Further details from the college, tel 27244.

Birkenhead. North Wirral College of Technology, Electrical Engineering Department, Borough Road, Birkenhead. Courses commencing week beginning 15 September. Enrolment 8–10 September. Further details from the Dept of Electrical Engineering, tel 051-652 1521, ext 21.

Birmingham. Bournville Institute, Selly Park Centre, Pershore Road, Selly Park, Birmingham B29 7PL. Thursdays, 7.15–9pm. Enrolment date as all adult education courses for Birmingham (see local press). Details from R. Blacker, G4GBE, 23 Leasowe Road, Rubery, Birmingham B45 9TB.

Bracknell. Bracknell College, Dept of Engineering and Science, Church Road, Bracknell, Berks. Courses commence 29 September. Enrolment 11, 12 and 15 September. Details from the college, tel Bracknell 20411.

Gosforth. Gosforth Adult Association Classes, Gosforth Secondary School, Gosforth, Newcastle upon Tyne. Tuesdays, 7–9pm, commencing September. Candidates may sit the examination at the school. Enquiries to the Principal, Gosforth Adult Association, at the school, or tel Newcastle upon Tyne 668439.

Langley. Langley College of Further Education, Station Road, Langley, Slough SL3 8BY. Operating techniques (using the college station G3XPL), Mondays 5.30–7pm; morse, Mondays 7–8.30pm; theory, Thursdays 7–9pm. Enrolment 9–10 September, 12.30–8pm. Further details from E. C. Palmer, G3VC, at the college.

Leamington Spa. Mid-Warwickshire College of Further Education, Department of Engineering, Warwick New Road, Leamington Spa CV32

5JE. Thursdays, 30-week course commencing 18 September. Enrolment 4-5 September, 9-12am, 2-4pm or 6.30-8pm.
Manchester. Pendlebury High School, Cromwell Road, Swinton. Thursdays, 7.30 pm, commencing end of September. Registration prior to first class. Details from course instructor, P. Whatmough, G4HYE, tel 061-794 3706.
Melton Mowbray. Melton Mowbray College of Further Education, Asfordby Road, Melton Mowbray, Leics. Enrolment in early September, details will be in local press. Information from the college, or from course tutor, G3WKM, tel Melton 68810.
Newport. Newport Amateur Radio Society, Brynglas House, Brynglas Hill, Newport. First meeting Monday 8 September, 6.30pm. Further details from L. A. Groucott, GW3YTJ, 2 Durham Road, Newport, Gwent NPT 7DU.
Northampton. Duston Upper School, Duston, Northampton. Tuesdays, 7-9pm, commencing 23 September. Enrolment 3-4, 8-9 September. Fee for 30-week course, £15. For further information tel Northampton (0604) 33834.
Orpington. Orpington Adult Education Centre, Ramsden Boys School, Cullmans Road, Orpington. Commences 16 September. Further details from Mr A. E. Betts, G8TKV, tel Orpington 31123, evenings, or 01-632 4585, office hours.
Stockport. Avondale Evening Centre, Edgeley, Stockport. Thursdays, 7pm. 21-week course commencing 25 September. Enrolment 16, 17, 18 September. Morse class may be available Tuesday evenings commencing 23 September. Enrolment dates as above. Details from John Heywood, G4IAL, tel 061-236 6751, office hours.
Walsall. Broadway North Adult Education Centre, Walsall, West Midlands. Mondays 7-9pm, commencing September. Fee for three terms: £9. Further details from the Adult Education Dept, Civil Centre, Walsall, tel Walsall 21244 ext 2318.
Weybridge. Brooklands Technical College, Dept of Technology, Heath Road, Weybridge, Surrey. Wednesdays, 6.30-8.30pm, commencing September. Enrolment 8, 9, 10 September between 6 and 8pm. Further details from Mike Tooley, G8CKT, Department of Technology, at the college, tel Weybridge 53300, ext 247.

your opinion

THE PHASE 3A SATELLITE

The Editor
Radio Communication

Sir—The excellent coverage given to the Phase 3 satellite in the May issue of *Radio Communication* will have highlighted the absolute calamity which has occurred through the loss of this satellite at its launch. Even the reader completely uninterested in satellite communication must have been impressed by the description and illustrations of this project. For those who designed and built this sophisticated piece of amateur radio equipment, its loss has been a bitter disappointment indeed.

Those who are interested in satellite communication will be gratified to learn that it is hoped to complete the duplicate Phase 3 satellite which was being constructed alongside the one which was lost. Already well-wishers have started a fund to help along this possibility, as the cost of launching and constructing Model A has severely depleted the funds available for this project. How long it will take to complete the replacement, if indeed this proves to be practical, and when launch facilities will again be available remains to be seen, but if the enthusiasm which went into the first one can be re-established for the second, we may yet have a Phase 3 satellite in orbit.

Arthur C. Gee, G2UK
Chairman, AMSAT-UK

OLD CALLSIGN "5FZ"

The Editor
Radio Communication

Sir—The old call "5FZ" was issued to the Lincoln Wireless Society in the year 1923, by the then Postmaster General. We have a record of this call in a call list contained in a *Wireless World* diary for the year 1927. Also we have a record in an old society minute book of the payment of the licence fee which was, at that time, 25 shillings.

A Wireless and Scientific Society was formed in Lincoln in the year 1921 and, although there have been two short breaks, amateur radio activity has been in operation in Lincoln since that date. Next year will be the sixtieth anniversary of the start of amateur radio in the city, and the present club is very keen to demonstrate this long period of activity. Application has been made to the Home Office for the re-issue of this old call, and it would seem that favourable consideration would be given if it were possible to substantiate the existence of the call, to them, as at present they are unable to trace the call.

To help in this, it would be of great assistance if any older radio amateurs who are in possession of any relevant records could loan such records to the present club so that copies may be made to support our application to the Home Office. If anyone can help, great care would be taken of any records and postage charges would be willingly met.

Mike Wells, G4JES
Secretary, Lincoln Short-Wave Club
4 Horner Close
Brant Road
Lincoln LN5 2AZ

COMPUTER STANDARDS

The Editor
Radio Communication

Sir—As the "personal computer" is now reasonably priced, many radio amateurs are using them for rtty, morse, ASCII, station control etc. To exchange programs over the air and possibly also to communicate in ASCII it is necessary to use standard tones and data transmission rates. There are several possible alternatives, including rtty tones, the Kansas City standard used for cassette interfaces and the MODEM tones specified by CCITT in Europe and the USA standard in North America.

Increasing use of landlines for data transmission makes it desirable to use the same standards in amateur radio so that programs can be exchanged with non-amateurs by telephone. This rules out rtty, which is further limited by the five-bit code designed for mechanical printers. Most "personal computers" have a Kansas City interface (1,200 and 2,400Hz), but this is impractical for amateur radio because it uses too wide a frequency spectrum, and the harmonic relationship would cause problems if there was any distortion.

We propose that amateurs should adopt the CCITT standard using the lower frequency pair for simplex transmission (Mark, "1", 980Hz and space, "0", 1,180Hz). Standard ics are available for this purpose but not all conform to CCITT. One that does and which we have used successfully on 144MHz is the Motorola MC14412VL which has the advantage that it is switchable to the USA standard. We also suggest a rate of 300 baud should be used, although this is less important than standardizing the tones.

We would be interested to receive readers' comments.

C. T. Dollery, G3GAF
P. B. Kemmis, G8NFS

obituaries

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

Mr D. Brideson, G3MXU
Des Brideson, of Worlingworth, Suffolk, died suddenly on 30 April, aged 43. He was mainly a cw operator, and was keen on constructing equipment.

Mr R. Montgomery, GI4GDV
Robert Montgomery died on 30 May, aged 24, as the result of an accident. He was a founder member and the first chairman of Lagan Valley ARS, and also served the Society as area representative. His main interests were in home construction and television and radio repair. He also had a keen interest in contest operating.

Mr E. L. Wright, G3SI
Leslie Wright, of Thaxted, Essex, died recently after a long illness. Licensed before the second world war, he gave generously of his time and skill during the war years, listening out to enemy transmissions.

Active on all bands after the war, he was known worldwide on 28MHz and made many lasting friendships on 3·5MHz. He was sadly unable to continue to enjoy his hobby in later years because of failing health.

We have also been advised of the deaths of:
Mr T. Newson, G8BKB, on 17 May.
Mr T. L. Peterson, G6VG, on 14 May 1979.
Mr J. W. Underwood, G3CIW, on 14 May.

council proceedings

A brief report on the Council meeting held on 31 May 1980

Present: Mr P. Balestrini (President, in the chair), Dr E. J. Allaway, Messrs D. Andrews, J. Anthony, R. Barrett, J. Bazley, R. Bellerby, P. F. D. Cornish, T. P. Douglas, Dr D. S. Evans, Messrs K. A. M. Fisher, L. N. G. Hawkyard, G. R. Jessop, G. I. Knight, W. F. McGonigle, B. O'Brien, D. M. Pratt, G. M. C. Stone (members of Council), R. F. Stevens (tlo), D. A. Evans (general manager).

Apologies had been received from Mr A. W. Hutchinson.

RSGB President for 1981

The President said he would like to bring forward the action regarding the election of the 1981 President. Dr Allaway proposed and Mr Douglas seconded that Mr O'Brien be elected President for 1981.

There were no other nominations and the proposal was carried unanimously.

1981 Council election

Dr Allaway and Messrs Bazley, Douglas and Fisher complete their terms of office on 31 December 1980. With the exception of Mr Douglas, who did not wish to seek re-election for health reasons, all indicated that they would accept nomination.

Council felt that a zonal manager elected President should not continue in the office of zonal manager. This being the case an election for Zone A would be necessary, and as a consequence there would be three vacancies for ordinary members of Council in 1981, not four, as the permitted maximum number of Council members, including the President, is 18.

Mr Cornish confirmed that he would be pleased to continue as hon treasurer if Council wished.

General manager's report

Mr Evans spoke of the continuing success of the Alexandra Palace Exhibition and of the combined efforts of the R & E Committee and RSGB staff which contributed to this success.

The general manager reported on the work being done with the new IBM34 data processor equipment, and on future projects for which it would be used.

Mr Evans also reported that the two directors of Raynet Ltd would be the hon treasurer and the chairman of the Finance & Staff Committee. The general manager would be company secretary.

Financial report

Mr Cornish presented the Society's accounts to 31 March 1980. The current position showed a surplus above the budgeted surplus, due to increased book sales, although subscription income and advertising revenue were also slightly up.

Mr Cornish gave a review of various aspects of the accounts and concluded that the Society's finances were overall in good order, despite the payment of approximately £34,000 for new data processing equipment. Council then discussed various aspects of the accounts.

Review of committee business

Finance & Staff

Dr Allaway introduced the revised age limits for students up to the age of 25. After some discussion Council approved this recommendation. Dr Allaway thanked Mr Bellerby for the work he had done on the student survey.

HF

Mr Bazley introduced two recommendations from the committee to Council. The first concerned hf awards and the bringing of these under the wing of the HF Committee; this was agreed by Council. The second proposal was that the RSGB Countries list should follow the ARRL DXCC List. After some discussion it was agreed to accept this recommendation.

HF Contests

Mr Andrews referred to the planned activities for 1980.

Mr Balestrini reported he had received a letter from PA0LOU, the President of IARU Region 1, regarding common rules for hf field day. RSGB were invited to be the first society to judge the contest under these new rules, and Mr Andrews said that the HFCC would be happy to do so. Mr Andrews suggested that a Region 1 contest field day manager be appointed within the RSGB to co-ordinate this particular activity, and suggested that Mr D. Thom, G3NKS, be appointed to this post as he was heavily involved in the discussions which led to the adoption of common rules. This was agreed.

IARU

The President reported briefly on the ARI meeting in Italy. The visit had been worthwhile, especially in pointing out that the RSGB was not involved in the decision to move the next IARU Region 1 triennial conference from Monaco to the UK.

Interference

Mr Andrews asked if the Interference Committee were to be involved with the next edition of the *Interference Manual*. Mr Anthony replied that this was currently being discussed with a view to putting proposals to the F & S Committee.

Mr Anthony reported that there were approximatley 17 outstanding cases of interference at present, of which very few involved audio breakthrough problems.

Membership & Representation

Mr O'Brien said that the committee had spent some time looking into the position of RSGB groups. It was suggested that RSGB groups have a registration fee with the Society to enable these groups to avail themselves of the same facilities as other RSGB affiliated clubs and societies. The fee would be the same as the affiliated societies fee without *Radio Communication*. After discussion Council approved these ideas and asked the committee to produce a draft constitution etc.

Mr O'Brien spoke about the importance of affiliated clubs. Much discussion had taken place within the committee regarding the form of contact with the Society's affiliated clubs, societies and groups. The matter was still under discussion and Dr Evans had been asked to draft proposals on behalf of the committee.

Microwave

Dr Evans reported on the committee's involvement with the UK UoSAT project, and the recent IARU Region 1 VHF Managers' Conference. It was hoped to conclude the work on the chapter for the next edition of the *VHF Manual* in the near future.

Rally & Exhibition

Mr Hawkyard commented on the success of the recent Alexandra Palace Exhibition. His impression was that traders now regarded this as a prime event. The RSGB steward scheme had worked well but there was still a requirement for more people to serve on the RSGB book stall.

Mr Jessop said that he thought the RSGB stand was considerably improved but felt there should be some means of defining the boundary of the RSGB stand.

The President commented on the lack of proper restaurant facilities.

Mr Hawkyard commented briefly on the Woburn Abbey mobile rally.

Propagation Studies

Mr Stone mentioned the committee's proposal to establish a regular propagation bulletin again after some years. After some discussion it was agreed that the chairman of the committee and the general manager should get together to make a recommendation to the Finance & Staff Committee in the first instance.

Raynet

The President, on behalf of the committee, commented on the recent Ministry of Transport decision not to allow green flashing lights on vehicles. It was, however, in order to erect a green flashing light at an incident on a pole adjacent to a vehicle. He also commented on other discussions which had taken place with the Home Office.

The use of the title "National Raynet Committee" was discussed and Council agreed that the title "RSGB Raynet Committee" should be used in future.

Technical & Publications

Dr Evans commented on the sale and production of various RSGB publications.

Dr Evans said that there would seem to be considerable merit in employing a technical officer whose main function would be to provide a technical background for RSGB publications; the committee was currently considering this matter.

Dr Evans answered questions on the crystal calibrator kits and the hf receiver project. Mr Bazley said that he was very keen to see the RSGB receiver project get off the ground and he felt that specific projects like these could be handled with specialist paid help.

Dr Evans confirmed that at present there was no overload in the existing editorial or production mechanisms, the additional effort required was primarily in the book writing area.

Telecommunications Liaison

The President invited Mr Stevens to comment on any TLC matters. Mr Stevens said that he had nothing specific to report and invited questions. Mr Knight said that he felt one of the main problems on repeaters

was the number of licensed amateurs who were addressing remarks and having conversations with known unlicensed stations. Mr Pratt read out a letter which it was proposed to send to any licensed amateurs who were observed in communication with known unlicensed stations.

Mr Hawkyard asked if any action were being taken with regard to illegal cb operators using the lower part of the exclusive 28MHz amateur band. Mr Stevens confirmed that work was already in hand with regard to this matter, and clarified the position by saying that no illegal operation of this nature appeared to be occurring in the UK as yet. In reply to a question, Mr Stevens said it was illegal to listen to cb.

Some discussion took place on the proposals for a novice licence.

VHF

Mr Douglas said he wished to record on behalf of the committee a vote of thanks to Graham Knight for his excellent column over many years.

Mr Douglas said that at the present time he did not feel that it was necessary for the UK to switch to a 12·5kHz channel system but that clearly this matter would be discussed in more detail at the 1981 IARU Conference.

VHF Contests

Mr Hawkyard drew Council's attention to the correspondence between the Committee and Mr Brown, GJ4ICD.

Membership and representation

Council noted and approved that the subscriptions of three members had been waived.

Council granted affiliation to Geoffrey Chaucer School Radio Club, Canterbury; and Southampton Radio Club.

Council noted the position in Regions 4, 10 and 20 with regard to regional representatives (See June/July issue).

The appointment of the following area representatives was noted: Mr G. D. Edy, G4AXD, Maidstone and District; Mr T. Mays, G2CWR, Torbay; and Mr J. A. Sheardown, G8TIY, Scunthorpe.

A request from Mr Kyle, RR15, to hold an ORM on 20 September, was granted.

Correspondence

The President reported on various items of correspondence; and on the action taken in response to them.

Citizens band

There was a short discussion on various points related to illegal activities by so-called "citizens band" operators.

Nominations for election to the 1981 Council of the RSGB

The Society's Articles of Association require that members who are entitled to vote be notified of those Council members who retire at the end of each year. The Council members who retire on 31 December 1980 are as follows:

ORDINARY MEMBERS (eligible for election)

Dr E. J. Allaway, G3FKM, who will accept nomination for re-election

Mr J. Bazley, G3HCT, who will accept nomination for re-election

Mr T. P. Douglas, G3BA, who does not intend to stand for re-election (for health reasons)

Mr K. A. M. Fisher, G3WSN, who will accept nomination for election (Mr Fisher was co-opted on to Council for 1980).

ZONAL MEMBERS

Mr B. O'Brien, G2AMV, is to become the Society's President on 1 January 1981, thus creating a vacancy on Council for a member to represent Zone A.

NOMINATION PROCEDURE

The vacancies on the 1981 Council may be filled either by the re-election of retiring members of the Council or by the election of any qualified Society member. In both cases a proper nomination must reach the secretary at RSGB HQ not later than 10 October 1980. A member who has been a corporate member of RSGB for not less than three years immediately prior to nomination is qualified to serve on Council. Members standing for election as zonal members must be resident in the appropriate zone, as must those who make zonal nominations.

Any 10 or more fully-paid-up corporate members may nominate any qualified member for election to Council by delivering, in one closed envelope, to the secretary of RSGB, their respective nomination in writing. (As a safeguard it is recommended that each candidate be nominated by more than 10 members.)

The nominated member must also enclose:

(i) Written consent to accept office if elected.

(ii) A statement indicating if he/she will have passed their 70th birthday either prior to 1 January 1981 or within the three-year period commencing 1 January 1981.

(iii) A statement saying if his/her nomination for Council is for ordinary or zonal membership.

(iv) A statement declaring any commercial interests in the field of amateur radio. The candidate may use a maximum of 150 words as a statement of address to be circulated with the ballot forms. This statement of address should contain biographical details of the candidate as well as any other information he/she would like to convey. Bona-fide statements will receive the minimum of editing consistent with good style and factual accuracy; however, statements in excess of the maximum will be cut to 150 words.

(v) A suitable black and white photograph (head and shoulders), if he/she wishes.

Complete nominations should be addressed to: D. A. Evans, Secretary, RSGB, 35 Doughty Street, London WC1N 2AE, and must arrive not later than 10 October 1980. All nominations received will be acknowledged by return of post.

Contests calendar

3 August	144MHz QRP and SWL *(Rules in June/July issue)*
5 August	DF Qualifying Event South Manchester *(Rules in June/July issue)*
9–10 August	European DX (CW) *(Rules in August issue)*
11–12 August	Meteor Scatter *(Rules in May issue)*
16 August	10th SARTG WW RTTY
17 August	70MHz Trophy and SWL
17 August	DF Qualifying Event Slade *(Rules in June/July issue)*
23–24 August	21st All Asian DX *(Rules in August issue)*
24 August	10GHz Cumulative *(Rules in May issue)*
31 August	WAB VHF *(Rules in March issue)*
31 August	ROPOCO *(Rules in June/July issue)*
6–7 September	IARU Region 1 VHF/UHF/SHF (VHF Section) *(Rules in June/July issue)*
6–7 September	SSB Field Day *(Rules in May issue)*
6–7 September	144MHz Trophy and SWL *(Rules in June/July issue)*
7 September	Bulgarian DX *(Rules in August issue)*
13–14 September	2nd International (28MHz portable) *(Rules in August issue)*
13–14 September	European DX (Phone) *(Rules in August issue)*
13–21 September	12th BARTG VHF/UHF *(Rules in August issue)*
14 September	RSGB Region 1 VHF *(Rules in August issue)*
14 September	DF Final Dartford Heath
21 September	10GHz Cumulative *(Rules in May issue)*
27 September	AGCW-DL *(Rules in April issue)*
4–5 October	432/1,296/2,304MHz and SWL
4–5 October	IARU Region 1 VHF/UHF/SHF (UHF/SHF section) *(Rules in June/July issue)*
4–5 October	RSGB UHF *(Rules in August issue)*
10, 18, 26 October	432/1,296MHz Cumulative *(Rules in August issue)*
12 October	21/28MHz *(Rules in May issue)*
19 October	21MHz CW *(Rules in June/July issue)*
26 October	70MHz Fixed *(Rules in August issue:* **NB change of date***)*
26 October	Shefford & D ARS Transmitting and Receiving (Section 1) *(Rules in August issue)*
1 November	Shefford & D ARS Transmitting and Receiving (Section 2) *(Rules in August issue)*
2 November	144MHz CW
3, 11, 19, 27 November	432/1,296MHz Cumulative *(Rules in August issue)*
8–9 November	Second 1·8MHz
7 December	144MHz Fixed
7–8 February 1981	7MHz (Phone) *(Rules in August issue)*
28 February–1 March 1981	7MHz (CW) *(Rules in August issue)*

contest news

Region Round-up Contest 1980 results

Although activity was not as high as anticipated, the majority of entrants enjoyed this contest, especially since it was of much shorter duration than in previous years. Most of those who included comments with their logs were in favour of the rule changes introduced this year.

The winner, Barry Simpson, G3PEK, contacted 38 out of the possible 39 RSGB regions, in his first appearance in this contest. He used an FL101/FR101 combination to an inverted-V trap dipole antenna and 150W input. In the QRP section, S. G. Spencer, G3ILO, took first place with a modified TS120V at 10W input to a 132ft dipole fed with open wire line.

Some 86 stations were active on 3·5MHz and 112 on 7MHz, from all RSGB regions except Region 14 on 3·5MHz. With one exception, the standard of logs received was very good and few unmarked duplicates were found. Most points were lost for incorrectly-copied callsigns. The check lists included with some entries were also very helpful.

The HF Contests Committee is grateful for all the many comments and suggestions received and will review them when the rules for next year's event are formulated.

Certificates will be awarded to the first three stations in each section.

G3KKQ

SECTION A

Posn	Callsign	QSOs	Points	Posn	Callsign	QSOs	Points
1	G3PEK	111	12,654	16	G4EBK	86	8,184
2	G3ZEM	104	11,772	17	GM3OXC	88	8,160
	G4CNY	109	11,772	18	G3ICH	86	8,096
4	G3SJJ	108	11,664	19	G4IQM	78	7,956
5	G3PDL	104	11,433	20	G3ZDW	74	6,688
6	G4BUO	103	11,124	21	G3EUE	78	6,380
7	G3NOM	105	10,990	22	GI2FHN	78	5,656
8	GW3MPB	102	10,500	23	G3AWR	61	5,624
9	G4DUW	100	10,064	24	G8AB	58	4,275
10	G3SJE	100	9,900	25	G3CCZ	56	3,059
11	G4DRS	103	9,824	26	G4HZF	40	2,645
12	G3SNX	87	9,360	27	G4JIL	32	1,920
13	G2HLU	94	8,976	28	G3LHG	44	1,615
14	G4HIU	90	8,738	29	GI4GYE	29	1,125
15	G5MY	88	8,481				

SECTION B

Posn	Callsign	QSOs	Points	Tx	Pwr (input)	Antenna
1	G3ILO	90	8,877	TS120V	10W	132ft cf
2	G4BUE	90	8,646	Argonaut	5W	Inv-Vs
3	G3NKS/P	50	3,212	HW8	3W	80ft ef at 12ft
4	GW3SB	37	2,033	HW8	3·5W	Dipoles
5	G4EJN	26	1,022	FT101/2N5913	2W	80ft lw
6	G6GH	11	264	HW8	3W	Trap vertical

Checklog from G3MCK gratefully acknowledged.

April 1,296MHz Contest results

Over 80 G stations were operational on 1,296MHz in this contest. The advent of a commercially made transverter has, no doubt, resulted in the considerable increase in activity. The committee can only express disappointment with the poor entry. The VHF Contests Committee Cup goes to G4BPO/P, with certificates to the runner-up, G8EVU; the single-operator section winner, G4BEL, and runner-up G3TDG. *G5HD*

SINGLE OPERATOR

Posn	Callsign	Points	QSOs	Km	Pwr	Antenna
1	G4BEL	5,912	44	340	100	5ft dish
2	G3TDG	4,151	46	367	30	28-el Yagi
3	G8BIS	3,925	25	338	50	L/Yagi
4	G8DKK	3,753	34	384	30	34-el Pb
5	G8CTT	1,146	19	160	1·25	22-el I/Y
6	G8ART	750	12	152	35	2 · I/Y
7	G3YTE	594	8	144	0·5	15/15
8	G4FRE	475	7	185	60	15/15
9	G3VCT	376	7	72	50	L/Yagi
10	GD2HDZ	275	2	145	50 (in)	26-el Yagi

MULTI OPERATOR

Posn	Callsign	Points	QSOs	Km	Pwr	Antenna
1	G4BPO/P	7,911	56	381	250	4 · I/Y
2	G8EVU	7,576	49	426	80	I/Y
3	G4DDC/P	4,282	40	410	30	15/15
4	G4GRT/A	4,265	27	262	15	4×I/Y
5	G4JAR/P	3,509	35	248	20	4 · I/Y
6	G8VWA/P	2,883	33	375	1	L/Y
7	G4HWA/P	1,996	26	171	10	4×I/Y
8	G3XWZ/P	1,844	18	225	1	Dish
9	G4BRK	1,732	22	141	50	4×I/Y
10	GW8ACG/P	1,342	13	310	2·5	4 · I/Y
11	G4DRV/A	320	6	149	1	15/15
12	G3AMW/P	278	4	113	15	2×I/Y

April 432MHz Contest results

The 432MHz band produced a number of bad signal complaints which were carefully investigated. Several complaints against one station all included evidence of receiver inadequacy. Future complainants should give details of antenna attenuators used. Concern is felt over the proliferation of K2RIW amplifiers with their 1kW capability and less than unconditional stability.

The Council Cup goes to G4JAR/P, with a runners-up certificate to GW3UNU/P.

G5HD

SINGLE OPERATOR

Posn	Callsign	Points	QSOs	Km	Pwr	Antenna
1	G4DGU	710	118	480	400 p.e.p.	20-el I/Y
2	GJ4ICD	707	67	712	400 p.e.p.	4 · 21-el
3	G3YTE	417	71	477	150 p.e.p.	48-el Mb
4	GD2HDZ	246	24	435	400 (in)	18-el Pb
5	G8BIS	241	47	449	150 p.e.p.	21-el Yagi
6	G8KAX	235	53	347	100 p.e.p.	20-el ZL-spc
7	G3PBV	230	30	412	50 p.e.p.	2×10-el Yagi
8	G4ASR	215	35	355	90 p.e.p.	88-el Mb
9	G8SFI	207	37	520	100 p.e.p.	21-el Yagi
10	G2AMV	206	36	338	150 p.e.p.	46-el Mb
11	G8EEM	198	28	615	200 p.e.p.	21-el Yagi
12	G4EYV	186	44	466	100 p.e.p.	21-el Yagi
13	G8DKK	184	34	384	60 p.e.p.	21-el Yagi
14	G4AEZ	163	41	365	40 p.e.p.	2 · 21-el Yagi
15	G8OPR	160	35	306	100 p.e.p.	18-el Pb
16	G8LGL	150	28	322	400 p.e.p.	21-el Yagi
17	G8IEM	141	33	319	20 p.e.p.	13-el I/Y
18	G8IZR	62	15	302	10 p.e.p.	17-el Quad
19	G4HFO	49	9	235	10 p.e.p.	48-el Mb
20	G5DF	38	6	335	10 p.e.p.	46-el Mb
21	G8CTT	37	15	110	10 p.e.p.	46-el Mb
22	G8LXY	30	19	94	50 p.e.p.	8-el Yagi
23	G3VCT	27	11	148	6 p.e.p.	18-el

MULTI OPERATOR

Posn	Callsign	Points	QSOs	Km	Pwr	Antenna
1	G4JAR/P	938	145	504	300 p.e.p.	2 · 21-el
2	GW3UNU/P	887	116	680	400 p.e.p.	26-el I/Y
3	G4BPO/P	754	93	477	250 p.e.p.	25-el I/Y
4	G3NNG/P	732	120	610	300 p.e.p.	18-el
5	G4HWA/P	673	122	641	80 p.e.p.	21-el
6	G6YB/P	519	79	545	400 p.e.p.	18-el Pb
7	G3EFX/P	486	92	525	90 p.e.p.	2 · 11-el
8	G4CQR/P	425	71	440	100 p.e.p.	4×21-el
9	G8VWA/P	372	88	432	150 in	88-el Mb
10	G8ECN/A	357	47	575	220 p.e.p.	19-el
11	G3XWZ/P	322	68	475	10 p.e.p.	48-el
12	G8GCP/P	272	71	304	50 p.e.p.	46-el Mb
13	GW8APP/P	266	46	358	100 p.e.p.	46-el Mb
14	G4GRF	236	50	412	100 p.e.p.	21-el
15	G3AMW/P	219	39	405	50 p.e.p.	28-el I/Y
16	G2AJS/P	128	20	380	10 p.e.p.	88-el Mb
17	G4ITF/P	73	21	225	10 p.e.p.	4-el I/Y
18	G8TMI	61	17	152	11 p.e.p.	48-el Mb

RSGB UHF Contest rules

1600–1600gmt, 4–5 October 1980
Bands—432MHz to 24GHz.

This contest is timed to coincide with the IARU Region 1 Contest. Each band will be tabulated individually and no multipliers will be used.

Contestants wishing to have their logs forwarded to IARU should clearly state this on Form 4422.

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

All entries and checklogs to: VHF Contests Committee, c/o Mr R. Taylor, G4BEL, 12 The Rampart, Haddenham, Cambs CB6 3ST.

1,296MHz Cumulative Contest rules

2100-2300gmt; 10, 18, 26 October, 3, 11, 19, 27 November 1980

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

All contacts must be made directly on the 1,296MHz band.

All entries and checklogs to: VHF Contests Committee, c/o Mr C. Sharpe, G2HIF, 20 Harcourt Road, Wantage, Oxon OX12 7DQ.

432MHz Cumulative Contest rules

1900-2100gmt; 10, 18, 26 October, 3, 11, 19, 27 November 1980

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

All entries and checklogs to: VHF Contests Committee, c/o Mr C. Sharpe, G2HIF, 20 Harcourt Road, Wantage, Oxon OX12 7DQ.

70MHz Fixed Contest rules

0800-1200gmt; 26 October 1980 (Note change of date)

The following general rules, published in the January 1980 issue of *Radio Communication,* will apply: 1, 2, 3, 4c, 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.

7MHz Contests 1981 rules

Licensed radio amateurs and listeners throughout the world are invited to take part in these RSGB 7MHz contests. Rules are as in previous years with the exception that both sections will end at 0900gmt (see Rule 3).

Log and cover sheets may be obtained from the RSGB, 35 Doughty Street, London WC1N 2AE, in exchange for a large stamped addressed envelope—those who need a larger quantity are advised to purchase one of the new combined log and summary sheet pads advertised elsewhere in *Radio Communication.*

TRANSMITTING SECTION

1. The general rules for RSGB hf contests, to be published in the January 1981 issue of *Radio Communication,* will apply.
2. **Eligible entrants.** British Isles: RSGB members only.
   Rest of world: all licensed amateurs.
3. **Periods.** Phone: 1200gmt 7 February to 0900gmt 8 February 1981.
   CW: 1200gmt 28 February to 0900gmt 1 March 1981.
4. **Sections.** Single-operator only.
5. **Bands.** Phone: 7·04 to 7·10MHz.
   CW: 7·00 to 7·04MHz.
6. **Exchange.** RS(T) plus serial number starting at 001.
7. **Scoring.**
   (a) British Isles stations with:
   European stations: 5 points per QSO.
   Non-European stations: 15 points per QSO.
   British Isles stations may not work each other.
   (b) European stations with:
   British Isles stations: 5 points per QSO.
   (c) Non-European stations with:
   British Isles stations: 15 points per QSO.
8. **Multiplier.**
   (a) British Isles stations: one for each different country worked (RSGB list applies). VE, VK, USA, ZL, and ZS call areas will each count as a country for this purpose.
   (b) Overseas stations: One for each different British Isles prefix worked, ie G2, G3, G4, G5, G6, G8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GJ2, GJ3, GJ4, GJ5, GJ6, GJ8, GM2, GM3, GM4, GM5, GM6, GM8, GU2, GU3, GU4, GU5, GU6, GU8, GW2, GW3, GW4, GW5, GW6 and GW8, (a maximum of 42). *Note that the prefix GB will not count.*
9. **Final score.** QSO points multiplied by the number of different multipliers contacted.
10. **Logs.** Log sheets should be headed: date, time (gmt), callsign of station worked, RS(T) and number sent, RS(T) and number received, if multiplier, and QSO points claimed. A summary sheet is required showing the countries or prefixes worked.
11. **Declaration.** Each log must be accompanied by the following declaration. "I declare that my station was operated in accordance with the rules of the contest, and in accordance with the terms of my licence". The declaration must be signed and dated.
12. **Address for entries.** Entries must be sent to: RSGB HF Contests Committee, c/o P. A. Miles, 28 Scotch Orchard, Lichfield, Staffs WS13 6DE, England, and not via RSGB HQ. Misdirected entries may be disqualified.
13. **Closing date for receipt of logs.**
    Phone contest: 4 April 1981.
    CW contest: 25 April 1981.
14. **Awards.** The Thomas (G6QB) Memorial Trophy will be awarded to the leading British Isles entrant in the cw contest. Certificates will be sent to the entrants placed first, second and third in the British Isles, European and non-European section of each contest.
15. **Dispute.** In the case of any dispute, the ruling of the Council of the RSGB shall be final.

RECEIVING SECTION

Rules as transmitting section except as superseded below.

1. The general rules for RSGB hf receiving contests, to be published in the January 1981 issue of *Radio Communication* will apply.
2. **Eligible entrants.** British Isles: RSGB members only.
   Rest of world: all listeners.
3. **Scoring.**
   (a) British Isles listeners should log only overseas stations in contact with British Isles stations. European stations logged count five points, others 15 points.
   (b) Overseas listeners should log only British Isles stations participating in the contest. European listeners may claim five points per QSO logged, others 15.
4. **Multiplier.** As transmitting section.
5. **Logs.** Log sheets must be headed: date, time (gmt), callsign of station heard, callsign of station being worked, if multiplier, and points claimed. Note that the callsign of the stations being worked may only repeat once in every six contacts logged.
6. **Declaration.** As transmitting section plus, "I certify that I do not hold a transmitting licence".

Dartford Heath DF Event results

This two station event was especially arranged to celebrate the 10th anniversary of the formation of the club and attracted 14 entries. Frequencies of 1,970 and 1,980kHz were chosen and a special trophy purchased for presentation to the winner.

Good signals were heard at the start from both stations, 13 leaving to find station B first and only one to station A. Station B was located at Wingates Wood, near Halling, and with a very long antenna, hundreds of yards of dummy antenna and almost impenetrable undergrowth it presented a formidable problem.

Station A was located on a footpath at the side of a mineral railway line at Swanscombe and access was easy if it was approached from the correct side. However, most df types do it the hard way and many competitors were observed descending an almost vertical slope completely out of control!

The eventual winner was Bill North, G3TRY, and the trophy was presented to him at the rendezvous at the club headquarters, where everyone enjoyed the free tea. Much hilarity ensued at the discomfiture of the "professional", Brian Bristow, whose numerous excuses for only locating one transmitter gradually reduced everyone to tears!

The results are as follows:

			Time of arrival	
Posn	Name	Club	Station A	Station B
1	W. North	Mid-Thames	1614	1545½
2	E. Mollart	Mid-Thames	1614½	1545
3	P. Tyler	Mid-Thames	1616	1541
4	T. Gage	Mid-Thames	1638	1543
5	M. Easterbrook	Dartford Heath	1648	1556
6	P. Homer	Dartford Heath	1649	1559
7	B. Pechey	Mid-Thames	1705	1600
8	B. Bristow	Mid-Thames	1548	–
9	C. Wells	Mid-Thames	1656	–
10	P. Woollett	Dartford Heath	–	1701
11	G. Foster	Stratford	–	1701
12	P. Sharman	Dartford Heath	–	1703
13	J. Wells	Mid-Thames	–	–
14	C. Marsh	Vange	–	–

DF Qualifying Event Mid-Thames results

On a glorious early summer day a Mid-Thames record number of 25 competitors assembled with picnics at the ready on the eastern edge of Blackbush airport, but by the end of the day it took most competitors at least one pint to recover from their ordeal!

Station A, Graham Taylor, G3MDC/P, was hidden in gorse bushes perched above the A3 and the Devels Punchbowl at Hazelmere. Cover here was a little sparse, but the station was 16 miles south of the start which compensated for this. Eric Mollart, after guessing right, actually found the operator out of his hide at 2.10pm (40min after the start) checking the antenna, but this eventually proved no advantage to him.

Station B, Paul Hawes, G4CKW/P, was hidden in Hang Wood six miles west of the start. This station was better hidden in thick conifer wood with bracken undergrowth and used a culvert underneath the M3

to put most of a 1,000ft long antenna on the wrong side of the motorway over a marsh. At least six competitors investigated a sack of pine needles and bracken half way down the culvert in search of the transmitter, and thus came out rather wet and muddy.

The tea was held at The Swan public house, at Sherbourne St John, where over 50 people demolished the buffet and a few pints as well. The Mid-Thames RDF Club Trophy was awarded to Roger Parsons, who together with A. Simmons qualifies for the national final (subject to confirmation).

Posn	Name	Club	Time of arrival Station A	Station B
1	R. Parsons	Burton-on-Trent	1420	1507
2	A. Simmons	Mid-Thames	1431½	1520½
3	E. L. Mollart	Mid-Thames	1410	1532½
4	B. Bristow	Mid-Thames	1546	1447½
5	I. Butson	Colchester	1550	1444½
6	D. Newman	Rugby	1554	1446½
7	P. Tyler	Mid-Thames	1558	1456½
8	C. Merry	Dartford	1450	1602½
9	P. Lisle	Mid-Thames	1449½	1621½
10	M. Hawkins	Chelmsford	1623	1500½
11	D. Holland	South Manchester	1623½	1501½
	W. Pechey	Mid-Thames	1623½	1503
13	T. C. Gage	Mid-Thames	1623½	1501½
14	R. Shepherd	Mid-Thames	1630	1501½
15	W. North	Mid-Thames	1431	—
16	G. A. Whenham	Coventry	1432½	—
17	J. Wells	Mid-Thames	—	1500
18	A. Sapsed	Mid-Thames	—	1502½
19	R. Goodearl	Mid-Thames	—	1503½
20	P. Yeates	Salisbury	—	1505½
21	R. Vickers	Slade	1519½	—
22	C. Wells	Mid-Thames	—	1540½
23	M. Easterbrook	Dartford	1617	—
24	P. Woollett	Dartford	1617½	—
25	D. York	South Manchester	—	—

G. T. Peck Challenge Trophy DF Event results

This event is the first national df competition of the year and is run by the Mid-Thames RDF Club in memory of Geoffrey Peck.

The contest started at Coombe Hill, Ellesborough, in the Chiltern Hills and due to the lack of foliage at the end of March presented concealment problems to the organizer. A solution was found by concealing transmitter A underground with 600ft of antenna three miles from the start. Most competitors experienced difficulty in finding this transmitter and were quickly exhausted running up and down the steep hill on which it was situated.

Transmitter B, six miles southwest of the start, provided most competitors with a long run-in across Naphill Common.

The eventual winner, Eric Mollart, was just 27s ahead of Derrick Newman, and these two, the oldest competitors, celebrated by forming the Geriatrics DF Club!

The results are as follows:

Posn	Name	Club	Time of arrival Station A	Station B
1	E. Mollart	Mid-Thames	1457	1550
2	D. Newman	Rugby	1500	1550½
3	B. Bristow	Mid-Thames	1457	1556½
4	R. Goodearl	Mid-Thames	1457	1556½
5	P. Lisle	Mid-Thames	1453	1610½
6	P. Yeates	Salisbury	1457	1611½
7	C. Plummer	Mid-Thames	1614	1414½
8	B. Poole	Mid-Thames	1458	1614½
9	C. McEwen	Dartford Heath	1457	1617½
10	R. Shepherd	Mid-Thames	1458	1619½
11	G. Whenham	Coventry	1620	1436½
12	W. North	Mid-Thames	1620½	1504
13	M. Hawkins	Chelmsford	1621	1440½
14	R. Vickers	Slade	1621½	1441½
15	C. Merry	Dartford Heath	1622	1441½
16	C. Wells	Mid-Thames	1622½	1457½

RSGB Region 1 VHF Contest 1980

The rules for this contest are the same as those for the 1979 contest, published in the July 1979 issue of *Radio Communication*, except that:
(a) the date is 14 September 1980; and
(b) scoring for 1·3GHz will be one point per 5km.

Copies of the rules are obtainable from Mr N. Horrocks, G2CUZ, 34 Sandbrook Road, Ainsdale, Southport PR8 3JE.

12th BARTG VHF/UHF Contest rules

The rules for this contest are the same as those for the 11th contest, published in the August 1979 issue of *Radio Communication*, except that:
(a) the dates are 13 and 21 September;
(b) the information required in the first sentence of Rule 5 (a) must be passed in both directions and logged;
(c) the third paragraph of Rule 6 is deleted; and
(d) Rule 7: the cover sheet must give the address for correspondence, site and equipment details, comments, and signature of responsible person.

Copies of the rules can be obtained from Mr C. Plummer, G8APB, 148 Porter Road, Brighton Hill, Basingstoke, Hants RG22 4JT.

Shefford & District ARS Transmitting and Receiving Contest 1980 rules

Section 1. 144MHz. 0900gmt until 1300gmt Sunday 26 October 1980.
Section 2. 1·8MHz. 2000gmt until 2400gmt Saturday 1 November 1980.

Contacts. To consist of an exchange of reports, serial numbers beginning at 001 and name of county (new county boundaries), or country (if outside the UK), using any permitted mode. Contacts via repeaters will not count for points.
Entrants. The contest is open to all licensed operators, but in particular those who have obtained their licence in the past 18 months. Portable, mobile and fixed stations may take part.
Scoring. One point per contact; 10 points per contact with G3FJE, the Shefford ARS station. The total score in each section to be multiplied by the number of UK counties worked in that section. Countries outside the UK count as additional counties. Only one contact with a specific station in each section will count for points.
Logs. Logs must include the following information:
Date, time, callsign, RS(T) and serial number sent, RS(T), serial number and county received, points claimed. Any convenient log sheet containing the above information may be used. The location of the entrant's station, if different from his normal QTH, must be stated. The RSGB county abbreviations to be used.
SWL entries. Scoring will be as for the transmitting section with the following differences:
(a) Only contacts made by stations taking part in the transmitting sections of the contest will count for points.
(b) Logs must include:
Date, time, callsign of station heard, report by RS(T) by swl on station heard, report, serial number and county sent by station heard, callsign of station being worked and points claimed.
A particular station must only appear once in the "station heard" column.
Power. To give the newly licensed operators less of a handicap, power on 144MHz is to be limited to 25W.
Awards. Specially endorsed certificates will be awarded to the winner, second and third in each section of both the transmitting and swl sections. Certificates for all entrants are available provided an sae of minimum size 10 by 6½in (or metric equivalent) is included with the entry.

Post separate logs for each contest, post marked not later than 14 December 1980, to: Brian Elliott, G8TYN, 4 Ivel View, Sandy, Bedfordshire, for 144MHz entries, or Nick Button, G4IRX, 134 London Road, Biggleswade, Bedfordshire SG18 8EL, for top band entries.

Cray Valley RS 10th SWL Contest rules

1. From 1800gmt 13 September to 1800gmt 14 September. Up to 18 hours logging may be done during this period and the rest period must be clearly shown. Multi-operator stations may log during the entire contest
2. The contest is open to anyone in the world and there will be two sections (phone and cw) each containing two categories (single-operator and multi-operator). The second category is open to two or more listeners or to clubs and more than one receiver can be used.
3. The 1·8, 3·5, 7, 14, 21 and 28MHz bands may be used.
4. Stations may be logged using any mode.
5. The practice of logging a series of contacts made by one station is deprecated. Log entries must not include the same callsign in the "station worked" column more than 20 times on each band.
6. The object of the contest is to log as many stations in as many countries as possible. Scores should be compiled as follows: one point for each station heard on each band *multiplied* by the number of different countries heard on each band added together.

A list of countries heard must be furnished and a separate log must be submitted for each band. In addition, a bonus of up to 100 points will awarded for neatness. Illegible logs will not be accepted.
7. The call areas of the USA, Canada and Australia will each count as a separate country, ie W1,2,3,4,5,6,7,8,0; VO1, VO2; VE1,2,3,4,5,6,7,8; VY1; and VK1,2,3,4,5,6,7,8. All other countries will be determined by the official RSGB countries list.
8. No CQ, QRZ or similar call will be allowed to count for points. AM or MM stations are not to be included in the entries.
9. Log sheets are available from Owen Cross, G4DFI, 28 Garden Avenue, Bexleyheath, Kent DA7 4LF, who must be sent a large sae at the address above. It is desirable that entrants use official log sheets, but entries on home-made log sheets will be accepted as long as the following information is given: date, time gmt, band, station heard, station being worked, report at swl's QTH. Points may be only claimed for stations actually heard, and the callsign must be shown in full.

If points are claimed for both stations the callsign of each must appear in the 'station' heard column.
10. Entries should be sent to the contest manager, Mr Owen Cross, at the above address, to arrive **not later** than 3 November 1980.
11. Certificates of merit will be awarded at the discretion of the Board of the Cray Valley RS, and its decision will be final.

RSGB SLOW MORSE PRACTICE TRANSMISSIONS

Alterations and additions to this list should be sent to the organizer, Mr M. A. C. MacBrayne, G3KGU, 25 Purlieu Way, Theydon Bois, Essex.

Clock time	Callsign	MHz	Mode	Town
Sundays				
0900††	G3WNR	1·975	A1/A3J	South Shields, T & W
0915††	G3LEQ	144·225 145·250 slant polarized to west-north-west 1·950 29·250	A1/A3J F2/F3 A2/A3 F2/F3	Knutsford, Cheshire
1015	G3CGD	1·875	A1/A3	Cheltenham, Glos
1030	G3OHM/A	144·180	A1/A3J	Birmingham
1100	G2FXA	1·910	A1/A3/A3J	Stockton-on-Tees
1100	G3XJJ	3·535	A1/A3J	Northampton
1130	G3BLS	145·375*	F2	Osney, Oxford
1200	G3HVI	144·750*	A2/A3	Stoke-on-Trent, Staffs
1800††	G3WNR	144·725*	F2/F3	South Shields, T & W
1815††	G3LEQ	144·250 145·250 slant polarized to west-north-west 1·950	A1/A3J F2/F3 A2/A3	Knutsford, Cheshire
1830	GM4HIG	3·550 145·550*	A1/A3J F2/F3	Aberdeen
1900	GW3WSU GW4GSH	145·250*	F2	Barry, S Glam
1930	G3LDW	144·160*	A1/A3J	Halesowen
2100	G4EWK	144·850 to south-west	F2	Burton-on-Trent, Staffs
Mondays				
1045	G3RAF	3·550 144·025*	A2 A2	Locking, Avon
1300	G3VHE	3·525	A1	Swindon, Wilts
1330	G3VHE	145·350*	F2	Swindon, Wilts
1830	G3ZQS G4CGT	1·930 145·525	A1/A3J (usb) F2	Darwen, Lancs
1830	GM4HIG	144·250 horizontal to south-west	A1/A3J	Aberdeen
1900	G3VHE	145·350*	F2	Swindon, Wilts
1900	G3ZRZ	1·975	A1/A3	Blackpool, Lancs
1900	G3GWI	145·475	F2/F3	York
1930	G3RAF	3·550 144·025*	A2 A2	Locking, Avon
1930	GI3SXG	144·100	A1/A3J	Newtownards, Co Down
2030	G3ASR	1·875 144·175* vertical	A1/A3J A1/A3J (lsb)	Harrow, Middlesex
Tuesdays				
1045	G3RAF	3·550 144·025*	A2 A2	Locking, Avon
1830	G4CWN	144·100	A1/A3J	Stoke-on-Trent, Staffs
1830	G3ZQS G4CGT	1·930 145·525	A1/A3J (usb) F2	Darwen, Lancs
1900	G4RS	3·565 145·525*	A1/A3J F2/F3	Catterick, N Yorks
1930	G3RAF	3·550 144·025*	A2 A2	Locking, Avon
1930	G3ZYY	145·550 vertical to east	F2/F3	Saltash, Cornwall
2030	G3IRM	1·975	A1/A3	Bury St Edmunds, Suffolk
2030	G4FFC	144·390 horizontal to south	A1/A3J	Pertenhall, Beds
2030	G3OHM/A	144·180	A1/A3J	Birmingham
2030	G3KGU	1·915	A1/A3	Theydon Bois, Essex
2100	G4EWK	144·850 to south-west	F2	Burton-on-Trent, Staffs
2200	G3AWL	144·110 to south	A1/A3J	Easington, Co Durham
Wednesdays				
1045	G3RAF	3·550 144·025*	A2 A2	Locking, Avon
1830	G3ZQS G4CGT	1·930 145·525	A1/A3J (usb) F2	Darwen, Lancs
1900	GW3WSU GW4GSH	145·250*	F2	Barry, S Glam
1900	G2ABC	145·250	F2/F3	Truro, Cornwall
1900	G3ULY G4EXD	1·960 145·475*	A1/A3J F2/F3	Culgaith, Cumbria
1930	G3RAF	3·550 144·025*	A2 A2	Locking, Avon
1930	G3ZYY	145·550 vertical to east	F2/F3	Saltash, Cornwall
2000	G3SWP	144·180*	A2/A3J	Doncaster, S Yorks
2015	G3WVJ	1·845	A1/A3	Staines, Middlesex
2100	G3HVI	144·750*	A2/A3	Stoke-on-Trent, Staffs

Clock time	Callsign	MHz	Mode	Town
Thursdays				
1045	G3RAF	3·550 144·025*	A2 A2	Locking, Avon
1830	G3ZQS G4CGT	1·930 145·525	A1/A3J (usb) F2	Darwen, Lancs
1900	G4BNA	3·590	A1	Swindon, Wilts
1900	G3BLS	145·375*	F2	Osney, Oxford
1900	G3ZRZ	1·975	A1/A3	Blackpool, Lancs
1900	G4RS	3·565 145·525*	A1/A3J F2/F3	Catterick, N Yorks
1930	G3RAF	3·550 144·025*	A2 A2	Locking, Avon
1930	G3ZYY	145·550 vertical to east	F2/F3	Saltash, Cornwall
1930†	G3ASR	1·875 144·175* vertical	A1/A3J A1/A3J (lsb)	Harrow, Middlesex
2000	G2ACZ	1·808	A1	Mablethorpe, Lincs
2100	G4EWK	144·850 to south-west	F2	Burton-on-Trent, Staffs
Fridays				
1045	G3RAF	3·550 144·025*	A2 A2	Locking, Avon
1830	G4CRI	3·525	A1	Helston, Cornwall
1830	G3ZQS G4CGT	1·930 145·525	A1/A3J (usb) F2	Darwen, Lancs
2000	G3WQK	144·750	F2	Hailsham, Sussex
2200	G3AWL	144·110 to south	A1/A3J	Easington, Co Durham
Saturdays				
0915††	G3LEQ	144·250 145·250 slant polarized to west-north-west 1·950	A1/A3J F2/F3 A2/A3	Knutsford, Cheshire
1045	G3RAF	3·550 144·025*	A2 A2	Locking, Avon

* Omni-directional
†First and third Thursday in each month
††Restarting in September

Special event stations

GB4TCF, 23–25 August
The station will be operating from the Town and Country Festival at the National Agricultural Centre, Stoneleigh, Warks. It will be in operation from 1800gmt 22 August until 1700gmt 25 August, on 7, 14, 21 and 144MHz, in all modes, including rtty. Visitors to the station—to be housed in the Royal Pavilion—are welcome. Details from G4GEE, QTHR.

GB2FOL, 5–7 September
The Camping Club of Great Britain & Ireland Amateur Radio Group will be operating a station at the club's National Feast of Lanterns, to be held at the East of England Showground, Peterborough. Schedules with campers are especially welcome. Details from GM4HHY, QTHR.

GB2BB, 12–14 September
The station is to commemorate the 40th anniversary of the Battle of Britain. It will be operated from Mitchell Junior School, Southend Road, Hornchurch, Essex, named after the designer of the Spitfire and the old site of Hornchurch aerodrome. Details from P. Herring, G4FQF, QTHR.

GB2HFA, 26–28 September
The station will operate from the Hobbies For All exhibition, in the Memorial Hall, Cleethorpes. Details from R. J. Scarlett, G4HZF, QTHR.

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 £1 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: **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

FTDX560, fitted blower, spare set valves, KW E-ZeeMatch speech processor, power pack, 9V SEM pre-amp, PM2000 wattmeter, two spkrs, desk mic, Yaesu filter, £375. G4DGH, QTHR.

Joystick antenna, ideal QRP or flat dweller, c/w 3A atu, tunes 10-160m, £28. Tandberg semi-pro reel-to-reel 1/2 tr mono three-speed all metal deck, teak cabinet, £48. G8VMN. Tel Burnham, Bucks (062 86) 4769.

IC215, R0-9, S0, S20, S22, S24, orig packing etc, £110. B128 tx/rx, 2-8MHz, 12V psu, circuits, spare valves, xtals, £15. G3JPX, QTHR. Tel Canvey Island 63004.

Liner 2, pre-amp, modified mic, £95. FT202R, spkr/mic, R3, R5-6, nicads, £110. Tonna 16-el (fixed), as new, £28. Buyers collect. G8CQH, QTHR. Tel 021-444 2327, evenings.

Slim Jim, as new, £9. QM70 144/28, as new, £9. D. Mathews. S.W. London. Tel 01-876 7868.

NEC CQ110E tx/rx, 160 10m ssb, a.m. cw, etc. 160W o/p, mains/12V, built-in psus, digital readout, cw filter, fan, all comp, used little, mint cond, £485. Joystick type 'J', new, unused, £45. G4BKM, QTHR. Tel Denham (0895) 834358, evenings.

Marconi TF801D/1, Heathkit IB1103 counter, Dawe 440A audio oscillator, Philips N2225 cassette, Marconi TF791D deviation meter, Rigonda spkrs inc built-in amps, 19in mono three-station tv, most manuals. Highest offers secure. G8EZT, QTHR. Tel 749 2584.

FDK Multi 2700 2m multimode tx/rx, 10W, vgc, two years, £360 ono. G4JNX (exG8OCJ). Tel Great Yarmouth (0493) 750079.

FT221R with YC221 digital display, cw, 11 xtals, giving 44 channels, £415. G3BYY, QTHR. Tel Wraysbury 2007.

JV6PV4500, used little, portable video recorder, monochrome, camera, 9in Sony, batt/mains, monitor/rx, rechargeable battery, power unit/charger, 10 once only used tapes, rf converter, all leads, £550. P. S. Bush, 41 Waverley Road, Bristol BS6 6LT. Tel 0272-44688 or 43932, daytime.

Telford TC10 2m multimode tx, a.m./fm/ssb/cw, vfo, one xtal channel, operating instructions, mic, vgc, £75. G8JQQ, QTHR. Tel 0603 868712.

IC260E, Icom's latest all mode 2m rig, two months old, boxed, still under guarantee, owner going hf, nearest offer to £290. G4JQO, King's Lynn, Norfolk. Tel 0553 840401.

FT101Z, three months old, superb cond, hardly used, comp with fan, mic. First offer over £500 secures. Mosley TD3Jr trap dipole £20. Reason for sale—going QRT from base stn. Buyer collects. G4IWA, G8LFP, QTHR.

Drake T4XC, R4C, ac, dc power supplies, extra filters, xtals incl ship WWV, Eteki frequency counter, MS4 spkr, spare unused driver finals, Drake W4 wattmeter, all manuals, fine cond, no mods, £525 only. G3ZTM, QTHR. Tel Walton on Thames 21731.

KW2000B, matching ac psu, exc cond, £190. Carr extra. G4HUX, 7 Fontburn Road, Seaton Delaval, Northumberland. Tel 0632 482798.

Icom IC240 metered power a/c pack, mag mount, 5/8 whip h/b ZL-Special portable beam, exc, £165. Approx 140ft aluminium tubing, various dia, 0·625-1·25, £20. 6KT66, boxed, £10. CR tube DG/7-5, £5. National Velvet Vernier dial, £4. G3AO, QTHR. Tel Chinley 50639.

ASR33 teletype, printer, keyboard, tape reader, punch, in one unit, 20mA current loop, ASCII operation, immac unmarked cond, 567 hours on clock, full service manuals, operator handbook, tapes, rolls, accessories, £450. G4FYY, QTHR. Tel Crawley (0293) 514788.

TR7500, MM432/144R transverter for 2m, 70cm fm, push button band change, matching two band mag mount antenna, £320. HT37 80-10m, two 6146, spare valves, exc cond, £90. 2m transverter, hb, for use with FT101, 40W, £40. Tel 0829 40518, evenings.

Free 40ft Versatower, with QTH detached bungalow, 3/4 bedrooms, 17ft lounge diner, kitchen, integral garage, separate bathroom, w/c, gardens front and rear, planning permission for 60ft tower, £27,500 ono. Hamilton, G4IAV, 329 North Road, Atherton, Manchester M29 0RF. Tel 0942 870954.

FT101E, spare pa valves, orig packing, good cond, £440 ono. R. Davis, G4IZG. Tel Worthing (0903) 41109.

FC301, matching atu/ant switch for FT301, new June 1979, immac, £75. Atlas DL300 oil filled dummy load, 300W, £5. Low-pass filter, 1·8-30MHz, £5. G4FYY, QTHR. Tel Crawley 514788.

FT101 Mk2 fan, cw filter, mic, G3LLL's rf processor, mod kit, ext spkr, audio/notch filter, spare pas, driver, £350 ono. FV101B, £55. Both immac cond. G4DJC, QTHR. Tel Witham (0376) 514845.

Icom IC22A, channels S18-S23, R3-R7, R0, R0RR, mobile mount, £125 ono. Liner 2 pre-amp, mobile mount, £90 ono. G3RVX, QTHR. Tel Bath (0225) 859195.

Going QRT, hf comp station, KW2000B rig, perfect cond, list of operational gear on appn profl, amateur 66 years sufficient for conclusion, offers 2m station considered, part exchange. G8IX, QTHR. Tel 0782 24941.

FT901DM all mode hf tx/rx, purchased May 1979, two year warranty, magnificent spec, incl built-in electronic keyer, processor, audio peak filter, variable i.f. bandwidth, rejection tuning, 180W input, new cond, in carton, accessories, £750. G4FYY. Tel Crawley (0293) 514788.

FT101 Mk2, 160-10, FV101 outboard vfo, £320. Might sell separately. Europa B 2m transverter, £60. KW2000 single 6146, £95. Icom 201 multimode 2m tx/rx, £230. Magnum 2m linear, QQV06/40A, £70. G3BOC, QTHR. Tel Nessciffe (0743 81) 392.

IC255E, Icom's latest fm tx/rx, one month old, £235 ono. Consider swop hf tx/rx, w.h.y? Tel David, 01-360 6659, evenings.

Yaesu FT7B, FP12, £375. Samson ETM3C keyer, £40. Datong rfc cupper, used little, £40. Eddystone 820 rx, £45. Hicks. G4DVP. Tel Binbrook (Lincs) 511, ext 338.

FT221RD, extras, £350. KW2000B, psu, £200. PF1 on RB6, three sets of nicads, £35. 7ERP printer, 6S6 tape reader, ST5 tu, £80. Burndept 365 on SU8, £50. W15U, RB10, RB4, SU8, 10 channel, extras, £120. G8PWT, QTHR. Tel Maidstone (Kent) 50095.

FDK700E, hardly used, £170. Solartron CT316 'scope, dc-6Hz, £40. 5/8 mag mount, £10. AM10D, on 145, rx needs attention, £15. G3VSN, QTHR. Tel 61306.

BC221J, battery operated, metal case, charts, £20 ono. G8FW, QTHR. Tel 0703 443622.

Joystick, Joymatch atu, brand new. G3BGJ, 36 Redhill Court, Bournemouth. Tel Bournemouth 518953.

KW202 rx, 160-10m, ssb, cw, a.m., Q multiplier, as standard, manual, £130. KW204 tx, 160-10m, 180W ssb, cw, a.m., new pa tubes, ptt mic, manual, £130. Both exc, the pair, £250. G4FJU, QTHR. Tel Walsall (0922) 31675.

Partridge joystick vfa, system J, 500W p.e.p., used indoors only for 3-4 hours, so nearly new, £40 or near offer. Tel Redcar 485355.

Mizuho SB2M handheld 2m ssb rig, unused, in makers' case, £100. Heathkit HW17, HW30, other odd items, offers? All property of the late G8CFN, Ashstead, Surrey. GW4ADL, QTHR. Tel Swansea (0792) 73289.

FT101, YD846 mic, £300. FL2100 to match, £300. Sell as set, £500 ono. G4JUX, The Bungalow, Mill Lane, Hebden, Skipton, Yorks.

Creed 7ERP 240V ac, base, cover, three extra paper rolls, unused since professional overhaul, first sensible offer secures. Could deliver locally. Tel Southampton 760178.

Set Pye PF1 Pocketfones, xtalled for SU8, fully aligned, comp with nicads, charger, circuit diagram, alignment details, £40, or exchange for AR40 rotator. G8POO, QTHR. Tel Stocksfield 3449.

Liner 2, fitted PA3 pre-amp, piptone, handbook, mic, £95. Heath IG102 rf sig gen, £18. Heath IM18U vvm manual, rf probe, £15. Heath metal locator, GD1190, Cointrack, nicads, charger, case, £80. G3MQY, QTHR. Tel Ringwood 4625.

TS700 2m multimode 12V/mains, good cond, £230. Eddystone 840C rx, gen cov, Joystick antenna, tuner, 2m MM converter, £50, the package. Ideal swl rig. G4HTM. Tel Basingstoke 23421.

Europa B 144MHz transverter, G3LLL nbfm units (rx and tx boards), spare QQV0640A, £85. Would split. MMV1296 23cm varactor tripler, as new, £24. New valves: QQV07-50, £8; QQV06-40A, £5. Collins uhf coaxial relay, £5. G3OHC, QTHR. Tel 021-308 2512.

Versatower P40, requires ground post, £150. FT101 80-10m pa, unused, £240. MMT432/28 transverter, £90. MMT432/28 converter, £14. Telequipment S32A 'scope, requires attention, £15. 70cm 8-over-8, £5. Parabeam, £10. 144MHz 10-el, £10. Various scaffold poles. 9 School Lane, Buckden, Huntingdon. Tel 811445.

KW Vespa Drake 2B rx, parent Q-multiplier, working manuals, £160 ono. Swan tx/rx, Cygnet, 10m, requires alignment, otherwise good cond, stn/mobile manual, £100 ono. BC221, charts, battery, £15. Suggest inspect/collect. *Wanted:* DC supply FT200. G3SGH. Tel Ashford (Kent) 21158.

Going hf only, Magnum 2m transverter, leads for '101, 200W input, nine months old, £80 ono. 16-el Tonna, nine months old, buyer collect, £25. Both for £90. G8JGK, QTHR. Tel Chelmsford (0245) 69034.

FT101, comp with mic, leads, used little, £300. G2AFR, NOT QTHR. Tel Bransgore 73553.

Yaesu FRDX400 rx, all bands, all modes, built-in 4+2m converter, Technical Associates preselector, both vgc, £170. Buyer inspects/collects. 136MHz (satellite band) converter, will despatch, £10. G8VFV. Tel Knottingley, W. Yorks (0977) 86735.

FDK Palm 2, remote mic conversion, all accessories, eight xtals, £85 ono. FDK Multi 700E, fitted PA2 pre-amp, very sensitive, £165 ono. Both three months old, as new, orig packing, mods by professional electronics engineer, G8UZJ. Tel Tewkesbury (0684) 293934.

Drake T4XC, R4C, AC4, MS4, comp set spare valves, £700. Mustang 3-el Yagi, £50. Mast, 45ft, rotator, £75. Vidicon colour camera, yokes with plate dichroics, £25. Buffham, G3TMA. Tel Norwich 712548.

KW Viceroy Mk3A, ssb, cw tx, recent overhaul at KW, new pa, £70. G4CLZ, QTHR. Tel 0226 763530.

TR2200GX, S19-23, R2-7, fully xtalled, nicads, charger, psu leads, carrying case, manual, £108. G4HXS, QTHR. Tel Crosshills (0535) 33726.

Trio TR7500 2m tx/rx, manual, maker's carton, perfect, £170. Europa 2m transverter, fitted with internal antenna relay, used little since pa valve replaced, £55. Carriage extra or buyer collects. G5BM, QTHR. Tel Newent 820960.

Amphenol coaxial switch, one input, two output, comp with three bnc plugs, new, £6.50. GPO type morse key, all brass, base, cover, immac, £16, plus postage. *Wanted:* antenna coupler type CU168, CU286, or Plessey PV14C. G3GUU, QTHR.

Yaesu FT223 2m rig, all frequencies xtalled, comp mic, magnet mount whip, high/low power, new QTH prevents use, very good rig, nearest offer to £150. Buyer arranges collection. GM3YTA, QTHR. Tel 041-772 8262, anytime.

Atlas 210X noise blanker, mobile mount, hb psu, £300. C. Baker, GM4GMR, 49 Blinkbonny Road, Falkirk, Stirlingshire.

Collins solid-state MP1 mobile power unit, mobile mount, 351D2, carrying case, CC2, offers invited. Three 4X150A, two used, one new, offers. Boxed Ham-M3, £100. R4C 1·5 filter, 10 and 160, xtals, £25. Comdel processor, as new, £25. G4DAM, QTHR.

FTDX560, vgc, recent Amateur Communications overhaul, still carries guarantee, comp Shure 201 mic, good supply spare valves, finals, buyer collects, or Securicor, hardback handbook, demo arranged, nearest offer to £250. Tel 041-772 8262, or contact 3·7MHz, Dads' Army net, 2300bst.

HQ170A amateur band rx, £110. Superb rx, orig manual, cowlgill, mast, rotator, motor, new, unused, £30. EC10 Mk2, internal mains psu, 144MHz converter, in-built fm board, good cond, £95 ono. IC280E, mint cond, £215 ono. GW3YTL. Tel 0547 528030, evenings.

KW107 KW dummy load, Datong a.s.p. Dainty, 43 Copse Avenue, West Wickham, Kent. Tel 01-777 2340

FT227RA, fitted with 25kHz/5kHz scanner, four memories, full remote control, boxed, as new, £200. G4JLU. Tel Dave, 01-349 1122, days, 01-954 6728, evenings.

FL 200 ssb tx, £70. Lafayette Starflight tx, transistor keying and break-in fitted, 90W cw, matching vfo, £30. Lafayette Precon hf bands converter, £8. Manuals with all items. Prefer buyer collects. *Wanted:* Early (pre-1930) mags and gear. G3SSJ, QTHR.

Minibeam model B24 (similar to the G4MH version) for 10, 15, 20m. Buyer collects, £30. G3XPV, QTHR. Tel Brentwood (0277) 217294.

FT101, exc cond, desk mic, £350. KW2000B, desk mic, spare valves, £200. KW EZee-Match, £20. Marconi TF144G sig gen, £15. BC221 internal psu, £25. SWR/pwr meter, new, £10. *Wanted:* Urgently, BC312, BC342, FRG7. G4IXY. Tel Garston (Herts) 70115.

Pair 4CX250BM, uhf bases, chimneys, eht transformer for linear amp; Datong rf clipper; Shure 201 mic; Practika LTL camera, exchange for best offer of 144MHz fm rig or w.h.y.? GW4CZK, QTHR. Tel 0248 722352.

Yaesu FT101E tx/rx, first-class cond, owner converted to solid-state, £375. Delivered Securicor. GD3KHE, QTHR. Tel (IOM) 0624 6636.

Icom IC245, homebrew keypad, eight hours use, only £280. Yaesu FT202, fully xtalled, nicads, mint cond, £75. ITT Starphone uhf portable, RB14, SU8, three channel, spare batts, £85. G8SDC. 175 Spies Lane, Halesowen, West Midlands.

Jaybeam 14-el 2m long Yagi, £18. Buyer collect. Ryall, Drayton Lodge, Vicarage Lane, Dunston, Stafford. Tel Penkridge 4606.

Electrolytics, suitable high voltage power pack, eight 50 + 50μF 500V dc tubular L100mm overall 035mm, insulated, as new, 90p each or £6 the lot. G3HKH. Tel Weybridge 47112.

Pye Cambridge AM10B, all fm mods, front panel, digital channel readout, etc, fitted xtals S0, R4, S20-23, £45. G4AQB, QTHR. Tel Bolton 389033.

Racal RA17 rx in louvred case, £150. Eddystone 888 type case, front, £5. Eddystone 898 dial, £5. Wee megger in leather case, £10. All ono, good cond, prefer buyer collects, otherwise carriage extra. G3WWL, QTHR. Tel 021-353 8874.

Property of the late GW3INO: beam rotator, class D wavemeter, KW swr meter, KW EZee-Match, Heathkit, rx SB303, Vespa tx (KW), Hammerlund 170A rx (not wkg), handbook, quantity *RSGB Bulletins, Radio Communications,* Heathkit vvr, V7AU. GW3IMQ, QTHR.

Racal RA117E communications rx, rf select/protect unit, ssb adaptor, vlf converter, Racal table cabinet for rx, Racal rack cabinet for extras, exc cond, manuals, some orig packing, offers around £500. Darkroom equipment. G8LQL. Tel Goosnargh 372, evenings.

Datong up converter, £95. G-whip multimobile, 10/80, base, £18. Class-D wavemeter, £5. Morse records, £5. G8JKN, 42 Lindsey Crescent, Kenilworth, Warwickshire CV8 1FL. Tel Kenilworth 55211.

Yaesu FT7 hf tx/rx, all 10m xtals, Yaesu matching linear FL110, both four months old, in perfect cond, £385. G3KLF. Tel Fareham 236906.

HT37 80-10m ssb/cw/a.m. tx, 2X6146 pa, exc cond, £90. Transverters: MMT144/28, eight months old, £70; MMT432/28s, £90. Tel 0829 40518, evenings.

Standard 828M 2m tx/rx, orig packing, handbook, £115. Europa B 2m transverter, updated by SEM, handbook, £65. Holdings tx/rx nbfm converter for FT101B, £30. G3UIE, QTHR. Tel 04895 2108, after 5pm.

50ft UR67 cable, £7 ono. Jaybeam 5XY/2M, £10 ono. 2m ground plane, £2. 90ft tv coaxial cable, £5. Other items available. VHF front end i.f., 28MHz, £5. Brown, 165 Canterbury Road, Morden, Surrey. Tel 01-648 0028, after 6pm and w/ends.

Trio 2200GX, S20-23, S18, S0, R4, R6-7, RR7, nicads, charger, case, etc, £95. G8LYC, QTHR. Tel 01-658 6644.

FT221R, D suffix, h/book, dc leads, etc, £275. Trio 2300, nicads, mains psu, VB2200GY, £180. Creed 7E, ST1 tu, £30. HRO rx, psu, gc coils, spares, £20. Buyers must collect before 15 August. G8EHU, QTHR. Tel 0283 790454.

T1510S 2m fm mobile/portable frequency synthesized tx/rx, 12/1wt, nicads, helical ant, £160. 1/2 wave 2m antenna, magnetic base, £10. G4AWL, QTHR. Tel Cosham 373503.

KP202 charger, S20, S22, R5-7, £70. Storno 6CHA, S20, S22, R5, R7, £35. GEC xtal activity meter, £10. Airmech vhf wave analyzer, £15. Storno high band base, £8. Marconi 1073A, 75Ω, £15. Ferrograph recorder, £50. G8BIH. Tel Alton 82739.

QTH: superb family house, completely modernized, five bedrooms, fitted wardrobes, two reception, kitchen/dining (28 × 12), bath, shower, gas central heating, extensively pine-panelled, large garden, 8min station, city, shops, very co-operative neighbours, £38,500. G5DCS. Tel Worcester 20040.

FT501/FP501 ssb digital tx/rx, 10 80m, 500W p.e.p., etc, ex-con, £395. BC221 com charts, mains p/supply, £18. ZL Special 2m beam, 12-el, £15. 2m 8-el quad elements, only £5. G3JNY, QTHR. Tel Leeds 863058.

YO100 monitor scope, mint, £65. FT2FB 2m mobile, £65. 14-el Parabeam, 2m, £12. BC221 calibration book, £15. G3LBG, QTHR. Tel 0702 521561.

Xitex morse tx/rx MRS100, self-contained single chip microcomputer, ASCII or Baudot capability, variety of interfaces accommodated, automatic cr/lf in copy mode, sending rate of 1/150wpm set from keyboard, complete manual, £130 post paid. G3RDG, QTHR. Tel 01-455 8831.

QRT Sale: FTDX401, vgc, new pa, FV400 vfo, £250. New Europa C 2m transverter, £80. IC215, 14 channels, nicads, charger, helical, £150. Dual band 2-el Moseley beam, £40. 8XY, 2m, £15. All ono. Tel 0203 310299.

FT101EE, SP101, mint cond, manual, leads, etc, three matched pairs, pa, driver valves, £400. FT202R 2m handheld tx/rx, nicads, charger unit, 19/23 xtal channels, still under guarantee, ext spkr/mic, mint cond, £110. KLM 2m linear amp, 80W out, mint cond, £65. Hy-Gain 18AVT/WB 80 to 10m, unused vert ant, mint, comp with 10ft copper earth rod, £55. Carriage extra on all items. G4GQH, QTHR. Tel Bournemouth (0202) 522796.

FT221RD, £310 ono. FT227R autoscan, rev rptr, etc, £175. Both as new. PF1 on RB2, nicads, charger, £25. MM hf pre-amp, £10. Multichannel uhf Starphone, £65. G3NPZ, QTHR. Tel Fareham (0329) 283736.

FT101E, FV101B, SP101, cw filter, mic, leads, manual, spare valves, £500. TR2300, nicads, charger, mic, manual, 10W pa, 5/8 whip, mint cond, £155, no offers. Stereo hi-fi Rotel RX402, SP25/2, Shure M447, £100. Buyers collect. G4EYZ, QTHR.

Equipment deceased amateur: FT101B, FV101 vfo, SP101 spkr, Datong rf speech clipper. Asahi swr meter, SEM Z-Match, Heathkit gdo, Redifon vhf tx/rx, 2m 10XY Yagi, 5-el 2m quad, Marconi test gear—universal bridge, oscillator TF1370A, TF2600 voltmeter. G3KQJ, QTHR. Tel 0902 893037.

Telford TC7 Mk2 rx, 2m, 70cm converters, £40. 2m a.m. Cambridge, fm detector kit, £30. CT53 sig gen, 8·9MHz–300MHz, £15. CT527 rf voltmeter, £15. Solatron VF252 ac millivoltmeter, £10. G8IWY. Tel 01-743 1523, work, 01-863 0757, home.

HQ1, brand new, £75. 2m 5-over-5, £8. 8-over-8, £13. Ringo Ranger, £12. Variac 2kW, £15. Osker SWR200, £15. Astatic pre-amplified base station mic, volume, tone, £20. Lavoie uhf precision frequency meter, 375–725MHz, £10. Tel Godalming (Surrey) 29757, evenings.

FRG7000, digital, as new, £290. Telequipment D75 50MHz db scope, £400. Keithley 168 digital multi-meter, 0·1 per cent perfect, £85. MK Blue Line 2000 rx, terminal unit, as new, £56. MM prescaler, £15. G8DFZ, QTHR. Tel 0943 3083, all day, night.

Sony AV3620CE, b and w, reel-to-reel video tape recorder. 2hrs of ½in high density tape, includes uhf modulator, £220 ono. L. Hughes. Tel Basildon 284601, weekdays, Gt Dunmow 810677, weekends.

G-whips, 10–80m, chrome swivel ball-type basemount, all new, unused, list £47, £32. G2KF, QTHR. Tel 072-681 2337.

Lunar linear amp model HF3 100L2, 1·8–30MHz, 200W p.e.p., solid-state, under 15min use, as new, perfect, £100. Pye Cambridge AM10B, R6, S20–24, fully comp mic, spkr, cables, carrier, perfect, £70. MFJ antenna tuner model 160–10, mobile or base, £25. G4GDM, QTHR. Tel Wirral (051-334) 1819.

FDK Quartz 16, matching psu, Jaybeam colinear, co-axial, mobile safety mic, 5/8 mobile whip, connecting leads, all in good cond, comp 2m base, mobile station, £200 the lot. G3WRO, QTHR. Tel Harlow 30609.

FT201 hf 260W, ac/dc supplies in-built, all accessories, orig packing, matching rf speech processor, new spare pa/driver valves, vgc, £365 ono. EC10/2, batt/mains packs, handbook, vgc, £125 ono. Misc components, sae enquiries. *Wanted:* R1000, FT707. Lockwood, G3XLL, QTHR. Tel Mellis 596.

Trio 7500 fm tx/rx, 80 channel, exc cond, maker's box, comp, £175. Trio 7010 ssb/cw tx/rx, coverage 144·100kHz–144·335kHz, orig packing, comp, £90. G8PEW, QTHR. Tel 0493 67980.

Clearing shack: Solartron 'scope BC221AK, etc, other items all cheap for callers, sae list. G3GAD, QTHR.

Heathkit GD1U gdo, £12. 2m converter, BF256, 4–2MHz i.f., £10. TW communicator, 2m, £12. 70cm 46-el multibeam, £8. 4m a.m. Vanguard tx, £5. Magazines: *Ham Radio, Elektor, VHF Communications, Radio Communication, New Scientist,* all buyers collect. G3ZMD, QTHR. Tel Luton 24448.

Trio TS515 10–80 tx/rx, 2X6146 pa, exc cond, handbook, £250. G4DHK. Tel Bristol 553767.

FT101B, cw filter, ext spkr, mic, spare pa and driver valves, user manual, service manual, extender boards, ac/dc leads, £350. G4BGY, QTHR. Tel 01-777 9061.

Sommerkamp FL200B, FR100B, separates or tx/rx, £150. G3DCN, QTHR. Tel 0442 56196.

Decca radar masthead tx/rx unit, remote monitor screen, in wkg order but in need of a service, £400 ono. Buyer collects. GM4IZN. Tel 0542 31797.

Yaesu FT227R, 25/5kHz, scanner, 143–149MHz, reverse repeater, auto toneburst, £195 ono. Rigonda VL100M 5in b and w portable tv, £27. Sentinel 2m converter, 2–4MHz i.f., £10. *Wanted:* Pye Compact, Starphone or similar, working 70cm, handheld. G4JQP. Tel Radstock (0761) 34216.

TR2300 2m synthesized hand portable, as new, comp with orig packing, accessories, helical antenna, commercial 2A psu (worth £60), 5-el antenna, £160. Will deliver up to 50 miles. G8MYX, QTHR. Tel 0993 841305.

Standard 828M 12 channel 2m mobile tx/rx, xtalled on S0, S20–23, S13, R3–7, toneburst, mobile mount, ls/mic, manual, wkg perfectly, £125. G3KLF. Tel Fareham 236906.

IC2E Icom handheld, boxed, as new, used only for holiday, £139. Trio TR7500, mobile mount, exc cond, one year old, £170. G8TCV. Tel Stroud 78432.

TS700G, six xtal channels, matching spkr, £350. Datong up-converter, with power pack, £90. Items used little, mint cond. Prefer buyer of tx/rx collects. Forster, 41 Marlborough Street, South Shields, Tyne & Wear.

Eddystone 750, exc cond, £65. Several PF1s, RB14, SU8, dual channel, £34. Pair Creed 75s, professional spec, 50/45 bauds, £100. FT2 auto, £110. FT2F, £80. G3LZN, QTHR.

FT901DM, new cond, £800. SB200, £150. SB610, £35. SB227R, £160. 18AVT/WB, £35. Buyer to collect. G4KG, 2 Sunbury Court Island, Lower Sunbury, Middx. Tel Sunbury 82267.

FDK2000 2m multimode, as new, orig packing, buyer collects, £210 ono. G8MXP, QTHR. Tel 0249-74 283, after 5pm weekdays, all day weekends.

Trio 9R59D rx, good cond, £45. Buyer collects. Tel Ashbourne (Derbys) 3702.

Trio 9R59DS gen cov rx, vgc, manual, Partridge Joystick, tuner, makes ideal comp rx station for beginner, £60. Cash and carry. Tel Stanford-le-Hope (Essex) 5057.

FT2FB 2m tx/rx, 12 channels, S19–23, R1, R5–7, auto t/b, pre-amp, manual, mic, mobile mount, £70. JR599 gs rx, 160–10m, 2m WWV, a.m., fm, ssb, cw, all filters, manual, vgc, SP5D spkr, £170. 2m handhelds. w.h.y.? G4GYO. QTHR. Tel 09274 21732. weekends.

Nascom 1 T4, buffer, 16K r.a.m. boards, psu, case, four-way motherboard, high speed cassette interface, front panel control of uart data, clock speed for instant c/o to rtty etc, £260. G8IZU, QTHR. Tel Kettering (0536) 3154.

KW2000A tx/rx, 160–10m, vgc, wkg order, comp with matching ac power unit, handbook, all circuit diagrams, matching dynamic mic included, £150, cash please. G3JFC, QTHR. Tel Crayford 522489.

MM144/28 transverter, £60. Parts, data for 100W 2m pa, solid-state, 12V, £35. Pair 10-el Parabeams, two-way power splitter, £30. 664BLX (BLW 78), 100W at 2m, 28V, with data, £7. Pair 587BLY, 80W at 2m, 28V, £7. BLY89C, 25W at 2m on 12V, 3W drive, £5. Paper caps: 15μF at 1,200V dc, £1; 4μF at 1kV, 70p; 1μF at 1·5kV, 50p. 20A mains variac, £12. All above plus carriage. G8MJD, QTHR. Tel 0532 674721.

Heathkit SB301 amateur bands rx, exc cond, nicely constructed, incl cw xtal filter, Heath spkr, £98. Stereocode processor (Jan '76 *Radio Communication*), very effective, £12. PW speech processor (Jan '80), £8. All quality items. G4GTU, QTHR, W Sussex. Tel Steve, Rustington 4123.

IC215 2m fm portable, vgc, auto toneburst, R0–7, S8, S32, S19–22, RR6, nicads, charger, case, manual, helical whip, mobile mount, £150 ono. G8SCV, QTHR. Tel Newmarket 4295.

Yaesu FT101E, £445. FV101B, £60. FL110, £110. Trio TS120V, £325. PS20, £35. Lunar HF3 linear/pre-amp, £110. All in immac cond, orig packing. Swan 350, dc power supply, £210. Hartley 13A d/b oscilloscope, £20. Buyers to collect. Cossor 1039, free to collector. G3XJN, QTHR. Tel Epsom (037 27) 21486, evenings.

Standard C8800 2m fm mobile/base station rig, used very little, in orig packing, £220. G3ZSQ, NOT QTHR. Tel 0274 587218.

KW2000B, power supply, manual, only £170. FT200, FP200, manual, £220. Mosley trap dipole TD3Jr, 10/15/20m, used for two months, £27. G4IBG. Tel 0273 731391.

FT202R six channel handheld, remote spkr/mic, NCI ac charger, mint, £115. 18AVT/WB, can be tested before removal, £54. Nikon FTN, motor drive, hard case, cost £505.93, bargain, £295. Amateur use only. G4IFO, QTHR. Tel Weybridge 48749.

Icom 210, fm, 2m, fully vfo, 1–12W output, 12V or mains, repeater, etc, good cond, £200 ono. G8EHS, QTHR. Tel 0473 212355 ext 225, day, or 0473 79537, evenings.

WANTED

Suitcase radios. American researcher purchases military radios built inside civilian style suitcases or other clandestine radios, any style or condition, working or otherwise, complete or incomplete. Send phone number in letter. Melton—Box 2037, Ogden, Utah, 84404, USA.

Buy or borrow circuit diagram or any information on Peto Scott monitor type TB1204. G3RWW, QTHR.

Coils, crystals, power supply for wartime B2 "suitcase set", original plugs, key, headset, etc. August 1969 *Radio Communication* to make up year for binding. G3UZI, QTHR.

2m transverter, must be secondhand, for 28m into 2m. G4FZS. M. Bulmer, Searchlight Workshop, Newhaven, Sussex.

Monitor scope, Trio or Yaesu preferred. G5HX, QTHR. Tel Coventry 412397.

RAF morse key type D, ref No 10A/7373. G3BGJ, 36 Redhill Court, Bournemouth. Tel Bournemouth 518953.

Eddystone telescopic antenna LP3126, mounting blocks for EC10. Valve 6CH6. G3NHM, QTHR. Tel 021-358 2841.

For the National Wireless Museum: old rx, tx, valves, testgear, spkrs, valve testers, radio books, leaflets, magazines, ccts, QSL cards, etc. Collection arranged. Please contact hon curator, G3KPO, QTHR. Tel Shanklin (098 386) 2586.

Buy or borrow service manual or circuits and layouts for Teac A7300 2T tape deck, will pay carr, etc. A. Hamm, G4EBI, 99 St James's Road, London SE16 4RA. Tel 01-231 0879.

A75 commuters, visitors and residents to support a 2m repeater near Wigtown, perhaps linking with GI, GD, GW. Please write to G8APX, QTHR.

Kokusai mechanical filter, MF455-15CK or scrap G2DAF tx or rx with Kokusai filter. G4JGG. Tel 0908 77613, after 5pm.
CR100 rx handbook or circuit, buy or borrow (will return within a week). G3UUQ, QTHR. Tel 01-643 6001.
£50 plus postage offered for VFO30G in good condition, unmodified and complete, with manual. G4JHL. Tel Patrick, Pershore 4241.
TA33Jr, 10-15-20m beam or something similar. AR40 rotator. A. R. Brammer, 220 Stone Road,Hanford, Stoke-on-Trent. Tel 659717.
Kokusai MF455-10CK filter, four 465kHz i.f. transformers, valve type Denco or Electronique. Three 6BA6 valves. GW8UH, QTHR. Tel 0222 25062.
12AVQ or similar three-band self-supporting vertical antenna. Armistead, GM8JMN, QTHR. Tel 031-445 1343.
Mechanical bug key, Vibroplex, etc. Any ex-Government type keys for collection. G3UTX. R. A. Ridley, 23 Greenacre, Worlebury, Weston-S-Mare, Avon.
HW8 or similar. G4HQH, 20 Swaddale Avenue, Chesterfield, Derbys S41 0SU.
Copy Trio TS515 operating manual, will buy or borrow for copying purposes. GM3AJY, QTHR.
Heathkit SB104A tx/rx. Heathkit HR1680 rx. SBA3012 400Hz xtal filter for HW101. Heath coaxial switch HD1234. G4GTU, QTHR. W Sussex. Tel Steve, Rustington 4123.
G-whip multi mobile, incl Extendarod and coils, except 160, good cond essential. G3WVW. Tel. 01-529 8550.

Mobile rallies calendar

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

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.
17 August—Preston Amateur Radio Society Mobile Rally. Walton-le-Dale County High School, Bamber Bridge, Preston (one mile from M6 Junction 29). Talk in on S22. Usual attractions including Bring-and-Buy stand. Doors open 11am. Details from G8SIV, QTHR.
24 August—Torbay ARS Rally. STC/ITT Social Club, Brixham Road, Paignton. Talk in on S22 and GB3TR (R2). Trade stands, bookstall, equipment stall, bar and refreshments. Raffles. Huge car park. 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 Mobile Rally. Telford New Town Centre Malls, Shropshire (exit 12, A5 off M6; A442 from N or S; M54 from W). 11am opening. Talk-in via GB3TRG on S22, 144MHz ssb, SU8/SU20. Over 40 stands plus flea market. Usual attractions, including free coach service to the Ironbridge Gorge Museum nearby. Full catering and licensed premises on site. Unlimited parking. Further details from G8DIR, tel Shrewsbury 64273, G8UGL, tel Telford 584173 or G3UKV, tel Telford 55416. All QTHR.
14 September—Bucket and Spade Party, The Regency Hall, Saundersfoot, commencing at 11am. Talk-in will be on S22, R7 and RB4. Refreshments will be available, including a licensed bar. Further details from GW3XJQ, tel Carew (06467) 610.
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.

Looking ahead

13 September—Scottish Amateur Radio Convention. Organized by West of Scotland Amateur Radio Society. Details from Ian McGarvie, GM4JDU, 3 Kelso Avenue, Paisley PA2 9JE.
14 September—Isle of Wight get-together, Alverstone Manor, Shanklin. Details from G3KPO, QTHR, tel 098 386 2586.
28 September—Welsh Amateur Radio Convention, Oakdale Community College, Blackwood, Gwent. Details from GW3KYA, QTHR.
18-19 October—Jamboree on the Air.
6-8 November—Amateur Radio Retailers Association National Amateur Radio Exhibition, Granby Halls, Leicester. **(NOTE DATE CHANGE.)**
6 December—RSGB AGM, IEE, Savoy Place, London.

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IC-2E, really the smallest hand-held around, so the photo next to the pack of cigarettes is not "just for a lark"! Simplex and duplex operation over the full range 144–146MHz in 5kc steps, built-in tone-burst, and giving a full 1·5W out from its 9V battery.

£159 inc VAT

IC-251E, a really up-to-the minute replacement for the IC-211E, incorporating all the latest technology, making it the finest VHF base station at its price. Microprocessor control on multi-mode operation providing FM, USB, LSB, CW coverage in the 144–146MHz range. Scanning facility allowing memory scan and programme scan between predetermined channels. Two VFO's can be used independently or will track. Seven-digit frequency readout down to 100Hz.

IC-251E £479 inc VAT

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SWR200B swr/power meter covering 3-200MHz 50/75 Ohm power range 3-30MHz, 20/200/2kW, VHF 2/20/200W **£34.95** plus VAT. P&P £1.00.

SWR300 swr/power meter 3-30MHz (2m and 70cm with adaptors) power range 20/200/2kW with SPC-2B 20/200W at 2m with SPC07A 2/20W at 70cm. Respective prices **£39.95, £14.95, £18.95** plus VAT. P&P £1.00.

SWRVVV meter body only, covers 144/432MHz with adaptors SPC-2B and SPC 07A, **£19.95** plus VAT. P&P £1.00. Adaptors as SWR300.

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HK707 Straight Up/Down keyer	**£8.75**
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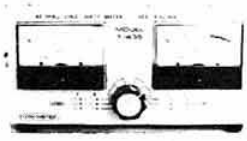
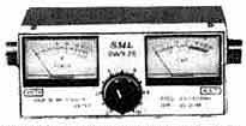
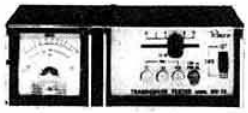


T-435: VHF/UHF swr and power meter with 2/20/120 watt through line power measurement **£29.95** plus VAT. P&P 75p.



SWR25: This ever-popular twin SWR and Power meter covers 3-5-150MHz at **£11.00** plus VAT. P&P 50p.



UH74 SWR & power meter switchable HF, 2m & 432MHz with remote head at **£14.25** + VAT and 50p P&P.

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2m with BNC	**£3.85** each
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2m for IC215, Trio 2200 Gx, standard C146A	**£3.50**

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CT-1 Coax Toggle 3 SO239's **£5.95** plus VAT. P&P 25p.
CT-2 Coax Toggle 2 SO239's 1 PL259 **£5.95** plus VAT. P&P 25p.

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As EK-150 but with four memories each capable of storing 256 bits making a total of 1,024 bits. This can be recalled separately or in sequence for one long message. **£117.50** plus VAT. P&P £1.

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MMC 144 LO 2m convertor	**£21.00**

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The C8800 is a matching unit to the C7800 with the same features covering the 2m band in 5 or 25kHz steps (this is switchable from the rear panel). S20 and S22 are pre-programmed and available at a touch of a button, the unit has a 3 position RF gain to attenuate strong signals such as repeaters. Provision is made for two repeater offsets (600kHz is fitted as standard) at **£219.50** + VAT carriage free.

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This 10-channel scanner out-performs many of its rivals due to its highly sensitive front end and excellent filtering. A one channel 50Mw transmitter is incorporated that's ideal for local use. Controls include squelch, volume, autoscan and manual channel stepping. The unit comes complete with channels S20, R1, R2, R7, ni-cads, charger, helical antenna and wire antenna. Price **£69.95** + VAT carriage free.

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The **ALUMAST** is a 15" (375mm) wide triangular cross section lattice sectional aluminium mast based on a 10ft (3.05m) section length. It is supplied "knocked-down" in a tubular carton for ease of transport, but can easily be assembled needing no special tools or skills. The system includes top plate with bearing sleeve, rotor plate and a choice of a fixed base frame (FB-1) or one with hinge joints (HB-1) to enable the mast to be pivoted at ground level. Guy brackets are available for use at heights above 30ft.

- ★ Made from high strength corrosion resistant alloy using WESTERN'S EXCLUSIVE 'W' section leg extrusions.
- ★ Easy assembly using bolts and "Nyloc" locking nuts for security.
- ★ Free-standing to 30ft (9.15m) with a typical tri-bander plus VHF/UHF antennas.
- ★ Heights to 250ft (75m) with appropriate guy configurations (ask us for quotes).
- ★ Lightweight—only 25lb (11kg) per 10ft (3.05m) section.
- ★ 30ft (9.15m) mast is delivered in a tube only 10ft 6in (3.2m) long, 6in (0.126m) dia.

A COMPLETE 30ft (9.15m) MAST for **£240.35**
375/PSS/3; HB-1; RMP-1; TP-1

FULL PRICE LIST

375/PSS/3	30ft mast (3 sections)	£184.00
375/PSS/1	Additional 10ft section	£ 62.68
HB-1	Hinged base unit	£ 31.05
FB-1	Fixed base unit	£ 21.85
RMP-1	Rotor mounting plate	£ 12.08
TP-1	Top plate with sleeve	£ 13.23
GB-1	Guy brackets (set of 3)	£ 11.50

All prices include carriage and VAT at 15%

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A NEW ROTOR

A new rotor at a reasonable price for those lightweight VHF/UHF beams. Silent control box, robust construction, good value for money! Needs 5-wire control cable. Mast bracket included.

PRICE £29.95
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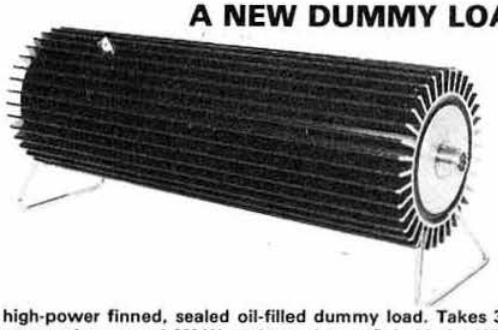

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Brief Specification

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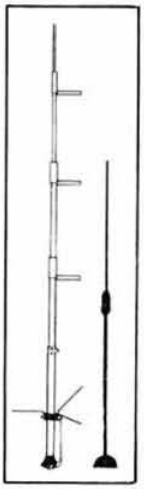
- Switched selectivity 0.4, 1.2, 1.8 and 2.4 KHz
- AC or 12V DC powered for base station or mobile/portable operation
- Built in VOX, speech processor and 25 KHz calibrator
- Power output 10 watts min SSB/CW/FM (Typical 15 watts) — 5 watts AM

LIST PRICE: Fitted 2.4 KHz filter £799.00 inc VAT
Fitted ALL filters £899.00 inc VAT

432 MHz Transverter (ordered with F850) £100.00 inc VAT



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KT872 — 7/8 Mobile Whip £10.10
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C43 — Cable Assembly and Plug £3.45
All above prices include VAT.

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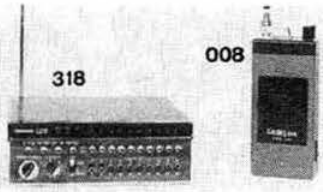

Pocket Model — 008 covers 8 Channels in 2m or marine bands. Lockout on all channels. Wide range of accessories supplied PRICE: £59.00 inc. VAT.

318 — Three Band Monitor — allows 20 Channels in 430-470 MHz, 140-175 MHz and 68-88 MHz ranges to be scanned in user programmable order. Mains or battery operation. Vehicle mount supplied. PRICE: £95.00 inc. VAT. Carriage extra on above prices.

Stock Crystals: S20, 21, 22, 23 — RO to 7 — SU 8 and 20 — RBO, 2, 4, 6, 10, 14 — MO, 6, 10, 16. PRICE: £3.00 each inc. VAT.

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A Solid State, all modes unit covering 1.7 to 38 MHz. Typical power output 130 Watts for 215 watts DC input and 4-7 watts drive (15 watts SSB). RF sensing VOX circuit. Switchable receive pre-amp. Supply requirements: 13.8V at 20A, Negative Earth. Size: 5"w x 7"l x 3"h Weight: 2.5 lbs

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2N4427	1	10	12	175	£0.92
2N3553	2·5	9	28	175	£1.02
2N5913	2	7	12	470	£1.40
SD1127	4	12	12	175	£2.1 (1)
2N6080	4	12	12	175	£4.1
SD1143	12	10	12	220	£6.00
2N6081	15	6·3	12	175	£6.50
2N6082	25	5·7	12	175	£7.50
2N6084	40	4·5	12	175	£11.00
RF2127	70	6·6	12	175	£21.00 (2)
SD1019-5	100	6+	28	175	£16.00
2N5590	10	5·2	13	175	£5.50
2N5591	25	4·4	13	175	£6.90
SD1428	45	6·5	12	175	£11.55 (2)
2N5944	2	9	12	470	£5.90
2N5945	4	8	12	470	£7.50
SD1135	5	7·5	12	470	£4.50
SD1136	10	5·5	12	470	£6.75
2N5946	10	6	12	470	£9.50
SD1088	25	6·8	12	470	£16.00 (2)
SD1089	40	4·3	12	470	£22.00 (2)
SD1434	45	5·0	12	470	£23.00 (2)

NOTE (1) G.Emit. IC202/215 P.A. (2) Controlled "Q" Type

Low noise semiconductors

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MUL BFR91 2·5dB N/F at 1·2GHz Pack	£3.00
Sig SD306 1·5dB N/F at 150MHz "D" MOS	£2.20
Sig SD201 4dB N/F at 1·2GHz "D" MOS sin/gate	£2.00
BFR34A 4dB N/F at 2GHz T Pack	£1.99
BFT66 Low intermod. for Preamp. Low noise	£2.25
3N204 2nd Generation MOSFET to replace 40673	£1.25
40673 RCA Low noise MOSFET	£0.80

BF900 Stripline VHF/UHF MOSFET. 2dB N/F 200MHz £1.35

SPRAGUE GOODMAN 500V MICA TRIMMERS Prof. Quality Grade 1 Low Loss Mica. Equiv. to ARCO. Capacities in Pf. 2·5-7 **70p**. 4-20 **75p**. 7-40 **75p**. 16-100 **85p**. 25-150 **95p**. 40-200 **£1.00**. USA Man.

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ANTENNA RELAYS. Mag. Dev. 951-170-12V 50Ω RG43 cable. Good VSWR to 1296 **£7.45**.

Hewlett Packard Diodes. 5082 Series. 2800 H.Car. **97p** 2835 H.Car **85p**. 3080 Pin **85p**.

ITT 10·7 Xtl Filters for 12·5kHz spacing 910Ω 25pf. **£6.00**
ITT Xtl Filter for 25kHz spacing 910Ω 25pf. **£7.00**

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Jackson Tetfer PTFE (UHF) 1·5-10pf Low Loss **28p**. Dau. PTFE film. 1·5-9pf 2-18pf all **24p**. Surplus 10mm 2·5-25pf 3 pin type **12p**.

FERRITES. Mullard. FX1115 Bead **5p**. FX1898 6 hole **11p**. FX2049 2 hole trans **10p**.

50Ω BNC COLINE. Plug RG43 **61p**. S/H Sock **60p**. Greenpar 50Ω 4 hole Sock **55p**.

CAPACITORS. All ceramic. Min types. Mul 1000pf 100V plate **5p**. 1500pf **5p**. Disc 500V 1000pf **5p**. 200pf **4p**. UHF Micadisc F/T 22pf **15p**. 1000pf solder F/T **9p**. 50pf **8p**.

TBA 120 Int cct F.M. amp disc **70p**.

MC12013p 500MHz ÷ 10 I/C with ttl O/P 5V with instructions for use. **£10.00**.

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Extra 10p postage over normal due to weight.

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Plas Br Rect 400V 2·5A **30p**. ZS276 600V 1·5A **8p**.

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PM2-25 Amp 3·03 in for 20+W 144MHz 13·8V 50 **£18.25**.

CPM modules as above but with RF changeover etc. add **£6.50** to above prices and prefix to read CPM.

PM70-4 Amp 0·4W for 4W 432MHz 13·8V 50 **£17**.

PM70-10 Amp 2·5W for 10W 432MHz 13·8V 50 **£17.50**.

PM70-10A Amp 1·6W for 10W 432MHz 13·8V 50 **£18.50**.

PA U2 432 preamp 13dB gain with N/F <2dB **£7.75**. Tested Prescaler board with input amp. Type 35mV 432MHz. 5V supply TTL O/P. Neg Earth. **£21.00**.

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Integrated circuits: 723 (TO5), **75p**; SN76660, **75p**; CD4001AE, **25p**; NE555, **55p**; 709 (TO5), **30p**; 741 (DIL 8), **30p**; 7410, **25p**; 7472, **25p**.

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★ We are pleased to announce that TORBAY ELECTRONIC COMPONENTS of 185 Higher Union St, Torquay (Tel: 211086) are now agents for Booth Holdings Bath and will stock and sell a range of ICOM equipment.

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rf technology from G4DGU

During May we ran into a delivery problem with one of our suppliers which resulted in us falling behind with deliveries of some of our products. Obviously we very much regret this and we extend our apologies to those people who waited so patiently.

We try very hard to learn from our mistakes. A result of this episode is that in future we will be attempting to hold our complete range in sufficient depth of stock to buffer forseeable manufacturing problems.

FT221/225 front-end board
Not only is this board now in use by top vhf-dx'ers and contest groups around the world—yes folks, people are interested in vhf-dx outside Western Europe—but we're starting to get interest from another group of vhf'ers altogether: the repeater builders! They have recognised that the excellent dynamic range properties can provide a 'no compromise' repeater front-end. If any bona-fide repeater group wishes to incorporate our board into their machine we'd be happy to explain the advantages.

Used for the purpose for which it was designed, it will provide significantly better all-round receiver performance than any other commercially available front-end known to us. **£53.87**

144MHz preamplifier
This preamp uses a noise-matched 3SK88 in a very carefully optimised circuit. Unlike many other 'competitive' devices we have included a proper bandpass filter with a nose bandwidth of around 2·5MHz and 50dB rejection at ±12MHz to minimise out of band strong signal problems. The use of an ultra-low noise mosfet allows the use of minimum front-end gain while maintaining the system nf at such a level that external noise limits the system sensitivity. An internal attenuator allows gain-setting, while facilities are also provided for masthead relay control.

As the proper use of preamplifiers is not altogether obvious, we've prepared an application note which is available on request.

If you have an application for an Ina in the 60-200MHz region, we can supply this amplifier retuned to your frequency upon request. Unboxed **£10.79**. Boxed **£17.72**

Microwave system components
We've been expanding this product group which is essentially an extension of our 1·3GHz transverter system. This month we are confining ourselves to a listing of those modules which are available ex-stock. Ask for our new Microwave System Component data sheet.

1·3GHz low noise amplifier	£22.72	2·3GHz low noise amplifier	£22.72
1·3GHz gain block	£11.15	2·3GHz gain block	£16.10
1·3GHz bandpass filter	£6.75	350-400MHz source	£18.25
1·3GHz 144MHz mixer-lo board	£22.60		

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A much better approach to stacking antennas than 'phasing harnesses'. Ask for our data sheet!

2-144N	£26.75	4-144N	£29.75
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Ben is also now producing a dipole/splashplate feed for 1·3GHz dishes. We've no details of price etc as we write but by the time you read this we should know.

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FT707

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★25kHz crystal calibrator feature
★Internal, xtal or external VFO control

FV707DM

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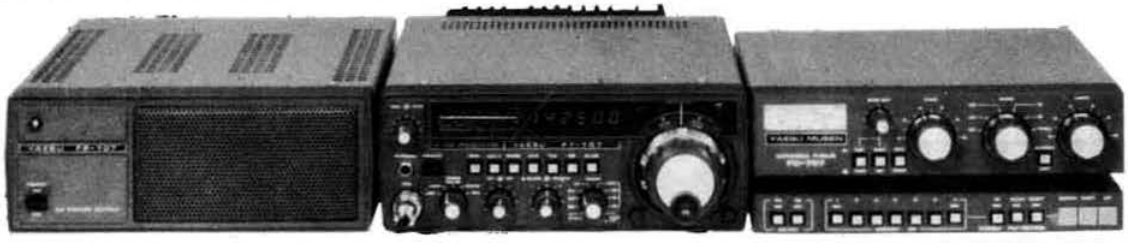

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