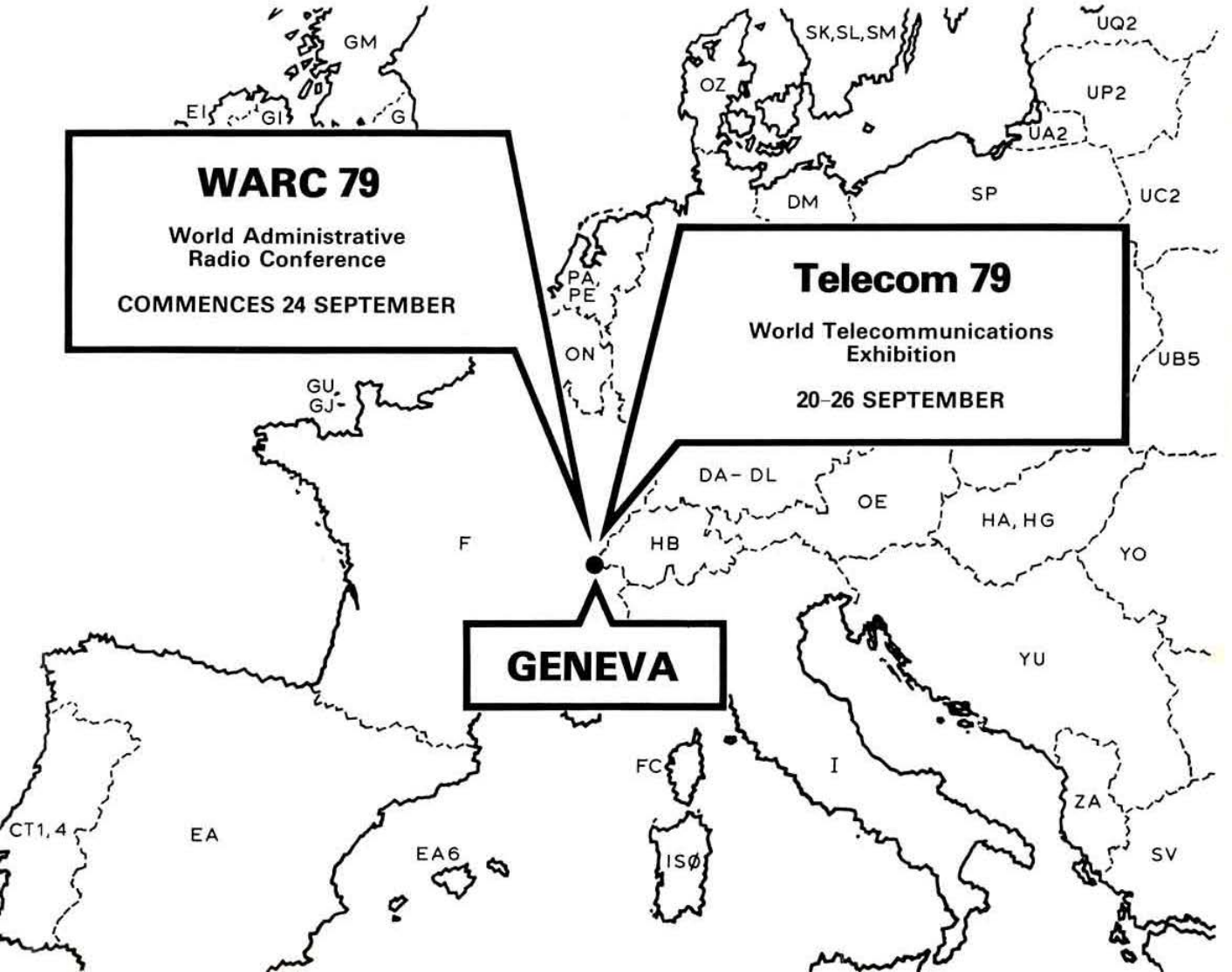
September 1979

radio communication

journal of the Radio Society of Great Britain

IT'S ALL HAPPENING IN GENEVA THIS MONTH



TRIO IN SOUTH LONDON
CATRONICS FOR TRIO
TRADE UP TO TRIO AT CATRONICS

TS180S
THE NEWEST HF TRANSCEIVER

TS180S Brief Specification

Frequency range:	160m to 10m Amateur Bands
Mode:	CW, USB, LSB, FSK
RF Input Power SSB:	200 watts PEP
CW:	160 watts DC
FSK:	100 watts DC
RX sensitivity:	10dB S/N at 0·25μV
Power requirements:	Max. 20A at 13·8V DC
Price:	**£712.00**
or	**£825** with dig. freq. cont.

THE CENTRE FOR

TR7500
WHY SETTLE FOR ANYTHING LESS?

TR7500 Brief Specification

Frequency range:	144–146MHz
Channel spacing:	25kHz (other spacings available)
Repeater shift:	+ or − 600kHz (1·6MHz available)
Power output:	Nominally 15–18W
RX sensitivity:	12dB SINAD for 0·2μV or less
Tone burst:	1750Hz tuning fork. Automatic in repeater mode
Price:	£240

Catronics

The message we are trying to say is that Catronics Ltd is an authorised Trio dealer with the full service and spares organisation backed by Lowe Electronics Ltd

COME TO

SECOND HAND EQUIPMENT

We always have a selection of used equipment in stock, currently as follows:

TR2200GX	£125
TR220G	£100
Swan 500	£310
Liner 2	£100
etc, etc.	

TS120S
MULTUM IN PARVO

TS120S Brief Specification

Frequency Range:	80m to 10m Amateur Bands
Mode:	CW, USB, LSB
RF Power output:	200W PEP
RX sensitivity:	10dB S/N at 0·25μV
Power requirements:	Max. 18A at 13·8V DC
Price:	£495

AMATEUR RADIO

TR2300
2m SYNTHESISER PORTABLE

TR2300 Brief Specification

Frequency range:	144–146MHz
Channel spacing:	25kHz
Repeater shift:	−600kHz (+600kHz option)
Power output:	Nominally 1 watt
RX sensitivity:	12dB SINAD for 0·2μV or less
Tone burst:	1750Hz tuning fork (Automatic)
Price:	£199.00 inc. charger

APPROVED TRIO DEALER

BARCLAYCARD VISA

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

Access

CATRONICS LTD, DEPT 909, COMMUNICATIONS HOUSE,
20 WALLINGTON SQUARE, WALLINGTON, SURREY SM6 8RG. Tel: 01-669 6700.
Shop/showroom open Monday–Friday: 9.00–5.30, closed for lunch: 12.45–1.45. Saturdays: 9.00–1.00.

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September 1979 **Volume 55 No9**

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LOWE ELECTRONICS Ltd

TRIO TS120V £408 inc. VAT

Measuring only 9½" × 3¾" × 9¼" – which is about the size of a packet of cornflakes, the TS120V can best be described as a miniature TS820. The rig covers all bands 80–10 metres – and all of 10 metres 28–30MHz so it's ideal for transverter driving, has digital readout built in, vox, break-in CW, RIT, noise blanker and the unique Trio passband tuning system used in the 820. The power output is 10W and a matching linear will be along shortly.

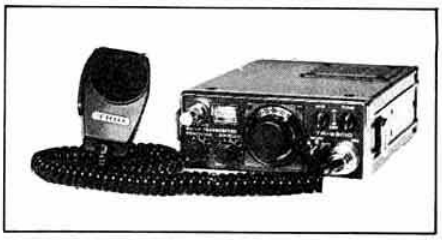
The TS120V is clearly a winner for mobile operation but is equally attractive at home and is perfect for the VHF/UHF enthusiast who requires a high performance I.F. system for his transverters.

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

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

OR MAYBE EVEN LOOK AT THE NEW TS120S WITH 200 W PEP TS120S £495; PS30 £98 inc. VAT

TS120V – TS120S THE SYSTEM APPROACH FROM TRIO



TRIO TR2300 £199 inc. VAT

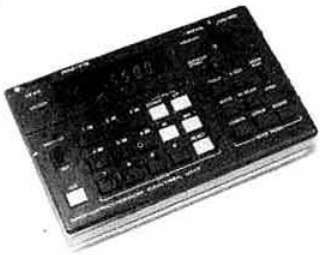
The TR2300 is a remarkable package which combines all the advantages of a portable station with those of a sophisticated mobile set. With the TR2300, you get full band coverage from 144–146MHz in fully synthesized 25kHz channels together with 600kHz repeater shift (and reverse repeater if required) with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

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

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

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

TR 7600



The TR7600 is the newest 2 metre FM transceiver from Trio and is equally at home in mobile or fixed station use. Using up to the minute techniques, the TR7600 offers full coverage of the 2 metre band in 5kHz steps together with a built-in memory channel, repeater shift, tone burst and the very best engineering in the business.

The transmitter uses a power module instead of the usual PA transistor and this removes the need for PA and driver alignment thus ensuring peak performance at all times. The receiver uses the latest devices in the front end and mixer stages together with a ceramic discriminator for better than ever performance.

The new RM76 microprocessor controller plugs into the back of the TR7600 and extends the transceiver facilities even further. Some of these facilities are:

1. Key in any frequency in the 2 metre band.
2. Call up a permanently programmed calling channel.
3. Scan the entire band in 5kHz steps with the option of finding a busy channel or a clear channel.
4. Set lower and upper scan limits, e.g. set to scan between 145·5 and 145·6 only.
5. Put up to six frequencies into memories.
6. Scan the memorised channels.
7. Use the last memory channel as a non-standard repeater shift, e.g. 1·6MHz.
8. Select + or – 600kHz repeater offsets.

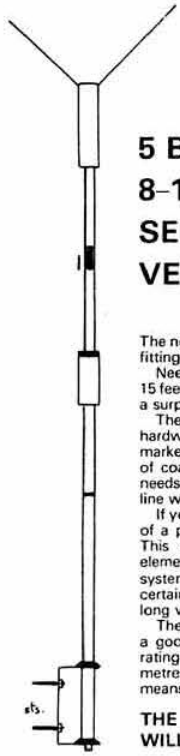
Clearly it's semiconductor magic at its best and makes a winning combination with the TR7600.

Final note – there is a high power version of the TR7600 having 25 Watts output – so naturally it's called the TR7625. Now for prices.

TR7600 – £247.25 TR7625 – £273.70 RM76 – £74.50

and as always, our prices include VAT at the current rate.

LOWE ELECTRONICS Ltd



HF5

5 BANDS
8–10 METRES
SELF-SUPPORTING
VERTICAL

The new HF5 vertical aerial is a real answer to the problem of fitting a five-band aerial in a small space.

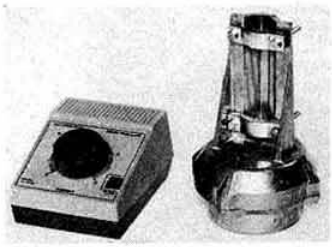
Needing only a metal ground post, and being only around 15 feet high, the Lowe HF5 gives you real DX performance at a surprisingly low cost.

The HF5 is made from strong alloy tubing with stainless hardware and unlike some other verticals currently on the market, gives a 50 ohm match at the base so that any length of coaxial feeder may be used. Beware the vertical which needs a critical feeder length, it's simply a disguise for a feed line with a high SWR.

If you need to mount the HF5 up at roof level or on the top of a pole, a matching five-band radial system is available. This system comprises a loading coil and alloy radial elements so as to reduce the space taken up by the aerial system. The cost of this radial kit is lower than the HF5 and certainly a lot more convenient than trying to stretch out long wire radials across the roof.

The HF5 system gives you coverage from 80 to 10 metres, a good 50 ohm feed impedance and a reasonable power rating of 200W on 80 and 40, rising to 500W on 20, 15 and 10 metres. Weight of the assembled aerial is around 3kg (which means that you can lift it with ease).

THE HF5, A WINNER ALL ROUND (IF YOU WILL EXCUSE THE PUN) £41.40 inc VAT



ROTATOR FU200

£40.39 inc VAT

The FU200 is a low-cost rotator designed expressly for the VHF/UHF enthusiast. Capable of turning most VHF/UHF aerial systems, the FU200 uses a fully automatic controller to allow "hands off" operation. The control knob is turned to the direction desired, the "operate" button is pressed and the rotator quickly and quietly takes up the new direction, automatically switching off when the chosen direction is reached.

The FU200 is housed in a rugged die-cast case and is supplied complete with upper and lower mast clamps and all fixing hardware.

Rugged, reliable and not expensive, the FU200 is the ideal rotator for the dedicated VHF/UHF operator.

FBB-9A 1·5–40MHz BALUN

The FBB-9A is a new 1:1 50 ohm balun designed for a wide variety of uses. Being fully waterproof and having a support eye at the top, the FBB-9A is ideal for use as a centre piece for dipoles. The unbalanced output is via a standard SO239 socket and will, therefore, carry the weight of feeder without problems.

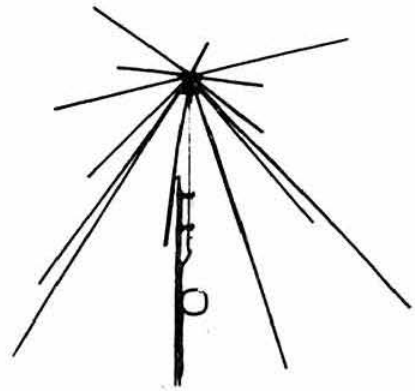
The balun is rated at 2·5kW pep and measures 4" × 2" overall.

FBB-9A £11.50 inc VAT

This page serves to remind you that, in addition to being the distributor for Trio, we also stock a comprehensive range of everything else for the amateur.

GDX-2

A NEW APROACH TO A *CLASSIC* DESIGN



The classic wideband antenna for VHF and UHF has always been the discone. This type of antenna has a gain of around 3dB, a frequency range of 10 to 1 and provides an easy match to coaxial feed lines. The problem has always been one of construction but the introduction of the GDX-2 solves the problem for you. The GDX-2 utilises alloy elements to form the classic discone shape without incurring excessive wind resistance. The frequency range covered is 50–480MHz with gain up to 3dB and vertical polarisation.

The advantages to the short wave listener are obvious; with a single aerial, he can cover not only the 4 metre, 2 metre and 70 centimetre bands but also the aircraft band 108–136MHz, business radio bands, the marine band 156–162MHz and so on.

The radio amateur or professional user can also use the GDX-2 since it is rated to handle up to 500 Watts PEP when used as a transmitting aerial.

The GDX-2 is supplied complete with a short stub mast, mast clamps and fixing screws and a waterproof screwed cap for the SO239 connector at the base of the stub mast. Construction is in hard alloy for the elements, with stainless screws and accessories.

The GDX-2 is a remarkable aerial and comes at a remarkably reasonable price for all its performance.

GDX-2 SPECIFICATION

Type	Discone	Polarisation	Vertical
Frequency Range	50–480MHz	Connector	SO239
Impedance	50 ohms	Weight	3kg
Gain	3dB	Length	1·9 Metres
Power Input	500W maximum	**GDX-2**	**£36.80 inc VAT**

SUNDRY GOODIES YOU CAN'T BE WITHOUT

		PRICE inc VAT £	P&P £
ME221	Station multimeter 20K/V	**16.49**	0.75
RA144	2 metre receiver preamp	**9.05**	0.15
P.S.U.	Regulated 13·5V dc 3·5 amp	**18.40**	1.00
P.S.U.	Regulated 13·5V dc 700 mA	**10.93**	0.75
FC-5M	5 digit 50MHz counter with I.F. offset.	**41.40**	0.30
FC6-A	250MHz counter. Switched gate time.	**66.70**	0.30
DX-008	Fully programmable counter for any rig	**115.00**	1.25
LCM-1	500MHz counter 240V/12V	**115.00**	1.25
Tool kit	Complete eight piece kit in case	**8.49**	0.75
Punch kit	Set of five chassis punches and reamer	**8.63**	0.75
Pearl catch	For picking up small nuts, etc.	**0.98**	0.15
Microphone clip	Screw fixing	**0.21**	0.15
Microphone clip	Self adhesive	**0.25**	0.15
Microphone clip	Magnetic	**0.31**	0.15

LOWE ELECTRONICS Ltd

AR240

FROM A. O. R.
FULL COVERAGE 144 148MHz
CHANNEL SPACING 5kHz
FULLY SYNTHESIZED
+600 and −600kHz SHIFTS
1750Hz TONEBURST
1½ WATT OUTPUT

SURELY THE MOST AMAZING HAND-HELD TRANSCEIVER YET!

The AR240 is a truly staggering rig. In a small hand-held unit, you have a fully synthesised 2 metre FM transceiver covering 144-148MHz in 5kHz steps. Frequency selection is by direct reading top mounted decade switches giving instant access to any frequency in the tuning range. Power output is over 1W and the receiver sensitivity is not only excellent, it's maintained across the full tuning range by automatic voltage controlled tracking. Both up and down 600kHz repeater shifts are built in as is a 1750Hz tone burst.

What more could you ask for in a hand held, except possibly a price of **£199** including VAT?

LS707

We happily present the only 70cm multi-mode transceiver available today. The LS707 is a high quality, high performance unit which covers 430-440 MHz in ten 1 MHz bands with full VFO control. All the desirable features are included; Vox; break in CW; calibrator; noise blanker; RIT; etc. together with true all mode FM, AM, USB, LSB and CW operation.

The LS707 is built using plug-in modules, and the quality of construction is of the best. Transmitter output is nominally ten watts and the receiver is GOOD. Fixed channel operation is available and the overall impression of the LS707 is that it will satisfy the most demanding user.

LS707 £535 inc. VAT. PSU—any 12V @ 3-4A will do.

Remember, if you have any questions about equipment or problems about amateur radio, we are always happy to help and we are only a phone call away. We have always believed in giving honest advice and help to anyone, and also in backing up our advice with unequalled service.

You should really come along to Matlock some time soon and inspect not only the complete Trio range, but also all the other items which we stock, from J Beams and Microwave Modules to humble plugs and sockets. We also normally have a good selection of guaranteed, tested secondhand equipment with extended warranty on much of the secondhand Trio gear.

Whilst you are visiting, you should take a quick peek into the service department run by the man with more equipment repair knowledge than anyone else in the country and backed by probably the best facilities.

We are open for business from Tuesday to Saturday inclusive—not Mondays, and from 9 am to 5.30 pm with no half days etc. As a special service to our customers, we also extend the telephone service until 9 pm in the evening so that if you wish to contact us, you can speak directly to either Alan, G3MME or myself, G3PCY, out of normal business hours. This facility is all part of the Lowe Electronics special approach.

Remember, when you buy a rig from us, you also buy the peace of mind which comes from the knowledge that you will always be looked after should you ever have any problems. You may get ten quid off by going elsewhere but that ten quid could be the most expensive discount you ever had should the rig go wrong!

HC1400 £230 inc. VAT

The HC1400 is a new powerful (30 watts) 2 metre FM transceiver for mobile/fixed station use, with a most comprehensive array of features. Using a TMS 1100 microcomputer to control all functions gives complete and easy operation of a complex transceiver.

Features include coverage from 144-148MHz in 5kHz steps; digital frequency readout of transmit and receive channels; selectable channel steps using either the all-electronic channel control or the optional remote control microphone; high power TX (30 watts plus); three memories for storing any frequencies within the tuning range for instant recall and also for programming repeater shifts of up to 4MHz wide.

Normal repeater and reverse repeater shifts are provided together with a fully automatic tone burst. It's too much to talk about in a short advertisement so why not call us and ask any questions. It's top quality, certainly; top value undoubtedly, at **£230** inc. VAT.

Remote frequency readout and remote control microphone available as options.

EMPORIUM NEWS

Well, the biggest news is that the Emporium is moving to new purpose-built premises designed by Derbyshire's answer to Le Corbusier, otherwise known as David G8GIY.

In order to continue with our legendary service to the customer, and in order to display the ever expanding product lines, we simply need much more room. The new showroom and workshop facilities will quite simply be the best in the country and naturally we shall be happy to greet you as a visitor. Nearer the opening day—about November—we shall be giving details of a few fiendish schemes to tempt you in, like a visitors free raffle with a first prize of a TS180S . . . More news later.

HEAD OFFICE AND SERVICE CENTRE

119 CAVENDISH 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

ICOM..... Simply the Best

There's not much more you can say!

It's over five years since we started to represent ICOM in the UK—and since then thousands of UK amateurs have bought it, tried it, and liked it. We are proud to represent Icom here and do our best to provide the back-up service which a product of this quality deserves. We have a service department to be proud of, with up to date (and expensive) test equipment, plus engineers whose job it is to know Icom equipment. If you can get over to see us, we will be pleased to demonstrate the range and let you operate our station (if you are licensed). If you find Kent too far away and would like to see before you buy then why not visit one of our agents and dealers scattered throughout the country.

AGENTS (PHONE FIRST—All evenings and weekends only, except Norfolk and Burnley)
Scotland—Jack GM8GEC (031-665 2420) **Wales**—Tony GW3FKO (0222 702982)
Burnley—(0282 38481) **Midlands**—Tony G8AVH (021-329 2305)
North West—Gordon G3LEQ (Knutsford (0565) 4040) **Yorkshire**—Peter G3TPX (022678 2517)

H.P. TERMS AVAILABLE
FOR ALL MAIL ORDERS AND SALES DURING BUSINESS HOURS
YOUR SOLE AUTHORISED UK IMPORTER FOR ICOM

BARCLAYCARD VISA

THANET ELECTRONICS

143 Reculver Road, Beltinge, Herne Bay, Kent (02273 63859)

Access

PAUL
G3VJF

ICOM®

IC-211E IC-245E IC-701

THE LEADERS IN ALL SOLID STATE SYNTHESIZED RIGS

THE ONES WITH THE *FINAL* WARRANTY

2m
BASE
←IC-211E

IC-245E
MOBILE →

These three transceivers all use the patent Icom LSI chip to generate the operating frequency *digitally*—this gives you the stability of a crystal in a tunable rig. Coupling between the tuning knob and the logic controlling the synthesizer is optical. This is what gives the unhampered 'feel' to the large weighted flywheel knob used on the 211E and 701. The rate of tuning is varied electronically to provide rapid transit to the part of the band you want while maintaining superb fine 100Hz control for tuning in that SSB signal—this is equivalent to 5kHz per revolution at the slow rate. Being digitally controlled beasts all can be controlled remotely—either by using the RM3 (Icom's 'Computer' key pad), your own 'home brew' keypad or even your home computer. Thus it is much easier to add scanning etc at a later date.

All three transceivers employ broadband techniques which mean there is no pre-selecting, tuning and loading at all—giving instant transmit facility which means you get the Dx while the other chap is twiddling knobs—and this is achieved without loss of performance. The solid state PA's are protected against bad VSWR—but you won't get far with a rotten antenna! They are so reliable that we GUARANTEE THEM AGAINST FAILURE for 12 months. This same warranty applies to all components and labour costs on new equipment bought from us providing there has been no unauthorised tampering.

YOU CAN'T GO WRONG WITH ICOM

—SIMPLY THE BEST

IC-701
HF
£899

AMATEUR ELECTRONICS UK

AEUK – Your number one

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

THE SUPERB FT-101Z AND FT-101ZD TRANSCEIVERS ARE NOW APPEARING IN LARGE NUMBERS ON THE H.F. BANDS FOR THE SIMPLE REASON THAT THEY REPRESENT THE BEST VALUE FOR MONEY AVAILABLE TODAY BUT PRICE NOTWITHSTANDING MANY OPERATORS ARGUE THAT THE RECEIVER PERFORMANCE IS SUPERIOR TO ANYTHING THEY HAVE HANDLED BEFORE—CALL, 'PHONE OR WRITE (PLEASE SEE FACING PAGE) FOR FULL DETAILS.

FT101ZD Series High Performance Transceiver

FULL COVERAGE
Full band coverage is provided on the FT-101ZD: 160 through 10 meters, plus WWV/JJY reception on 5MHz. Teamed with the FTV-901R transverter, operation can be extended to 72, 144, and 430MHz from your desk top.

CLEAN OUTPUT SIGNAL
With today's crowded bands, we all have the responsibility to keep our transmitted signal free of spurious radiation. YAESU engineers have included RF negative feedback, for a clean output signal.

STATE OF THE ART NOISE BLANKER
The all-new noise blanker is extraordinarily helpful in reducing the level of impulse noise. The blanking level may be adjusted from the front panel.

RF SPEECH PROCESSOR
A high-performance RF speech processor is built into every FT-101ZD, providing an increase in your average talk power of approximately 6dB. The processor level can be adjusted from the front panel, for optimum signal enhancement.

WORLD-WIDE POWER CAPABILITY
The FT-101ZD has provision for operation from a variety of AC voltages, from 100 to 234 volts. When you're travelling, you'll never need a heavy, bulky transformer for operation with your FT-101ZD. A DC-DC converter is an available option, for mobile operation. The FT-101ZD is small enough to qualify as carry-on baggage on most airlines, and is equipped with a strong, side-mounted handle for ease of carrying.

VARIABLE IF BANDWIDTH
Using two 8-pole crystal filters with superior shape factors, the FT-101ZD variable bandwidth system is a valuable tool on today's crowded bands. With the turn of a dial, high-pitched SSB "buckshot," or unwanted CW signals, can be eliminated from the IF passband.
Compare for yourself: other systems use a single filter in the IF; though you can move away from one interfering signal, you may move into more QRM. The YAESU design actually varies the bandwidth, *eliminating* the QRM. Other manufacturers would have you spend hundreds of pounds on different filters for 2.1kHz, 1.8kHz, 1.5kHz, 800Hz, 500Hz, etc. With the FT-101ZD, you have continuously variable bandwidth—from 2.4kHz down to 300Hz.

DIGITAL PLUS ANALOG READOUT
The FT-101ZD features digital plus analog frequency readout. The display features big, bright LED digits, for maximum readability. For extra savings, the economy model FT-101Z gives you the same precision analog display, at a significantly reduced cost. You can add the digital display later, if you wish.

INTERFACE WITH 901 SERIES COMPONENTS
Your FT-101ZD may be used with all of the exciting FT-901DM series accessories. The FV-901DM synthesized, scanning VFO provides storage and recall of up to 40 frequencies, in addition to its 3-speed scanner and auto scan function. See for information on other accessories.

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

FROM SOUTH AND EAST. We are located approximately two miles from Junction 5 of the M6 from which follow signposts to Birmingham. Within ½ 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.

Hours: 9.30–5.30 Continuous including Saturdays—Early closing Wednesday, 1 p.m.

Access

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

Access

AMATEUR ELECTRONICS UK

source for YAESU MUSEN

THIS MONTH WE FEATURE THE HIGH TECHNOLOGY CPU-2500RK 2M F.M. TRANSCEIVER WHICH IS ONE OF THE MOST SOPHISTICATED UNITS AVAILABLE ON THE MARKET TODAY. 36p IN STAMPS BRINGS YOU THE LATEST YAESU GLOSSY CATALOGUE WHICH GIVES FULL SPECIFICATION TOGETHER WITH DETAILS OF THE EVER-GROWING YAESU RANGE—AND AS AN ADDED BONUS YOU WILL GET OUR CREDIT VOUCHER VALUE £3.60—A 10-1 WINNING OFFFER!

General Coverage Communications Receiver FRG-7

● 0·5-29·9MHz Coverage with 10kHz Readout

The FRG-7 is a precision-built all-purpose communications receiver, featuring all solid state construction for long life and high performance. Utilizing the Wadley Loop drift cancellation system, in conjunction with a triple conversion superheterodyne circuit, the FRG-7 boasts high sensitivity along with excellent stability. It provides broadcast listeners with such features as a 3-position tone selector, an RF attenuator, and an automatic noise suppression circuit. For many years of satisfying reception, the FRG-7 is the receiver for you.

Digital Display Communications Receiver with CPU Digital Clock & Timer FRG-7000

● 0·25 Thru 29·9MHz Coverage with 1kHz Readout

Computer technology and convenience features are brought together in the FRG-7000, a digital-display general coverage receiver for the discriminating SWL. The digital clock and timer, controlled by a CPU (Central Processing Unit) chip, will read at both local and GMT time, and will control peripheral station equipment such as a tape recorder. Improved SSB selectivity, ease of operation, and rugged construction are yours with the new FRG-7000 from YAESU.

BRANCH: AMATEUR ELECTRONICS, UK—COASTAL, CLIFTONVILLE, KENT, KEN McINNES, G3FTE, THANET (0843) 291297. 9 a.m.-10.30 p.m.

BRANCH: AMATEUR ELECTRONICS UK-SCOTLAND, 287 MAIN STREET, WISHAW, LANARKSHIRE, GORDON McCALLUM, GM3UCI. TELEPHONE WISHAW 71382. (EVENINGS CARLUKE 70914)

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- ★ Smaller, compact size
- ★ Full 360° circular dial
- ★ Provision for fitting "map" dial

The rotor is mechanically identical to 502CXX but should be ordered as...

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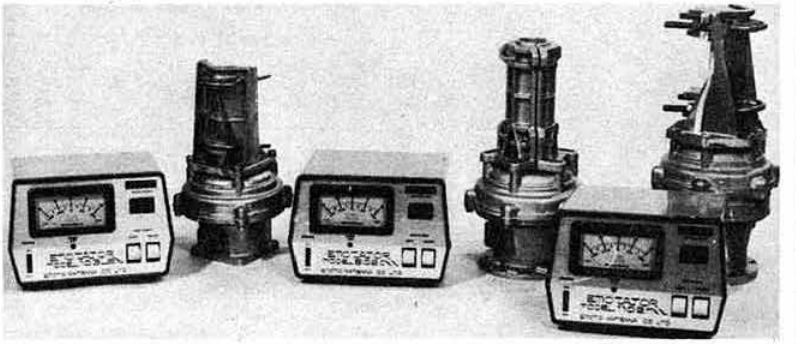

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The best answer to your rotary mast problems Robust, ball-bearing fitted unit with stainless hardware. Complete with 4 lugs for guying rotary masts up to 62mm dia—or can be bolted to flat tower plate, as an alignment bearing.

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8-way control cable **36p**/metre *plus* **£1.50** carriage *plus* VAT

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Yaesu	CPU-2500RK 25 watts	**£345.00**
Icom	IC-280E mobile	**£250.00**
Icom	IC-240—good value	**£193.00**
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All above are synthesized except 202R

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WATERS & STANTON ELECTRONICS

TRIO HAS COME TO THE SOUTH EAST

TRIO

APPROVED TRIO DEALER

It's now our pleasure to announce that we have been appointed official Trio stockists for the South East. We shall be carrying the full range of their products, including the new TS180S solid state HF rig and TS 770 VHF/UHF transceiver.
Please note that all our stocks of Trio, are supplied from the official UK importers, Lowe Electronics, and therefore have the full spare parts back up. We are the only Trio dealers in the South East who have UK models (as against German and American models)—don't take chances—saving a few pounds now could prove expensive later.

Yes, 1979/1980 promises to be an exciting year for Trio and Waters & Stanton. This month we will be moving into our large, purpose built premises a couple of hundred yards away in Main Road, Hockley. But don't worry, all our mail will be re-directed automatically—in fact, our mail order customers won't notice we've moved (apart from an even faster service!) Callers will see our new super store (we hope) as they enter Hockley! No parking problems, two miles from Southend-on-Sea and a shop full of Trio—can you resist the invitation to visit us?

TRIO TS820S £832 inc. 15% VAT

The Trio TS820S must be the HF operators dream come true. Many superlatives have been used to describe it and all are justly deserved. It's the transceiver that you'll hear from about every corner of the World with its distinctive, clean, crisp audio. A most effective RF processor ensures a remarkable improvement in readability under QRM conditions without any degradation of quality and RF negative feedback produces just about the cleanest signal you'll find anywhere. 160-10 metres, 200 watts PEP input and 0·2uv for 10dB S-N all add up to an enviable package. Add to this the digital readout display and unique selectivity obtained by "bandpass tuning" of the IF section produces a transceiver that is today's DX operator's No. 1 choice. For further information or credit terms, just drop us an S.A.E.

TRIO TS520S £542 inc. 15% VAT

The TS520 is now the most widely sold HF rig in the World. Just listen for a while on the HF bands and you'll realise just how many TS520's there are about. Full 6 band coverage of 160-10 metres with 200 watts PEP input and built-in speech compressor will get your signal around the World with ease. And, of course, the TS520 gives you a remarkable receiver performance to match.
With the TS520 you are buying the best engineered HF rig in its price bracket—and that's our own opinion having tried them all! Ask any owner of a TS520 what he thinks of it—he'll tell you his only regret is all the QSO's he lost by not changing to Trio before! If you have a limited budget yet want performance and a rig that will hold its price, then the TS520 is your choice.

TRIO TR7500 £240 inc. 15% VAT

The TR7500 2 metre FM transceiver combines simplicity of operation with advanced design. Full coverage of 144-146MHz in 80 × 25kHz channels means no more crystals to buy. Dial indication meets the modern operator's requirements—if you want S20 you simply dial "20". For R6 you simply dial "6"—if you're one of those operators who finds channel numbers easier to use than frequency readout, then we can recommend this as a "best buy". Reverse repeater operation is, of course, a single switch action—as it should be. The package comes complete with microphone, mounting bracket and DC leads.
Performance is equal to the best in a remarkably small package—15-18 watts transmitter output and better than 0·2uv sensitivity matched with the unparalleled Trio quality and attention to detail makes the TR7500 hard to beat.

TRIO TR2300 £199 inc. 15% VAT

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

WATERS & STANTON ELECTRONICS

HOLD IT!

FDK PALM IV

1 WATT 6 CHANNEL 70cms HAND-HELD

Another first from our Japanese factory. The smallest, cheapest and finest 70cms hand-held ever to be offered to the radio amateur. And if we sound enthusiastic about this delightful little package, you're right. Look at what £159 buys—Palm IV fitted SU20; 6 channel capability; simplex, plus and minus 1·6MHz shift; single xtal per channel (£3); xtal controlled automatic tone-burst; quarter wave flexible BNC whip; ni-cad rechargeable battery pack; 240V AC mains charger; external 12 volt cigar lighter; power cord; built in condenser microphone; 1 watt output and English operating manual. This is the ultimate in portability and slips easily into one's coat pocket. Optional accessories include, leather case, HP7 external battery pouch for prolonged life and all the popular simplex and repeater channels ex-stock (£3 each or 5 for £12!)

£150 inc. 15% VAT ex-stock

FDK MULTI-700E

THE PERFECT 2M FM MOBILE TRANSCEIVER

12½kHz or 25kHz + 25 Watts
£229 inc. VAT & Delivery

When a transceiver has so many more features than its rivals and yet sells for less than most, then surely it can be rightly described as the "best buy" for 1979. Truly a concept of design that looks to the future as well as the present. Its powerful 25 watts makes it twice as powerful as its competitors and ensures more solid QSO's. 2 RF stages in the receiver ensure that the high power is matched by the most sensitive receiver on the market. No more xtals to buy, the Multi 700E comes 144·75 to 145·975MHz in 25kHz click tuned channels. And for the 1980's 12½kHz channels can be interspaced at the touch of a button. Repeater operation is taken care of at the flick of a switch for either normal repeater mode or reverse mode for listening on the input channel. Automatic xtal controlled tone-burst is built in and the power output is continuously variable down to 1 watt. Altogether a remarkable transceiver at an amazing price. Included in the package is a quick release mobile bracket, matching microphone, mounting hardware kit, DC fused lead and English operating manual. Send SAE for full details of the "PERFECT" rig.

STOP PRESS!

Mobile safety mics back in stock complete with boom and gear lever switching boxes. State transceiver model when ordering. **£20.95** inc. VAT.

KYOKUTO

KYOKUTO DENSHI COMPANY LIMITED

KDK FM2016E 2m FM DIGITAL SYNTHESIZED TRANSCEIVER

The KDK FM-2016E is a 12V DC two metre FM transceiver for mobile and base station use. It has been compactly designed with emphasis on maintenance and ease of use by using the latest CMOS IC digital PLL circuitry.

Rx 144·000-148·995MHz and Tx 144·000- 145·995MHz.

Direct readout of operating frequencies by large size LEDs.

The most commonly used, 100kHz and 10kHz, switches are mounted coaxially. These will not go below the 0 or above 9 position facilitating frequency changing by feel only, for "eyes-on-the-road" motoring and use by those with impaired sight.

An electronic memory using CMOS RAMs (Random access memory ICs drawing only 25nA!) allows any four out of the 1,000 channels to be written-in (stored) at a flick of a switch. An auto-charging back up NiCad battery maintains the RAMs contents after disconnection from the power.

The plus 600kHz and minus 600kHz positions of the mode switch provide for normal repeater operation. In position 1T-2R the set Tx's on the frequency in memory channel 1 and Rx's on memory channel 2 (likewise the 3T-4R position). This provides for non-standard shifts, and is also convenient for use in conjunction with up-converters.

The memory may be scanned in the "closed" mode, (the scanner will stop at the first channel in use) or in the 'open' mode, (stopping at the first empty channel). Scan-hold allows transmission immediately the scanner stops.

Dual-gate MOS-FETs are used for the RF and mixer to provide superior inter-modulation characteristics with high sensitivity. Performance is held constant across the wide frequency range covered, by automatic electronic tuning.

A monolithic crystal in the first IF and a commercial quality 15-pole ceramic filter in the 2nd IF provides extremely sharp selectivity. The 2nd IF is built with discrete components to keep stray coupling to a minimum and a ceramic discriminator has been adopted for excellent temperature stability and long-term alignment.

The RIT (Receiver incremental tuning) and centre zero meter are useful for contacts with off-frequency or drifting stations.

The single conversion transmitter uses a balanced mixer, five stages of electronic tuning, and a four-stage low pass filter for a clean, spurious-free signal.

The ultra-modern silicon transistor in the final will survive even an infinite VSWR.

Power: HIGH (15 Watts) and LOW (1 Watt), is selectable by a front panel switch (useful with a linear).

Direct FM of the VCO results in superb audio.

A two mode (burst or continuous) tone generator is adjustable from 1,750 to sub-audible frequencies.

A 5-pin "DIN" connector is provided on the rear panel for a KDK SC-12A SELCALL (tone encoder-decoder) unit, headset-microphone combinations or similar.

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TONE BURST
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NiCd CELL PACK
EXT MIC OPTION
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RANGE OF ACCS.

★ Supplied c/w NiCd Battery pack

NB illustration of USA Model

FT202R ACCESSORIES

YM24	External Mic/speaker.....	£14.50 + 15% VAT **£16.68**
NC1	Mains Charger for Ni-Cd cells.....	£16.50 + 15% VAT **£18.98**
PA1	12V PSU 'Basemaster'.....	£16.50 + 15% VAT **£18.98**
AA	Ni-Cd 'AA' 500mAh-set....	£7.20 + 15% VAT **£8.28**
XTAL	Crystals. Stock selection...	£4.00 + 15% VAT **£4.60**

FT207R ACCESSORIES

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NC2	Quick charger/AC adaptor.....	**TBA**
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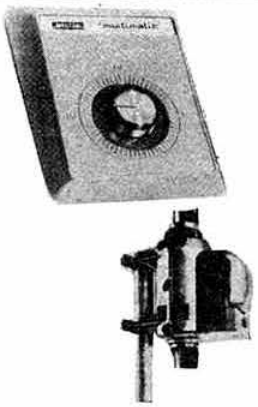

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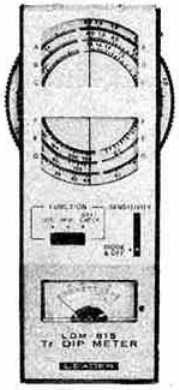

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1·5–250MHz
XTAL TEST

Neat self-contained plug-in coils. Reliable instrument. **(p&p free)**

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VHF RECEIVER POCKET SIZE

12 CHANNEL
130–170MHz

Supplied c/w case, charger, NiCds, etc. S(20, 21, 22, 23) and R(0, 1, 2, 3, 4, 5, 6, 7). **(p&p free)**

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12V DC. 10W nom. drive. Rx Pre Amp E310 Low Noise. **(p&p free)**

Remote control available

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310	¼ λ	Swivel Base	£3.50	095	¼ & ⅝	Fibreglass Mount	£2.10
344	¼ λ	Sprung Base	£5.55	092	¼ & ⅝	Magnetic Mount	£8.95
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341	⅝ λ 2m	Sprung Base	£6.65	091	¼ λ	Magnetic Mount	£9.80
350	¼ λ 2m	Fine Tune Base	£7.15	089		Gutter Mount	£4.75
351	¼ λ 2m	Sprung 350 Base	£8.25	093		Boot mount	£2.90
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056		63cm Parallel Whip	£0.95	044		Blank off ¼ λ	

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GDX1	Discone 80-480MHz		£37.50	250/28	10M base loaded		£11.75
GDX2	Discone 50-480MHz		£39.50	260/144	2m, ⅜ λ Gutter clip		£17.15
LT606	Log50-500MHz		£75.95	260/70	4m, ¼ λ Gutter clip		£17.15

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4Y/4M	4 element yagi		£13.00	5XY/2M	5 element crossed		£16.00
PMH2/4M	2 way harness		£9.20	8XY/2M	8 element crossed		£20.00
D15/23	15 over 15 slot		£23.40	10XY/2M	10 element crossed		£26.50
UGP/2M	Ground Plane		£7.10	PMH2/C	Circ. phasing harness		£5.20
C5/2M	Vert Colinear		£31.00				
5Y/2M	5 element yagi		£7.70	PMH2/2M	2 way harness		£6.85
8Y/2M	8 element yagi		£10.00	PMH4/2M	4 way harness		£7.85
10Y/2M	10 ele long yagi		£21.50	C8/70	Vert. Colinear		£39.50
14Y/2M	14 ele long yagi		£27.50	D8/70	8 over 8, slot fed		£15.50
PBM10/2M	10 ele Parabeam		£26.00	PBM18/70	18 ele. Parabeam		£18.70
PBM14/2M	14 ele Parabeam		£31.60	MBM48/70	48 ele. Multibeam		£21.80
Q4/2M	4 element quad		£16.60	MBM88/70	88 ele. Multibeam		£29.00
Q6/2M	6 element quad		£22.00	8XY/70	8 element crossed		20.00
D5/2M	5 over 5, slot fed		£13.80	12XY/2M	12 element crossed		£29.80
D8/2M	8 over 8, slot fed		£18.40	PMH2/70	2 way harness		£5.90
				PMH4/70	4 way harness		£12.40

G-WHIP VHF MOBILE ANTENNAS (Carriage £0.95) + VAT 15%

TRIBANDER	10-20M Slide		£20.00	FLEXIWHIP	10M Mast		£14.40
LFCOIL	40/80/160M	each	£5.70	FF	15/20/40/80/160M	each	£5.70
LFWHIP	Telescopic		£2.60	GW BASE	Standard		£3.65
MULTIMOBILE	10-20M Auto		£23.00	35BASE	Heavy Duty		£5.00
MMCOIL	40/80/160M	each	£5.70	TA	35 to G-Whip		£0.80
MMWHIP	Telescopic		£2.60	EXTENDAROD	Extension		£9.50

GEM QUAD FIBREGLASS 10-20M (Carriage £2.50) + VAT 15%

GQ2E	2 Element quad		£124.00	GQ4E	4 Element quad		£249.00
GQ3E	3 Element quad		£187.00	GQCK1	1 Element Conversion kit		£63.00

MOSLEY TRI-BAND BEAMS (Carriage £3.50) + VAT 15%

TA32	2 ele. 200W RMS		£70.00	MUSTANG2	2 ele. 1KW RMS		£95.00
TA33	3 ele. 200W RMS		£105.00	MUSTANG3	3 ele. 1KW RMS		£130.00

SMC TRAPPED DIPOLES 10-80M. (Post £0.75) + VAT 15%

S500	Standard – 14 SWG		£26.50	P500	Portable – Cu/Terylene braid, c/w 75ft feeder		£32.50
HP1K	High Power – 14 SWG		£29.00				

WIRE & BRAIDS (Post and Packing extra) + VAT 15%

7/029H	Cu Hard Drawn	yd	£0.15	14 SWG	Cu Hard Drawn	yd	£0.13
7/036H	Cu Hard Drawn	yd	£0.18	BRAID	Cu/Terylene, ¼"	yd	£0.14
7/044H	Cu Hard Drawn	yd	£0.24	7/029S	Cu Soft Drawn	yd	£0.13

AERIAL INSULATORS (Post Extra) + VAT 15%

SMCP1	3" Polyprop. ribbed		£0.37	EGG1	1½" Egg porcelain		£0.33
SMCP2	8½" polyprop. ribbed		£1.85	IP3	3" Porcelain ribbed		£0.48

WIGHTRAPS AERIAL TRAPS (Post £0.40) + VAT 15%

WTS	Standard – White		£5.85	WH1B	"Space Saver", 3·5MHz resonance, for 1·8MHz		£7.50
WTHP	High Power – Blue		£8.25				

BALUNS 3-30MHz (Post £0.50) + VAT 15%

BN86	1:1, "U" bolt mount		£13.50	W2AU1	1:1, c/w spark gap		£9.50
HIQ	1:1, "Hang up"		£8.70	W2AU4	4:1, c/w spark gap		£9.50

LIGHTNING ARRESTORS COAXIAL (Post £0.30) + VAT 15%

SM566	Spark, SO239/PL259		£2.55	NSK7S	Gas, SO239/SO239		£7.50
SM567	Spark, SO239/SO239		£2.55	LA1	Gas, Bulkhead		£39.50

CABLES RF FEEDERS (Carriage extra) + VAT 15%

RG58U	50Ω 0·2" Stranded	yd	£0.18	307EP	75Ω "Economy"	yd	£0.12
UR43	50Ω 0·2" Solid	yd	£0.17	UR70	75Ω 0·225" Stranded	yd	£0.18
UR76	50Ω 0·2" Stranded	yd	£0.17	UR39	75Ω 0·306" Medium	yd	£0.27
UR67	50Ω 0·405" Heavy	yd	£0.42	UR57	75Ω 0·405" Heavy	yd	£0.45
RG213	50Ω 0·405" Heavy	yd	£0.42	302	75Ω Flat twin	yd	£0.11
306	300Ω Ribbon	yd	£0.12	3X21	240Ω Oval twin	yd	£0.08

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

PL259	Standard UHF plug		£0.48	SO239	Free angle UR43		£0.88
UG175/U	Reducer UR43		£0.12	PL258	Back-back, female		£0.79
UG175/U	Reducer UR70		£0.12	PL274	Back-back, chassis		£0.93
PL259R	"Reduced" plug		£0.58		Back-back, male		£1.20
PL259SL	"Solderless" UR67		£0.55	M359	Angle (1m + 1f)		£0.93
PL259SS	"Solderless" UR43		£0.55		"T" (3 females)		£1.48
PL259P	Push-on plug		£0.69	M358	"T" (2 fem. 1 male)		£1.20
PL259E	Elbow plug UR43		£0.83		4-way (3 fem. 1 male)		£1.85
	Panel mount PL259		£0.93		SO239/Car + phono		£0.60
SO239F	4 hole socket		£0.42		SO239/2·5mm Jack		£0.69
SO239T	2 hole socket		£0.42		SO239/3·5mm Jack		£0.69
SO239NI	Socket "nut" inside		£0.51	255/U	SO239/BNC male		£1.53
SO239NO	Socket "nut" out		£0.51	273/U	SO239/BNC fem.		£1.53

COAX PLUGS BNC (Post £0.20) + VAT 15%

UG88	Plug, Stnd UR43		£0.54	UG914	Double male		£0.93
UG959	Plug, Large UR67		£2.66	UG274	"T" 2 female, 1 male		£1.44
UG291	Socket, 4 hole stnd.		£0.56		"T" 3 female		£1.74
UG1094	Socket, Nut fixing		£0.56	UG306	Elbow adaptor		£1.62
UG89	Socket, Free, UR43		£0.72	255/U	BNC male/SO239		£1.53
UG914	Double female		£0.93	273/U	BNC female/PL259		£1.53

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

1¼" od	Aluminium 16g	ft	£0.42	2"	Al. Thick wall 1⅛"		£1.05
1½" od	Aluminium 16g	ft	£0.46	2"	Steel Galv. 1⅛"		£0.82

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

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

ROPES—WIRES (Post and Packing extra) + VAT 15%

3mm	HT steel, 0·63T.	yd	£0.18	X150	Rustproof, ⅛" D.	490'	£16.30
4mm	HT steel, 1·5T.	yd	£0.24	7X18q	Galvanised	100'	£4.40

ROPES—TERYLENE (Post and Packing extra) + VAT 15%

¼"	BS150 lbs (circ.)	yd	£0.07	½"	BS1250 lbs (circ.)	yd	£0.14
½"	BS650 lbs (circ.)	yd	£0.10	1"	BS2450 lbs (circ.)	yd	£0.27

CABLE GRIPS (Post and Packing £0.30) + VAT 15%

⅛"	Bulldog, galv.		£0.19	HD9	Plated brass line clamp for copper wire		£0.44
¼"	Bulldog, galv.		£0.16				

SHACKLES (Post and packing £0.30) + VAT 15% N.B: Pin sizes given.

¼"	D galvanised		£0.24	⅜"	D galvanised		£0.33
⅝"	D galvanised		£0.28	½"	D galvanised		£0.42

THIMBLES (Post and packing £0.20) + VAT 15%

F1235	1¼" Nylon, for terylene		£0.14	1½"	Galv. for steel		£0.13
F985	1½" Nylon, for terylene		£0.16	1¾"	Galv. for steel		£0.15

RIGGING SCREWS TURNBUCKLES (P&P £0.30) + VAT 15%

	4" × ⅝" pressed		£0.75		6" × ¾"		£2.85
TPR933	4½" × ⅝"		£1.65		Miscellaneous		P.O.A.

GUY STAKES (Carriage £1.00) + VAT 15%

GS18	18" Angle galv.		£2.55	GS36	36" "T" section, Heavy Duty, Galvanised		£7.75
GS27	27" "T" galvanised		£3.75				

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

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

RAWLBOLTS (Post and packing £0.40) + VAT 15%

	½" rawlbolt		£0.24		⅜" rawlbolt		£0.42
D2	⅝" rawlbolt		£0.29		⅞" rawlbolt		£1.45

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

SMC53	1-2" mast, 1" boom		£1.10	JBL73	1-2" mast, 1¼" boom H.D.		£1.50
SMC63	1-2" mast, 1-1¼" boom		£1.25	CP1	2" × 2", 6" × 6" plate		£2.30

MISCELLANEOUS HARDWARE (P&P extra) + VAT 15%

SMC59/15	2" mast sleeve 15" long		£4.20	MBP	Mast Base Plate 2"		£3.40
SH2	Snap hook 2½"		£0.68	ER4	Earth rod 4' c/w clamp		£4.25
MC1	Mast cap cast alloy 2"		£1.85	UB2	U bolts 2" × ⅜"		£0.32

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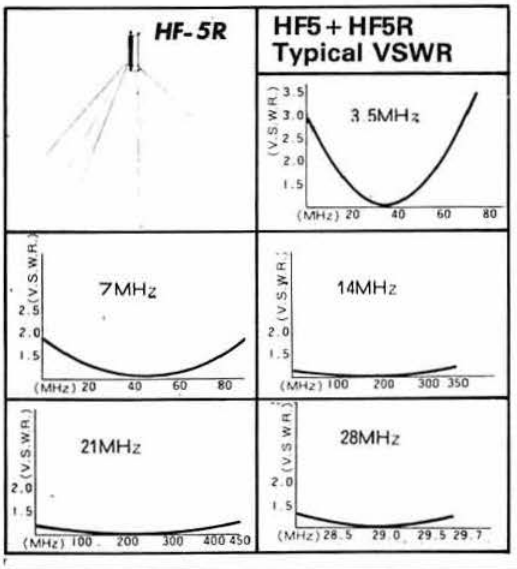
80, 40, 20, 15, 10 metre coverage from this remarkable new antenna. Only 4·8m (15¾') high and 4·2cm in diameter, it nevertheless is capable of handling 500W PEP on 10, 15 and 20m. (200W PEP 40 and 80) within its 1·5:1 VSWR bandwidth. 50 ohm coaxial feed is to an inbuilt SO239 socket. Suitable for mounting at ground level on an earth post, (with or without radials) or in an elevated position (only 2·9Kg) with wire radials or better still with the HF5R (1·8Kg) radial kit. The HF5R (max power 150W PEP) has five solid radials of very similar length (2·05 to 2·2m) sloping at 45° to the antenna.

HF5 : **£35** (+ CARRIAGE*) + VAT 15% **£40.25**
HF5R: **£20.25** (+ CARRIAGE*) + VAT 15% **£26.85**
*CARRIAGE: on either *or* both together £1.50



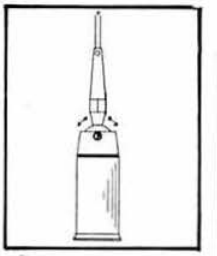
VHF MOBILE AERIALS SMC FOR THAT BIT MORE

	78F	78B	258
BAND	144MHz	144MHz	432MHz
TYPE	⅝λ	⅝λ	⅝ + ⅜
GAIN	4·5dB	4·5dB	5·5dB
POWER	100W PEP	150W PEP	100W PEP
LENGTH	1·75m	1·72m	0·94m
WEIGHT	400gm	440gm	190gm

SMC78F element only **£10.00** (P&P £1.00) + 15%
SMC78B element only **£11.00** (P&P £1.00) + 15%
SMC258 element only **£10.00** (P&P £1.00) + 15%

Base of element is a PL259M connector (handy for tests, portable operation etc) Excellent VSWR, 50ohms feed.

SMC78F
Base section showing fold over provision (mounted on GMCA. SMC258 similar)



SMC78B
Base section showing angle adjustment ball. Necessary where RG4M is mounted directly on car

GMCA
GUTTER MOUNTING
Cast, heavy chrome, adjustable GMCA **£5.00** (P&P £0.20) + 15% VAT

RG4M
CABLE ASSEMBLY
c/w 4m. RG58 & PL259 plug RG4M **£3.00** (P&P £0.30) + 15% VAT

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FT901DM

FOR THE PERSON WHO NEEDS THE BEST

TO TRY IT IS TO BE CONVINCED

The FT901DM Transceiver offers unparalleled receiver performance combined with state-of-the-art transmitter design from 10 to 160 metres. Some transceivers have WWV reception but no 160 capabilities, others have 160 but no WWV, CB, or crystal calibrator. Some offer selectable sideband but no AM probably no FSK and almost definitely no FM (Tx *and* Rx. CW was just not an afterthought on the 901. For instance the internal Curtis ic keyer (designed for amateur radio applications) is powered directly by the set and provides immunity to RF interference and false keying through contact bounce. All these features, including an advanced noise blanker, are standard equipment on the DM, not costly extras.

Full size digital plus clear analogue frequency display and memory circuitry provide the ultimate in versatility and operating efficiency. The "calibratable readout allows you to set the exact CW transmit frequency (no more falling out of the bottom end of the band) and when used in conjunction with the audio peak filter provides measurement of incoming signals frequency directly (without looking for near non-existant zero beat). The velvety smooth tuning dial action provides great setting accuracy whilst the phase locked loop local oscillator unsurpassed stability. The memory unit can store (at the press of a button) any transmit, receive, or transceive frequency, thus permitting (in any segment), split operation for DX or 10 metre repeater use (remember the FM).

Filtering is the heart of a receiver. In addition to numerous band stop filters, crystal filters of 600Hz*, 2·4kHz, 6·0kHz*, and 12kHz define the IF bandwidth. This is only part of the story. By a mixing process two crystal filters' passbands' overlap by a desired amount to provide selectivity continuously variable from the normal 2·4kHz right down to 300Hz without even having the CW Filter installed! Do not be fooled by other systems such as "IF shift" (N.B. this "width" system also moves the Centre Frequency) which only move the passband and cannot change the bandwidth. (Known in the trade as "QSY into the QRM" devices). Other filters worthy of note are the Rejection Tune, tunable notch for removing unwanted narrow signals from the IF passband and the Audio Peak Filter A.P.F. razor sharp filter, without ringing, which produces a dramatic increase in signal to noise ratio and QRM rejection on CW.

The FT901 is a complex instrument but the internal layout is clear and straightforward, computer style plug in circuit boards being used throughout. By substitution and extenda board tests, valuable service time is saved in unsoldering components from deep inside the chassis. This approach also reduces point to point (rats nest) wiring and results in a clean compact unit with high component density.

Purity of emission is important both legally and ethically. Out of band spurii interfere with other services and can cause TVI. Equally important is your reputation amongst other amateurs, which will deteriorate quickly if you transmit distortion products across the band. The FT901 includes a built-in low pass filter, toroidal output circuitry and R.F. negative feedback on the 6146B PA's for a spurious free output signal. The in-built R.F. speech processor with front panel level control increases average talk power (by filling "holes" in your voice pattern) by about 6dB without audible harmonic distortion.

Ergonomics or human engineering is often neglected in design. On the '901, knobs are positioned logically and push buttons with LED indicators are used where necessary.

For /A, /P, or /M the '901 is surely the ultimate station in one box, with provision for operating from a variety of voltages. 100-234V AC (50/60Hz) and 12V DC with inbuilt invertor.

Accessories include: the FV901DM external VFO (synthesized 100Hz step, spin and 3-speed electronic tune + auto search with 40 memory channels), the FC901 antenna tuner/power meter, the SP901 speakers, the Y0901 monitorscope (with or without panoramic adaptor facilities), the FTV901 transvertor for 4, 2, and 70cms (with repeater shifts etc) in one box and the YR901 Morse, RTTY decoder (to TV video monitor or TTU) etc.

RADIO SOCIETY OF GREAT BRITAIN

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

Founded 1913
Incorporated 1926
Member society, International Amateur Radio Union

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

The national society representing all UK radio amateurs

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

GENERAL MANAGER AND SECRETARY
D. A. Evans, G3OUF

EDITOR
A. W. Hutchinson

ANNUAL SUBSCRIPTION RATES

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

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

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

RSGB NEWS BULLETIN SERVICE

The RSGB news bulletin, callsign GB2RS, is broadcast every Sunday morning on hf and vhf, giving almost complete coverage of the British Isles. Its main purpose is to provide an outlet for amateur radio news items and announcements which, by virtue of their topicality or urgency, cannot wait for the next issue of *Radio Communication.*

The bulletin is prepared early on Thursday morning, and news items, marked "GB2RS news" should reach RSGB HQ by first post that day (telephoned items can also be accepted until 10am). No guarantee can be given of inclusion in part or whole of any item submitted and, once broadcast, items are not usually repeated.

SCHEDULE

Time	MHz	Location and coverage (hf) or beam heading (vhf) of station
0930	3·65	G2MI, Bromley, Kent (SE England)
1000	3·65	G8ML, Cheltenham (SW England)
	144·50	G3FZL, London
1015	3·65	GI3GAL, Belfast (N Ireland)
1030	3·65	G2CVV, Derby (N Midlands)
	144·50	GM8FFX, Aberdeen (NE Scotland)
	144·50	G3PWJ, Brierley Hill (NW)
1045	144·50	G8LIC, Middlesbrough (NW)
	144·50	G3FZL, London
	144·50	G3SMT, Stockport (NNW)
1100	3·65	G5VO, Bridlington (NE England)
1115	3·65	G3LEQ, Knutsford (NW England)
	144·50	GI3TLT, Bangor, Co Down (N)
1130	3·65	GM3TCW, Wishaw, Lanarkshire (S Scotland)
1145	3·65	GM3HGA, Aberdeen (NE Scotland)

An rtty news bulletin, callsign GB2ATG, is also transmitted every Sunday at 1200 and 1900 on 3·590MHz and at 1230 and 1245 on 144·6MHz. This bulletin carries items of interest to rtty enthusiasts.

RSGB QSL BUREAU

E. G. Allen, G3DRN,
30 Bodnant Gardens, London SW20 0UD

QTC
amateur radio news

Reminders...

...that nominations for election to the 1980 RSGB Council must arrive at RSGB HQ not later than 10 October 1979.

...that label carriers used to post this issue also carry a delivery survey questionnaire.

(See *Radio Communication*, August 1979, pp 712-3.)

WARC

With the opening of the conference only days away, the efforts of the national societies and the IARU will now be concentrated in Geneva, where the votes of 154 countries will decide the pattern of the radio frequency spectrum for the next 20 years.

It is planned to issue periodical news bulletins from the WARC, but it cannot be too strongly emphasized that any changes are not definite until after the last meeting on 30 November and the final acts have been signed. Initially the WARC will break down into committees, sub-committees and working groups. A proposal approved by a sub-committee could be rejected by the main committee and then restored by a plenary meeting, or vice-versa. Until a proposal has been finally approved by a plenary meeting its fate is still uncertain.

The work of the WARC is based on consideration of bands of frequencies and not the total demands of individual services. The amateur service therefore receives no different treatment from any other ITU defined service. All proposals go through the same procedure and suffer the same uncertainty until after a plenary meeting.

Therefore, please pay no attention to the rumours which will undoubtedly circulate between now and 30 November. The **facts** will be published here as soon as possible.

Subject to minor variations, the IARU team at Geneva will consist of: VE3CJ (IARU president), W4KFC, W0BWJ, W1RU, K1ZZ, ZL2AZ, YV5BPG, JA1NET, WA6IDN, 9V1RH, G5CO, HK3DEU and SP5FM. Representation includes IARU HQ staff and all IARU regions. The IARU team will be present as observers with no voting rights.

A number of amateurs will also be present as members of national delegations, among them Roy Stevens, G2BVN, as a member of the UK delegation to the conference.

According to the ITU, the budget cost of WARC is Swiss Fr8½ million, included in which is the cost of printing 31 million sheets of A4 size documents. The number of delegate registrations so far is 1,450.

Scottish zonal meeting

An RSGB Zone G meeting for members in Scotland will be held at the North British Hotel, Edinburgh, on Saturday 6 October commencing at 2pm. The meeting will be chaired by the RSGB President. All members of the Society in Scotland are invited to attend.

1980 RSGB Exhibition

The RSGB National Amateur Radio Exhibition next year will be held at Alexandra Palace, London, on 9-10 May.

RSGB HF CONVENTION

It is with considerable regret that the Committee HF has to announce the cancellation of the RSGB HF Convention which had been arranged for 15 September in Birmingham. In spite of the excellence of the programme and the presence of distinguished guests, the number of bookings was disappointing and it was felt that no other course was open. Those who have booked tickets are thanked for their support and will receive refund of money paid in full.

RAE, 3 December 1979

The RSGB has arranged two examination centres at which the Radio Amateurs' Examination can be taken on Monday 3 December 1979, in London and Derby. The fee for the examination will be £12 for the full examination, and £9 for candidates who are resitting one paper only.

Requests for application forms stating which centre is required, but *not* enclosing payment, must reach the local examinations secretary, RSGB, 35 Doughty Street, London WC1N 2AE, by Monday 24 September.

The closing date for receipt of completed application forms and payments is 15 October. Entries received after that date will not be accepted.

RAE instructors

The Society's Education Committee is again arranging an informal discussion for RAE instructors and members of the committee at the Leicester exhibition. This will take place at 2pm on Saturday 10 November. All local examination secretaries and RAE instructors will be welcome to attend and are invited to send notice of questions to G3KQF, QTHR, although this is not a prerequisite to attending or asking questions.

Can you help?

The RSGB Planning Advisory Panel, whose purpose is to advise members on planning problems associated with masts and antennas, is in need of more volunteers qualified to deal with planning problems. Primarily the requirement is for solicitors and barristers, but others such as surveyors and architects who have experience of planning problems and appeals are also invited to offer their services.

Anyone who can assist, or knows of any other person who can do so, is asked to contact the general manager at RSGB HQ.

Stolen equipment

FT2FB 144MHz mobile transceiver. Has extra lights and switch on front panel. Extensive modifications internally. Case possibly damaged around mounting holes. Information to G4APB, QTHR, Erith.

DARC vhf get-together

The West German national society, DARC, will hold its annual vhf get-together at Weinheim on 15-16 September. All amateurs are invited, and full details may be obtained from DARC, Postfach 1155, D-3507, Baunatal, West Germany.

Scottish trophies

It is proposed to present the Jock Kyle and Jack Wyllie trophies at the Scottish Amateur Radio Convention on 22 September 1979. The Jock Kyle Trophy will be awarded to the amateur or group who has excelled in the vhf field of amateur radio in Scotland during the year. The Jack Wyllie Trophy will be awarded to the amateur or group who has excelled in the field of amateur radio during the year. Citations signed by five Scottish amateurs should be sent to any of the Scottish regional representatives.

Congratulations

Congratulations are extended to the following members who received awards in HM The Queen's Birthday Honours List in June:

W. B. H. Lord, G5NU, Companion of the Bath (CB);

A. McKenzie, G3OSS, Member of the Order of the British Empire (MBE), for work in audio research and welfare of the blind and disabled.

USSR opens top band

An announcement in the newspaper *Sovetskiy Patriot* of 16 May 1979 has been translated by HB9BRQ as follows:

"Amateur radio stations of all categories and novice radio stations are permitted to operate on cw in the band 1,850–1,950kHz, on ssb between 1,875 and 1,950kHz, and with a.m. between 1,900 and 1,950kHz. The highest power that may be used is 10W, with 5W maximum for novices.

"Novice stations may only establish communication with another novice station. For these stations the prefix 'EZ' will be used. The number of the prefix and the suffix will be composed in accordance with the usual system, eg the Georgian SSR—EZ6FAA–FZZ. It is hoped that the use of this band will encourage the development of radio sport as well as wide attraction of youth into amateur radio."

Promoting amateur radio

A meeting of the Working Group for Promoting Amateur Radio in Developing Countries (set up at the IARU Region 1 conference in April 1978) took place at Kozara, Yugoslavia, in June; the Yugoslavia national society SRJ being the host.

Among those present were Amir Muzzamil el Kobani, 6U2AA (above right), and Mokhtar Mohammed Abu el Hassan, ST2MM, above, left). 6U2AA is director-general of the Youth & Children Palace in Omdurman, and a member of both the Central Committee and the Youth Committee of the Sudan Socialist Union. ST2MM is also associated with the Youth & Children Palace.

Welsh Amateur Radio Convention

Oakdale Community College
Blackwood, Gwent

10am–5.30pm, 30 September 1979

Trade exhibition	**Convention "radio shack"**
TV and rtty display	**RSGB bookstall**
Raynet	**Bring and buy sale**

LECTURE PROGRAMME FROM 1.30pm

- Tape/slide lecture on JA0CUV/1's dxpeditions to C2ICW, VR1AJ, VR4CW, VR8D, YJ8CW, S2ICW and 8QLAH.
- Colour film on moonbounce (eme) operation.
- Colour film on amateur television.
- "The Privileged Ones"—tape/slide lecture on amateur radio.
- Tape/slide lecture on the 1978 dxpedition to Navassa Island.

Talk-in from 9am on S22

Admission: 50p, at the door. Refreshments

Full information from B. Davies, GW3KYA, 16 Vancouver Drive, Penmain, Blackwood, Gwent NP2 0UQ. Tel 0495 225825.

"A cmos keyer with memory"

The author of this article (*Radio Communication* August 1979) has designed a double-sided pcb which avoids wired links, and is only two-thirds the size of the original board. This is available, drilled and roller-tinned, for £4.95, including VAT and postage, from Autocraft, 37 The Shimmings, Boxgrove Road, Guildford, Surrey GU1 2NQ.

"A frequency counter for a 144MHz transmitter"

Anyone having difficulty in obtaining a quartz crystal of 2·09715MHz for this counter (*Radio Communication* May 1979) is advised that the author (N. B. Pritchard, G8AYM, QTHR) has a number of these for sale at £1 each.

Help for UOSAT project

The project to build Britain's first amateur spacecraft (UOSAT), based at the University of Surrey, is looking for full-time electronic engineers and technicians to work on satellite design and construction.

During the first six months of the programme, from January 1979, the preliminary conceptual, structural and system designs have been completed and breadboard development of the spacecraft sub-systems is now under way.

Appointments will be as university staff for a period of two years, until the anticipated launch in mid-1981, and suitably qualified applicants may have the opportunity to register for a higher degree. Proven practical experience and a willingness to become involved in all aspects of the programme are necessary.

For further details, please contact Martin Sweeting, G3YJO, UOSAT Project Manager, Department of Electronic Engineering, University of Surrey, Guildford, Surrey GU2 5XH.

EI/GI Convention 1979

Ballymascanlon House Hotel
Dundalk, Co Louth
14 October 1979
Doors open 10.30am

LECTURES

2.45pm "Design of antenna systems" by Martin O'Dwyer, Telecommunications Ltd, Dublin.
4.30pm "Propagation" by Conn Hunter, EI9V.

Special programme for the ladies

Trade stands **Raffle** **Bookstall**

Admission, including afternoon tea: £1

Further details from EI7CD or GI8AYZ

Old-timers telephony and cw event

For the fifth year in succession RAOTA and the Dutch OTC have arranged an activity period for the first Monday and Tuesday in October, to enable old-timers in both countries to keep in touch. The event will commence at 0900gmt on 1 October and will run until 1530gmt on 2 October. As last year there will be no full-time co-ordinators, but PA0DK (on 3,600kHz) and PA0PN (on 7MHz cw or ssb) will be available for information. G2PT will also be available on 3,600kHz (ssb) or 7,025kHz cw.

Propagation on 7MHz may well turn out to be good, and hence this band may become the busier of the two. Although specially arranged for old-timers (licensed for 25 years or more) anyone wishing to QSO old-timers will be welcome.

Radio Amateur Old Timers' Association

The 1980 RAOTA reunion will be held on Friday 25 April at the Horseshoe Hotel, London W1.

Amateurs wishing to become members of RAOTA should write to the hon secretary, Miss May Gadsden, 79 New River Crescent, London N13 5RQ, or telephone 01-882 1272.

Jersey Radio Convention

Hotel de France
St Saviour Road
St Helier
22–23 September 1979

PROGRAMME

22 September. Meeting of RSGB members, commencing at 2.30pm.
23 September. Luncheon, 12.30pm.

Grand raffle with £2,000 worth of prizes

RSGB bookstall

Details from GJ4ICD, tel 0534 26788

UK FM Group (Western) AGM

Wirral Mercury Motor Inn
Backford Cross, Nr Chester
7.30pm, 17 September 1979

Scottish Amateur Radio Convention

Kingsway Technical College
Dundee

Saturday 22 September 1979

11am to 5.30pm

Usual trade stands and RSGB bookstall

PROGRAMME

1 to 5pm	Convention and RSGB forum
11am to 2pm	Snack catering
Noon to 1pm	Lunches
7.30pm	Dinner at Invercarse Hotel, Perth Road, Dundee

TICKETS

Exhibition and convention.....£1.25
Exhibition, convention and dinner.....£5.50

Dinner tickets only in advance from I. Strachan, GM4FLP, Upper Flat, East Claver House, Dundee, Scotland. SAE, please, with enquiries and bookings.

Amateur Radio Operating Manual

edited by R. J. Eckersley, G4FTJ

This new book describes the essential operating techniques required for most aspects of amateur radio from 1·8 to 432MHz, and provides a comprehensive set of operating aids, including:

- band plans
- beacon lists
- CQ zone list and map
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- great-circle bearings
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- meteor shower table
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- operating abbreviations and codes
- prefix maps and lists
- propagation prediction charts
- QTH locator map
- repeater maps and lists
- satellite look-up tables
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192 pages, paperback **£4.83 incl p&p**

Great Circle DX Map

A new edition of this popular station accessory, now printed in three colours with updated amateur radio prefixes. It shows the bearing in degrees of any dx station and is thus invaluable for the hf operator with a beam antenna. This map is intended for wall mounting and is plastic laminated for extra durability.

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RSGB Publications (Sales)

The "Echelford" 144MHz fm receiver

by N. B. PRITCHARD, G8AYM*

THIS receiver was developed as a club constructional kit for the benefit of members of the Echelford Amateur Radio Society. The design was based on an article in *VHF Communication* [1] but incorporates modifications and improvements to the original design. The design is not state-of-the-art in any sense of the word, but what was required was a cheap and simple reproducible circuit that would encourage and promote interest in construction by various club members, and possibly allay the fears of some would-be constructors regarding the "black art" of vhf construction. A quick scan over the circuit will indicate the use of a crystal filter and, while these would normally be expensive, one club member donated a large number of surplus units for the project and, in fact, further filters were purchased as surplus for £5 each. A fair percentage of the parts was generously provided by some companies, and thus the club members were able to produce for a very reasonable sum a receiver of acceptable but not exceptional performance.

*11 Hillside, Slough, Berks SL1 2RN

Circuit description

The antenna to be used, either a whip or Yagi for example, is connected to SK1 which links with a tuned circuit L1 and C1 resonant at 145MHz. A low impedance tap couples the signal into an rf amplifier, TR1, using an AF239 germanium planar transistor in grounded base configuration. The collector of TR1 is fed via ferrite bead FB1 to a second tuned circuit L2 which has a balanced coupling winding connected to IC1. L2 is tuned by means of fixed capacitor C5 and by the variable capacitor C41 via C6, which serves to reduce the tuning range of C41. IC1 type SO42P is a balanced/mixer/oscillator, the input signal being fed into pins 7, 8 in balanced form and the oscillator being formed betweens pins 10, 11, 12, 13, with C9, 10, 11 forming the feed-back network. The oscillator is tuned via L3 by C42, which is ganged with C41, and fix-tuned by C8, with C7 limiting the tuning range of C42. The oscillator operates below the received signal by 10·7MHz, which is the i.f. frequency.

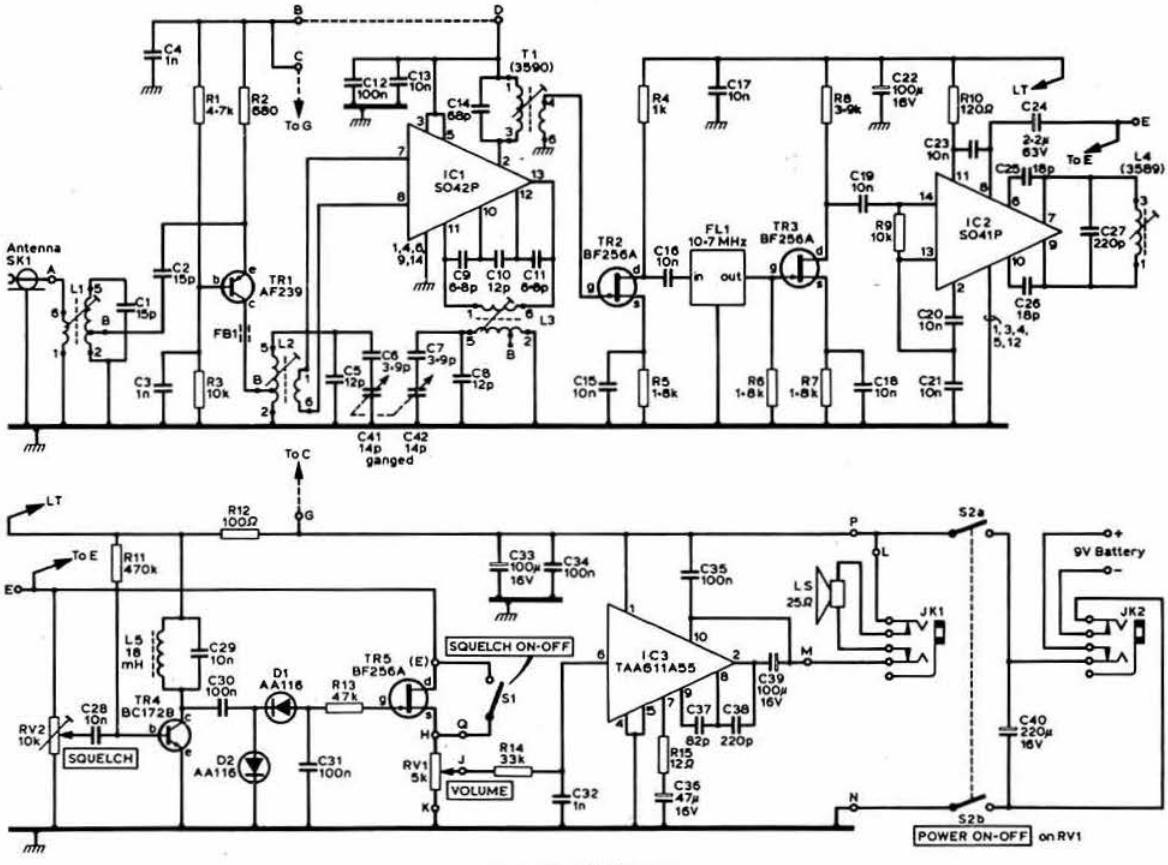


Fig 1. Circuit diagram

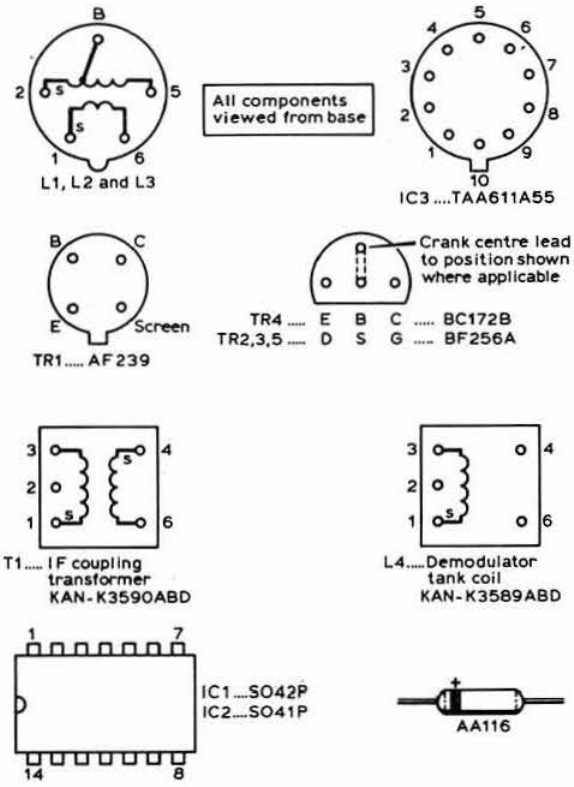


Fig 2. Connection diagrams, bottom views

The i.f. appears at pin 2 of IC1 and is coupled via a tuned circuit, C14/T1, to the gate of TR2 which is an N-channel fet type BC256A operating in grounded source. TR2 acts as an i.f. amplifier, and via its drain resistor R4 presents the correct source impedance for the quartz crystal filter FL1 which has a bandwidth of ±7·5kHz at the −3dB points. The filter is terminated by R6 in parallel with the gate impedance of TR3, another BF256A in grounded source configuration again used as an i.f. amplifier. The amplified signal is taken from the drain of TR3 and couples into IC2 via C19.

IC2 type SO41P is a six-stage limiting amplifier/fm demodulator, the tank tuning circuit being formed by C25, 26, 27, and L4 resonant at 10·7MHz. The audio recovered from the demodulator is partially de-emphasized via C23 and couples via C24 to the audio circuits. The audio signal passes via TR5, BF256A, which acts as a squelch gate, to the volume control RV1 and R14, C32 (giving final de-emphasis) to the audio amplifier IC3.

IC3 type TAA611A55 raises the level of the audio signal enough to provide a maximum of about 1W into an 8Ω loudspeaker. R15, C36, 37, 38 tailor the audio response to be 120Hz to 4kHz −3dB relative to 1kHz with a 22Ω load. An external load such as a low impedance loudspeaker (4Ω minimum) or a pair of headphones may be connected via JK1 which disconnects the internal loudspeaker. External power may be applied to the receiver via JK2 which disconnects the internal battery. In the absence of an rf carrier, only noise will exist at point "E". This will be passed via RV2 and C28 to the noise amplifier TR4, a BC172B. The collector load is an LC circuit tuned to about 10kHz and is coupled via C30 to a diode detector/doubler. The negative-going output of this detector turns off TR5 (the squelch gate) and hence prevents the noise from being passed to the audio amplifier. If the receiver is now tuned to a carrier, stronger levels of rf signal will progressively quieten the limiting rf amplifier, reduce the negative bias

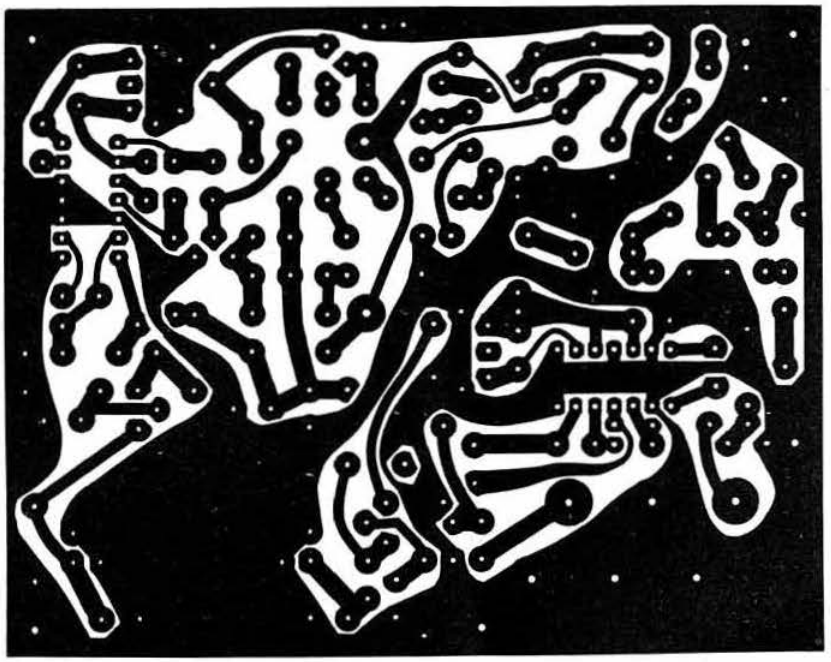


Fig 3. PCB etching, underside

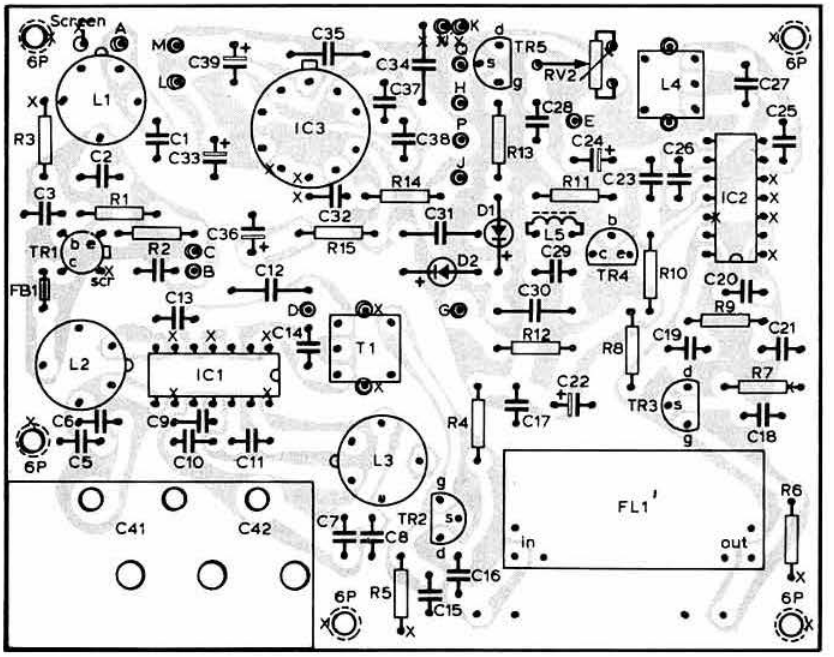


Fig 4. Component layout, pcb top view

6P indicates 6BA tapped x 0·5" long pillars

Components list

R1	4·7kΩ	**R10**	120Ω
R2	680Ω	**R11**	470Ω
R3, 9	10kΩ	**R12**	100Ω
R4	1kΩ	**R13**	47kΩ
R5, 6, 7	1·8kΩ	**R14**	33kΩ
R8	3·9kΩ	**R15**	12kΩ

All resistors 0·25W 5% carbon film

RV1 5kΩ carbon pot log with switch
RV2 10kΩ carbon pot linear
C1, 2 15pF ceramic plate ±2%
C3, 4 1nF ceramic plate ±10%
C5 12pF ceramic plate ±2%
C6, 7 3·9pF ceramic plate ±2%
C8, 10 12pF ceramic plate ±2%
C9, 11 6·8pF ceramic plate ±2%
C12 100nF polyester ±20%
C13, 15, 16, 17, 18, 19, 20, 22, 23, 28, 29 10nF ceramic plate −20 +80%
C14 68pF ceramic plate ±2%
C22, 33, 39 100μF electrolytic pluggable 16V
C24 2·2μF electrolytic 63V
C25, 26 18pF ceramic plate ±2%
C27, 38 220pF ceramic plate ±2%
C30, 31, 34, 35 100nF polyester ±20%
C32 1nF ceramic plate ±10%
C36 47μF electrolytic pluggable 16V
C37 82pF ceramic plate ±2%
C40 220μF electrolytic (with mechanical sets only)
C41, 42 15pF swing tuner (Wingrove & Rogers 3/CG80-03/1)
L1 Antenna coupling winding
L2 Mixer tuning coil
L3 Local oscillator coil
(Toko type E515HNS−210170 RIE9)
L4 Demodulator tank coil Toko type KAN−K3589ABD
L5 Squelch inductor 18mH Toko type 187LY−183
T1 I.F. coupling transformer Toko type KAN−K3590ABD
FB1 Ferrite bead

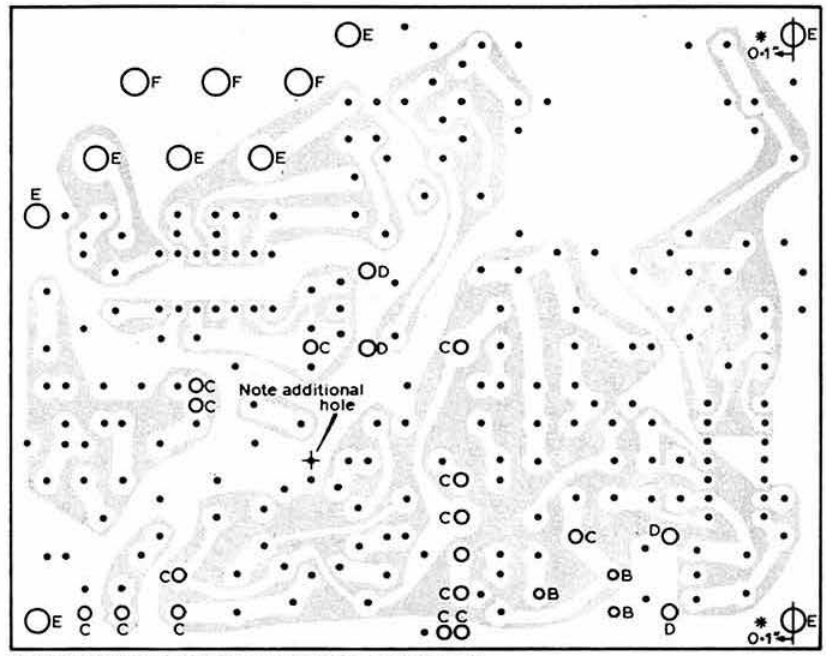
FL1 Crystal filter 10·7MHz bw ±7·5kHz, ITT type 024BG/923B
D1, D2 Germanium diode type AA116 noise demodulator
TR1 AF239 Germanium pnp rf amplifier
TR2, 3 BF256A jfet i.f. amp/filter matching
TR4 BC172B silicon npn squelch amplifier
TR5 BF256A jfet squelch switch/gate (identified with white spot)
IC1 SO42P balanced mixer/oscillator (Siemens)
IC2 SO41P limiting amplifier/demodulator (Siemens)
IC3 TAA611A55 af output amplifier
LS1 Internal loudspeaker 25Ω/1W Mullard type AD2071/Z25
SK1 Belling-Lee antenna socket
JK1 0·25in headphone jack
JK2 3·5mm power jack
S1 SPST squelch on-off
S2a, b Power on-off dpst (on RV1)

Variations
It is recommended that a 6:1 reduction drive is used with the tuning gang. Also, some experiments with the removal of rotor vanes would produce a more expanded scale if less coverage was required.

Coil winding details

Coil	Toko part No	Function	Winding (0·7mm wire) 1	2	3
			Pins 2 5	Pins 2 8	Pins 1 6
L1	E515HNS-210170 RIE9	Antenna coupling	2½ turns	¼ turn	2¼ turns
L2	E515HNS-210170 RIE9	Mixer tuning	2½ turns	¼ turn	2¼ turns
L3	E515HNS-210170 RIE9	Local oscillator	2½ turns	¼ turn	2¼ turns
T1	KAN K3590 ABD	1st i.f.	Pins 1 3	Pins 4 6	
			15 turns	8 turns	–
L4	KAN K3589 ABD	Demodulator tank coil	Pins 1 3	–	–
			7 turns		

All wound on ferrite cores. (Original coils custom-made by Toko.)



Recommended metric drill sizes with nearest equivalent

Holes 'A'....	1mm dia	No 60	0·040"	Holes 'D'.....	1·8mm dia	No 50	0·070"
'B'.....	1·2mm dia	No 56	0·047"	'E'.....	3mm dia	No 31	0·118"
'C'.....	1·5mm dia	No 53	0·059"	'F'.....	3·3mm dia	No 30	0·129"

Fig 5. PCB drilling guide. (*For those building the receiver in a die-cast box, these two mounting holes should be relocated upwards by 0·1in to allow the corners to be removed to clear screw bosses in the box)

applied to the squelch gate, and therefore allow any fm modulation on the carrier to be passed to the audio amplifier. Thus, by varying the setting of RV2 the sensitivity of the squelch circuit may be suited to any appropriate rf level, eg adjusted so that signal levels below, say, 1μV may be effectively cut off and only signals above that level may be resolved.

A degree of power supply flexibility has been built in. For a basic circuit not associated with a transmitter, the rf amplifier, mixer/osc and i.f./audio stages may be run from the same power supply. To effect this, link points B to D and C to G. However, when used with a companion transmitter circuit it is desirable to shut down the receiver, except the oscillator, in the transmit mode in order to maintain frequency stability. The mixer/osc may be powered continuously via point D, preferably by a stabilized 7V supply but, with points C–G linked, the main power to the circuit may be switched off in the transmit mode at point P.

Construction

The circuit is constructed on a double-sided pcb, the top side of the board being plain copper to provide an earth plane. All holes are spot drilled with a 1mm drill, and opened out according to the drilling guide. Most of the holes on the top side have to be counter-bored in order to isolate component leads from earth. The counter-boring guide shows which holes should *not* be counter-bored, all others being counter-bored with either a Vero track cutter or a suitable drill to produce a copperless area of about 0·1in diameter. Finally de-burr all holes lightly with a drill, removing as small an amount of copper as possible around the hole.

Assembly

Assembly is generally straightforward, but care should be taken to mount all components well down on to the pcb, not forgetting to check for inadvertent shorts to the top side earth plane. Wherever possible, earthed component leads should be soldered to the top side. Care should be taken over soldering, since the components will have short leads, particularly the ics.

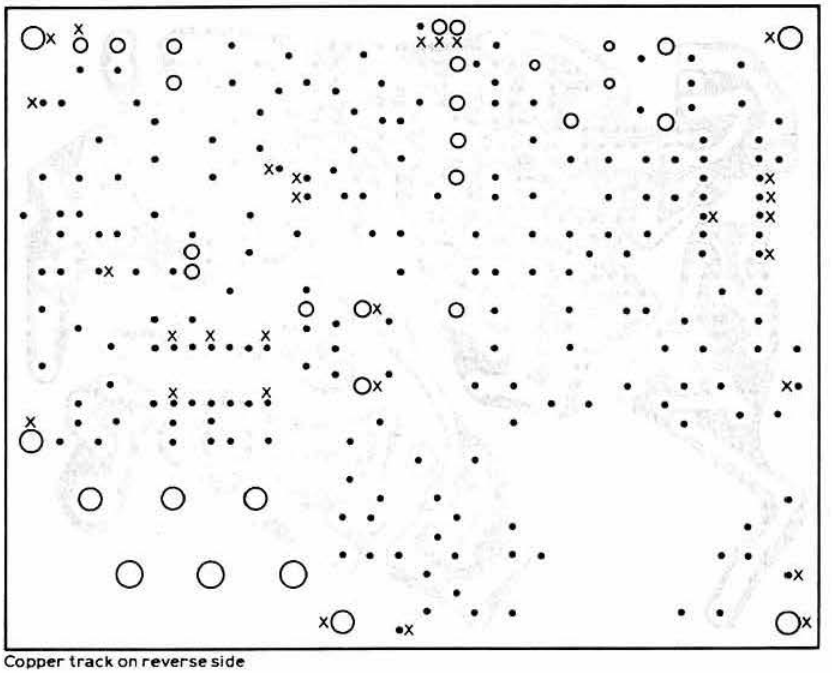
Alignment

Turn RV1 and RV2 to minimum and switch off the squelch (switch shorting) and the loudspeaker load to M and L. Make connections C–G and B–D and ensure that the power lines to P and N are decoupled with 220μF if testing with a battery, otherwise af instability may result due to high dynamic source impedance.

Inject to pin 14 of IC2, via a 10nF capacitor, a signal at 10·7MHz with a deviation of 3kHz peak at about 1mV amplitude and 1kHz modulation. Adjust L4 for maximum recovered audio at H or M.

Inject at point H a sine wave of 1kHz and 10mV p-p, and check for undistorted output at M with an oscilloscope. Output will be approximately 1W(8Ω) or 250mW (25Ω) for about 20mV p-p at H with maximum volume.

Adjust C41/42 to mid-travel and inject a sweep generator into the antenna socket, taking the output from IC2 pin 14 to the equipment demodulator via a 10nF capacitor. Locate the 145MHz marker on the sweep generator and align L3 to produce a response on this marker. Then adjust L1,2 and T1 to produce maximum amplitude, being careful not to overload



Copper track on reverse side

Fig 6. Top side counter-boring guide. File excess glass fibre at circumference to match the underside copper pattern. If building receiver in die-cast box, corners must be removed to clear box bosses. Crop front end corners at 45° by 0·1in and then crop rear corners to give good fit in the box. It may be necessary to file away the base of the mounting bosses in the box due to their large taper. The holes marked "X" should NOT be counter-bored, but the drill burrs should be removed carefully. The remaining holes should be counter-bored to expose the glass fibre to a diameter of about 0·1in

Receiver specifications

(based on two different receivers)

Frequency coverage	144–146MHz
Image response	–34dB relative to 145MHz
Sensitivity	Low level detectability Ω0·25μV ≤1μV for 10db quieting 1·5μV for 20dB quieting Start of quieting Ω0·5μV
Oscillator drift	
Variation with supply	11V + 15kHz 10V + 8kHz 9V 0 8V – 8kHz 7V – 15kHz
Switch-on drift after 1min from switch-on	
	+5min ..... –5kHz
	+30min 11kHz
Oscillator detuning with input level	
(detuning starts at 5–10mV)	
	10mV ..... –11kHz
	100mV ..... –70kHz
	1,000mV ..... –31kHz
I.F. bandwidth	±7·5kHz at 10·7MHz
Overall af bandwidth	100Hz–3kHz at –3dB
Output versus deviation	3kHz peak deviation at 1kHz gives ≥250mW into 25Ω at maximum volume
Quiescent current consumption	20mA at +9V

Note. RF measurements were made with a Hewlett-Packard 8640B signal generator. RF voltages are rms levels assuming a 50Ω load, ie the emf levels are twice those indicated.

the receiver as this will mask the alignment. Check that by adjusting C41/42 that the whole of 144–146MHz is tunable with about 0·5MHz extra at either end.

Remove all input signals, switch on the squelch (S1 open) and check that the noise at the audio output is killed when RV2 is adjusted anticlockwise between 40 and 75 per cent of travel. The receiver is now ready to use.

Conclusion

Eighteen kits of parts have been sold to EARS members and at the time of writing about 50 per cent have been completed. In two cases the local oscillator would not operate satisfactorily, and this has been cured by the addition of a 1kΩ resistor to ground on each of pins 10 and 12 of IC1. This increases the transconductance of the mixer-oscillator and maintains the oscillation correctly. This problem has been the only one encountered, and in all other respects the circuit has been found to operate satisfactorily.

In spite of its simplicity, the receiver performs well compared with some well-known "black boxes", although one could find several areas where improvements could be made. The author's version, located at Slough, Berkshire, receives GB3LO (about 25 miles distant) without any problem, the antenna being a 5λ/8 whip magnetically mounted on an instrument cabinet in the loft. GB3SN is receivable, although with some noise present, without any difficulty.

All in all, the receiver has proved to be an interesting little project to design and build.

Reference

[1] "A miniature receiver for the 2m band". G. Ruhr, OH2KT.

BROMA—Binary Read-Out Meter Adapter

An aid for the visually handicapped

by P. H. H. Jones, BEM, G3DRE*

Introduction

The unit to be described is a millivoltmeter in which the output indication is in the form of coded tones. It is intended primarily to be connected across the meter terminals in existing equipment in order to provide a precise audio indication corresponding to the meter reading. It was developed originally to enable blind people to perform circuit measurements conveniently and with the same precision that sighted people take for granted. An advantage over Braille test meters is that it leaves both hands free to perform adjustments.

The output signal consists of two coded tone signals similar to morse code which represent all integers between 0 and 99. The maximum resolution at full-scale deflection, therefore, is ±0·5 per cent, which is more than adequate for most purposes.

The input of the millivoltmeter will usually be connected directly across existing meters of a variety of types. As these will have different sensitivities, the basic sensitivity of the millivoltmeter is made adjustable so that its full-scale deflection can be set for any input between 40 and 200mV. The voltage developed across the terminals of most meters falls within this range.

An important advantage of this approach is that use is automatically made of all the existing metering circuitry of the equipment being monitored—and without it being necessary to know this circuitry. Where it is not practical to connect the unit directly across the meter movement itself, as with a voltmeter with its series resistor fitted internally, a suitable potential divider network will be needed to provide the 40–200mV signal required by the millivoltmeter.

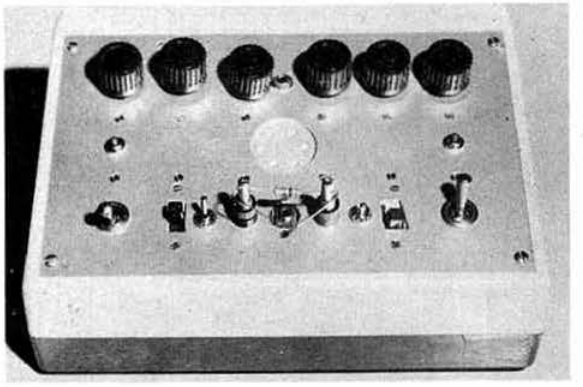
The millivoltmeter can be set up as an absolute indicator, the range of which can be extended to cover volts, amperes and ohms using conventional test meter techniques. It can also be used with a suitable temperature sensor, for example, to measure temperatures.

Although initially intended to be used by blind people, the unit will also be useful under other conditions where conventional meters are difficult to read, as in a mine, or where they are vulnerable to damage. The audio output is, of course, readily recorded on a standard tape recorder—with a running commentary, if appropriate!

Circuit description

The complete circuit is shown in Fig 1. The main circuitry consists of an analogue-digital converter in which the voltage presented at the input terminals is converted into tone signals according to the following scheme:

*69 Prospect Road, Bradway, Sheffield, Yorks.

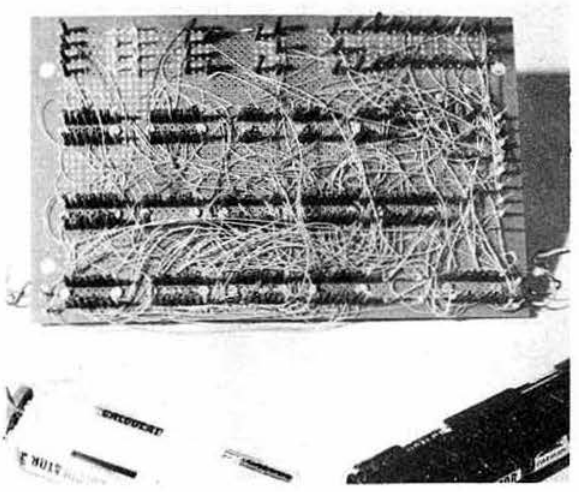


The completed audio read-out millivoltmeter. This version also reads voltage, current and resistance, and also incorporates transistor testing circuitry

1 ···–	6 –···
2 ··–·	7 –··–
3 ··––	8 –·–·
4 ·–··	9 –·––
5 ·–·–	0 ––––

Thus the read-out corresponding to "69" would be –··· ––··. The output signal is preceded by a warning tone indicating that the read-out conversion is taking place within the unit.

Controls are provided to adjust the speed of the read-out, the volume and pitch of the audio tone, and the overall sensitivity of the millivoltmeter as noted earlier. The equipment can be set to give a continuous indication suitable for tuning-up a circuit. Alternatively it may be switched to a "one-shot" mode so that the read-out is produced only on demand. The audio output may be connected to an external loudspeaker or earpiece as desired.



Wiring of the integrated circuits using wire-wrapped rather than soldered connections

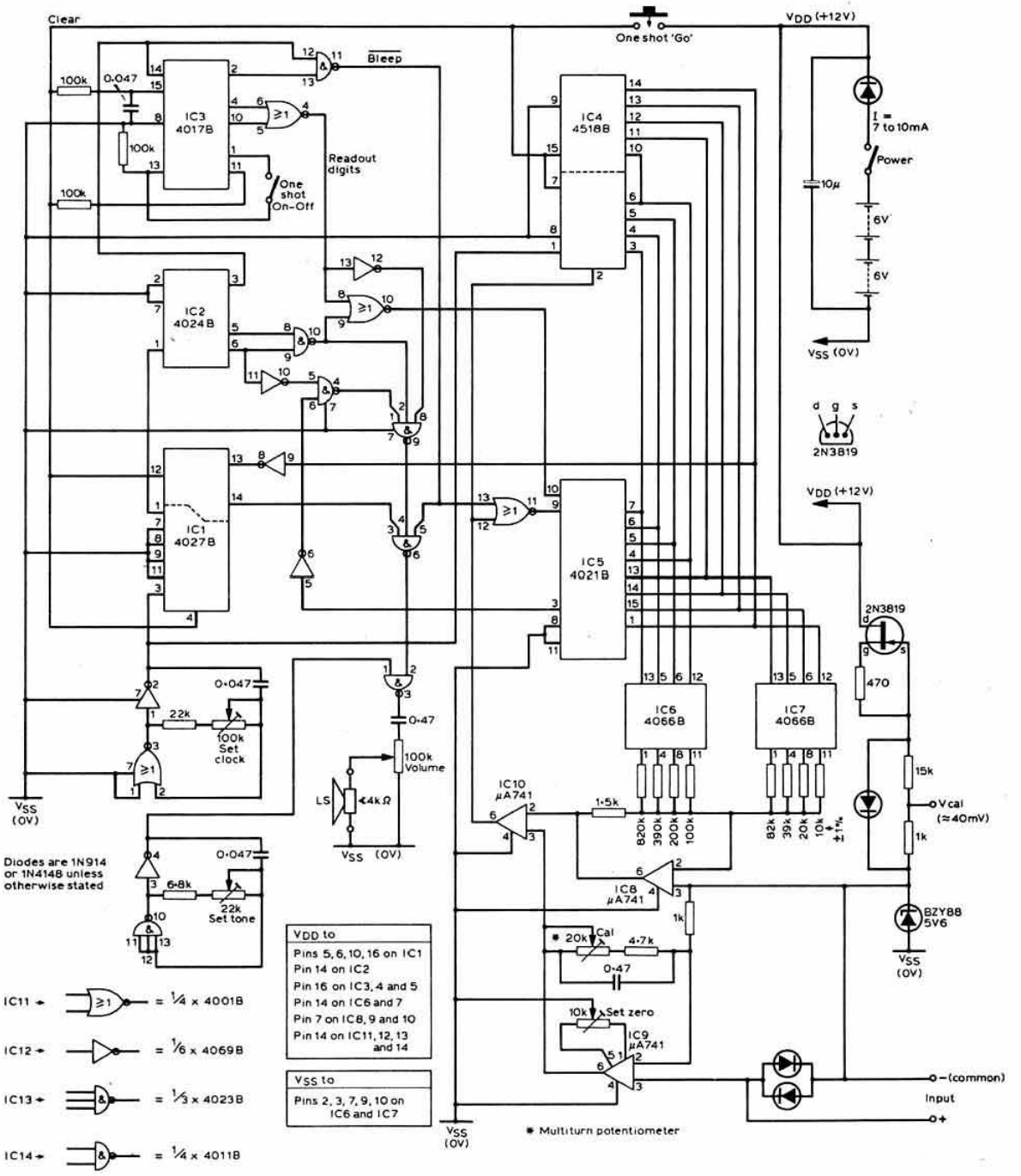
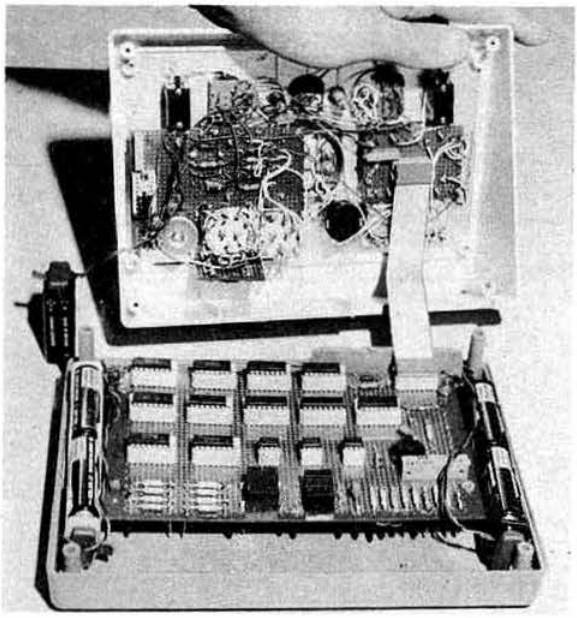


Fig 1. Complete circuit of the audio read-out millivoltmeter. All resistors are 0·5W metal oxide ±2 per cent tolerance except for the 10kΩ ±1 per cent resistor. Resistors marked R are 100kΩ ±5 per cent or better. The 0·047µF capacitors marked C, and the 0·47µF capacitors are 160V working polycarbonate. The 20kΩ SET CALIBRATION potentiometer can be a cermet 10-turn type, but this is expensive. A conventional 265° potentiometer may be substituted, although this is less convenient in use

(All photographs by courtesy of St Dunstan's)



The internal circuitry

The input circuitry is protected against accidental damage by incorporating back-to-back diodes which effectively short the input if a voltage exceeding about 600mV is applied. If an output greater than 99 is produced, the unit will generate a continuous tone.

The circuit can be built using conventional pcb/solder techniques. However, versions have been made on a 6×4in plain Veroboard using the Vero Mini-Wrap wiring system. The latter is of advantage especially to blind constructors as it eliminates the need to use solder.

Operation

The mode of operation of the circuit is as follows. An oscillator producing square waves with a frequency of approximately 256Hz is fed to a series of eight dividers, each one dividing the frequency by two. The final frequency is thus $256 \div 2^8$, that is, 1Hz. This signal is fed into an electronic stepping switch which gives an output at 10 sequential contacts, each contact being fed for 1s except for the first one, designated output No 0, which is alive for only 0·5s.

The outputs from contacts designated 1, 4, 5 and 9 are mixed with the frequencies 1Hz, 4Hz and 8Hz in such a manner that they produce an early warning half-second tone from a separate audio oscillator, the frequency of which can be adjusted to suit the users own preference, when Contact 1 first becomes alive. They then produce a burst of four dots or dashes while Contact 2 is alive, and another similar burst while Contact 4 is alive. Contact 9 is permanently wired into the circuit in such a manner that it resets all counting devices to a zero output and the stepping switch to Contact 0. Contact 9 is reached 8·5s after resetting. The dots and dashes are produced by mixing the 4Hz, 8Hz and a phase-reversed 8Hz signal, and are selected automatically according to whether or not the information available to control them is a 0 (=dot) or 1 (=dash) binary digit. The automatic resetting occurring at 9 can be manually over-ridden by a front-panel-mounted switch. When this is operated, it is necessary to press a spring-return START switch in order to reset the counters. When this switch is released, the instrument will carry out one complete read-out cycle and then stop.

The 0 and 1 binary information selecting the dots and dashes is obtained from the analogue-digital converter. This section is fed with the input voltage and converts it into a series of eight digits, the values of which, starting with the most significant digit, are equal to 80, 40, 20, 10, 8, 4, 2 and 1 per cent of the meter full-scale deflection.

By grouping the digits into two groups of four and resetting each group to zero when its total value exceeds 90 or 9 respectively, a binary-coded-decimal train of digits is produced, the total value of which can lie anywhere between zero and 99. In this way the meter reading is divided into steps at 1 per cent intervals. These digits are fed simultaneously into a parallel/series storage device—a shift register—which then feeds them out one at a time to the dot/dash generator to produce two bursts of four dots or dashes. The maximum accuracy of this process is +1 per cent/−0 per cent of the full-scale deflection of the meter. However, even using normal 2 per cent resistors, except for one that requires to be within 1 per cent, the overall accuracy should not be much worse than ±2 per cent after calibrating.

Power to the unit is 12V±25 per cent at a current of about 7mA, plus that required to power the audio output device. If the latter is a high-impedance earpiece then the additional current will be small.

Setting-up

The millivoltmeter is set-up by first adjusting the SET-ZERO control until a 00 signal is heard when the input is shorted. In normal use the millivoltmeter is connected across the meter in the equipment to be monitored with the circuit conditions set to give a large meter deflection. The SET-CALIBRATION control is then adjusted so that the audio read-out corresponds to the meter reading—as usually provided by a sighted person, of course. Subsequent readings above and below this point, and on other metering ranges, thereafter will retain this calibration.

If the meter has a full-scale deflection of 1, 10 or 100, for example, then the audio read-out can be made to correspond directly with the meter reading with suitable positioning of the decimal point. However, if the meter reads 0–30, for example, then one has the choice of making the audio read-out either 0–100 and to use the appropriate conversion factor or, alternatively, to make the read-out also read 0–30 if convenience is more important than absolute accuracy.

The basic design includes a reference voltage source of approximately 40mV which has a temperature coefficient of −125μV/°C. If this source is accurately calibrated, then it can be used to make the millivoltmeter an absolute instrument.

Acknowledgements

The author would like to express his sincere thanks to all who have taken part in the BROMA project, especially: Chris Cadogan, G3XWB, and Tony Wilmott, G8MPF, for many hours of design work; Tony Whitaker, G3RKL, of Sheffield University for his invaluable advice; Messrs Vero Electronics for their help with the Mini-Wrap system; St Dunstan's for their financial assistance in producing the prototype; and my daughter Rosalind who read the circuit so that it could be transcribed into Braille for the wiring of the prototype. □

Crystal-controlled tones and baud speed for vdus

by I. CLINE, G3EMU*

A shack in the garden is a place of mixed blessings. One of the worst aspects is the great range of temperature that one can experience in this environment; in the author's it can vary from 0 to 15°C in a short time. This of course is one of the worst enemies of free-running oscillators.

Having built of copy of that excellent vdu by G3PLX, it was not long before the author was getting reports of wrong baud speed, and this became more apparent as winter came and he started using some heating. The obvious answer seemed to be that crystal-controlled oscillators were needed for better stability; he chose a 1MHz crystal, as these are easier to come by, although other frequencies could be used if the divisor is calculated.

Circuit details

The frequencies are 728Hz for the baud speed, and 1,275, 1,445Hz for the tones used for afsk, and these are obtained by dividing the 1MHz crystal output to the required frequency. To do this the author used the cmos CD4040, a 12-bit binary counter. Details of how the divisors are derived are given for anyone who wishes to apply them to another frequency crystal, and they will also give an idea of the degree of accuracy obtained.

(1) The baud speed. The uart requires $16 \times 45 \cdot 5 = 728$, so $\frac{1\text{MHz}}{728} = 1{,}374$. Using only the integers of the divisors, the binary numbers used from the Q outputs of the counter are shown below—1 when used and 0 when not used.

1,024	512	256	128	64	32	16	8	4	2	1
1	0	1	0	1	0	1	1	1	1	0

1,374
1,024
350
256
94
64
30
16
14
8
6
4
2
2
0

This requires outputs from Q11, Q9, Q7, Q5, Q4, Q3 and Q2

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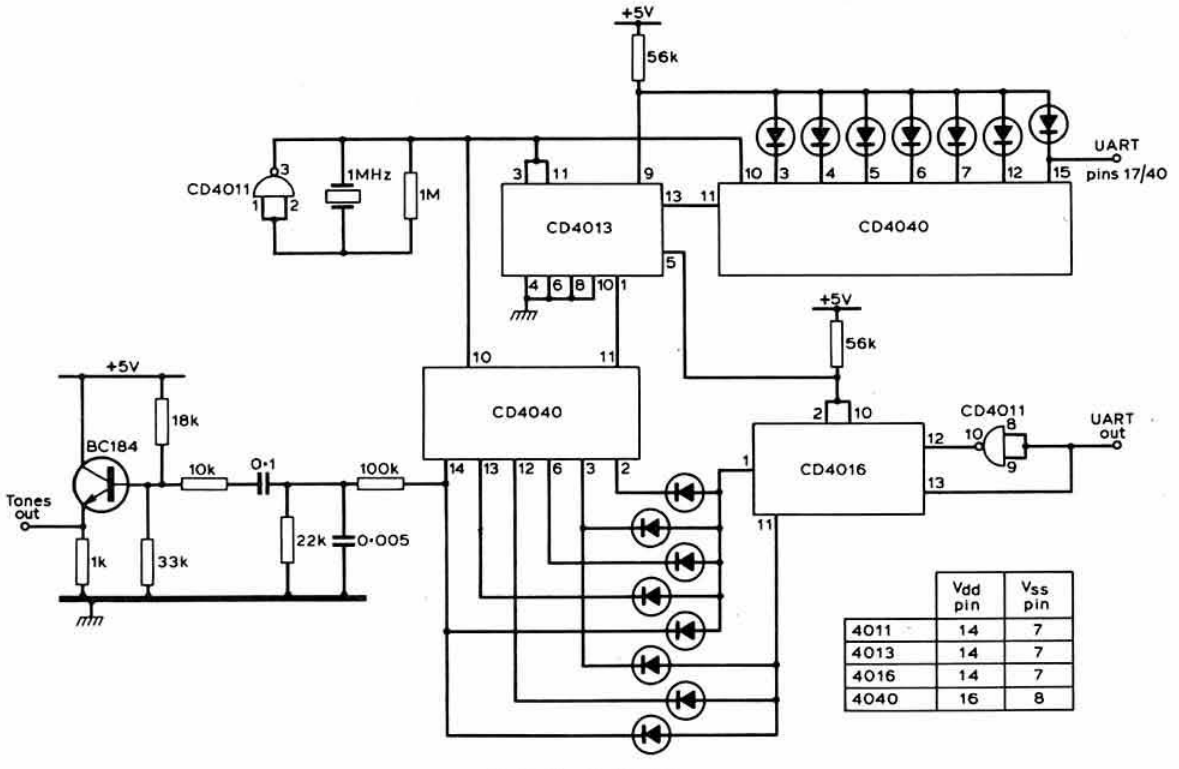


Fig 1. Circuit diagram

on the counter, and will compare favourably with the governed speed of a printer motor.

(2) 1,275Hz tone—same procedure. $\frac{1MHz}{1,275} = 784.$

1,024	512	256	128	64	32	16	8	4	2	1
0	1	1	0	0	0	1	0	0	0	0

784
512
272
256
16
16
0

For 1,275Hz, use outputs from Q10, Q9 and Q5.

(3) 1,445Hz tone—same procedure. $\frac{1MHz}{1,445} = 692.$

1,024	512	256	128	64	32	16	8	4	2	1
0	1	0	1	0	1	1	0	1	0	0

692
512
180
128
52
32
20
16
4
4
0

For 1,445Hz use outputs from Q10, Q8, Q6, Q5 and Q3.

The outputs are coded with diodes, and when the correct count comes up, their common point, which is also joined to the 56kΩ resistor, goes high. This resets the counter via the CD4013 flip-flop. Output to the uart is taken from Q10.

The operation of the counter for the tones is similar; the serial rtty from the uart pin 23 goes to a CD4016 switch direct and via a CD4011 as inverter. The corresponding mark and space tones will go via the simple filter and emitter follower.

The other part of the CD4011 NAND gate is used as the crystal clock. Due to the high impedance of this device, no trouble has been experienced with such a simple oscillator in geting the crystal to fire. No doubt trimmer capacitors could be used should it be found that the crystal is too far off 1MHz.

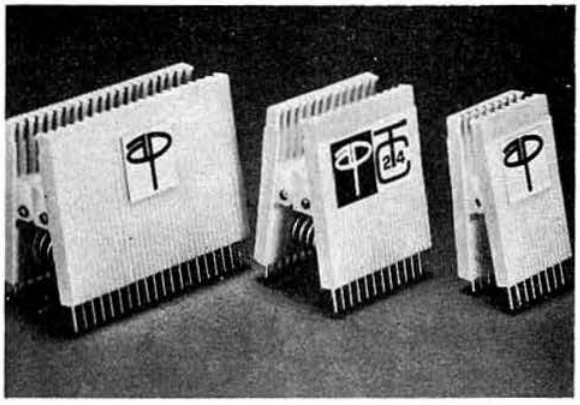
The unit was built on a Veroboard, similar to that of the vdu, complete with edge connector. The cmos is run from 5V dc to enable it to use the same power supply as the ttl in the rest of the logic circuits. It is quite easy to get working, and is a worthwhile scheme if drift is a problem. □

NEW PRODUCTS

Lektrokit ic test clip

The new Lektrokit TC14 ic test clip offers a simple and inexpensive means of accessing any ic pin or lead. Test probe attachment is made simple and the chances of damaging ic pins are avoided. The test clip simply clips over the ic, bringing its individual lead connections out to a set of easily accessible contacts at the opposite end of the clip. Various sizes are available to exactly match the popular ic pin configurations [8-, 14- and 16-pin dil].

Reliability is enhanced by the gold-plated, phosphor bronze spring contacts that have been specifically designed to achieve a wiping/cleaning action. A contact "comb" separating individual contacts gives positive positioning and prevents accidental shorting of adjacent leads. Probes from test instruments such as dmms, 'scopes etc, can hang freely from the long terminal/test connections at the top of each test clip and not interfere with terminals in the bottom row when the clip is on its side.



A selection of Lektrokit ic test clips

The TC-14, which clips directly over a 14-pin dil, costs only £2.95. Further information from Lektrokit Ltd, Sutton Industrial Park, London Road, Earley, Reading, Berks RG6 1AZ. Tel 0734 669116.

Pulsar portable power pack

This portable power pack is fitted with either of the following elpower solid-gel rechargeable batteries—6V 16AH, 12V 8AH or 24V 4AH. It has a durable hard plastic case with or without a terylene shoulder strap, and a carrying handle is moulded into the case as standard. The output of the power pack can be on many different types of socket but generally, it is supplied with the cigar lighter socket.

The applications for the power pack are numerous and include: portable power for hand lamps, portable television, cameras, film cameras and communications equipment. Further information from Pulsar Developments Ltd, Spracklen House, Dukes Place, Marlow, Bucks SL7 2QH. Tel Marlow 06284 73555.

Tee for "Two"

A simple add-on filter for 144MHz

by A. R. C. BADCOCK, G8IPQ*

MAKING one's own transmitters can be a major source of satisfaction and learning, and is one of the fundamental aspects of amateur radio. Doing it yourself can also bring many problems, not the least of which is removing from the transmitter the harmonics which can embarrassingly appear on other bands. Not all amateurs are professionals with access to expensive spectrum analysers to aid the production of a clean output, so some form of simple and reliable filtering is needed to make the necessary difference to the output signal.

Requirements

(i) A cheap, easy-to-construct filter for the 144MHz band.
(ii) It must be reasonably small to fit in average enclosures.
(iii) It must cover the band with a small insertion loss (less than 1dB).
(iv) It must attenuate all harmonics by a substantial amount (at least 10dB).
(v) It must be simple to construct and set up.

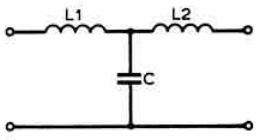


Fig 1. Basic low-pass section

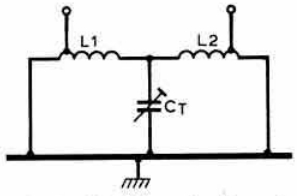


Fig 2. Modified "matched" section

The filter

The simplest approach is to use a constant K filter section (Fig 1), choosing a T section because it reduces the number of expensive capacitors. The basic section, however, is difficult to match over a wide bandwidth, a feature needed to keep the transmitter loading reasonably constant, so some modification is required which alters the filter type from the starting concept. To provide a match, the ends of the T are grounded and the output connections are tapped up from ground (Fig 2). The capacitor C_T is made variable and tunes the centre frequency of the filter. The filter now exhibits more of a bandpass characteristic.

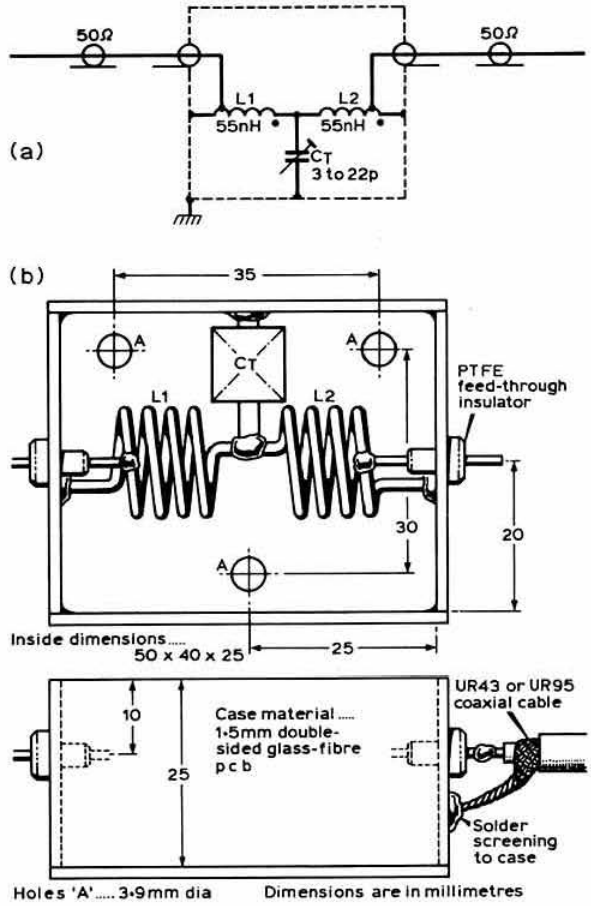


Fig 3. (a) Filter circuit. The junction of L1, L2 and C_T is suspended freely, supported only by the tag of C_T. The earth end of L1 and L2 is on the base of the enclosure directly under the end of the coil. All joints of encasing pcb strips are soldered. Coil details, L1 and L2: 4t 16swg tcw, 12·5mm id, 12·5mm long, separation 10mm, taps ½t from earth. (b) Typical construction, plan and side views

Construction

The filter circuit and constructional details are shown in Fig 3. Strips of double-sided pcb are soldered to form a box structure as shown, and the coils wound and soldered in. The ptfe lead-throughs tap on to half-a-turn up the coils from the earth end. (If a die-cast box or aluminium box is used the connections can be via BNC sockets.) The capacitor is soldered in the centre. A good quality trimmer such as made by Oxley or Jackson is preferred.

Alignment

Alignment may be made with a receiver and a signal generator, or simply by listening to an on-air signal near band centre and peaking C_T for maximum signal. When connected to the transmitter, any further tweaking, if needed, may be carried out using a power meter.

*5 Hornapark Close, Churchlands, Lifton, Devon PL16 0BE.

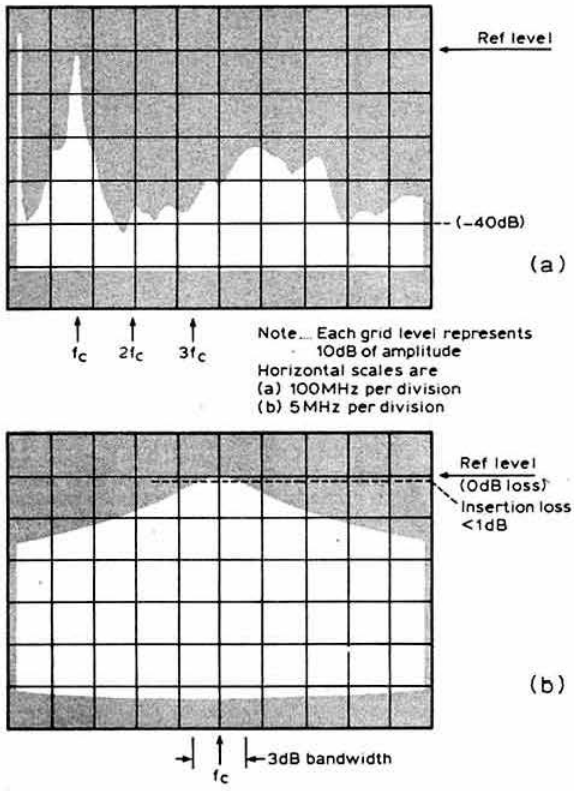


Fig 4. (a) Spectral response of filter unit (10MHz to 1GHz). (b) Filter response centred on 145MHz

Spectrum analyser settings

Fig 4(a): Wide frequency sweep of the "T" filter
Drive power +10dBm from Hewlett-Packard 8602C.
Sweep generator set at 0·01s sweep time for sweep of 10MHz to 1·5GHz.

Spectrum analyser (Hewlett-Packard 141T) settings:

Input attenuation	−10dB
Bandwidth	10kHz
Sweep width	100MHz per division
Scan time	5s
Video filter	off
Log reference	−10dB

Fig 4(b): Narrow frequency sweep of the "T" filter.
Sweep oscillator setting as before.
Spectrum analyser settings:

Input attenuation	−10dB
Bandwidth	3kHz
Sweep width	5MHz per division
Log reference	−10dB
Scan time	1s
Video filter	10kHz

Note: The position of the centre frequency and relevant harmonics (2nd and 3rd) and the approximate bandwidth are indicated on the figures.

Adaptations

The filter may be adapted for 70 or 432MHz by suitably scaling the number of coil turns and capacitor value. (Try six turns for 70MHz and use a larger capacitor, say 35pF. For 432MHz, experimentation with two turns and a 2 to 10pF trimmer may yield the desired result.) The filter can be used as a receive filter to reject strong interference. It may be scaled in size using 6mm diameter and 20swg coils and built on the receiver pcb, fitted in front of the preamp.

Performance

The filter responses are shown in Fig 4. The bandwidth (3dB) is approximately 6MHz and has an insertion loss of under 1dB. The maximum attenuation of all frequencies out of band and around the third harmonic is of the order of 40dB, and greater at the second harmonic. The centre frequency tunes over about ±30MHz approximately.

Conclusion

Building and setting up the filter should be straightforward and well within the abilities of most constructors. It should provide a good basis for experimentation, and should give a simple method of ensuring a cleaner output signal. □

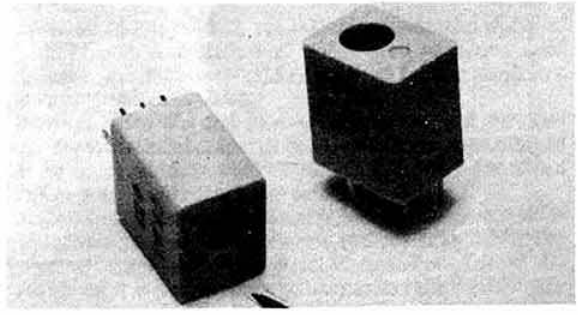
NEW PRODUCT

Toko mechanical i.f. filters

Toko have introduced what are claimed to be the world's smallest mechanical i.f. filters for frequencies in the range 450 to 480kHz. The basic mechanical element is available either individually, the CFM2 series, or with integral input, and input/out matching i.f. transformers known as CFMA and CFMQ types respectively.

The main advantages of these filters over conventional ceramic and crystal filters is the low cost and size required to achieve equivalent shape factor responses. The CFMA and CFMQ series also maintain an excellent skirt response by taking advantage of the ift matching to keep the stopband below −70dB.

Priced at less than £1 for all types, Toko CFM filters are available with a wide range of matching transformers, in bandwidths ranging from 4 to 10kHz, with stock centre frequencies of 455kHz. Further information from: Ambit International, 2 Gresham Road, Brentwood, Essex. Tel 0277 227050.



Toko CFMA mechanical i.f. filters

G4BWE cw memory

by S. PRICE, G4BWE*

ONE of the most exciting developments of recent years has been the solid-state random access memory. Although in the eyes of many amateurs the ram is synonymous with the microprocessor revolution, and therefore something to be avoided, it is true to say that these integrated circuits may be employed in a wide variety of applications outside computing. The design to be described employs a type 2102 1,024 bit (1k for short) static ram now available at a retail price of well under £2 from many electronics suppliers. Using the 2102 and a handful of other components, the design provides the cw operator with the facility to store CQ calls and other short messages for automatic transmission. A unique feature of this cw memory is that it can be used with any key—el-bug, mechanical bug or straight key—the memory can even be programmed by tapping two pieces of wire together!

A form of cw memory similar to the one to be described is the "memory keyer" used extensively by American operators (see *Ham Radio Magazine* October 1973 etc). As its name suggests, the memory keyer consists of an electronic bug key combined with a random access memory. By linking the key and memory, very efficient use of memory space is obtained, as it is a simple matter to use the same clock oscillator for both the dot/dash generator and the ram address circuitry. The inherent synchronization thus achieved means that only one memory location is required to store each dot and three locations for a dash.

The author's cw memory has its own independent clock oscillator, and there is no synchronization with the incoming morse. In order to record the morse accurately it is therefore necessary to run the clock at such a rate that approximately four memory locations are used to store each dot, and 12 locations will be expended during a dash. If the clock is operated at a slower rate than this, distortions of the dash/dot ratio etc will become noticeable. The system is therefore relatively inefficient, but when one has 1,024 memory locations to play with and only a typical CQ call to record, efficiency becomes an academic consideration.

Operation

In order to record morse, S1 is set so as to ground pin 3 of the memory. This pin is the READ/WRITE control, and when it is grounded the 2102 is ready to accept data appearing on pin 11. The morse key is now depressed, and two things happen: (i) The "data-in", pin 11, goes high, indicating the start of either a dot or dash; (ii) the reset pin (4) of IC1, an NE555, also goes high and the ic starts oscillating. IC1 is the clock oscillator which feeds the address counters IC2, IC3 and IC4 (all SN7493 ttl four-bit counters).

An interesting feature of the design is that a variable time constant has been provided to control the period for which IC1 continues to run after the key contacts have broken. RV2 can therefore be set so that the memory will only clock for the duration of one word space after the operator ceases sending. This facility enables the user to pause for long periods while composing a message without huge gaps appearing on replay.

Only two of the four bistables contained within IC4 are required to provide address counts for the ram, so one of the

*64 Northover Road, Westbury-on-Trym, Bristol BS9 3LH.

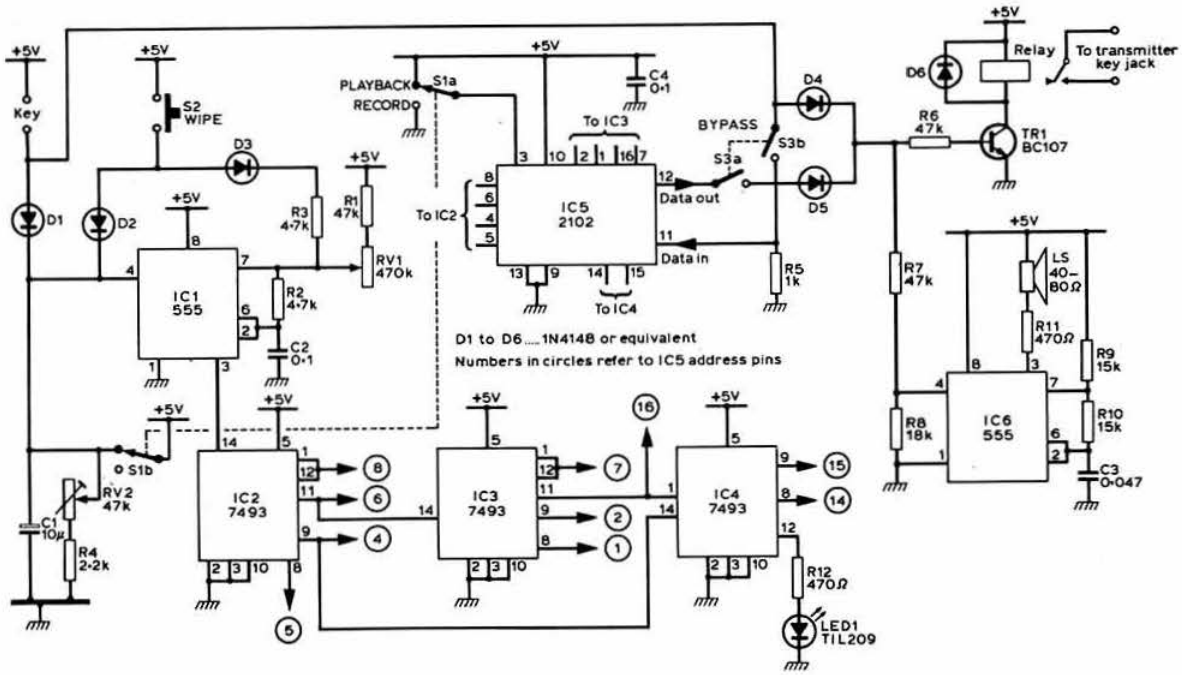


Fig 1. Circuit diagram of memory

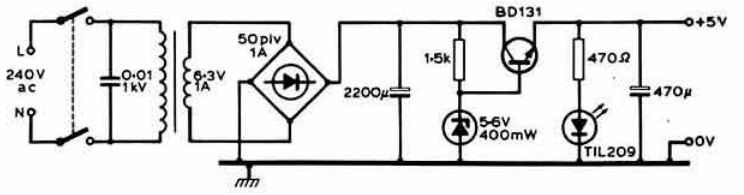


Fig 2. Circuit of prototype mains psu

spare bistables is used as a led driver feeding LED1 with the address count divided by four. LED1 therefore provides an indication of the speed at which the clock is operating, and the user should set RV1 so that LED1 flashes at dot rate.

In order to play back the morse that has been recorded, it is necessary to operate S1 so that pin 3 of the memory is taken high by S1A, and the clock is put into continuous operation by S1B. The morse appears as a series of logic pulses on pin 12 of the ram, and the speed at which it is replayed will depend on the setting of RV1 and can be varied over a wide range. Indeed, the cw memory will be very useful as an aid for those learning to send morse on a straight key; for instance, the pupil can record a short burst of morse at 12wpm and then replay his attempt at 4wpm, thus enabling close examination of errors. It is important to remember that once the memory has been set to PLAY-BACK, it will continue to send whatever has been recorded over and over again; so one can transmit, "CQ DE G3XYZ" for half an hour, if necessary, without touching even a single control!

The memory is fitted with a WIPE control in the form of S2, which is a single-pole push-to-make switch. When S2 is depressed the clock oscillator is enabled via D2 and R3 thus raising the clock frequency considerably. Providing S1 is in the RECORD position and the key is up, depressing S2 for approximately 3s will have the effect of writing "logic 0" into every memory location, thus removing any morse. It will be necessary to wipe the memory each time the unit is switched on, as when power is initially applied to a ram its locations assume random logic states.

S3 is a bypass switch which enables morse to be transmitted without simultaneous recording. S3 should also be used to interrupt the play-back of CQ calls etc as, although flicking S1 to record will also silence the memory, the operation of the memory READ/WRITE control can cause partial loss of data from the 2102.

TR1 drives a miniature reed relay to provide transmitter keying, and a side tone is generated by IC6. The output of IC6 can, of course, be fed directly to a 1kΩ earpiece if the constructor does not wish to employ a miniature loudspeaker (the side tone and transmit relay will operate during record).

As with an electronic keyer, rf radiation from a powerful transmitter may cause the cw memory to malfunction. It should therefore be built into a screened box, and 0·01μF capacitors etc will be useful in providing decoupling of flying leads coming off the circuit board. It may also be necessary to decouple individual ics using 0·01μF or 0·1μF capacitors.

The cw memory requires a single, regulated +5V supply, and as three ttl ics are employed a mains psu is recommended (Fig 2). It is, of course, possible to employ cmos counters rather than 7493s, but LED1 will then require a driver transistor (because the fan-out capabilities of cmos are lower than ttl) and the 2102 ram still requires a regulated 5V supply. □

technical topics

Pat Hawker, G3VA

TIMES change, and some of the erstwhile "magic" of radio has perhaps gone for ever. Just how powerful a spell can be cast by radio construction is well illustrated in the following extract from "Most Secret War" by Dr R. V. Jones:

"My main hobby in my schooldays was, as with many other boys of my generation, the making of radio receiving sets. There has never been anything comparable in any other period to the impact of radio on the ordinary individual in the 'twenties. It was the product of some of the most imaginative developments that have ever occurred in physics, and was as near magic as anyone could conceive, in that with a few mainly home-made components simply connected together one could conjure speech and music out of the air. The construction of radio receivers was just within the competence of the average man, who could thus write himself a passport to countries he could never hope to visit . . . when at last I could afford a thermionic valve in 1928, I built a receiver that picked up transmissions from Melbourne which that station acknowledged by sending me a postcard carrying the signatures of the English Test Team."

We would add that this "magic" lasted well beyond the 'twenties, certainly for hf and vhf receivers, and is by no means entirely dead even today.

Polar-loop ssb transmitters

Linear amplifiers used for valve and solid-state ssb transmitters tend to suffer from two major disadvantages when compared with the Class C (or Class D) amplifiers which can be used for cw/a.m./nbfm: they are very inefficient converters of dc into rf, and generally the degree of linearity achieved is insufficient to prevent the generation of far from negligible spurious third-order and other intermodulation products. Noise and spurious products from earlier, low-level stages also tend to be faithfully amplified and are often present in the output from the transmitter.

It is not surprising, therefore, that there have been a number of attempts to develop ssb transmitters which break away from the need for linear rf amplification. An example is the Dutch system of "constant-amplitude ssb" although great care is needed to avoid broad transmissions. An earlier, more elegant, system was originally described by Leonard Kahn in a paper "Single-sideband transmission by envelope elimination and restoration" in *Proc IRE*, July 1952, pp803-6. Kahn showed that Class C amplification could be used to amplify a phase-modulated component of a low-level ssb signal, with the amplitude envelope restored again in the final power amplifier stage: see the simplified diagram, Fig 1. His paper indicated that a performance equal to or better than that of conventional ssb transmitters could be achieved, with a dc-to-rf efficiency equal to that of an a.m. transmitter (indeed he claimed that a.m. transmitters could be modified quite simply for ssb operation in this way), yet providing lower distortion and fewer spurious products than might be expected with a conventional ssb transmitter using linear amplification.

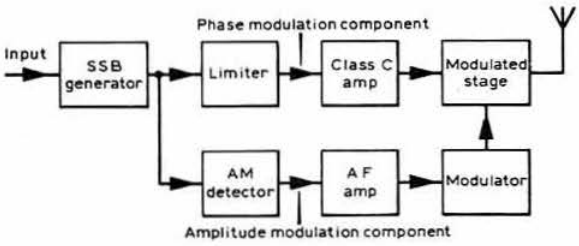


Fig 1. Simplified block diagram of Kahn system of ssb transmission by envelope elimination and restoration, so permitting use of Class C or D rf power amplifiers

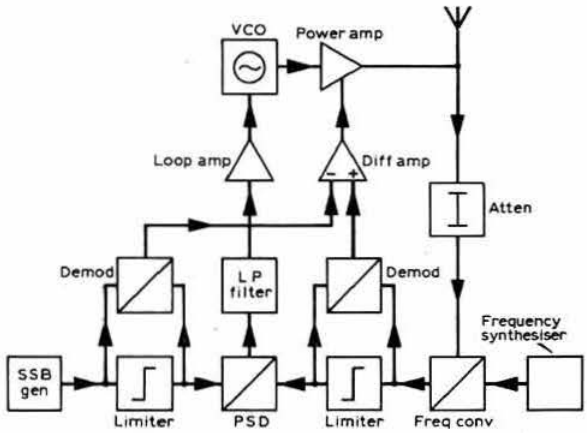


Fig 2. Block diagram of the polar-loop hf/vhf ssb transmitters incorporating feedback into a Kahn system as developed at Bath University

Like a number of the other extremely ingenious systems developed over the years by Kahn (examples: compatible ssb, Echoplex, a.m. stereo) this system seems to have been largely ignored, partly because it was felt that the design of high-level amplitude modulators of the linearity required to minimize spurious products could be almost as difficult as designing linear rf amplifiers.

However, recently V. Petrovic and Professor W. Gosling of Bath University, as part of their work on mobile ssb systems, have shown that a very high order of linearity of an a.m. stage can be achieved using feedback techniques. Full details of an effective gate-modulated vmos amplifier developed at Bath was given in *TT* December 1978 under the heading "VHF/A.M. with vmos". They have now utilized this linear modulator for a form of the Kahn ssb system, which they term the "polar-loop transmitter" (*Electronic Letters*, 10 May, 1970, Vol 15, No 10, pp288-9): Fig 2.

Experimental solid-state ssb transmitters providing peak outputs of 13W at 99·5MHz and 20W at hf have been built at Bath, using a mixture of bipolar and vmos devices in the rf stages. Typically they achieve third-order intermodulation products over 50dB down on p.e.p. and power efficiency in excess of 55 per cent. Output spectrum is shown in Fig 3 (this is a more recent measurement than that given in *Electronic Letters*). The polar-loop concept could also be applied to transmitters of higher power, or could be used at higher frequencies.

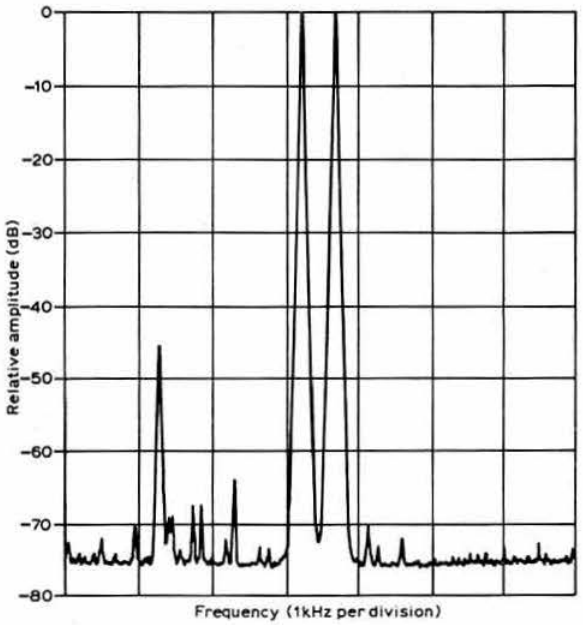


Fig 3. RF spectrum of polar-loop ssb transmitter using two-tone test

Kahn outlined the system as follows: (a) a portion of a low-level ssb signal is limited, producing a pure phase-modulation signal; (b) this phase-modulated signal is amplified to the desired output level in non-critical high efficiency Class C amplifiers; (c) a portion of the original low-level ssb signal is detected and the resultant af signal amplified; and (d) this signal is then used to remodulate the phase-modulated signal, resulting in an amplified copy of the original ssb wave. Petrovic puts this rather differently as follows: "The single-sideband signal is resolved into polar co-ordinate form; that is, two signals—one angle-modulated but of constant amplitude (obtained simply by limiting the output from the ssb generator), and the other proportional to the instantaneous amplitude of the ssb and, hence, a baseband signal. The angle-modulated component is amplified to the required power level in high efficiency (Class C or D) amplifiers, and then high-level amplitude-modulated by the amplitude component, suitably scaled. The result can be shown to be a perfectly reconstructed ssb signal at high power level." The new configuration uses feedback to improve linearity but follows Kahn in resolving into polar co-ordinates within the feedback loop.

Although the polar loop system has been patented, Petrovic has stated that this would not prevent amateurs from building such transmitters for their own use: indeed he is convinced that the system has a number of advantages of particular appeal to those building their own equipment.

(a) Because all rf circuits can be at the output frequency, the rf portion of the transmitter can be exceptionally simple, using Class C amplifiers.

(b) Because of the use of feedback, the transmitter is unusually insensitive to power-supply variations, tuning, change of components etc and does not require critical setting up. Power supplies to the rf amplifiers do not require regulation.

(c) The absence of mixer-type frequency conversions reduces the number of spurious products, resulting in a clean output spectrum.

While the experimental designs at Bath University have been based on the gate-modulated vmos arrangement described last December, other forms of solid-state or valve modulators could be used. Neutralized push-pull vmos rf power amplifiers, with simple biasing, have been made successfully. However, it has been found that care is needed in keeping the value of the bias resistors low (although vmos devices are free of most of the destructive characteristics of bipolar rf power devices, a number were destroyed before the cause of the problem was found).

Vmos rf amplifiers

Although many references have been made in *TT* and *Radio Communication* to the advantages of vmos devices such as the Siliconix VMP-4, the relatively high cost of these devices (compared to surplus bipolar rf power devices) has so far tended to limit their use by amateurs. However, over the past few months a number of low-cost devices, providing a few watts of rf output, have become available. A number of designs, based on these, are beginning to appear. For example, an experimental design for 21 and 28MHz, using four vmos devices, is described by Doug DeMaw, W1FB in *QST* May 1979 (in the same issue is an article by Ed Oxner, ex-W9PRZ, on building broadband, ultra-linear vmos amplifiers based on the VMP-4). A 1·8MHz transmitter has also been described recently in *Practical Wireless* (see below).

Phil Rimmer (of Messrs J. W. Rimmer, 367 Green Lanes, London N4 1DY) has written to me on the suggestion of Horton Canale, GM3XFC, as follows:

"After reading of the possibilities of vmos power fets for rf applications, GM3XFC was frustrated by their apparent high cost and the difficulty of obtaining them. However, a few months ago he came across one of our advertisements for the latest Siliconix devices and was amazed at the prices of some of them. He feels that very few amateurs are aware of the recent devices and suggested I should write to you.

"The devices are the VN10KM and the VN40AF, VN67AF and VN89AF series. We sell the VN10KM at 60p and the VN67AF at 85p. The VN10KM is in a plastic package equivalent to the TO5; it can dissipate about 1W in free air, and considerably more with the tab (low temperature) soldered to the printed circuit board.

"The VN67AF is similar to the VN66AF but with a slightly relaxed specification. The VN67AF has a $V_{DS(on)}$ max voltage (at I_D of 1A and V_{GS} of 10V) listed at 3·5V instead of the 3·0V for the VN66AF. Although a few early samples of the VN67AF had a figure up to 3·5V, recent samples are seldom worse than 2·7V. Our firm provides a selection service at an additional cost of 10p per device. For the VN10KM at an I_D of 0·5A the unselected figure is 2·5V, selected 1·75V; while for the VN67AF the unselected figure is 3·5V and the selected figure is 2·5V; all figures using standard 80μs, one per cent duty cycle pulse test.

"The $V_{DS(on)}$ figure is important in that it defines the 'on' state power dissipation and, therefore, the efficiency of the device in certain applications. While it might seem that these low-cost devices are limited to fairly low-power applications, it should be noted that they can readily be connected in parallel. Indeed, we have found that the use of a number of low-power devices in parallel can produce better performance than with a single higher-power vmos device. The use of six paralleled

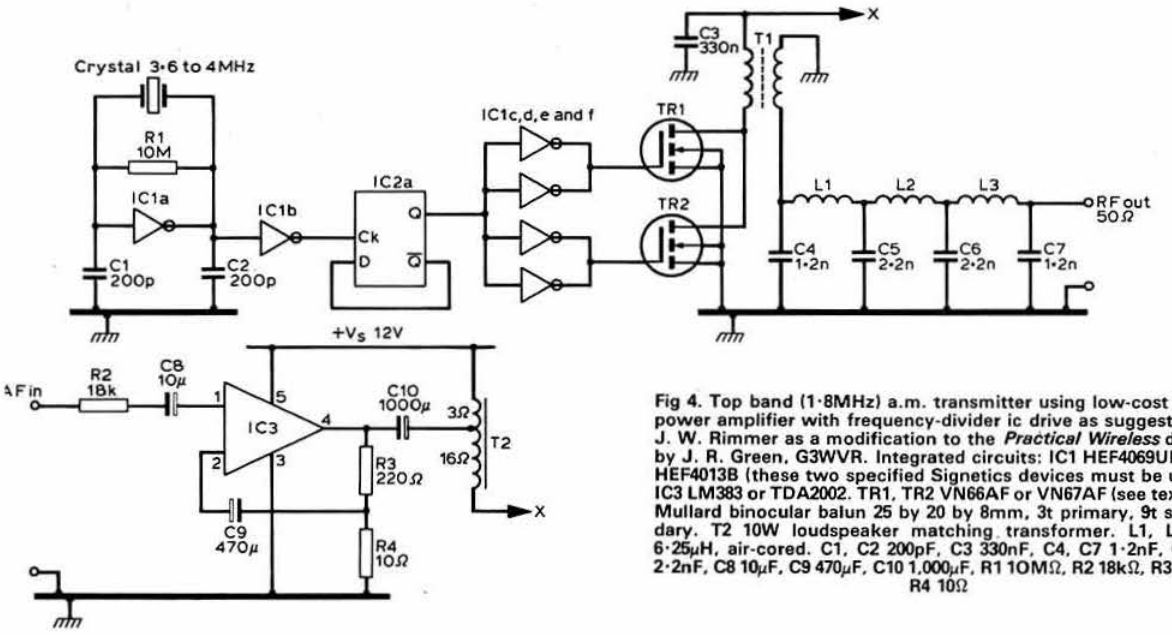


Fig 4. Top band (1·8MHz) a.m. transmitter using low-cost vmos power amplifier with frequency-divider ic drive as suggested by J. W. Rimmer as a modification to the *Practical Wireless* design by J. R. Green, G3WVR. Integrated circuits: IC1 HEF4069UB, IC2 HEF4013B (these two specified Signetics devices must be used), IC3 LM383 or TDA2002. TR1, TR2 VN66AF or VN67AF (see text). T1 Mullard binocular balun 25 by 20 by 8mm, 3t primary, 9t secondary. T2 10W loudspeaker matching transformer. L1, L2, L3 6·25μH, air-cored. C1, C2 200pF, C3 330nF, C4, C7 1·2nF, C5,C6 2·2nF, C8 10μF, C9 470μF, C10 1,000μF, R1 1OMΩ, R2 18kΩ, R3 220Ω, R4 10Ω

VN67AF devices has been compared in switching applications with a single VN64GA (which costs twice as much as six VN67AF devices) and found to provide greater consistency; reduced heat-sink requirements; greater flexibility.

"I enclose a design for a 7W 1·8MHz a.m. transmitter (Fig 4) as an illustration of what can be done: the design is essentially that of J. R. Green, G3WVR, as published in *Practical Wireless* July 1979, but simplified by the use of rather more modern components to show the ease of driving vmos power fets (the Signetics locmos devices are up to 100 per cent faster than conventional cmos and incorporate 'gutsier' output transistors).

"I would also bring to the attention of your readers the 52-page Siliconix vmos power fets design catalogue (January 1979 issue) which is available from us at 45p. Postage is 20p per order".

This catalogue includes a number of useful application notes and design aids covering rf, af and switching applications as well as detailed data sheets for the current range of Siliconix devices.

Valve linears for 144MHz

The June 1979 *TT* included details of an Australian 144MHz linear amplifier with a QQVO6/40 for use with solid-state transceivers such as the IC202. It has to be admitted that a number of readers are by no means convinced that the amplifier as described is always likely to prove sufficiently linear or free from parasitics for its use to be recommended in the crowded conditions of the European 144MHz band.

M. W. Pothecary, G4FUU, points out that the screen-grid circuit of a balanced push-pull valve amplifier should not unbalance the amplifier in any way. While a 50Ω resistor in the screen connection to the valve, with a *regulated* screen supply, is usually all that is required, any by-pass capacitor connected directly to the screen-grid (as in the VK3AUI circuit) can cause inbalance and result in setting-up difficulties. Alternatively, a correctly designed rf choke should be connected between the valve and any by-pass capacitor.

G4FUU has built a number of linear amplifiers using QQVO6/40 and QQVO3/10 valves and finds the circuit arrangement shown in Fig 5 to be satisfactory. It uses less

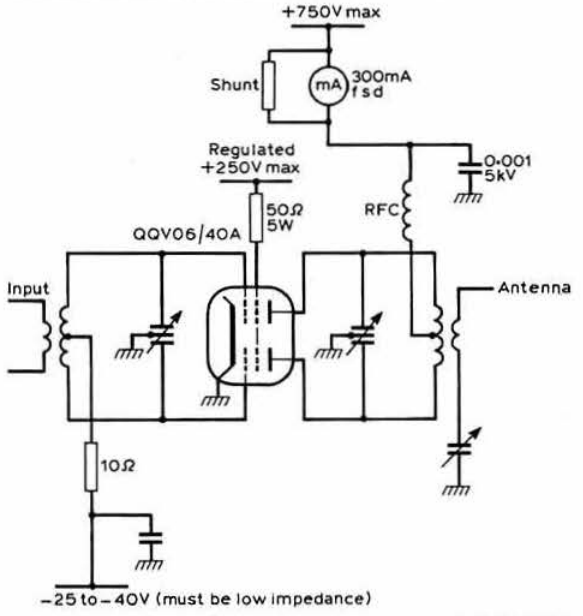


Fig 5. G4FUU's 144MHz linear amplifier using QQVO6/40A. Screen voltage 250V regulated (280V recommended by DK3UZ). Low impedance bias supply (maximum source impedance 5kΩ) and bias adjusted for "just a sniff of grid current at maximum drive"

components than the VK3AUI circuit but calls for a stabilized screen supply and a low-impedance bias supply (so allowing the cathode to be firmly grounded).

Edmund Ramm, DK3UZ/G5BCS, also feels that the VK3AUI amplifier could prove unsuitable. He writes: "With linear amplifiers there is not much freedom of choice of the electrode voltages. To ensure optimum linearity of the QQVO6/40 it requires 750V on the anode, 280V stabilized on the screen-grid (a linear amplifier with a floating screen supply is surely a contradiction in terms) and the stabilized negative control grid-bias needs to be adjusted to allow for an idle anode current of 40mA. A bias circuit with zener diodes only is not easy to adjust; a potentiometer across the diodes would help and, as linear operation of this valve needs to be strictly B_1 (no grid current!), its value can be fairly high.

"When a good-quality lecher-type anode tank circuit is used, the QQVO6/40 will deliver a maximum rated output of 74W. While it is possible to squeeze more out of it, the operation then inevitably becomes far from linear (operators who boast of having a 120W 'linear' using this valve please note!).

"Finally, it should be observed that with the simple output circuit shown, harmonic suppression is unlikely to be better than 40dB, so that the addition of a low-pass filter becomes mandatory."

When long-path is better

One of the most significant discoveries in the field of hf propagation (even if still not widely recognized as such) was that made in the 'fifties by H. J. Albrecht when he realized that the signal strength and reliability of European amateur signals on 3·5, 7 and 14MHz, as received in Australia, just could not be accounted for by conventional theories of multi-hop propagation. This led him 20 years ago to propose the theory of long-distance "chordal hop" hf propagation without intermediate ground reflection losses.

This concept, together with the similar work by Fenwick and Stein on "round-the-world echoes" and the satellite-orientated work on "whispering galleries", is only gradually establishing itself as being the mode by which *the majority* of long-distance amateur contacts are made, particularly those with the antipodes. In his 1978 IEE Conference paper "HF antennas and propagation modes in relation to the amateur service" (reported in *Radio Communication* May 1979, pp428-9) Les Moxon, G6XN, indicated that the reliability of chordal hop propagation over the long-path to Australia reached almost

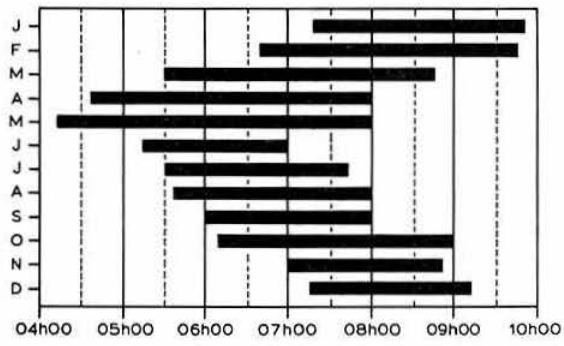


Fig 6. Hours during which the 7MHz long path between Western Europe and Australia (VK2) was found to be open by Albrecht in 1956-7 and which led to the chordal hop theory of long-distance hf propagation

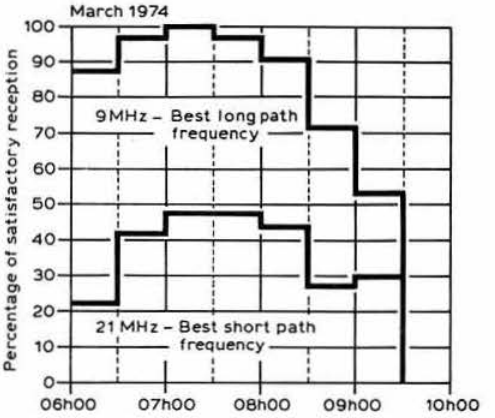


Fig 7. Percentage of satisfactory reception of the Deutsche Welle high-power broadcast transmissions in Australia during March 1974 showed the marked superiority of 9MHz long-path transmissions over the 21MHz short-path transmission

100 per cent at 14MHz for daily periods averaging at least two hours, around 0700-0900gmt over 6-7 years of each of the last three sunspot cycles, with a marked absence of the slow fading typical of multipath propagation such as occurs over trans-atlantic paths.

Further very strong evidence in support of these views can be found in the article "On the propagation of short waves over very long distances: predictions and observations" by K. J. Hortenbach and F. Rogler of Deutsche Welle (the German external broadcasting service) in *Telecommunication Journal* (Vol 46, VI/1979, pp320-7). In brief, this detailed article shows how superior service can be provided to Australia and New Zealand from Wertachtal, West Germany, during the local evening hours by utilizing the 24,000km long path across South America than via the 16,000km short path. It is shown that signals over the long path are often 25dB stronger than the calculated figures based on the normal CCIR formulas. Equally important is the fact that the optimum frequency for long-path service at this time of the day is about 9MHz, whereas that for short-path service is about 21MHz.

Among the reasons advanced to account for the 25dB discrepancy are: (1) the long path is basically a "dark" path and thus far less subject to layer absorption due to the action of the sun; (2) the effect of antipodal focussing (this arises mainly from the fact that all great circles passing through any point on a sphere intersect also at a second point diametrically opposite to the first point, so that signals setting out in *any* direction from point A become focussed on the antipodal point B); and (3) the belief that the propagation modes are free from ground reflection losses (ie chordal hop and not conventional multi-hop). Figs 6-7 reproduced from the German article underline these points.

There are thus several lessons to be learned from the Deutsche Welle experience:

(a) Longer may be louder.

(b) Going up in frequency may put your signals down in strength (what one needs is the muf *for the optimum path*).

(c) The traditional amateur "dawn/dusk" (grey-line) periods of optimum dx are directly linked with the *regular appearance* of ionospheric tilts which occur because of the difference in effective layer height in darkness and daylight. Fig 8

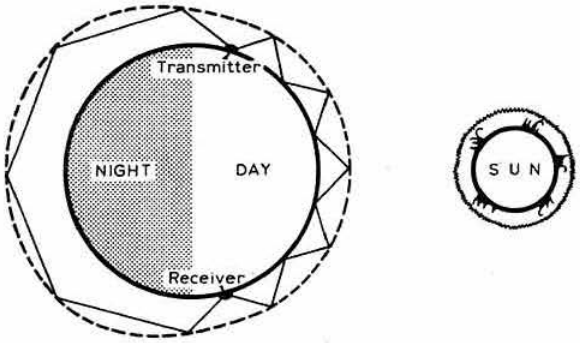


Fig 8. Showing how the change of effective height of the ionospheric reflecting layer around dusk and dawn produces the tilts that make possible chordal hop propagation for long-path transmissions with low darkness attenuation and elimination of multiple ground-reflection losses that occur on the daylight short-path transmissions

shows how chordal hop propagation may occur when the signals hit a "tilted" layer.

(d) When the tilts are roughly overhead, one can launch a satisfactory chordal hop signal *even with an antenna providing a high angle of radiation.* The main advantage of low angles of radiation is that the path is open for a longer period.

The new look sunspot cycle

Yet another way in which we may have to bring our thinking up-to-date is the fundamental question: how long do sunspot cycles last and how regularly do they occur? Most of us, I guess, would (at least until recently) have answered such a question confidently enough, that a sunspot cycle lasts, on average, 11 years, although cycles have been known to vary from under 8 to over 17 years, with each new cycle appearing to be triggered off by some irregular event.

But a series of letters and articles by Professor R. H. Dicke of Princeton University (eg Letter, *Nature* Vol 276, p676; "Solar luminosity and the sunspot cycle", *Nature* Vol 280, 5 July 1979, pp24–7; and "The clock inside the sun", *New Scientist* 5 July 1979, pp 12–4) brings together convincing evidence

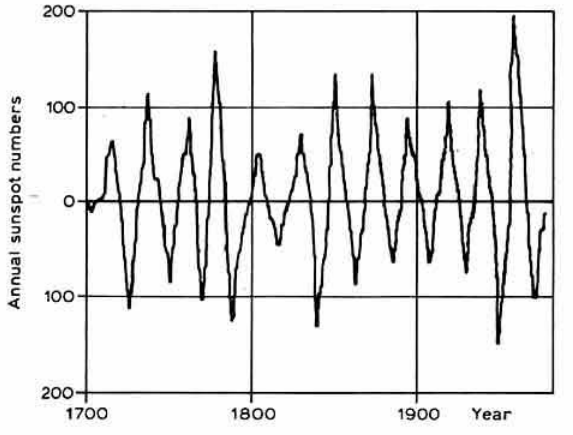


Fig 9. Sunspot cycles plotted on the basis of 22-year-old cycles having 11-year reversals of magnetic field polarity

that the true sunspot cycle lasts 22 years, and that each cycle is triggered off regularly deep inside the sun (although this event occurs some considerable time before the appearance of sunspots on the surface). The variations are caused, it is suggested, by differences in the time taken by the transport of the magnetic field from the deep interior to the surface of the sun. Professor Dicke considers that the sun has the ability to "remember" the correct period of the cycle and gets back into phase over successive cycles.

The idea of a 22-year rather than an 11-year cycle is supported by the fact (discovered by Harold Babcock some two decades ago) that the solar magnetic field reverses polarity in successive 11-year periods. Dicke suggests that the cycle is like that of an ac waveform. Fig 9 shows sunspot numbers plotted against years when one puts alternate maxima as "positive" and "negative" peaks.

He even puts forward a speculative hypothesis as to the nature of the buried "clock". He writes: "It seems very likely that it is a magneto-fluid oscillator. A crude analogue is an oscillating bowl of jelly. The magnetic field lines in the conducting solar gas act like stretchable threads of rubber lacing the 'jelly' together."

So there you are. When it comes down to basics our hf dx depends on that flaming great bowl of orange jelly in the sky.

G4COM's alignment aid

The May *TT* (p424) included details of two proposed modifications to the useful alignment aid (*Radio Communication* January 1976) which allows vhf receivers to be readily adjusted for maximum signal-to-noise ratio. This has prompted the original designer, J. R. Compton, G4COM, to comment as follows:

"The method of producing a negative supply voltage which LA8AK suggests is certainly an improvement. Anything which enables us to dispense with one battery, or to use a single power supply, is well worth having, especially at a component cost comparable to the purchase price of the second battery.

"I am less enthusiastic about the other suggestions. Reducing the value of C1 has no effect on the noise generated. If in practice it has the effect of reducing 'drift' of the meter, this is probably because with the lower value, IC3 may be limiting on peaks and therefore giving a less accurate reading. With the circuit as originally published, the limited bandwidth of a 741 ic as IC2 is irrelevant.

"I am also rather surprised at the delay quoted for a crystal filter (1ms). Delay is presumably a function of the inverse of the bandwidth and would seem unlikely to be much over 0·5ms at most for an ssb filter, but even if the quoted figure of 1ms is correct, the resulting error would be well under 10 per cent and can probably be safely ignored in a simple circuit such as this. Nevertheless the suggested alternative circuit for the square-wave generator seems an improvement on the original design using discrete transistors, although I did find it necessary to provide reverse bias to TR2, which the circuit used by LA8AK apparently does not do."

G4COM has received a good deal of evidence of the interest in many parts of the world in this technique, and the effectiveness of the original design, although he recognizes that the original version is still capable of considerable simplification and improvement. As he puts it: "In the best tradition of amateur radio, I used the components which were lying about, so it comes as no surprise to learn that there are better ways of doing the job."

Car instrument regulator

Mick O'Donnell, G8CCV, noted after installing a broadcast radio in his car that the instrument-supply regulator was introducing quite a lot of "hash" on to the supply lead to the radio.

The operation of a conventional regulator depends on a bi-metallic strip which heats up when current is drawn through it; the different coefficients of expansion cause the strip to bend, so breaking the supply circuit. In turn, this causes the strip to cool down again until the circuit is restored and the process is continually repeated. This provides a stabilized 10V to the instruments, but if not adequately suppressed the constant making and breaking of the contact creates an appreciable amount of radio interference.

G8CCV believes that prevention is better than cure, and decided to replace the bi-metallic strip regulator with an electronic regulator. He used a 7805 three-terminal plastic 5V regulator ic with the common pin "lifted" above earth by means of a 5V1 zener diode, so that the unit provides a 10V 1A regulated supply, more than ample for the 300mA drawn by the two instruments fitted in his car.

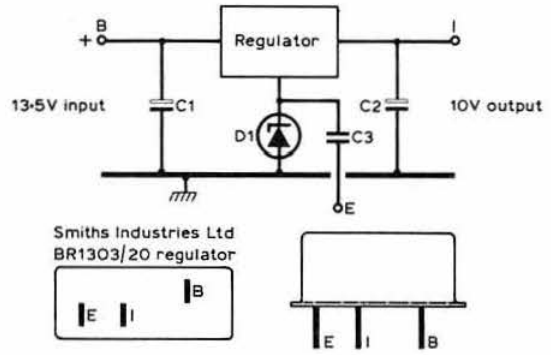


Fig 10. Use of three-terminal solid-state regulator to replace the bi-metal strip regulator normally used for the car instruments' supply. 7805 plastic regulator. ZD1: 5V1 400mW zener diode. C1, C2: 1μF/35V tantalum capacitors. C3: 0·01μF disc ceramic

Since the original regulator was a three-terminal device (coded B for battery), E for earth and I for instruments) of a type made by Smiths Industries (type BR1303/20), G8CCV dismantled it and removed the interior components, so providing space for the new regulator to be carefully built on to the original pins, the cover then being refitted. This unit has been in service for some time and has proved reliable. As shown in Fig 10 it is for negative-earth vehicles but conversion for positive-earth vehicles would be self-evident.

The "dasher" key

A means of converting a normal mechanical bug key into a simple form of mechanical/electronic el-bug is described by Joseph Fenn, KH6JF, in *Ham Radio* (March 1979, p68). This uses a 555 ic timer in conjunction with a small 6V dc, sensitive relay to provide automatic dashes when the dash control is held over, while of course also providing automatic dots by means of the usual vibrating action. The two controls provide speed and weight adjustment, and unlike most el-bugs it can be set to provide dashes of any required ratio to the dots, permitting the long-dash style of sending sometimes cultivated by amateurs. A

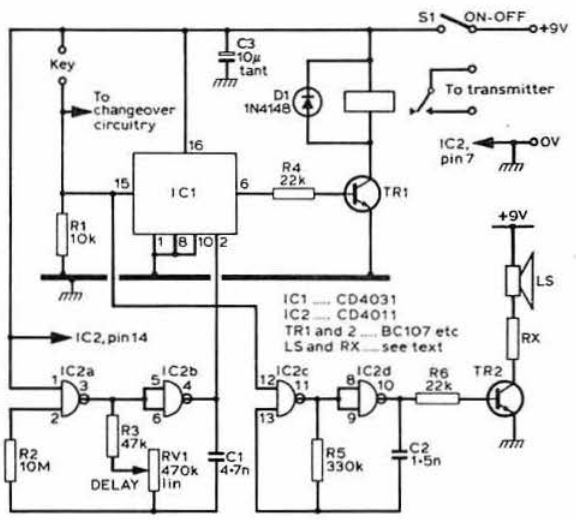


Fig 11. KH6JF's 555 "dasher" unit providing automatic dashes on a mechanical bug key. The diode can be any small-signal switching diode, K1 is a small 6V relay. Shielded twin lead (plus ferrite beads for higher power) should be used between the "dasher" and the key to eliminate rfi problems

rechargeable nicad battery is used, and the unit is enclosed in a small screening box, connected by two-core-plus-shield cable to the bug key, with the screen taken to the frame post. If, in spite of these precautions, strong rf fields cause erratic dash lengths, this can usually be cured by putting ferrite beads on the input and output leads. The only change needed to a Vibroplex-type key is to disconnect the lead under the base from the dash contact post.

Cow-power pioneer

Tim Hutchinson, 5Z4DV, was interested to read the January *TT* item on SM4AQL's successful use of "biogas" produced in his own large methane digester. But he wonders if anyone can beat his own claim that he put possibly the very first cow/pig-powered transmitter on the air in 1955. Initially he used a 32V bank of Nife cells charged from a modified 2hp Lister paraffin engine run entirely on biogas (methane/carbon dioxide) produced from his numerous livestock's manure plus other farm waste including coffee skins, grass etc. The high-voltages came from ex-aircraft rotary converters, and his engine has already chalked up 60,000 hours, although he now also has available a 240V supply from an alternator driven by an 8hp Petter engine run partly on diesel and partly on biogas. Like SM4AQL's system, 5Z4DV in Kenya uses his biogas installations for many purposes other than amateur radio, and considers the greatest benefit is the output of rich organic fertiliser. At least some stations seem well-insulated against the coming energy famine!

Significant snippet

Mike Nicholas, G3TOI, of MN Electronics Ltd, Glenfield, Bury Road, Basingstoke RG23 8EE, has noted the comments about the use of hypodermic needles as ic desoldering aids (*TT* May etc). He writes: "We have a supply of needle tubing in two-inch lengths from needle manufacturers and so known to be unused and without the unwanted sharp point. We can supply these at a cost of 35p to cover administration, VAT etc but please provide a stamped addressed envelope." □

Cycle 21—progress report

by F. M. SMITH, G8KG*

An earlier article (Solar Cycle 21—progress and prospects, *Radio Communication* March 1979 pp221–5) compared the progress of the present solar cycle up to the end of 1978 with that of the preceding three cycles and drew some tentative conclusions about the probable levels of activity during the peak period. This progress report should be read in conjunction with that article, which concluded, in brief, that the current cycle was ahead of Cycle 18 (peak of 152) but behind Cycle 19 (peak of 201), and that the forthcoming peak in solar activity would probably be one of the highest on record, with a maximum smoothed monthly sunspot number of about 170 probably occurring late in 1979 or early in 1980.

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Progress in 1979

It is now possible to update the story of Cycle 21 with data up to and including that for June 1979. The year began with a very steep rise in both sunspot activity and solar radio flux, but this is only part of the story, as a few key figures will show:

Highest monthly sunspot number	= 166 (January)
Lowest monthy sunspot number	= 103 (April)
Highest monthly solar flux	= 199 (February)
Lowest monthly solar flux	= 169 (May)
Highest daily sunspot number	= 231 (9 June)

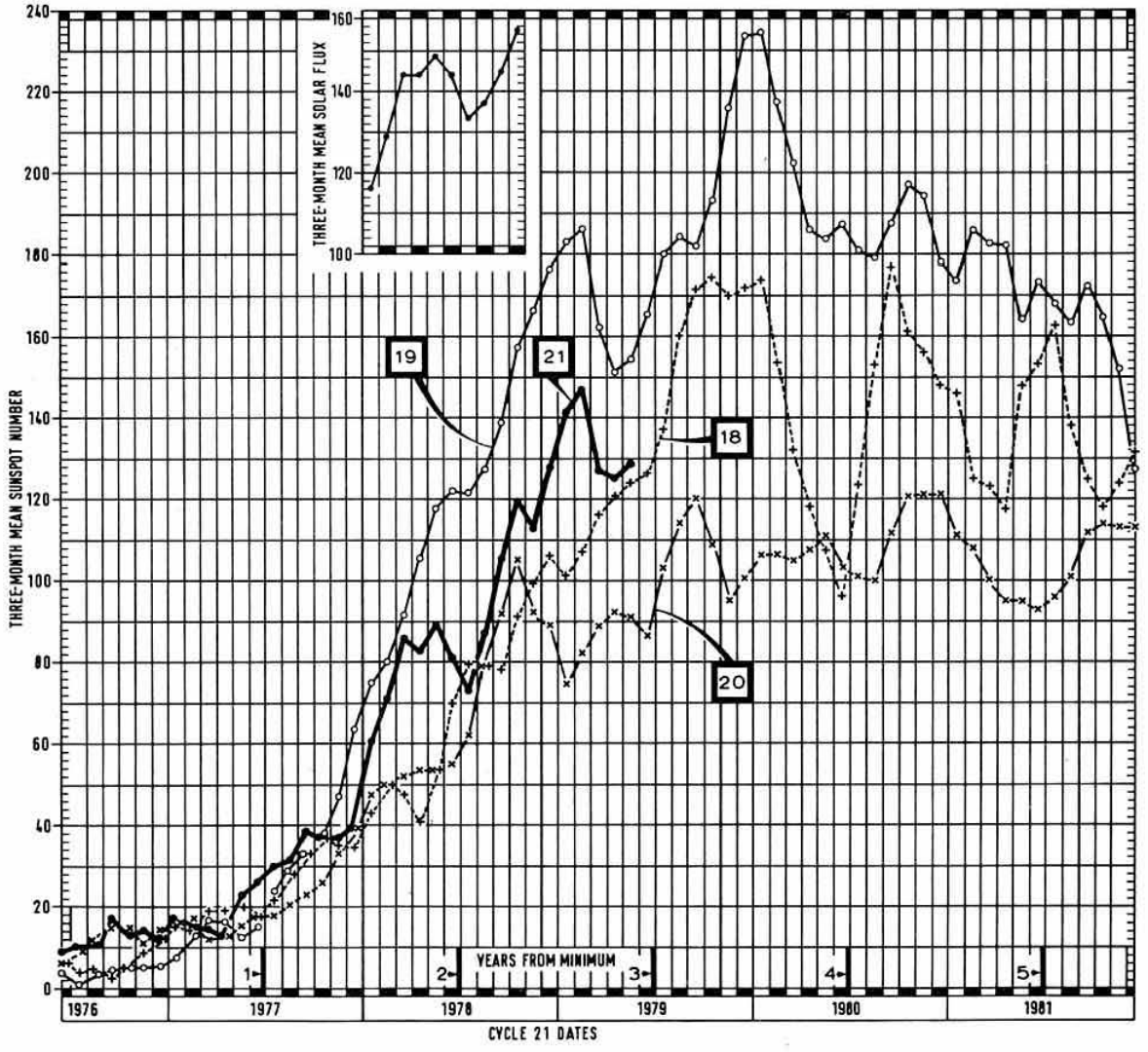


Fig 1. Progress of Cycle 21 compared with the preceding three cycles

Lowest daily sunspot number = 68 (20/21 April)
Highest daily solar flux = 247 (9 June)
Lowest daily solar flux = 139 (23 June)

It can be seen that while the highest daily sunspot number and the highest (as well as the *lowest*) daily solar flux values during the period were in June, the mean levels of activity were higher in the early part of the year. The 27-day mean sunspot number reached a peak of 169 on 13 January and then fell steadily to a minimum of 98 on 18/19 April, before recovering to around 150 by the middle of June. The profile of the 27-day mean solar flux was similar in shape but lagged by one solar rotation, with a peak of 205 on 9 February and a trough of 168 by 16 May, with a recovery to around 180 by mid-June.

The general trend over the past six months can best be seen from Table 1 and from Fig 1, which is an up-dated version of Fig 2 on p226 of *Radio Communication*, March 1979. Cycle 21 is still threading a path between 18 and 19, and has passed through a subsidiary peak during the first half of 1979 which closely resembles the behaviour of Cycle 19 at the corresponding time. It is very tempting to conclude that we shall now see a steep rise in the three-month mean curve to a maximum of around 200 in December 1979 and January 1980, the equivalent smoothed number being 170.

Table 1. Three month mean solar flux and sunspot numbers centred on November 1978 to May 1979

	Nov	Dec	Jan	Feb	Mar	Apr	May
Mean solar flux	158	172	189	193	186	176	177
Mean sunspot No	113	127	141	147	126	125	129

There is, however, no certainty that the present cycle will follow the pattern of Cycle 19 so closely, and there is no general agreement on the detailed prospects. The latest forecast by NOAA, Boulder, based on data up to April, is for a peak smoothed monthly number of 155 ±31 (90 per cent confidence), with November 1979 as the most probable peak month. On the other hand the Swiss Federal Observatory at Zurich has recently favoured an earlier date for the peak, with a value of 155–165 occuring in August or September. □

DX QSOs

By V. KANEVSKIY, UL7GW
(Translated from *Radio* by Dexter Anderson, HB9RQ)

The experiments of V. Kanevskiy, UL7GW, from Alma Ata, who for several years has been investigating long-distance propagation of radio waves in the low frequency amateur bands, have previously been described in Radio *(July 1974). His work has generally been rated highly by scientists, who consider it desirable to encourage radio amateurs to do research on the laws of long distance propagation. In the following article V. Kanevskiy presents new facts concerning long-distance propagation and advances a hypothesis concerning the relationship between long-distance propagation and processes in the earth's crust.*

ACCORDING to generally accepted theories, long-distance (over distances of 10,000km) short-wave propagation occurs as a result of multiple reflections from the ionosphere and the surface of the earth. In the low frequency bands, however, on account of intense radio-wave absorption in the lower ionosphere (D and E layers) such reflection is accompanied by excessive energy losses. For this reason it is not possible, as a rule, for low-powered amateur radio stations to conduct long-distance communication in these bands.

Irregular radio-wave propagation is also possible without intermediate reflections from the surface of the earth, within an ionospheric waveguide as it were. However, existing literature contains no indications of the conditions under which this type of propagation occurs, thus precluding the possibility of making predictions for such radio communication.

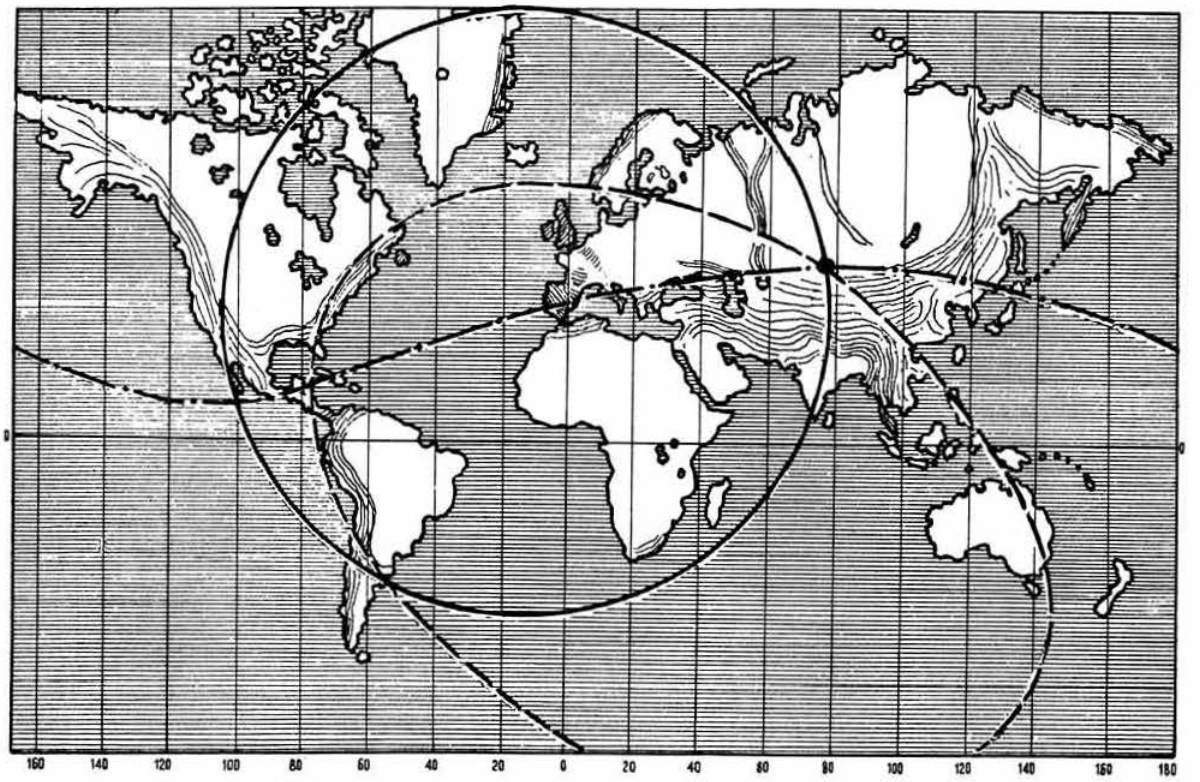
In conducting amateur communication from Alma Ata in 1965–76 it was noted that radio-wave propagation, apparently without intermediate reflections, is observable in all the hf bands in certain directions, at fixed time intervals for each direction. The practical use of these observed phenomena made it possible to conduct—on 7 and 3·5MHz alone—over 2,000 dx contacts. Experiments were carried out over an entire 11-year solar cycle.

In Alma Ata three abnormal propagation belts can be traced most clearly: north-west to south-east; latitudinal and meridional. The axes of these belts coincide with tectonic disturbances in the earth's crust: the first with the region of deep faults in the Ch-Iliysk mountains to the north-west of Alma Ata; the second clearly follows the line of the geomagnetic equator and coincides with the Zailiysk Ala-Tau faults; and the third goes along the central Kazakhstan fault, crossing Lake Balkhash eastward of the city of the same name. On the map the coincidence of the abnormal propagation axes with regional faults in a number of regions of the earth can be seen (the Appalachian and Sierra Nevada mountains in North America, and the Cordilleras and the faults in the lower reaches of the Parana river in South America).

Such a coincidence can hardly be considered accidental. It is possible that tectonic movements in the earth's crust bring about a corresponding disturbance in the homogeneity of the ionosphere, leading to conditions favourable to the propagation of radio waves.

For a quantitative assessment of long-distance radio-wave propagation, a factor was chosen which in the author's view is the only acceptable one in amateur conditions—the number of contacts with one and the same geographical area of the world. Fears that this factor is influenced by the uneven distribution of amateur radio stations, and by changes in the level of activity at different times of the day, are not borne out in the averaging of the data. Thus, for example, in the USA there are a great number of amateur stations in the states of Illinois, Ohio, Michigan and Florida. However, during abnormal radio-wave propagation it was not possible to establish contact with one of them. There were, it is true, dozens of QSOs with the state of Florida, but only with one amateur (W4BGO), who is located in the extreme west of the state, which falls within the area of abnormal propagation.

The same may be said about the contacts with amateurs in South America. In all, three to five contacts each were established with radio stations in Rio de Janeiro and São



Map of regional faults in the earth showing the directions of abnormal radio-wave propagation

Paulo, mostly on 21MHz; whereas with Buenos Aires, Montevideo and Rosario, located in the area of abnormal propagation, 99, 21 and 27 contacts were made respectively.

It was successfully established that changes in the level of activity of amateur radio stations in the course of the day produce only a lessening in the number of contacts during less favourable periods compared with more favourable ones. During contests, when amateurs operate without interruption around the clock, stations in areas affected by abnormal propagation appear and disappear at precisely the predicted intervals. This is particularly noticeable on 7 and 3·5MHz.

It was also noted that in the course of a 24h span, several periods of abnormal radio-wave propagation could be distinguished. Thus the maximum number of QSOs with South America occurs at 1000 to 1300gmt, while the maximum number of contacts with Africa is at 2250 to 0300gmt. In this connection, propagation from south-east Africa and the extreme south of South America along a meridional line occurs at earlier hours. After 0000gmt the majority of contacts are along a latitudinal line. At 0130 to 0200gmt stations from the Pacific coast of the USA and Canada come through.

Normal contacts with W6/7 and VE7 on the south-west (long) path are possible only on 21 and 14MHz, and on particular days in the middle of winter (22 December–5 January, on 7MHz). Use of periods of abnormal propagation also made contacts possible on 3·5MHz. At the same time stations from the south of Africa and South America were coming through by the same route. It is interesting that radio stations situated on the axis of abnormal propagation (W6MUR, K6DC) were perfectly audible in Alma Ata, but that UJ8, UH8 and UM8 stations were not.

Communication conditions with the Hawaiian Islands differ sharply from those elsewhere. Here there are no clearly defined maxima of abnormal propagation. Under favourable conditions KH6 stations appear (even on 3·5MHz) after sunset on the Hawaiian Islands, and are audible without interruption until local morning. It is characteristic that while local time on the Hawaiian Islands and in New Zealand is almost the same, as is the number of radio amateurs, the number of contacts with KH6 predominates over QSOs with ZLs, especially in the lower frequency bands.

During experiments on all bands, cases were noted of single and multiple round-the-world radio echo during maxima of abnormal propagation, and twice (14 December 1974 at 1605gmt, and 1 March 1976 at 0022gmt), on a frequency of 3,505kHz, long radio echoes were received with a delay time of 10 to 15s. Apparently a long radio echo is a frequent case with propagation of radio signals in a circular channel, into which they can enter during abnormal propagation.

The frequency band affected by abnormal propagation can be very wide. During the experiments contacts were repeatedly carried out switching from one band to another. Worthy of attention is a case that occurred on 11 September 1974, when a contact with VK4YP (Brisbane, Australia), begun at 1250gmt on 14MHz, was continued on 3·5MHz, without interruption, at 1308gmt; but most impressive were cases of reception of

atmospheric interference from tropical storms in the area of Central America. Regularly, during the maximum of abnormal propagation, noise from storm interference was traced over the whole band from 3·5 to 21MHz, and disappeared following the end of propagation.

Obviously success in carrying out distant contacts using abnormal propagation will be different for radio amateurs in areas near deep faults in the earth's crust (Central Asia, the Lake Baykal area, Far East, Caucasus) and for those in areas situated on plateaux. The results will also depend on the position of faults in the areas where the other operators are located. If the other operator is 10,000 to 15,000km away, the width of the propagation belt under favourable conditions can exceed 1,000km. The probability of a contact, especially on 7 and 3·5MHz, will decrease with distance from the axis. The carrying out of contacts on 7 and 3·5MHz over distances of over 30,000km, and reception of around-the-world echo, are unlikely for residents of plateaux. □

HF propagation study

The hf propagation study has up to now given the highest probable frequency (hpf) for communication. This frequency is set by penetration of the F-layer and is largely independent of the transmitter power, modulation etc. Because the ionosphere is variable from day to day the highest communication frequency may be about 20 per cent below the hpf on half the days of the month, and lower still on days following ionospheric storms. As lower frequencies are used the signal-to-noise ratio becomes poorer since, in general, both the ionospheric absorption and the noise level increase as the frequency decreases. There is a frequency below which the signal will have unusable strength. This frequency is termed the lowest usable frequency (luf) and is defined as the frequency above which a specified signal-to-noise ratio will be exceeded for a specified percentage of time.

Obviously the stronger the signal the lower the luf, so the power actually radiated from the transmitting antenna at the elevation angle required for F-layer propagation is an important determining factor. For long-distance communication low elevation angles are required and the actual radiation from practical antennas in typical installations among houses, trees etc are difficult to predict or measure. At the receiving end, noise is the determining factor. Atmospheric (static) noise level has systematic daily and seasonal variations with frequency; there will be times when static noise is over-ridden by man-made noise (not always evident as such) and the receiving antenna may discriminate against noise from certain directions. Thus for a given signal strength the luf will have both local and global variations.

Another factor which can affect the luf is the E-layer cut-off frequency, when this layer is present. The ionosphere, therefore, has a bandpass filter effect with the upper limit set by the hpf and the lower limit by the E-layer muf at the elevation angle being used for F-layer propagation, because the wave cannot then penetrate the E-layer. This is called the screening frequency, and below it short-skip propagation occurs. The "best" frequency for schedules etc is likely to be the band nearest to the geometric mean of the hpf and luf, since this will give the best chance of allowing for day-to-day variations. In some cases the hpf will be below the luf, implying that communication may not be possible at that time on that path.

It can be seen that an accurate luf calculation and its statistical variation can only be made when all the parameters affecting signal and noise at the receiver input can be given values; that the resulting luf would apply only to links having nearly identical parameter values, and that it applies only to one direction of the link.

The lufs given in the table assume values typical for the amateur service, and each one is the higher of the signal-to-noise luf and the E-layer screening luf. They are intended as a guide to the times and duration of dx openings, particularly on the lower bands. Note that the atmospheric noise level used is that for the UK, so they apply only for reception in the UK. Each user should determine for himself by trials over several months whether the luf is appropriate for his own station. It may be possible to find a multiplying factor for the luf which will allow for local conditions.

The table has been modified to show both hpf and luf by a single number. This number will have three or four digits, the last two of which are the luf, eg

Prediction	HPF (MHz)	LUF (MHz)
2317	23	17
904	9	4
1200	12	00*
1318	13	18**

*LUF = 00 indicates data not available.
** LUF greater than HPF indicates that all frequencies will have poor performance or be unworkable.

A further change to the layout of the table has also been made. In many cases the hpf is determined by the European end of the circuit so that long-range communications at similar azimuths will have similar predictions, regardless of the actual location of the distant end. For an experimental period, therefore, the routes have been arranged in azimuthal order, from 0 to 360°, with gaps at 90, 180 and 270° in the table, rather than in the previous alphabetical order. It is hoped that this will assist those wishing to communicate with other locations. To aid in this a small-scale great circle map with the predicted locations marked on is available by sending an sae to the membership services officer at RSGB HQ. This new arrangement has the disadvantage that short path (s) and long path (l) predictions for Australasian and Pacific circuits are now separated in the table, but the letters in brackets draw attention to this. □

Predicted hpf + luf in megahertz for September 1979

	00	02	04	06	08	10	12	14	16	18	20	22
Suva (s)	1600	1400	1600	2300	2700	2900	3000	2900	2500	2800	2100	1900
Wellington (s)	1600	1500	1800	2600	2900	3200	3200	2800	2400	2300	2100	1700
Osaka	1611	1512	1812	2614	3015	3314	2913	2512	2110	1909	1708	1709
Hong Kong	1610	1512	2013	2816	3418	3517	3614	3111	2808	2606	2205	1707
Sydney (s)	1613	1516	2019	2820	3420	3517	3613	3209	2706	2305	2205	1709
Moscow	1503	1203	1204	2306	2707	2808	3008	2907	2906	2604	2103	1603
Bangkok	1709	1511	2213	3117	3619	3718	3915	3711	3608	3006	2305	1807
Singapore	1808	1611	2313	3317	3719	3918	4015	3811	3707	3105	2404	1906
New Delhi	1803	1606	2309	3312	3714	3915	4014	3810	3206	2604	2403	1903
Perth	1910	1714	2417	3521	3923	4020	4116	3611	3508	2605	2105	2107
Teheran	1903	1704	2406	3509	4012	4113	4212	4009	3906	3104	2403	2102
Colombo	1904	1707	2411	3515	4017	4118	4216	4011	3807	3205	2504	2104
Bahrain	2103	1804	2306	3609	4112	4113	4313	4010	4006	3204	2703	2303
Cyprus	2003	1703	1805	3107	3610	3811	3811	3709	3707	3105	2503	2203
Aden	2404	2006	2208	3711	4214	4316	4515	4312	4209	3406	2804	2504
Seychelles	2600	2100	2200	3700	3900	3800	4000	3800	4300	3200	2900	2300
Mauritius	2500	2100	2200	3600	4200	4000	4000	4200	4300	3500	3000	2600
Nairobi	2603	2203	2206	3610	4214	4315	4514	4512	3709	3605	3003	2703
Malta	1703	1502	1402	2205	2808	3009	3009	3009	3107	2705	2303	1803
Salisbury	2803	2403	2205	3510	4115	4017	4016	4414	4411	3806	3103	2902
Cape Town	2900	2400	1900	3200	4100	4400	4500	4600	4400	4000	3200	3000
Lagos	3004	2703	2403	2907	4012	4414	4415	4614	4413	4208	3304	3003
Suva (l)	3000	2900	2400	2900	3200	2800	2600	2400	2000	2400	3500	3100
Gibraltar	1502	1402	1202	1503	2304	2506	2506	2506	2605	2403	2102	1702
Ascension	2904	2903	2403	2408	3913	4315	4316	4417	4316	4210	3504	3004
Wellington (l)	2800	2700	2400	2300	2300	2100	1700	1700	1500	2500	3100	3000
Dakar	2800	2600	2100	2407	3711	4213	4114	4214	4213	4111	3506	3002
Las Palmas	2403	2202	1902	2004	3207	3709	3611	3711	3710	3606	3103	2703
Falklands	2806	2604	2305	2207	2212	3618	4122	4224	4222	4118	3612	3008
Rio de Janeiro	2805	2604	2404	2207	2511	4116	4119	3820	3718	3814	3610	3007
Buenos Aires	2705	2604	2304	2106	2410	3615	4120	4121	4120	4017	3712	3008
Sydney (l)	2613	2411	2110	1908	2908	2513	2219	1923	1824	1922	2918	3015
Lima	2600	2400	2100	1900	2700	2500	4000	3900	3900	3900	3700	3100
Barbados	2603	2302	2002	1804	2206	3610	3914	3815	3815	3813	3710	3106
Bogota	2500	2200	2000	1700	2400	2600	3900	3700	3600	3700	3700	3100
Jamaica	2400	2000	1800	1600	2200	2400	3600	3600	3500	3600	3600	3000
Bermuda	2400	2000	1800	1600	1800	3100	3600	3500	3500	3600	3600	3000
New York	2206	1906	1606	1506	1507	2410	3313	3414	3414	3412	3310	2708
Mexico	2200	1900	1600	1500	2200	1900	2900	3300	3300	3300	3300	2700
Montreal	2109	1808	1608	1508	1510	2412	3124	3315	3315	3313	3111	2709
Denver	2000	1700	1500	1400	1500	1500	2200	2800	3100	3100	3000	2600
Los Angeles	2000	1700	1500	1400	1600	1500	1600	2500	3100	3000	2900	2500
Vancouver	1900	1600	1500	1500	1900	1700	1700	2100	2200	2400	2600	2200
Iceland	1208	1108	1108	1307	1909	2109	2210	2310	2210	2209	1909	1508
Honolulu	1800	1500	1400	1700	2400	2000	2100	1700	2100	2900	2600	2000
Fairbanks	1800	1500	1500	1900	2200	2200	2300	2400	2400	2400	2400	2000

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

the month on the air

John Allaway, G3FKM *

ALL the hard preparatory work is now complete and WARC will be under way on the 24th of this month. Between that day and the beginning of December the shape of amateur radio in the immediate future will be decided, and there will, quite naturally, be a thirst for news of progress. The structure of ITU conferences is such that each point is discussed and agreed upon at three levels before coming before the plenary session for final approval, and this means that informed "leaks" may well occur. Rumours may well be rife but it cannot be emphasized too much that *nothing* is finally decided until *all* stages have been passed.

At the time of writing, G3SCP (G. J. Gilman, 4 Woodgreen Road, Stopsley, Luton, Beds) had a number of ircs for sale at 15p, sase, please.

Amateurs who are interested in meteorology are invented to join F6CDX on 3,740kHz at 0750 (French time). Jean Pierre is particularly interested in weather satellite transmissions and he is anxious to organize a net.

DX news

The first Netherlands amateur licence was issued in 1929, and to celebrate the occasion amateurs in that country will be permitted to put a "5" before the number in their callsigns during the period 10 October to 10 November—eg PA0 will become PA50, PA1 = PA51, etc.

9H1FV, who was formerly 9X5SP, has informed PA0TO that his old call is being used by a pirate on 14MHz cw. Most of these contacts were made during April and May 1979.

9Q5MA is reported to speak Dutch, French and English and to have been worked on 14MHz ssb at 2300 and also on 21MHz at 1800.

EI0DMF was the callsign of a special station on the air from Dundalk.

Stations in Djibouti used the prefix J27 (instead of J28) on 26/27 June.

PJ9JR and PJ9KK were only active during October 1978, but N4MM is receiving QSL requests for contacts allegedly made at other times. It seems that these were not made by the rightful owners of the calls.

G3WW reports making an sstv contact with VR6TC on 21MHz and also with 5N0DOG on 28MHz. That with VR6TC is believed to be Tom's first on this mode outside the USA. G3WW has now worked 1,251 different sstv stations located in 99 different countries.

Stations in Liberia are being allowed to use the 5L prefix in place of EL during the remainder of 1979.

A new permanent Scout station should be active by now from Scout HQ, Kota Kinabalu, Sabah, using the callsign 9M6BP.

*10 Knightlow Road, Birmingham B17 8QB

Martin, OH2BH, and his wife, OH2BE, with the equipment they used to make a new world record score in last year's CQ WW DX Contest (CW) from their second home in Madeira as OH2BH/CT3

IS0LYN has written to say that the information published in June *MOTA* concerning the activities of 3V8AA has proved to be incorrect. All contacts are in fact valid for DXCC credit.

In an *ARRL Bulletin* dated 8 June it is pointed out that the HP9 prefix is not valid for use on amateur frequencies. HP9 calls belong to the maritime service.

G3SCP has recently taken over the task of QSL manager for TA2KS. He says that Korhan is very active with his HW32 and is to be found on 14,235kHz most evenings after 2030—sometimes until 0400. Gregg occasionally acts as mc, a procedure of which he does not approve but finds helpful because of the low power and weak signal from TA2KS. The same applies to 3B6CD who may now have left Agalega, but if not may be found on 21,210kHz from 1600 to 1800.

WA2WYR/CX is en route to Pakistan where he hopes to obtain a licence. He is with the USA embassy staff and will also visit A4, A5, A6, A7, A9, EP, JY, S2, S7, VU, YA, YI, YK, 4S, 4W, 4X, HZ, 9K and 9N during his tour of duty. He hopes to get on the air from as many of these as possible.

QSLs for the various French ITU special calls may be sent as follows: HW2ITU-F6EEM, HW3ITU-F6BLZ, HW5ITU-F9OE, TK2ITU-F6DCQ, TK3ITU-F8OP, TK5ITU-F5IN, TK6ITU-F6BFH, TK8ITU-F6EBN, TK9ITU-F9RM.

QSLs for contacts with HV3SJ made by DJ0YD on 11 and 12 November 1978 may be obtained from W6KNH.

Amateurs in Singapore are using the 9V0 prefix in place of the usual 9V1 until 1 October. This celebrates the 10th anniversary of the formation of the Singapore ARTS.

Activity from the USSR on 1·8MHz is now considerable, and UT5AB (who uses 1,851kHz) says that he is active on most evenings and would welcome contacts.

New callsigns will be used in the German Democratic Republic, possibly commencing on 1 January. The prefixes will be as follows: Y21A–Y29Z (repeater stations), Y31A–Y39Z (contest stations), Y41A–Y49Z (beacons), Y61A–Y69Z (news bulletin stations), Y21AA–Y29ZZ (individual stations), and Y31AA–Y39ZZ and Y91AA–Y99ZZ (club stations). Letter suffixes will indicate districts as follows: Rostock A, U; Schwerin B; Neubrandenburg C; Potsdam D, P; Frankfurt a/O E; Cottbus F, X; Magdeburg G, W; Halle H, V; Erfurt I,

Q; Gera J, Y; Suhl K; Dresden L, R; Leipzig M, S; Karl-Marx-Stadt N, T; and Berlin O.

The newly independent Kiribati (formerly the Gilbert Is, VR1) has been allocated the prefix block T3A to T3Z.

There are now 14 licensed stations in Nigeria. The latest additions are 5N4BPC, 5N5AOM, 5N9GD, 5N9GM, 5N0MSR and 5N0RBB. Prefixes now indicate the state in which the station is located, and these are as follows: 5N1-Ogun, Oyo; 5N2-Kwara, Niger; 5N3-Ondo, Bendel; 5N4-Rivers, Anambra; 5N5-Imo, Cross Rivers; 5N6-Gongola, Bauchi; 5N7-Burno, Kano; 5N8-Bemie, Plateau; 5N9-Kaduna, Sohoto; 5N0-Lagos, Abujo.

According to VE1CCC, VE1SPI will be on the air from St Paul Is (in the Indian Ocean) from 12 to 14 September and will use the callsign VE1SPI/FB8Z.

Dxpeditions

There is a possibility that there may be some activity from the 8Z4 Neutral Zone this month, and OE6EEG's name is being connected with it. Readers will remember that Selim was involved in the May 1979 expedition to Abu Ail Is (OE6XG/A) together with J28AZ, DJ9ZB, I2FGP and I2CBM. P29JS has received a letter from the assistant wireless advisor to the Government of India stating that "New amateur rules have come into force with effect from 1 January 1979, in accordance with which it has not been possible to grant the licence for short periods of stay." This was in reply to his attempts to obtain permission to operate from the Andaman Is.

C5ABK is said to have received permission from the authorities in Guinea-Bissau to visit there and to operate for two weeks during December—most likely the first two. QSLs will be handled by G3LQP.

The EJ4DJ and EJ4DK expedition from Inishmurray Is during the period 8 to 10 June experienced a number of problems but made 290 contacts on seven different bands—37 countries and all continents except Oceania were worked. All who require QSLs (including listeners) are invited to apply to GI4FUM (see "QTH Corner").

Another S African homeland becomes independent on 13 September. This is Vendaland and is located about 200 miles north of Pretoria. ZS6AK and a group of other amateurs plan to be on the air from there on all bands 3·5 to 28MHz, cw, ssb and rtty.

VQ9JJ and VQ9KK have planned a visit to Cocos-Keeling Is during early September—possibly from 7 to 9th. Their VK9Y calls are not known.

A massive operation from Tunisia early in September, with up to 10 stations on the air, has been reported by I1FKB (via *Long Skip*). This should continue for 15 days.

VE7BTV, W7ISX and two other operators will visit St Paul Is (Canada) between 14 and 24 September. They will have two sets of equipment and should be found around 3,525, 3,795, 7,025, 7,195, 14,025, 14,195, 21,025, 21,245, 21,295, 28,025, 28,495 and 28,595kHz. QSLs should go to VE7BTV.

DK6XR and DK7XN plan a S Pacific expedition starting on 14 September in Noumea as FK0XR. DK6XR will be FW0XR from Wallis Is from 19 to 26 September, YJ8XR from 28 September to 5 October, and FO0XR from 6 to 10 October. (It would seem likely that DK7XN will use the XN suffix.) Frequencies to watch will be 3,795, 7,045, 7,080, 14,195, 21,295 and 28,595kHz, and most operation will be split-frequency.

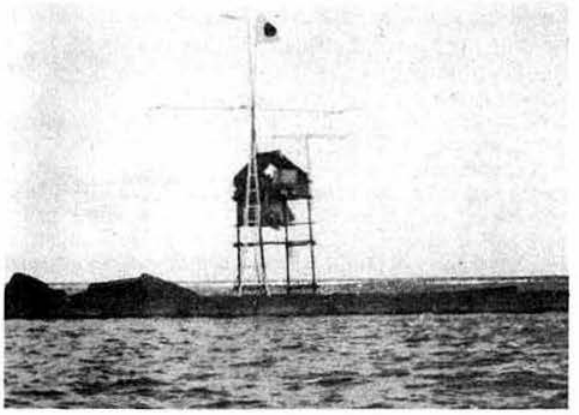
News from overseas

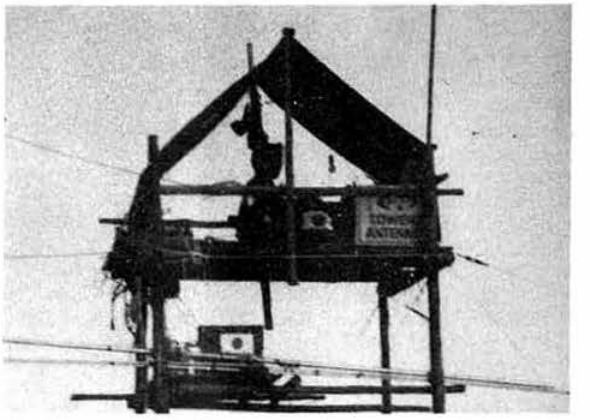
Geoff Smith, A9XBD, advises that he is leaving the Arabian Gulf area after 10 years and moving to Hong Kong, where he should arrive in mid-October. QSLs should be sent via WA3HUP (see "QTH Corner") for both his old and new calls.

Ted Ross, GM3LWS, returns home from Cyprus this month. He has been on the air as ZC4CZ and says that he will QSL to those from whom he has received cards as soon as possible. He mentions ZC4JG and ZC4LP as both being active from the Episkopi sovereign base area, the first-mentioned is known to use rtty as well as cw and ssb.

Peter Lee is now VP1PGL and active on 14, 21 and 28MHz using an FT101EE transceiver and a trap vertical antenna. He says that as an ex-G he hopes to work regularly into the UK and will be looking for British stations on the three bands mentioned between 1400 and midnight on ssb.

Dick Whittington, G3UQD, has been in the Seychelles Is for over a year and has now been issued with the callsign S79DW. He has a KW2000A transceiver and a G5RV antenna. It is good to learn that licences are being issued again in S7—for a period no new licences were granted and the only stations allowed on the air were those who still had unexpired portions of their three-year licences. Dick says that there are now five or six active stations on the islands.





The second dxpedition to Okino-Torishima operated for four days in mid-June as JF1IST/7J1. These photographs will show why the station could not operate during bad weather!

Jim Smith, P29JS, was recently in London and was entertained by G3GIQ. L to r: (standing) P29JS, G3NKQ, G3MCS, G3KMA, G3VKW; (seated) G3SJH, G3VLW, G3UGL, G5ACW

South Sandwich Islands

Readers may be wondering whether there is any further information concerning the validity of LU3ZY QSL cards for DXCC in the light of the Society's representations to ARRL. In a letter dated 17 April the general manager of ARRL agreed that Article VI of the Antarctic Treaty of 1961 says that "The provisions of the present treaty shall apply to the area south of 60°S latitude . . .". The S Sandwich Is group is north of 60°S.

A further letter dated 5 July from W3AZD, assistant communications manager, DXCC, says, "The decision to accept the LU3ZY cards from S Sandwich for DXCC credit was made some time ago . . . The major dx bulletins carried the acceptance of LU3ZY for DXCC credit some time ago."

Scout amateur radio

VK6SH (or some other call as yet not known) will be on the air from 29 December 1979 to 7 January 1980 from the 12th Australia/4th Asia Pacific Jamboree in Perth. The set-up will be extensive and will include rtty and fstv, as well as hf and vhf stations. Prearranged schedules may be made by writing to Scout Amateur Radio VK6SH, 12th Australian Jamboree, Box 7, PO, West Perth, W Australia 6005. A British contingent will be attending this event.

The 22nd Jamboree-on-the-Air will take place on 20-21 October.

Welcome

The following overseas members of the RSGB were enrolled during June: AC2U, DC7UT, DJ1US, DK7EO, EI5CE, H44PG, KA8EAO, KA9CNV, KL7TR, K6DRY, LA3BX, N2AXX, N3AQF, N4AOS, N7ADY, ON6CP, P29RA, P29RO, SM6ETO, SV1MS, TA2DX, VK4ZIT, VS5JS, VU2GO, WA2ORX, WA4ATE, WA4OSR, WA4SQL, WA5WJZ, WA6KQB, WA6ZFK, WB1GZX, WB2KAB, WB2KTM, WB3EOD, WB6ECQ, WB7AJP, WB7WLD, WB0MHW, WD5IUP, WD8ISG, W2GRD, W3ODJ, W3QF, W6MJN, W6QEU, W7UDH, YV2BSV and ZS6HS, New listener members included E. C. Aguilar (F), L. J. De Bruycker (ON), J. I. Holland (VE7), R. M. Milen (W2), P. E. Freeland (W2), J. Ellis (W4), I. Yatzevich (W4), S. C. Tooby (W6), E. R. Hansen (W7), G. Thompson (W7), D. Lomady (W8), J. I. Holland (VE7) and R. Kričak (YU).

Contests

In the 1978 **International Short Wave Championship of Romania, G3ESF** scored 63,750 points, **GJ2LU** 5,902, G6NK 5,538, and G4AEM 4,117. Unfortunately the rules for the 1979 event (which took place during the first weekend in August) were not received until after the July issue had gone to press.

SSTV Activity Contest

1500 31 August to 1500 29 September.

Organized by the Japan Amateur Slow Scan TV Association. Two classes: (1) sstv contacts both ways and (2) ssv between sstv station and ss viewer. Central frequencies around 3,540, 7,080, 14,230, 21,340 and 28,680kHz. QSOs between sstv stations count two points, between sstv and ssv one. Multiplier is Japanese call areas (JA1-JA0) plus JR6 and JD1 as well as DXCC countries (except JA). Exchange contest number. Final score is points × (multipliers + number of days operated)—note that only 24 days may be used in the contest. Stations may work on each band but no cross-band QSOs may be made. Send logs before 20 October to: Mr Eiji Ohshima, JA1EKK, 1-55 Honjuku, Kitamoto-City, Saitama, Japan.

The results of the **9th Worldwide SSTV Contest** (1979) list 25 entrants, with **G3WW** listed seventh with 18,800 points. Other British entrants were G3GRJ (12,768 points) and GM3WIL (8,096).

The CQ WW DX Contests

0000 27 October to 2400 28 October (Phone)

0000 24 November to 2400 25 November (CW)

All bands 1·8 to 28MHz. Exchanges consist of RS/T plus *CQ* zone number (UK is in zone 14). One point is gained for each contact with one's own continent and three with others. Stations in one's own country may only be contacted for multiplier credit and no QSO points claimed. The multiplier is the total number of DXCC countries and *CQ* zones worked on each band added together. There are three categories of entrant: (a) single-operator single- or multi-band, (b) multi-operator, single transmitter (all band) and (c) multi-operator, multi-transmitter. In category (c) only one signal may be radiated on each band at any time. Entrants should use separate log sheets for each band and follow the layout of the official log form with 40 contacts per page. Log and summary sheets may be obtained from *CQ* by sending a large self-

addressed envelope and ircs to: CQ WW DX Contest Committee, 14 Vanderventer Avenue, Port Washington, LI, NY, 11050, USA. A small supply is available from G3FKM (sase, please). Entries should be sent to the same address and posted before 1 December for the phone section and before 15 January for the cw event.

The winners of the **1979 Bermuda Contest** were: for Bermuda, VP9IX; for Germany, DK5WL; and for Canada, VE3BVD. Rather surprisingly the UK winner has been named as K5MM, who was operating from Guernsey using his reciprocal callsign GU5CIA.

The Italian YLRC "Elettra Marconi" Contest
1300 29 September to 2400 30 September
3·5 to 28MHz. Phone and cw. Exchange RS/T plus QSO number (from 001), and yls who are members of the YLRC also send "RC". Two points for contacts on cw with a yl, one point on phone. Stations may be worked on each band but on one mode only. Multiplier is one for each European DXCC country and five for each club member worked on each band. Use separate log sheet for each band and also a summary sheet showing details of scoring etc, and enclose usual signed declaration. Post before 15 November to Maria Luisa Bedini, PO Box 2108, Prato 50047 (FI) Italy.

HK0 DX Contest
0001 7 September to 2359 9 September
7 and 14MHz, phone only. Exchange RS plus serial number (from 001). Contacts with 5K0SSA count 10 points, with other HK0s five, with stations in S America three, with other stations two (except with own country which counts only one point). Multiplier is total of different countries worked on each band. Submit separate logs for each band and send entries to International HK0 DX Contest, PO Box 392, San Andres Is, Colombia, before 30 October. Please include summary sheet indicating scoring.

Awards

The Second Stradivari Award
Issued by the Cremona section of ARI. Applicants must score 40 points (Europe) or 30 (elsewhere) by working stations in the district of Cremona between 0000 22 September and 2400 10 October. Stations may be contacted each day for credit, and may also be worked on different bands each day with at least one hour between contacts; each contact counts one point. QSOs on 28MHz count two points. Send log which shows station, QSO numbers (from 001), time, date, band, RS/T, one QSL for each station worked, and 10 ircs to: ARI, Sez di Cremona, Box 144-26100, Cremona, Italy, no later than 31 December 1979.

The Worked All Britain Award
The award manager for this is now G4AVA, QTHR, and WAB books are obtainable from G4FQO (D. Roberts, 10 Bovington Rd, Carterton, Oxford OX8 3US) price £2.60 (including 60p postage). All proceeds of this award are directed to RAIBC. WABC nets are to be found on 1,928kHz, 3,760kHz and 7,060kHz.

QTH CORNER

A35DD	via ZL1BCG, J. Ridpath, 50 David Av, Manurewa, Auckland, New Zealand.
A35DJ	via ZL1ALE, Mrs A. B. Johnston, 63 Red Hill, Papakura, New Zealand.
A9XBD	via WA3HUP, Mary A. Crider, RD2, Box 5A, York Haven, Pa, 17370, USA.
C31NR	DL5KX, W. Breuer, Barlachweg 28, 5000 Koeln 30, W Germany.
C31SE **C31SR**	DA1GF, Lynn Igou, Flanaganstr 27-16, 1000 Berlin 33, W Germany.
C31TD	WA3OMQ, D. L. Cantrell, 156 Fisher Drive, Monongahela, Pa, 15063, USA.
DJ9WX/HB0	Uli Heuberger, DJ9NX, Motzstr 22, D-1000 Berlin 30, W Germany.
GI4FUM	Dr W. D. Hutchinson, 8 Lisnoe Park, Ravernet, Lisburn, Co Down.
S79DW	Dick Whittington, PO Box 234, Mahe, Seychelles.
SV1DC/A	PO Box 161, Athens, Greece.
VP1PGL	P. G. Lee, PO Box 46, Belmopan, Belize.
VP2AZE	L. Sisson, G3EBR, QTHR, or via bureau.
VP2MAY	via K1RH, R. M. Hirsch, 172 Newton Rd, Woodbridge, Ct, 06525, USA.
VP5AH	via WA4DRU, A. B. Harbach, 2318 S Country Club Rd, Melbourne, Fla, 32901, USA.
WD6CDU/KH9	D. Lynch, 7231 Kensington Ct, Highland, Cal, 92346, USA.
XF4MDX	Mexico City DX Club, Box 21-167, Mexico City 21, DF, Mexico.
ZC4CZ	GM3LWS, E. H. Ross, 24 Ettrick Way, Glenrothes West, Fife KY6 1JL.
ZK2YL	via ZL1ALE (see A35DJ).
3C1X	now via SM6CSB, Harald Lofhede, Nordgardsvagen 5, S 430 50 Kallered, Sweden.
5N0AGD	PO Box 390, Apapa, Lagos, Nigeria.

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

A picture taken during a visit by HB9s BEI and MSW to GI4GVS in Carrickfergus. R to l: David, GI4FUM: xyl of HB9BEI; Jennifer Penney; Peter, GI4GVS; Bruno, HB9BEI; Fritz, HB9MSW, and his xyl

Ken Collins (left), VS6JF, president of Hong Kong ARTS, with Robin Bellerby, G3ZYE, during his recent visit to VS6

Robin Bellerby, G3ZYE (left) with David Rankin, 9V1RH/VK3QV (IARU Region 3 secretary), in Singapore

The Isle of Man Millenium Celebration Special Award
This is available to Europeans who contacted one station using the GT prefix, together with four other GD calls, and to non-Europeans with one GT plus three GD contacts, all during 1979. Note that a station using the GD prefix during the special week of the GT calls may not be counted. Claimants should send a log extract, plus 12 ircs or US $4 to GD4FWQ, hon secretary, Isle of Man ARS, 20 Terence Avenue, Douglas, Isle of Man, before 31 March 1980. Listeners may apply for this certificate.

The **WAVKCA** and **HAVKCA** were mentioned in July *MOTA*. Please note that the WIA awards manager is now Bill Verrall, VK5WV, 7 Lilac Avenue, Flinders Park, S Australia, 5025.

Geoff Watts publications

Geoff Watts is still producing his *Radio Amateur Prefix-Country-Zone List*. For each country it gives DXCC status, normal and special prefixes, ITU callsign block allocations, continent, *CQ* zone and ITU zone. It includes full information on Antarctic stations, USSR club stations, obsolete prefixes used in the past eight years and much more. This is a "must" for the serious listener and dx operator, and its 15 pages cost 50p (UK) or US $2 or six ircs by overseas airmail. Another useful item is the *QSL Managers List*. This is now four pages, and sheets 1 to 4 may be obtained by sending 27p (four ircs from overseas) to 62 Belmore Rd, Norwich NR7 0PU. The 15-page *Directory of Islands* is useful to those working for the various IOTA Awards—it contains details of these and a full listing of all islands which are eligible for them. This costs 50p (UK), and six ircs elsewhere.

Band reports

G8KG is now back in circulation and has kindly supplied the following summary of solar activity to date. Preliminary information suggests that the provisional Zurich sunspot number for July will be close to 150. The three-month mean centred on June should therefore be close to 145, indicating that the cycle is again climbing and remains ahead of Cycle 18. In recent months, however, it seems that although sunspots have been numerous they have not been very active, and the 27-day mean solar flux, which began a slow decline in mid-February and recovered briefly in early June, has subsequently been falling quite steeply up to the time of writing. It looks as if the value centred on the last week of July will be below 150 sfu, compared with 205 sfu in February. It is too early as yet to assess the impact of this behaviour on the height and timing of the peak.

The postal services have been a little kinder this month and reports have been received from the following (to whom, many thanks): G2HKU, G5JL, G5MP, G3s AAE, GVV, IMW, KSH, LOL and LPS, GM3LYY, GM4CHX, G4EHQ, G4FMO and BRSs 17567, 31301, 36928 and 38934.

Stations listed in italics were using cw.

1·8MHz. **0000** *UK2PCR, UB5VEB,* **0300** *LU1DZ, LU9EIE, PY1DMQ, PY1RO, PY2FOS, YV1OB.* **2200** *OH2BO, UK1AAA, UR2RPB.* **2300** *UA1DZ, UR2FU, UP2BFE, UR2GKW.*

3·5MHz. **0100** J3ABG. **0200** PY2WTU, VE1. **0300** FM7WS, K2BT, PY7ZZ, W1, 4, 9. **0400** GU5CXM (Sark), KP2A, VP8ML. **2100** C31XQ (QSL to DK4QK), UK9CAE.

7MHz. **0000** *UA0HZ, VP5AH, VU2GO.* **0400** HC1FF, ZL. **0500** *FG0DDV/FS* (QSL to W2QM), *KL7MF, VE4CF/1* (Sable Is), VP2MEH, (QSL to K8JLB), ZL. **0600** *XE2CKA.* **2300** *KP4V, YV5FCK, ZD8TC.*

14MHz. **0400** *J28AG.* **0500** *VP5ONX,* XF4MDX, *5W1BQ.* **0600** A35s DJ, YL, *FK8BG,* KS6DV/KH1, VR1PJ, *VR3AR.* **0700** FK8CR, H44WH, KA1MI, KX6PP, VR1AW, VR1BE/KH1, XF4IX, YJ8PD, ZK1CQ, ZL. **0800** C21s AM, IB, HK0FR, KH6WF/KH8, T2AAA, TO8DO, VR1BD, ZK2VE, 3D2ER. **0900** H44DX, WD6CDU/KH9, *ZL5MC.* **1000** DU, JA, KC4USV, VK0PK, VR3AR. **1100** H44PT, KH6HHD, VR1AW, YJ8PD. **1600** S2BTF, W6-W7. **1800** JT1BG, JT0YFU. **1900** HM0OS, *3V8AC.* **2000** H44CF, KL7, *P29EJ,* S79RD, VP8. **2100** J6LFQ, VR3AH. **2200** N2KA/SV9, VE4CF/1. **2300** C5AAP, *HS1ABD,* YK1AA.

21MHz. **0500** *HK9BRW, KL7, VK.* **0600** HC8GI, *KL7, VQ9MR,* ZK2YL. **0700** FO8AK, KG6SW/KC6 (W Carolines), ZK1DR, 3D6BP. **0800** FO8FO, JA, KH6, KL7H, ST0RK, VK, ZL, *5W1BZ.* **0900** FO8DT, HM, JA, VK, VR1BE/KH1, T2AAA, XT2AW. **1000** FK8CR, H44LW, KH6WF/KH8, ZK2DD. **1100** KH6FKG, *WA7JRL/SU.* **1200** OK3TAB/D2A, *FW8AB,* KL7EO. **1300** JA. P29GC. **1400** OJ0MA (OH0MA), *VP5AA,* W6, *3B8CF.* **1500** HH2T, VP2MFA, VQ9JJ, W6. **1600** *SU1MI,* XT2AV, 3B6CD. **1700** TA1MB, W6-W7, ZS2MI. **1800** A7XAH, C31UN (QSL to EA3AOC), *J3ABP,* KH6. **1900** *FG0DDV/FS,* KH6WF/KH7, S79MC. **2000** HH2T, VP2MFA, G3HCT/VP9, *VQ9KK,* XF4J, XF4MDX. **2100** KX6BU, SU1CR, VR6TC, W6. **2200** JA, KL7, VK2, W6-W7, ZL1. **2300** VK, W6-W7, 5W1AZ.

28MHz. **0800** VKs, 3AFW, 6FO. **0900** VK6, 5Z4IX. **1000** S79RD, VQ9KK. **1200** LU, ZS. **1400** C5ABR, LU, PY, ZS5IB/3, 5T5CJ. **1600** A2CDW, VP5ONX, 5N0DOG. **1700** HS1ABD, VP8QJ. **1800** VP2MAY, YB0ADW. **1900** CX, PZ, W3. **2000** VE1. **2100** CE5GS, HC1EE, W3-W4, XE1RL. **2200** C5AAP, *HZ1HZ, VK2, VK3, ZD7AR.*

Grateful thanks to all those who have provided news items, and also to the authors of the following for information: the *Ex-G Radio Club Magazine* **(W3HQO)**, *DX News Sheet* **(Geoff Watts)**, *Long Skip* **(VE3FRA)**, the *West Coast DX Bulletin* **(WA6AUD)**, *DX'press* **(PA0TO)**, and *CQ Magazine* **(W1WY)**.

Please send items to reach G3FKM for the **October** issue no later than **7 September**, and for **November** by **5 October**. □

swl news

Bob Treacher, BRS32525 *

SLP reports

28MHz cw. Six listeners took part in this slp, including Eric Trebilcock, BERS195, who reported that in Australia the slp occurred between 0200 and 0400! Needless to say, no stations were logged. The skip lengthened towards the end of the slp and a mixture of dx was reported in G-land. Thirty-seven countries were heard during the 2h period—18 from Europe, 11 from Asia, three from North America, two each from South America and Africa, and one from Oceania.

14MHz ssb. Band conditions seemed to vary depending on the location of the listener, but most mentioned heavy QRM from strong European signals. Many interesting stations were reported between 0700 and 0900, including WA6EWI/TI9, Cocos Is; VK0PK, Macquarie Is; and ZK1DN, Cook Is. Seventy-four countries were heard by the nine listeners submitting logs to Dave Whitaker. All nine VK call areas were also logged.

7MHz cw/ssb. The cw section attracted only four entrants, while the ssb section provided six logs. The cw section held on 3 June was disappointing in that little dx was heard apart from Ws, and they faded out at 0615. Another welcome report received by Dave was from Eric Trebilcock, who at his third try actually managed to submit a log. The times were more favourable (1500-1700 local time). The three listeners in G-land reported 33 countries—27 in EU, three in South America, two in North America and one in Oceania. As a matter of interest to listeners in G-land, Eric Trebilcock's log read 0512 ZL2UV; 0514 ZL2OD; 0535 VK5DW; 0537 W5WQN; 0615 KH6D; 0617 VK2YK; 0619 W2BF; 0656 KH6GGZ; 0658 W7AMH. Reasonable for 1500-1700 local time.

The 7MHz ssb event on 7 July saw an improvement in conditions. Five continents and 35 countries were heard. Dave was pleased to receive a log from Hans Nilsson, SM3-16335. The outstanding dx signal belonged to YS9RVE who was using a 2-el quad at 68ft and running 400W.

Dave reminds everyone that the next slps are 0600-0800 7 October on 3·5MHz cw, and 0600-0800 3 November on 1·8MHz ssb. All logs to Dave Whitaker, whose address appeared in last month's column.

Newcomers

Jack Hum, G5UM, forwarded one letter from RS41733 who is mainly interested in the vhf/uhf bands. We do not usually trespass into GM8FFX's territory and mention these bands in *SWL News*, but I am sure that Graham will be pleased to hear from any listeners who have any worthwhile reports on vhf/uhf activity, especially during the sporadic-E and tropo season. Your scribe eavesdrops on 144MHz from time to time and has heard that stations have recently been heard/worked from EA, EA8, IS0, IT9 and 9H1. With the new "squares" award available, these dx stations are well-sought after because of the rarity of EZ, GX, GY and HV squares.

Also writing for the first time was Graham Hodge, ARS41742, who uses a general coverage receiver into a long wire antenna, and Jonathan Pearce, ARS41759. Jonathan uses a Lafayette HE30 receiver which he acquired from a radio society meeting in Gloucester, and was proposing to make up an all-bands dipole and a tuning unit during his school holidays.

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

1979 HF countries table

Station	28	21	14	7	3·5	1·8	Total	Mode
BRS25429	173	190	232	97	86	22	800	ssb
BRS35943	151	173	211	101	103	7	746	ssb
ARS8841	148	158	232	77	80	5	700	ssb/cw
RS41426	96	106	93	56	71	21	443	ssb/cw
A9191	66	91	150	63	48	9	427	ssb
BRS25901	79	88	120	38	41	6	372	ssb
BRS34740	86	94	81	33	38	7	339	ssb
ARS41386/GJ	53	97	100	38	14	1	303	ssb
BRS40293	60	58	99	40	36	7	300	ssb
BRS20185	73	56	104	24	23	1	281	ssb
BRS39161	56	62	117	14	18	2	269	ssb
ARS39784	77	57	83	26	23	2	268	ssb
BRS41333	73	87	52	18	35	2	267	ssb/cw
BRS40814	58	59	84	34	17	0	252	ssb
BRS35121	22	42	102	19	36	6	227	ssb/cw
BRS41136	60	59	60	23	8	0	210	ssb/cw
BRS40705	61	56	49	24	14	1	205	ssb
ARS41554	29	53	65	18	36	3	204	ssb
BRS40292/GU	42	40	50	19	28	2	181	ssb
BRS27421	0	0	100	22	19	1	142	ssb
BRS40705	41	42	36	7	12	1	139	ssb
ARS40133	28	31	34	7	14	0	114	ssb
A9107	32	27	35	0	13	0	107	ssb

All-time countries table

(Starting score 500)

Station	28	21	14	7	3·5	1·8	Total	Mode
BRS17567	265	304	349	163	224	33	1,338	ssb/cw
BRS25429	242	281	319	210	216	36	1,304	ssb
BRS32525	228	279	301	196	232	26	1,262	ssb
BRS25901	212	273	309	182	189	22	1,187	ssb
BRS35943	195	255	290	183	211	23	1,147	ssb
ARS8841	189	222	294	111	134	5	955	ssb/cw
BRS34740	139	192	219	126	151	33	860	ssb
BRS32286	96	195	225	75	172	4	767	ssb
A9191	144	187	232	72	95	11	731	ssb
BRS20185	130	129	188	35	44	6	533	ssb

DX traffic

It was good to hear again from Neville Spry, BRS17567, who included details of an incredible jump in the all-time countries table. Neville now requires China, Heard Is, Kamaran Is, Burma, Manahiki and Republic of Yemen to have all countries confirmed. He also provides some disturbing news concerning the QSLing habits of W7PHO, who is QSL manager for ZK2VE; apparently he will *not* QSL any swl report. Equally disturbing is the news from Dave Whitaker, who provides similar distasteful rumours from N0TG. He returned Dave's card, which listed five consecutive QSOs, saying, "I've received 22,000 reports, but our purpose was not to receive reports—only to give contacts." Hard to believe, but some have funny ideas of what constitutes ham spirit. (Your scribe, however, has received his N0TG/KP1 card, so perhaps you were unlucky, Dave).

West Coast DX Bulletin, with a circulation of 3,300, has ceased publication due to pressure of work on the editor, WA6AUD, and ageing copying facilities. This magazine has

provided many with up-to-date information for many a year, and will, I am sure, be missed. However, with the great number of amateurs on the USA west coast, it is hard to think that a similar publication will not be born soon.

Band reports this time suggest a decline in conditions during July. Phil Waltho, BRS41136, remarked that his log was full of Europeans; Ian Le Page, BRS40292, noticed a marked decrease in 28MHz activity, but is looking forward to the Cray Valley Listeners Contest on 15/16 September (rules in the July issue) and hopes that conditions will be favourable. John Doughty, BRS40705, has been committed to other summer activities but managed several interesting stations on 28 and 21MHz plus UF6HU on 7MHz ssb.

Paul Corrigan, BRS35121, entered a score into the table for the first time. Ken Steele, BRS36883, wrote on his return from YU-land. He took his receiver and a mobile whip with him and on the flight out put on his headphones and started to tune the bands, but a steward spotted him and asked him tactfully to turn the receiver off in case it interfered with in-flight communication. Paul Bishop, BRS39161, also commented on poor band conditions, but found that listening around 0130 on 14MHz paid dividends.

Of the listeners towards the head of the 1979 table, all seem to have found something of interest. Ian Le Breton, ARS41386, sent his details on a postcard showing St Aubin's Harbour, Jersey. Ken Sketheway mentioned FO8 and 5W1 on 21MHz, and YS9RVE, ZL3NE, PJ3AS, ZP5GH and PY5ATZ on 7MHz. Ken also reported QSL returns from K4YT/5T5, JY9FE and VP1KG. Dave Stewart, BRS40293, wrote after a long absence away on business. He had logged YI8AAK, KL7IZM, 9Q5MA and VP8QJ, all on 14MHz, and mentions his first QSL return thanks to 9H4Q.

Ian Marquis, ARS41426, is now working full-time and relaxes by tuning the bands during evening hours. Although the dx-end of 3·7MHz is not so full of dx signals at this time of year, it still seems that some G stations are annoying the dx fraternity by rag-chewing in the top 10kHz. If the band is open for dx a QSY below 3·775MHz would be appreciated by the ever-increasing number of Gs who like to winkle out the weak dx at the top end of the band. This cannot be achieved if others run 400W, and use poorly adjusted speech processors which obliterate the weak signals, simply to work their pal 10 miles away. It is hoped that during the winter season on 3·7MHz, the offenders will go and have their rag-chews elsewhere.

Robert Small, as usual, continues to extract some good dx from the bands. He was particularly pleased with LX1AC on 1·8MHz. XF4IX on Revilla Gigedo was a new country for Robert on 14MHz, while 21MHz provided 3B6CD on Agalega Is. On the QSL front, Robert reports cards from C9MJO, VK2DCA/VK9N, HR0QL and 8Q7AF. Unfortunately Wake Is is still on many listeners' wanted lists after WD6CDU/KH9's expedition to the island. Conditions were poor and the signal was quite weak. However, it is understood that a further expedition may be mounted soon.

Last, but not least, Dave Whitaker reports XF4, KH7, VR3, FO8 and ST0 for five new countries on 21MHz. He has also heard rumours of activity on 1·8MHz from Russia and its republics. Dave reports monitoring 7MHz early one Sunday morning in July to find 5W1 and KH8 working into KZ5 and EA8 but, alas, not a squeak in Harrogate. Dave now has 329 countries heard all-time and 249 during 1979.

Keep the comments and news coming. All news for the November issue to reach your scribe by 22 September 1979. □

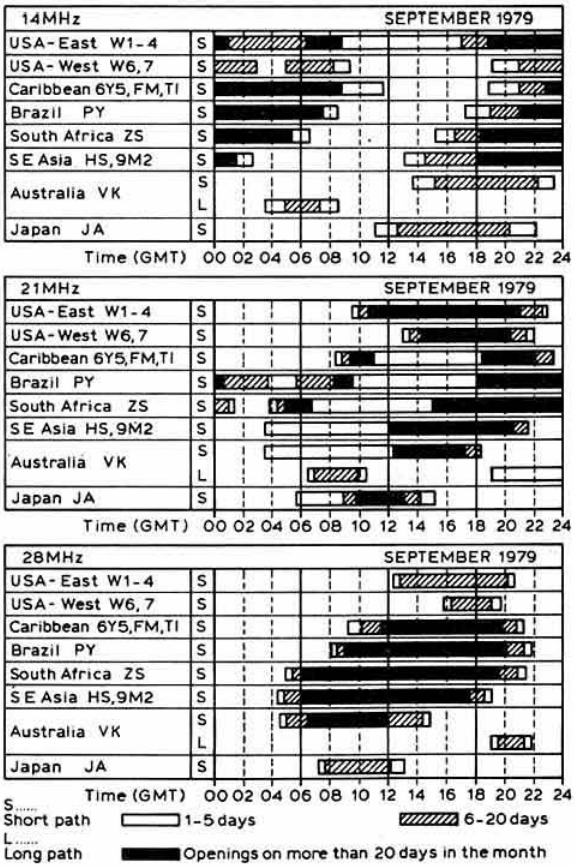
Propagation predictions

From September onwards there will be a steady increase in F2 mufs, and dx conditions on the hf bands will improve, to reach their maximum during October and November. On favourable days (days with above average mufs) traffic with North America will be possible on **28MHz** and towards the end of the month will improve considerably. While conditions for traffic with South America and Africa will show little improvement on last month, the traffic with Central America and Australia will be vastly improved.

Conditions on **21MHz** will also improve but will not be as noticeable as on 28MHz. Traffic with Australia and western North America will be certain. The **14MHz** band will remain a night-time dx band on the whole, and traffic with North America may be interrupted from time to time. As dusk falls earlier in the northern hemisphere as the season advances, the best time for dx will be before midnight.

The **7MHz** band will remain the ideal band for local traffic during daytime without the dead zone. As the season advances the chance for dx will increase while the longer part of the path lies in darkness. Distances covered will increase on 7 and **3·5MHz** compared to the summer months. Interruptions by the dead zone will only occur infrequently on 3·5MHz during the latter half of the night.

The provisional mean sunspot number for June 1979 from the Swiss Federal Observatory was 150·5. The period 5–9 June saw daily numbers in excess of 200. The predicted smoothed numbers for October, November and December are 152, 150 and 148 respectively.



4-2-70

Graham Knight, GM8FFX*

Beacons out of service

Both the Scottish vhf beacons have been taken out of service for repair and maintenance. The Angus beacon, GB3ANG on 144·975MHz, is being overhauled by Alex Allan, GM3ZBE, who hopes to have it back to normal power soon. The beacon keeper, Frank Hall, GM8BZX, is investigating the possibility of improving the coverage by changing the antennas to 8-el arrays if the site owner can accommodate the extra weight on the mast.

The Lerwick beacon, GB3LER, on 144·965MHz, is out of service due to parts of the antenna system being destroyed in a gale. The beacon is located at the Lerwick Observatory on a very exposed site which is subject to many high winds, and the beacon keeper was surprised that the original antennas had survived for more than two years. Unfortunately the storm blew half of each antenna away, thus causing the beacon transmitter to operate into an impedance much higher than 50Ω. Consequently the final amplifier stage suffered from this mismatch and the transmitter has been returned to its constructor, GM3ZBE, for repair. Dave Jarrell, GM5CSY, misses the auroral warnings he receives from GB3LER and he has donated two heavy-duty replacement 8-el antennas. These antennas have 1·5in diameter elements which should help to keep GB3LER in service once the transmitter has been serviced.

New beacon specially for Es and Ar

RSGB member, Roel Zwartjes, PA0JTA, has sent *4-2-70* details of a special new beacon which has been designed only to be on the air during auroral or sporadic-E openings. Four well-known Dutch dx operators, PA0CSL, PA0FRE, PA0JTA and PA0LSC, are able to switch the beacon on by remote control using a sub-audible tone system. The beacon will stay on the air for 30min after being activated, and can be keyed up for further periods during extended Es or Ar openings. This special beacon uses the callsign of PA0JTA, is located at Rotterdam in QTH locator CL03g, and operates on 144·820MHz. Phase modulation with a maximum deviation of 12kHz is used during the identification periods, during which the callsign, QTH locator, and either Es or Ar are transmitted.

PA0JTA himself has built this interesting beacon, which must be one of the few to incorporate a solid-state receiver, tone decoder and timer along with the more usual callsign generator and transmitter. The beacon runs 25W output to a "big wheel" antenna, and reception reports should be sent to Roel Zwartjes, PA0JTA, Stoutstraat 16a, Rotterdam 3008, Holland.

New world record on 432MHz

These pages recently recorded the fact that WB6NMT in California set a new record by being the first amateur in the world to have had successful moonbounce contacts on all four of the 50, 144, 220 and 432MHz amateur bands available to vhf operators in America. WB6NMT has now set another world record by contacting KH6HME in Hawaii on 432MHz ssb at 0500gmt on 18 July. As both stations are located in the northern hemisphere there is no possibility that this contact was by transequatorial propagation, but that the distance of 4,080km was covered by extended tropospheric ducting. Contacts have previously been established between the west coast of America and Hawaii on 432MHz but this increases the tropospheric record considerably. As well as being known for moonbounce operation, and even eme dx expeditions, WB6NMT is the president of Lunar Electronics.

Gibraltar vhf news

The Gibraltar 70MHz beacon, ZB2VHF on 70·26MHz, is again operational, although at present the hours are restricted to the period between 1800 and 2400gmt. It is hoped to resume 24h a day soon, and in the meantime 70MHz operators are reminded that if there is a break in transmissions it means that Jimmy Brunzon, ZB2BL, the beacon keeper, is listening for calls. As recently as 28 June, GI3ZTL monitored the beacon and noticed a break which enabled a contact to be established—it is especially interesting to note that GI3ZTL was operating on amplitude modulation.

The 50MHz beacon, ZB2VHF on 50·035MHz, which normally sends its callsign by cw, is occasionally programmed to indicate that ZB2BL is listening on 28·450MHz for cross-band contacts. By this means Brian Bower, G3COJ, was able to have a 20min contact with ZB2BL on 9 July at the very late starting time of 2235gmt. The ZB2VHF beacon was also heard by GM5CSY at Inverbervie (YR square) on 9 July, this being the farthest northerly reception reported, and a contact between ZB2BL and GM5CSY would set a new record.

More power from GB3SU

Jack Hum, G5UM, reports that signals from the GB3SU beacon on 70·695MHz are now stronger due to the commissioning of a new solid-state transmitter built by Tony Whitaker, G3RKL. The original valve transmitter has been in service since April 1969 when GB3SU initially came into service from a building at Sheffield University, and latterly from the site it now shares with the repeater GB3HH at Harpur Hill, near Buxton, Derbyshire. The new solid-state rig runs 20W, almost twice the power of its valved predecessor, and G3RKL has taken the opportunity to change the keying cycle so that both the QTH locator and county code are now sent on cw. It is hoped that these improvements will increase the coverage and service given by GB3SU, and reports should be sent to Tony Whitaker, G3RKL, 160 Derbyshire Lane, Sheffield S8 8SE.

Scottish expedition

Paul Widger, G8AGU, and Iain McHardy, GM3JFG, have been going on annual vhf expeditions to Scotland since the early 'seventies, and during that time have built a reputation for reliability and good operating. This year's expedition took place in July and they operated on 144MHz and 432MHz from Lockerbie (YP square), Gatehouse of Fleet (XO), Selkirk (YP), Barrhill near Girvan (XP), Kilsyth (XQ), Dollar (YQ), Forfar (YQ) and Dundee (YQ). The equipment consisted of Microwave Modules transverters and linear amplifiers running 100W output on each band to a Jaybeam 5-el on 144MHz and a Jaybeam 18-el on 432MHz.

G8AGU and GM3JFG worked several stations from each of

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their locations, and are full of praise for G3ZPJ of St Ives in Cornwall, whom they dubbed as the second Cornish beacon due to his consistent signals on 144MHz. From their high sites they were able to hear GB3EM and GB3WHA, the 432MHz beacons, on most evenings, and made contacts on 432MHz with G3GNR (Devon), G6GN (Bristol) and G3TDG in Kent, a regular occurrence throughout the expedition. G8AGU and GM3JFG are to be congratulated and thanked for operating from so many places and sticking to their itinerary despite the less-than-perfect weather conditions. G8AGU has now gone back to Devon, and GM3JFG has gone home to Fortrose in the north of Scotland, with both operators keeping a special watch for each other on 432MHz and hoping for an auroral contact on that band.

GD8EXI goes /MM and /MA

Richard Baker, GD8EXI, mindful of the Isle of Man Millennium, and the influx of 150 amateurs anxious to use the GT prefix, decided to leave the island on holiday before it became knee-deep in callsigns. Having secured a maritime mobile licence, marinized his Liner 2 transceiver, and fixed a 4-el quad to the rigging of his 35ft catamaran, GD8EXI/MM set sail for Scottish waters, and during the period 24 June to 4 July operated from some very rare QTH squares. Visits were made to Isle of Whithorn, Drummore, Campbeltown, Inverary and Port Patrick before returning home to Port St Mary. Stations in G, GD, GI, GM, GW, EI and Italy were contacted from the boat, with I4BXN in FE38c being the best dx on 144MHz. A sporadic-E opening occurred at 1600gmt on 28 June while he was sailing in Kilbrannan Sound between Arran and Kintyre.

Some operators were unaware of the suffix /MA which GD8EXI used when operating from the harbour at Campbeltown, and more than one GM station was heard to remark that GD8EXI/MA was a pirate and a very ignorant one at that! GD8EXI did not spend a great deal of time on the radio but is very pleased with the contacts he did make and promises to be /MM again later this month. He regrets that the /MM licence does not allow operation on 432MHz as it would be much easier to organize a rotary beam for the higher band. Richard is pleased that the new QTH Squares Award allows /MM contacts, and reckons that the number of possible squares could be doubled by /MM and oil rig operation. As well as operating as GD8EXI/MM and GD8EXI/MA he also managed a brief spell as GT8EXI/MM, thus keeping both the suffix and prefix hunters happy.

Illegal operation on repeaters

On a number of occasions in the past these pages have referred to illegal operation on the 144MHz band, and details have been given of successful prosecutions and of new types of detection equipment. Reference has also been made to licensed amateurs contravening their licence conditions by exchanging remarks with bogus operators. This is obviously a cause for concern to many repeater groups, and some have referred to this problem with their members in repeater group newsletters. The latest edition of *FM News,* the journal of the UK FM Group (London), contains a special editorial on this subject which causes concern to fm operators throughout the UK. The editorial makes so much sense that extracts from it are reproduced below.

"It is now very disturbing to note that many legitimate stations are contravening their licence conditions by working—and indeed, encouraging the 'S******s' and 'G*******s' on GB3LO. In a sense, by writing this editorial we are doing the very thing we advocate should NOT be done—giving them recognition. Once again we urge you to ignore completely blatantly unlicensed stations. If you cannot 'get over the top', then QSY. All this has been said before, but there is now another aspect of illicit operation that seems to be on the upsurge.

"There is a significant number of phoney—but superficially genuine sounding—stations operating virtually every day on the London repeater. The most usual practice is for one of these pirates to adopt an old G8 call formerly belonging to someone who is now a G4, or maybe has allowed his G8 call to lapse. The obvious point about this is its non-appearance in the current call book. Many of these phoneys are obvious when listened to carefully. Anyone with a G8 call earlier than, say, G8EEE, must, if genuine, have held a licence for at least eight years and therefore should not sound: (a) like a 15-year-old schoolboy, or (b) totally inexperienced.

"We strongly advocate the same approach to these pirates as we recommend for the jammers—IGNORE THEM COMPLETELY—DON'T WORK THEM OR EVEN ACKNOWLEDGE THEIR EXISTENCE."

The *FM News* editorial continues: "There are several members of the FM Group who, on a regular basis, knowingly work and encourage jammers and (it is very difficult to believe, unwittingly) work phoneys." The editorial ends by mentioning the fact that the UK FM Group Committee has considered the possibility of expelling the worst offenders under the terms of its constitution.

Illegal operation on 144MHz ssb

Unfortunately illegal operation on 144MHz is not confined to the fm mode, and many operators have been deceived recently by a pirate who persists in using exotic callsigns of the type normally only worked during *Es* openings. On 21 June GM8FFX monitored a station using the callsign SV1DH who was in contact with a station in Yorkshire, but the beam peaked up due south of Aberdeen. Further checks with other stations established that this "SV1DH" was a long way from Greece and in fact beamed north of Nottingham and east from Leeds. The same joker has been monitored using the following callsigns SU1ADV/1, SU2DX, SV1DH, SV0DA, YU2CUT, 5B4WR and 4X4HF. Operation using these callsigns took place on 2, 19, 21 June and on 1, 11 July, and operators who "worked" *Es* to any of the above stations on these dates were misled by this bogus operator. Normally pirate operation of this type would not be reported in *4-2-70,* but this person appears to have contacted many people and it is only right that these operators should know that their QSOs were with a station in Britain and that there is no point in sending QSL cards to the above stations.

"Backyard moonbounce" at G4DGU

Many readers have written to *4-2-70* commenting on the moonbounce and meteor scatter experiments being carried out by Chris Bartram, G4DGU. They wonder how it is possible for a single person to work eme and ms on 432MHz without having a huge dish in the garden. Most people envisage eme operation as a matter of megawatts feeding antennas big enough to fill football fields. In the past this has been, in part, true, but advances in receiver technology in particular have made the mode available to amateurs with rather less space. Chris Bartram, G4DGU, has proved it is possible to achieve excellent results

with an antenna which fits into a fairly typical 8 by 16m back garden. Of course with such a small antenna the engineering standards of the complete system need to be very high, as a single lost decibel can make the difference between success and failure. Because of the interest shown in the G4DGU system, this month's *4-2-70* describes his antenna system and next month's will detail the receive and transmit system.

A few sums suggest that the minimum antenna gain required for a system capable of producing moonbounce echoes on one's own receiver on 432MHz, within the confines of the UK power authorization (other countries allow more!) is 23-24dBi. This can be obtained in several ways: a practical 16ft dish will give about this gain, as will four of the G3JVL-design Yagis. Of the eight Yagi systems that have been reported in the literature, G4DGU feels that four have demonstrated sufficient consistency over the eme path to suggest that they were also capable of the required performance. These four are arrays assembled from the 13-el and 19-el K2RIW-design Yagis, the 21-el F9FT design and the Viezbickie antenna. Chris Bartram chose to follow the latter design, as a considerable amount of data detailing this antennas development at the American National Bureau of Standards was readily available, and he uses a system based on eight of these Viezbickie antennas.

The road to a working eme system is littered with projects abandoned by those who bit off more than they could chew. This is particularly true of eme antenna systems, some of which are very difficult to manoeuvre and require the assistance of extra operators. G4DGU set out at the beginning to construct a one-man system without any form of motorized drive, and this very much simplified the construction of the antenna.

The booms of the G4DGU Yagis are made from standard 12mm square hard-drawn aluminium tube. This is generally available in 3m random lengths which are sufficiently long to enable the cutting of both the boom and the support for the trigonal reflector. Three-millimetre hard aluminium rod is used for the elements, while the struts which strengthen the completed assembly are made from 10mm diameter tube. Each Yagi was made to tolerances of 1mm.

The supporting structure is made from 2in television antenna tube and is held together with conventional fittings. A 10ft length of 6in-sided lattice mast supports the antenna. The result is a surprisingly strong, yet light, structure which has stood up to the winds very well.

The power distribution network used to feed the Yagis in the array at G4DGU consists of a pair of fairly conventional four-way, equal-split, phasing harnesses manufactured from FHJ4 coaxial cable and a double-screened 20mm solid dielectric cable. The two halves of the network are joined by an in-phase reactive combiner which uses slab line techniques, and is rather easier to construct than the W0PW designs in the ARRL *VHF Manual*. The critical line sections were cut to length using dead reckoning, and a reasonable phase balance within 4° was achieved using this method. G4DGU admits that there was an element of luck in achieving this excellent result, as vector voltmeter measurements of the phase difference between physically identical lengths of cable are frequently of the order of 10° per wavelength. Plans are now in hand for G4DGU to replace the harnesses with reactive combiners, as a small improvement could result from the lower distribution network losses by the elimination of the high vswr sections inherent in the phasing harness approach.

It must be emphasized that G4DGU's antenna system is the minimum possible for consistent moonbounce contacts and that it is virtually impossible to work eme stations using a smaller system. G4DGU has already worked 20 stations in five continents, and next month *4-2-70* will describe the other sections of the G4DGU eme system.

Television dx

Mention has been made in these pages in the past of amateurs who also monitor various television stations as a guide to auroral, *Es* or tropo openings. For most licensed amateurs television dxing is secondary to their main interest in working distant stations. However, some enthusiasts have a primary interest in television dx and, whereas an amateur rushes to his transceiver, the avid television dxer stays by the set and can log very interesting stations, which can be of great assistance to the work of the Propagation Studies Committee.

Kevin Jackson, of Leeds, has already provided a great deal of information for these pages, much of his results co-relating with other *Es* and auroral reports. Kevin Jackson monitored an *Es* opening to Portugal on ChE3 (55·25MHz) around 1900gmt with signals from a 180W Azores television station appearing on ChE4 at 1940gmt. The night of 17 July produced a test card from RUV in Iceland from 2354 until 0130gmt. Signals were quite strong at times on this 62·5MHz transmission and Kevin attributes this reception to auroral *Es*. On 12 July good tropo conditions enabled television signals to be received from uhf stations in northern Germany and Sweden, with the best dx being the Karlstad transmitter on Ch43 (647·25MHz)—a distance of 1,100km.

Kevin Jackson is looking forward to winter and the anticipated F2 activity which he hopes will bring long-haul television dx. He has just received a report from a fellow television dxer in Holland which mentions reception of RTA-Algeria on ChE5 (175·25MHz) during the spectacular *Es* opening of 28 June.

Sporadic-E reports

Despite the hoaxer already mentioned, some operators worked a great many real dx stations on 144MHz via *Es* propagation. Mike Dennison, G3XDV, took time off from compiling the Kent Repeater Group newsletter to exchange 5 and 9 reports with YU2RQG in QTH locator HE77h, G3XDV's contact took place at 1745gmt on 28 June, and Mike used a barefoot FT221R and an 8-el antenna for this long-distance contact. On the same day Darrell Mawhinney, GI8JPG, in Lisburn, worked I3TJR, I3LDS, I3VFJ, I3LCZ, DB2BG, YU2RSK, YU3TDW, YU2CGC, YT9MI and IW3QEF, all between 1440 and 1607gmt. GI8JPG's best contact of the opening was with IT9TDN in HY68b at a distance of 2,420km.

Keith Fisher, G3WSN, further south in Swanage, Dorset, first noticed this opening at 1308gmt and, using an IC202E and a 25W amplifier to a home-built 9-el long Yagi, worked more than 20 stations, including IT9XJJ (GY), IT9VZS, IT9VQC (GX), I6WJB (HC), IW9ACT (GY), 9H1B (HV), 9H1BT, 9H1CE and 9H1DU. G3WSN noticed a distinct fade in the *Es* signals at 1406gmt but many of the IT9 stations returned a short time later, but at 1600gmt the propagation changed and he went on to work I8QAF (IY), DF3RU (FJ), OK1KHH/P (HJ) and OK2PGM in IJ square.

Avid listener Mike Allmark, in Leeds, heard most of the above opening plus I4BXN (FE38c), I4PWL (FE60f), I4AGF (GE41d), IT9PLT (HX77h), I7HVP (IB74c), YU3ER (HG63d) and YU3CAB in square HG64. Geoff Brown, GJ4ICD, in Jersey, worked more than 70 stations in the *Es* opening, in-

cluding 30 YUs, 30 IT9s, five 9H1s, two LZs and a station in Switzerland. GJ4ICD works as a television engineer and is fortunate in being able to spot early warnings of the Es signals reaching 144MHz.

Tropospheric openings

Several good tropospheric openings occurred during July and at the beginning of August. GM8HUT proved to be a popular station on 144MHz from his new location near Sumburgh in the Shetland Islands. GM8HUT hopes to be able to participate in auroral openings from this northern location and thus give operators a chance of working the very rare QTH square of ZT. Mike Allmark in Leeds logged many stations on 144MHz, including F1BYN (ZE52j), F1BUU (ZE08e), F1ADT (ZE40a), F1DLZ/P (ZG), F1FHI (ZH63f), F1EFD (YH), F6ELI (ZE19j) and EA1CR. Mike is full of praise for the 70MHz signals received in Leeds from GU4ASO/P and GM3WOJ/P. Using just 10W from a Microwave Modules transverter and a 12-el antenna at 9m agl. G3XDV, in Kent, had a two-way ssb contact with LA6OI in locator DS78f. This contact took place on 13 July at 1910gmt, and G3XDV is very pleased to have made this contact with the lower power from his site, which is only 180ft asl.

Auroral reports

Ron Livesey, the co-ordinator of auroral observations for the British Astronomical Society, recently published a report in the BAA journal which details the results of three different groups of observers—visual, magnetic and radio. The report includes information relating to auroral events in the northern hemisphere and co-relates some of these with aurora australis, noting visual observations made by ships in both hemispheres. A great deal of information is exchanged on a regular basis between the RSGB and the BAA, and several names well known to readers of these pages are credited among the radio auroral observers.

There was a great shortage of radio auroral events in July, with only two being reported. A weak event occurred on 17 July around midnight, but only SK4MPI on 144·960MHz was heard via the aurora. A much stronger event occurred on 26 July; this started at 2330gmt when GM4DSZ noted auroral signals from DL0PR on 144·910MHz beaming 330° from Aberdeen. This aurora reverted to a more usual 30° beam heading by 0100gmt, and during the next two hours GM4COK in Edinburgh went on to work DF3XZ (FN21), SM0CPA (IT60), SM3CSO (IU), SM3FGL (GT), SM4FXR (GT32), SM4IVE (HT68), SM4GVF (HT76), SM6DXX, SM6ITE (GQ25) and Dutch stations. The event seemed to be confined to northern stations, and G4FUT in Sunderland was another strong signal during the opening.

FM adapter for FT101

Many vhf amateurs are using Yaesu FT101 type transmitters to generate low-level 28MHz signals to drive linear transverters for the 144MHz band. This popular set-up allows operators to use all the facilities of the hf transceiver on the vhf bands but limits use to a.m., cw and ssb, the three modes available on the FT101. With the growing popularity of fm above 145MHz, several amateurs have modified their FT101s by fitting external fm detectors and internal circuitry for nbfm transmission. Most of the modifications involved hanging an fm detector on the back of the FT101, feeding it with signals from the i.f. output jack and then rerouting the detected signals via the existing audio circuitry; with sometimes quite complicated arrangements being required to change modes.

Operators contemplating making these modifications will be interested in a new fm adapter (KM101) which is made by Kent Modules and is available in the UK from AJH Electronics. The adapter, which is housed in a box 185 by 40 by 115mm, connects into existing sockets on the FT101 and may be left permanently connected to the transceiver regardless of the band or mode selected. The transmit circuitry includes pre-emphasis, clipping, filtering and crystal-controlled tone-burst, and has separate controls for microphone gain and deviation. The receive circuit incorporates a crystal filter and a squelch control, with the volume being controlled by the FT101 in the usual way. The fm adapter takes up very little room and can be simply placed on top of the transceiver. LEDs indicate when the adapter is in use and whether it is switched to simplex or repeater mode. As well as allowing vhf cw and ssb users to sample the delights of fm operation above 145MHz, the adapter also adds fm to the transmission modes available on the hf bands—many vhf repeater operators, including Gordon Adams, G3LEQ, have commented favourably on the American 28MHz repeaters. This adapter is exported from the UK by Sota Communication Systems.

Brussels Millennium VHF Award

The Union Belge des Amateur Emetteurs is offering its Brussels Millennium Award to commemorate the thousandth year of the city's existence. Contacts must be made with stations in Brussels during 1979 and with stations using the special OS Belgian prefix. European stations can claim the award by sending extracts of log entries for vhf contacts with 15 stations located in Brussels. Expenses in issuing the award are covered by sending three ircs with the logs to: Brussels Millennium Award, BP 1000, B-1040 Brussels 4, Belgium, before 15 February, 1980.

Two more Supreme Awards

On the awards front this month special plaudits go to the two Colins—G3DY of Whittlesey near Peterborough, and to G3SPJ of South London. Both have just earned themselves Supreme Awards Nos 26 and 27 respectively, Colin Morton, G3DY, turned in two Seniors and a 1,296 Standard, while Colin Woolf, G3SPJ, gained his by submitting three Seniors for 70, 144 and 432MHz.

Awards manager, Jack Hum, G5UM, is certain that the 70MHz Senior Award is very hard to get, and he has a special word of congratulation for Basil O'Brien, G2AMV, who has just earned himself 70MHz Senior No 43. G2AMV is now on the lookout for an opening towards Scandinavia on 432MHz to assist in getting QSL cards from that area for the higher band award.

First QTH Squares Award to G3IMV

Although the new RSGB QTH Squares Award was instituted only on the first day of 1979 it has taken two well-known vhf operators less than six months to work the 10 countries and 40 QTH squares required for a 144MHz award. Jack Hum, G5UM, the vhf awards manager, reports that the first claim to reach him arrived in mid-June from John Hunter, G3IMV, of Milton Keynes, and it was followed 24 hours later by another claim from Geoff Brown, GJ4ICD (ex GJ8ORH), of St Saviour, Jersey.

G5UM makes the observation that both operators did well to obtain the necessary QSL cards from the stations they contacted in such a short period of time. He goes on to cite the G3IMV claim form as a model of neatness; the QTH squares were typed in alphabetical order, and the 10 countries were all underlined in red ink. By a stroke of good fortune all the QSL cards bore the relevant locator square.

Copies of the claim form for the new QTH Squares Award can be obtained by sending a stamped addressed envelope to Jack Hum, 27 Ingarsby Lane, Houghton-on-the-Hill, Leicester LE7 9JJ. Full details about the award were given in *4-2-70* (January 1979).

Firsts and farthests

A comprehensive list of believed firsts from Guernsey has been submitted by GJ4ICD (ex GJ8ORH), as follows:

144MHz

To Yugoslavia—YU2CKL-GJ8ORH, 4 June 1978, Es
To Spain—EA1CR-GJ8EZA, 10 Sept 1977, tropo
To Poland—SP5JC-GJ8KNV, 13 Dec 1978, ms
To Denmark—OZ6OL-GC8EZA, 26 Oct 1975, tropo
To Bulgaria—LZ1AB-GJ8ORH, 10 July 1978, Es
To Portugal—CT1WW-GJ4ICD, 7 June 1979, ms
To Czechoslovakia—OK1OA-GJ8ORH, 3 Jan 1979, ms
To Estonia—UR2RQT-GJ8ORH, 12 Dec 1978, ms
To Byelo—UC2AAB-GJ8EZA, 8 July 1977, Es

432MHz

To Spain—EA1CR-GJ8ORH, 11 March 1978, tropo
To Luxembourg—LX1FX-GJ8KNV, 24 Sept 1978, tropo
To Switzerland—HB9ARI-GJ8EZA, 11 Sept 1977, tropo
To Belgium—ON5NK/A-GC8EZA, 4 July 1976, tropo
To Holland—PA0VV/P-GC8EZA, 3 July 1976, tropo

If any Guernsey operator can better any of the above he is asked to send details to Jack Hum, G5UM, QTHR, within the next three months. After that period the information will be sent to SM5AGM, the IARU Region 1 records co-ordinator. As these records are being listed by mode of transmission it is important that this should be given when forwarding details of record claims to G5UM.

Jersey Radio Convention

Many vhf amateurs will be attending the Jersey Radio Convention which is to be held on 22–23 September; attractions include a £2,000 raffle. Well-known vhf dxers GJ8KNV, GJ8EZA and GJ4ICD are organizing the event and have already taken bookings from 200 French amateurs who will be attending what promises to be an outstanding event. Further information is available from GJ4ICD, 'Lemnos', Longueville Road, St Saviour, Jersey.

Late news

GM4HDL and GM8SAU were active on 144MHz at the beginning of August from the island of St Kilda (VR18g) and both operators are planning an expedition to VS square. ON5FF was an outstanding signal during the Perseids meteor shower operating as G5DAA from the Isles of Scilly (WJ). GM8DMZ has been experimenting on ms with his array of four Jaybeam 8-over-8 Yagis, working several stations on 144MHz ssb during the Perseids. Meteor scatter contacts were completed with SM3BIU (30min, 17 bursts, 67 pings), DJ5MS, I2VRN and SM2BYC in far away GZ square. □

oscar news

AMSAT Phase-3-A

AMSAT Phase-3-A is a high altitude, long-lifetime satellite to be launched in March 1980 as a secondary payload aboard an Ariane mission. The European Space Agency will provide the launch opportunity from a site in Kourou, near the coast of French Guiana. The satellite will be inserted into an initial (temporary) elliptical orbit with a projected inclination of 17°, an apogee of 35,000km and perigee of 200km. After a few weeks in this orbit—when the spacecraft has stabilized and the on-board microcomputer has determined that the satellite is in the proper orientation to the sun and the earth, and at the proper position in its orbit—a one-shot onboard perigee kick motor will fire. The solid-propellant motor will burn for one 20s period and lift the perigee to its projected final 1,500km altitude and raise the inclination to 57°. This orbit will have a period of approximately 660min and a longitude increment of about 165°W/orbit.

Please note that these figures are only preliminary estimates; the final data cannot of course be known until precise measurements are made after launch. However, the figures are suitable for giving the potential satellite user a sense of what the orbit will be like.

This orbit will favour the northern hemisphere at first, as the apogee after the perigee kick motor firing will occur at about 26°N. During the course of the first two years, the latitude of the apogee will drift gradually northward to its highest point: 57°N. From this time on, the apogee will drift southward until after another year or so it will occur over the equator. Thereafter, the southern hemisphere will be favoured and the second of the AMSAT Phase-3 missions will have been launched, again initially favouring the northern hemisphere. Throughout their lifetime, however, the AMSAT Phase-3 series satellites will be accessible throughout the world at some point during the day; those regions falling under the illumination at apogee will simply have greater access times.

AMSAT Phase-3-A will carry a Mode B transponder. Its uplink will be in the 432MHz band and downlink in the 144MHz band. The passband will accommodate ssb, cw, sstv, rtty and whatever digital modes are approved for use through the satellite. There will be several special service channels that will deal exclusively with such areas as data exchange, education, scientific study, officially authorized traffic, and general interest/information bulletins from around the world. A general beacon for routine telemetry and codestore information, and an engineering beacon for more sophisticated management purposes will be at the very edges of the passband.

To access the satellite, a user will need about 1,000W erp on 432MHz. High-gain antennas to achieve this effective radiated power economically are feasible, as near the apogee (±3h) AMSAT Phase-3-A will move very slowly and through a comparatively small arc; tracking will be a fairly simple task.

This is only a very brief overview of the Phase-3 project to familiarize potential users with its characteristics and potential. □

microwaves

Charles Suckling, G3WDG *

10GHz news

Some very good cross-channel results have been obtained recently on 10GHz. On 22 June G3RZD and G8GKV, operating portable near Newhaven in East Sussex, carried out some tests with F6DLA/P near Barfleur. Signals were 40dB above noise, and were still readable using only an open waveguide as antenna. GB3ALD was also received, at 18dB above noise. A second test took place on 20 July, a result of a random call on 144·33MHz. F8WN was persuaded to go out on 10GHz, and was heard with extremely strong signals on 10GHz by G3RZD/P over this 175km path. On this occasion a very heavy fog was present.

The potency of narrow-band continues to bring forth some remarkable results. On 24 June G3YGF, G8RHI and G3WDG took the opportunity to listen for G3JVL from a number of sites between Oxford and London. From a site near Stokenchurch, some 700ft asl, signals peaking 10dB above noise were obtained through heavy rain; the path length was 100km. Very heavy fading was observed and signals could be heard over a 40–50° range of beam headings. Two other peculiar effects were noticed—the signal peaked up at an antenna elevation of about 10°, and the frequency varied by a few hundred hertz according to where the antenna was pointed! Subsequent analysis of the weather map showed that a fast-moving trough was passing over the path at the time of the test. Presumably this was ducting the signals, and the duct was located at some height above the ground. The signal could have been leaking out of the duct along its length, explaining the wide range of beam headings over which the signal was heard, with different doppler shifts corresponding to the different relative velocities of parts of the moving duct.

During the 22 July section of the 10GHz Cumulative Contest, G3YGF and G8RHI operated from Mynydd Maen in south Wales. The full troposcatter system was used on this occasion, including 10W twt and 4ft dish. The main purpose for the trip was to test equipment potential over the 175km path to G3JVL. An early start was made from Oxford so that the 4ft dish calibration could be set up on the rising sun, using the method described in *Microwaves* (June 1979). Signals were obtained immediately on the 11am sked with G3JVL, and were copied throughout the day at 8dB above noise. The G3YGF signals were 14dB above noise at G3JVL, and this contact was both stations' first over 150km, giving them the first microwave distance awards by troposcatter. Contact was also possible on ssb. G8RHI's equipment was also tested, and equally good signals received from G3JVL.

On 21 July an even longer path was attempted, over the 305km path from Moel Famman (10km west of Mold) to Hayling Island. On this occasion G3JVL's signals were received all day at an average level of 3dB above noise, with three half-hour-long enhancements to 12dB. During these the signals peaked at an antenna elevation of 3°. When signals were at the 3dB level the signal peaked on the horizon, as would normally be expected. The enhancements were probably again the result of weather front propagation, as heavy thunderstorms were present over much of the country at the time.

Part of the G3YGF portable 10GHz troposcatter system, showing Land-Rover and roof-mounted 4ft dish

On the journey to this site the opportunity was taken to operate mobile-mobile on 10GHz ssb. Open waveguide antennas were used, and reliable communication was achieved over several hundred metres line-of-sight. On the open road, signals were lost around corners, but in town scattering from buildings etc gave useful signals even when the vehicles were not line-of-sight to each other.

A novel way of tuning in the signals was found—to either slow down or accelerate, using the variation in Doppler shift!

1·3GHz tropo news

The increasing interest in 1·3GHz evidenced itself by a record level of activity on this band during VHF NFD. Conditions seemed average, yet operation direct on 1·3GHz proved very successful for many stations. The use of 432MHz for setting up contacts is probably a hindrance for local contacts, but it is still useful to help in making dx contacts where antenna alignment is critical. The leading stations had made nearly 50 QSOs in the first eight hours of the contest, a very different state of affairs since the writer was last operational on 1·3GHz three years ago! The use of ssb is now almost universal, and it is probably due to this that so many contacts can be set up without talk-back. Most stations returned to cw later in the event, however, to catch the more distant stations.

The standard of signals was generally good, although some stations appeared to have problems with frequency stability. This can render weak signals very difficult to copy; it is worth ensuring that crystal oscillators are operating in a stable condition and are proof against supply voltage variations. Checking equipment *before* the contest will show up these deficiencies.

BRS34348 (Chatham) was listening during VHF NFD and received a large number of signals. He has also been comparing the performance of his various antennas, and notes that after cleaning up his G3JVL loop-Yagi it outperformed his 15/15

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

Jaybeam Yagi, to which it was inferior before. G3JVL agrees that corrosion may well affect the gain, and that every attention should be paid to the weatherproofing. Current commercial loop-Yagis require weatherproofing before installation, and G3JVL recommends painting the elements with polyurethane varnish followed by spraying with aluminium paint, as specified in the original article. This method has proved very successful in the salty air at Hayling Island, which normally causes serious corrosion of aluminium.

GM8BKE has supplied news of current 1·3GHz activity in central Scotland. He is now operational on ssb with 50W output from a 2C39A system using modified UPX-6 cavities, to a conversion by GM8BJF. GM8BJF is also operational on the band, with an amplifier using four 2C39s which produces 250W output. Other stations active in the area include GM4DIJ, GM3FYB, GM3KJF and GM3YDN. They are all looking for skeds, and are anticipating interesting results when propagation conditions open to the Continent.

G3WDG is also operational again on 1·3GHz, and hopes to be regularly active portable from the Northampton area (the new home QTH). It is hoped to reinstitute the once very successful Monday night activity periods, in which the writer used to participate from G3KAC at Bristol. Skeds would be very welcome indeed.

More 1·3GHz moonbounce activity

LX1DB, well known for his 432MHz eme activity, is now active using this mode on 1·3GHz. His equipment consists of a 30ft dish, 500W from a rig of eight 2C39s and an NEC 64535 low-noise preamplifier. He has obtained some good echoes, and recently contacted PA0SSB and W6YFK. The latter station was worked on 16 July, and the QSO was overheard, using the 20ft dish at Oxford, by G3YGF and G3WDG. The signal from W6YFK was quite strong, peaking 8dB s+n/n in 500Hz bandwidth, while LX1DB was considerably weaker.

Forthcoming round table meetings

Three round table meetings are scheduled for September/October. Details of the first of these, at Martlesham, were given last month. The next meeting is at Sheffield on 13 October, and details of this can be obtained from G8AGN. The third meeting is on 21 October at the usual Winchester venue. It has been agreed to revert to the previous format of including short lectures in the afternoon session. The subjects to be covered will be the construction, tuning-up and operation of the G3JVL 10GHz ssb transmit/receive mixer, together with other techniques for narrow-band operation, and the construction and maintenance of microwave beacons, with special reference to GB3IOW. Further details from G3JHM. □

NEW PRODUCT

Beckman 3020 multimeter

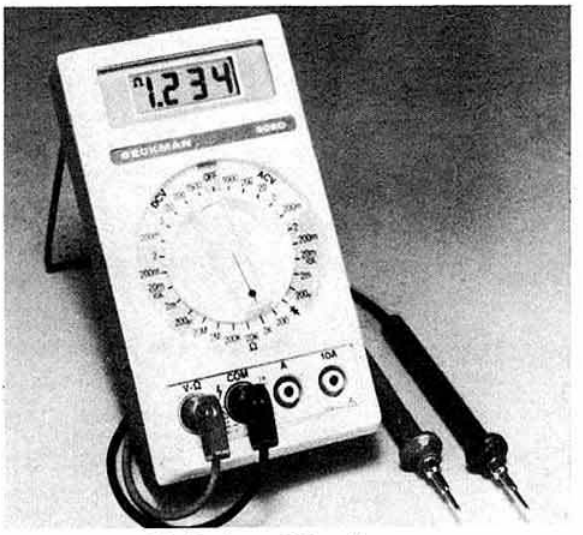
A portable, high-precision 3½ digit multimeter has been introduced by Beckman Instruments. Designed to simplify test and measurement, it is claimed to have features not found on any other multimeter currently on the world market, such as the Insta-Ohms™ instant continuity test indicator and the 2,000h battery life. The instrument is available direct from Beckman or through a range of distributors in the UK, the price being £115.

Measurements can be made across five dc voltage ranges from 200mV to 1,500V full scale; five ac voltage ranges spanning 200mV to 1,000V full scale; five ac and dc current ranges, 200μA to 2A full scale (a separate input extends the range to 10A); and six resistance ranges with full scale from 200Ω to 2MΩ.

The low-power resistance ranges permit in-circuit resistance measurements to be made without turning on semiconductors, which would affect the measurements. For applications that require testing of diodes and semiconductors, a separate semiconductor test function provides 5mA of test current, enough to verify the operation of most semiconductor junctions—even circuits with as low as 200Ω of equivalent parallel resistance.

The Insta-Ohms™ continuity test indicator allows continuity to be checked simply and speedily. When an in-range resistance is measured an ohms symbol appears on the display in less than 1ms.

The 3020 has an input impedance of 22MΩ and measures signals with frequencies of up to 10kHz. Accuracy is to within 0·1 per cent + 1 digit on all dc voltage ranges. Both ac voltage and current are average rms measurements.



The Beckman 3020 multimeter

A single 9V transistor battery provides up to 2,000h of continuous instrument operation, giving up to two-years typical use. During the final 200h of battery life a decimal point blinks on the display to warn the user to change the battery. Calibration, guaranteed for one year, requires only the simple adjustment of an internal trimming potentiometer.

Accessories include two carrying cases, a radio-frequency probe for voltage measurements up to frequencies of 200MHz, a current clamp for measurements up to 200A, and a deluxe test-lead kit with test leads and 10 screw-in probe tips.

Further information from Beckman Instruments Ltd, Queensway, Glenrothes, Fife KY7 5PU. Tel Glentrothes 753811.

obituaries

Death of a pioneer

John Scott-Taggart, OBE, MC

Wing-Commander John Scott-Taggart, who died in July at the age of 82, was a notable radio pioneer who became a household name in the early years of broadcasting.

He was first licensed with the callsign LUX before the first world war, and during the war won the Military Cross while serving as an army wireless officer at the battle of Lys. After the war he was employed by Ediswan where he was responsible for a considerable amount of valve development. At the same time he was a research engineer for the Radio Communication Company, later becoming a consultant.

In the valve field he held a number of patents and developed the Biotron and Negatron negative resistance valves; among others, the ES2 and ES4 were notable types.

As soon as experimental licenses were again available, he was among the first to receive one, holding callsign 2LR. He was an active member of the Wireless Society of London, serving on its committee in 1921-2, during which time that society successfully petitioned the PMG to allow regular broadcasting.

He was a prolific author, among his books being *Thermionic Tubes in Radio Telegraphy and Telephony, Elementary Textbook on Wireless Vacuum Tubes, Wireless Valves Simply Explained* and *Practical Wireless Valve Circuits*. In 1922 he founded the Radio Press, which published, in 1923, *Modern Wireless*, later followed by *Wireless Weekly*, of which he was both editor and contributor of many technical articles. In these journals a vast number of home-constructed broadcast receivers were described, and his ST circuits were particularly popular. The ST100 was probably the most popular of his many reflex circuits. He founded his ST Valve business in 1926.

In 1927 he sold his publishing business and became a wireless patent consultant. He was called to the bar in 1928, and in 1935 became a fellow of the Institute of Radio Engineers.

During the second world war he commanded radar stations in France and Britain, and became Air Ministry staff officer responsible for all radar training. Later he was directly responsible for the installation and maintenance of all Chain Home radar stations in Britain.

After the war he joined the Admiralty Signal & Radar Establishment, retiring in 1959. In 1975 he was made an Officer of the Order of the British Empire (OBE).

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

Mr J. Browne, G4XC
John Browne, who died on 23 June aged 70, was first licensed in 1926 as G2XB. Having allowed that licence to lapse he was allocated G4XC after the second world war, and was active for many years on cw using a side-swiper, mainly on 7MHz. A staunch member of the RSGB and Grimsby ARS, he helped many interested newcomers to obtain a licence.

Mr M. D'Arcy, G3AGL
Maurice D'Arcy, who died on 28 May aged 67, was a founder member of the RNARS, and an enthusiastic supporter of activity from *HMS Belfast*, rarely missing a society event. He served as a telegraphist in the Royal Navy during the second world war, and was licensed shortly after his discharge. He was also a founder member of Wanstead and Woodford RS.

Mr A. Hammond, G2AFM
Alf Hammond, who died on 20 June aged 86, was originally licensed in 1928 as 2AFM AA, and worked mainly on 7 and 28MHz. When he had to be admitted to hospital, permission was obtained by Bromsgrove & D ARC for him to operate on 144MHz fm from the hospital. Mr Hammond was a member of RAIBC.

Mr F. J. Merriman, G2FPR
Frank Merriman, who died on 25 January, had been a well-known member of Wolverhampton ARS for many years, and was always on hand to make newcomers welcome. He was well known to local 1·8 and 3·5MHz operators, and shortly before his death had acquired 144MHz equipment.

Mr T. L. Peterson, G6VG
Tom Peterson died on 14 May. He was active on all the hf bands and on 144MHz.

Mr G. Shipway, G3XTK
Gordon Shipway, who died on 5 July, was a member of South Dorset RS, active for many years on the regular Sunday morning top band net operating in South Dorset. Much of his gear was home-constructed, and his cheerful voice was well known to numerous swls in the south of the county and as far off as Sark.

Mr T. E. Wilson, G6VQ
Tom Wilson, who died on 24 July aged 71, was a well-known dx operator. Licensed since 1936 and a keen cw operator, he was awaiting confirmation of his 300th country when he died. He was a member of FOC and was active on the hf bands.

We have also been advised of the deaths of:
Mr E. Dabill, G3ZPX, on 9 May;
Mr K. Simpson, GW3RQV, in June.

RAE courses 1979–80

(See also the list on p745 of the August issue)

Bangor, Co Down. Bangor Technical College. Tuesdays and Thursdays, commencing mid-September. Further details from the college; or GI3WSS, tel Holywood 4277.
Bedford. Westfield School, Queens Park, Bedford. Tuesdays, commencing 25 September, 7-9pm. Enrolment 18-19 September, 7.30-8.30pm. Fee £8.50 for complete course lasting 20 weeks plus. Further information from Eric Elsley, G3YUQ, tel Bedford 768120, evenings.
Birmingham. Brasshouse Centre, Brasshouse Passage, Broad Street, Birmingham B1 2HR. Mondays and Wednesdays. Enrolment 10 September. Further information from G3NCX, tel 021-354 1337.
Birmingham. Perry Common Adult Education Centre, Blackrock Road, Birmingham. Tuesdays, commencing 18 September, 7.15-9.15pm. Enrolment 11 September. Term fee £3.80. Further information from A. J. John, Great Barr Institute, tel 021-554 4028.
Borehamwood. Borehamwood College of Further Education, Elstree Way, Borehamwood, Herts. Wednesdays, commencing 26 September, 7-9pm. Enrolment 10-11 September, 7-8.30 pm. Further information from G. L. Benbow, G3HB, QTHR, tel 01-863 1765; or the college, tel 01-953 6024.
Bradford. Joseph Priestley Institute of Further Education. RAE and morse. Commencing 17 September. Enrolment 5-6 September.
Brentwood. Brentwood Adult Education Centre, Bishops Hill, Rayleigh Road, Hutton, Brentwood, Essex. Wednesdays and Thursdays, commencing 26 and 27 September, 7.30-9.30pm. Enrolment 11 September, 7-8.30pm. Further details from T. E. Downing, G3MXH, tel Billericay 54370; or from the centre, tel Brentwood 218593.
Bridgend. Bridgend Adult Education Centre, Brynteg Lower Comprehensive School, Heol Gam, Bridgend, Mid Glam. Commencing September. Further details from Brian Walters, GW3YSP, QTHR, tel 0656 741583, evenings only.
Burgess Hill. Marle Place Adult Education Centre, Leylands Road, Burgess Hill, W Sussex RH15 8JD. Tuesdays, commencing 18 September, 7.30-9.30pm. The course lasts for 30 weeks. Further details from P. D. Dimmick, tel Burgess Hill 6355.
Canterbury. Canterbury College of Technology, New Dover Road, Canterbury. Commencing mid to late September. Enrolment early September. Further information from the college, tel 66081.
Chester. Blacon High School, Melbourne Road, Blacon, Chester. Thursdays, commencing 27 September, 7-9pm. Enrolment 10-11 September, 7-9pm. Further details from J. Clare, tel Chester 679130.
Chester. Chester College of Further Education, Eaton Road, Handbridge, Chester. Thursdays, commencing 20 September, 7-9pm (numbers permitting). Enrolment 5-6 September, 6-8.30pm. Further details from J. Clare, tel Chester 679130; or from G3SES, QTHR.
Crawley. Ifield Evening Centre, Sarah Robinson School, Ifield, Crawley, W Sussex. Thursdays, commencing 27 September, 7-9pm, for 30 weeks. Enrolment 10-11 September, 7-9pm. Further details from R. Scrivens, G3LNM, tel Crawley 22540.
Dudley. Dudley Technical College, Dudley DY1 4AS. Tuesdays, 6.30pm. Enrolment 4-7 September. Further details from the college, tel Dudley 53585.
Gosforth. Gosforth Adult Association, Gosforth Secondary School, Gosforth, Newcastle Upon Tyne. Tuesdays, commencing September, 7-9pm. Further details from the principal at the school; or tel Newcastle Upon Tyne 668439.

Hemel Hempstead. Dacorum College, Marlowes. Wednesdays, commencing 26 September, 6pm. Enrolment 10 September. Further details from course organizer C. Burke, G3VOZ, tel Hemel Hempstead 833300.
Knottingley. Knottingley High School, Knottingley, W Yorks. Enrolment 10 September.
London (Brixton). Brixton College of Further Education, Ferndale Road, London SW4 7SB. Wednesdays, commencing 19 September, 6.30pm. Enrolment 10–14 September. Further details from the college, tel 01-737 2323/6.
London (Chingford). Friday Hill House, Simmons Lane, London E4. Thursdays, commencing 20 September, 7.15pm. Enrolment on first night of the course. Fees £10, or for those under 18 £5 (subject to alteration). Further details from Alan Foss, G8EAY, tel 01-500 6034.
London (Harrow). Hatch End High School, Harrow, Middx. Wednesdays, commencing 3 October, 7–10pm. Enrolment at Nower Hill High School, 15 and 18 September, 10am–3pm and 7–9pm, respectively. Further details from G4HFL, 46 St Kilda's Road, Harrow, Middx.
London (Highgate). Holloway Institute, Highgate, London N7. Mondays, commencing 17 September, 7–10pm. Enrolment week commencing 10 September. Further details from Brian Bond, G3ZKE, tel 01-485 7065.
London (Paddington). Amberley Adult Institute, Amberley Road, Paddington. Mondays and Thursdays, commencing 17 September, 7–9pm. Enrolment 6–7, 10 and 12 September. Further details from G4HFL, 46 St Kilda's Road, Harrow, Middx.
Manchester. North Trafford College, Talbot Road, Stretford, Manchester M32 0XH. Theory, Thursdays 6.30–9pm; morse, Mondays 6.30–9pm. Enrolment 10–12 September, 6–8pm. Further details from R. J. Birkinshaw at the college, tel 061-872 3731.
Manchester. Openshaw Technical College. Enrolment 10–12 September. Further details from G3IOA.
Manchester (Swinton). Moorside School, East Lancashire Road, Swinton. Thursdays, commencing 13 September, 7.30pm. Further details from G4HYE (G8BFP), tel 061-794 3706.
Melton Mowbray. Melton Mowbray College of Further Education, Wilton Road, Melton Mowbray, Leics. Tuesdays, commencing 18 September, 7–9pm. Enrolment early September. Further details from K. G. Melton, G3WKM, tel Melton Mowbray 68810.
Motherwell. Mid Lanark ARS, Wrangholm Hall Community Centre, Jerviston Street, New Stevenson, Motherwell ML1 4UQ. Fridays, commencing 7 September, 7.30pm.
Portsmouth. Portsmouth Further Education Centre, Drayton Road, North End, Portsmouth. Tuesdays and Thursdays. Details from the college principal, or G6NZ.
Southampton. Glen Eyre Further Education Centre. Enrolment 11 September, 6.30–8pm.
Southampton. Southampton RC Clubroom, City Engineer's Yard, Kent Road, Southampton. Fridays, commencing 7 September, 7.30pm. Further details from G4COM, tel Fairoak 3017.
Stockport. Avondale Recreation Centre, Heathbank Road, Edgeley, Stockport. Thursdays, commencing 20 September, 7.15–9.15pm. Enrolment 11–13 September. Further information from G4IAC.
Stockton-on-Tees. Stockton and Billingham Technical College, Oxbridge Avenue. Theory, Mondays, commencing 17 September, 6.30pm; morse, Thursdays, commencing 20 September, 7pm. Further details from J. Ross, G3WWG, tel Stockton-on-Tees 64974; or from the college.
Turnford. East Herts College of Further Education, Turnford, Herts. Sponsored by Cheshunt & D RC. Commencing September. At least 20 candidates are required if the course is to take place. Further details from G3OJI, tel Ware 4316.
Walsall. Broadway North Centre, Walsall. Enrolment 17–18 September, 6.30–8.30pm. Fee £3.60 per session. For further information contact F. Fear, 185 Longwood Road, Aldridge, West Midlands, tel Aldridge 52706, evenings.
Wirral. Neston Adult Education Centre, Neston Comprehensive School, Raby Park Road, Neston, Wirral. Tuesdays, commencing 25 September, 7.15–9.15pm. Enrolment 11 and 13 September, 7.15–9.15pm. Further details from J. Clare, tel Chester 679130.

In addition to courses listed above, the following will also be taking place:

Morse classes will be held at Friday Hill House, Simmons Lane, Chingford, London E4, commencing 17 September, 7.30pm. Details from D. A. Platt, G3JNJ, tel 01-804 9373.

A course specifically designed for candidates who have previously failed the RAE, and those who have partially completed a course, will be held at De Beauviour ILEA School, commencing on 17 September, with both a workshop and transmitting station available. A morse instructor will be in attendance Mondays–Thursdays 7.30–9.30pm. Enrolment 10 September. Further information from F. J. Barns, G3AGP.

raynet

Robert Bullard, G8NMW*

Derbyshire Raynet

On 26 April Derbyshire Raynet was invited, through deputy controller G8LVO, to attend a briefing of the Derbyshire Cave Rescue Group at Matlock divisional police headquarters. The purpose of this meeting was to assess the feasability of Raynet providing communications during a search. This search, which had started two weeks earlier when two teenagers had been reported missing, had already covered most of the woods and moorland surrounding Cromford and Matlock Bath. Now the Cave Rescue Group had been called in to search the many disused mine shafts in the area. Because police communications were being used on other searches in the area, it was requested that Raynet cover the Cave Rescue Group's communications with the police. The official call for assistance duly came from police headquarters at 2pm on the following day. (This was just the second time in Derbyshire Raynet's history that they had been called out; the first occasion being in 1977 when flooding in the Long Eaton area caused a breakdown of normal communications.)

The areas to be searched included both sides of the Via Gellia near Cromford, the Matlock Bath side of Masson Hill, and the moors around Bonsall. The cave rescue personnel were split into groups, and each group allocated a search area. Communications were required between the groups and also back to search control at Matlock police station. Search control was at about 300ft asl, and the search areas only slightly higher. Between the two points of communication were hills of 1,000ft.

The terrain consisted mainly of steep wooded hillside with loose rock underfoot. With this in mind the need was for able walkers, properly shod and waterproofed and equipped with hand-held/portable transceivers. With the use of portable equipment, power output was low, and with little or no repeater coverage in the valley bottoms a relay station was required. (How useful a portable Raynet repeater would have been! – *G8NMW*). It was decided to use the services of G8GIY at his home QTH as a relay, using 144MHz from the search groups to the relay and 432MHz from there to search control. A mobile with 144 and 432MHz was held in reserve to cover unforeseen events. The only real worry at this stage was battery life for portable rigs; fortunately several spare sets of nicads were found among the Raynet group members, and a quantity of dry cells was acquired by G8MHB from a local shop on a sale or return basis.

On the morning of the search a host of boot-wearing, waterproofed, rucksack-carrying pedestrian stations met at Matlock police station and were each assigned to a search group. They were then transported to the various areas to be covered, and from arrival there until 6pm a constant stream of calls passed between the groups and search control via the relay station. The shortest period of inactivity during the whole time was 3min. Many hundreds of messages passed between the groups and HQ; the subject matter of these messages varying from details of search areas completed to requests for special equipment.

Letters of thanks have since been received by G8DKV, Derbyshire Raynet controller, in praise of the group's assistance and efficiency.

West Lincolnshire Raynet

The following is a short report compiled from information received from G3YWS.

On 25 June the West Lincolnshire Raynet Group was called out by the deputy emergency planning officer for Lincolnshire to assist in receiving operations of the Vietnamese boat people at Morton Hall, near Lincoln. The group was called out at 4.30pm to report at Morton Hall at 9pm for briefing, and before its members were allowed on the incident site they all had to have polio vaccinations.

Five members of the group provided hand-portable stations to give communications around Morton Hall, enabling the relief teams to do their work efficiently. No major problems were encountered, but much experience was gained in the use of hand-portable equipment, including the need to ensure that nicads were always fully charged and that a supply of spare batteries was available. The operation lasted eight hours, after which standard service communications were installed and working.

An acknowledgement of services rendered has been received from the county emergency planning officer. □

*12 Moriston Road, North Brickhill, Bedford.

contest news

144MHz Portable Contest (May) results

The delay in the publication of these results was caused by the postal problems encountered at the time of the contest—many entries took three weeks to arrive.

The VHF Contests Committee again seems to have got the weather forecast wrong, and contestants had to contend with heavy rain and winds on the hill tops. However, the contest appears to have been a success, with some good contacts made, most being by *Es* during the first hour of the event. Overall log keeping was of a very poor standard, with many groups losing points for omissions of QTH and /P—may we suggest again that contestants read the rules *before* the event, rather than afterwards.

Congratulations to G4BPO/P and GW8BHH/P for their convincing leads.

G4BEL

Posn	Callsign	Points	QSOs	QTH	Pwr out	No ops	Best dx	Km
1	G4BPO	7,952	643	AM67	400	9	DD1SA	709
2	GW8BHH	7,210	624	YM44	350	6	DB2EU	798
3	GW6UQ	6,642	584	YN75	400	4	DC6EX/P	757
4	G3ZIG	5,579	455	AM06	400	5	DK3LL	652
5	G6UW	5,480	495	AK12	300	4	DB5SD	725
6	G3WKS	4,964	468	AL73	200	6	DB5SD	661
7	G3EFX	4,947	503	ZK10	250	6	DC5NA	654
8	G6HH	4,454	461	AK03	400	6	DK2NH	702
9	G3PIA	4,263	513	ZL34	400	6	DF1ZE	705
10	G4DSP	3,899	367	AN61	150	7	DB7OZ	674
11	G3OUR	3,686	475	ZL02	400	9	DF3IP	755
12	GD3FLH	3,625	340	XO68	150	6	F1DZN	1,377
13	G4HOT	3,387	473	ZN52	160	5	DF7VX	710
14	GM4AXG	3,077	275	YP42	250	7	GU8NIS/P	662
15	G4BEM	2,854	402	ZN71	200	6	DF7VX	727
16	G8PPS	2,716	289	AM65	200	5	DJ6CA	604
17	G4ADV	2,686	282	XK28	150	7	PA3ALL	675
18	G3XBF	2,643	395	AL21	180	5	DF1ZE	619
19	G4APA	2,569	419	ZL15	50	3	F0MD	655
20	G4CCC	2,423	239	AM14	150	2	DL7GBA	626
21	GW4ALE	2,261	299	YM04	250	7	—	—
22	G2SU	1,959	301	ZN11	200	4	DB6KI	675
23	G4CRC	1,955	179	XK64	400	2	F2EP	901
24	G4BRA	1,948	375	ZL26	400	6	GM4EGS	496
25	GW4GMO	1,900	261	YL05	175	3	DB1BP	720
26	GW6GW	1,871	306	YL25	60	5	DC6EX/P	700
27	G4DAR	1,862	317	YM40	90	6	OE3HJW/3	1,336
28	G8OHM	1,686	333	YM50	100	9	GM8FFX	519
29	G8LIR	1,620	259	YL62	180	2	GM8BDX	508
30	G3FJE	1,561	248	ZM79	70	7	PA0THT	471
31	G8KGI	1,515	247	ZK05	14	6	DJ9UX	870
32	GI4BAC	1,490	124	WO70	12	5	GU3KFT	600
33	G3RKW	1,478	220	ZN58	70	7	DF7VX	652
34	G8RZO	1,444	330	ZL27	100	3	DB6KI	600
35	G4GZL	1,392	252	YM48	30	3	F1BBI	517
36	G4GRX	1,373	235	YN19	75	3	F1BZN	1,016
37	G4CJG	1,329	161	ZO22	200	2	PE1BUU	515
38	G3JEQ	1,298	301	ZL77	50	2	DF7KF	585
39	G3VER	1,223	275	ZL28	60	10	PA0THT	505
40	G3XNO	1,152	219	ZN11f	60	9	F6AGV	495
41	G8PRG	1,138	218	ZN44	250	2	PA0KDV	500
42	G8LED	1,106	230	ZM45	50	2	GM4ISS	415
43	GU8NIS	1,076	111	YJ48	120	8	GM4AXG	650
44	G4HIR	1,006	229	ZL66	50	6	GM4AXG	503
45	GM3ZQM	782	104	YP59	100	3	G6UW/P	536
46	G8KRB	749	127	ZO46	25	1	G3CHN	495
47	G8LVM	729	161	ZN72	50	1	GU8NIS/P	395
48	G4CDD	717	163	ZN32	60	4	ON5EX	450
49	GW3OXD	679	122	YM54	10	3	F1DMB	560
50	GW4ARC	610	121	YN54	40	3	F1BZN	607
51	G8PHG	589	122	ZL42	50	2	GM3YUV/P	451
52	G3AHD	572	86	ZO12	25	5	G4ADV/P	—
53	G3XWZ	544	131	ZM02	400	3	PA0FHG	435
54	G8NQP	525	91	ZL71	100	2	GM4AXG/P	495
55	GM8PHU	454	70	YO35	35	4	G3PIA/P	565
56	G4IGZ	435	79	YO35	15	1	G3KEQ	400
57	G3XKZ	397	89	ZM63	20	1	PA0FHG	420
57	GI4GTY	397	57	WO40	10	4	G3ZIG/P	540
59	GM4GIO	259	59	YP25	12	2	GW8BHH/P	368

Check logs received and acknowledged from G2BQ, G3LCH, G3YDX, GM4HAM, G8EYC and GI8OJG.

A "Tonna" eye view of some of the members of RAF Scampton ARC, G3RKW, during the May 144MHz portable contest. From l to r: G4DEE, G8LUV, G4EYL, G4GI, G3VOD, G3XF and G8OFQ. *Photo:* Howard Fairbrass

Region Round-up Contest results

Once again we have to report a disappointing entry in this year's contest, with both sections showing a decrease on last year's entry, especially the telephony section with only 12 logs received. Major changes to the rules may have to take place in an effort to revitalize this contest; it is not the HF Contest Committee's intention to hold an event, with all the work and checking involved, for just 12 ssb entrants.

As always participants were invited to send in comments and suggestions with their logs, the most frequent being that in its present state the contest is too long and that the duration be reduced. On the other hand, a number of comments were received saying that the timing is just right. Other comments received were as follows: "Can top band be included"—G3ILO; "Include county code in contest exchange"—G3CVB; "People should check their clocks, as several entrants were still at it after 1800"—G2HLU; "Can the 30 QSO minimum rule be relaxed, and also the rule regarding home address in licence"—G4BUO. Several comments were received regarding a certain G4 station who insisted that he was in Region 2—all entrants have been treated the same on this one.

The winner of the cw event was Derick Handscombe, G4BWP, with Stuart Jesson, G4CNY, winning the phone section once again. Ron Thomas, BRS15822, repeated his success of last year by winning the cw listeners' section again, and taking first place in the phone receiving section as well. Certificates will be awarded to the first, second and third placed entrants in each section.

The HF Contests Committee would like to thank all those who took part, and particularly those who submitted check logs and commented favourably on the committee's work.

G3KDB

CW TRANSMITTING SECTION

Posn	Callsign	QSOs/Regions per band 3·5MHz	7MHz	Points
1	G4BWP	75/18	83/19	17,538
2	G4BUO	74/19	77/19	17,214
3	G4FAM	67/18	82/20	16,986
4	G3NOM	59/19	78/19	15,618
5	G4CNY	58/19	76/19	15,276
6	GW3MPB	54/19	75/19	14,706
7	G3YMC	54/19	64/19	13,452
8	GM3OXC	45/17	76/18	12,705
9	G3GC	52/18	56/19	11,988
9	G3ICH	43/17	68/19	11,988
11	G4DDL	58/19	47/19	11,970
12	G4FLM	45/18	60/19	11,655
13	G2HLU	43/17	56/19	10,692
14	GI2FHN	25/16	65/19	9,450
15	G4CHM	35/18	40/19	8,325
16	G3ZDW	39/17	40/18	8,295
17	G3ZOG	28/16	40/18	6,936
18	G3SNX	41/18	19/14	5,760
19	G3ILO	30/12	30/18	5,400
20	G4HSD	38/14	16/14	4,536
21	G3CVB	19/11	31/19	4,500
22	G6GH	21/12	28/18	4,410
23	G3AWR	—	43/19	2,451

Check logs were received from G3MCK, G8GF and G3NKS.

CW RECEIVING SECTION

Posn	Station	Points
1	BRS15822	12,765
2	BRS34310	8,670

PHONE TRANSMITTING SECTION

Posn	Callsign	QSOs/Regions per band		Points
		3·5MHz	7MHz	
1	G4CNY	186/19	194/20	44,460
2	G4BWP	189/20	155/20	41,280
3	G3XBY	180/18	118/20	33,972
4	G4BYY	146/18	112/20	29,412
5	G4HKF	120/18	118/20	27,132
6	G3XMV	126/19	105/20	27,027
7	GU3YIZ	111/18	116/20	25,878
8	G4HSD	73/14	21/9	6,486
9	G3NKS	35/15	22/11	4,446
10	G4DDL	50/16	8/5	3,654
11	G2VJ	22/14	19/11	3,075
12	G2HLU	20/10	21/12	2,706

Check logs were received from G3EJF, G4FAM and G8PR.

PHONE RECEIVING SECTION

Posn	Station	Points
1	BRS15822	16,872
2	BRS34310	14,580
3	A40482	4,200
4	BRS33673	2,640

DF Qualifying Event Burton-on-Trent results

Fifteen competitors took part in this contest. Station A, G3NFC/P, was located about four miles SE of the start, on the edge of Repton Shrubs. The 1W transmitter and 350ft antenna radiated a strong signal over the entire area, and it was expected that most competitors would aim for this site first, which nine did. Bob Vickers and Ian Butson only took until 1421 to find the hidden station.

Station B, G4AXR/P was 12 miles from the start on the north bank of the Trent and Mersey Canal, west of Fradley Junction. The antenna passed through a tunnel under the canal into a swampy wilderness, but even this was no great deterrent to Chris Plummer, who arrived at 1432. Most competitors, needing cooling streams, waded through the tunnel, but a few preferred the half-mile run along the canal tow path.

The contest was won at 1514 by Eric Mollart, with Ian Butson and Chris Plummer qualifying for the National Final.

Posn	Competitor	Club	Time of Arrival	
			Station A	Station B
1	E. Mollart	Mid-Thames	1439	1514
2	I. Butson	Chelmsford	1421	1524
3	T. C. Gage	Mid-Thames	1530	1445
4	J. R. Vickers	Slade	1421	1534
5	C. D. Plummer	Mid-Thames	1534	1432
6	M. P. Hawkins	Chelmsford	1437	1535
7	P. Lisle	Mid-Thames	1436	1536
8	G. Whenham	Coventry	1435	1537
9	D. Holland	S Manchester	1556	1454
10	C. Wells	Mid-Thames	1601	1453
11	C. Merry	Dartford Heath	1601	1444
12	D. Newman	Slade	1450	1605
13	P. Homer	Dartford Heath	1444	1609
14	D. Witts	–	1630	1435
15	A. Butcher	Chelmsford	1456	–

DF Qualifying Event Dartford Heath results

Twenty-four competitors assembled at Shipbourne for this, the third, qualifying event. Both stations were clearly heard at the start and all except two competitors were soon on their way. One arrived late due to a damaged heater hose, and the other had difficulty when his df set packed up at the start.

Station A, G4BDF/P, was manned by Charles Oliver and Colin Merry, and was situated in a hole in the ground at the bottom of a steep slope between the Pilgrims Way and the North Downs Way, about 19km NE of the start. Station B, G4EGU/P, was operated by Phil Wolfe and Steve Shorey and was located in a prickly bush in Shoreham Wood about 12km NW of the start.

Two thirds of the competitors headed for Station A, and Brian Bristow found both stations before the runner-up had found one. In future, other competitors intend equipping themselves with rabbits to decoy the human ferret masquerading as a navigator. About half the competitors found both stations and only two failed to find either station. E. Mollart and T. Gage qualified for the final.

Posn	Competitor	Club	Time of Arrival	
			Station A	Station B
1	B. Bristow	Mid-Thames	1454	1413
2	E. Mollart	Mid-Thames	1508	1558
3	T. C. Gage	Mid-Thames	1509	1558½
4	D. Holland	S Manchester	1507	1558½
5	C. Wells	Mid-Thames	1507½	1600
6	M. Hawkins	Chelmsford	1615	1451
7	P. Homer	Dartford Heath	1508½	1616
	P. Tyler	Mid-Thames	1616	1458
9	A. Lisle	Mid-Thames	1617	1458½
10	P. Sharman	Dartford Heath	1509½	1618
	I. Butson	Chelmsford	1618	1455
12	B. North	Mid-Thames	1506	1625
13	D. Brocks	Chelmsford	1545	1626
14	J. Everist	Dartford Heath	1455	–
15	G. Foster	Stratford	1505	–
16	L. F. Pleasant	Colchester	–	1515
17	M. Easterbrook	Dartford Heath	–	1520
18	J. Herbert	Colchester	–	1521
19	B. Petchy	Chelmsford	1545½	–
20	I. Clabon	Dartford Heath	1546	–
21	C. Butler	Dartford Heath	1616½	–
22	D. Newman	Slade	1619	–

IARU Region 1 VHF/UHF/SHF Contests rules

In addition to the full rules, published in the June issue of *Radio Communication,* the following details should be noted.

VHF Contest (144MHz, September). All entries and check logs should be sent to VHF Contests Committee, c/o L. Hawkyard, G5HD, The Eyry, Newton St Petrock, Nr Torrington, Devon EX38 8LU.

UHF/SHF Contest (October). All entries and check logs should be sent to VHF Contests Committee, c/o R. Taylor, G4BEL, 12 The Rampart, Haddenham, Cambs CB6 3ST.

70MHz Fixed Contest rules

0800–1200gmt, 21 October 1979

The following general rules, published in the January 1979 issue of *Radio Communication,* will apply: 1, 2, 3, 4c, 5a, 6a, 7a, 8, 9a, 10a, 11a, 12–22.

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

432MHz Cumulative Contest rules

2000–2230gmt; 28 October; 9, 21 November; 3, 15, 27 December 1979; 8 January 1980

The following general rules, published in the January 1979 issue of *Radio Communication,* will apply: 1, 2, 3, 4b, 5a, 6a, 7a, 8, 9a, 10b, 11–22.

All entries and check logs to: VHF Contest Committee, c/o C. Sharpe, G2HIF, 20 Harbour Road, Wantage, Berks OX12 7DQ.

1,296MHz Cumulative Contest rules

2000–2230gmt; 3, 15, 27 November; 9, 21 December 1979; 2, 14 January 1980

The following general rules, published in the January 1979 issue of *Radio Communication,* will apply: 1, 2, 3, 4b, 5a, 6a, 7b, 8, 9a, 10b, 11–22.

All entries and check logs to: VHF Contests Committee, c/o C. Sharpe, G2HIF, 20 Harcourt Road, Wantage, Berks OX12 7DQ.

BATC/International ATV Contest

Amendment to rules

The international organizers of this contest, to be held on 8/9 September (rules in Radio Communication April 1979, p353) have now decided to allow one-way television contacts to count for half-points.

National Field Day 1979 Results

Preplanning for NFD takes various forms, and each group has its own idea of the work to be done and the time-scale involved. Some start early and take meticulous care to test equipment and antennas, work out strategy and plan to the 'nth degree. Others leave it to the last moment and go into the contest with a hope in their heart and untested gear. Just how much total time is spent in the preliminaries is anyone's guess, but it certainly must run into several thousand man-hours.

This year, all this effort culminated in the 24 hours of the contest during the week-end of 10-11 June when the hopes and ambitions of nearly 100 groups were put to the test. For a favoured few, good conditions, top-class operating and a modicum of luck brought success and record high scores. For the others, who suffered at the hands of Murphy or were unable to find the conditions they needed, there is always next year—and they can start to plan (as the 1979 NFD winners did after the last contest). The generally good weather must have provided some compensation, and in adversity most seem to have enjoyed the contest and the camaraderie that is always a feature of NFD.

Apart from 28MHz, most groups in the Open Section reported good conditions, particularly on the 14 and 21MHz bands. Restricted Section entrants were not as enthusiastic about hf band conditions, but even so some very good scores were claimed and a number of groups reported that this was their best NFD ever!

NFD Trophy

Guernsey ARS.....3,346 points

Bristol Trophy

Northern Contest Club.....3,065 points

Gravesend Trophy

Channel Contest Group.....2,616 points

Scottish NFD Trophy

Glenrothes & D ARC.....2,877 points

Frank Hoosen (G3YF) Memorial Trophy

Swansea ARS.....1,174 points

Leading scores on individual bands

Open Section		
1·8MHz	Edgware & D RS	518 points
3·5MHz	Harlow & D ARS	1,168 points
7MHz	Farnborough & D RS	1,167 points
14MHz	Swansea ARS	1,174 points
21MHz	Guernsey ARS	1,400 points
28MHz	Glenrothes & D ARC	358 points
Restricted Section		
1·8MHz	Sutton & Cheam RS	546 points
3·5MHz	Mansfield RS	811 points
7MHz	Worthing & D ARC	1,139 points
14MHz	Channel Contest Group	724 points
21MHz	Cornish RAC	516 points
28MHz	Northern Contest Club	402 points

Overseas stations giving most points to entrants

Europe:	OK2KMR	N America:	W0BMM
Africa:	ZS6ME	Australasia:	VK6PG
Asia:	ZC4CZ		

Open Section

The previous record number of QSOs in an NFD contest was 970, made by the Channel group in 1977, but this year this record was surpassed by the Guernsey group, GU3HFN/P. Guernsey fully preplanned their win and set themselves hourly targets to give a total of 1,200 QSOs; they were quite disappointed not to have achieved this total and they felt that 28MHz had let them down. This was their first entry into the Open Section and their fine performance nets them the NFD Shield and the 21MHz Open Section band certificate. They used an FT101B transceiver feeding a four-element triband Yagi and separate inverted-V dipoles, and their team of GU3MPS, GU3CHY, GU3EON and GU5CIA achieved another NFD record of 78 QSOs in an hour (between 0300 and 0400).

The Swansea ARS group, GW5ZL/P, were runners-up last year, and this year they repeated their success with a score of 2,923 from 840 contacts. Their team of GW3INW, GW3NJW, GW3OAY and GW4BCC used an FT401 transceiver with a two-element triband cubical quad and a 264ft c/f wire. They were also the band leaders on 14MHz, and will receive the Frank Hoosen (G3YF) Memorial Trophy for their efforts. This will compensate them for not receiving a repeat award of the Gravesend Trophy, which this year goes to the runners-up in the Restricted Section.

Behind Swansea were the Racal ARG, G3RAC, who were fourth last year. Their third placing was obtained by operators G3KLH, G3PEM, G3YGR and G4HNF who used an FT101B transceiver, a two-element triband quad, two half-waves in phase for 7MHz, and separate dipoles for 3·5 and 1·8MHz.

Restricted Section

In a repeat of last year's result, the Northern CC, G3VMW/P, were again the winners of the Bristol Trophy, with an increase of 27 QSOs over their 1978 total, and unlike many other groups they were able to make some useful points on 28MHz. Their team of G3VMW and G3WPF was unchanged from last year. They used an FT101E transceiver and a 264ft inverted-V centre-fed antenna. They will also receive the certificate for the highest 28MHz score.

The Channel group, G4DAA/P, who usually dominate the Open Section, changed to the Restricted Section this year and came up smiling, as they will be awarded the Gravesend Trophy, being the runners-up in the section with most entries. G3FXB and G3MXJ were the operators and they used a R4/T4 combination and 260ft c/f wire.

In third place were the Stockport RS, G6UQ/P, who were runners-up in 1978; operators G3FYF and G3NOM using a TS520S transceiver and a 200ft c/f wire. Last year they were able to take advantage of better conditions on 28MHz, but in common with most competitors they found the band to be in very poor shape and were only able to make a few QSOs.

Scottish NFD Trophy

Once again the winners were Glenrothes & D ARC "A" station, GM4GRC/P. They were in the Open Section and made most of their score from contacts on 7 and 14MHz, with useful back-up from 28MHz and the other bands. GM3OLK, GM3YOR and GM3ZSP were the operators, and their gear was an FT101B feeding a two-element triband quad and dipoles. Glenrothes "B" was the highest placed GM entrant in the Restricted Section.

Check logs

The HF Contests Committee thanks the many stations that sent check logs for the contest. These were from G3IFF/P, G3VTT/P, GU3HKO/P, G4QK, HB7R/P, JA6AKF, K4KUZ, OK1DWF, OK2KMR, OK3CAU, OK3WPP, OZ1EE, VK6PG, VK6RV, VU2GO, W1OPJ, W6VD, W8HJ, W9OR, W0BMM, W0URD, ZC4CZ and ZS6ME.

The certificates for the stations giving competitors most points go to OK2KMR, ZS6ME, ZC4CZ, W0BMM and VK6PG.

28MHz

The band was in a sad and sorry state for most of the contest period, and many groups found it very difficult to make more than a handful of contacts. Once again the northern part of the UK fared better than the south for contacts with Europe. Even so, the openings in the north were of short duration, most signals suffered from heavy QSB, and the band was reported to be very noisy. Some dx was worked and many logs include contacts with LU, PY, VU, W, ZS and 9J2.

The band leaders were the overall winners of the Restricted Section, the Northern CC, G3VMW/P, and they receive one of the band certificates. Glenrothes "A", in the Open Section, were second and they receive the other band certificate. East Notts CC, also in the Open Section, were third, and Croydon SRCC were second in the Restricted Section.

Possibly due to band conditions, many logs contained inaccuracies in the recorded callsigns and reports, and most entrants have lost points. Some logs contained unmarked duplicate contacts and this is inexcusable in view of the small number of stations contacted by the offenders.

Most of the groups who used the band asked that the ×2 bonus be retained, and a number were of the opinion that without the bonus no group would have troubled to use the band at all. The committee is very aware of the unstable and varied conditions that can exist during mid-summer. The bonus was added to the scoring system to encourage groups to use the band, and the committee thanks all those who persevered with it.

21MHz

Although some stations enthused about conditions and the dx worked, there were numerous complaints about the difficulties in working on the band. Analysis of the logs suggests that the south had the better conditions and that most dx signals were worked by stations using beam antennas with a low vertical angle of radiation. In recent years the difference in performance between the entrants in the Open and Restricted sections has not been as marked as it was this year, and very few of the "wire antenna" brigade were able to make much impression on the dx.

Having a GU call must help, but good operating and a four-element beam contributed to the very high score achieved by the Guernsey

Operators of the winning station, GU3HFN/P: GU5CIA, GU3MBS, GU4EON and GU4CHY

group. They started the contest on 21MHz and stayed with it, apart from quick excursions to 14 and 28MHz, until 2300. During this period they made 270 contacts at a high average scoring rate. They also used the band for long periods on Sunday and this gave them a good foundation for their overall win of the NFD Shield.

Racal, G3RAC/P, also did well and made 265 contacts to put them in second place, and GW5ZL/P, in third place made 190 QSOs. All three of the leaders were in the Open Section and were using rotary beam antennas at optimum heights above ground. Cornish RAC, G4CRC/P, who operated in the Restricted Section, did very well to make 516 points from their 265ft wire antenna at 35ft; they receive the band certificate for the Restricted Section, and Guernsey the certificate for the Open Section.

Logs were generally good, except for one that was almost unreadable in places due to the alterations and overwriting.

14MHz

Although leading scores were somewhat reduced this year, band conditions were generally good, with the path to North America remaining open all night. As for 21MHz, the more southerly stations appeared to have the best of the conditions, but this was not exclusive and some northern entrants did very well on the band. There was some traffic to VK/ZL around breakfast time and, once the skip had shortened, the European portables provided fairly brisk business for most of the day—too much it seems, as many logs mention the attentions of LZ1KSP, who seemed determined to work every station at least six times!

As reported in the Open Section report, the Frank Hoosen (G3YF) Memorial Trophy, for the overall leader on 14MHz, goes to Swansea, GW5ZL/P. Their 394 QSOs included 114 with European portables and 197 with North America.

The overall NFD winners, GU3HFN/P, having been able to place greater emphasis on 21MHz, spent less time on the band. They are in second place with 344 QSOs, mainly from contacts with the USA and Europe.

In the Restricted Section, the leaders were the Channel Contest Group, G4DAA/P, with 232 QSOs, 95 of these were with North America and 72 with European portables.

Conditions were probably typical of midsummer at a sunspot maximum, with the band not opening for dx until late evening and with the high absorption during the day prohibiting all but semi-local contacts. Noticeably absent was any opening to Japan and to other areas of Asia.

Unmarked duplicates and errors were a feature of some logs, and a few entrants lost a substantial number of points for these mistakes.

7MHz

Ninety-one logs, plus a number of check logs, were received for this band. Activity remained high throughout the 24 hours, with plenty of G and European portables to work. Many stations found plenty of dx, and the period between 0100 and 0600 provided good contacts with North America. ZL1AH, ZL3GQ and ZL2UV were also contacted. Of the groups using the band, 24 elected to start the contest on it, and a further six joined the fray in the first hour.

Band leaders in the Restricted Section, the Worthing & D ARC, G3WOR/P, made 383 QSOs using an FT101 and a delta loop antenna, with G2ALM, G3HQQ, G3LQI, G3WPO, G3YQI and G4GVB as the operators.

In the Open Section, G3RRA/P, the Farnborough & D ARS also used an FT101 and a delta loop to give them first place from 355 contacts and were comfortably ahead of Salisbury, G3FKF/P, who made 329 QSOs.

Nearly all stations lost points during the checking process, with some worse than others. Problems were mainly due to unmarked duplicate contacts and incorrectly copied callsigns. Two logs had to be completely rescored as for some reason they were based on the old scoring system. The most difficult to check were the original logs compiled during the contest, which suffered from alterations and overwriting. In checking, an undecipherable callsign lost all the points claimed for the contact.

Comments with the logs showed that most users considered the band to be very good and perhaps the best of the six. A few complained of patchy activity during the Sunday morning. Others comments were: "Too many DLs"-*G4KF*; "Our club only consists of one man and a dog, helped by schoolboy checkers"-*Garendon*; "We need a better rx"-*Liverpool*; "Would prefer an earlier start and finish, some of us didn't get home until 8pm"-*BSC Port Talbot*; "Who stole the band at 0800?"-*Farnborough*..

3·5MHz

The "bread and butter" band is the most frequent comment on the logs. With good conditions to Europe throughout the period of the contest, and a sprinkling of dx during the night, many groups did well on this band. There was no evidence of any part of the UK being more favoured by the prevailing conditions, and there were no "dead" areas as had been reported in earlier contests. Activity was somewhat lower than in previous years, due no doubt to the all-night openings of the hf bands. Static caused little difficulty but some entrants commented on problems from locally generated noise. Typical was ". . . believe it emanated from the site owner's egg packing station—NO YOLK!".

The overall band leader was the single-band entry from Harlow & D

Members of Thames Valley ARTS at their NFD site at Kempton Park racecourse. L to r, G3LHN, G3GTX, syl of G4DZS, daughter of G3BPM, xyl of G3GTX, G3BPM, G3JIP, G2AIU and G3OGP

OPEN SECTION

Posn	Group	Callsign	1·8MHz	3·5MHz	7MHz	Points 14MHz	21MHz	28MHz	Total	Number of contacts
1	Guernsey ARS*	GU3HFN/P	268	69	471	1,056	1,400	82	3,346	1,030
2	Swansea ARS	GW5ZL/P	458	107	467	1,174	593	124	2,923	840
3	Racal Amateur Group	G3RAC/P	264	134	556	1,017	868	70	2,909	851
4	Glenrothes & D ARC "A"*	GM4GRC/P	288	423	707	804	297	358	2,877	795
5	Shefford & D RS*	G3FJE/P	472	312	699	810	242	126	2,661	719
6	East Notts Contest Group*	G3TBK/P	364	450	457	510	397	354	2,532	676
7	Crawley ARC*	G3TR/P	248	304	736	782	370	60	2,500	713
8	Medway Radio Contest Group	G3ZYV/P	468	256	414	867	366	124	2,495	674
9	Norfolk ARC*	G3IOR/P	242	342	708	485	498	92	2,367	675
10	Leicester RS	G3LRS/P	444	322	797	371	221	114	2,269	592
11	Torbay ARS	G3NJA/P	414	257	542	503	431	120	2,267	589
12	Bromsgrove & D ARC*	G3VGG/P	252	140	463	899	479	24	2,257	685
13	Leicester Poly ARS	G3SDC/P	408	313	750	505	236	8	2,220	611
14	Bristol Contest Group	G6YB/P	420	447	629	344	207	160	2,207	546
15	Hornsea & D RS	G5GX/P	208	439	580	603	283	76	2,189	609
16	Gravesend RS*	G3GRS/P	510	178	560	601	210	90	2,149	561
17	Reading ARC	G3ULT/P	388	528	361	510	167	96	2,050	508
18	Guildford & D RS*	G6GS/P	392	294	583	577	77	80	2,003	560
19	Plymouth RC*	G3PRC/P	366	34	385	604	498	64	1,951	552
20	Leyland Hundred AR Group	G3GGS/P	278	214	627	294	290	202	1,905	469
21	Cray Valley RS Ltd	G3RCV/P	356	242	548	275	342	140	1,903	484
22	Kingsway Tech Coll, Dundee*	GM4AAF/P	328	258	354	515	284	152	1,891	493
23	Liverpool & D ARS	G3AHD/P	458	204	186	349	257	351	1,805	394
24	Grimsby ARS "A"	G3CNX/P	512	306	342	441	155	20	1,776	444
25	Scarborough ARS	G4BP/P	378	292	414	358	198	104	1,744	415
26	Edgware & D RS "A"	G3ASR/P	0	249	714	691	74	0	1,728	494
27	Verulam Training Group	G3VER/P	0	263	569	636	153	24	1,645	485
28	Bangor & D ARS	GI3XRQ/P	68	257	258	401	349	280	1,613	465
29	Ilford RSGB Group	G3XRT/P	380	530	604	98	0	0	1,612	417
30	Chiltern ARC	G3CAR/P	196	398	140	498	157	176	1,565	395
31	Wirral ARS	G3NWR/P	374	212	448	448	20	0	1,502	395
32	Dumfries & Galloway R & EC	GM4HAA/P	328	222	451	128	40	306	1,475	372
33	Conway Valley ARC*	GW6TM/P	458	224	394	267	105	0	1,448	333
34	Greenock & D ARC	GM3ZRC/P	0	132	337	566	134	268	1,437	409
35	Bridgend & D RC	GW3REQ/P	292	78	235	545	96	180	1,426	368
36	Clifton ARS	G3GHN/P	0	320	555	378	53	100	1,406	375
37	Chelmsford ARS*	G4DAN/P	0	390	575	341	61	0	1,367	390
38	Hartlepool/Easington ARCs	G3IDV/P	252	50	547	369	113	0	1,331	342
39	The Hamsters	GM3SSB/P	0	289	372	383	206	56	1,306	380
40	Bury RS	G3BRS/P	350	310	323	250	8	0	1,241	296
41	Harlow & D ARS	G6UT/P	0	1,168	0	0	0	0	1,168	374
42	Farnborough & D RS	G3RRA/P	0	0	1,167	0	0	0	1,167	355
43	Preston ARS	G3KUE/P	292	278	285	8	251	0	1,114	283
44	Newbury & D ARS*	G3WOI/P	0	252	227	408	121	48	1,056	306
45	Salisbury R & ES	G3FKF/P	0	0	1,019	0	0	0	1,019	329
46	Ainsdale RC	G4EID/P	0	0	242	325	291	60	918	254
47	Edgware & D RS "B"	G3GC/P	518	0	0	0	0	0	518	87

Note: Contacts made are claimed numbers, not checked figures.
* Inspected stations.

ARS, G6UT/P, operated by G3KEF, G3WRO, G3WUX, G4GHU and G4HFR. Their 374 QSOs, were 42 contacts less than their 1978 total. They used a TS510 transceiver and a dipole. Their log was notable for its high level of accuracy, and they lost very few points during the checking process, clearly reflecting the value of paying attention to accurate logging and checking. They receive the Open Section Certificate.

In the Restricted Section, the leader was G3GQC/P, the Mansfield RS, who made 275 QSOs using a TS820 and a long c/f wire. Their operators were G3DBZ, G3EQF, G3KDQ, G4AAH and G4HCD.

1·8MHz

Comments from competitors using the band were few and far between, so it has been necessary to read between the lines in compiling this band report. Conditions on the band were apparently quite noisy with long bursts of static and some deep QSB. Points scored were hard-earned and were mainly obtained from inter-G portable working, with only a very few European contacts logged. Although most groups used the band for short periods during the night, the peak activity was before 0200.

Using the same team as last year, G2DMR/P, the Sutton & Cheam RS, were again the band leaders. Operating in the Restricted Section, G3DCZ and G3LCH, operated for 4¼ hours to net 80 contacts for the band certificate. Second highest score was made by the Northern CC, G3VMW/P, who were the overall winners of the Restricted Section. In the Open Section, Edgware & DRC, G3GC/P, took the other band certificate, having made 87 contacts, but a lower final score related to the two Restricted Section leaders. They had two sessions on the band and their operators were G3GC, G3ZDJ and G4HMD. Just behind them was the Grimsby ARS "A" station, G3CNX/P, operated by G3VIP.

A number of groups have asked that the multiplier of × 2 for contacts on 1·8MHz be retained or increased to × 3. Other comments from entrants reflect the prevailing conditions: "Contacts on the band made between shivers"–*Sutton and Cheam*; "Disappointing"–*Blackdown*; "Where were all the Europeans?"–*Plymouth*.

The standard of logs received varied from excellent to the virtually unreadable inked-over-pencil offering which was previously mentioned. Very few unmarked duplicates were included, but nearly every log lost points due to errors in recording callsigns and reports.

Equipment and antennas used

Following the limited offering in last year's report on the gear used by competitors, there have been many requests for this feature to be expanded and to be a regular part of the NFD report. The committee hopes the following is helpful.

Apart from three groups who used non-transceive separate transmitters and receivers, all the other entrants used transceivers or transceive-coupled separates. The most popular transceiver was the FT101 (B, E and Z), with a total of 32 in use. The next most-used transceivers were the TS820 and TS820S, followed by the TS520 (and S), and the FT401. These four types accounted for 65 per cent of the equipment used. The remaining 35 per cent in order of popularity were the FT200, HW100/101/SB101/102, KW2000, FR101/FT101, R4/T4, IC701, and one each of SB104, TR7, TR4, FT301, TS510, Tentec Triton, Swan 350, FT501 and FT7. Three groups used homebrew transceivers, and another had a home-built transmitter coupled to an SB303 receiver. In the Open Section, 13 groups mentioned that they had used the second receiver permitted under the rules, and the types included the FRG7, AR88, Drake 2B, R4, FR101, HRO50, and five others not specified.

AC power from diesel or petrol-driven generators is now the norm for NFD, and units in use varied from the simple 300W Honda to a massive 15kVA ex-RAF Lister mounted on a four-wheeled trailer borrowed from a local farmer. One group borrowed a generator that ran on methane gas, and another, with the petrol shortage in mind, converted their new 1·2kW unit to run on lpg. Only two entrants said they were using battery power, and one of these float-charged the batteries from a petrol-driven charger.

RESTRICTED SECTION

Posn	Group	Callsign	Points 1·8MHz	3·5MHz	7MHz	14MHz	21MHz	28MHz	Total	Number of contacts
1	Northern Contest Club	G3VMW/P	508	575	654	439	487	402	3,065	748
2	Channel Contest Group*	G4DAA/P	454	487	684	724	179	88	2,616	680
3	Stockport RS*	G6UQ/P	482	396	636	605	221	144	2,484	634
4	Sunderland RSGB Group*	G3RDI/P	364	392	611	631	244	172	2,414	615
5	SRCC Croydon RSGB Group*	G6LX/P	432	312	717	518	137	262	2,378	590
6	Blackdown Contest Group	G4BEZ/P	320	370	430	656	431	144	2,351	621
7	Addiscombe ARC "A"	G4ALE/P	472	402	752	495	98	92	2,311	591
8	Government Comms ARC "B"*	G3NKS/P	446	412	626	543	244	32	2,303	571
9	Bracknell ARC	G4BRA/P	408	509	642	474	123	120	2,276	591
10	Downs Contest Group	G4BVH/P	480	307	671	545	153	116	2,272	585
11	Hereford ARS	G3YDD/P	324	266	648	577	289	92	2,196	556
12	Lichfield ARS*	G3WAS/P	462	300	613	373	293	112	2,153	516
13	Government Comms ARC "A"*	G3SSO/P	446	362	411	703	68	60	2,050	520
14	Garendon School RC	G3MKX/P	144	442	457	557	207	88	1,895	501
15	White Rose RS	G3XEP/P	0	356	642	590	201	92	1,881	528
16	Worcester & D ARC*	G3GJL/P	472	318	652	141	220	76	1,879	448
17	Horsham ARC	G4HRS/P	264	246	646	498	103	84	1,841	488
18	Addiscombe ARC "B"*	G3WRR/P	196	426	551	387	165	84	1,809	426
19	Colchester Radio Amateurs*	G4CRA/P	390	445	625	312	2	0	1,774	449
20	Sutton & Cheam RS*	G2DMR/P	546	279	497	262	64	120	1,768	414
21	G4KF Contest Group	G4KF/P	200	361	535	337	125	102	1,660	480
22	Catterick Garrison ARC	G4RS/P	448	272	403	282	199	40	1,644	401
23	Oxford & D ARS*	G2DU/P	330	178	320	443	295	20	1,586	422
24	Maidenhead & D ARC	G3WKX/P	350	274	346	364	56	172	1,562	384
25	Cornish RAC*	G4CRC/P	208	187	302	314	516	26	1,553	411
26	Glenrothes & D ARC "B"*	GM4GUL/P	268	295	438	525	6	16	1,548	411
27	Echelford ARS*	G3UES/P	138	290	609	341	120	32	1,530	423
28	Caterham Radio Group	G3TWJ/P	242	370	611	178	8	112	1,521	385
29	Ayr AR Group	GM3WIL/P	474	150	309	445	86	8	1,472	372
30	Stourbridge & D ARS	G6OI/P	0	276	428	534	121	82	1,441	417
31	Radio Club of Worksop	G4CRE/P	0	324	407	317	176	209	1,433	386
32	Stroud & D ARC	G3SZS/P	466	224	405	223	98	0	1,416	332
33	Gloucester ARS	G3MA/P	268	98	489	361	132	24	1,372	379
34	BSC Port Talbot ARS	GW3EOP/P	74	242	364	363	309	0	1,352	413
35	Southdown ARS	G3WQK/P	384	280	306	131	90	158	1,349	306
36	Blackpool & Fylde ARS*	G8GG/P	262	194	416	222	91	100	1,285	311
37	Vange ARS	G3YCW/P	0	237	622	326	84	0	1,269	366
38	Lincoln SW Club	G3IXH/P	268	160	255	311	154	64	1,212	321
39	Thornton Cleveleys ARS	G4ATH/P	186	168	362	227	15	252	1,210	292
40	Worthing & D ARC	G3WOR/P	0	0	1,139	0	0	0	1,139	383
41	Great Yarmouth RC	G3YRC/P	60	358	480	147	4	0	1,049	302
42	Thames Valley ARTS	G3TVS/P	296	189	36	252	142	92	1,007	241
43	Eccles & D RS	G3GXI/P	0	0	801	14	0	0	815	265
44	Mansfield RS	G3GQC/P	0	811	0	0	0	0	811	275
45	Grimsby ARS "B"	G4EBK/P	0	0	777	0	0	0	777	251
46	Havering & D ARC*	G3TTB/P	0	652	0	0	0	0	652	229
47	Weston-super-Mare RS	G6LQ/P	0	80	491	0	0	0	571	183
48	Rhondda RS	GW8HF/P	0	171	210	82	40	16	519	153
49	Chingford Group RSGB	G3JNJ/P	0	0	172	108	80	0	360	97

Note: Contacts made are claimed numbers, not checked figures.
*Inspected stations.

In the Open Section the hf antennas were mainly triband rotary beams. This year there were 23 Yagis and 12 cubical quads, with 27 of these being at the full permitted height of 60ft. One group used three separate full-sized Yagis for 28, 21 and 14MHz, and four stations had rhombics. On 7MHz the antennas seem to get more complex, and there were seven rotary beams in use (four Yagis and three quad/delta loop types). Other 7MHz antennas varied from phased multi-element jobs to simple trap dipoles and long wires. On 3·5MHz, loops were quite popular, and one group had a semi-rotatable single-loop delta antenna using loaded sides! Dipoles, trap verticals and long-wires were also in use, and on 1·8MHz the 270ft c/f proved very popular.

Restricted Section entrants were more conservative, and the majority of stations used a c/f wire between 200 and 300ft long, with open wire feeders and an atu for multiband use. A few groups used similar antennas with lengths of between 130 and 160ft, and there was one of 500ft and another 600ft long. Most of these antennas were erected horizontally between two masts, but the inverted-V arrangement with a single support mast was also used. The G5RV, so popular in recent years, appears to have lost its appeal and was hardly used this year. There were also fewer trap multiband dipoles than usual, but the single quad loop fed with open wire line for multiband use is gaining in popularity, and no less than six were shown to be in use this year.

Mention should also be made about antenna supports, and although some groups seemed reluctant to give details, others have provided this information. The majority of stations seemed to use a pipe mast, either being a purpose-made type or one constructed from scaffold poles. Heights varied from 30-35ft for Restricted entrants to 50-60ft for the Open Section stations. A few groups used trees as supports, and two entrants in the Open Section reported that they had the benefit of trailer-mounted 60ft Versatowers. From information reported to the committee, it is believed that several other stations also used trailer-mounted Westowers and Versatowers.

Last year one group managed to borrow a street lighting tower vehicle, but this year we have reports that two such vehicles and a turntable ladder vehicle were in use. The rumour that one group used a mobile crane has not been confirmed!

Comments from competitors

(Rules)

"Now OK, please make no changes"–*Sutton and Cheam.*
"We are very happy with rules, please make no changes"–*Lichfield.*
"Very happy with new scoring scheme"–*Blackpool & Fylde, Eccles.*
"We like the new scoring system, please keep it"–*Croydon, GCARC, Leyland Hundred, Bristol, Gravesend, Sunderland and others.*
"Scoring is good under new system, but sorry to see no Commonwealth bonus"–*Stockport.*
"Extra points for Commonwealth, please"–*Leicester.*
"New scoring better, but less incentive to work dx"–*Downs.*
"Old scoring better"–*Cray.*
"Should be a QRP Section"–*GCARC (B).*
"The Restricted Section is a sick joke"–*Clifton.*
"Restricted Section certainly easier to plan and erect"–*Channel.*
"Restricted Section is liked by our groups as it takes the panic out of station erection and gives us time to relax before the start"–*Croydon.*
"Bonus for those using 100 per cent homebrew, please"–*Edgware.*

(Log sheets)

"New log sheets are a pain"–*Cray.*
"Thanks extra log sheets this year, we like them"–*Shefford.*
"New log sheets make things easier"–*Bracknell.*
"New log sheets save postage and are easy to use"–*Croydon.*

(Conditions)

"Good old sunspot maximum, conditions excellent all bands"–*Cornish.*
"Excellent conditions all bands except 10"–*Leyland Hundred.*

"Wonderful conditions"-*Guernsey.*
"Conditions first class" -*Leicester.*
"Good lf conditions, but poor on hf"-*Stockport.*
"Conditions poor on hf"-*Sunderland and others.*
"Good contest, spoilt by poor conditions"-*Bracknell.*
"Please will someone provide an ionosphere for next year"-*Sutton & Cheam.*

(Weather)
"Excellent"-*Cornish, Croydon, Downs, Leyland Hundred, Gravesend, Shefford, Stockport and Swansea.*
"Thanks for arranging for the sun to shine"-*Channel.*
"Thanks for traditional NFD wx, could not have been better"-*Leicester.*
"Please change dates of NFD to November, we might get better wx"-*Guernsey.*

(Equipment)
"RF everywhere"-*Cornish.*
"Gremlins really came our way this year"-*Northern CC.*
"Problems"-*Downs.*
"Lost out main skyhook and had to make do with a smaller aerial"-*Blackpool & Fylde.*
"Our site manager was wearing wrong boots, so the aerial did not fit between the masts"-*Sutton & Cheam.*
"Our site manager had a row with his wife about staying out overnight and forgot to bring the petrol, and this was only the start of our troubles. The local garage would not lend us any cans, the mast fell down and was damaged due to someone letting go of a guy during erection. When we finally got going, there was so much rf in the tent that the keyer would not work on the hf bands. The final straw came at 0200 when a cow knocked down the tent, but we finished the contest!"-*Anon,* by request (and you think you had troubles!).

(General)
"Operating standards lower than usual"-*Cray.*
"Proliferation of auto CQ machines backed up by atrocious sending"-*Catterick.*
"Poor operating more general this year"-*GCARC.*
"Operating standards very good"-*Guernsey.*
"Still too many dupes"-*Croydon and others.*
"Very enjoyable contest"-*Swansea.*
"Can't wait for next year"-*Shefford.*
"We have already started planning for next year. We really enjoyed the contest, and our thanks to all concerned"-*Guernsey.*
"Naturally we are planning for 1980"-*Gravesend.*
"Enjoyed contest—our thanks to all who organized"-*Downs.*
"We had all mod cons including a microwave oven"-*Leicester.*
"At 0600 our site was visited by a group of young people who sang hymns. Isn't it wonderful how amateur radio broadens the education"-*Blackdown.*

(and finally)
"This was our first NFD for 12 years, and how it has changed! Kind wx, good conditions, a beautiful site and lashings of good food and drink. A well-organized contest, thanks—we will be back next year"-*Lichfield.*

Comments from the HF Contests Committee
Last year we reported on the poor standards of log keeping and the very noticeable reduction in accuracy in recording callsigns and reports. The 1979 logs were even worse, and almost every competitor has lost points due to errors or because of unmarked duplicates. A few logs were so badly written that the adjudicators were unable to decipher some of the calls, and one that has previously been mentioned in the band reports lost a very substantial number of points as only part of the log could be read. If similar logs are received in the future, the adjudicators will have no alternative but to declare them unacceptable and void all the contacts.

Unmarked duplicates were prevalent and were penalized at a rate of three times the claimed score for the contact. Thus, an unmarked repeat contact with a portable station on 1·8 or 28MHz has cost the entrant 24 points. In reviewing the rules for the 1980 contest, the committee will consider if the current × 3 penalty is a sufficient deterrent and whether each entrant should provide a list of stations worked on each band.

The majority of competitors seemed to like the new log sheets, and there were no complaints this year that insufficient sheets had been sent to entrants. The sheets are intended to be double-sided, but the committee does not mind if only one side is used. With postage costs being so high, the use of both sides will save weight and mail charges.

Station inspections have become a part of the NFD scene, and many groups welcome the visits. This year the committee is very grateful to the regional representatives who organized the inspections and to the many others who visited the stations on behalf of the Society. The total number of stations visited was 32 in all parts of the UK.

The committee thanks all those that have commented on the revised scoring system and the rules. Forty-six groups approve of the changes, albeit with a few who would like extra points for contacts with the Commonwealth. Only three competitors objected to the new system and one of these has since had a change of mind. There was overwhelming support for retaining the × 2 bonus on 1·8 and 28MHz.

In conclusion
As for the past two years, the arrangements for organizing and judging the contest were in the hands of G3KKQ, BRS20249 and G6LX. This year G3MXJ joined the team and provided the band summaries for 3·5 and 14MHz, as well as helping with the checking. G3KKQ looked after the entry and inspection procedures and checked the 7MHz logs as well as writing the report on the band. BRS20249 had the mammoth task of summarizing all the entries, preparing the logs for checking and producing the tabulations. He also checked the 1·8MHz logs and wrote the band report. G6LX supervised the overall checking and wrote the band summaries for 21 and 28MHz, as well as writing this report. All the adjudicators are members of the HF Contests Committee.

The committee originally forecast that it would not be possible to complete the checking and finalize the results in time for a September publication date. This was reported in the 1978 NFD results and there were a number of requests to keep the September date if at all possible. BRS20249, who is in the printing profession, devised a number of special forms which have assisted the adjudicators and saved much time in the preparatory work. Even so, some 50,000 contacts had to be checked on a line-by-line basis, and the total time expended by the team for the NFD contest exceeded 500 man-hours.

The 1980 event will revert to the first weekend in June (7 and 8), as there is no clash with the European Whitsun holiday. The committee hopes to see you all during the contest and that conditions will be good, the weather as kind as this year—and no cows at 0200 to knock down the tent!

Contests calendar

8 September	BARTG VHF RTTY *(Rules in August issue)*
8-9 September	International ATV Activity *(Rules in April and September issues)*
8-9 September	European DX Phone *(Rules in August issue)*
15-16 September	Scandinavian Activity CW *(Rules in August issue)*
16 September	BARTG VHF RTTY *(Rules in August issue)*
16 September	RSGB Region 1 VHF *(Rules in July issue)*
16 September	DF Final Rugby
22 September	AGCW-DL VHF CW *(Rules in June issue)*
22-23 September	Scandinavian Activity Phone *(Rules in August issue)*
October 1979-January 1980	432MHz Cumulative *(Rules in September issue)*
6-7 October	VK/ZL Oceania DX Phone *(Rules in August issue)*
6-7 October	IARU Region 1 UHF/SHF *(Rules in June and September issues)*
6-7 October	G-QRP Club QRP CW *(Rules in April issue)*
6-7 October	432/1,296/2,304MHz *(Rules in June and September issues)*
13-14 October	VK/ZL Oceania DX CW *(Rules in August issue)*
14 October	21/28MHz *(Rules in May issue)*
21 October	70MHz Fixed *(Rules in September issue)*
21 October	21MHz CW *(Rules in July issue)*
November 1979-January 1980	1,296MHz Cumulative *(Rules in September issue)*
3-4 November	144MHz CW
10-11 November	2nd 1·8MHz
10-11 November	Esperanto Contest (ILERA). *(Details from G4MR, QTHR)*
17 November	All Austria 1979
24-25 November	BATC SSTV
2 December	144MHz
1980	
2-3 February	7MHz Phone *(Rules in June and July issues)*
23-24 February	7MHz CW *(Rules in June and July issues)*

club news

RSGB affiliated societies and clubs, and RSGB groups, are invited to submit items for inclusion in "Club News" to their regional representatives (not direct to the editor).

Items of news and dates of forthcoming events should reach RRs by 20 September for the November issue.

Club secretaries are QTHR unless otherwise stated.

REGION 1—RR W. M. Furness, G3SMM, 16 Coniston Avenue, Sale, Cheshire M33 3GT.

Ainsdale (AARC)—Thursdays, fortnightly; 13, 27 September, 11, 25 October. Ainsdale Scout HQ. Full details from G2CUZ.

Blackburn (East Lancs ARC)—First Thursday in each month, 7.30pm. New venue: "The Globe" Bowling Club, Willows Lane, Accrington. Sec N. Jenkin, G4CGT, 5 Minster Crescent, Darwen.

Blackpool (B&DARS)—First Monday in each month. Phone G5ND (Blackpool 64508) for details of venue.

Bolton (B&DARS)—First Wednesday in each month. Horwich Leisure Centre, Victoria Road, Horwich, Bolton. Sec John Debney, G8RWY, 2 Coverdale Avenue, Heaton, Bolton.

Bolton (Edbro Radio Club)—New club! Details from the sec c/o Edbro Ltd, Lever Street, Bolton.

Bury (BRS)—Tuesdays, 7.30pm. Second Tuesday in each month (Main meeting); 11 September (G3BRS 40th anniversary dinner), 9 October (Construction competition/film night). Mosses Community Centre, Cecil Street, Bury. Publicity officer, Mike Bainbridge, G4GSY, tel 061-761 5083. Visitors always welcome.

Carlisle (C&DARS)—Mondays, 7.30pm. Currock House, Lediard Avenue, Currock, Carlisle. A very full programme of lectures and demonstrations has been arranged for the coming months. Full details from G8DVD.

Chester (C&DARS)—Tuesdays, 8pm, except first Tuesday in each month. YMCA, Chester. New sec, from whom further details can be obtained, D. Cutts, tel Gresford 3344.

Douglas (IoMARS)—Mondays fortnightly. "Keppel Hotel". Cregny-Baa, Nr Onchan. Sec GD4FWQ, tel Douglas 22295.

Eccles (E&DARC)—Tuesdays, 8.30pm. "White Swan", Worsley Road, Swinton. CW class each week. Sec Chris Harrison, G8KRG, tel 061-789 3538.

Leyland (LHARG)—Second Monday in each month, 7.30pm. "Rose & Crown", Ulnes Walton, Leyland. Details from G3XII.

Liverpool (L&DARS)—Tuesdays, 8pm. Conservative Association Rooms, Church Road, Wavertree. Sec G4EST.

Liverpool (North Liverpool RC)—For details of meetings please contact R. Porter, G3VXK, 11 Cranmore Avenue, Crosby, Liverpool L23 0QD; tel 051-928 1610.

Liverpool University (UoLARS)—Meetings each lunchtime. Membership open to Polytechnic members and associated colleges. Shack in the Reilly Building, open anytime. Prospective members should contact Geoff Plucknett, G4FKA, UoL, 2 Bedford Street North, Liverpool L7 7BD.

Macclesfield (M&DRS)—Second Tuesday in each month, 8pm. "The Old Millstone", Waters Green, Macclesfield. For details of programme, etc, contact Julian Wanden, G8ATI, tel Macclesfield 20661.

Manchester (M&DARS)—Wednesdays, 7.30pm. Morse practice most evenings, lecture on third Wednesday in each month. Newton Heath Community Centre, 203 Droylsden Road, Newton Heath, Manchester. New sec John Dent, G8OWY, 76 Lynwood Grove, Audenshaw, Manchester. Club station G3HOX active on hf and vhf.

Manchester (South Manchester RC)—Fridays; 7 September (Mini df; start from HQ at 2015), 14 September (Surplus equipment sale), 21 September ("Development of ssb transceiver" by C. McKenzie, G8LQO), 28 September (Mystery lecture), 5 October ("Experiences in operating a df station" by W. R. Parkinson, G3FNM, tape/slides), 12 October (Club quiz), 19 October ("Two-tone tests on a linear amplifier" by P. G. Torry, G3SMT—postponed from 20 July), 26 October (Night on the air/preparation for contests), 2 November ("Construction techniques" by D. C. Holland, G3WFT), 8pm. Mondays (Informal), 8pm. Sale Moor Community Centre, Norris Road, Sale. 9 November (Annual dinner). Bowdon Hotel, Altrincham. New sec David Holland, G3WFT, 32 Woodville Drive, Sale, Cheshire M33 1NF, tel 061-973 1837. Visitors always welcome.

Manchester (UMISTRS)—Wednesday afternoons, cw classes if required; Thursday evenings. The radio shack. UMIST Union bar. Prospective members please contact M. P. Doig, G4CQZ,UMIST RS, UMIST Union, PO Box 88, Sackville Street, Manchester M60 1QD. G3CXX/G8FOT active on 1·8/144MHz and, in the near future, on 432MHz/1·3GHz.

North Western Repeater Group—Informal meetings on the third Thursday in each month, 8pm. "Globe Club", Willows Lane, Accrington, Lancs. Details from sec. G3RXH.

Ormskirk (OARC)—Wednesdays, 8pm. Members' QTHs. New sec Kevin Higgins, G4IGX, 8 Delph Top, Greetby Hill, Ormskirk L39 2DX.

Penrith (Eden Valley RS)—Third Thursday in each month. Two Lions Hotel, Great Dockray, Penrith, Cumbria. Sec G4HYJ, *Herald* office, 14 King Street, Penrith, Cumbria. Full programme. Visitors welcome.

Preston (PARS)—Thursdays fortnightly; 13, 27 September, 11, 25 October. Windsor Castle, St Paul's Square, Preston. Sec John Loftus, 14 Fishergate Hill, Preston, tel 53508.

Salford (Dial House RS)—Wednesdays, 5.30—9.30pm. Dial House, 21 Chapel Street, Salford, Lancs. Net channel 145·25MHz fm—the club station G3WDH monitors this frequency every club night for any other station. Details from sec G8JCL, c/o M43 at above address.

Stockport (SRS)—Second and fourth Wednesdays in each month; 12 September (Quiz), 19 September (Natternight), 26 September (Surplus equipment sale), 10 October ("Keyboard morse generation" by G3NOM and G3RUG), 8pm. Blossoms Hotel, Buxton Road, Stockport. Sec G3FYE. Club net Sundays 11am 3,692kHz. The club now has the additional call, G8SRS.

Thornton Cleveleys (TCARS)—First and third Wednesdays in each month, 8pm; morse practice from 7.30pm. St John Ambulance Hall, Fleetwood Road North (next to "Gardner's Arms"), Thornton. Details from sec G8MKQ.

UK FM Group (Western)—First Thursday in each month, 8pm. Grappenhall Community Centre, Grappenhall, Nr Warrington. 17 September (AGM), 7.30pm. Wirral Mercury Motor Inn, Backford Cross, Nr Chester. Sec G3LEQ, tel Knutsford 4040.

Warrington (W&DARS)—Tuesdays, 7.45pm. Grappenhall Community Centre, Bellhouse Lane, Grappenhall, Warrington. Sec G3MMD, tel Lymm 3533.

Wigan (Douglas Valley ARS)— First and third Thursdays in each month. Shevington Conservative Club, Shevington, Wigan. Details from G4EHK, tel Appley Bridge 3320.

Winsford (Mid-Cheshire ARC)—Wednesdays. RAE class 7pm to 8pm. Morse class every third Wednesday. Technical Activities Centre, rear of Verdin Building, Verdin Comprehensive School, Grange Lane, Winsford. Net nights 1·8MHz Monday, 8pm; 144MHz (fm) Tuesdays. Hon sec G3JWK.

Wirral (WARS)—First and third Wednesdays in each month, 7.45pm. Sports and Recreation Centre, Grange Road West, Claughton, Birkenhead. Hon sec G3DLF.

Wirral (W&DARC)—Second and fourth Wednesdays in each month, 8pm. Sports Concourse, West Kirby, Wirral. Hon sec Malcolm Mackintosh, G8NMG, tel 051-334 1027.

The secretary of the Isle of Man ARS reports that a preliminary census after the GT period (end of June/early July) indicates that at least 50 stations operated from the island and produced in excess of 50,000 QSOs. The GT period was a great success and thanks are due to everyone, both on and off the island, for producing this result. Inquiries to GD4FWQ in relation to the Millenium Award should be accompanied by ircs—English postage stamps are *not* accepted in GD-land.

REGION 2—RR D. S. Smith, "Red Roof", Goathland, Whitby, North Yorks YO22 5AN. Tel Goathland 333.

Bradford (UBARS)—Thursdays, 7.30pm. N10, Main Building. Sec G8GOV, 30 Moorfield Drive, Baildon, Shipley, West Yorks. Net frequency 145·275.

Denby Dale (DD&DARS)—Second and fourth Wednesdays in each month, 7.30pm. Pie Hall, Denby Dale. Sec G3FQH. Visitors always welcome.

Doncaster (Doncaster Metropolitan Institute of Higher Education ARC)—Details from sec Robert Lane, G4AWU, Kelston, Doncaster Road, Bawtry, Doncaster, S Yorks. Club call G3UER.

Goole (G&DARS)—Fridays, 7.30pm (during school term only). Goole Grammar School. Details from chairman G3VBI.

Halifax (Northern Heights ARS)—Second and fourth Tuesdays in each month, 7.45pm. New venue, HQ Bradford Sub Aqua Club, Mountain, Nr Queensbury. Sec G3UI.

Hornsea (HARS)—Wednesdays, 8pm. Rear of Victoria Hotel, Hornsea (facing Hornsea Mere). Sec Bob Murden, G4BHF, 93 Gillshill Road, Hull, Yorks HU8 0JL. Club net Tuesdays 8pm S21 (145·525MHz fm).

The wedding of James Rankin, G4HKD, and Carol Candler took place at Pocklington, North Humberside, on 23 June. G4HKD is a member of York ARS, and a wide circle of friends sent their best wishes to the couple, among them: G4HAJ, G4HJO, G3YNO, G3VBI, G8PSE, G4FXX, G8PXB, G4CWS, G8GLM, G8ING, G8JIU, G2BXZ, G8NZZ, committee and members of Hull & D ARS, and swls Nick Fowler and Graham Sweeting

Hull (H&DARS)—Fridays, 8pm. Kingston Community Centre, Fountain Road, Hull. Sec E. A. Durrant, 27 Trafford Road, Willerby, Hull HU10 6AJ.
Hull (Hull University R&ES)—Tuesdays, 1.15pm. Room 313B, University Union Building, Cottingham Road. Enquiries to G8RPZ. All amateurs welcome.
Leeds (White Rose RS)—Wednesdays, 8pm. Moortown Rugby Football Club, Moss Valley, Alwoodley, Leeds 17. Sec G4DZI.
Leeds (LUUARS)—Tuesdays, 8pm. Union Annexe (second floor), Woodhouse Lane. All new students welcome. Sec G4CNG, QTHR, or at "E" block, Lupton Flats, Alma Road, Leeds 6, during term.
Otley (OR&ES)—Tuesdays; 11 September ("RTTY" by G8AWN), 8pm. 14 Back of Court House Street, Otley. Sec G8DFZ.
Pontefract (P&DARC)—6, 20 September, 4, 18 October, 7.30pm. Nottingly Town Hall Committee Room. Sec G4AAQ.
Scarborough (SARS)—Mondays, 7.30pm.Scarborough Cricket Club, North Marine Road, Scarborough. Sec G4EDR. All visitors welcome. Talk-in by arrangement.
Sheffield (SARS)—Third Monday in each month, 8pm. "Sheaf House Hotel", Bramell Lane, Sheffield. Note new sec G4APV, 321 Fulwood Road, Sheffield S10. Visitors and swls particularly welcome.
UK FM Group (Northern)—7 October, 4 November, 7.30pm. Royal Hotel, Barnsley. Sec G8PLJ. Do you use GB3NA? Your subs or donations would help to support the service provided by this repeater
Wakefield (W&DARS)—11, 25 September, 9, 23 October, 7.30pm. Holmfield House, Thornes Park, Wakefield. Sec Andrew Walker, G4ARH, tel Horbury 274607.
York (YARS)—Fridays (except third in each month), 7.30pm. 19 October (Annual dinner—details from sec). United Services Club, 61 Micklegate, York. Sec G3WVO.

REGION 3—RR H. S. Pinchin, G3VPE, 61 Cole Bank Road, Hall Green, Birmingham B28 8EZ. Tel 021-777 1320.

Birmingham (Midland ARS)—18 September, 23 October, 8pm. Room 118, University of Aston, Gosta Green, Birmingham. Sec G8BHE.
Birmingham (Slade RS)—First Friday in each month, 7.45pm. The Committee Room, Church House, Erdington, Birmingham. Sec G4FGF.
Birmingham (South Birmingham RS)—Thursdays (HF night on the air), Fridays (Construction and morse classes), 7.30pm. 3 October (Talk by Jack Hum, G5UM), 7 November (AGM), 8pm. Hampstead House, Fairfax Road, West Heath, Birmingham B31 3QY. Sec G4GZI.
Birmingham (University of Birmingham ARS)—Tuesdays during term, RAE and morse class fortnightly, 7pm. Students' Union (above stage). Club stations G3IUB and G8IUB. Sec G8HTH.
Bromsgrove (B&DARC)—12 October ("Integrated circuits" by James Bryant, G4CLF), 9 November ("Hints and kinks on antennas"), 8pm. Avoncroft Art Centre, Bromsgrove. Sec G4HFP, tel Stourport (02993) 3818.
Burton-on-Trent (BonT&DARS)—Wednesdays, 8pm. Stapenhill Institute, Main Street, Stapenhill, Burton-on-Trent. Sec G3ACR.
Cannock Chase (CCARS)—First Thursday in each month (Formal), other Thursdays (Informal), 8pm. Bridgetown War Memorial Club, Union Street, Bridgetown, Cannock. Sec G8FWZ. Visitors and new members welcome.
Coventry (CARS)—21 September (Members' slide show), 28 September (Night on the air), 5 October (AGM), 12, 19, 26 October, 2, 9 November, 8pm. Baden Powell House, 121 St Nicholas Street, Radford, Coventry. Sec G8OMB. Visitors welcome.
Coventry Technical College (CTCARS)—Mondays, 7pm. Winfray Annexe of the college. Sec G8ISJ.
Coventry (University of Warwick ARS)—Wednesdays during term, 7pm. Cryfield Farm, University of Warwick. Talk-in on S20, or contact G4BXI or G4DCW, Hurst Flat 40, Cryfield Village, University of Warwick.
Dudley (DARC)—Second and fourth Tuesdays in each month, 7.45pm. Central Library, Dudley. Sec Norman Rock, 28 Conway Close, High Acres, Kingswinford, Brierley Hill DY6 8PT.
Hereford (HARS)—First and third Fridays in each month, 8pm. Civil Defence HQ, Gaol Street, Hereford. Sec G4CNY.
Lichfield (Chad RC)—Alternate Wednesdays, commencing 26 September, 8pm. The Naval Club, Burton Old Road, Lichfield. Sec G4ESK.
Lichfield (LARS)—First Monday and third Tuesday in each month, 8pm. "Swan" (bar), Lichfield. Sec Ted Bowen, RS33003, tel Ibstock (0530) 60396.
Malvern Hills (MHRAC)—Second Tuesday in each month, 7.30pm. The "Star", Cowleigh Road, North Malvern. Sec G3IPY.
Mid-Warwickshire (MWARS)—First and third Mondays in each month, 8pm. 61 Emscote Road, Warwick. Sec G8CXL.
Redditch (RRC)—Second and fourth Thursdays in each month, 8pm. WRVS Centre, Ludlow Road, Redditch. Sec G3EVT.
Rugby (RATS)—Wednesdays, 7.30pm. Cricket pavilion entrance to B Building, Rugby Radio Station, A5 trunk road, Hillmorton, Rugby. Sec G4ECO.
Shrewsbury (Salop ARS)—20 September (Natternight), 27 September (Surplus sale by Bob Carter, G8NKO), 4, 11, 18, 25 October, 1, 8 November, 8pm. "Albert Hotel", Smithfield Road, Shrewsbury. Sec G3UDA. New members welcome.
Solihull (SARS)—18 September (Members' shack slides), 16 October (AGM), 7.30pm. The Manor House, High Street, Solihull. Morse classes available. Sec G4BBT. New members and visitors welcome.
Stoke-on-Trent (North Staffs ARS)—First and third Mondays in each month (Lectures, etc), other Mondays (Natternights, Raynet and club station, G4BEM), 7.30pm. Harold Clowes Community Centre, off Dawlish Road, Bentilee, Stoke-on-Trent. Sec G8ORU. New members welcome.
Stoke-on-Trent (SonTARS)—Thursdays, 7.30pm. 2a Racecourse Road, Oakhill, Stoke-on-Trent. Sec G4CWN.
Stourbridge (StARS)—17 September ("Electronic organ history" by Ernest Gardiner, G6GR), 1 October (Constructional evening), 15 October ("Microprocessors" by Malcolm Sparrow, G8KQJ), 5 November (Constructional evening), 7.45pm. Library, Longlands School, Brook Street, Stourbridge. Sec G4IEB.
Stratford-upon-Avon (SuponA&DARC)—Every third Friday, commencing 28 September, 7.30pm. The Clubroom, Swimming Pool, Bridgefoot, Stratford. Sec G4EXR, tel Stratford (0789) 5638, weekends only. New members welcome.
Sutton Coldfield (SCRS)—Second and fourth Mondays in each month, 7.30pm. Central Library, Sutton Coldfield. Sec G8LTW.
Tamworth (TARS)—Second and fourth Mondays in each month, 7.30pm. Indoor Sports Centre, Corporation Street, Tamworth. First, third and fifth Mondays in each month, 8pm. "Halloughton Grange", Whitacre Heath, Nr Coleshill. Sec G8MKT.
Telford (T&DARS)—19 September ("The IC", Mullard film), 26 September, 3, 10, 17, 24, 31 October, 7 November, 7.30pm. Phoenix Centre, Webb Crescent, Dawley. Sec G3UKV, tel Telford (0952) 55416. Visitors welcome.
Walsall (WARC)—Alternate Wednesdays, commencing 19 September, 8pm. Forest Community Centre, Forest School, Hawbush Road, Leamore, Walsall. Sec G4GKC, tel Walsall 31675.
Willenhall (W&DARS)—Alternate Wednesdays, commencing 26 September. Little London Community Centre, Bloxwich Road South, Willenhall. Sec M. P. Batchelor, 19 Newlands Close, Willenhall, West Midlands WV13 2DQ. New members welcome.
Wolverhampton (WARS)—17 September ("Microphones— professional and amateur"), 1 October (AGM), 8 and 15 October (Film and slide shows), 22 October (Club project, discussion), 29 October (Natternight), 5 November ("An expedition to the Hebrides" by Peter Burden, G3UBX), 12 November ("Plugs and sockets", discussion), 8pm. Neachells Cottage, Danescourt Road, Stockwell End, Tettenhall, Wolverhampton WV9 9PH. Sec G8EDG.
Worcester (W&DARC)—24 September (AGM), 1 October ("CW operating" by Roger Avery, G3TQD, and Brendan Magill, G3RMF), 5 November ("Practical antennas" by Terry Russell, G3JFH), 8pm. "Old Pheasant", New Street, Worcester. Sec G4EKG, tel Evesham (0386) 41105. New members and visitors welcome.

REGION 4—RR N. J. H. Grassby, G4CPY, 22 St Cuthberts Avenue, Great Glen, Leicester. Tel 053 759 3387.

Following information is latest received.

Derby (D&DARS)—Wednesdays, 7.30pm. Tuesdays and Fridays (Morse classes), 7pm. 119 Green Lane, Derby. Sec Jenny Shardlow, G4EYM.

Derby (NHARG)—Fridays, 7.30pm. Nunsfield House, Boulton Lane, Alvaston, Derby. Sec Ian Cage, G4CTZ.

Glenfield (Leicestershire Raynet Group)— Monthly. County Hall, Glenfield. Further details from M. G. Barker, G8CAC.

Grimsby (GARC)—First and third Thursdays in each month, 8pm. Alexandra Club, Cleethorpes.

Leicester (LRS)—Mondays, 7.30pm. Club House, Gilross Estate Cottage, off Groby Road, Leicester.

Leicester (LPARS)—Mondays, Wednesdays, Thursdays and Fridays, lunchtime during term. Leicester Polytechnic. Sec R. Newstead, G3CWI, 24 Richmond Road, Leicester.

Lincoln (LSWC)—Second and fourth Wednesdays in each month. Lincoln Corporation Social Club, Waterside South, Lincoln. Sec R. Shaw, G3VRD.

Mansfield (MARS)—First Friday in each month, 7.30pm. "New Inn", Westgate, Mansfield.

Matlock (Derwent Valley ARS)—First Monday in each month, 7.30pm. "The Royal Oak", Tansley, Nr Matlock. Guest speakers each month.

Melton Mowbray (MMARS)—Third Friday in each month, 7.30pm. St John Ambulance Hall, Asfordby Hill, Melton Mowbray. Sec Richard Winters, G3NVK.

Nottingham (ARCON)—Thursdays, 7.30pm. Sherwood Community Centre, Mansfield Road, Nottingham. Sec M. Shaw, G4EKW.

Nottingham (Trent Polytechnic RS)—Wednesdays. Newton Building, Room 105. Further information from the chairman Paul Robinson, via Students' Union, Trent Polytechnic.

Nottingham University (NURC)—Tuesdays. Contact R. Dixon, G4BVY, c/o Students' Union, Nottingham University.

Scunthorpe (SARC)—Tuesdays, 7.30pm. The Hobbies Centre, Franklyn Crescent, Scunthorpe. Sec J. Stace, G4FUH.

The RR would be pleased to hear from all club secretaries in the region, either by post or telephone.

REGION 5—RR R. E. G. Kendall, G8BNE, 19 Willow Green, Needingworth, Huntingdon PE17 3SW.

Bedford (B&DARC)—Wednesdays, 8pm. Ravensden. Sec G4FFC.

Cambridge (C&DARC)—Fridays, 7.30pm. Air Training HQ, Newmarket Road. Sec G4BAO, 20 Guest Road, Cambridge CB1 2AL.

Cambridge (CUWS)—Mondays; 5 November ("Microwaves" by G3YGF), 19 November ("UOS-AMSAT" by G3YJO or G4CWH). Queen's Bar. Meet the club on stall 215 at the Societies Fair on 13-14 October. Details from Adrian Langford, G8PQP, St John's College.

Corby (CARG) Fridays, 7.30pm. Hightrees Scout Centre, The Nook, Corby. Sec G8MLA.

Dunstable (DDRC)—Fridays; 14 September ("Moonbounce" by G3WDG), 28 September ("Batteries"), 8pm. Chews House, 77 High Street South, Dunstable. Sec G8ASP.

March (M&DRAS)—Tuesdays, 7.30pm. 2 Grays Lane. Sec G8GNE.

Northampton (NRC)—Thursdays, 8pm. Kingsthorpe Community Centre, Thornton Park, Kingsthorpe, Northampton. Details from sec I. P. A. Scott-Iversen, 35 Milverton Crescent, Abmington Park, Northampton.

Peterborough (GPARC)—Fourth Thursday in each month, 7.30pm. Southfields Junior School, Stanground, Peterborough. Sec G4FDF.

Peterborough (PR&ES)—For details contact G3EEL.

Shefford (S&DARS)—Thursdays, 8pm. Church Hall. Hon sec G4DAQ.

St Neots (Foster Cambridge RC)—Tuesdays, 8pm. Foster Cambridge Ltd, Howard Road, Eaton Socon, St Neots. Details from P. Dineen, 5 Reynolds Drive, Little Paxton, St Neots.

REGION 6—RR F. S. G. Rose, G2DRT, 84 Cock Lane, High Wycombe, Bucks HP13 7EA. Tel Penn (049481) 4240.

Banbury (BARS)—First Friday in each month, 7.30pm. The General Foods Sports and Social Club, Spriceball Park, Banbury. Sec S. L. Terry, G8OCT, tel Banbury 4769.

Bracknell (BARC)—Mondays, 8pm. Coopers Hill Centre (adjacent to station). For meeting details please contact sec D. Williams, G4CVN, tel Windsor 56096.

Burnham Beeches (BBRC)—First Monday in each month, 8pm. Hedgerley Scout Hut, Hedgerley, Nr Slough, Bucks. Sec G8DAY. New members, visitors and swls welcome.

Harwell (Atomic Energy Research Establishment RC)—Fridays, lunchtime. The Shack, AERE Harwell, Didcot, Berks. For further meeting details contact sec G8DVK.

High Wycombe (Chiltern ARC)—8pm. John Hawkins Ltd, Victoria Street, off Oxford Road (A40), High Wycombe. Further details from sec G4FRL, tel Kingston Blount 52006.

Maidenhead (M&DARS)—First Thursday and third Tuesday in each month; 6 September ("Homebrew receivers" by G. P. Stancey, G3MCK), 4 October (Grand junk sale). Red Cross Hall, The Crescent, Maidenhead. Sec P. J. Patich, G3TWG, tel 06285 25275.

Mid-Thames RDF Club—For competition details, please contact sec T. C. Gage, 28 Aldbourne Road, Burnham, Bucks SL1 7NJ, tel Burnham 63363.

Newbury (N&DARS)—Second Tuesday in each month. Newbury Technical College. Details from sec G8LTD, tel Newbury 46078.

Newport Pagnell (Milton Keynes ARS)—8pm. Lovatt Hall, Newport Pagnell, Bucks. For further details contact F. Walters, Staff Residence, Milton Keynes College of Education.

Oxford (O&DARS)—Second and fourth Wednesdays in each calendar month, 7.30pm. Civil Service Social Club, Marston Road, Oxford. New sec J. G. Bright, G4HJL, 22 Westfield Road, Long Wittenham, Abingdon, Oxon OX1 4RF.

Oxford University (OURS)—Please contact sec M. Evans, G8LTE, Worcester College, Oxford, for meeting details.

Reading (RARC)—Details from sec Chris Young, G4CCC.

REGION 7—RR D. A. G. Pedder, G3LFX, 97 Elgar Avenue, Tolworth, Surbiton, Surrey KT5 9JS.

Addiscombe (AARC)—Tuesdays, 9.15pm. "Spreadeagle", Portland Road, South Norwood. Sec G3SJX, tel 01-656 9054. New members and visitors most welcome.

Ashford (Echelford ARS)—Second Monday and last Thursday in each month, 7.30 for 8pm. The Hall, St Martin's Court, Kingston Crescent, Ashford, Middx. Sec G3TDR, tel Staines 56513.

Bexley Heath (North Kent RS)—8pm. St Mary's Institute, 2 North Cray Road, Bexley. Sec G3VFD.

Coulsdon (CATS)—Sec A. R. Bartle, G6HC, tel 01-684 0610.

Cray Valley (CVRS)—First and third Thursdays in each month; 6 September (Surplus sale extravaganza), 7.30 for 8pm. Christchurch Centre, High Street, Eltham, London SE9. For details of morse classes run by the club contact sec. Sec G4FUG.

Croydon (Surrey Radio Contact Club)—First and third Wednesdays in each month; 5 September ("Synthesizers" by G4CDY), 3 October ("Solid-state high power pas" by G3SJX), 7 November (Surplus equipment sale), 5 December (Christmas party), 7.30pm. TS Terra Nova, 34 The Waldrons, Croydon. Sec G4FFY.

Crystal Palace (CP&DRS)—Third Saturday in each month, 8pm. Emmanuel Church Hall, Barry Road, London SE22. First Tuesday in each month (Open house). Members' QTHs. Sec G3FZL.

Guildford (G&DRS)—Second and fourth Fridays in each month; 14 September (Quiz night), 28 September (Equipment sale), 12 October (Basic home computer), 26 October (Junk sale), 8pm. Model Engineers HQ, Stoke Park, Guildford. Sec G4BHQ.

Guildford (University of Surrey E&ARS)—Informal meetings, lunchtimes during term. Lower Bar, Union House, G8AHK is active on vhf, and G3IGQ on hf. Skeds and QSOs always welcome. Sec G8MIO, tel Guildford 71281.

Kingston (K&DARS)—Second Wednesday in each month; 14 November (AGM), 12 December (Surplus equipment sale), 8.15pm. Berrylands Scouts and Guides HQ, Stirling Walk, Raeburn Avenue, Surbiton. Sec G4APG, tel 01-399 8113.

New Cross (Clifton ARS)—Fridays, 8pm. 225 New Cross Road, London SE14. Details from R. A. Hinton, 42 Sutcliffe Road, Welling.

Redhill (Reigate ATS)—Third Tuesday in each month, 8pm. Constitutional Centre, Warwick Road, Redhill. First Tuesday in each month. "Marquis of Granby", Hooley Lane, Redhill. Sec G3XSZ.

Sutton & Cheam (S&CRS)—12 September ("TVI review" by G2FSA), 21 September ("UHF repeater GB3NS" by G8CUX), 31 October (Junk sale), 16 November ("Slow-scan tv" by G3HSK), 19 December (Christmas social). For meeting venues contact hon sec G. W. Brind, G4CMU, tel 01-225 4497.

Thames Ditton (Thames Valley ARTS)—4 September ("Electronic organs" by G8PIE). Giggs Hill Green Library, Giggs Hill Road, Thames Ditton. Sec G3ZNW.

Tolworth (Decca ARG)—New club! First Thursday in each month, 8pm. Decca Sports and Social Club, Kingston Road, Tolworth. Sec G3NFV, tel Leatherhead 72587.

Wimbledon (W&DRS)—Second and last Fridays in each month, 8pm. St John Ambulance HQ, 124 Kingston Road, Wimbledon. Sec J. W. Todd, tel 01-540 9031.

Radio amateurs present at the wedding of G8GHH and G3ZZZ at Canterbury Cathedral on 17 February. L to r: G8FEZ, G8DOH, G4CZU (best man) G4ELP, G8GHH (bridegroom) G4AQE, G3ZZZ (bride), G3VJF, G8MDJ, G8MLB, G8LSD (bride's brother-in-law) and G3JMB (bride's father)

REGION 8—RR D. N. T. Williams, G3MDO, "Seletar", New House Lane, Thanington, Canterbury, Kent.

Brighton (B&DRS)—8pm prompt. Catholic Church Hall, Bristol Road, Brighton. Details from N. Hewitt, G8JFT.

Burgess Hill (Mid-Sussex ARS)—Alternate Thursdays, 7.30pm. Marle Place Further Education Centre, Leylands Road, Burgess Hill. Details of future events from G3JMB or G4HHB.

Canterbury (East Kent RS)—6 September ("Oscar" by K. Crouch, G8KEN), 4 October (AGM), 1 November ("For the beginner"), 6 December (Wine and cheese), 10 January 1980 (Grand junk sale). Further details from G8GHH or G3MDO.

Chichester (C&DARC)—Details of future events from J. Chinn, 5 Shrubbs Drive, Middleton-on-Sea, Bognor Regis PO22 7SL, tel 2335.

Crawley (CARC)—Details of future events from G3MGL, tel 0293 20986.

Dartford (DHDFC)—Second Friday in each month. Scout House, Broomfield Road, Dartford. Details from Jeanette Maggs, 25 Leybridge Court, Eltham Road, Lee, London SE12.

Dover (South East Kent YMCA ARC)—Wednesdays, 7.30pm. Further details from G8PZA or G8KEN.

Eastbourne (Southdown ARS)—First Monday in each month. Details from R. Jeffries, G8KQN, 84 Mill Road, Hailsham, Sussex BN27 2HU; or pro G3LFZ.

Gravesend (GRS)—Mondays, 7.30pm. Windmill Tavern, Shrubbery Road, Gravesend. Details from G4GML.

Hastings (HE&RC)—Fridays. 479 Bexhill Road, St Leonards-on-Sea, Sussex. Third Wednesday in each month, 7.30pm. West Hill Community Centre, Croft Road, Hastings. Details of events from G4FET.

Horsham (HARC)—First Thursday in each month. Parish Rooms, The Causeway, Horsham. Details of future events from A. C. Wadswirth, G3NPF.

Kent Repeater Group—Details of membership from G3XDV.

Maidstone (MYMCAARS)—Fridays; first and third in each month devoted to the beginner; 7.30pm. Y Sports Centre, Melrose Close, Loose, Maidstone. Details of events from sec J. A. Hastie, tel Medway 251387.

Medway (MARTS)—Details of events and venue from G4EVY.

Sussex Repeater Group—Information from G8HVV.

Tunbridge Wells (West Kent ARS)—Alternate Fridays. Adult Education Centre, Monson Road, Tunbridge Wells. Tuesdays following the Fridays (Informal). Drill Hall, Victoria Road. Details from Brian Castle, G4DYF.

Worthing (W&DARC)—Tuesdays, 8pm. Adult Education Centre, Union Place, Worthing. Details from G8MSQ.

REGION 9—RR H. W. Leonard, G4UZ, 4 Start Bay Park, Strete, Dartmouth TQ6 0RY.

Camborne (Cornish RAC)—First Thursday in each month, 7.30pm. SWEB Clubroom, Pool, Camborne. Full details from G3VGO, tel Devoran 864255. Cornish net each weekday 10am on 3·715MHz, and on Sundays 11am on 3·682MHz. Visitors always welcome at club meetings.

Exeter (EARS)—Second Monday in each month; 10 September (Talk by G3OFY), 8 October (AGM), 7.30pm. Community Centre, St Davids Hill, Exeter. Full details from Jack Bawden, 232 Exwick Road, Exeter EX4 2BA.

Exeter University (EUARS)—Sundays, 2.30pm. Full details from Julian Corben, G4EXT, c/o "Devonshire House", Stocker Road, Exeter EX4 4PZ.

Exmoor (ERC)—Second and fourth Thursdays in each month, 7.30pm. "Loughrigg", East Street, South Molton. Full details from Dave Stone, tel North Molton 377.

Exmouth (EARC)—Alternate Wednesdays, 7.30pm. Rolle College, Exmouth. Full details from Dave Hanson, 67 Carter Avenue, Exmouth, tel 75482.

Newquay (N&DARS)—Alternate Wednesdays, 7.30pm. Treviglas School, Newquay. Full details from new sec Ted Warne, G3YJX, tel Wadebridge 2772.

North Devon (NDRC)—Second and fourth Wednesdays in each month. New chairman is G3YGJ. For full details of meeting places contact G4CG, tel Barnstaple 3636.

Plymouth (PRC)—Alternate Mondays, 7.30pm. Whitleigh Methodist Church, Budshead Road, Whitleigh, Plymouth. Further details from John Butcher, G4GWJ.

Plymouth (Plymouth Polytechnic ARS)—Future events include df hunt, quiz with local clubs and minibus trip to Leicester rally. For further information contact R. Taylor, G4HZA, Amateur Radio Society, Plymouth Polytechnic Students' Union, Drake Circus, Plymouth. Club station is G3TCP, with listening facilities available on 3·5-28MHz, 144 and 432MHz, for 24 hours every day in term time.

Saltash (S&DARC)—First and third Fridays in each month, 7.30pm. Burraton Toc-H Hall, Saltash. New sec D. Bunce, 47 Hobbs Crescent, Saltash, tel 2839.

Torbay (TARS)—Fridays, with special meeting on last Saturday in each month; 29 September ("South Devon clay industry" by G8CRS), 27 October ("Micros in your life" by Trevor Brownen), 7.30pm. Bath Lane, rear of 94 Belgrave Road, Torquay. Full details from Mrs Ged Coker, c/o G4FCN, tel Ipplepen 812117. Visitors most welcome at club meetings. Torbay net Mondays, Wednesdays and Fridays 10.30am on 3·756MHz, and Saturdays 10am. 144MHz net Mondays 8pm on S22.

REGION 10—RR R. G. Barrett, GW8HEZ, 23 Carshalton Road, Beddau, Pontypridd, Glam.

Barry (BCoERS)—Thursdays, 8pm. In addition, special events are arranged every fortnight. New venue: Weycook Cross, Five Miles Lane, Barry. Details from new sec M. E. Woodberry, GW8OPK, 60 Pen-y-Graig, Rhiwbina, Cardiff, tel 613635.

Blackwood (BARS)—Fridays, 7pm. Oakdale Community Centre, Oakdale, Blackwood, Gwent. Details from GW4BLE, 10 Llanthewy Road, Newport, Gwent.

Bridgend (B&DARC)—Second Wednesday in each month, 7.30pm. NCB Social Club, Tondu, Bridgend. Details from sec GW4BDV.

Cardiff (CRSGBG)—Second Monday in each month; 10 September (Film show), 8 October (AGM and constructors' contest), 7.30pm. Pantmawr Inn, Pantmawr Estate, Cardiff. Details from GW3GHC.

Merthyr (Hoover ARS)—Mondays, 7.30. Hoover Social Club, Pentrebach, Merthyr. Details from GW3RNC.

Newport (NARC)—Mondays, 7pm. Adult Education Settlement, Brynglas Road, Newport. Details from GW8MER.

Pembroke (PRSGBG)—Last Friday in each month, 7.30pm. Defensible Barracks, Pembroke Dock, Dyfed. Details from sec GW3XJQ.

Port Talbot (British Steel Corporation ARS)—Thursdays, 7.30pm. BSC Sports and Social Club, Margam. Port Talbot. Details from GW4BDV.

Rhondda (RARS)—Every other Thursday, 7.20pm. Transport Employees' Club, Porth. Details from GW3PHH.
Sully (S&DSWC)—Mondays fortnightly, 7pm. Sully Bowls and Social Club, 58 South Road, Sully, Cardiff. Details from David Hughes. 13 Nailsea Court, Sully.
Swansea (SARS)—Tuesdays fortnightly, 8pm. Sketty Park Sports and Social Club. Anewin Way, Sketty Park. Swansea. Further details from GW4HAT. Intending visitors must contact sec before arrival.
Swansea (University College of Swansea RS)—Mondays, 7.30. Room 801, Applied Science Building. Details from sec J. Morris, 1 Hadland Terrace, West Cross, Swansea, tel 68675.

REGION 11—RR P. H. Hudson, GW3IEQ, "Silhill", Dinas Dinlle, Caernarvon.

Following information is latest received.
Bangor (UCNWARS)—Thursdays, 7.30pm. Small Lecture Theatre, School of Engineering Science, Dean Street, Bangor.
Conway Valley (CVARC)—Second Thursday in each month, 7.45pm. The Quaries, Llandulas, Colwyn Bay.
Rhyl (R&DARC)—Fourth Thursday in each month. Ambulance Station, Coast Road, Rhyl. Other Thursdays (On the air on 144·00MHz), 8pm. Newcomers and visitors welcome.

REGION 12—RR F. Hall, GM8BZX, 45 Priory Cottages, Lunanhead, Forfar, Angus DD8 3NR.

Aberdeen (ARS)—Fridays; 7 September (Surplus sale), 14 September ("Behind the scenes at the RSGB" by GM8FFX), 7.30pm. 80 Guild Street, Aberdeen (next to Station Hotel immediately adjacent to railway station). Sec GM4BKV. The club now has a print board service from your own artwork.
Dundee (Kingsway Technical College ARC)—Tuesdays; 6.30-7pm morse practice, 7-8pm arranged lectures, 8-8.15pm coffee, 8.15-9pm any other business and discussion. Dundee Technical College, Old Glamis Road, Dundee. Sec GM4FLP.
Elgin (Moray Firth RS)—Wednesdays, 7.30pm. Elgin Technical College. Sec GM8OVN. The club extends a warm welcome to all licensed amateurs and swls in the area who may be hesitant in coming along. Non-members will be asked to pay a donation of 50p per meeting, with a limit of two attendances before joining the club.
Invergordon (Easter Ross RC)—Every second Tuesday. 100 High Street, Invergordon. Details from sec GM4DKL.
Inverness (Technical College ARC)—Every second Wednesday, 6.45pm. Room C30. Sec W. Lee, 36 Old Mill Road, Inverness.
Kirkwall—Members now meet on a few occasions during the year to discuss various aspects of amateur radio. Information from GM3IBU, tel Kirkwall 3232.
Perth (P&DARG)—Tuesdays, 7pm. Perth Technical College. Sec GM4DQJ. The Perth repeater, GB3PR, is now operational on channel R3—coverage reports would be welcome.
Shetland (Lerwick RC)—Wednesdays, 7.30pm. "Annsbrae House". Information from sec GM4BBL. Visitors always welcome. It is anticipated that a move will be made to new premises in Lerwick sometime during the coming year.

RR12 will be available at the Scottish Amateur Radio Convention, in Dundee, on Saturday 22 September, for members wishing to discuss matters relative to amateur radio.

REGION 13—RR A. B. Givens, GM3YOR, 41 Veronica Crescent, Kirkcaldy, Fife KY1 2LH. Tel Kirkcaldy (0592) 200335.

Berwick-upon-Tweed (B&DARS)—First and third Fridays in each month, 7.30pm. Avenue Hotel, 122 Marygate, Berwick-upon-Tweed. Details from sec GM8IIO.
Dalgety Bay (Marconi Space & Defence Systems ARC)—Open to employees and ex-employees of the company. Tuesdays, 7.30pm. MSDS Social Club, Hillend Industrial Estate, Dalgety Bay, Fife. Details from GM3YND, tel Dalgety Bay 822678.
Dunfermline (DARS)—Second Wednesday in each month, 7.30pm. CCTV Studio, Pittencrieff School, Maitland Street, Dunfermline. Details from GM3CIG.
Edinburgh (E&DARC)—Tuesdays, 7.30pm. City Observatory, Calton Hill, Edinburgh. Details from sec GM8MJV, tel 031-663 2033.
Edinburgh (Ferranti Recreation Club AR Section)—Membership is restricted to company personnel. Details from GM8JKG, tel 031-441 5684. Visits by other clubs by prior arrangement.
Edinburgh (GB3ED Repeater Group)—GB3ED is a 432MHz repeater situated at Napier College, Edinburgh, and operating on channel RB14 (output 433·350MHz, input 434·950MHz). Details of group meetings from GM3GBX, tel 031-447 2611.
Edinburgh (Heriot Watt University ARC)—Open to persons attending any of the city's universities or colleges. Wednesdays, 2pm. Aerial Laboratory, Top Floor, Mountbatten Buildings, 31-35 Grassmarket, Edinburgh. Informal get-togethers, 7.30pm. University Bar, Riccarton Campus, Currie, Midlothian. Details from GM4EAU, tel 031-443 5061.
Edinburgh (Leith Nautical College ARC)—First and third Thursdays in each month, 7.30pm. Leith Nautical College, 24 Milton Road East, Edinburgh 15.
Edinburgh (Lothians RS)—Details of programme from GM8BJF, tel 031-447 5527.
Glenrothes (G&DARC)—Third Sunday and every Wednesday in each month; 16 September (AGM), 16 October (Visit to Radio Forth, 3pm—numbers limited, contact sec for details), 21 October, 18 November, 7.30pm. Old Nursery School Building, Provosts Land, Douglas Road, Leslie, Fife. Details from GM4EJI.
St Andrews (University of St Andrews R&ES)—Details from Physics Department, North Haugh, St Andrews.

REGION 14—RR I. L. McKechnie, GM8DOX, 42 Newton Crescent, Dunblane FF15 0DZ.

Following information is latest received.
Ayr (AARG)—Community Centre, 24 Wellington Street, Ayr. Sec GM3THI.
Dumfries (D&DARG)—Details from GM3WOJ.
Falkirk (Stirlingshire ARG)—Details from GM4DGT.
Glasgow (West of Scotland ARC)—Try GM4FDM for information.
Greenock (G&DARC)—Tuesdays and Fridays, 7.30pm. 22 Inverkip Street, Greenock. Details from sec GM3LYI.
Helensburgh (HARC)—Try GM4FEO for information.
Motherwell (Mid-Lanark ARS)—Alternate Fridays, commencing 2 March, 7.30pm. Wrangholm Hall Community Centre, Jerviston Street, Motherwell. RAE and morse classes every Friday. All details from sec GM4FKD.
Stevenson (Ardeer RCARS)—Details from GM3SUL.
Stirlingshire (SARG)—New group! Starting up initially to put a 70cm repeater on the air. Anyone welcome to join including members of the diminished Falkirk & District RC, to enlarge club activities. Details from sec GM3POK, or GM4CXF.

All secretaries please note the closing date for items for insertion in the next *Club news* at the beginning of this feature. RR14 has an Ansaphone available for their use. Tel Dunblane (0786) 822212.

REGION 15—RR I. J. Kyle, GI8AYZ, 2 Galgorm Gardens, Ballymena, Co Antrim BT42 1BA.

Ballymena (BRC)—Tuesdays, (RAE and morse classes), 7.30pm. Fridays (Club night). Sundays (Special projects), 3pm. 86 Old Cullybackey Road, Ballymena. Sec GI4HCN.
Bangor (B&DARS)—First Friday in each month, 8pm. Redcliffe Hotel, Bangor. Sec GI4AAM.
Belfast (BRSGBG)—Third Wednesday in each month; 19 September (AGM). 90 Belmont Road, Belfast. Details from GI3USS.
Belfast (CoBYMRC)—Tuesdays, 7pm; Saturdays, 2.30pm. 29 September (AGM), 10.30am. 12 Wellington Place, Belfast. Sec GI8MQR.
Belfast (Queen's University of Belfast RC)—Tuesdays during term, 8pm. Queen's University, 37 Fitzwilliam Street, Belfast 9.
Dromore (Lagan Valley ARS)—First Monday and third Tuesday in each month, 8pm. Scout Hall, Mossvale Road, Dromore, Co Down. Details from AR GI4GDV.
Mid-Ulster (MURSGBG)—First Sunday in each month. GI4BAC's QTH. Details from AR GI8RJW, tel Armagh 524453.
North Ulster (NURSGBG)—Now reconstituted. Details of meetings from GI4HVI, GI8JTS QTHR.

REGION 16—RR M.S. Appleby, G3ZNU, 45 Cedar Avenue, Kesgrave, Ipswich IP5 7HA.

Bury St Edmunds (BStERS)—Third Tuesday in each month, 7.30pm. Red Cross Headquarters, Mustow House, Eastgate Street, Bury St Edmunds. Details from John Munro, 29 Angel Hill, Bury St Edmunds.
Chelmsford (CARS)—First Tuesday in each month, 7.30pm. Marconi College, Arbour Lane, Chelmsford. Details from R. Brocks, 30 Rowan Drive, Heybridge, Maldon.

Colchester (CRA)—Thursdays, fortnightly, 7.30pm. Main Block, Colchester Institute, Sheepen Road, Colchester. Details from Frank Howe, G3FIJ.
Felixstowe (FARC)—Tuesdays (Informal). Felixstowe Golf Club. Details from John Hobin, G3XIX.
Great Yarmouth (GYRS)—Last Thursday in each month, 7.30pm. 67 Southdown Road, Great Yarmouth. Details from Tony Besford, G3NHU.
Harlow (H&DRS)—Tuesdays, 8pm. Mark Hall Barn, First Avenue, Harlow. Details from sec Dan Evans, G4HFR, 17 Alsa Gardens, Elsenham, Bishop's Stortford, Herts CM22 6HD, tel 0279 812300.
Harwich (H&DRA)—Thursdays, 7.30pm. Harwich Adult Education Centre. Details from sec Tony Free, G4EYE.
Haverhill (H&DRS)—Fridays, 7.30pm. Steeple Bumpstead Road, Haverhill. Further details from Chris Kitchener, G8IMI, tel Haverhill 2852, evenings.
Ipswich (IRC)—Second and last Wednesdays in each month during school term; 12 September (Informal), 26 September ("Filters" by D. Munro), 10 October (Final planning for JOTA), 31 October (Junk sale), 14 November (Talk and demonstration of model submarine by Jim Goulty, G8BBV), 8pm. Handford House, Ranelagh Road, Ipswich. Morse classes also available. Further details from Jack Tootill G4IFF, 76 Fircroft Road, Ipswich.
Loughton (L&DARS)—Fridays, fortnightly, 8pm. "Loughton Hall", Rectory Lane, Loughton. Further details from sec John Ray, G8DZH, tel 01-508 3434, evenings.
Lowestoft (L&DARC)—Fridays; 7 September ("Antennas" by Dud Charman, G6CJ, RSGB tape/slide lecture), 21 September (AGM), 5 October (Discussion of schools evening), 19 October (Junk sale), 9 November (PO films about ship-to-shore radio and satellites), 7.30pm. North Suffolk Teachers' Centre, Lovewell Road, Lowestoft. Details from Paul Godfrey, G8JBD.
Martlesham (MRS)—First Wednesday in each month, 7.30pm; Formal meetings to re-start in September. Visitors always welcome but must first contact Simon Garrett, G4EVN, PO Research Centre, Martlesham Heath, Ipswich.
Norwich (Norfolk ARC)—Wednesdays, 7.45pm. Crome Community Centre, Telegraph Lane East, Norwich. Details from Peter Forster, G3VWQ.
Southend (S&DRS)—Fortnightly, 8pm. Church Hall, Sir Walter Rayleigh Drive, Essex. Contact sec G3YOA.
Stowmarket (S&DARS)—First Monday in each month, 7.30pm. Red Cross Hall, Stowmarket Railway Station. Details from Ray Preston, G8MYE.
Thurrock (TARC)—First and third Tuesdays in each month, 8pm. Grays Park Hall, Orsett Road, Grays. Morse tuition available. Details from sec G3KMD. Club net on 144MHz S21/22, on second and fourth Tuesdays in each month, 8pm. New members and visitors welcome.
Vange (VARS)—Thursdays, 8pm. Main Hall, Barstable Tenants' Community Association, Long Riding, Basildon. Details from Mrs D. Thompson, 10 Feering Row, Basildon SS14 1TE.

Syd Smith, GJ8EZA, and xyl Mary, secretary of the Jersey AEC, after their wedding in June

Jersey (JARS)—Sundays, 10.30am, and Fridays, 8pm. Le Hocq Tower, St Clement, Jersey. Sec R. H. Ford, "Sanaldi House", Plat Douet Road, Bagot, St Saviour, tel 0534 31131.
Poole (PARS)—Last Friday in each month, 7.30pm. Poole Technical College. Sec Phil Ciotti, G3XBZ, 214 Rossmore Road, Parkstone, Poole.
Portsdown Hill Repeater Group—Activity night on GB3PH (RB2), Mondays, 8.30pm. All stations welcome to the net. Details from G8GNB.
Portsmouth (P&DRC)—Wednesdays, 7.30pm. Portsmouth Community Centre, Malins Road, Buckland, Portsmouth. Sec A. C. Cake, G3CNO, 7 Wheatstone Road, Southsea.
Salisbury (SR&ES)—Tuesdays, 7.30pm. Salisbury Activity Centre, Wilton Road. Sec G2FIX, 74 Victoria Road, Wilton, Salisbury.
Southampton University (SUARC)—Tuesday evenings. Also informal meetings every lunchtime in the clubroom, Old Union Building. Sec A. C. Talbot, The Radio Club, JCR Post, The University, Southampton.
Southampton (SRSGBG)—First Monday in each month. Lanchester Building, Southampton University. Wednesdays. The Clubroom, Kent Road. Both at 7.30pm. AR J. R. Compton, G4COM, Aysgarth, Beech Corner, Durley Brook Road, Durley, Southampton.
South Dorset (SDRS)—Lecture Hall, South Dorset Technical College, Newstead Road, Weymouth. Sec R. D. Cridland, G3ZGP, 13 Clarendon Avenue, Redlands, Weymouth.
Swindon (SD&ARC)—Alternate Wednesdays, 7.45pm. Clubroom, Oasis Leisure Centre. Sec I. Browne, 59 Kitchener Street, Swindon.
Winchester (WARC)—Third Saturday in each month. The Scout Log Cabin, Stockbridge Road, Winchester. First Friday in each month (Informal). Crown Hotel, North Walls, Winchester. Both at 8pm. Sec Peter Simpkins, G3MCL, Lawn End, Park Road, Winchester.

REGION 17—RR H. G. Cunningham, G8FG, 235 Station Road, West Moors, Wimborne, Dorset BH22 0HZ. Tel Ferndown (0202) 976018.

Basingstoke (BARC)—Third Wednesday in each month, 7.30pm. Chineham House, Popley Way, Basingstoke.
Basingstoke (UK FM Group Southern)—First Wednesday in each month. Chineham House, Popley Way, Basingstoke. Details from pro Chris Jackson, G8POB, 69 Buriton Road, Harestock, Winchester.
Bournemouth (BRS)—First and third Fridays in each month, 7.30pm. Dolphin Hotel, Holdenhurst Road, Bournemouth. Sec Bill Coombes, G4ERV, 32 North Road, Boscombe. Visitors welcome.
Chippenham (C&DARC)—Tuesdays, 7.30pm. Sheldon School, Hardenhuish Lane, Chippenham, Sec P. J. Tuck.
Fareham (F&DARC)—First and third Wednesdays in each month, 7.30pm. Porchester Community Centre, Room 9. Sec David James, G8GRV, tel Titchfield (03294) 45977.
Farnborough (F&DRS)—Second and fourth Wednesdays in each month, 7.30pm. Railway Enthusiasts' Club, Access Road, off Hawley Lane, Farnborough. Sec G3TMQ, 103 Hawley Lane, Farnborough.
Guernsey (GARS)—Tuesdays and Fridays, 8pm. Details from sec GU8ITE, PO Box 100, St Peter Port, Guernsey.
Horndean (H&DARC)—Second Thursday in each month, 7.30pm. Merchiston Hall, Horndean. Net Thursdays, 7.30pm 28·4MHz; and 8pm S16. Sec V. Lear, G3TKN, 18 Alten Road, Waterlooville, Hants.
Jersey (JAEC)—Details from sec, tel 0534 23249.

REGION 18—RR W. A. Ricalton, G4ADD, 4 South Road, Longhorsley, Morpeth, Northumberland.

Following information is latest received.

Durham (DURES)—During term. Physics Dept, Science Site, Durham University. Details of events from G3ZJY, G4FOP, or sec I. P. Jefferson, BRS41816, Grey College, Durham. External members especially welcome.
Easington (EAR&EC)—Tuesdays and Thursdays, 7.30pm. Easington Village Workmen's Club. RAE and morse tuition if required (the club has a good pass record). Details from sec G4GXI. All welcome.
Great Lumley (GLAR&EC)—Alternate Wednesdays, 7.30pm. Great Lumley Community Centre. RAE and morse tuition if required. Sec G4DWM.
Hartlepool (HRC)—Mondays, 7.30pm. Methodist Church Hall, Grange Road. Sec G3NWU.
Middlesbrough (Post Office ARC)—All amateurs welcome, but first contact sec G8CDP.
Middlesbrough (Teesside Repeater Group)—Last Tuesday in each month, 7.30pm. 196 Marton Road, Middlesbrough, Cleveland. All amateurs and swls invited but first contact sec G8MBK.
Morpeth (Northumbria RC)—Thursdays (Informal). "Queens Head", Morpeth. Sec G8GVN.
Newcastle Upon Tyne (Tyne & Wear Repeater Group)—5 December, 7.30pm. Arts Common Room, Claremont Tower Block, Newcastle University. Sec G4DOB, tel Newcastle 744444.

South Shields (SS&DRS)—Fridays, 7.30pm. Trinity House. Old and new members welcome. Sec G8BQF, 67 Lauderdale Avenue.
Tyneside (TRS)—Mondays, 7.30pm. The Community Centre, Vine Street, Wallsend. Morse tuition can be arranged. Sec G8OFA, 69 Rectory Lane, Blaydon-on-Tyne. New members welcome; club equipped for multiband operation.

REGION 19—RR R. J. C. Broadbent, G3AAJ, 94 Herongate Road, Wanstead Park, London E12 5EQ.

Barking (BR&ES)—Mondays (Constructional), Wednesdays (CCTV), Thursdays (Informal), 8pm. 27 September (Film show/talk, "Training guide dogs"), 4 October ("Microprocessors"), 1 November (Talk, "Nuclear electricity supply" by CEGB). Tuesdays (Morse class), 7.30pm. Hon sec G8IZN. All welcome at any meeting.
Central London (Post Office HQ ARG)—Third Thursday in each month (Lectures), 5.30pm. Location varies. First Thursday in each month (Bar socials), 12–2pm. Central London. For specific details of this group, for members of PO only, contact P. H. J. Houseago, G8SGB, tel 01-388 6161 ext 202 or 204
Chesnunt (C&DRC)—Wednesdays, Church Room, Church Lane, Wormley, Herts. New hon sec Roger, G8LNM. The club is sponsoring an RAE course commencing September at the East Herts College of Further Education, Turnford, Herts. A minimum of 20 candidates is required to get started; further details from G3OJI, tel Ware 4316. (Do it now, it's September—*RR19.*)
Chingford (Silverthorn RC)—Fridays, 7.30pm. Friday Hill House, Simmonds Lane, Chingford E4. Sec G4AJA, tel 01-529 2282. All visitors welcome.
Chiswick (Acton, Brentford & Chiswick RC)—18 September (Review of members' equipment), 16 October (Home-made vhf/uhf antennas), 7.30pm. Chiswick Trades and Social Club, 66 High Road, Chiswick W4. Hon sec G3GEH, tel 01-992 3778.
Ealing (E&DARS)—Tuesdays, 8pm. Northfields Community Centre, Northfields Road, London W13. Hon sec E. Batts, G8LWY, 27 Cranmer Court, Richmond Road, Kingston Upon Thames. All welcome.
East London (ELRSGBG)—Third Sunday in each month, September to May; 16 September ("Getting started on A5" by T. Mitchell, G3LMY; and "A fast-scan tv" with demonstration), 21 October (Talk on RSGB matters by Dr Dain Evans, G3RPE), 18 November ("QRP operation and activity" by Rev G. Dobbs, G3RJV), 3pm. Wanstead House, The Green, Wanstead, London E11. Hon sec Rod Holmes, G3PKQ; or hon chairman G3AMF. For information tel 01-989 9224. All are welcome.
Edgware (E&DRS)—Second and fourth Thursdays in each month; 13, 27 September, 8pm. Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. 25 September and 6 October (Edgware activity period, an all dc bands operating contest for fully paid up members). For details contact hon sec Dennis Lisney, G3MNO, tel 01-907 1237. An AR has been appointed for Edgware, Alan, G3PSP, tel 01-950 6827.
Harrow (RSH)—Fridays, 8pm. Harrow Arts Centre, High Road, Harrow Weald. (Bar, car park—park neatly.) Hon sec G4AUF, tel 01-868 5002.
Havering (H&DARC)—Wednesdays, 8pm. Fairkytes Art Centre, Billet Lane, Hornchurch (opposite New Queens Theatre). Details from A. G. Negus, G8DQJ, tel Upminster 24059.
Holloway (Grafton RS)—Fridays, 8pm. Holloway Institute, Archway Annexe, Highgate Hill, London N19. Details from sec B. Bond, G3ZKE.
Ilford (IRSGBG)—All meetings are informal. 50 Mortlake Road, Ilford, Essex. Sec. G3LRE, tel 01-500 7196.
St Albans (Verulam ARC)—Fourth Thursday in each month; 27 September ("RAIBC" by Francis Wooley, G3LWY), 25 October ("Micros in amateur radio" by Peter Martinez, G3PLX), 22 November ("Intruder Watch" by S. A. G. Cook, G5XB), 8pm. Jubilee Centre, Catherine Street, St Albans. Second Thursday in each month (Informal—ragchew and ale?). Salisbury Hall, London Colney. Hon sec A. Clarke, G8MAE, tel 0442 64751. All visitors are very welcome at meetings.
Shelburne (SRC)—Thursdays, 7pm. Shelburne Youth Centre, Hornsey Road, London N7. RAE courses available. Hon sec T. C. Clark, G4BZW, tel 01-249 1843. Sec would be pleased to hear from any prospective members. The club has a 2000E transceiver, and G5RV for licensed members to use.
Southgate (SRC)—Second Thursday in each month; 13 September ("Oscar" lecture by R. Limebear, G3RWL), 11 October (Films), 8 November (G6QM Construction Trophy; films of club events during the past year), 7.45pm. The Scout Hut, Wilson Street, Winchmore Hill, London N21. Hon Sec G8EWG, tel 01-440 7353. For details of club events contact pro I. R. Selby, G4DRI.
South Kensington (Baden Powell House Scout ARS)—This club has been disbanded due to lack of support. (RR19 had a fine letter of explanation from former member Les Mitchell, G3BHK).
South West Herts UHF Group—This group, currently running GB3HR, requires donations; to G3THQ please. The building of GB3BM and GB3SWM, the 10GHz beacon, is currently progressing. Talks can be arranged for interested clubs. Sec G8BBE.
Stevenage (S&DARS)—First and third Thursdays in each month, 8pm. Morse 7.30pm. Plant B staff canteen, British Aerospace, Gunnels Wood Road, Stevenage. Hon sec Ted Godfrey, 94 Common View, Letchworth. FM net, Mondays 1930, 145·550MHz.
UK FM Group (London)—Second Tuesday in each month; 11 September ("WARC 79" by Tim Hughes, G3GVV), 8pm. The Cleveland. This group has had a slight problem as its usual meeting place is due for demolition. At the time of writing no definite information was available on a future meeting place. For further details members and others should contact Chris, G4EVA, or Tony, G4BPC.
West Drayton (LT District Line ARC)—Thursdays, 6pm. DLAA Sports Ground, Park Place, Gunnersbury Avenue W3. (Bar). This club requires the attendance of former members, who lost interest, to enable the club to survive. It would also like the assistance of local amateurs who could give talks on any radio topic. Hon sec R. Ball, G8JEB, tel 01-422 0414. Club net 144·250 ssb, 2000–2100 local.

REGION 20—RR G. Mather, G3GKA, 8 Hills Close, Keynsham, Bristol.

Following information is latest received.
Bridgwater (HPSSARS)—Second Monday in each month, 7.30pm. YMCA, Nr St John Ambulance Hall. Further details from G4ETN.
Bristol (BARC)—Tuesdays, 7.30pm. The University Settlement, Barton Hill, Bristol 5. Sec G8KGE.
Bristol (BRSGBG)—7–9.30pm. Small Lecture Theatre, Queens Buildings, University Walk, Clifton, Bristol 8. Hon sec G4FRG.
Bristol (North Bristol ARC)—Fridays, 7pm. RAE instruction Wednesdays, 7pm. Lockleaze Community Association, Romney Avenue, Lockleaze, Bristol BS7. Hon sec G2BSU.
Bristol (Shirehampton ARC)—Fridays, 7pm. Twyford House, Shirehampton. Hon sec G4GTD. HF and vhf station all modes, lectures and films, df hunts etc, planned for 1979. RAE and more classes in progress. New members welcome.
Cheltenham (CARA)—First Thursday and third Friday in each month. "The Old Bakery", Chester Walk, Cheltenham. Hon sec G8MZV.
Gloucester (GARS)—First and third Thursdays in each month, 7.30pm. Chequers Bridge Centre, Painswich Road, Gloucester. Hon sec G3MA.
Weston-super-Mare (WsMARS)—Second Monday in each month, 7.30pm. Lewis Block, Worle Comprehensive School, Redwing Drive, off Mead Vale, Weston-super-Mare. Hon sec Irvin Barr-Sim, The Old Dairy, Eastertown, Lympsham, Somerset.
Yate (Y&DARC)—First Friday in each month, 8pm. G3RQN QTH. Further details from G8LGC. All welcome including swls.
Yeovil (Y&DARC)—Thursdays. Building 101, Houndstone Camp, Yeovil (off A3088). Hon sec G3NOF. Club net 10.30am Sundays, 3·660MHz.

Mobile rallies calendar

9 September—Telford Mobile Rally, Telford New Town Centre Malls, Telford, Salop (approached via: A5 off M6, exit 12; A442 from N or S; or M54 from W, follow signs to town centre). Opens 11am. Talk-in via GB2TRG. Attractions include trade stands, exhibits, full on-site catering, licensed premises, bring and buy stands and family attractions. Free coach service to Ironbridge Gorge Open Air Museum, celebrating the bicentenary of the world's first iron bridge. Further details from G8DIR, QTHR, tel Shrewsbury 64273; G8FSV, QTHR, tel Telford 48603; or G3UKV, QTHR, tel Telford 55416.
16 September—Peterborough R&ES Mobile Rally, Walton School, Mountsteven Avenue, Peterborough. Talk-in S22 G3DQW and RB10 via GB3PB, with special callsign GB3PMR. Usual exhibits, bring and buy. Details from G3EEL, QTHR, tel 65423 or 62881.
30 September—Harlow & D ARS Mobile Rally, Netteswell Comprehensive School, Harlow. Details from G3KEF, 71 Lodge Hall, Harlow, Essex.
7 October—Great Lumley AR&ES Mobile Rally, Community Centre, Great Lumley, Nr Chester-le-Street, Co Durham. Talk-in on 144MHz, with special callsign GB3GLR. All usual attractions. Further details from G4DWM, 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 75p (stamps not accepted) for every 40 words or part thereof. They will not be acknowledged. Those not clearly worded or punctuated will be returned. No correspondence concerning this service can be entered into.

Closing dates in 1979; **27 Sept, 25 Oct, 22 Nov, 27 Dec.** No guarantee of inclusion in a specific issue can be given, other than the first possible issue after receipt.

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

Magnum Six processor for KWM2 or S-line DOW-key, 220V relays, Hallicrafters R48 spkr, Seco swr meter, exc, as new, £20. Katsumi processor, new, £5. Ham-M spares, HRO-60 cabinet, £10. Turner +2 transistor mic, Trio ham clock, £10. AR88 valves. G3DAM, QTHR.

Sommerkamp FTDX505, £290. Hammarlund HQ170A, with 2m, £105. TS520, £390. Shure 444, £29. Unused Drake MN4, £65. New Hy-Gain BN86, £12. BC221, £21. MFJ ssb filter, £25. Buyer arranges collection. Spry. Tel Colwyn Bay 57376, after 8pm.

KEN KP202, 2W, 2m, hand-portable, boxed, as new, R5-7, S0, S20, S22, xtal controlled toneburst, spare antenna, battery tray, leather case, nicads, £89. Coutant ASC2000 stab psu, 13·8V 20A continuous, 28A peak, £28. High power vhf/uhf coaxial relays, plugs, £6. 4CX250B ptfe base, chimney, valve, £9. Ex-wkg equipment 4CX250Bs, £4. QQVO6/40As, tested, as new, gold plated pins, £7. 3in square 100μA meters, scaled 0-25-50-100W, £2. All plus carr. G8ENI, 14 Julian Close, Great Wyrley, Walsall. Tel Cheslyn Hay (0922) 415374.

Storno Viscount, preamp, toneburst, S20-22, R6, two control boxes, £40. Mains transformer, 0-80-2,560-2,820V at 700mA, £14. Telequipment S51A Serviscope, £35. Hartley 13A double-beam 'scope, £30. R1155 gen cov rx, built-in psu, £25. G4EBQ, QTHR. Tel 061-620 7868.

Yaesu FT220 2m tx/rx, fm, ssb, cw, four xtal channels fitted, built-in timer for repeater use, 57s auto reset, MH, £190. G8RXO. Tel Gloucester (0452) 411409.

KW2000 ssb cw tx/rx, 6146B pa, Shure p/t mic, morse key, ac pp, some spare valves, circuit instructions, VU2MKS worked recently on 21MHz ssb, good cond, £110. Mobile 12V supply, £18. G3MBL, QTHR. Tel 01-445 4321.

MFJ cw filter, as new, £15 ono. G4DLW, QTHR. Tel Helsby 5221.

9R59DS, bc bands, £45. Mosley trap dipole, £5. Possible delivery. G4HFS. Tel Paulerspury 314.

Collins KWM2, late round emblem series, Walters rejection tuning, mint cond, little used, £700. R4C, 1·5 filter, 10 and 160 xtals, 50ft tower, raising motor, cover, absolute bargain, £25. Various USA mobile antennas, mounts, coils, new, offers. G3DAM, QTHR.

Modular Electronics 432/28 transverter, 10W output, £65. QM70 432/28 transmit converter, 200mW output, £10. Fast paper tape reader, 5/6/7/8 track, approx 400 chars/s, £20. Stabilized psu, 300V at 150mA, −150V at 100mA, £15. G8HCK, QTHR. Tel 0925 813229.

Drake TR7/DR7/PS7, fitted cw and a.m. filters, six months old, £800 ono; consider deal with TL922, SB220, FL2100B or NAG linear. Write: Hicks, G4DVP, Flight Simulator, RAF Binbrook, Lincoln LN3 6HF.

Assembled rf section 2m linear, 4CX250B, silver plated stripline anode and grid lines, incl blower, eht feedthroughs, caps, Heath hinged case, offers. Yaesu YO100 monitorscope, immac cond, quick sale, £70. GM3XNE, QTHR. Tel Ardrossan 67326.

MMT144/432, £100; psu, £12. FDK2700, £350. SEM 40W pa, £25; psu, £15. BNC coaxial relays, £5. SEM 2m preamp, £3.50. 2m Bantex antenna, £3. GW3TMP 10m preamp, £5. MMC144/2 converter, £12. HC25U, 22MHz, £1.50. G8FAK, 32 Springfield Way, Cranfield, Beds.

KW201 rx, valves, £170 or nearest offer. J. Gower, 2 Underhill Road, Dulwich SE22. Tel 01-693 1776.

FT101E, exc cond, comp with mic, cw filter, spare pa valves, orig packing, owner going to sea, £380. Hamilton, G4GTF, NOT QTHR. Tel Market Harborough 62624.

Bantam hi-band, £40 ono. Teleprinter 7E, £25 ono. Terminal unit, £30 ono. *Wanted:* Europa transverter. G4ADE, QTHR. Tel 0274 682363.

Kit of parts for a 12ch 2m fm tx/rx, bought last year from GWM Radio, xtals for S20, S23, unused, total cost was £60, £45. Powell, G8RAG (Manchester). Tel 061-973 6372.

Advance sig gen, model B4A2, 100kHz-70MHz, £35. 1,100V-1,100V 500mA huge transformer, suitable linear amp, £7. Heathkit grid dip oscillator, mains, manual, good cond, 1·8MHz-250MHz, £10. Will haggle. G3OML, QTHR. Tel 01-540 2713.

Storno CQM13, control box, circuits, xtals on S22, R6, £30. Simpson, G3XQZ, QTHR. Tel 0234 781149.

Radiovision Commander rx, double superhet, all bands, bargain, £50. G3ORU, 30 Abbey Crescent, Sheffield S7 2QX.

Drake, MN4, atu/swr/rf watts, 200W continuous, £80. Plus carr. G8LT, QTHR.

Linear amplifier, KW600, in exc order, £150. Delivery by arrangement, or buyer sees wkg and collects. G3RDG, QTHR. Tel 01-455 8831.

Racal rx/exciter unit, ssb/a.m./cw, 4ch output input (incl 10·7MHz), ideal basis for 2m rig, £45. Redifon GR286 base stn, part converted 2m, £30. SX28, rough, handbook, £15. Tel Neath 820356.

Eddystone 888 amateur bands rx, 160-10m, exc cond, £80 ono. Microwave Modules 144/28MHz receive converter, £10 ono. Striplin, 19 Birchwood Road, Malvern, Worcs. Tel Leigh Sinton (0886) 32619.

TR7200G, fm, mobile, 12ch, five repeater, seven simplex, preamp, mic, mobile mount, lead, manual, 15W output, good cond, £130. 70cm Jaybeam, 18-el Parabeam, £10. G8JBN, 33 North Farm Road, Lancing, W Sussex BN15 9BT. Tel Lancing 66418.

Pye Westminster W15FM, boot mount, 6ch, S0, S8, S20-21, R6-7, auto t/burst, spare 10ch osc pcbs, £75 ono. Pye Westminster W15AM, h/band, single channel, £40. Whiston, G8RCL (Warrington). Tel Penketh 4766.

Trio VFO30G, as new, £75. Collect or carr extra. G3JDJ, QTHR.

Drake 2-C rx, 3-30MHz, xtal calibrator, 2-CQ spkr/Q-multiplier, notch filter, £150. Buyer collects. G8OPL, 19 Fenton Avenue, Barnoldswick, Colne, Lancs BB8 6HB. Tel Barnoldswick 812288.

Commercial vdu, £35. KP202, charger, helical, £90. Eddystone 940, mint, £100. Heathkit HFW1 oscillator, £25. 110V ac 5V 21A psu; digital tape unit; 110V ac 12V 1·4A psu; Microwave Modules 2m tx; offers. G8EII, QTHR. Tel Stevenage 68282; or Hitchin 55634.

Sanyo reel-to-reel video recorder, as new, £220. Onan 12V 400W petrol generator, £60. Pye Cambridge, high band, £30. Pye Vanguard, fm'd, £35. G8ETI, QTHR. Tel Swindon (0793) 22380, day; or 0793 825350, evenings.

R1155, early model with df, orig cond, wkg order, £20 ono. Various paper capacitors, 0·5μF 2,500V to 8μF 500V. Buyer collects. G4BLI. Tel 051-722 5050.

TR8300, fitted RB2, SU8, SU18, SU20, PAU1 preamp, in good cond, mic, dc lead, h/book, £135 ono. G4CDU, QTHR. Tel Nigel, Saltash (07555) 2066.

KDK 2015 fm digital 2m tx/rx, internal PA3 preamp, fully operational over 5MHz to international standard, up and down repeater shift, four memory and scanning facilities, £195. G5PW, NOT QTHR. Tel Cleckheaton 875566.

One of the last great a.m. rigs, built by the late Norman Turner, a.m. tx, 10-80m, in vertical rack, incl 15 E. Turner meters (two damaged), offers? Lafayette HA700 gen cov comms rx, 5-band, 0·15-0·4, 0·55-30MHz, £35. G4EJC. Tel Hemel Hempstead (0442) 832318.

KW204/202, almost as new, pair, £450. Trio 9R59DS rx, almost as new, £45. Buyer collect. G3PPH, QTHR. Tel 051-525 2162.

IC215 portable 2m tx/rx, 3W, R0-7, S18-23, large nicads, helical antenna incl, orig packing, £150: Microwave Modules MM50/500 digital frequency meter, £50. G3MSW. Tel Harrogate (0423) 879202.

Catronics vdu kit, built and tested, requires boxing, incl keyboard, cursor, page memory, etc, £150 ono; or swop for fb printer, cash adjustment, w.h.y.? Manuals for AM10D, BC348/224C, HRO, HR24, £2 ea. G8LCK, QTHR.

FT200, G3LLL clipper, £250. FTV250, SSM preamp, £100. 2m QQVO6-40 linear, incl psu, £25. Other stuff, please enquire. G8HBW, QTHR. Tel 09655 466.

Counters: YC355D, £100; VHF Communications design, 500MHz, £65. Telequipment dual-beam 10MHz 'scope, rack, £350. 70cm 12XY, £20. G3ZVC 10-7MHz tx/rx, requires xtal trimming, £30. *Wanted:* motor for Stolle rotator, or 2010 motor head for spares. G8FFI, QTHR. Tel Cosham 86184.

Kondo 2000 digital 24h alarm clock, battery driven, three months old, orig packing, £13. G3PZP, QTHR. Tel 01-570 0448.

Cambridge AM10D, 2m, a.m./fm, 6ch, fitted t/burst, boot mount, with control box, mic cradle, 3ch fitted, R0, R6, S16, £35 ono. *VHF-UHF Manual,* brand-new, £4. 2m 5/8 glass-fibre whip, with fittings, £4. Tel Hemel Hempstead 64025, after 6pm.

Pye Compact hand-held, good cond, perfect wkg order, wkg and xtalled on SU8, comp with batts, circuit diagrams, £45. P. Wayer, 124 White Dirt Lane, Catherington, Portsmouth, Hants. Tel Horndean 592687.

Murphy B40C, exc cond, spare coil pack, dial, tuning capacitor, etc, £45. R209 psu, spares, £25. Grampian 562 valve amplifier, £10. PO 10-way jack strips, £1 ea. Tel Gordon, Reading (0734) 474064.

Jaybeam 2m antenna, D8/2M, 8-over-8, £10; Microwave Modules 144/28 converter, £6; both in good cond. Tel Dewsbury (0924) 452303.

FT200B/FP200B, mint cond, new pa tubes, £295. G4GQT, QTHR. Tel 0524 2389.

Creed gear: 75 rx only tp, plinth, 80-0-80 supply; 72 tape reader; £50 ono. Buyer collects. KB5 keyboard, unused, £30. Set UT-4 boards, comp all components, £50 ono. Racal 806R freq meter, £60. G3LDI, QTHR. Tel Wymondham 603463.

Teletext decoder, convert your tv to teletext with this Tifax decoder, interface, psu, ready to install, not used now due to purchase of Philips teletext rx, £110. GJ8KNV, QTHR. Tel Phil, Jersey (0534) 53333.

Storno Viscount, 2m, fm, S20, S22, R4-5, toneburst, preamp, spare 145·8 xtal, £60 ono. 2m xtals, 18·19375, 52·083 for S22, £2 ea. 10·7MHz filter, £5. Hughes, G4DSO, QTHR. Tel Pangbourne (07357) 2119.

Digiratt 1K *(Ham Radio* November '78) kilobyte memory kit, PCB Associates USA, four plug-in pcbs, all board components, £26 incl p&p. Standard C146A hand-held, helical, Basemaster charger, case, handbook, antenna adapter, channelled S20, S22, R6, two spare, £85. G3AZI, QTHR.

FT221R, D suffix, one year old, £325. Liner 2, £100. Three Pye Bantams, HP1FM, on 2m, leather cases, nicads, £50 ea ono. AM25B, 10ch, £25. GM8NGL, QTHR. Tel 031-663 9071.

Pye Bantams, choice of four, single and multi channel, all xtalled and wkg on 2m, various channels, one mobile mount, one mobile psu/nicad charger, prices from £40. Photocopy Creed 75 workshop manual, £2, plus postage. G3LFZ, QTHR. Tel 07912 3737.

Trio JR60 rx, 0·5-30MHz, bandspread on amateur bands, ssb, a.m., cw, fm, built-in 2m converter and Q-mult, £45. Cossor 1049 dual beam 'scope, heavy, £17. Sentinel 2m converter, i.f. 14-16MHz, £9. G4HNN. Tel 01-778 9756.

FDK TM56B 2m rx, fitted 12ch, mint cond, £80. Tel Ashford (Kent) 22506.

Heathkit: vvm model V-7AU; 'scope IO-12U, electronic switch (trace doubler) S-3U; rf probe; 'scope applications kit EF-2; with manuals; £70, split considered. Kleinschmidt teleprinter, ST5 h/b tu, punch, reader, various cables, etc, £70; offers considered. G8JEH, QTHR. Tel 3142.

TR7010 2m ssb tx/rx, as new cond, mobile mount, etc, in orig packing, £145?; or exch Multimode FT221R, TS700G, etc, cash adjustment. G8JYS, QTHR (N Yorks). Tel Hovingham 471.

AR88, manual, in clean cond, prefer buyer inspects and carts away, around £60; would like to exch for 888A or 888. Hurst, G3JJU, 31 Avondale Road, Fleet, Hants.

Datong automatic rf speech processor, £40. Sinclair PDM35 digital multimeter, £15. G3VGU, QTHR. Tel Grays Thurrock 5677.

Recording tape: 7in reels, ¼in wide, super quality, magnetic, £1.60 ea. 10½in dia bulk reels, ¼in, enough for four 7in reels, £3.60; 10½in reels, ¼in wide, suitable for video, £3.30; all incl p&p. *Wanted:* KW109. G3AZI, QTHR.

Late Vespa, re-valved, tuned, exc runner, manual, spares, £95. 18AVT/WB, radials, chimney lashings, etc, £35. G3VFB. Tel Anton, 01-892 2229.

KW E-Zee match atu, near mint cond, £25. GM4DZX, QTHR. Tel 041-959 4455, after 6pm.

TR7200G, S19-23, R0, R2-7, comp with mic, mobile mount, stand, £150. *Wanted:* ext vfo for TS510. Tel 0423 864448, after 6pm.

FT101E, immac cond, spare finals and driver, orig packing, etc, £450. FV101B, £75. Datong rf clipper, £38. Tel Trebetherick (Cornwall) 2362.

Heathkit HW100 tx/rx, hb psu, £130. Heathkit OS1 'scope, £20. Collect or carr extra. *Wanted:* Yaesu FT7. Atkinson, 17 York Cresent, Alnwick, Northumberland.

FT101E, as new, used very little, cw filter, boxed, comp, £425. G4BLI. Tel Liverpool 722 9043.

RTTY, G3PLX *(Radio Communication* April '77), four pcbs from Catronics, incl moving cursor, fully wired, assembled, edge connectors, holders for every ic, xtal, finest components, deluxe job ready to go, needs only 5/12V, keyboard, modulator, £85, incl p&p. G3AZI, QTHR.

Trio TS820, cw filter, remote vfo, mic, service manual, £650; Ham-M rotator, cable, £70; TH3 Mk3 triband beam, coaxial, £80; all one. G5CMX, 13 Southcote Way, Penn, Bucks.

KW109 atu, KWS-1 high power tx, 75A-4 rx, low pass filter, mobile psu for TS900, VFO900; sae please. *Wanted:* vvm, good 'scope, MT3000A. GM4AGS, QTHR.

Hy-Gain Galaxy GT550A hybrid 500W p.e.p. tx/rx, incl spares, £150; or exch FRG7. Ex-equip 4CX250B uhf bases, £7 ea. FT101 dc supply kit, new, £9. 14AVQ, £20; or exch V3JR. G3OPF, 10 Milford Avenue, Stony Stratford, Milton Keynes MK11 1HA.

PF5UH, incl nicad, £60. PF2FMH, 3ch, 2m, £75. Pair PF1s, RB4, spare batteries, £40. EA12, handbook, £150. Pye R18FM, T30FM, very high spec, ideal repeater, superb cond, £300. UHF Westminster, 9ch fitted, £135. TS700G, £400. Tel Chapel End (Warks) 395451.

TS700G, £350. G8LLB, QTHR. Tel 01-553 7094, day time; or 01-531 0716, after 6pm.

FTDX560, mic, handbook, spare valves, £250. Buyer sees wkg and collects. G4EEP, QTHR. Tel Ash Bank 2904, evenings.

TS520, VFO520, SP520, £500 post paid. TA33Jr, £40. R. Guard, "Oaker Bank", Skipton Road, Killinghall, Harrogate HG3 2AR. Tel 0423 68507.

Jaybeam C8/70 colinear, unused, £35. ASPE667UK 70cm mobile colinear, unused, magnetic mount, £20. Trio TR3200, 8ch, helical, nicads, £150. R/C glider kits, Graupner: Cirrus, £30; Mosquito, £30. All ono. G4HQX, G8EKT QTHR. Tel Dursley 45461, after 6pm.

DX100-U, plus spares, £60. RA1 rx, Q-multiplier, £35. Leak Point-One TL-10 mono amplifier, preamp; Goodmans Axiom-150 twin-cone spkr; large reflex cabinet; TSL fm mono tuner; 1035 cro; offers. Buyer collects. G3LGV, QTHR. Tel 061-633 1783.

Yaesu FT221R, £295; FT7, £250; FTDX401, £250; Icom IC245E, £295; IC202, £120; 25W pa, £25; SB301, £40; Multi U11, £195; all in good wkg order, and ono. G3SPZ, QTHR. Tel 01-845 5469.

Western Electronics 30ft Alumast, new, unused, comp with top plate, rotor mounting plate, hinged base, £165. Buyer collects. G3MRP, QTHR. Tel 021-783 4771, evenings.

Swan 350 240V psu, KW1000 linear, manuals, the two, £400 ono. G3WNM, QTHR. Tel 01-959 4781.

Holdings G3LLL nbfm unit, plugs in to FT101s, comp with tx and toneburst boards, new, £30. ST5 rtty send/receive terminal unit, Creed 7E printer, exc cond, £40. Buyers collect. G4FLY, QTHR. Tel 0734 594495.

Conway Cruiser trailer tent, exc cond, used annually, placed in heated storage during winter, sleeps 4/6, integral kitchen, sink, very compact, all metal body, overrun brakes, £400. G8PYG, NOT QTHR. Tel 0234 64504, evenings and weekends.

FDK Multi 2700, all modes, built-in Oscar converter and speech processor, analogue and synthesized vfos, as new, in orig packing, £400. Richards, G3CWB, QTHR.

Pye Bantams, HP1, fm, pair, £75. G3ZAF, QTHR (SW15). Tel 01-785 9666.

AR-10XL rotator, unused, £20. Ultra Cub, 2m, hand-held, £20. TR2200GX, 12ch, £120. Multi U11, £220. ARRL *Handbook* 1978, £4. ARRL *VHF Handbook,* £1.75. ARRL *FM/Repeaters,* £1.25 RSGB *NBFM Manual,* 75p. *World at their fingertips,* £1.50. G8KMV, QTHR. Tel 0438 54689.

Nascom 1 micro computer, 2k B-bug monitor prog, MM57109 number cruncher, ¼k handling prog, on cassette, all info, will demo, £200. Tel Robert, 01-777 3971, after 6pm.

IC22A, 12ch, R1, R3-7, S0, S18, S20-23, comp with portable accessories, mains psu, Bantex 5/8 whip, £160. *Radio Communication,* comp years, 1972-8, offers. Buyer collects. G8KVQ, QTHR. Tel David, Stalham (0692) 80938.

Collins 75S-3, mint, £275. Revox A77, £350. Trio 2200GX, £130. Ham 2, £75. AHB mixer, 12ch, £400. Creed 57 page printer, £10. Creed 6S5 auto transformer, £5. Creed reperf, £5. Williams, GW4FOK, QTHR. Tel Neath 4643.

IC202 ssb/cw tx/rx, comp, 144·000-144·400, nicads, boxed, manual, mint, £150. Heathkit HA-201 cw/fm rf amp, 1W in, 8W out, manual, £8. 5/8 2m mobile whip. G8EEN, QTHR. Tel 0373 864478.

IC215E, vgc, R0-9, S20-22, mobile mount, telescopic, helical and mag mount antennas, £120; or swop for Europa C 144/28 transverter or similar. G4GYC, NOT QTHR. Tel Andover 65011.

Heathkit sig gen RF1U, £16. Class D wavemeter Mk2, £5. T&T speech compressor, £8. MM 500MHz counter, £60. Heathkit vtvm IM18, £30. Heathkit transistor tester IT27, £5. Solartron 'scope test/probe leads, £5. Spares only: Pye Cambridge fm discriminator and second i.f. boards, £4; Storno Viscount, £5; calculator 14 good nixie tubes, £3; Murphy base stn and mobile, £10. D. Clowes, G8KLX, QTHR. Tel 0332 880850, weekends only; or 01-739 3433 ext 260, weekdays.

"Wireless World", 1960–79, please send sae for list or ring. *Wanted:* cheap vhf portable or mobile, for Raynet use. G8BXO, QTHR. Tel South Molton (07695) 3382, evenings.

Brown's type A 'phones, adjustable diaphragms, 100Ω, mint, £14. HRO 'phones, top quality American, moving coil, new, boxed, £9. 4CX250B, new, boxed, £16. US Navy key, enclosed contacts, £5. Celestion 8in 15Ω spkr, new, £6. Postage extra. G3GUU, QTHR.

EC10 Mk1, mains psu, £70. ¼hp motors, £5 ea. Folding cycle, 20in wheels, almost new, lights, carrier, £30. Mini van, 1976, 32k, new tyres, long MoT, £800. Olympus Pen-EE camera, ½fr, £30. G3ZNW, QTHR. Tel 01-432 3787, work.

Shure mic, model 202, 50k high impedance, £12. Transformers, 450-0-450 200mA, two 6·3V ct 4A ea, 5V 3A, £6. KT88s, £3 ea. Transformer, 250 in, 115V and 12V out at 1A, £6. Buyer collects. G4HMW. Tel Chesterfield 36496, after 5pm.

Two Pye Bantams, type HP1FM, on 160MHz, comp, unmodified, leather cases, mics, six nicads, charger, manual, £145. Two type 72 I/O golfball electric typewriters, manual, one wkg, one for spares, offers. G3MRQ. Tel 0327 60380.

Cossor 1058 'scope, £15. Cossor 1324 wobbulator, 10–110MHz, £15. TF517 A-M sig gen, 140–300MHz, £15. Avo type 1 sig gen, 50kHz–80MHz, £15. R216, 19–157MHz, a.m./fm, £50. CT53 sig gen, 9–300MHz, £15. Collect heavy items. GR336 marine (rx only), four xtals fitted, £10. 9MHz rx xtals, £2 ea. MMW converter, 144MHz, 2–4MHz, £10. Valve ssb filter, 455kHz, £5. Magnum transverter, 28–144MHz, £70 ono. AR88 w/change switch, £4. G8PXS, 18 Hawkins Road, Folkestone, Kent. Tel 0303 76063.

DX-5V vertical, £42; Datong ASP speech processor, leads, £58; Codar CR-70A rx, good cond, £22; all carr paid. Tel 0463 41211.

Gem 2-el three-band quad, assembled June 1979, modified from Gem design, extra rigidity, 12swg enamelled copper wire instead of frail 16 as supplied, element lengths and gamma feed as recommended by WI0RR W65AI, demonstrable 1:1 vswr on all bands when fed with single UR67 coaxial, £75. Sale strictly basis buyer collects. G3OFK, QTHR. Tel 0734 733674.

FT250, internal MFJ audio filter, new FP200, FV200, 160m h/brew transverter, offer for comp 160–10m stn, or will split. *Wanted:* FT7B or FT301, can cash adj; also FT101, etc, must have 12V capability. Tel Maidstone (0622) 39936, evenings.

Pye Vanguard AM25BV, 6ch, converted fm wkg, S20–21, S23, R5, manual, conversion diags, control gear, additional unit for spares, £35. Single channel AM25BV, control gear, £15 ono. 10A 12V dc psu, to suit above, £15. GI8HIT, QTHR. Tel Belfast 642887.

Trio JR500S, 80–10m, amateur bands only, vgc, buyer collects or pays carr; sensible offers. *Wanted:* Trio 9R59DS, in exc cond, as near new as possible, will consider one with mods if in good cond. Write. G8LFP, QTHR.

TA33 3-band beam, list price £105, good cond, buyer collects, offers over £40. Selection new multimeters, £5 to £8 ea. 400pF variables, 3cm spacing, £1.50. 13 Wood Lane, Isleworth, Middx. Tel 01-568 1331.

Yaesu FT221, £325. Frontier Electronics pa, 200W, £100. Avo transistor tester, £20. Newton, "Kings Weir", Slipe Lane, Wormley, Herts EN10 6EX. Tel Hoddesdon 68394.

Liner 2, preamp, pip tone, spare mic, etc, £100. G8CKD, QTHR (Herefords). Tel Malvern 3183.

HW32A 20m ssb tx/rx, manual, psu, £75, plus carr. Gecophone, BBC approved xtal set, collector's item, offers; ditto Melody Maker 334, approx 1935. *Wanted:* FT75, two psus. J. Simpson, 19 Hollinside Close, Whickham, Newcastle Upon Tyne NE16 5QZ. Tel 882995.

Icom 202E, cw/ssb, perfect, must sell, £120 ono. Mk123 "spy" tx/rx, 2·5–20MHz; 12W cw/tx; xtals for 3,554, 7,009, 7,037, 14,018, 14,074kHz; rx, a.m./ssb/cw; ac/dc psu; handbook; phones; £80 ono. G4GMZ, QTHR (W London). Tel 01-575 1839.

Trio 2200G, nicads, charger, mounting bracket, xtals S20–24, R0, R3–7, £110. New KVG XF9E fm filter, £25. HC6U marker xtals, 6, 8, 11, 12, 13, 14, 16, 17, 27MHz, £1.20 ea. Narda freq meters: 200–500MHz; 1·5–2·4GHz, £400 ea. G4BBR, QTHR. Tel 0242 27588.

KW204 tx and mic, £140. Buyer collects or carr extra. Buffham, G3TMA. Tel Norwich 712548.

Marconi HP56N mobile tx/rx, single channel, converted to 144·040MHz, needs keying installed, has bfo and works ok on tx/rx, can xtal to work on a.m. segment of 2m, handbook, full circuits, £35 ono. Collect. G4GMZ, QTHR. Tel 01-575 1839.

JR310, narrow band filter, showroom cond, had very little use, orig manual and box, best reasonable offer, cash sale. Buyer collects. Would accept JR500SE, mint cond, as part payment. G3FK, QTHR. Tel 07257 436.

KW2000E, mains psu, 160–10m, low power output socket, vox, xtal, calibrator, manual, lovely cond, £275. FTDX100, recent check-over/alignment, 80–10m, low power output socket, xtal calibrator, vox manual, 120W input, mains or 12V dc, £145. Tel Dunstable 69783, after 6.30pm.

TR7010, 144·1, 144·35, comp, rx preamp, orig packing, £140. Homebrew 28MHz tx/rx, based on G3ZVC board, 2W output, £85. AM10B, 144MHz, no control, £10. SWR bridge, £8. Fujica pocket 350 zoom 110 camera, case, £25. G3OUT, QTHR. Tel Leicester 302480.

TR7010, 2m, ssb, 40W transistorized linear, 5-el Yagi, £145 ono. Pye Compact vhf h/held, xtalled RB4, RB6, multiway battery charger, batteries, also suit Pocketfone battery range, £50 ono. G8KBW, QTHR. Tel Maidenhead (0628) 27105.

Mufax picture tx, D/658/D, a.m./fm, £120. Buyer collects. G3KZG, QTHR.

Cambridge AM10D, dash mount, a.m./fm, tunable on receive, fitted S0, S18, S20, S22, S24, toneburst, also xtals for R3–7, 144·95, 145·87, 145·26, £63. Buyer collects. G4CPI, QTHR. Tel Bitton 4484.

2m rig, IC22A, all 22ch xtalled, £105. 5/8 whip, mag mount, £10. HF multimobile G-whip, 10, 15, 20, 40m, £18. Garry Orford. Tel Bristol 426851, days; or 33981, evenings and weekends.

IC240, no mods, 10 months old, £160 ono. Tel 0245 466915, after 5pm or weekends.

FRG7, fine tune, new cond, comp with manual, 2m microwave module, £155 ono. G2FLC, QTHR. Tel 604781.

Datong FL1 audio filter, new, boxed, £41. Redgrave, 1 Orchard Cottages, Awbridge, Trysull, Wolverhampton. Tel Wombourne (Staffs) 896625.

500MHz generator, 50W output, cavity tuned, ideal for conversion to 432, 144 or hf pa, or QRO tx, incl fan-cooled triode TD2-400A (2kV ht), 5 by 2 by 2ft, £120 ono. Delivered England. G4GMZ, QTHR (W London). Tel 01-575 1839.

TR2200GX, S20–24, R3–6, 144·800, S0, S18, orig packing, nicads, charger, carrying case, etc, very good cond, £145. CR70A rx, 160–10m, £35. G8LGO, QTHR. Tel Gosport (07017) 81296.

Drake SSR1 gen cov rx, as new cond, £120 ono. Stobbs, 78 Hershall Drive, Middlesbrough, Cleveland. Tel 0642 246689, day time.

32ft self-supporting tower, needs painting, 5ft square base, fitted platform for beam adjustment, Cowl Gill motor, fittings to take rotary extension scaffold tube mast, buyer collects, £80. Hallicrafters SX73 gen cov rx, manual, wkg but needs some attention, £50. 4-1000A, with plate and filament transformers, rf chokes, plate coil, offers. TS175-U, less xtal, £20. Collins mechanical filters for 75AH, new, boxed, 3·1kHz, 800Hz, £12 ea. RCA 6JS6, new, boxed, £2 ea. FV401 vfo, new, boxed, £55. BC453, BC454, BC455, spare 85kHz ifts, offers. Hickock vtvm, £5. Lavoie LA239 'scope, circuit, untested, offers. 832A and 4-125As, offers. G3FPQ, QTHR. Tel 0420 43168, evenings; or 01-839 7207, weekdays.

MMT 432/28S transverter, £95. 14AVQ, £27. Rotator Tandy/Stolle, £27. G3KEF, 71 Lodge Hall, Harlow, Essex.

Going QRT: IC30A, 9ch fitted; IC215, 15ch fitted, extras; FRDX400, fitted all options; Venus SS2 monitor; Vibratrol 100W linear; Texas TI58, programmable, PC100B printer; lots of other goodies; buyers collect. Call after 6pm. G8BAM, NOT QTHR. Tel 0508 8608 (Norfolk).

TR2200G, R5–7, S20–22, S0, R6 i/p, nicads, charger, BNC, helical, exc cond, £100 ono; or w.h.y. 70cm?; cash adjustment if necessary. Sony TC1345D stereo cassette deck, £75 ono. G8NCT, QTHR. Tel 0398 23306.

Fabulous Icom IC701, PS701, SM2, a superior hf base stn, compact enough for mobile use, immac, £799. Yaesu FT101B hf tx/rx, superb value, £299. Shure 444 mic, £15. Genuine reason for sale. G4FIR, NOT QTHR. Tel 01-708 0402 (London SE17).

Liner 2, exc cond, PA3 preamp, manual, must sell, hence £85 ono. G8MCG. Tel Upminster (Essex) 25577.

FT227R, scanner, exc cond, price incl 5/8 whip on magnetic mount, £210. Can deliver within reason. G3ZSF, QTHR. Tel Grimsby 78577.

IC22A, good cond, comp with usual accessories, xtalled on RR0, R0, R3–7, auto toneburst, R5 input, R1 output, S14, S20–23, £130. Sentinel 2m converter, i.f. 550–1,600kHz, £15. G4DOV, NOT QTHR. Tel Cheslyn Hay 414927.

Offers please for *Radio Communication*, February 1969 to December 1978. G8CGK, QTHR. Tel 0989 2715.

IC240, 2m, fm, 23ch, purchased May 1979, cost £189, mint, lost interest in 2m, £160. Carr extra. Walker, G4ICJ, 6 Arwela Road, Felixstowe, Suffolk IP11 8DG. Tel Felixstowe 6637.

Codar CR70A rx, exc cond, £40. SRX continuous tune 0·5–30MHz, new on 23 April '79, £140. Carr at cost. Gray, GM3PLO, QTHR.

40ft Telemast, unused, guys, £45. Frequency meter, BC906D, 0–100MHz, Philco Corp, £10. Sig gen, CT378B, 2–250MHz, £30. Mains filter, hb, £2. Potcore ferrites, £1. 50Ω carbon power resistor, fan, £2. Other bits, offers. G4GUJ, QTHR. Tel Wickford 65916, after 6pm.

G2DAF Mk1 ssb/cw 180–10m 50W tx, inc mains psu, immac construction and cond, very clean output, no tvi, incl all interconnecting cables, exc rig, £55. AR30 rotator, HB9CV 2m beam, both exc cond, used indoors only, £35. Eddystone 898 dial, new, boxed, £15. *Wanted:* urgent, galvanized tilt-over tower, Western or similar, approx 50ft, heavy-duty hf rotator, large braking and rotation torque, pref Emoto or w.h.y? G4GTU, QTHR (W Sussex). Tel Steve, Rustington 4123.

Technics stereo cassette tape deck, model RS263US, dolby, CrO_2, memory rewind, £65. Codar AT5 tx, homebrew psu, ac. GW8OKR, QTHR.

KW Viceroy ssb tx; Mossley FL1 rx, £100. Jaybeam PBM 18/70, Trio 9R59DS, calibrator, fm discriminator. 2m converters, various ifs. *Wanted:* 4CX250Bs. G8LGL, QTHR. Tel Nailsea (02755) 2478.

FRDX500S, FLDX500 spkr, all options, 2m, 4m, fm, filters, orig cartons, handbooks, £325; slow-scan Robot 70D monitor, slow-/fast-scan, videograph, frame reset, 128-/256-line, extra i/p Robot 80A camera, ½ ½f frame, pos/neg, int test signal, £450; all ono. Will deliver Securicor FOC. GI3MBB, QTHR. Tel Bangor 61946.

ETM3 squeeze keyer, £30. 70cm 12XY, circular phasing harness, £15. Stabilized psu, 4–15V, 10A, £30. QRO hf pa for completion, uses pair 4-400A, 3kV psu, 10–160m, £175. Cragg. Tel Dunstable (0582) 600358.

Trio TS500 hf bands tx/rx, ac psu, 80–10m, 180W p.e.p., 500kHz calibrator, new pair 6146Bs fitted, unmarked cond, handbooks, open to any test, buyer to collect, £150. G3WYN, QTHR. Tel 0444 412420.

FRDX500, FLDX500, 2m converter, 600Hz and 2·4kHz mechanical filters, 6kHz ceramic filter, spare pa tubes, handbooks, orig cartons, £300. GW3OAY. Tel Swansea 401733.

4CX250B bases: SK650HF, £4 ea; SK610VHF, one gold-plated pins, £5 ea. TC433 valve caps, 20p ea. Porcelain chimneys, 50p ea. Valves, used, £5 ea. 4CX150A, used, £3. Indicator tubes, ZM1500/12, data, £1.30 ea. G4GUJ, QTHR. Tel Wickford 65916, after 6pm.

Shure 201 mic, £8. 12-section locking telescopic mast, 15ft, £4. Datong repeater timer, £8. Carr extra. G2KF, QTHR. Tel 072 681 2337.

IC215, R1–7, S20–23, nicads, mobile mount, charger, rubber duckie, strap, etc, £155. IC3PE power l/s supply, suit IC215, £46. IC202-25 25W linear, fitted PA1 preamp, suits IC215, £38. OMB5 dig freq meter, up to 300MHz, £75. Boris chess computer, board, parts, cost £230, brand new, any offer over £100. Buyer pays carr. Tel Peter, 0842 61648, after 6pm and weekends.

Brand-new, unused, Datong agile filter FL1 (3723), ac adapter mpu, £55, plus p&p. G4CSB, QTHR.

Forced sale of immac TS515, comp with h/book, perfect wkg order, many good dxs worked, £270 ono. Prefer buyer inspects. *Wanted:* good wkg gdo, preferably Heath model. G4HSB. Tel Peter, 0642 86608, evenings.

Two Bantams, comp, wkg, hb/fm, vgc, pair, £160. Marine band xtals, three channels for above, tx/rx, £20. *Wanted:* two a.m. Bantams, hb or 145MHz. GU3HKV, QTHR. Tel 0481 47278, 6–7pm.

FT221R, accessories, good cond, £330 ono. 9-el F9FT X-Y Yagi, vgc, £24. G8RYT, NOT QTHR. Tel 01-856 3746.

IC210 vfo 2m fm tx/rx, mains/12V, xtal priority channel on GB3PI, £150. Plus carr. Brown, G4DCQ, 14 Bernard Road, Cromer, Norfolk.

TS700G, as new cond, £350. Sentinel Auto preamp, £10. SML twin meter swr bridge, £8. Boot mount, 2m 5λ/8 whip, £8. Adonis MM202G mobile safety mic, £12. Barlow, G8LQV, QTHR. Tel Banbury (0295) 3529.

Clearing shack: Cossor 'scope 1042A, manual, vgc, £16. Sig gen, AN.URM/33, 1–2·3GHz, 115V, 400Hz, £8. Ediswan R1103 stab psu, variable 500V, low ac voltages, £8. G3MOL, QTHR. Tel Brighton (0273) 777716.

Drake SSR1, fitted kHz digital readout, 1–30MHz in 30 bands, £150. *Wanted:* Telford TC10 multimode 2m tx. G3WDI, QTHR. Tel Lowestoft (0502) 63216.

FT101 Mk2, £300. IC22A, xtalled for R3–7, S0, S20–23, £120. Nixon 13·8V 5A psu, £12. Effects of late G3GTZ. G3AJZ, QTHR.

FDK Multi U11 70cm fm tx/rx, 9ch fitted, auto toneburst, mint cond, £240 ono. Lemasurier, G8NRZ. Tel Walton-on-Thames 44356/7/8, 9am–5pm only.

TS520, immac, only needs seeing, £375. Codar AT5, psu, £25. Genuine sales, equipment perfect. Palmer, G4FMO, QTHR. Tel Ashby (05304) 3973.

Custom built transformer for 2 × 4CX250 linear, 1,500V 0·5A, 6V 9A, offered at cost, £40. 4CX250B, base, chimney, £12. G4AHH, QTHR. Tel Silverstone 857350.

Mullard 510 amplifier, preamp, £5. Jason fm tuner, £5. Perdio Town and Country radio, marine band, £5. Two Goodmans Trebax tweeters, £6 pair. G3NJP, QTHR. Tel Sissinghurst 482.

FT200, FP200, as new, £270. QM70 144/432 tx/rx converter-tripler, unused, £45. 2m fm Cambridge, toneburst, vfo, vgc; FDK Multi-7, 2m tx/rx; offers? G4GZH, QTHR. Tel 02406 3460.

Adonis amplifier mic, unused, orig packing, advertised £39, accept £30. RSGB Z-match, contains Johnson tx condensers, 2kW rating, slow motion dials, switchable 50Ω dummy load, alum chassis, tatty looking but works perfectly, £16. G5FH, QTHR. Tel 0425 25974, evenings.

Yaesu Musen FRG7, very good cond, fine tuning, £150. Norton, 52a Station Road, Earlsheaton, Dewsbury, W Yorks. Tel Les, Dewsbury (0924) 452303.

Trio JR310 rx, 10–80m, vgc, £55. Sommerkamp separates FR100B, FL200B, immac £250. GW3WMY, QTHR. Tel Cardiff 703076.

Icom IC202 tx/rx, 144·0–144·4, 144·8–145·0MHz, exc cond, comp with accessories, leather carrying case, mains psu, £155. G4DPT, QTHR. Tel Cheltenham (0242) 38942.

Morse keys: G5NU dispersing collection of 16 keys, first world war to present day, incl many brass keys, Vibroplex, Junker, etc, the lot, £120; or separately, sae list. G5NU, QTHR. Tel Reading 81200.

IC240, with Superscan, £200. FT202R, fitted S20–22, R2–4, nicads, charger, £95. FRG7, narrow filter for ssb, £180. Gower, 10 Homethorpe, Hull HU6 9EU. Tel 0482 855436.

Trio TR2200G, 1W, portable, xtals, five simplex, five rptr, nicads, charger, case, pwr lead, manual, £95, plus carr. Tel 041-339 5256, after 6pm.

Hallicrafter HT37 80–10m 180W ssb cw a.m. tx, fb, £90. Drake 2B rx, 80–10m, calibrator, spkr, £90. 500W linear, psu, £90. Sphinx 160–80–20 ssb-cw tx, £30. G3AMY, QTHR. Tel Mansfield 642932.

Standard C146A, 2m fm, hand-held, exc cond, nicads, charger, spkr, mic, helical ant, leather case, fitted t/burst, R7, S20, S22, £90. G8MHR, NOT QTHR. Tel Romford (Essex) 45014.

KW Atlanta, vgc, recently overhauled by Decca, fitted cw sidetone, extractor fan, £200; Eddystone EC10 Mk1, average cond, £50; Tandberg reel-to-reel tape deck, superb, £70; Standard 828M, fully xtalled, all accessories, £150; or the lot, £410. G4HIY. Tel Lincoln 720414.

KW2000 12V dc psu, circuit, £15. Linear amplifier, pair TT10 (813), 15, 20, 40, 80m, two 6U4, ten semi-conductors, built-in p/p, fan, 14 by 21 by 12 high, untested, £25. G3MBL, QTHR (N London). Tel 01-445 4321.

KW Vespa, 90W, psu, h/book, mic, £75. Storno 600, S20–24, R5–7, 144·48, R0, two spare, 10W, second control box with autoscan, service manual, xtal t/burst, exc, £135. Eddystone S640 rx, Codar preselector, £18. Collect. Tel 01-648 5895, day time.

G3WPO design 2m fm tx/rx, 6ch, R3, R5, fitted, toneburst, nicads, 1W output, £50. 2m converter, Microwave Modules, 2–4MHz i.f., £13. CR100, needs alignment, £8. Piper. Tel Bognor Regis 5991 ext 41, office hours.

KW204 tx, good cond, no mods, £145. Sony CF550A stereo radio cassette, portable, £55. Microwave Modules 2m a.m. rx, £12. Prefer buyers collect. G4AGO, QTHR. Tel Rugby 811915.

Going QRT. IC202S, £180; Lunar 2M30–160P, 160W, all mode, linear/preamp, £165; 9-el portable Tonna, £15; all only four months old. Modular Electronics ME202-25P, fitted preamp, £30; 6-el Jaybeam quad, £17.50; both 18 months old. Avery, G8MGA, QTHR.

KW2000B, incl matching KW psu, remote 4B vfo, Q-multiplier, KW stability mod kit fitted, skeds arranged, £225. Buyer collects, carr extra. G4AMD, 40 Beech Road, Clanfield, Hants. Tel Chris, 0705 591871, evenings; or 0705 486391 ext 455, days.

Shack clearance: Technical Associates peak/notch filter; bug key; Bauer paddle; Asahi swr bridge, twin meters; G-whip Christmas tree mobile antenna; Hustler BM1 bumper mount; C-32 ball mount; 2-el tri-band quad, comp; offers? Chris Page, G4BUE. Tel Steyning 814594.

SWL selling: Jaybeam 4m 4-el Yagi, £6. 432MHz 48-el MB, £9.50. Tonna, two months old, 432MHz, 21-el, £15. MM converters: 70MHz, 28 i.f., £13.50; 432MHz, 28 i.f., £13.50. Denis Taylor, 25 High Brow, Harborne, Birmingham. Tel 021-426 5271.

Swan 500 80–10m tx/rx, psu, handbook, £250. *Wanted:* TR7010, 2m, ssb. Consider part exch or separate offers for above. G8KWX, QTHR. Tel 061-973 7147.

WG16, klystron mount, attenuator; X-13 micrometer tuned klystron, 20W load; £5 ea. 2K25; 723A/B; TD03-10; TDA2540; £1 ea. 25W 2m valve tx, £15. *Wanted: RSGB Bulletin* May 1944, July 1945; *Radio Communication,* February–May and October 1977. G8CUB. Tel Brentwood 214406.

EC10 Mk1, 500kHz–30MHz, mint cond, manual, £75. Tel 01-657 3630 (Croydon), evenings.

Trio R300, as new cond, comp with manual, orig packing, £150 ono. G. Davidson, 23 Burn Brae Crescent, Cookstown, Co Tyrone.

2m: Ken KP202, xtal tb, base charger, leather case, S0, S20, S22, R3, R6–7, £90; FT2FB, 1/10W, auto tb, 144·48, 144·60, S0, S32, S20–24, £110. G8GOV, 30 Moorfield Drive, Baildon, Shipley, W Yorks.

FTDX401, cw filter, spare valves, good cond, Shure 444 mic, £250. G4FJO, QTHR. Tel 04895 3664.

HQ1 mini, 6–10–15–20m, few months old, £70. Wavemeter, class D type, mains, £12. G4GLB, QTHR. Tel Tony, Greenhithe 844726.

SB104A ssb broadbanded hf tx/rx, digital frequency display, matching remote vfo, HP1144 regulated psu, £375. Atlas 180 tx/rx, mobile mount, £180. G3XHX, QTHR. Tel Liskeard 43749, evenings.

Icom IC202 ssb tx/rx, very good cond, nicads, case, in orig packing, £150. Moseley TA32 Junior triband beam, £40. KW coaxial switch; 300W 75Ω dummy load; £5 ea. Buyer collects or carr at cost. G4CCI, QTHR. Tel Trowbridge 5953.

Valves: ECH21, EF22, £1 ea; other early types. Transformer, 115/230V, 235–0–235, 200mA, 6·4V 6·7A. 5V 4A, £4. Matching choke, £1. Other transformers. Gardners 3-phase low volts, £3. G3MBL, QTHR (N London). Tel 01-445 4321.

FT200, FP200, all 10m xtals, mic, good cond, £180 ono. CD44 rotor, hardly used, £70. Glass chimneys for 3-500Z tubes, two, new, £5. Will deliver 50 miles, or buyer collect. G4COA, QTHR.
Heathkit SB101, SB600, £220. 5-el 2m Yagi, £8. Property of deceased amateur. Tel 01-594 6548.

WANTED

Surplus rx, wkg order, eg AR88, CR100, HRO, etc, required for swl. Woodward, 18 Stambourne Way, West Wickham, Kent. Tel 01-777 3379.
Manuals, instruction books for TCS13 equipment. TX COL52245. RX TCS12. COL46159. Valves, original key and equipment. AR88D, manual, valves. 1155 rx model N, if possible. DF loop and rf units. R. Williamson, GI3RNY, 13 Avonmore, Antrim Road, Ballymena, Co Antrim BT42 2BJ. Tel 41468.
AR77 S-meter. Morse key. 80m cw xtal. Kokusai filter, MF455, 10 or 15k xtals if poss. Geloso 898 or similar dial. Ferguson 3000/3500 manual. 80m command rx, Q5R or 85kHz ifts. Fay, 45 Chanel Road, Artane, Dublin.
Generator, 240 ac, up to 1kW, Honda or similar. Parry, G4HLG. Tel Westbury-on-Severn (045276) 506.
VFO30G, for TR2200GX, pref good cond. I. Fugler, "Halcyon", Crescent Road, Truro, Cornwall. Tel Truro 3741.
Suitcase type (spy) sets, A Mk3, 3 Mk2 (B2 set), MCR1, or others, any cond considered. Also interested in other surplus equipment and manuals. Tel 01-949 2317.
JR599 custom special, 2m converter, in good cond. *For sale:* bound volumes of *SWM* 1948-64, nominal cost if collected. G3EGV, QTHR (Dorset). Tel Preston (0305) 832157.
Marconi Kestrel 1963 instruction manual. Peter Tagg, 22 Hambledon Road, Waterlooville, Hants.
Compr. Handbook for HRO rx; coil packs J, JB, JC for same. Hussey. Tel Malvern (Worcs) 4968.
3cm waveguide switch or relay, for WG16. 4CX250, 4CX350, SK620A, in vgc. HT transformers. GJ8KNV, QTHR. Tel Phil, Jersey (0534) 53333
Valves 4-65A, QY365, CV1905, price and cond please. Greenwood, G2BUJ, 32 Pound Lane, Pinehurst, Swindon, Wilts.
Shield and 11-pin socket base for crt type 2API. G3GOT, QTHR. Tel Terling 229.
Gen, cct, for Hallicrafters Sky Rider Defiant. G8DFZ, QTHR (Yorks). Tel Otley 3083.
CRT type 3RPIA, 3in med pers green; 100kHz xtal for BC221 freq meter. *For sale: Radio Communication*, 1968-78 incl, £2 yearly, plus carr. G3LOL, QTHR.
Complete medium power cw stn, with all ancillaries, valves preferred, high-class homebrew suits, 50 miles of Manchester. F. Wilson. Tel 061-330 1182, Monday-Saturday except Tuesday, business hours.
Pye radiotelephone controller (RTC) handbook; any HC6U xtals. C. Walton. Tel Southampton 551580.
Yaesu FT101B, for aspiring G4. Barlow, G8LQV, QTHR. Tel Banbury (0295) 3529.
Valves, KTW61M, DH63M, KT61, V50, X61, or any of their equivalents. Pre-1945 BBC broadcast mic, any type. G8FSK, 38 Woodstock Road, Begbroke, Oxford OX5 1RG.
Small tobacco tins, will pay costs. Erland Belrup, SM7COS, Hjortshög 4540, S-260 34 Mörarp, Sweden.
B44 Mk2, with or without mods. Woden UM1 transformer. G3YNN, QTHR.
"Ham Radio Magazine", 1974-5. Prop pitch motor. G3FPQ, QTHR. Tel 0420 43168, evenings; or 01-839 7207, weekdays.
Truly small transistor portable comm rx, amateur/gen cov, to 30MHz, must have full usual ssb facilities, about 10 by 6 by 4in max, anything considered. Eddystone round die-cast spkr. KW E-Zee match. BRS12234, 16 East Parade, Rhyl, Clwyd.
Gen cov rx, var selectivity, CQR700, FRG7 or really good valve job. T. D. Ray, NHARG, Nunsfield House, Boulton Lane, Alvaston, Derby.
Any suitcase type tx/rxs. Items for B2 type 3 Mk2 tx/rx: suitcase, psu, manual, spares container, antenna and former, key, headphones, mains plug plus adapters and conversion pins. B2 Minor type A Mk3 tx/rx. Racal RA17/RA117, with ssb adapter, preselector, in exc cond. Belling-Lee mains rf interference filter, 250V/30A, or similar. Wireless Sender 53. Robbins-Myers rotary transformer, ex 52 set psu, input 11V/25A, output 1,300V/0-12A 156W. Letters only. Taylor, G3UCT, c/o 31 Willow Walk, Culverstone, Gravesend, Kent.
No 62 wireless sets. Also interested in any other army surplus sets, manuals, handbooks. A. P. Tapp, 13 Montgomery Close, Saltash, Cornwall PL12 4HU. Tel Saltash 5311, evenings.
Collector wants vintage wireless and xtal radios; Marconi U-2 Gecophone xtal sets; horn spkrs; *Wireless World* magazines, pre-1930; best prices. A. Nolf, 7 Cambrian Way, Ewloe, N Wales CH5 3RE. Tel Hawarden 534329.
Handbook for Storno Viscount CQM19. Suitable xtals for S19, etc, 8·082, 10·349MHz. Logging scale 0-100 for Hallicrafters S20 rx. G3MBL, QTHR (N London). Tel 01-445 4321.

Special event stations

GB2BB, 14-15 September
A special station will be in operation at Mitchell Junior School, South End Road, Hornchurch, Essex, to commemorate the Battle of Britain. The school, named after the Spitfire designer, is on the site of the old Hornchurch aerodrome. Further details from G4FQF, QTHR.
GB2IPA, 14-15 September
Harrow Police Station, Northolt Road, Harrow, Middx, is to be the site of a special event station set up as part of an open day to commemorate the 150th anniversary of the Metropolitan Police. Further details from G4FPK, QTHR, tel 01-907 2253.
GB2DRC, 14-24 September
A demonstration station will be operated during the Derbyshire Festival, at Dinting Railway Centre, Dinting, Glossop, Derbys. Further information from G4GNQ, QTHR.
G2NM, 16 September
Chichester & D ARC will be operating a special event station on 3·5MHz and vhf at Tidewaters, Bosham. The callsign, previously that of the late Gerald Marcuse, is allocated to the club but is only used on this annual occasion as a memorial to Gerald Marcuse and his achievements in the field of amateur radio. Further details from G8HSH, QTHR.
GB2CVS, 29 September
Members of the 10 Venture Scout units in Chelmsford will be operating a station in the Shire Hall, Chelmsford, during the "This is Venture Scouting – Chelmsford" exhibition. The station will be run as part of a display of activities including sailing, canoeing, mountaineering and community service, and there will be a climbing wall for public use. Uniformed licensed members of the movement are invited to participate in the operation. Further details from G8JBJ, tel Wickford (Essex) 4682.
GB2RUM, 3 October
The North Bradford Retired Men's Forum is holding a hobbies exhibition at the Methodist Family Centre, Thackley, Bradford, W Yorks, which will include a special event station operated from 1000bst to 1700bst. Further information from G4DXC, QTHR, tel Bingley 3289.
GB2SC, 6-7 October
A major county scout camp for Merseyside Scouts is to include a special event station as one of its attractions. The camp, incorporating a water-based endurance event – the Geoffrey Beavan Scout Challenge Competition – will be at Leisure Lakes, Tabby Nook, Mere Brow, Tarleston, Nr Southport. Further details from G3THA, QTHR.
GB2RRA, 6-14 October
Rolls-Royce & Associates Ltd will be holding an exhibition of employees' pastimes at its Raynesway, Derby, premises, and a special station, operated by the company's six radio amateurs, will be on display. Further details from A. Smith, G3EMJ, c/o Rolls-Royce & Associates Ltd, PO Box 31, Derby DE2 8BJ.
GB2IPA, 8-20 October
A special event station will be in operation at 109 Culver Grove, Stanmore, Middx, to commemorate the 150th anniversary of the Metropolitan Police. Further details from G4FPK, QTHR, tel 01-907 2253.

Looking ahead

9 September – IoW Get-together, Alverstone Manor, Shanklin, IoW.
22 September – Scottish VHF Convention, Dundee Technical College, Dundee.
30 September – Sixth Welsh Amateur Radio Convention, Oakdale Community College, Blackwood, Gwent.
12-14 October – World Association of Christian Radio Amateurs and Listeners Conference, Willersley Castle, Derbyshire. Details from: WACRAL Secretary, 13 Ferry Road, Warme, Hull HU7 5XU.
13 October – EI/GI Convention, Ballymascanlon Hotel, Dundalk, Eire.
8-10 November – Amateur Radio Retailers Association National Amateur Radio Exhibition, Granby Halls, Leicester.
9-10 May 1980 – RSGB National Amateur Radio Exhibition, Alexandra Palace, London.

MICROWAVE MODULES

NEW PRODUCT

MML432/50, 50 WATT 432MHz LINEAR POWER AMPLIFIER AND LOW-NOISE RECEIVE PREAMP

As mentioned in the August edition of the "Radio Communication", we are pleased to announce a new addition to our range of high quality linear amplifiers.
The MML432/50, is a 432MHz, 50 watt linear power amplifier combined with a low-noise receive preamplifier. The unit is styled on the lines of the MML432/100 and MML144/100 and includes the following features:

- 50 WATTS TYPICAL OUTPUT
- EQUIPPED WITH RF VOX AND MANUAL OVERRIDE
- RUGGED 145W DISSIPATION PA TRANSISTOR
- LED STATUS LIGHTS FOR POWER AND TRANSMIT
- ULTRA LOW-NOISE RECEIVE PREAMPLIFIER
- SUPPLIED WITH POWER LEAD AND ALL CONNECTORS

SPECIFICATION

LINEAR AMPLIFIER

Power profile	:	50 watts typical output for 10 watts input
Power Gain	:	6dB typical
Frequency Bandwidth	:	430–440 MHz @ – 1dB
Power Requirements	:	12·5 V @ 8amps for 50 Watts output. 13·8 V maximum
Quiescent Current	:	1 amp nominal @ 12·5V

RECEIVE PREAMP

Overall gain	:	10dB typical
Overall noise Figure	:	Better than 3·0dB
Frequency	:	430–440MHz at
Bandwidth		– 1dB
Receive Current	:	75mA nominal @ 12·5V

GENERAL

RF input connector :	50 ohm BNC	**Weight**	:	4Kg (8lb 13oz)
RF output connector :	50 ohm 'N' type	**Overall size:**	:	315 × 142 × 80mm ($12\frac{3}{8} \times 5\frac{5}{8} \times 3\frac{1}{8}$)

PRICE: £99 + VAT (£113.85 inc. VAT) DELIVERY FROM STOCK.

Any further information on this new product and others from our extensive range may be obtained by contacting our sales department, who will be only too pleased to help.

ALL MICROWAVE MODULES PRODUCTS ARE FULLY GUARANTEED FOR 12 MONTHS.

MICROWAVE MODULES
BROOKFIELD DRIVE, AINTREE, LIVERPOOL L9 7AN, ENGLAND
Telephone: 051-523 4011 Telex 628608 MICRO G

Lee Electronics Ltd

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SST • JAYBEAM • ASP • SHURE • LEADER • CDE • HY-GAIN • ETC

LEE

MICROWAVE MODULES DESPATCHED TO ANY PART OF THE WORLD POST FREE (+ 15% VAT)

TRANSVERTORS

MMT144/28 Transvertor	£79.00
MMT 28/144 Transvertor	£79.00
MMT 432/28S Transvertor with Oscar shift	£119.00
MMT 432/144R Transvertor	£151.00

VARACTORS

MMV 1296 23cm Tripler	£30.00

FREQUENCY COUNTERS

MMD 050/500Mhz Counter	£63.89
M500P 10 Prescaler	£25.00

LINEAR AMPS

MML 144 25W	£39.11
MML432 100W	£220.00
MML144 80W	£120.00

CONVERTORS

MMC 432/28S for Oscar	£26.58
MMC 432/144S for Oscar	£26.58
MMC 70 4m convertor	£18.00
MMC 70 LO 4m convertor	£20.00
MMC 144 2m convertor	£18.00
MMC 144 LO 2m convertor	£20.00
ATV435/51 convertor	£26.58
MMC1296/144/28	£30.00
MMC156/28 Marine	£20.00
MMC28/144 up convertor	£18.00
MMA 144/28 Pre-amp	£13.00

All 2m converters can be supplied with IF outputs of 2-4-12-14-18-28MHz 70cm models with IF outputs of 28-14-18- or 144MHz.

YAESU MUSEN (FULL RANGE AVAILABLE) FREE DELIVERY IN UK

FT901DM	£853.00	FT101E	£515.00	FL2100	£311.00	FRG7	£187.00
FT901D/DE	£737.00	FR101D	£525.00	CPU2500RK	£308.00	FRG7D1G	£227.00
FT101Z	£500.00	FL101	£453.00	FT225R	£487.50	FRG7000	£327.00
FT101ZD	£575.00	FT7	£244.45	FT225RD	£535.00	FT301	£515.00
FC901	£115.00	FT7B	£375.00	FT227R	£213.00	FT301D	£588.00
FTV901	£232.00	FL110	£130.00	FT227RB	£229.00	YH55	£8.75
FV901	£232.00	FP4	£35.00	FT227RX	£250.00	YD844	£19.50
YO901	£236.00	FP12	£67.00	FT202	£88.00	OTR24	£16.00

All prices subject to 15% VAT

A.S.P. MOBILE AND BASE STATION ANTENNAS

Asp201 ¼W 2m mobile	£3.50	Asp393 ¼W 3dB 2m mobile	£17	Asp E462 70cm 3dB mobile	£7.23
Asp2009 ½ 3dB 2m mobile	£8.20	Asp no hole boot mount	£3.70	Asp E667 70cm 5dB mobile	£16.90
Asp629 ¼W 3dB 2m mobile	£7.60	Asp magnetic mount	£8.95	Asp A659 UK 70cm 5dB, base antenna	£22.00
Asp677 ½ 3dB 2m mobile	£14.25	Asp cutter with cable	£6.75		
Universal cutter clip	£4.50				

Post & Package £1.00 + VAT 15%

POCKET MONITOR

This small receiver has 12 xtal-controlled channels. Fitted with 9—S0, S20, S22, S23, S24, R4, R5, R6 and R7, and comes complete with ni-cads, charger and carry case, etc.

£57.95 + 15% VAT
Extra channels available at £2.50 + VAT

ICOM RANGE

IC701 transceiver and power supply	£792.00
IC215 2M portable	£141.33
IC202S 2M SSB	£176.89
IC402 70cm SSB	£256.00
IC240 2M Transceiver	£168.00
IC245 2M FM/SSB	£354.62
IC211E 2M FM/SSB	£481.77
Xtals for 215/22 p/pair	£4.50
Cases 202/215/402	£6.75
Mobile mounting bracket 202/215	£10.75

LUNAR LINEAR AMPLIFIERS

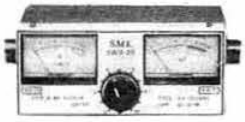
2M10-80P 2m 10W input 80W Output with 9dB gain pre-amp	£120.00
2M10-150P2M 10W input 150W Output with 9dB gain pre-amp	£182.50
2M3-150 2m 3W input 150W Output with 9dB gain pre-amp	£182.50
2M25-150P2M 25W input 150W Output with 9dB gain pre-amp	£160.00

STANDARD RANGE

C146A 2m 2W hand-held transceiver fitted S20 and S23 complete with T/burst and carrying case £125.00. C432 70cm 2-2W hand-held fitted 433-20, 433-50 with carrying case, etc, £169.00.

SST ANTENNA TUNERS

SST1 Random Wire Tuner	£22.00
SST2 Coax Wire Tuner	£26.75
SST3 Impedance Match unit	£13.50



SWR25 This ever popular twin SWR & power meter covers 3-5-150MHz at £10.50 + VAT and 25p P & P.

UH74 SWR & power meter switchable HF, 2M & 432MHz with remote head at £14.25 + VAT & 25p P & P.

★ NEW ★ ROTATORS

AR3000E is an excellent new rotator with disc brakes and carries 250kg of balanced weight. Only £79.95 + VAT. TR-1 low cost rotator for TV, FM and small beams, fully automatic at only £26.75 + VAT

★ NEW ★ POWER SUPPLIES

Px402 13-8V output, 3A continuous 4A max. Fully protected cutout. Only £19.95 + VAT.

★ NEW ★ RANGE OF KEYERS

Send for details

★ NEW ★ 2m MOBILE COLINEAR

6-5dB gain. Optional mounts available. £32.95 + VAT.

JAYBEAM

ALL MODELS IN STOCK

HELICAL ANTENNAS

2m with BNC	£3.85 each
2m with PL259	£3.85 each
2m for IC215, Trio 2200 Gx, standard C146A	£3.50

All + post 25p + VAT

ROTATORS

AR22	£43.00
CD44	£95.00
AR40	£47.50
HAM 11	£129.00
KR400	£85.00

SEND 25P IN STAMPS FOR COMPLETE PRICE LIST AND CATALOGUE

LEE ELECTRONICS LTD
400 EDGWARE ROAD, LONDON W2
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Nearest Tube: Edgware Road or Paddington main line.
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Buy it with Access

BARCLAYCARD VISA

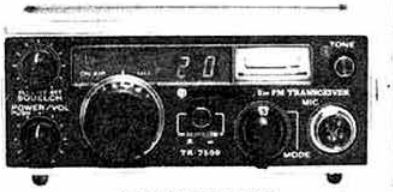
STEPHENS-JAMES LIMITED

APPROVED TRIO DEALER

TRIO TS-180S with DFC (Digital Frequency Control) Solid State HF Transceiver with every conceivable operating feature required by any operator. Two built-in microcomputers. 1·8 to 28MHz bands, 200 watt PEP. SSB-CW-FSK. RF Speech processor. Tunable Noise Blanker. Variable RF power output. 13·8V dc operation.

TRIO TS-120V

Full TRIO Range available from stock, including all accessories. Backed by the Trio organisation, we have never felt so confident in offering this range of equipment to the operator who wants the best.



TRIO TR-7500

TRIO PRICES

TS820S	£832.00	TS120V	£408.00	TR7500	£240.00	TR3200	£190.00
TS520S	£542.00	R820	£790.00	TR7600	£270.00	TR7010	£193.00
TS180S	£825.00	TL922	£797.00	TR2300	£199.00	R300	£189.00
TS120S	£495.00	TS700S	£549.00	TR8300	£250.00	DM800	£59.80

YAESU

FRG7 Receiver	£214.00
FRG7000 Receiver	£375.00

DRAKE

SSR-1 Solid State Receiver	£189.00
TR7 Transceiver and AC PSU	£1,022.00
MN7 Antenna Matching Unit	£127.50

Other Drake equipment available to order.

S.T.E. MILAN

AA1 Audio Module	£4.95
AD4 FM Discriminator	£5.00
AT23 C.C. FM Transmitter	£50.00
AR20 C.C. FM Receiver	£50.00
AG10 Tone Burst unit	£4.50

ARAC102. 28-30MHz and 144-146MHz FM-SSB-CW Receiver £106.00

STABILISED POWER SUPPLIES

Model 122 12·6V 2·5A	£15.66
Model 122s 10-15V 2A Single Meter	£22.50
Model 125 10-15V 5A	£28.00
Model 153S 4-20V 3A Dual Meter	£31.00
Model 156S 4-15V 6A Twin Meter	£40.00
Model 1210S 4-20V 10A Twin Meter	£88.00
Model 1220 13·5V 20A	£95.00

Maximum ratings quoted.

MICROWAVE MODULES

MMC144/28Lo 2m Converter	£23.00
MMC432/28S 70cm Converter	£30.56
MMC432/144S 70cm Converter	£30.56
MMC1296/28 23cm Converter	£32.20
MMC1296/144 23cm Converter	£32.20
MMV1296 23cm Triple	£34.50
MMDO50/500 500 MHz Converter	£73.47
MMT432/28S 70cm Transverter	£136.85
MMT432/144R 70cm Transverter	£173.65
MMT144/28 2m Transverter	£90.85
MMA144 2m Preamp	£14.95
MML144/100 2m Linear Amplifier	£142.60
MML144/25 2m Linear Amplifier	£44.97

TRANSCEIVERS AND RECEIVERS

SRX30 Solid State Receiver	£189.00
HC1400 25 watt FM Transceiver	£259.00
Swan 100MX Transceiver & AC PSU	£600.00
R512 Aircraft Band Scanning Receiver	£138.00
Digital Flight Scan Airband Receiver	£230.00
SR9 2m FM Receiver	£46.00
FDK TM56B FM Scanning Receiver	£109.00
AR240 800 Channel 2m Transceiver	£199.00
AMR217B 2m Scanning Receiver	£120.75

HY-GAIN

12AVQ 10-15-20m Vertical Antenna	£43.13
14VQ/WB 10-15-20-40m Vertical	£60.38
18AVT5WB 10-15-20-40-80m Vertical	£87.40

VARIOUS ANTENNA

HF5 vertical 10-through 80m	£41.40
Discone 5 Antenna 50-480MHz	£36.80
C4X 10-15-20m Vertical	£43.00
HQ-1 Minibeam Tribander	£96.76

Complete range of JAYBEAM HF AND VHF-UHF Antennas, send 9p for catalogue and price list.

TECHNICAL ASSOCIATES

Receiver Band Pass filter	£30.50
Receiver Peak and Notch Filter	£30.50
Audio Compressor	£30.00
SWL Preselector	£27.25
Crystal Calibrator	£23.00
VHF 144MHz tunable preamp	£24.00

G-WHIP. Mobile Antenna Range

Tribander Helical 10-15-20m	£23.00
LF Coils for above	£6.56
LF Telescopic for coils	£3.00
Standard Basemount	£4.20
MultiMobile 10-15-20m	£26.45
Coils for above	£6.56
Extendarod	£10.93
Flexiwhip 10m	£16.00
Coils for above	£6.56

SWL TUNING UNITS

MK2 Covers 550kHz to 30MHz £26.00

Designed and manufactured by us. Fifty switchable tunable positions, will match any antenna to your receiver. Now in use in over 40 countries. Ideal for use with QRP transmitters. Price includes VAT and postage on this unit.

SECONDHAND EQUIPMENT

Due to the fact that our secondhand equipment stock changes daily and our adverts are in press weeks before publication we are not publishing a list. A S.A.E. will bring you an up-to-date list or please phone. Good clean equipment wanted and spot cash will be paid. All secondhand equipment carries a three-month guarantee.

Shop Hours: Mon to Fri 9.30am to 5.30pm
Saturday 9.30am to 4.30pm
ACCESS and Barclaycard facilities
HP terms arranged. Part exchanges always welcome. Good clean equipment bought for cash. Items sold on a commission basis
We are located on the A574. Turn at the Greyhound Motel on the A580 (East Lancs Road) and we are about ½-mile on right. No parking problems at any time.

STEPHENS-JAMES LIMITED
47 WARRINGTON ROAD
LEIGH WN7 3EA
ENGLAND
Telephone (0942) 676790

Tecknowledgey for sale.

The Mark III FM Tuner

DIY Hi-Fi will never seem the same again. Ambit's Mark III tuner system is electrically & visually superior to all others. Some options available, but the illustrated version with reference series modules: £149.00 + £18.62 VAT

With Hyperfi Series modules £185.00 + £23.12

Features of the system:

- Precision construction & design of all parts
- Time/frequency display
- State of the art performance with facilities for updates, using modular plug in systems.
- Deviation level calibrator for recording
- All usual tuner features

ALL TUNER KITS £3 carriage

Digital Dorchester All Band Broadcast Tuner: LW/MW/SW/SW/FM stereo

A multiband superhet tuner, constructed using a single IC for RF/IF processing - but with all features you would expect of designs of far greater complexity. The FM section uses a three section (air gang) tuned FET tunerhead, with ceramic IF filters and interstation mute; AM employs a double balanced mixer input stage, with mechanical IF filters - plus a BFO and MOSFET product detector for CW/SSB reception. Styled in a matching unit to the Mark III FM only tuner, employing the same degree of care in mechanical design to enable easy construction. MW/LW reception via a ferrite rod antenna.

Electronics only (PCB and all components thereon) £33.00 + £4.95 VAT
Complete with digital frequency readout/clock-timer hardware £99.00 + £14.85 VAT
Complete with MA1023 clock/timer module with dial scale £66.00 + £9.90 VAT

Hardware packages are available separately if you wish to house your own designs in a professional case structure. Please deduct the cost of electronics from complete prices.

LW MW FM LCD Digital Frequency Display - July PW feature

Update your old radio, or build this into a new design. Or use it as a servicing aid - this low power unit with LCD display reads direct frequency in kHz/MHz, or with usual AM/FM IF offsets for received frequency. Low power LCD means no RFI - 15-20mA at 9v even with the divide by 100 prescalar. FM resolution is 100kHz, AM 1kHz. Sensitivities better than 10mV

Complete kit £19.50 + £2.93 VAT, built and tested module £27.00 + £4.05VAT

Ambit stocks and distributes a wide range of frequency counter LSI for all types of DFM- part two of the catalogue contains details of the MSM5523/4/5/6 range, and the versatile MSL2318 divide by ten or hundred prescalar IC. The DFM1 combined counter for AM,FM SW and direct/clock/stopwatch/timers - details available, but SAE please !

PW SANDBANKS PI METAL LOCATOR

Maintaining our professional approach to home constructor kits, we offer the pulse induction 'Sandbanks'. Now with injection molded casing for greatly improved enviromental sealing. **£37.00+£5.55vat**

VHF MONITOR RX WITH PLESSEY IC

4/9 channel version of the PW design - but **using standard (fundx9) crystals, and TOYO 8 pole crystal filter** with matching transformers. Coil sets from our standard range to cover bands from 40 to 200MHz. **Complete module kit £31.25 +£3.90vat .**

MICROMARKET

OSTS overflow:

6800P	650p	8212	230p	2102	170p
6820P	600p	8216	195p	2112	340p
6850P	275p	8224	350p	2513	754p
6810	400p	8228	478p	4027	578p
6852	365p	8251	625p	2114	1000p
8080	630p	8255	540p	+15% VAT	

RADIO and AUDIO MODULES : Consistently the most advanced

FOR FM

EF5801-3-4 series: 6 stage varicap tuning, all with oscillator output

5801	Dual gate MOSFET RF stages, bipolar mixer	£17.45 + 2.61VAT
5803	Dual gate RF/mixer stages, amplified LO out	£19.75 + 2.96VAT
5804	'Hyperfi' series, with internal PIN diode agc, and ultra wide range tuning system	£24.95 + 3.74VAT
EF5402	4 stage varicap tuner with TDA1062 and LO output. Uses FET/IC input. PIN agc	£10.75 + 1.61VAT

FOR 30-200MHz

The EF series are available on special order to cover bands (usually approx 20% of the centre frequency) in the range described. Details in our price list.

FOR FM IFs at 10.7MHz

7030	single 8 pole linear phase filter IF with HA1137/E10.95 + 1.64VAT	
7130	two 8 pole linear phase filter IF with CA3189E £16.25 + 2.44VAT	
7230	Hyperfi IF, switched bandwidth, AGC IF preamp, linear phase ceramic filters with diode switched narrow filter £24.95+3.74VAT	

DECODERS for MPX (STEREO)

Various types, guaranteed the world's biggest and best ranges

LARSHOLT FM TUNERSETS

7252	MOSFET front end combined with CA3089 IF £26.50 +3.97VAT	
7252	JFET front end, combined with IF and decoder £26.50 +3.97VAT	

FM/AM tuning synthesiser, see details elsewhere in th is advertisement

COMPONENTS for RADIO/COMMUNICATIONS/AUDIO/TV etc.

As usual, Ambit brings you the latest and best, a small selection of which is shown in this advertisement. The Ambit catalogues contain information on most of the devices mentioned here - and an order for the new part three will ensure you stay up with latest developments. Data photocopying service described in pricelist info.

RADIO ICs for FM

		vat
CA3089E	1.04	29
CA3189E	2.45	37
HA1137W	2.20	33
HA11225	2.20	33
SN76660N	0.75	11

RADIO ICs for AM/FM

TDA1090	3.35	50
TDA1083	1.95	29
TDA1220	1.40	21

IF AMPLIFIERS

K84406	0.50	07
MC1350	1.20	18

see comms ics also

COMMUNICATIONS

K84412	2.55	38
K84413	2.75	41
SD6000	2.75	56

SL1600 series

SL1610	1.60	24
SL1611	1.60	24
SL1612	1.60	24
SL1613	1.89	28
SL1620	2.17	33
SL1621	2.17	33
SL1623	2.44	37
SL 624	3.28	49
SL1625	2.17	33
SL1626	2.44	37
SL1630	1.62	24
SL1640	1.89	28
SL1641	1.89	28
SL6640	2.75	41
SL6690	3.20	48
MC3357	3.12	42
MC1496	1.25	19
NE544	1.70	25

Audio preamps

		vat
LM381N	1.81	27
LM382N	1.65	25
KB4836	2.53	38
KB4438	2.22	33
TDA1028	3.50	53
TDA1029	3.50	53
TDA1074	3.75	56

Audio power

TBA820M	0.75	11
TBA810AS	1.00	16
LM380N	1.00	15
ULN2283	1.00	15
TDA2002	1.95	29
HA1370	2.99	45
TDA2020	2.99	45

FETs, MOSFETs, bipolars, and various others: see PL

25/133/25/348 £10.00 + £1.50 pr. various high voltage drivers etc. from correctly matched sets of series transistors. (All 120v types)

OSTS: Remember all OSTS stocks are obtained from BS9000 approved sources - your assurance that all devices are very best first quality commercial types. Some LPSN TTL is presently in great demand, so please check by phone before ordering .

TTL: Standard AND LP Schottky

All prices listed ex-price *

	'N'	'LSN'		'N'	'LSN'
7400	13	20	7472	28	28
7401	13	20	7473	32	28
7402	14	20	7474	27	28
7403	14	20	7475	38	40
7404	14	24	7476	37	38
7405	18	26	7478	48	38
7406	38		7480	48	
7409	17	24	7481	86	
7410	15	24	7482	69	
7411	20	24	7485	106	99
7412	17		7486	40	
7413	30		7489	205	
7414	51		7490	33	90
7415		24	7491	76	110
7416	36		7492	38	78
7417	30		7493	32	99
7420	16	24	7494	78	
7421	29	24	7495a	65	99
7423	27		7496	58	120
7425	27		7497	185	
7426		27	741XX series		
7427	27	29	74107	32	38
7428	35	32	74109	63	38
7430	17	24	74110	54	54
7432	25	24	74111	68	
7437	40	24	74112		38
7438	33	24	74113		38
7440	17	24	74114		38
7441	74		74116	198	
7442	70	99	74118	83	
7443	115		74120	115	
7444	112		74121	25	
7445	94		74122	46	
7446	94		74123	46	
7447	82	89	74124		137
7448	56	99	74125	38	44
7449		99	74126	57	44
7451	17	24	74128	74	
7453	17		74132	73	78
7454	17	24	74136		40
7455	35	24	74138		60
7460	17		74139		60
7463		124	74141	56	

74142	265	
74143	312	
74144	312	
74145	65	97
74147	175	
74148	109	191
74150	99	
74151	64	84
74153	64	84
74154	96	
74155	54	110
74156	80	110
74157	67	55
74158		60
74159	210	
74160	82	130
74161		78
74162		130
74163	92	78
74164	104	130
74165	105	
74167	20	
74169		200
74170	230	200
74172	625	
74174	87	120
74175	87	110
74176	75	
74177	78	
74181	165	350
74183		210
74184	135	
74185	134	
74188	275	
74190		92
74192	105	180
74193	105	180
74194	105	
74196		99 110
74197		110
74198	160	
74199	160	
74247		90
74253		105

	'LSN'
74257	108
74260	153
74273	124
74283	120
74293	95
74365	49
74366	49
74367	43
74368	49
74373	77
74374	77
74377	124
74379	130
74393	140

VOLTAGE REGS:

7800 series 1Amp pos	95p
7900 series 1Amp neg	100p
78M series ½Amp pos	90p
78LCP 100mA	35p
78MGT2C variable	175p
79MGT2C variable	175p
723CN variable IC	65p
NE550	45p
L200 variable V and I	195p

MAINS EMI FILTERS

(BS etc approved types)

1 Amp in IEC chassis connector	4.83
6 Amp in IEC	5.83
5 Amp interin	3.87
(Toroid cores in Cat no. 2)	

MISC. Counter/timer, scalar devices.....

NE555 30p NE556 78p NE558 180p
LM3909 72p

95H90DC divide by 10/11 to 320MHz 780p
11C90DC divide by 10/11 to 650MHz 1400p
8629 divide by 100 to 175MHz min 420p
MSL2318 divide by 10/100 to 175MHz min 420p

ICM7216B/P1 : 8 decade 10MHz DFM counter and full function timer, with direct drive for an LED display (mpx). Uses 10MHz xtal 1982p

ICM7217A/B1 ; 4 decade programmable counter with direct LED drive 950p

ICM7207 clock pulse generator 495p

ICM7208 : 7 decade counter display 1495p

ICM7106CP : LCD DVM (3½ digit) 955p

ICM7106CPK : evaluation kit for 7106 24.80

ICM7107CP : LED DVM (3½ digit) 955p

ICM7107CPK : LED DVM kit for 7107 20.65

OKI MSM5523/4 : LED/Fluorescent display driver IC for time/timer/stopwatch/ AM/FM received frequency display and direct counter (use MSL2318 prescalar) inc Crystal 1400p

MSM5525 : AM/FM frequency only counter, for fluorescent displays (6LT06) inc xtal 1100p

MSM5526 : as MSM5525 but for LCD 1100p

4 digit LCD for ICM7106 or MSM5526 1100p

10 LED (2½x5mm) bar graph driver PCB for LOG or LIN (specify). Kit ex feds 300p

IMPORTANT : ALL PRICES SHOWN EXCLUDE VAT - WHICH MUST BE ADDED AT 15% OVERALL. PLEASE NOTE THE REDUCED CMOS/LPSN TTL RANGES DUE TO CURRENT SUPPLY SHORTAGE

CD4000

4000	17	4522	149
4001	17	4528	102
4002	17	4529	141
4006	109	4532	125
4007	18	4538	150
4008	80	4539	110
4009	58	4543	174
4010	58	4549	399
4011	17	4554	153
4012	17	4558	117
4013	55	4560	218
4014	95	4562	530
4016	52	4566	159
4017	80	4568	281
4018	80	4569	303
4019	60	4572	25
4020	93	4584	63
4021	82	4585	100
4022	90		
4023	17		
4024	76		
4025	17		
4026	180		
4027	55		
4028	72		
4029	100		
4030	58		
4035	120		
4040	83		
4042	85		
4043	85		
4044	80		
4046	130		
4048	60		
4049	55		
4050	55		
4051	65		
4052	65		
4053	65		
4055	135		
4059	563		
4060	115		
4063	109		
4066	53		
4068	25		
4069	20		
4070	20		
4071	20		
4072	20		
4073	20		
4075	20		
4076	90		

MORE FROM THE GENERAL AMBIT CATALOGUE RANGES:

Varicap tuning diodes for AM/FM/TV :
1-9 v AM tuning (Cr 15:1) from TOKO—

KV1211	double matched	175p 26p vat
KV1210	triple matched	245p 37p vat
KV1215	triple snap-apart	245p 37p vat
MVAM115	single 15v	105p 16p vat
MVAM125	single 25v	105p 16p vat
MV1M2	double 25v	148p 22p vat
BB204/104	double FM	40p 6p vat
BA102	single AFC etc	30p 4p vat
BA121/1TT210	single afc	30p 4p vat
BB105B	single UHF	40p 6p vat

PIN DIODES, BANDSWITCH types

BA479	PIN attenuator	35p 5p vat
TDA1061	Pi-form atten.	95p 14p vat
BA182	Bandswitch	21p 3p vat

All RF semiconductors stocked in depth. Please ask for quantity pricing details.

MPU controllable digital freq. synthesiser PCB. Preliminary.

Serial data controlled, with the standard swallow count system for maximum speed of operation. Multiple time constant filters, suitable for AM/FM and other communications/generator applications. Not for beginners. Full preliminary data package £1 + SAE. No phone enquiries answered on this system for the time being. Watch this space.....

Projected cost of the controller PCB less than £30: comprises the two modulus counter, prog.div., phase detector, multiple TC loop filter/integrators.

LINEARS

CA3130E	84
CA3130T	90
CA3140E	
CA3140T	72
LM301AH	67
LM301AN	30
LM339N	66
LM348N	186
LM3900N	60
709HC	64
709PC	36
710HC	65
710PC	59
723CN	65
741CH	66
741CN	27
747CN	70
748CN	36
NE531N	105

7 SEG DISPLAYS

HP5082 series.....

Red	7650	233p
	7653	233p
Yell	7660	233p
	7663	233p
Grn	7670	233p
	7673	233p
Fairchild	FND	
	500/507	150p

TOP GRADE LEDS by AEG. PRICES ARE EXC. VAT (add 15%)

SIZE	Red	Green	Yello	Orang
3mm	14p	16p	15p	20p
3mm	13p	15p	18p	19p
2½x5	17p	20p	20p	24p

Quantity discounts for LEDs:
10 per type - less 10%
100 per type - less 30%
100 mix in 10s - less 25%

FUTABA FLUORESCENT VACUUM DISPLAYS for CLOCKs etc

5LT02	clock display (static drive) with AM/PM flags	£9 + 1.35
5LT03	DFM display for MSM5525 LSI counter	£9.45 + 1.42 vat
6LT06	5 digit DFM display (GI AY5810D) mpxed	£9.75 + 1.46 vat

TOKO COILS, FILTERs, CHOKES, etc for AM/FM/TV comms—

TYPE	Size: 5mm	7mm	10mm	(please add VAT @15%)
AM IF	55p	33p	30p	Various for ICs, transistor etc.
FM IF	55p	33p	33p	Various for ICs, transistor etc.
SW coils			33p	Two impedance series
OSC coils	55p	33p	33p	For LW/MW/SW
TV vif/sif			35p	

Various coils in the range 20kHz to 300MHz - see TOKO catalogue

CERAMIC and MECHANICAL FILTERS (inc MURATA TYPES)

CFT455B/ CFT455C 60p; CFX014 -180p; CFU455C - 85p
CFT470C - 60p; CFU470C 65p

MURATA CFU455H and CFU455F cermic block filters 1.95ea
MURATA CFM455 series ladder filters. D,E,F,G,H bandwidths available now (20,16,12,8,6 kHz) £8.35 ea (metal encapsulated)
SFD455B, SFD4708, SFD472B 85p ea
CFM2 series mechanical elements types A,B,C,D (4-10k Hz bandwidth) 65p ea. (As used in RCME feature)

MULTIPLEX/PILOT TONE FILTERS, FM IF FILTERS. (see cat and :)

CFSE10.7/SFE10.7 - stereo FM IF ceramic filters (sim FM4 etc) 50p
CFS810.7/SFE10.7MJ - mono bandwidth ceramic FM IF filters 50p
SFE10.7ML - ultra linear phase stereo ceramic IF filters 70p
CDA10.7 - 10.7MHz ceramic discriminator (for CA3089 etc) 70p

Current news: A PCB for the Mullard DC tone and volume control system is now available £3 + 0.45 VAT. HMOS PA modules for 60-100W - kit £14 +£2.10VAT, heatsink £4.10+0.61. FM radio control system crystals £3.75 pair inc VAT (Sept on) . MK50366N: static drive clock/timer IC £3.78 + 0.57 VAT. 12½kHz channel spacing 8 pole 10.7MHz XTAL filter by TOYO type H4402 £15.50 + £2.32VAT. A further updated pricelist is now available, and we would like to remind you that enquiries can only be answered if accompanied either by an official business letterhead, or an SAE. STOP PRESS: TOKO's new split-apart triple AM tuning diodes are in stock £2.45 + 37p VAT, (KV1215). S BL1 diode DBM 1-500MHz - £4.25+0.64p.

Terms: CWO please. Account facilities for commercial customers OA. Postage 25p per order. Minimum credit invoice for account customers £10.00. Please follow instructions on VAT, which is usually shown as a separate amount. Overseas customers welcome - please allow for postage etc according to desired shipping method. Access facilities for credit purchases.

Catalogues: Ambit. Part 1 45p. Part 2 50p. 60p pair. TOKO Euro shortform 20p. Micrometals toroid cores 40p. All inc PP etc. Full data service described in pricelist supplements.

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DIODES/ZENERS

QTY.				
	1N914	100v	10mA	.05
	1N4005	600v	1A	.08
	1N4007	1000v	1A	.15
	1N4148	75v	10mA	.05
	1N4733	5.1v	1 W Zenner	.25
	1N4749	24v	1W	.25
	1N753A	6.2v	500 mW Zener	.25
	1N758A	10v	"	.25
	1N759A	12v	"	.25
	1N5243	13v	"	.25
	1N5244B	14v	"	.25
	1N5245B	15v	"	.25
	1N5349	12v	3W	.25

SOCKETS/BRIDGES

QTY.					
	8-pin	pcb	.16	ww	.35
	14-pin	pcb	.20	ww	.40
	16-pin	pcb	.25	ww	.45
	18-pin	pcb	.30	ww	.95
	20-pin	pcb	.35	ww	1.05
	22-pin	pcb	.40	ww	1.15
	24-pin	pcb	.45	ww	1.25
	28-pin	pcb	.50	ww	1.35
	40-pin	pcb	.55	ww	1.45
	Molex pins .01		To-3 Sockets		.35
	2 Amp Bridge		100-prv		.95
	25 Amp Bridge		200-prv		1.50

TRANSISTORS, LEDS, etc.

QTY.			
	2N2222M	(2N2222 Plastic .10)	.15
	2N2222A		.19
	2N2907A	PNP	.19
	2N3906	PNP (Plastic)	.19
	2N3904	NPN (Plastic)	.19
	2N3054	NPN	.55
	2N3055	NPN 15A 60v	.60
	T1P125	PNP Darlington	1.95
	LED Green,	Red, Clear, Yellow	.19
	D.L.747	7 seg 5/8" High com-anode	1.95
	MAN72	7 seg com-anode (Red)	1.25
	MAN3610	7 seg com-anode (Orange)	1.25
	MAN82A	7 seg com-anode (Yellow)	1.25
	MAN74	7 seg com-cathode (Red)	1.50
	FND359	7 seg com-cathode (Red)	1.25

9000 SERIES

QTY.		QTY.	
9301	.85	9322	.65
9309	.50	9601	.30
		9602	.45

MICRO's, RAMS, CPU's, E-PROMS

QTY.	
8T13	2.50
8T23	2.50
8T24	3.00
8T97	1.75
74S188	3.00
1488	1.25
1489	1.25
1702A	4.50
AM 9050	4.00
ICM 7207	6.95
ICM 7208	13.95
MPS 6520	10.00
MM 5314	4.00
MM 5316	4.50
MM 5387	3.50
MM 5369	2.95
TR 1602B	3.95
UPD 414	4.95
Z 80 A	22.50
Z 80	17.50
Z 80 P10	10.50
2102	1.45
2102L	1.75
2107B-4	4.95
2114	9.50
2513	6.25
2708	11.50
2716 D.S.	34.00
2716 (5v)	69.00
2758 (5v)	26.95
3242	10.50
4116	11.50
6800	13.95
6850	7.95
8080	7.50
8085	22.50
8212	2.75
8214	4.95
8216	3.50
8224	4.25
8228	6.00
8251	7.50
8253	18.50
8255	8.50
TMS 4044	9.95

C MOS

QTY.		QTY.		QTY.		QTY.	
4000	.15	4017	.75	4034	2.45	406974C04	.45
4001	.20	4018	.75	4035	.75	4071	.25
4002	.25	4019	.35	4037	1.80	4081	.30
4004	3.95	4020	.85	4040	.75	4082	.30
4006	.95	4021	.75	4041	.69	4507	.95
4007	.25	4022	.75	4042	.65	4511	.95
4008	.75	4023	.25	4043	.50	4512	1.50
4009	.35	4024	.75	4044	.65	4515	2.95
4010	.35	4025	.25	4046	1.25	4519	.85
4011	.30	4026	1.95	4047	2.50	4522	1.10
4012	.25	4027	.35	4048	1.25	4526	.95
4013	.40	4028	.75	4049	.65	4528	1.10
4014	.75	4029	1.15	4050	.45	4529	.95
4015	.75	4030	.30	4052	.75	MC14409	14.50
4016	.35	4033	1.50	4053	.95	MC14419	4.85
				4066	.75	74C151	2.50

– T T L –

4-1-79

QTY.		QTY.		QTY.		QTY.	
7400	.20	7492	.45	74H20	.25	74LS76	.70
7401	.20	7493	.35	74H21	.25	74LS86	.95
7402	.20	7494	.75	74H22	.40	74LS90	.85
7403	.20	7495	.60	74H30	.30	74LS93	.85
7404	.20	7496	.80	74H40	.35	74LS96	2.00
7405	.35	74100	1.15	74H50	.30	74LS107	.90
7406	.25	74107	.35	74H51	.30	74LS109	1.50
7407	.55	74121	.35	74H52	.20	74LS123	1.95
7408	.20	74122	.55	74H53	.25	74LS138	2.00
7409	.25	74123	.55	74H55	.25	74LS151	.95
7410	.20	74125	.45	74H72	.35	74LS153	1.15
7411	.25	74126	.45	74H74	.35	74LS157	1.15
7412	.25	74132	.75	74H101	.95	74LS160	1.15
7413	.45	74141	.90	74H103	.55	74LS164	2.90
7414	.75	74150	.85	74H106	1.15	74LS193	2.00
7416	.25	74151	.95	74L00	.30	74LS195	1.15
7417	.40	74153	.95	74L02	.30	74LS244	2.90
7420	.25	74154	1.15	74L03	.35	74LS259	1.50
7426	.25	74156	.70	74L04	.40	74LS298	1.50
7427	.25	74157	.65	74L10	.30	74LS367	1.95
7430	.20	74161/9316	.75	74L20	.45	74LS368	1.25
7432	.30	74163	.85	74L30	.55	74LS373	2.50
7437	.20	74164	.75	74L47	1.95	74S00	.45
7438	.30	74165	1.10	74L51	.65	74S02	.45
7440	.20	74166	1.75	74L55	.85	74S03	.35
7441	1.15	74175	.90	74L72	.65	74S04	.35
7442	.55	74176	.95	74L73	.70	74S05	.45
7443	.45	74177	1.10	74L74	.75	74S08	.45
7444	.45	74180	.95	74L75	1.05	74S10	.45
7445	.75	74181	2.25	74L85	2.00	74S11	.45
7446	.70	74182	.75	74L93	.75	74S20	.35
7447	.70	74190	1.25	74L123	1.95	74S22	.55
7448	.50	74191	1.25	74LS00	.40	74S40	.30
7450	.25	74192	.75	74LS01	.40	74S50	.30
7451	.25	74193	.85	74LS02	.45	74S51	.35
7453	.20	74194	.95	74LS03	.45	74S64	.15
7454	.25	74195	.95	74LS04	.45	74S74	.70
7460	.40	74196	.95	74LS05	.45	74S112	.60
7470	.45	74197	.95	74LS08	.45	74S114	.85
7472	.40	74198	1.45	74LS09	.45	74S133	.85
7473	.25	74221	1.50	74LS10	.45	74S140	.75
7474	.30	74298	1.50	74LS11	.45	74S151	.95
7475	.35	74367	1.35	74LS20	.45	74S153	.95
7476	.40	75491	.65	74LS21	.45	74S157	.98
7480	.75	75492	.65	74LS22	.45	74S158	.80
7481	.85	74H00	.20	74LS32	.50	74S194	1.50
7482	.95	74H01	.30	74LS37	.45	74S196	2.00
7483	.95	74H04	.30	74LS38	.65	74S257 (8123)	2.50
7485	.75	74H05	.25	74LS40	.70	8131	2.75
7486	.55	74H08	.35	74LS42	.95		
7489	1.05	74H10	.35	74LS51	.75		
7490	.55	74H11	.25	74LS74	.95		
7491	.70	74H15	.45	74LS75	1.20		

I^2L, LINEARS, REGULATORS, ETC.

QTY.		QTY.		QTY.	
MCT2	.95	LM320K24	1.65	LM373	3.95
8038	3.95	LM320T5	1.65	LM377	3.95
LM201	.75	LM320T12	1.65	78L05	.75
LM301	.45	LM320T15	1.65	78L12	.75
LM308	.65	LM323K	5.95	78L15	.75
LM309H	.85	LM324	1.25	78M05	.75
LM309 (340K-5)	1.50	LM339	.75	LM380 (8-14 Pin)	1.19
LM310	.85	7805 (340T5)	1.15	LM709 (8-14 Pin)	.45
LM311 (8-14 Pin)	.75	LM340T12	.95	LM711	.45
LM318	1.50	LM340T15	.95	LM723	.40
LM320H6	.79	LM340T18	.95	LM725	2.50
LM320H15	.79	LM340T24	.95	LM739	1.50
LM320H24	.79	LM340K12	1.25	LM741 (8-14)	.45
7905 (LM320K5)	1.65	LM340K15	1.25	LM747	1.10
LM320K12	1.65	LM340K18	1.25	LM1307	1.75
LM320K15	1.65	LM340K24	1.25	LM1458	.65
				LM3900	.95
				* LM75451	.65
				NE555	.45
				NE556	.85
				NE565	1.15
				NE566	1.25
				NE567	.95
				TA7205	6.95
				76477	2.95
				95H90	9.95

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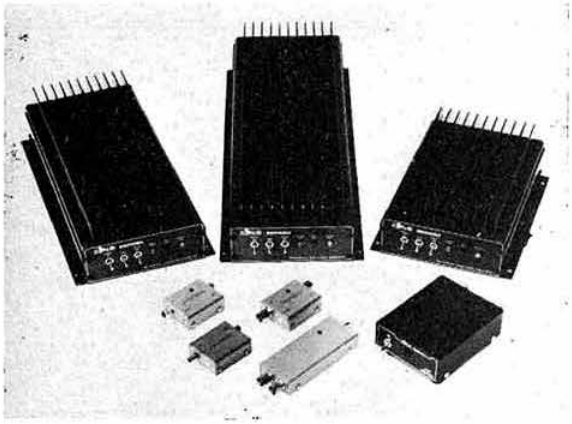

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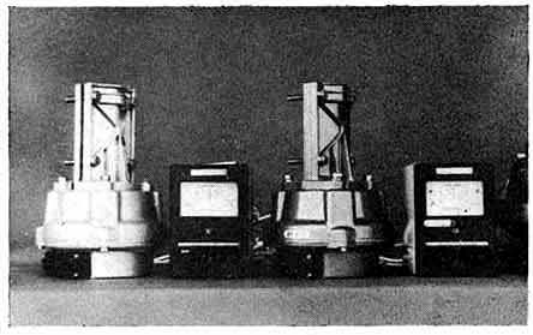

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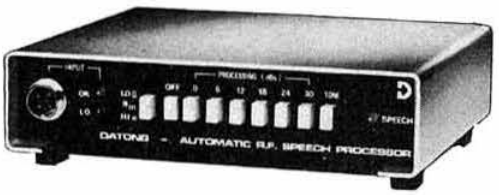
Model ASP



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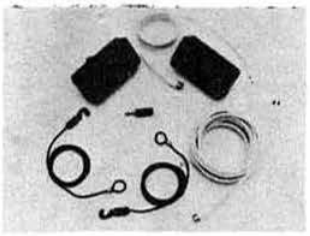

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RADIOTELEPHONE MARKER OSCILLATOR UNITS In addition to our 10·7MHz version we can now offer a 455kHz model, both are a small hand-held unit built into strong die cast box, size 100 × 50 × 25mm, grey hammer finish with internal battery, both units crystal controlled with good sine wave output. Prices: 10·7MHz model, **£16.00;** 455kHz model, **£18.00.** Other frequencies made to order. P.O.A.

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TBA120A ICs, 50p. TA7205P 6 watt audio IC ex-new equip. tested **£1.00,** with data. CA3089E FM IC **£2.00,** with data.

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