May 1979

radio communication

journal of the Radio Society of Great Britain

A SELECTION OF RSGB PUBLICATIONS

See inside back cover for full list

NEW FROM Catronics

NOW THE BEST IS EVEN BETTER
Introducing the most comprehensive R.T.T.Y. TERMINAL UNIT you can, or indeed need, ever buy—the Catronics CT100 Mk2

Now incorporating a number of modifications, YOU have asked for:
including Completely automatic receive/transmit modes.
Protected and buffered input provided for TTY keyboard.
Automatic re-generation of incoming tones.
Special r.t. interference suppression circuit, etc, etc.

Inputs for:	**Outputs for:**
Audio FSK signal in	V.D.U. or other TTL compatible equipment
Data in from V.D.U. (e.g. G3PLX)	TTY Magnet – single or double current
TTY Keyboard or Tape Reader	AFSK to drive Transmitter

Featuring a unique digitally controlled **'Autoprint'** circuit which is a superior replacement for the 'Antispace' and 'Autostart' facilities found on some other terminal units. The terminal will ignore most CW and phone signals but will respond to a correct RTTY signal.

Tuning correctly into an RTTY signal is made simple with a single **'correctly tuned'** LED plus an additional **'Mark frequency'** indicator.

The FSK demodulator circuit utilises a special 'state-of-the-art' system to give excellent performance and stability at low cost. The demodulator is set to decode signals within 75Hz of nominal frequency i.e. 1200–1350Hz for space and 1370–1520Hz for mark, when in narrow shift position.

The teleprinter interface unit incorporates electronic 'de-bounce' circuitry to eliminate spurious switching from the Keyboard. The loop supply is protected by a separate fuse and is suitable for driving all single current and double current magnets known to be available.

VAT inclusive prices are as follows: CT100 Receive only **£90.00**, CT101 Receive/Transmit **£93.50**, CT102 with Teleprinter interface **£94.50**, CT103 Complete Terminal Unit **£98.50**. All models plus **£3.50** Securicor delivery

G3PLX RTTY VIDEO DISPLAY

(April 1977 Rad Com)
Kit (excluding modulator, keyboard and P.S.U.), **£83.55**
Set of printed circuit boards **£15.20.**
UHF Modulator kit **£11.95.**
Flashing cursor kit **£8.60.**
Diode Matrix kit **£13.25.**
Suitable mains P.S.U. Transformer £2.75.
Catronics UHF Modulator, £15.00.

NOTE regarding PROM program: The PCBs and programmed PROMs supplied by us make use of a slightly different program sequence resulting in different pin connections to those published in the 'Rad Com' article. Whilst constructors buying PROMs and PCBs from us will have no difficulty, those producing their own PCBs or having PROMs programmed elsewhere should note this important difference. A detailed modification sheet is available with the PCBs.

KEYBOARD KIT

The printed circuit board is designed to take a maximum of 70 keys but may be assembled with a smaller number of keys for a simpler keyboard.

The board is not dedicated to any specific coding, allowing it to be used for any project whether it requires ASC11, Baudot or any other code. This makes it suitable for many projects including;

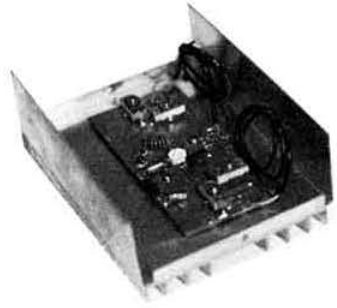
G3PLX RTTY VDU
Auto morse sender, etc.

The Keyswitches themselves are single pole push-to-make type and require no extra mechanical mounting arrangements.

A legend sheet is provided with each kit enabling the constructor to label the keys to suit individual requirements.

Price: only £29.00. Please add 50p for postage.

NEW 10 WATT 2M PA KIT



A 10 WATT output version of our famous 40 WATT 2M P.A. kit is now available, for boosting the output of 1-2 watt 2M FM transmitters.
12 volt supply **Auto T/R switching**
Complete with cabinet and full instructions
Kit price £18.00 inc VAT + 65p post
Also available ready-built at £28.00

40 WATT PA KIT

still available at £19.50 + 65p post
Requires 12 volt supply and 10 watts drive.
Also available ready-built at £29.50

SEE ALL OUR PRODUCTS AT ALEXANDRA PALACE EXHIBITION

All prices include VAT but please add minimum of 30p for p&p. Data—Catalogue available at 45p + large (A4) 18½p SAE
DEPT. 905 COMMUNICATIONS HOUSE, 20 WALLINGTON SQUARE, WALLINGTON, SURREY SM6 8RG
Tel: 01-669 6700 Open 9am to 5.30pm Mon to Fri, 9am to 1pm Sat. Closed for lunch 12.45 to 1.45pm

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

The Editor, RSGB,
88 Broomfield Road,
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Tel 0245 84938

Office hours: 0845-1645

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May 1979 Volume55 No5

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ABC MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

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ICOM®

LEADERS IN THEIR FIELD

IC-215
£159 inc.

The IC-215 is getting more and more popular also as it combines the advantages of a portable, which can be operated anywhere, with the ability to double as a low power base station by virtue of its 3 Watts of output and SO239 antenna connecter on the back. Of course there are facilities to operate it from an external power supply, and if it is fitted with Ni-Cads you can arrange to trickle charge these at the same time. The batteries used are of a sensible size being C type (or UII) instead of the 'penlight' batteries used by most of its competitors. This gives at least three times the operating power when you are away from home which you will appreciate if ever you have run out of battery in the middle of a QSO! It comes already crystalled up for 12 channels, S20, S22 and all the repeater channels 0 to 9. We think the extra power and larger batteries far outweigh the advantages of having the extra channels produced from a synthesizer.
Less VAT=£141.33 With VAT=£159

IC-202
£199 inc.

ICOM's range of sideband portables has been recently expanded. The well known and tested IC-202E has now been improved in the form of the IC-202S which has lower side band fitted also and provides sidetone on CW. The receiver has been hotted up making it even more suitable for use as a base station, either barefoot or as a prime mover. The new IC-402 is the 70cm version of the 202S giving the same facilities as its 2m cousin over the range 432-435·2 MHz. Both use a very stable VXO circuit, to give fully tuneable coverage of the band in 200kHz segments and both have extremely clean signals so that using them to drive a linear to the full legal limit presents no problems. We are very impressed with both the 202S and the 402.
The IC-202E was good . . . these are even better!

IC-202S	Less VAT=£176.89	With VAT=£199
IC-402	Less VAT=£256	With VAT=288

IC-402

OR IF YOU WANT A HAND-HELD—
HOW ABOUT THE AR-240?

IC-202

AR-240

Although not made by ICOM, we decided to take this exciting new little hand held into stock because it fills the need for a really good portable where size is of prime importance. It has an amazing performance with a truly excellent receiver. A synthesizer is used, with decade switch read out to cover the range 144-148MHz in 5kHz steps and 600kHz repeater shifts and a tone burst are built in. It comes with NiCads, a charger and a telescopic whip antenna—though if you want to make things even neater then you can use the ICOM FA1 flexible helical in place of this. At £195 inc VAT we think this is really good value for money.

AVAILABLE NOW DIRECT FROM HERNE BAY
Less VAT=£173.33 WITH VAT=£195

SOME PRICES ARE DOWN!

A few months ago we had to put up prices because of the poor state of the pound. Now things are better we are pleased to bring some of them down again. Let's hope things stay this way!

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

ALSO AVAILABLE FROM OUR SHOP IN HERNE BAY

MICROWAVE MODULES **ANTENNA SPECIALISTS**

J-BEAM **YAESU MUSEN** **FDK**

HP AND PART EXCHANGE WELCOMED

SEE IT AT ICOM® ALLY-PALLY

THE 'REMOTABLE' 2m RIG

IC-280

£245

inc VAT

25kHz SPACING OVER THE WHOLE BAND: 3 MEMORIES: LED READOUT: BUT MOST IMPORTANT—ICOM QUALITY

Icom's new 2 meter mobile has a detachable microprocessor controlled head, easy to read LED's and a new style meter set in a brushed aluminium front panel.

The 280E comes as one radio which can be mounted in the normal manner but as an option the entire front one third of the radio detaches and can be mounted in that small location in the car (such as the glove pocket) where other sets are just too large to fit, while the main body tucks neatly out of sight several feet away—such as under the passenger's seat. No longer do you have to mount a radio in a position where it is poised all ready to smash your right kneecap should you have an accident!

With the microprocessor head the IC-280E can store three frequencies of your choice, which are selected by a four position front panel switch. These frequencies are retained in the 280E's memory for as long as power is applied to the radio. Even when power is turned off at the front panel switch the programmed memories are maintained; and the 600kHz repeater shift is always retained.

It goes without saying that the usual high quality engineering for which Icom are renowned is found in the 280E. There are no nasty shortcuts to try to keep the price down to the detriment of performance.

It includes the latest innovations in large signal handling FET front ends for excellent intermodulation performance and good sensitivity at the same time. The IF filters are crystal monolithics in the first IF and ceramic in the second, providing narrow band capacity for today and tomorrow's crowded operating conditions. Modular PA construction with broad band tuning provides full rated power across the full 2 meter band.

FROM **THANET ELECTRONICS** OF COURSE

WATERS & STANTON ELECTRONICS

LOOK! 12½kHz or 25kHz +25 watts

FDK MULTI-700E

£229 inc. VAT & delivery

What can one say about a transceiver that has proved to be so perfect in design. Truly a concept that looks to the future as well as the present. Its powerful 25 watts ensures better coverage than its competitors and its 25kHz stepped frequency synthesizer means no more xtals to buy. And to match its powerful output two receiver RF stages are provided that typically give about ·3uv or better for 20db NQ. Reliable repeater operation is ensured by a crystal controlled tone burst and a pre-wired 600kHz shift. Listening on the input of the repeater or reverse repeater operation is obtainable at the flick of a single switch and the 25 watts output is continually variable down to 1 watt. A remarkable transceiver at a remarkable price—little wonder more and more people are saying, "I'm using a Multi-700E at this end, O.M." And one final point, it also tunes in 12½kHz steps and with the specially designed receiver filter 12½kHz operations is immediately possible. **IN STOCK NOW—ORDER TODAY.**

NEW MULTI-3000 2m ALL MODE TRANSCEIVER

The Multi-3000 is the new 2 metre all mode transceiver to leave the FDK factory. It features 15 watts of FM/SSB/CW with a host of features that keeps it in the forefront of value-for-money VHF transceivers. A demonstration model is available at our premises in Hockley and deliveries are expected May/June.
The design retains the switch selected synthesizer which can be used for FM to select any channel quickly and accurately. The synthesizer tunes in 10kHz steps and a separate control inserts the 5kHz digit as necessary. Complete coverage from 144 to 148MHz is provided and the three separate knobs for 1MHz, 100kHz and 10kHz digits make QSYing extremely rapid.

FDK's dual vfo facility is retained employing a separate flywheel drive with direct digital readout. Thus the switched synthesizer may be left on ones favourite FM channel and the vfo used to tune around the band. In the FM mode two tuning rates can be selected. The "rate of tuning" switch gives either 10kHz or 1kHz steps. The former for rapid QSYing and the latter for final tuning to the desired frequency exactly on any 1kHz multiple. On SSB and CW the same tuning control gives steps of either 1kHz or 100Hz. In this mode the digital display reads accurately to the nearest 100Hz. Tuning has never been easier! And that's not all. A memory button enables one to lock the last frequency (even down to 100Hz on SSB) and then carry on tuning around the band. At any time the memory button can be pressed to return to the original stored frequency and pressing it again returns you to the frequency you had just QSY'd from. In all, 3 frequencies can be stored, one on the switched synthesizer and 2 on the manual digital dial. Furthermore the memory is not lost when the equipment is disconnected from the supply cord.

Repeater operation is taken care of by a pre-wired 600kHz shift and this also operates an automatic crystal controlled tone burst.

All the usual features you are likely to need are also included: tone-burst defeat, VOX, Mic gain, AF and RF gain, noise blanker, receiver incremental tuning, fast and slow AGC, High/Lower power switch, squelch, also internal pre-sets for VOX gain, delay and anti-vox. The power supply is designed for 240 volts AC or 12 volts DC operation and projected price is **£519** inclusive of VAT. Another superb piece of engineering at a very reasonable price—FDK of course.

£519 inc. VAT & delivery—available June.

WATERS & STANTON ELECTRONICS

IN STOCK NOW—
ORDER TODAY

FDK PALM II

2M FM

SIZE: 6" × 2½" × 1¾"

WEIGHT: 1lb 3oz

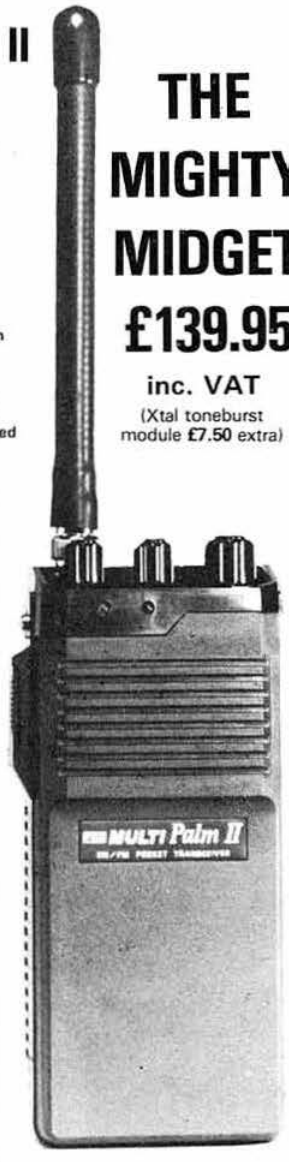
COMPARE ITS VALUE
COMPARE ITS FEATURES

- ★ Cigar lighter plug
- ★ External DC cord
- ★ Over one watt output
- ★ AC charger included
- ★ 6 channel capability
- ★ Simplex or ±600kHz switch
- ★ BNC aerial socket
- ★ Flexible whip supplied
- ★ S/20/22 supplied
- ★ Extra channels cost £2.90!
- ★ Xtal controlled tone-burst
- ★ Ni-cad battery pack supplied
- ★ High quality condenser microphone

THE MIGHTY MIDGET £139.95

inc. VAT

(Xtal toneburst module £7.50 extra)



ADONIS MICROPHONES . . .
KEEP PEOPLE TALKING!

M802G (illustrated) is the top of the range. Beautiful solid construction yet slim lines and the famous electronic "Touch to Talk" are but a few of its features. In addition, a 3-way switch normal operation, medium or high compression. A meter built into the base monitors the compression. The high quality condenser insert is enclosed in a noise cancelling housing and 3 switched outputs are provided so that the microphone can be fed to 3 different transmitters. Each output has its own output level control. If you want a microphone to match that new rig then we have the answer.
£59 including VAT.

FDK THE MOST ADVANCED FM RIG! MULTI 800D-25 WATTS

IN STOCK NOW

NOW INCLUDES:-

- ★ 144–148MHz coverage
- ★ Remote 'up/down' microphone
- ★ 2MHz and 4MHz band scanning
- ★ Dual memory
- ★ Electronic tuning

£289 inc. VAT (Remote display £19.95)

Send SAE for brochure

MIZUHO—2M SSB/CW Hand-Held

IN STOCK NOW

Fitted 144·20–144·40MHz
£165 inc VAT & delivery anywhere in UK.

THIS RIG GETS TO PLACES OTHER RIGS CAN'T REACH!

There is no denying that for local cross town chats and nets, FM has a lot of advantages. Maybe you've been licensed a few months and thinking of working a lot of DX—and yes, you've found that on FM it is just a little difficult—well, how about trying SSB. With a watt of SSB and a single yagi antenna you'll be amazed how far you can reach. And when those "DX lifts" come along you'll be in there with more than a chance! What better way to get in amongst the DX than purchase an SB2M. At £165 you'll find it impossible to beat for value. This really does form the basis for both a fun packed portable station or a compact base station—if you can't afford to trade-in your FM rig for an all-mode rig how about an SB2M—think about it—there's quite a big saving! And remember Spring is just around the corner. With a set of HP7 cells loaded in the rig, the 1 watt output is the economical way to sit on top of the local hills or climb up into the mountains and create your own DX pile-up!

WATERS & STANTON ELECTRONICS

DenTron GLA–1000

IN STOCK NOW

10–80m 1200W LINEAR

LOW COST, SMALL SIZE, BUT . . .

. . . BIG VOICE £289 inc VAT

DELIVERY FREE IN UK

This beautiful HF linear covers 80 to 10 metres and has its own built-in 117/234V power supply. Its diminutive size means less table space needed but without sacrificing power capability. Weighing in at just 24 pounds it measures only H.5½" × W.11" × D.11" with room to spare inside. An almost silent fan ensures cool running whilst the little power house generates 1200 watts input on SSB or 1kW DC for CW. RF drive required is approx. 80 watts and the amplifier can be instantly switched in or out of circuit. Comprehensive metering monitors HF volts, PA current and output RF voltage. Altogether a linear we can thoroughly recommend at a price you can afford—just **£289** delivered.

DenTron NEW HF–200A

DELIVERY MAY

80–10m 200W TRANSCEIVER

Prov. Price **£399** Inc. VAT & del.

MATCHING AC PSU AVAILABLE

A natural development from DenTron had to be the birth of a transceiver. Small, compact and powerful—it's simply that! Measuring only 4" high × 10" wide it makes both ideal fixed or portable stations with its 200 watts input capability. Simplicity coupled with performance was the formula—that's why you won't find a single tuning control on the front panel, apart from the VFO. Simply select the band and operate. Its nominal 13·6 V DC supply requirement draws 750 m/a on receive with full audio output and 20 amps on voice peaks or CW. A matching AC power supply is also available for both 234 volts and 117 volts and a remote VFO is also being produced. So if you're the kind of operator who wants less in the way of gadgetry and more in the way of performance per £ take a closer look at the HF200A—we have a feeling you'll like what you see!

DenTron USA

SUPERB HF EQUIPMENT AT VERY SENSIBLE PRICES!

DenTron MT–3000A

3kW 1·8–30MHz ATU

IN STOCK NOW

Yes, this is the ultimate in ATU's. It matches anything whether it be long wire, balanced or unbalanced feed or garden fence! We know of no other ATU that will handle the full output of some of today's big 2kW amplifiers but even if you are running one of the popular 1200 watt jobs, there's a lot to be said for the MT3000A. Its huge ceramic insulated capacitors ensure low loss aerial coupling and its wide-range bandswitch means it really does give continuous coverage—we've even supplied a number of these units for commercial applications!

The front panel size of 5¼" × 14" means it's still desk top size and its comprehensive front panel controls gives you complete armchair selection of your aerial system—in fact up to five different systems. Forward and reflected true RF power is monitored (either 0-200 watts or 0-2kW) and for initial tune up there is a 250 watt dummy load. This, more than anything else, is the one piece of equipment you will never get rid of once you've bought—a good investment indeed! **£275** inc VAT.

TWO SPECIAL BARGAINS

SUPER TUNER PLUS AVAILABLE JUNE

Designed to handle the popular 1200 watts linear, this ATU has all the features of its big brother the MT3000 with the exception of dummy load and RF power metres. The latter is replaced by an RF output voltage indicator but the continuous coverage and five selectable antenna facilities are retained. A real bargain at **£112** inc VAT.

SPECIAL OFFER

PEP/SWR/POWER METER

- ★ Remote sensing head
- ★ No external power needed

0–200 watts
0–2000 watts
1·8–30MHz
£59 inc delivery

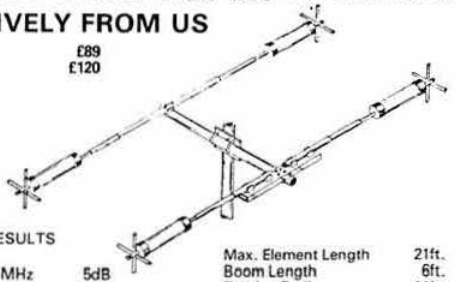
WATERS & STANTON ELECTRONICS

NEW!

MOSLEY MINI-BEAM 10-15-20M

EXCLUSIVELY FROM US

600 watt model £89
2kW model £120



FIELD TEST RESULTS

Forward Gain:		Max. Element Length	21ft.
28MHz and 21MHz	5dB	Boom Length	6ft.
14MHz	4dB	Turning Radius	11ft.
Front to Back Ratio	15dB	Wind load	60lbs.
S.W.R. at Resonance	1·5:1	Weight	17lbs.

NOTE:
The performance of this antenna is almost identical to a full size array by virtue of its low-loss capacity loading.

SAE FOR DETAILS

OTHER MOSLEY MODELS (EX STOCK)

MUSTANG 2kW 10-15-20M	£119.25
TA33 600 WATTS 10-15-20M	£106.85
TA32 600 WATTS 10-15-20M	£72.00
TD3JR WIRE DIPOLE 10-15-20M	£24.20
RD5 SWL ALL BAND DIPOLE	£27.00

ROTATOR BARGAINS!

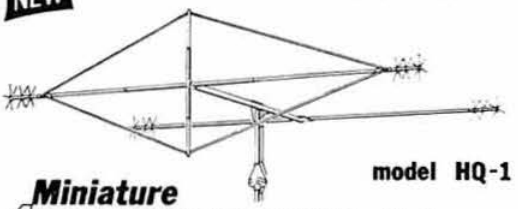
UK DISTRIBUTORS OF JAYBEAM ROTATORS

JAYBEAM KR400 supports ¼ ton costs £95 inc. VAT.
AN ABSOLUTE BARGAIN!

JAYBEAM 9502 ideal for VHF, £50 (only needs 3 core cable).
£1.50 carriage

SPRING NEWS

NEW **Hi-pot Multiple Hat Loaded!**

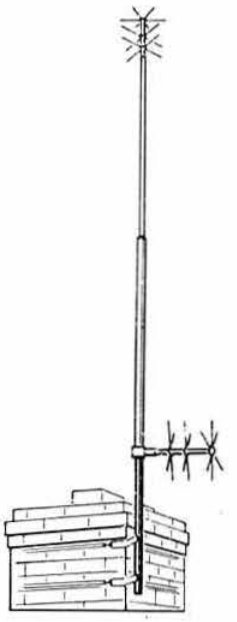


model HQ-1

Miniature Band HYBRID QUAD Antenna

HQ-1 A further stock of the fast selling HQ-aerials from USA has arrived. This amazingly compact beam covers 10–15–20 metres and has a turning radius of 6ft. 2in. It will take the full UK legal limit and is the ideal way of putting out a big signal from a small garden.

Price: £94.50 (£2.00)



Miniature Band Coaxial Vertical

MODEL C4 £41.50 (£1.50)

The MODEL C4 features the patented multiple hat* principle which allows operation on the 10–15–20 metre amateur frequencies with a single feedline. The C4 operates as a full electrical half wave on all bands. This unique feature permits the elimination of cumbersome ground plane radials normally used with vertical antennas. The C4 mounts in minutes with inexpensive TV type hardware.

JAYBEAM

VHF/UHF ANTENNAS

PMH2/4M 2 way harness	£9·39 (£0·75)
C5/2M 5dB colinear	£30·95 (£2·00)
52/2M 5 el. yagi	£7·70 (£1·00)
8Y/2M 8 el. yagi	£10·00 (£1·00)
10Y/2M 10 el. yagi	£21·32 (£1·50)
PBM10/2M parabeam	£25·37 (£1·50)
PBM14/2M parabeam	£31·16 (£2·00)
5XY/2M 5 el. x'd yagi	£15·97 (£1·50)
8XY/2M 8 el. x'd yagi	£19·91 (£2·00)
10XY2M 8 el. x'd yagi	£26·33 (£2·00)
PMH/2C circular harness	£5·00 (£0·50)
Q4/2M 4 el. quad	£16·31 (£1·50)
Q6/2M 6 el. quad	£21·71 (£2·00)
D5/2M el. slot	£13·61 (£1·50)
D6/2M el. slot	£18·22 (£1·50)
5VMK/2M vertical slot kit	£3·83 (£1·00)
UGP/2M ground plane	£7·03 (£1·00)
HO/2M halo head	£3·26 (£0·75)
HM/2M halo + mast	£3·88 (£0·75)
PMH2/2M 2-way harness	£6·80 (£0·75)
PMH4/2M 4-way harness	£16·34 (£1·00)
PMH4/2M 4-way harness	£16·34 (£1·00)
D8/70cm. el. slot	£15·47 (£1·50)
PBM 18/70cm. parabeam	£18·56 (£1·50)
MBM48/70cm. multibeam	£21·65 (£2·00)
MBM88/70cm. multibeam	£28·97 (£2·00)

ACCESSORIES:

UR43 Cable	18p m.
UR67 Cable	54p m.
75 ohm UHF	18p m.
PL259 plugs	60p
SO239 sockets,	60p
BNC plugs,	70p
SO239 joiners	85p
4 pin mic. plugs	84p

WE ARE THE UK's COMPLETE HAM RADIO CENTRE

MAIL ORDER & RENTAL SALES: **WATERS & STANTON ELECTRONICS, 31, SPA RD., HOCKLEY, ESSEX**
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PART TIME AGENTS G3XTX (0708) 78956 GM3GRX (0324) 24428 G3PWJ (03844) 77778
G3WRA (0432) 67864 G3NMU (0272) 669954

Access BARCLAYCARD VISA

LOWE ELECTRONICS Ltd

TR7500

WHY SETTLE FOR ANYTHING LESS?

The TR7500 is still the commonsense two-metre FM mobile rig, employing as it does the straightforward channel number display which reads 20 for S20, 7 for R7 and so on, with no six-digit frequencies to remember and straightforward fast access to any channel within the two-metre band 144–146MHz. A scanner unit is now available from M.R.S. Communications Ltd (see address section) to further expand the TR7500 facilities.

The sharp eyes will notice that the mode switch is now different on the TR7500, having four, not three, positions (marked 4, 5, N, R) and we are finding that the current equipment seems to have higher transmitter power and an improved receiver performance. Inevitably, people are calling this the TR7500B but it's really a case of a production improvement. So B it!

Why not call at your nearest authorised Trio dealer before you consider buying a two-metre FM mobile and ask to see the TR7500(B)? Take the lid off and see what good engineering design looks like in the unbeatable TR7500 from Trio.

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:	**£235 inc. VAT**

TR3200

PEAK PORTABLE PERFORMANCE

70cm FM repeaters are now so numerous and so efficient that it's almost possible to go anywhere in the country and still be within range of one. As many operators are finding, you don't need high power to be successful, and the TR3200 70cm portable/mobile rig provides the perfect solution to the search for a go-anywhere rig.

The TR3200 power output is two watts or more, switchable to 400mW, it has a really good receiver, a high gain ¼ whip antenna and top performance under all conditions. Use it portable on the internal battery pack or mobile using an external antenna and power from the car. Supplied with three channels fitted, carrying case, shoulder strap and all accessories, the TR3200 is the complete 70cm FM answer.

Drop us a line and ask for full details, or better still, come along and see the TR3200 and all the Trio range in comfort.

★ NEW ★
5-BAND 80-10m VERTICAL
NO RADIALS REQUIRED
ON GROUND POST
PRICE:
HF5 VERTICAL £40.50
inc. VAT

★ **STOP PRESS NEWS** ★

SOME

TRIO

PRICES ARE DOWN
CONTACT US FOR DETAILS

TS120V

MULTUM IN PARVO

NEW PRICE SOME TIME IN MAY CONTACT US FOR INFORMATION

P.S. BY "NEW" WE MEAN IT'S LOWER!

We introduce yet another exciting innovation from Trio in the new TS120V HF transceiver. Equally at home in mobile or home station situations, the TS120V packs more features into a small package than any other comparable model.

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 28-30 MHz so it's ideal for transverter driving, has digital readout built in, vox, break-in CW, RIT, noise blanker and the unique Trio passband tuning system used in the 820. The power output is 10W and a matching linear will be along shortly.

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

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

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

We at Matlock, have all fallen in love with the TS120V and we feel sure that you will too. At it's price of **£435** including V.A.T. (and including digital readout, vox, etc) we have no doubt that this transceiver will be another winner from Trio. See it soon.

FOR FULL CATALOGUE SIMPLY SEND 40p IN STAMPS TO MATLOCK

LOWE ELECTRONICS Ltd

TRIO TR2300

2 METRE SYNTHESIZER PORTABLE

The TR2300 is a really 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 and also in mobile situations.

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

The TR2300 is amazingly small, much smaller than it's 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!

For further information, please do not hesitate to contact your nearest authorised Trio dealer.

TRIO TR7010

Work real DX with ease on two-metre SSB and CW. The TR7010 combines a high performance receiver with a 10 Watt transmitter and provides mobile or fixed station capability at low cost.

Supplied ready to operate from 144·1–144·34MHz, the TR7010 covers all CW, SSB and beacon activity. 48 channels with 5kHz spacing plus VXO and RIT provide continuous coverage.

Operation in any other part of the two-metre band can be carried out by a simple crystal change and no re-alignment is required.

Single conversion using an IF of 10·7MHz with a first-class crystal filter gives outstanding selectivity. Wide range amplified AGC and newly developed FET devices in the RF and mixer stages allow maximum sensitivity to be used with freedom from overload due to adjacent signals.

The single conversion transmitter using fully balanced mixers generates a beautifully clean signal with crisp audio quality.

Join the SSB gang and work real DX for **£189.** Send for full details now.

***VERY* SPECIAL PRICE**
TS7005
CONTACT US FOR DETAILS

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 **£195** including VAT?

WHO'S WHO IN THE TRIO FACTORY-BACKED SALES & SERVICE GROUP

Not all dealers sell Trio products... and not all dealers who sell Trio products are authorised Trio dealers.
By buying your Trio equipment from an authorised dealer, you can be confident that you have the support of the Trio service and backup organisation stretching all the way through your distributor right back to the factory.
Only an authorised dealer can give you the service, spares and advice that you may need, and only an authorised dealer can allow you to take advantage of the regular meetings between the distributor and Trio factory personnel at which there is a constant exchange of information and advice.
The official Trio organisation in the United Kingdom is shown on the next page.

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.

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

FOR FULL LIST OF AUTHORISED DEALERS AND AGENTS SEE NEXT PAGE

Electronics (UK) Ltd

TRIO

TRIO TS-120V £425
MATCHING PSU—PS20 £59
Trio's latest for HF Mobile
Join in the mobile scene now that conditions are up!
★ Big rig features in a compact package
★ Digital frequency readout
★ All bands 10 to 80 metres CW/SSB ★ 10 watts output
★ IF passband tuning and other fine features.

COMING SOON—TS-120S 100 watt MODEL!

TRIO TS-520S £549
Yet another Trio bargain from WESTERN! The latest version of this fine HF Transceiver with all the up-to-date features needed by todays amateur but at a realistic price. No frills, just good all-round performance and excellent value at the price.
★ Full coverage 10-160 metres, CW/SSB
★ All solid-state except driver (12BY7A) and PA which uses rugged and proven 6146B (S-2001A) valves
★ Improved speech processor to help in those pile-ups
★ Highly efficient noise blanker

TRIO TS-820S £879
The pacesetting 10-160m Transceiver for the amateur who wants to keep up-to-the-minute! Loaded with features to make your operating even more enjoyable; among these are:
★ Advanced PLL circuitry and ultra-stable VFO for accurate and spurious-free frequency control
★ Factory-fitted digital readout of TRUE frequency—NOT just a "VFO counter" like some others
★ Speech processor gives true RF compression; front panel controlled and fully metered
★ IF shift to combat QRM on a busy band

TRIO TL-992 £819
Want a BIG LINEAR? This is it!
A real powerhouse to complement your station, only needs 80 watts drive for full output.
★ 2000 watts PEP input SSB; 1000 watts CW/RTTY
★ 2x Eimac 3-500Z in AB2 grounded-grid for cool efficiency
★ Blower switch-off delay and full safety interlocks

TRIO VHF EQUIPMENT

TR-2300 £189
Fully synthesised 2m FM portable, 25kHz channels, excellent value

TS-700S £599
All-modes on 2M, digital frequency readout, built-in switchable Rx preamp, mains and DC operation.

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WESTOWER . . . CHOSEN for its:

★ **HIGHER STRENGTH**—rated headloads up to 75mph (Standard) and 100mph (Heavy Duty)
★ **FULL DATA** published on loads and windspeeds—no guessing as to capability
★ **HIGHEST QUALITY** welding and workmanship
★ **SUPERIOR and UNIQUE** 'FBP' Framed Base (see below right)
★ **RAPID AVAILABILITY**—All models available from stock
★ **NO HIDDEN EXTRAS**—prices carriage paid mainland except some areas, which are clearly shown below
★ **WIDE RANGE**—Heights from 25 to 75 feet (Standard) and 42 to 107 feet (Heavy Duty).

TECHNICAL DATA

STANDARD RANGE

Model	1S	2S	3S	4S
Height	25ft	42ft	58ft	75ft
Headload	515lb	265lb	125lb	35lb
PRICE	**£241.92**	**£322.92**	**£419.04**	**£500.04**

Loads are for unguyed towers at 75mph windspeed.
Guyed loads are 880lb(1S), 600lb(2S, 3S), 330lb(4S)

HEAVY DUTY

Model	2HD	3HD	4HD
Height	42ft	58ft	75ft
Headload	360lb	145lb	26lb
PRICE	**£420.12**	**£513.00**	**£617.76**

PRICES SHOWN ARE FOR FBP MODELS AND INCLUDE VAT AT 8%

Loads are for unguyed towers at 100mph windspeed.
Guyed loads are 880lb(2HD, 3HD), 600lb(4HD).
5HD(91ft) and 6HD(107ft), guyed only models available.

Due to distances involved, carriage is extra for:
DEVON, SCOTLAND (S. of Pitlochry) £54.00
CORNWALL, SCOTLAND (N. of Pitlochry) £86.40 inclusive of 8% VAT.

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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 50, 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. Sae 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.

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

Access

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Here's a 10-1 winning offer if you'd like the full Yaesu catalogue. Just send us 4 × 9p stamps (36p) and we'll send you Yaesu's fully illustrated brochure together with our Credit Voucher for £3.60 against your eventual purchase. A couple of stamps will bring you the FT101Z, Atlas or Swan leaflets or our current used equipment list.

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100 WATTS MINIMUM OUT !

100MX—THE DE-LUXE MOBILE RIG WITH ALL THE EXTRAS

Solid state HF transceiver. 100 watt PEP and CW output, 80M-10M. Broadband design featuring noise blanker, VOX, 25KHz calibrator, CW sidetone, semi-break in CW, RIT, built-in speaker. Ultra stable PTO frequency source. Operates directly on 11 to 15 VDC, USB, LSB, CW operation. 9MHz 8 pole crystal IF filter. 4W Audio O/P.

UNBEATABLE PERFORMANCE—UNBEATABLE VALUE £459 PLUS VAT

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KYOKUTO

KYOKUTO DENSHI COMPANY LIMITED

KDK FM2016E 2m FM DIGITAL SYNTHESIZED TRANSCEIVER

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

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.

+·6 and −·6 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 sensitivity, 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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THE PRICE, £235+VAT (£264.37) inc. Securicor Delivery

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AR20	For small VHF ant. solenoid control	£34.50	HSP foc
AR30	As AR20 but solid state control	£41.00	HSP foc
AR22	For medium VHF solenoid control	£43.00	HSP foc
AR40	As AR22 but solid state control	£47.50	HSP foc
AR33	As AR40 but 5 preset/man controls	£59.00	HSP foc
BT1	Medium duty 4 preset/man controls	£79.50	HSS foc
CD44	Medium duty continuous read out	£95.00	HSS foc
HAM II	Heavy duty solenoid brake	£129.00	HSS foc
HAM III	Heavy duty solenoid brake	£139.00	HSS foc
TX1	Very heavy duty rotator	£199.00	HSS foc
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KR400	Medium duty – bell type	£85.00	HSB £1.60
H333	Heavy duty. Digital readout	£189.00	HSS foc
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2030	"Memomatic" through rotor type	£48.00	HSP foc
2021	"Sensor" Man 7 preset positions	£98.00	HSP foc
2031	"Programmatic" 7 pos. cont. by tuner	£85.50	HSP foc

ROTATOR ACCESSORIES

RZ100	Alignment bearing. All Stolle	£10.00	LSP	£0.60
CD562	Alignment bearing CDE AR20–AR30	£6.00	LSP	£0.60
AK121	Kit, rotor to Versatower, CDE Bell type	£3.60	LSP	£0.40
	Casting mast mounting for Ham III	£4.25	LSP	£0.60
	Hardware kit for above casting	£6.30	LSP	£0.40
50463	Hardware kit (replacement bolts, clamps) CDE CD/TR44 HAM (M, II, III)	£6.40	LSP	£0.60
50425	Hardware kit (replacement bolts, clamps) CDE AR (22-40-33) BTI	£4.30	LSP	£0.60
	Hardware kit (replacement bolts, clamps Stolle all models)	£3.60	LSP	£0.60

ROTOR CONTROL CABLE (Carriage extra or free with rotor)

4 Way	For AR (10-20-22)	pr. yd.	£0.20	LS
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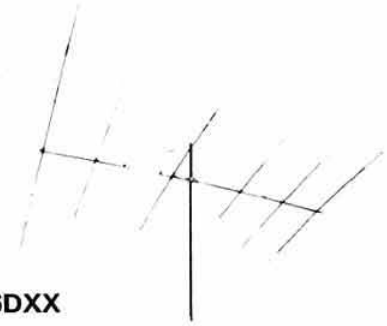

TH6DXX

TH3 MK3

HYGAIN + VAT(H 12½% L 8%) + CARR(B BRS P POST) [Where Securicor delivery is possible add £2.70 + 8%]

12AVQ	£37.50	HSB	£2.00	105BA	£92.00	H B	£3/8D	DB1015A	£115.00	H B	£3.50	BN86	£13.50	HSP	£0.60
14AVQ	£52.50	HSB	£2.00	153BA	£62.75	H B	£3.00	TH2MK3	£109.75	H B	£3.50	LA1	£27.35	LSP	£0.04
18AVT	£76.00	HSB	£2.25	155BA	£117.50	H B	£3/8D	TH3JNR	£113.50	H B	£3.50	LA2	£3.45	LSP	£0.30
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YAESU

ALL NEW FT101ZD

Digital & Analogue Readout

FT101Z

Analogue Readout Version

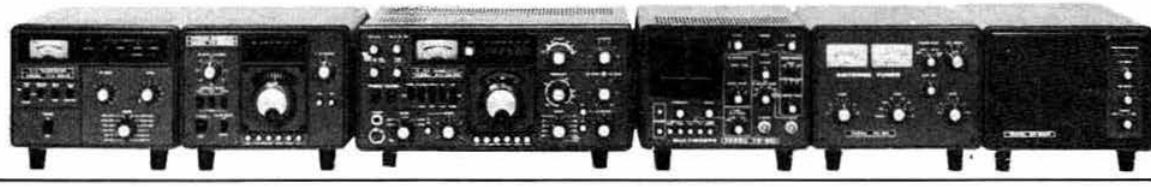
IS HERE NOW !

Any new piece of equipment from Yaesu is worthy of note, one good enough to be called a '101' in line with the world's most popular amateur transceiver, is an event of the decade. The 'Z' series is a base station design at its best, a no compromise, go anywhere (AC PSU included, DC invertor option) unit of the highest quality. The FT101ZD is an all new design using today's technology backed by a proud tradition.

For further details of this exciting new unit please contact any of our authorised sales outlets, for a free colour brochure.

- ★ Variable IF bandwidth 2·4kHz down to 300Hz
- ★ Digital plus analogue frequency display
- ★ RF speech processor—adjustable level
- ★ Wide receiver dynamic range, with sensitivity
- ★ Superb noise blanker—adjustable threshold
- ★ Vox built-in and front panel adjustable
- ★ Semi-break in with sidetone for slick CW
- ★ 6146B pa's with negative feedback. 180WPIP
- ★ 160–10 metres plus WWV plus auxiliary band
- ★ Antennuator 0–10–20 dB front panel switch
- ★ AGC: Slow-fast-off, front panel switchable
- ★ Clarifier (RIT) switchable on Tx, Rx or both
- ★ Selectable CW fixed bandwidths CW-W or CW-N

A full list of matching accessories is available to complement the FT101ZD. In the illustration below (looking from left to right) we have: the FTV901 transvertor (covering 4m, 2 and 70, with repeater shift etc. etc.) the FT901DM External VFO, (with 40 memory channels ±50Hz stability AWU!!!) auto and manual scanning, the FT101ZD itself, the YO901 monitor scope, which in addition to AF, IF, and RF monitoring offers panoramic (spectrum analyser) facilities. The FC901 Antenna Tuner/Power/SWR meter, and the SP901P external speaker with phone patch (Normal speaker SP901 available).



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Contact membership services officer at RSGB HQ

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.

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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

Current comment

WARC 79—UK proposals

The following statement has been issued by the Home Office:

The United Kingdom proposals for the 1979 World Administrative Radio Conference to be held in Geneva (24 September–30 November 1979) were published on 10 April 1979.

The proposals are in two parts, with each main section having its own introductory text. The first part of the proposals, comprising more than 300 pages, consists largely of the detailed changes the United Kingdom would wish to see made in the international Radio Regulations to cater for developments over the next 20 years. This part also contains proposals, under other items of the WARC agenda, such as provisions for communications from medical ships and aircraft, and a suggested pattern of future radio conferences. The second part, comprising 40 pages, contains a set of supplementary proposals of a more technical nature that take into account the results of a recent meeting of the International Radio Consultative Committee.

United Kingdom proposals for the international table of frequency allocations follow fairly closely the outlines given in the report issued by the Home Office in April last year. In the high frequency bands the UK is proposing increased allocations for maritime communications, for broadcasting services and for amateurs. These changes are made possible by the transfer of very many of the world's international communications onto satellites.

In the very high frequency range the proposals seek to inject a new degree of flexibility into the international frequency allocations to cater for the situation when the black and white tv transmissions have been phased out, while an upward extension of the fm sound broadcasting band is also proposed, with a degree of sharing between broadcasting and mobile services, again to provide flexibility for the future.

In the ultra high and super high frequency ranges the UK proposes numerous changes to cope mainly with foreseen increases in the requirements of various satellite services, while in the highest ranges—above about 40GHz—the UK proposes a virtual replanning of the radio frequency allocations to provide a flexible foundation for future exploitation of the bands by diverse groups of space and terrestrial services.

In the related fields of international frequency management procedures, the UK proposals reflect concern to protect all countries' equality of rights to use the radio frequency spectrum and the geostationary satellite orbit, to moderate the effects of the first-come first-served principle that has operated for many years, to provide a mechanism for effecting the changeover from the present pattern of high frequency allocations to that now proposed, and to improve the international records of frequency assignments maintained by the ITU.

The UK proposals also take into account a wide range of technological developments in transmitting and receiving equipment since the last major conference held in 1959, as well as the enormous body of work done by the International Radio Consultative Committee during the last 20 years in the field of radio propagation and frequency sharing by different radio services.

In broad terms, the UK proposals seek to bring the Radio Regulations up to date and to cater for future frequency requirements as far as they can be foreseen. At the same time they recognize the need to preserve the frequencies used by many of the millions of radio sets and installations around the world which could not be modified without prohibitive costs.

The United Kingdom proposals are the product of a four-year programme of work that has embraced all national usages of radio frequencies, and takes account of the ideas gained from the Home Secretary's exercise in public consultation conducted during 1977.

QTC

amateur radio news

Zone E Council member

Following non-receipt of any nomination for a Zone E Council member at last year's Council election, Mr D. H. Adams, GW3VBP, again offered his services as a co-opted member. At its meeting on 1 February, Council unanimously agreed to co-opt Mr Adams to serve as Council member for Zone E during 1979.

Region 4 representation

The result of the ballot for a Region 4 representative was:

N. J. H. Grassby, G4CPY	66 votes
M. Shardlow, G3SZJ	59 votes
R. L. Senter, G4BFY	8 votes

There were nine invalid votes.

Mr N. J. H. Grassby was therefore elected Region 4 representative.

QSL Bureau

The RSGB QSL Bureau will be closed from 4 to 25 June inclusive. Members are asked not to send QSL cards to the bureau during this period.

G8TAA-G8TZZ: Mr K. Draycott, G3UQT, 175 Oliver Road, Kirk Hallan, Ilkeston, Derbyshire DE7 4JW, has been appointed sub-manager for this series.

More mail delays

Members may already know, from Post Office statements published in the national press, that because of industrial action by Post Office sorters in London, all rebate and bulk second class postings into London were suspended from about 25 March.

This affected the mailing of the April issue of *Radio Communication* from Norwich, with the result that serious delays in delivery occurred in an area covering southern England, the West and the Home Counties. However, the Midlands, North Wales, the North, Scotland and Northern Ireland were not affected, as mail for those areas does not go through London from Norwich, and the journal was posted to those areas on 5 April.

In addition to delivery of the journal, this dispute also disrupted other postal services in the London area, resulting in non-receipt of some copy from contributors in time to meet the deadline for this issue of *Radio Communication*, including, unfortunately, *SWL news*.

Licence figures

The Home Office recently supplied the Society with the following total UK licence figures:

1954 — 7,708	1963 — 12,049	1971 — 20,489
1955 — 7,702	1964 — 13,067	1972 — 22,076
1956 — 7,925	1965 — 13,987	1973 — 23,756
1957 — 8,234	1966 — 14,934	1974 — 25,499
1958 — 9,116	1967 — 15,933	1975 — 27,750
1959 — 9,539	1968 — 17,338	1976 — 29,052
1960 — 10,006	1969 — 18,281	1977 — 23,237
1961 — 10,504	1970 — 19,351	1978 — 24,711
1962 — 11,289		

The figures are at 31 December each year. The present licence, which combined fixed and mobile licences into one licence, was introduced in 1977. The 1976 figure included 4,636 mobile licences.

RSGB callsign lapel badges

The Society is pleased to announce that another supplier of engraved callsign lapel badges has been obtained, and that these are once again available. Delivery will normally be three to five weeks. Orders should be sent to RSGB HQ, as described in the current price list on the inside back cover of this issue.

World Telecommunication Day 17 May 1979

The theme of World Telecommunication Day this year is "Telecommunications for all". It was chosen to highlight the fact that communication is indispensible to man's life, wherever he may be. The day marks the anniversary of the founding of the International Telecommunication Union on 17 May 1865.

Can you help?

The Radio Amateur Invalid & Bedfast Club is seeking representatives in the Merseyside, Manchester and West and South Yorkshire areas to assist disabled members with equipment and antenna problems. The club would also be pleased to receive offers of good communication receivers and ancillary equipment for its members.

Anyone who can help is asked to contact the RAIBC secretary, Mrs F. Woolley, G3LWY, 9 Rannock Court, Adelaide Road, Surbiton, Surrey KT6 4TE.

The RSGB requires the following bound volumes of *Experimental Wireless* for its library: Vol 1 (published by Percival Marshall), October 1923-October 1924; Vol 2, October 1924- December 1925.

Anyone who can assist is asked to communicate with RSGB HQ.

"A Rugby, MSF, time-code clock"

The author of this article, published in the February issue of *Radio Communication*, has advised the following additions and amendments:

Fig 3, C19. The note, omitted from the text, is: In the prototype clock, which used buffered ("B") series cmos throughout, there was found to be a problem with the monostable circuits driving the shift registers, and C19 was fitted to effect a cure. However, it is probable that if "A" or "UB" series devices can be used for IC2 and IC4, this component may not be necessary.

Fig 8. Two components are labelled C16; that adjacent to C18 is, in fact, R16.

Details of **L1** are 8in by ¼in dia ferrite rod, with about 370 turns of 34swg wire. The original coil had this in four layers, length of winding 1in. The inductance should be about 13mH.

Regarding the **MSF** transmission, this closes down for maintenance on about one morning per month; the time sent is bst or gmt, as appropriate for the time of year.

Lost or stolen

Lost or stolen in transit by Securicor in November 1978 from Harrogate to Southampton: Yaesu frequency counter YC601B serial 8F010459. Any information to G3DBU, QTHR, who points out that the "small print" of the Securicor consignee form which he signed limited the compensation they offered to £50 for a piece of equipment worth £145.

Stolen from the BBC car park, Shinfield Street, White City, London. On 17 August 1978: IC240 serial 6700746, plus remote channel indicator. On 5 February 1979: home-made 144MHz; the other club callsign, G8LTR, being the only one put using a 2N5642 and relay antenna change-over. Both from car of G8FRH between 10am and 6pm. Information to Shepherds Bush police station, or G8FRH, tel 01-743 8000 extn 4766.

Stolen on 3 February 1979, from a car in Langley Road, Slough: Icom IC22A, serial 3407023. Information to Mr A. J. Parcell, tel 0753 (75 from London) 74842, or to Slough Police, tel 0753 31282.

Microwave techniques for amateurs

This is the title of a symposium, held in association with the IERE, which will commence at

2pm, 5 June 1979
at
The Royal Institution
21 Albermarle St, London W1

PROGRAMME

2 pm: Introductory lecture by Dr Dain Evans, G3RPE
2.30pm: "Simple techniques for optimizing receivers" by Dr Charles Suckling, G3WDG
3.15pm: "High-gain Yagi antennas" by Michael Walters, G3JVL
4.30pm: "10GHz narrow-band techniques for troposcatter" by Julian Dannaway, G3YGF

Full details from: The Professional Activities Secretariat, IERE, 99 Gower Street, London WC1; tel 01-388 3071.

A frequency counter for a 144MHz transmitter

by N. B. PRITCHARD, G8AYM*

THIS circuit was developed to be wired into a 144MHz transmitter fitted with a vfo, in place of a tuning dial. Two circuit boards were used, one for the prescaler and one for the main counter. The prescaler consists of ecl and ttl devices to obtain the high frequency characteristics required, while the main counter is built entirely of cmos ics which gives good tolerance on power supplies—typically from 9V to 15V—and relatively low current consumption, 100mA at 12V, most of which is supplied to the displays, which are leds. The circuit was designed around parts readily obtainable by the author and thus does not employ any state-of-the-art techniques, or claim to be either the simplest or most cost-effective solution.

The prescaler (Fig 1) consists of a broad-band amplifier constructed with an MC10216L ecl ic, which is a triple-line-receiver, with each stage cascaded and some positive feedback applied on the last stage to form a crude Schmitt-trigger. This stage supplies ecl-compatible signals to the next ic with a typical sensitivity of 20mV rms at 150MHz. Reliable triggering is adjusted by means of R3.

Frequency division is obtained first by IC2, which accepts ecl input levels and gives ttl output levels with a division ratio of 10 in this circuit. This is followed by IC3, a 7490 ÷10 counter which further divides by 10. IC3 is arranged in the ÷5, ÷2 mode in order to give a symmetrical output waveform, which is more suitable for the main counter. The whole prescaler is operated from +5V and consumes by far the largest proportion of the total current, ie about 200mA.

*11 Hillside, Slough, Berks SL1 2RN.

Components list

R_{in}	See text	C1	See text
R1, 16	2·7kΩ	C2,7	10μF 6V
R2, 38	2·2kΩ	C3,9	220pF disc ceramic
R3	1kΩ preset	C4,5,12, 15,16	100nF
R4,5,6,7 10,11,12	470Ω	C6	10nF disc ceramic
R8	330Ω	C8	100nF polyester
R9	220Ω	C10	22pF disc
R13,21, 24–37	1kΩ	C11	1nF disc ceramic
R39	22MΩ	C13	33pF disc ceramic
R40, 42	100kΩ	C14	60pF trimmer
R41, 43	12kΩ	Capacitor voltages are minimums	
All resistors ¼W carbon film 5%			
IC1	MC10216L*	TR1,5,6,7	BC108
IC2	MC12012L*	TR2,3,4	BC158
IC3	7490	D1	BZY88C5V1 etc
IC4,5	MC14553B*		
IC6,7	MC14543B*	X1	2·097152MHz 20pF parallel
IC8	MM53107N†		
IC9,10	4027	Display	2 off NSB3882†
IC11	4073		

*Motorola. †National.

The main counter is based on the use of two cascaded MC14553B ics. This device is a three-digit counter with multiplexed outputs, ie only one four-line bcd output for all three counters, plus digit select outputs. The block diagram for the MC14553B is shown in Fig 2, and Fig 3 shows the complete main counter. Each ic is equivalent to six ics in more common circuit arrangements, ie it contains three decade counters and three quad latches. The outputs from the latches are fed into a multiplexer with its own scanning circuitry, thus giving very economical wiring arrangements. This means only four binary outputs and three-digit select outputs. The scanning oscillator frequency is controlled by an external capacitor, C11, and by feeding an out-of-phase scan signal to the second MC14553B only one set of three-digit driver transistors is required, with corresponding digits from each ic driven in parallel. The

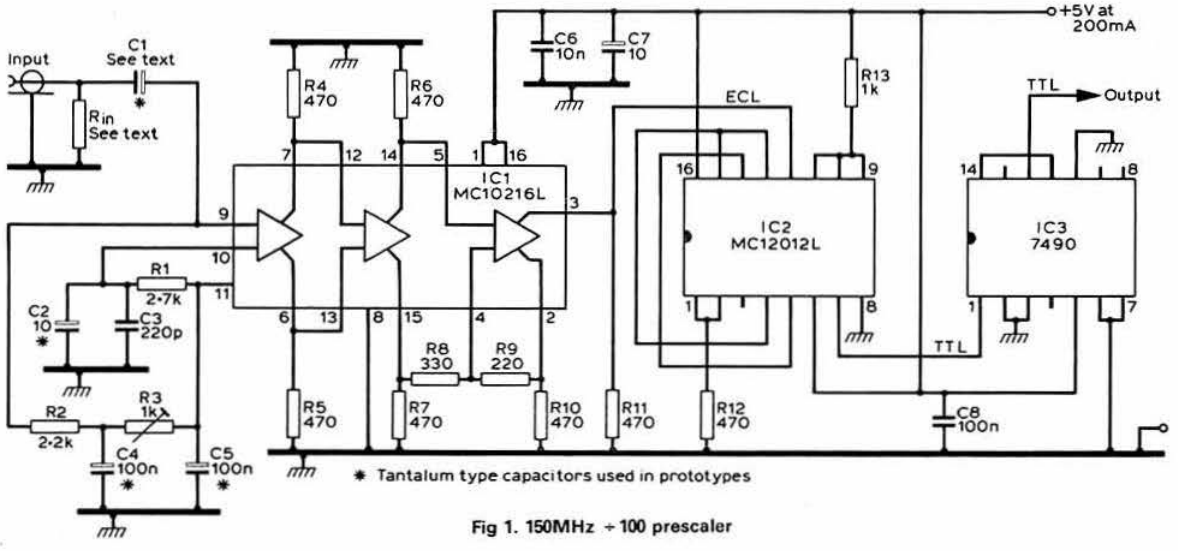


Fig 1. 150MHz ÷100 prescaler

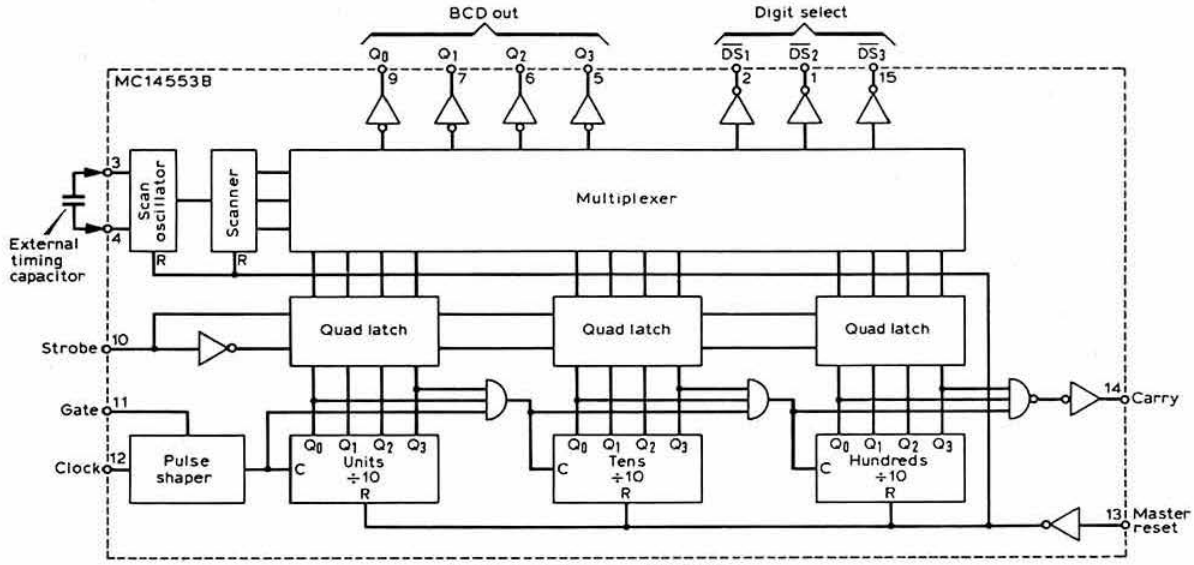


Fig 2. Block diagram of MC14553B

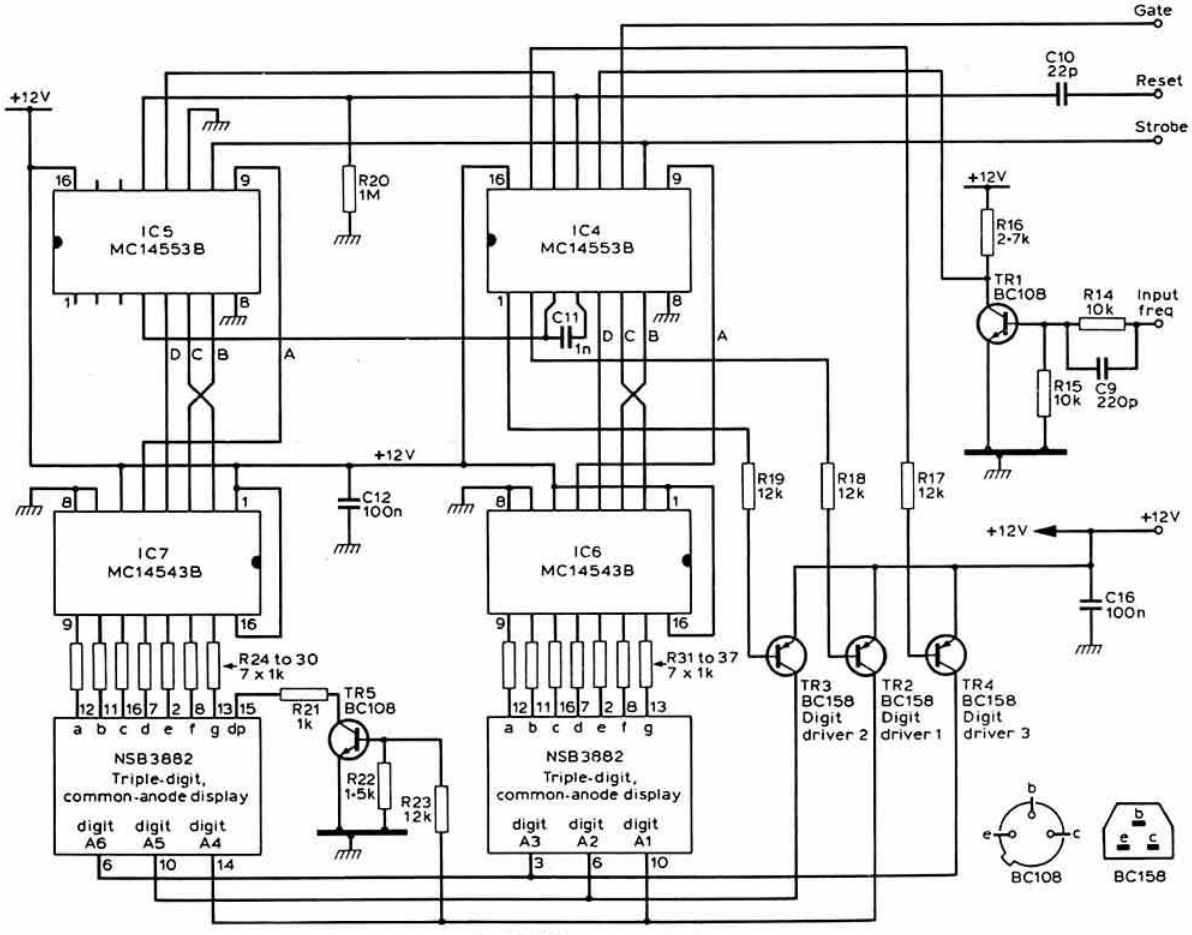
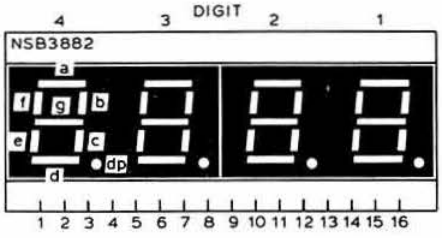


Fig 3. Main counter circuit



Pin No		Pin No	
1	n/c	9	n/c
2	Cathode, e	10	Common anode, digit 2
3	Common anode, digit 4	11	Cathode, b
4	n/c	12	Cathode, a
5	n/c	13	Cathode, f
6	Common anode, digit 3	14	Common anode, digit 1
7	Cathode, d	15	Cathode, dp
8	Cathode, g	16	Cathode, c

Fig 4. Connections to NSB3822 display

MC14553B, as can be seen in Fig 2, contains a pulse shaping network on the clock input terminal complete with a disable terminal. This has usefully been employed in IC4 to perform the signal gating function via the timebase waveform. Clock pulses at pin 12 are fed to the counters when the disable terminal pin 11 is in the low state. During the high state, strobe pulses and reset pulses are fed to pins 10 and 13 respectively of both IC4 and IC5.

The display system can employ any arrangement of common-anode display, but the prototype used a pair of NSB3882 four-digit displays manufactured by National Semiconductors, of which only three digits were used from each display. The format and pin arrangements for this display are shown in Fig 4, such a device yielding very simple wiring requirements relative to hand-wiring six individual displays. The decimal point is driven by TR5 and indicates megahertz by driving the left-hand display unit during the time slot for digits 1 and 4. Variations on this will be described later. The segment current is determined by resistors R24–30 and R31–37 (and also R21 for the decimal point) and is, typically as shown, 1kΩ for 12V supplies. Variations for brighter or dimmer displays or differing supplies are permissible. The data sheet for the MC14543B should be consulted for high current requirements for the led display.

The input signal from the prescaler is presented to IC4 via TR1 which converts the incoming ttl level signals to swing the full power rail of the cmos ics.

The general timekeeping of the counter is controlled by the timebase circuit (Fig 5). IC8 comprises a cmos oscillator and prescaler. The oscillator frequency is determined by a quartz crystal resonant at 2·097152MHz and is adjusted precisely by C14, R39, providing bias for the oscillator. Power is applied at pin 8 (a maximum of 6V) via R38 and a 5V zener diode D1. The output frequency at pin 1 is 60Hz and this is applied to TR6 to produce a signal swinging the full power rail. This frequency is divided in total by 12 to produce a square-wave timebase gate signal (1:1 mark–space ratio) of 5Hz (thus a low operational period of 100ms). The ÷12 function is performed by four J-K flip-flops (ie two 4027 ics) connected to divide in the following sequence: ÷2, ÷3, ÷2. By gating out suitable periods in this counter system during the "dead" time of the timebase signal, pulses can be generated to operate the strobe and reset circuits of the main counter. This function is performed by IC11, a triple-three-input AND gate. TR7 inverts the strobe signal to produce the requisite negative-going pulse. Reference to Fig 2 will show that the reset signal is in fact a MASTER RESET, and during the reset period the complete operation of the MC14553B, including multiplexing, is reset to zero. Thus the whole display would be seen to reset at 5Hz (for the period of the reset pulse) and thus produce a flickering effect on the display. This is easily overcome by differentiating the reset pulse via C10, R20 to produce a very narrow and therefore imperceptible reset action.

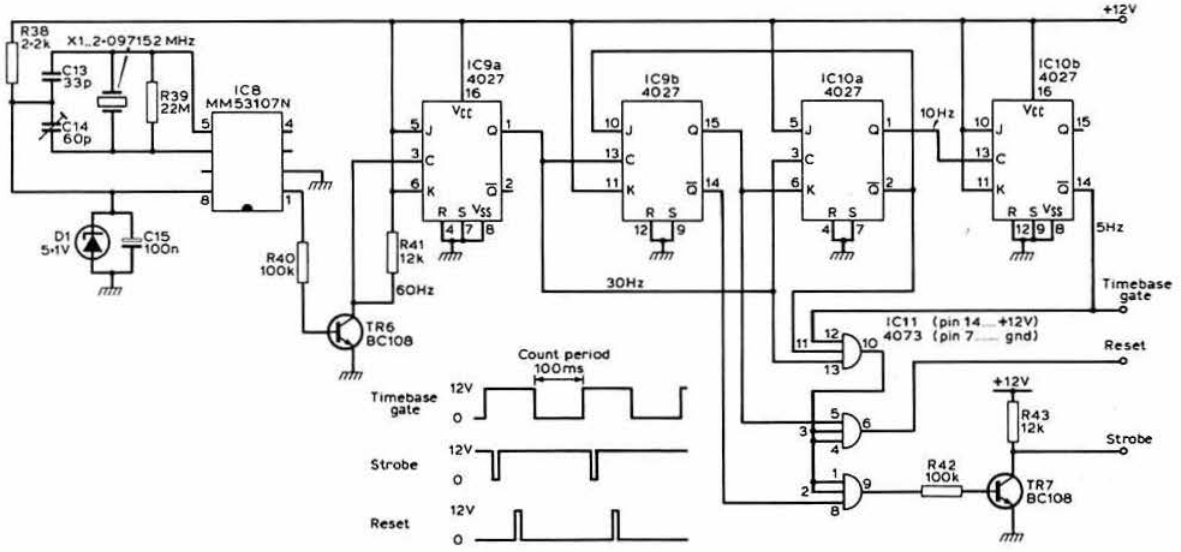


Fig 5. Timebase and control circuit

Table 1. Sensitivity of prescaler

Frequency (MHz)	Input voltage (rms)	Frequency (MHz)	Input voltage (rms)
5	1·1mV	100	5·5mV
10	1·1mV	125	7·5mV
25	1·6mV	145	15mV
50	2·25mV	155	18mV
75	5·0mV		

Voltages quoted are from generator of 50Ω source impedance, assuming a 50Ω termination. R_{in} = o/c.

Construction and calibration

The counter was constructed on two printed circuit boards as shown in Figs 6 and 7, and quad-in-line sockets were used for all ics. The suggested order of construction should be: timebase first, and check for correct control signals as in Fig 5; then the main counter, checking for an all-zeros display; and finally add the input amplifier and prescaler. A suitable accurate signal should be applied to the input circuit, preferably to completely fill all the digits, and C14 should be adjusted for a correct displayed frequency. Amplitude should be initially of about 50–100mV rms to ensure a reading. Then the frequency should be increased to 150MHz, or higher, and R3 adjusted to obtain optimum sensitivity to as high a frequency as possible. Recheck that lower frequencies are suitably sensitive with reference to Table 1.

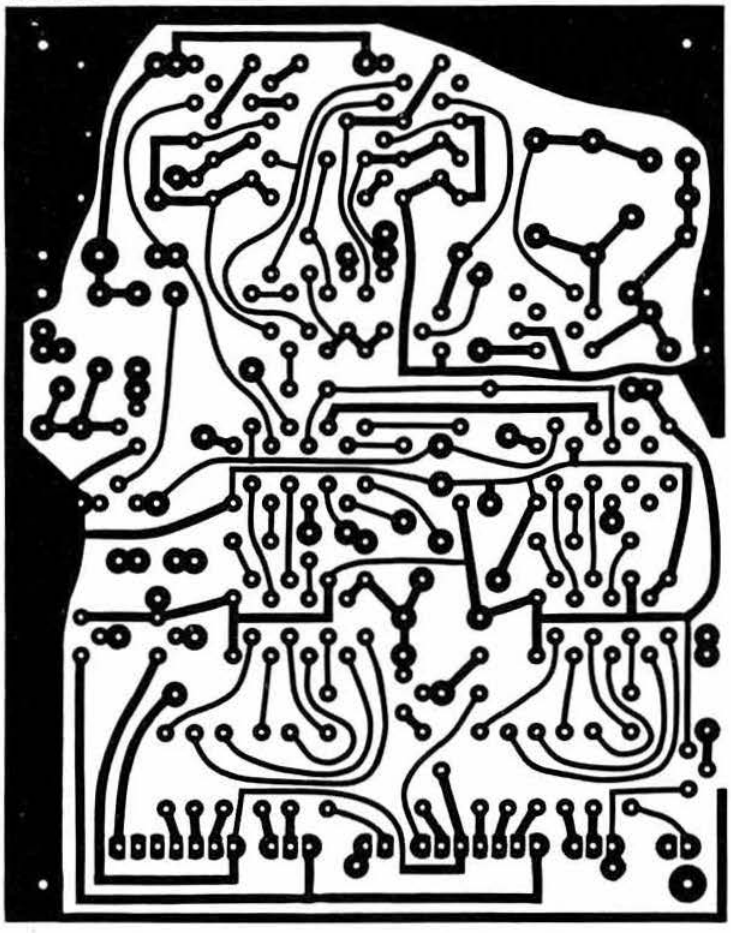
Variations and modifications

While the circuit was originally designed for a specific purpose, it is very flexible for other requirements. For instance note the following figures given as data for the MC14553B:

Guaranteed frequency response at 12V = 2·0MHz
Guaranteed frequency response at 15V = 2·5MHz
Typical frequency response at 12V = 5·0MHz
Typical frequency response at 15V = 7·0MHz

Thus with suitable input amplifiers and shaping networks the main counter will give the above results. Similarly, by removing IC3 and feeding IC2 pin 7 directly to TR1, a maximum guaranteed frequency range of 20MHz at 12V and typically 50MHz. The resolution for the basic counter is 10Hz, for ÷10 prescaler it is 100Hz, and using the ÷100 prescaler it is 1kHz. In conjunction with these variations, it is possible to vary the position of the decimal point. TR5 via R21 is connected to the decimal point connection in either the left or right display block as appropriate, and TR5 is driven via R23 from the digit

4·8" x 3·8"



3·8"x 2·0"

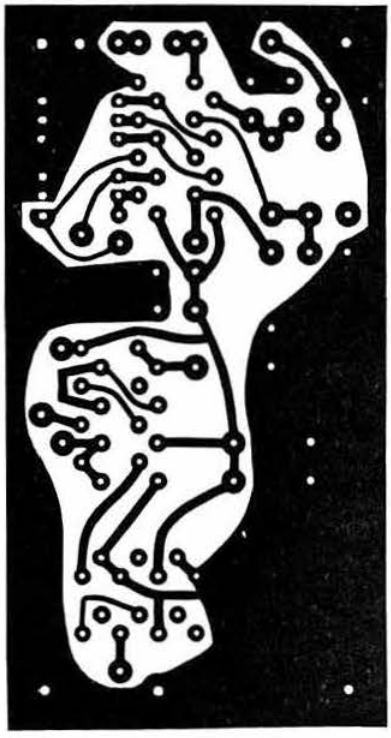
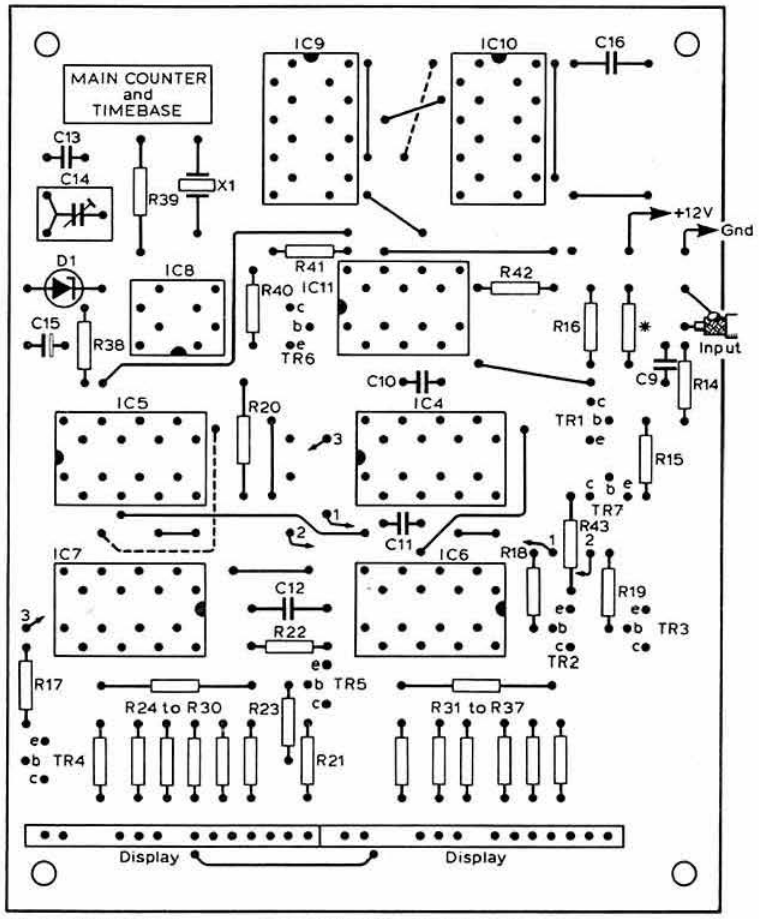


Fig 6. PCB copper patterns viewed from foil side



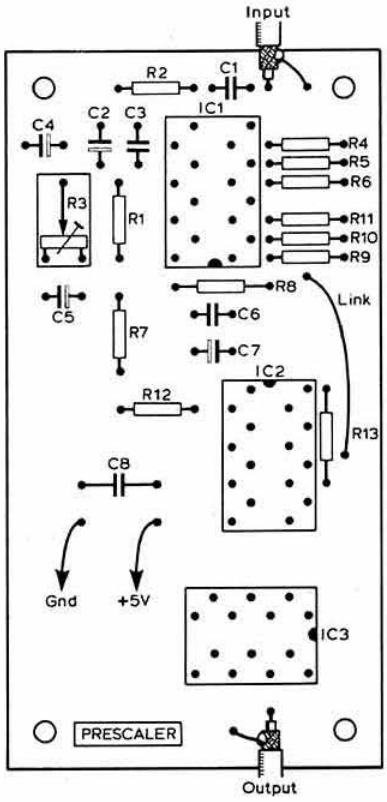


Fig 7. Component layout from top side: (l) main counter and timebase, (above) prescaler

drive line according to the digit position (1, 2 or 3) required. Typically, to indicate megahertz with right-hand decimal and all the above three modes, the decimal point is activated on the left-hand display block, and R23 is switched as necessary between A1, A2, A3 drive lines.

A high input impedance circuit is shown in Fig 8, which could be used mainly with lower frequency working, although it should work to 150MHz. Otherwise R_{in} and C1 should be chosen according to the requirements. In the prototype, R_{in} was absent and C1 was a 10nF disc ceramic. Tantalum capacitors were used in the electrolytic and 100nF positions in

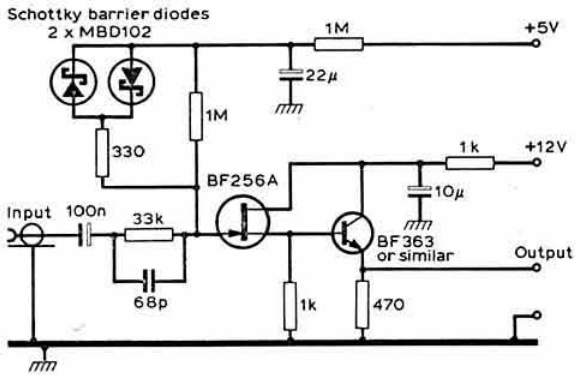


Fig 8. Prescaler high impedance input circuit

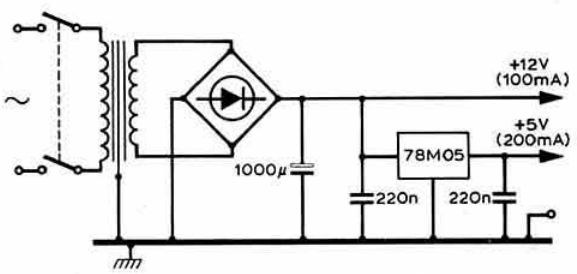


Fig 9. A possible power supply

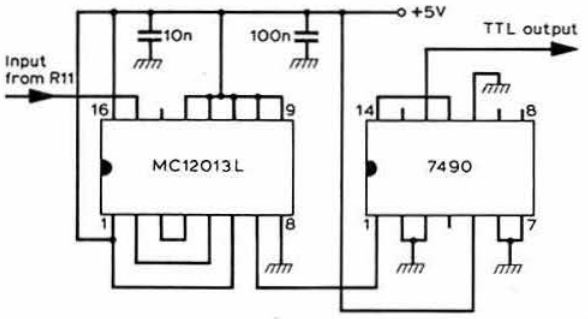


Fig 10. Alternative prescaler

ought to function satisfactorily with suitable peripheral circuitry, and would possibly be cheaper. Fig 10 shows a possible circuit for using the cheaper MC12013L as a prescaler. It should be noted that the MC12013L is capable of dividing in excess of 550MHz and that, if preceded by a suitable wideband uhf amplifier and followed by a 74S90, measurements at 432MHz would be possible provided the main counter will work to about 4·5MHz or higher. A circuit for a broadband amplifier is shown in Fig 11. Note that Figs 10 and 11 have not been constructed by the author and are provided only as "food-for-thought".

The approximate cost of the ics, not including the MC12012L, is £15. The cost of this device and the displays has not been included since preferences may vary. The author cannot undertake to supply pc boards.

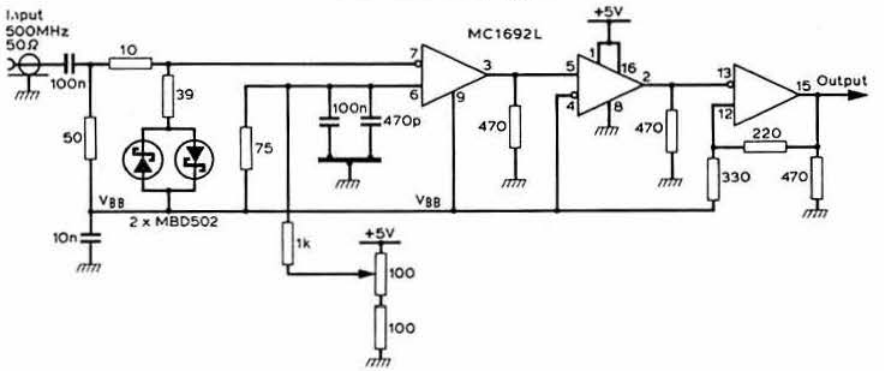


Fig 11. 500MHz broadband amplifier

the amplifier part of the prescaler, although these are not particularly necessary. The pcb for the prescaler could be made double-sided, with possible advantage, with all earth connections simultaneously made to the top-side copper. If constructed on non-coppered Veroboard, every effort should be made to keep earth connections as short as possible. The transistor types used throughout are non-critical, and typical types are indicated. IC8 is manufactured by National Semiconductors for use with digital clocks and, as with X1 (20pF parallel resonant), should not be too difficult to obtain.

For some basic uses employing only the main counter, a resistor of approximately 180kΩ from TR1 base to +12V may be added to give more sensitivity as a fairly crude input amplifier (see Fig 7).

Power supply arrangements will vary according to the application used, but reference to Fig 9 will indicate a suitable circuit. The +5V rail should be stabilized fairly well, but the main counter power rail is uncritical and may vary from 9V to 15V.

The printed circuit allows for a connection to the "D" output of IC10b which has a frequency of 5Hz. This was made in order to have a reference frequency for use with a "huff-and-puff" vfo stabilizer.

While the 2·097152MHz crystal is specified as being 20pF resonant, there is no reason why crystals made for 12pF to 30pF should not be employed if they are more readily available. It may be necessary to change the value of C13 in order to be able to adjust for correct frequency with other crystals.

During the course of writing this article the author has had cause to note the recommended one-off price given by Motorola for the MC12012L, ie in excess of £20. It would seem that the 95H90 by Fairchild or the MC12013L by Motorola

Acknowledgement is due to Robin Hewes, G3TDR, for reading and correcting the manuscript and for constructing a second model. □

An inexpensive high-Z accurate transistor voltmeter

by R. E. BARBER, BSc, G3NEF/ZC4RE*

SOME time ago the author was faced with the problem of how to measure a wide range of voltages with series impedances of megohms. The measurements had to be accurate to within 2·5 per cent, and furthermore they had to be repeatable with time. No commercial instrument capable of meeting the required specification within the limited budget of the project being available, it was decided to build an instrument to meet the following specification:

Measuring range 10mV to 400V fsd.
Input impedance Better than 15MΩ on all ranges.
Accuracy Better than 2·5 per cent on all ranges.
Power supply 2×PP3 batteries, self-contained.
Low drift with time and temperature.
Capability by modification to measure rf, af and mains voltages, rms and peak values.
Small in size, easily portable.

Due to the requirements of low drift, high sensitivity and small size, it was decided to use operational amplifiers as the active part of the instrument. The very high loop gain in the open loop configuration of these amplifiers (approx 80dB) makes them ideal for gain control by negative feedback, as the gain can be very accurately set; in fact, as accurate as the resistor values R1, R2 and R3 in Fig 1, where the gain input to output is equal to $\frac{R1+R2.}{R2}$ To obtain the required ranges, 10mV to 400V, without resorting to extremely high values of input attenuator resistance, it was decided that two operational amplifiers should be used in series, with the gain of the second amplifier variable.

The initial circuit design is shown in Fig 2, and with the component values indicated it was found that the instrument met all the specifications except one; on the 10mV range only, it was found that the imput impedance was 2·5MΩ. For most

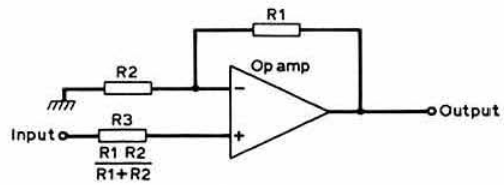


Fig 1. Op-amp circuit

applications, however, this limitation would not be significant and so the circuit is included as a very inexpensive and versatile high-Z voltmeter. The other problem found with this circuit was that it is necessary to zero set each time the range is changed; this is due to the relatively high input current of the U741; in practice, however, this problem was found to be insignificant.

Unfortunately the 10mV range was critical to the author, and so the circuit shown in Fig 3 was evolved at an extra cost of £5. The circuit uses a fet input op-amp in place of the first U741, and meets all of the design criteria after calibration. In addition, S1b and R17 are no longer required, leading to a simpler circuit. The current taken from the supply was also somewhat reduced, as the LH0042C uses less than the U741. The input impedance on all ranges was found to be better than 18MΩ; this was calculated and measured using an impedance meter at 1kHz. In addition, the accuracy after calibration was better than 2·5 per cent on all ranges and had a better stability with time than Fig 2. A point to note is that the accuracy is primarily set by the accuracy of the resistors used. Hence the cost of the instrument can be reduced if lower tolerance resistors are used, eg five per cent resistors will give rise to approximately an accuracy of five per cent. Finally it was found that the problem of constantly resetting zero each time the range was changed had reduced to insignificant proportions.

Construction

The component layout is not critical, in fact both ics were mounted close together on the final instrument, but on the prototype they were well spaced with no noticeable difference in operation. Care should be taken in soldering, and to use as short a lead as possible on all components, especially on the input attenuator as noise generated here will be very noticeable. The author finally used small gauge Veroboard as the circuit base and soldered the ics directly to this board, which in turn

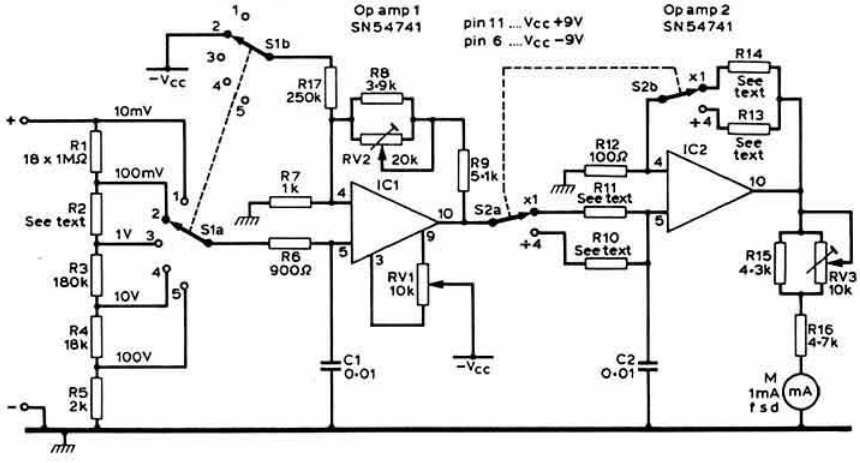


Fig 2. Prototype circuit of voltmeter

*Officers' Mess
RAF Akrotiri
BFPO 57

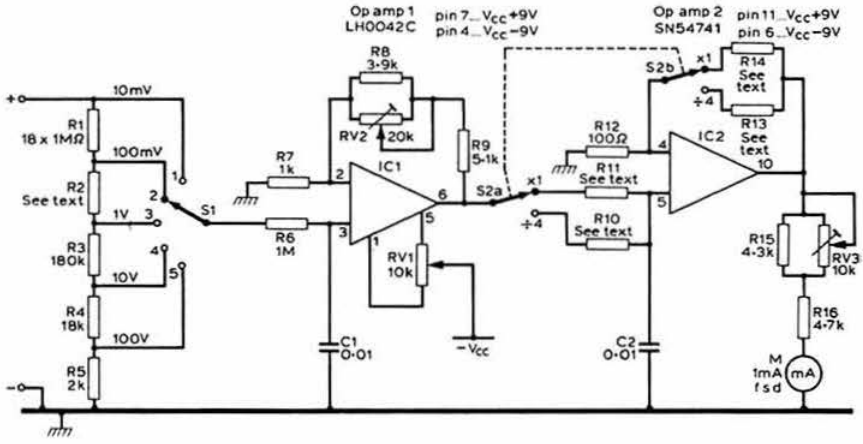


Fig 3. Final circuit of voltmeter

was fixed directly to the meter terminals. All other components were also fixed and soldered on to the board (care should be taken not to overheat the chips when soldering them or other components to the board). The input attenuator was also built on Veroboard of the same gauge. All resistors used were one per cent high tolerance and stability, except the variable ones which were 20 per cent, and connected as shown to minimize their variations with time.

Setting up

Having built the instrument, carefully check all the wiring for correctness. Also, switch the instrument to its 10mV range and set RV3 to its maximum value; this ensures that the meter cannot exceed fsd on switch-on. Switch on and connect a 20mV dc signal to the input, set RV3 so that the meter reads fsd plus about two per cent. Remove the 20mV signal and short-circuit the input; adjust RV1 for zero on the meter. Connect a 10mV dc signal to the input and adjust RV2 for fsd on the meter.

The calibration of the instrument's active parts is now complete and it should hold to within one per cent on all ranges, including the divide-by-four (S2). Using the U741 op-amp, S1b is required to bias the first stage so that the offset voltage fed back through the chip itself, due to the poor transfer impedance of the U741, comes within the range of RV1 set zero control. When using the fet op-amp LH0042C this biasing arrangement is not required; however, if the Fig 2 circuit is used, then the additional contacts on S1b could be used to set the zero on each range, thereby reducing further the need to set zero on each range by adjusting RV1. The author felt that this added complication on Fig 2 was not worthwhile, as the biasing needed to set zero accurately varies with the U741 used (the variation is quite considerable and the values of biasing resistors can only be found by trial and error).

Components list

Fig 2	
R1	18 × 1MΩ
R2	1MΩ + 750kΩ + 51kΩ in series
R3	180kΩ
R4	18kΩ
R5	2kΩ
R6	900Ω
R7	1kΩ
R8	3·9kΩ
R9	5·1kΩ
R10	2·4kΩ in parallel with 100Ω
R11	180Ω in parallel with 220Ω
R12	100Ω
R13	2·4kΩ in series with 100Ω
R14	9·1kΩ + 750Ω + 51Ω all in series
R15	4·3kΩ
R16	4·7kΩ
R17	250kΩ
RV1	10kΩ variable
RV2	20kΩ preset
RV3	10kΩ preset
Op-amps	2 off SN54741 or equivalent
C1, 2	0·01μF 50V wkg
M	1mA fsd 3in scale
S1	5-way 2-section wafer switch
S2	DPDT switch

Fig 3	
All as Fig 2 except:	
R6	1MΩ
R17	omitted
S1	5-way 1-section wafer switch
Op-amp 1	LH0042C
Op-amp 2	SN54741

Future developments

A design is in hand to build a constant current rectifier section for this instrument, thus giving it a linear scale on ac voltages up to 400V peak. This rectifier board will be placed between the meter and the amplifiers and thus will be easily switchable. It is hoped that with suitable modifications the resultant instrument will be capable of measuring voltages to within five per cent over the frequency range dc to 100kHz. At the time of writing, problems are being experienced both with linearity at very low meter deflections and with accuracy above 50kHz.

To obtain the required calibration voltage of 10mV, the accuracy of the 20mV signal not being that critical, the author used a U2 cell and a potential divider network. The circuit and values used are shown in Fig 4, an Avo being used to first check that the cell is up to scratch at 1·5V.

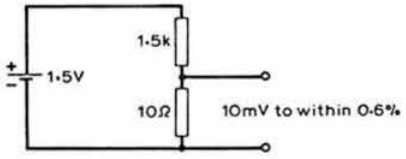


Fig 4. Potential divider network for calibration voltage

If one wishes to measure dc currents, this can be achieved by measuring the voltage drop across a known resistor. By using unity value resistors, ie 0·1, 1, 10Ω, an almost direct reading meter can be achieved; a 1W 0·01Ω one per cent resistor could be used to measure current drawn from 1A fsd to 10A fsd. □

A modification to the G3ZSS digital morse code generator

by K. J. MARLEY, G3EIO/HB9ALV*

In the February 1974 issue of *Radio Communication*, an article by G3ZSS described a simple morse code generator. The circuitry employed provided for the reading of a 128-bit diode matrix, and the start/stop signal was generated by a key or push button which had to be depressed as long as the signal was to be transmitted.

On the spur of a digital moment, the author set about reproducing the circuit and noted several shortcomings; the most important ones being:

(a) when switching on, some spurious signals can appear at the keyer output;

(b) the keyer enable signal, not being a digitally defined quantity, bounces and causes erratic starts;

(c) at high transmission speeds, the chance of message overshoot is great if the operator's reaction is not quick;

(d) the output of the multiplexer is 1 (high) when the circuit is not enabled, which means the keying relay is continuously energized.

*Eulenweg 7, Baden, Switzerland

In an effort to provide optimal operating comfort, the control circuitry was modified and extended as shown in Figs 1 and 2.

In this circuit, compared with the G3ZSS version, two leds are provided to indicate clearly the state of the circuit; further, the start key generates an enable or inhibit signal which is dependent upon this state. Also, a reset signal is generated when switching on the supply so that all flip-flops are positively set to a defined state. Another feature is the extended matrix capability of 256 bits by using the SN74150 multiplexer. (This possibility was mentioned in the G3ZSS article.)

For those readers who are interested in the circuit function, the following description will be helpful.

As soon as the supply voltage is switched on, the Schmitt trigger combination (IC1ef) begins to generate clock pulses. At the same time a further Schmitt trigger combination (IC1ab) with timing circuitry releases a "clear" pulse which is applied to the two flip-flops (IC2ab) ensuring that their outputs are defined ($Q = 0$ and $\bar{Q} = 1$). The led STOP indicates this state.

As soon as the start key is depressed for a short period, Schmitt triggers IC1c and IC1d with timing circuitry, release an enable pulse which flips IC2a output $\bar{Q}$ to 0 (low) and indirectly

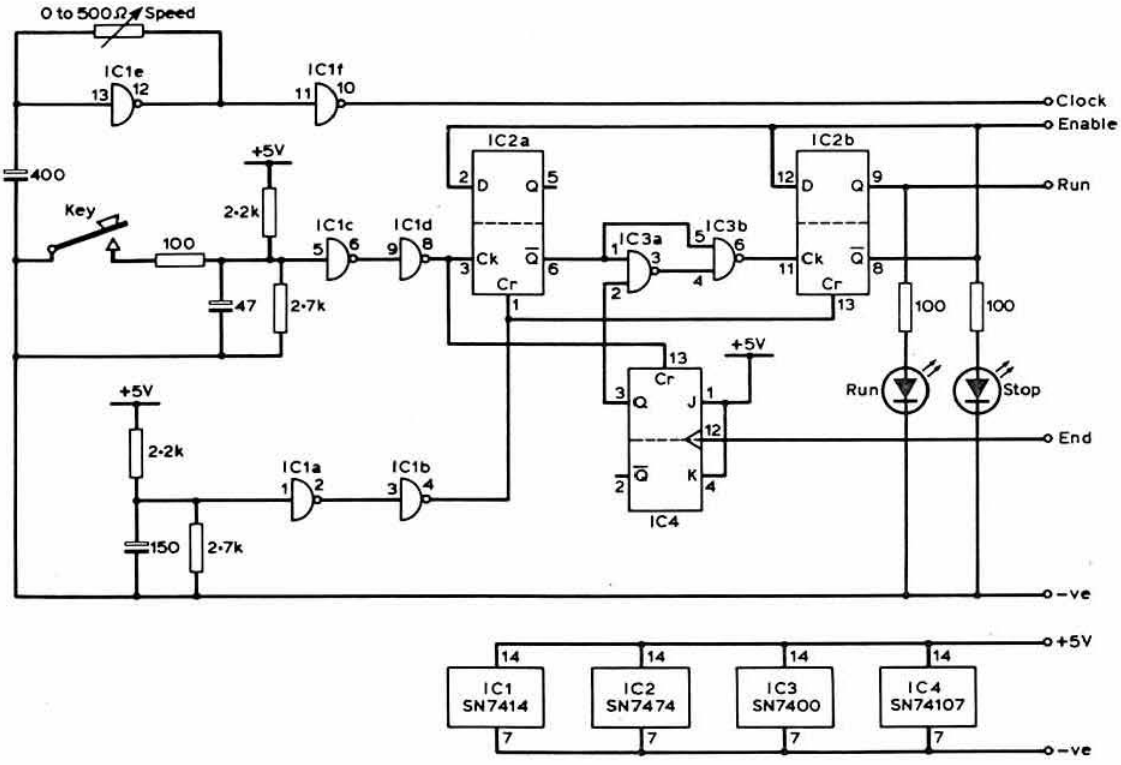


Fig 1. Basic control circuitry

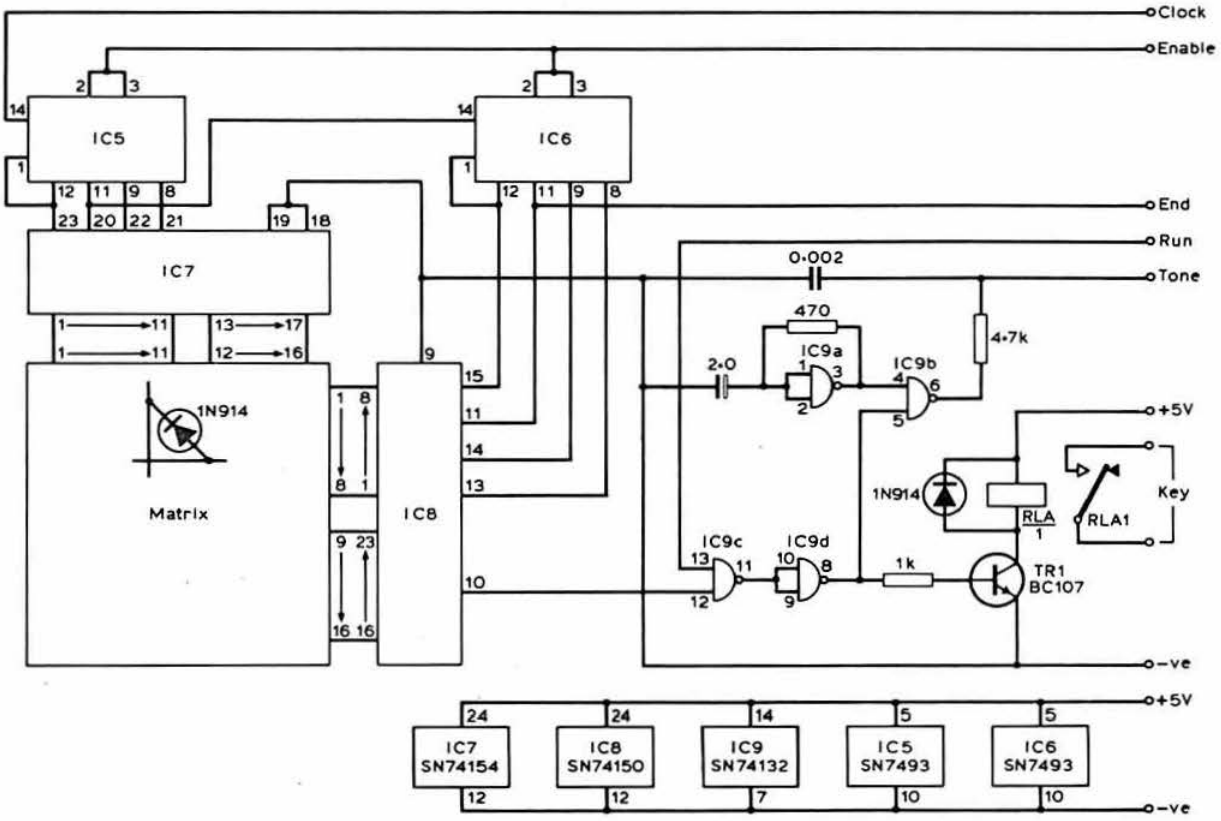


Fig 2. Counter, decoder, matrix multiplexer and output

IC2b output $\bar{Q}$ also to 0 by reason of the state of the intermediate NAND gates IC3a and IC3b. In this condition the led RUN illuminates and the enable line to IC5 and IC6 is 0 so that the clock signal applied to pin 14 of IC5 can now be counted. The output signal appearing at pin 10 of IC8 can only be passed to TR1 via IC9d when the second input of IC9c is also 1. This condition is fulfilled by the Q output of IC2b (RUN).

The tone generator, comprising two Schmitt trigger stages IC9ab, is also controlled by the signal appearing at pin 5 of IC9b and releases signal bursts to the output in unison with the keying impulses.

At the end of each 256-bit count, the negative flank of the pulse from pin 11 of IC6 is applied to the clock pin 12 of a JK flip-flop IC4 whose output Q thus changes alternately between 0 and 1 as each cycle is completed. However, since IC3a will not change its output state unless both inputs are 1, the periodic changes of IC4 will have no effect. At any time during a count cycle, a further pulse from the key via IC1c and IC1d will flop IC2a $\bar{Q}$ to 1 and reset IC4 so that a 0 is applied to pin 2 of IC3c during the remaining period of the count cycle. With the change then caused by the next pulse to pin 12 of IC4, the NAND combination IC3ab causes IC2b to flop and pin 8 again becomes 1. With the enable line high, the counters IC5 and IC6 stop, shutting down the further count.

The circuit has been built-up on two separate pcbs corresponding to Figs 1 and 2. For those readers who employ an electronic keyer, the possibility exists of extracting the clock signal from there and feeding it into the morse code generator. This will ensure that the memory-generated CQ and QSO that (hopefully) follows will be transmitted at the same speed.

Apart from the ics, all of which are easily obtainable, no special or close tolerance components are required, and the pcb build-up is relatively simple. RLA1 was chosen from the range of reed relays in the standard 14-pin dil housing. As an added safety precaution, sockets were used for all the ics. □

The "miracle sky hook"

by A. D. TAYLOR, G8PG*

A support that will raise one end of an antenna to between 70 and 110ft, that can be erected by one man in a couple of minutes, and that only costs a few pence, sounds like a pipe dream. Actually such a support is easy to make. It takes the form of our old friend the kite. Originally used by Marconi for his first reception of transatlantic radio signals, the kite-supported antenna seems to be largely overlooked by the present generation of hf band operators. This is a pity, as modern materials make kites very easy to construct, and give better performance than some of the heavier materials previously used. This can be said with some confidence—a few months ago G8PG had never built or seriously flown a kite, but now his home-made models fly extremely well. If a kite is to support an antenna successfully it must be very stable in flight, thus allowing long periods of "hands off" flying, and it must have a good lifting capability. After various experiments, a design which meets these requirements has been evolved. It is simple and inexpensive to make.

Construction

The kite used is a square kite, flown with two corners in the vertical plane and two in the horizontal plane (Fig 1). It is made from part of one of the polythene bags used to collect the waste in a kitchen pedal bin, four of the so-called "18in garden canes" obtainable from multiple stores, and a small fishing hook swivel (the swivel isolates the kite from the twisting motion of the nylon kite line). Sellotape, plastic insulating tape and string will also be required during construction. One pedal bin liner bag should provide enough material to make two kites.

The method of construction is as follows. Lay two of the garden canes side by side and adjust the overlap until the total length is 24in. Using Sellotape, bind the two canes tightly together along the whole length of the overlap. Repeat the process, but now using the second pair of canes. Carefully measure out and mark the exact centre point of each pair of canes.

Make a cut down one side of the pedal-bin bag, then carefully open up the bottom, which is closed by means of plastic adhesive. The result will be a large sheet of plastic. Lay one pair of canes on the centre line of this sheet, with one end level with the bottom. Secure each end of the canes firmly in place by means of a piece of Sellotape. Lay the second pair of canes over the first and exactly at right-angles to them, and carefully align the previously marked centre points. Fix the ends of the second pair of canes firmly in place with Sellotape. With a pair of scissors, accurately cut away all excess plastic until the square shape shown in Figure 1 is obtained. Put more Sellotape over the four ends of the canes until they are firmly fixed to the plastic material, then further strengthen the joints with a piece of plastic insulating tape. Note that the kite is not collapsible—it is permanently assembled and is transported by laying it on top of the luggage in the boot of a car.

Balance the centre point, where the two pairs of cane cross, on a finger. If the kite is not balanced move the point at which

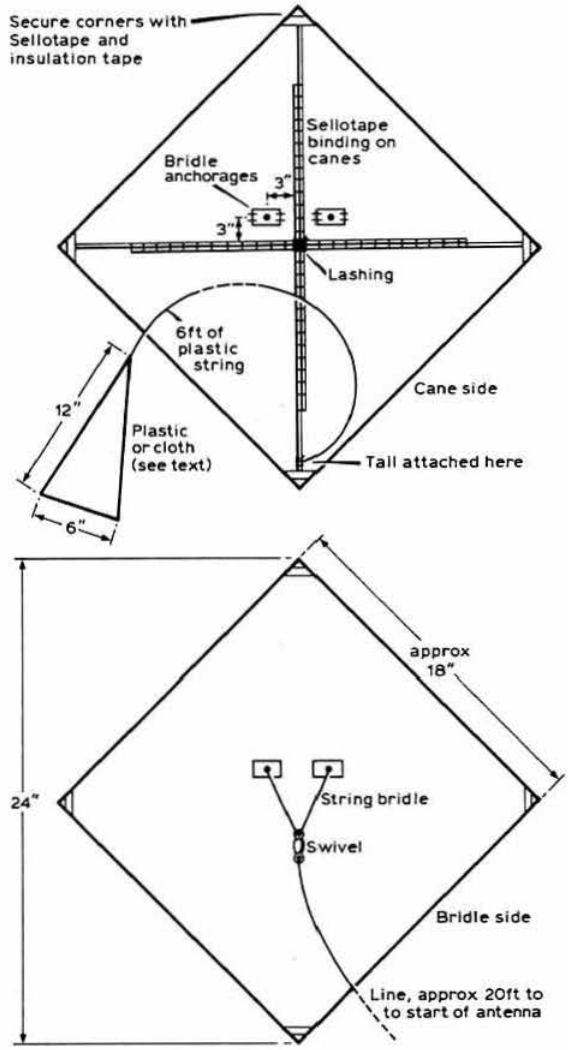


Fig 1. Construction

the two pairs of canes cross until balance is achieved, then lash the two pairs of canes together at this point with thin string.

To make the bridle, measure a point 3in above one pair of canes and 3in to the left of the second pair of canes. Fix a 1in length of insulating tape to each side of the plastic at this point. Make a small hole through the insulating tape and plastic at the point where the 3in guidelines cross. Do the same thing again, but this time at a point 3in to the right of the second pair of canes. Pass one end of a length of thin string through one of the holes, tie it to a pair of spent matchsticks, then pull the matchsticks up to the surface of the kite and fix them in position with insulating tape. Slip the fishing swivel over the free end of the string, pass the free end through the second hole in the kite, and adjust the length of the string to produce a V with its apex 4in from the surface of the kite. Position the swivel at the apex of the V and secure it in place by putting a couple of turns of copper wire around the string. Secure the free end of

*37 Pickerill Road, Greasby, Merseyside L49 3ND.

the string by means of matchsticks and insulating tape as already described. The kite is then complete. Assembly only takes a few minutes and the cost of materials is about 6p.

The line/antenna

The 150ft line used with the kite is made from the so-called "stunt kite line" available from toy shops; this is a very light nylon line, usually sold in 100ft lengths. The small plastic winders supplied with these lines are not suitable for antenna work, so when the line/antenna has been made it should be wound onto a piece of board 8 by 6in with slots 1in deep and 4in wide cut in the narrower ends. As the weight-lifting capacity of a kite is limited, the antenna suggested consists of 130ft of 28swg enamelled copper wire, plus a short lead-in. Experience by other operators using "invisible" antennas shows that this gauge can handle up to 150W.

To make up the antenna, reel off 135ft of kite line and fix it firmly between two supports, such as spades, driven into the ground. Clean 1in or so at one end of a reel of 28swg wire and solder 4ft of light, flexible, insulated wire to it. Attach the joint firmly to the kite line, 4ft from one end, by tying it on with thin string and then taping it in place. Keeping both kite line and wire under tension, reel off a further 10ft of wire and tie to the line at the end of the 10ft section, using thin string. Repeat this every 10ft until 130ft of wire has been reeled out. Cut the wire and secure the end of the last 10ft section to the line by twisting the last 2in round the line and taping them in place. The line/antenna is then wound on to the winding board, starting at the lead-in end.

In tests so far made, this antenna has been worked against a counterpoise consisting of the chassis of a saloon car. Coupling to the transmitter has been with the aid of the coupler shown in Fig 2. Components L1, C1 are chosen to resonate at the desired operating frequency, tap T1 is adjusted to provide a good match to the transmitter output, and tap T2 is adjusted to provide maximum rf into the antenna.

One point is worth stressing. Even in breezy weather the wind does occasionally die away for a minute or so, and this may allow the kite to sink gently to earth. If QRO equipment is being used to excite the antenna this might cause a mismatch at the transmitter output, so to avoid any possibility of damage it is suggested that QRO equipment be run at not more than 75 per cent of its rated power when attached to a kite antenna. No problems have arisen when using QRP all-transistor equipment.

Flying the kite

Before attempting to fly a kite, the following safety precautions should be noted:

(1) Never fly a kite where it can fall on power lines, telephone lines, roads, people or animals.

(2) Never fly a kite if there is a possibility of lightning in the area.

(3) Never fly a kite above 200ft (unless special permission has been obtained).

To prepare the kite for flying, tie the end of the line to the free ring on the swivel, and tie on the tail at the point indicated in Fig 1. If the wind is strong, tie one or more additional pieces of cloth on to the tail. Lay the kite flat on the ground, reel off about 60ft of line/antenna, and weigh down the winding board with a heavy stone. Return to the kite, stand back to wind, hold the line loosely in one hand, and launch the kite with the other hand. Move back quickly, paying out line until the antenna

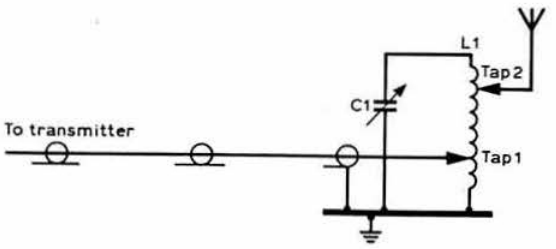


Fig 2. Coupling circuit

reaches a reasonable height, then move back to the winding board and pay out the remainder of the line/antenna.

If the kite is stable but rises sluggishly and then stops rising, take weight off the tail. If the kite takes up a position horizontal to the ground and then falls, try additional weight on the tail, and if this does not give a complete cure slightly shorten the bridle by moving the position of the wire binding. If the kite rises well but side-slips violently to earth, slightly adjust the position of the point at which the two sets of canes cross (by moving the lashing in the horizontal plane) until the instability is cured. Time spent in careful adjustment is repaid by the ability of the kite to fly "hands off" for two or three hours at a time. Once the antenna has been paid out, the bottom of the line/antenna should be secured to a suitable anchor at the point where the lead-in is attached. A small garden fork driven into the ground makes an excellent anchor.

Test results

Tests carried out from GW8PG/P used a 3W transistor cw transmitter to excite the antenna on the 14, 7 and 3·5MHz bands. Despite poor summer daylight conditions, excellent results were obtained. One 30min session on 14MHz produced contacts with seven European countries in an arc from Sweden to Spain, indicating that, even though there is some slope on the antenna, it is still largely omni-directional. On 7MHz all of western Europe was worked, and on 3·5MHz a distance of 250 miles was worked at mid-day. The advantages of a high antenna and an absolutely quiet location were also very apparent when receiving; QRP (3 to 9W) stations in seven European countries being both heard and contacted. Indeed it is not until one goes to a really quiet location that one can appreciate the unbelievable level of electronic environmental pollution that exists in most urban areas. □

technical topics

Pat Hawker, G3VA

A recent *TT* noted that the advice "keep it working" becomes increasingly more difficult as equipment becomes more complex—and also, paradoxically, as components become more reliable. In the old days a high percentage of all faults could be traced and cleared by the straightforward process of "valve pulling" (although, in fairness, one should admit that in practice a significant percentage of all valves achieve incredibly long working lives). While "keep it simple" is one way of making it easy to find and repair faults, one cannot shut one's eyes to the fact that some of the equipment now found in many shacks represents complex systems, even if much of the complexity is absorbed into the world of microelectronics. More and more of the equipment breakdowns can be traced to what are basically mechanical faults, particularly those stemming from the thin, fragile wires and less-than-perfect printed boards, or damaged connectors and switch contacts. Good mechanical design does not always go hand-in-glove with the ingenious electronics of modern equipment.

Keep it serviceable

So what can the amateur designer and constructor do to improve the "serviceability" of his equipment and so reduce the "mean time to repair" (mttr)? Some useful ideas have been put forward by Kenneth Jesson in an article "Product serviceability" in *Electronic Design* (No 8, 12 April 1978), and a selection of these and other suggestions are presented below:

Physical construction. How long will it take to reach and remove a faulty component in various parts of the equipment? There used to be one, now long-obsolete, British television receiver which it was said involved removing over 50 screws and much desoldering to reach some of the vulnerable stages. Today much equipment is built on a single large pcb, as this is the least expensive form of construction for a manufacturer. But for better serviceability it may be preferable to use a number of smaller boards fitting into a mother-board using edge connectors; this may allow faults to be more readily isolated, traced and repaired. The modular concept, with small boards, also tends to make component replacement easier and less time-consuming, as well as facilitating field replacement using spare modules.

Labelling. Labelling and indicating components so that they can be identified from circuit diagrams also results in better serviceability. Where boards could require servicing on both sides, component identification should be provided on both sides. It is useful to be able to identify readily which is pin 1 on an ic, or which is the negative side of a capacitor, or the emitter of a transistor: a tip here is to use a "square pad" connection point to distinguish this pin or lead from the circular pads used for the other connections. It adds nothing to the cost.

Monitoring. Miniature light-emitting-diodes can form the basis of systems for instant visual monitoring of a wide variety of "fault" or "regular" conditions by means of "green", "red" and "flashing" displays (five-state led displays can be devised using dual red/green led units combined with a 555 timer, *see later*). Some monitoring suggestions made by K. Jesson include "green" to show whether a power supply is regulating, or "red" to indicate it is in current limit; locked or unlocked phase-locked loops in synthesizers; an indication whether a circuit is sampling properly, etc. Low-current leds and torch bulbs cost less than miniature meters but give an immediate indication that a system is "go" or "no-go".

Crystals and crystal oscillators

Many amateurs still look upon a crystal-controlled oscillator as a high-stability system, regardless of such factors as capacitance loading, drive levels, ageing, and the differences between parallel, series and overtone modes, etc. It is often not recognized that ideas on frequency stability have changed over the years to the stage where plugging any crystal into any oscillator circuit cannot be expected automatically to provide the sort of stability and performance demanded today. It has often been pointed out that not every channelized vhf transceiver comes up truly on channel or stays truly on channel. And although modern crystal units are more reliable and less subject to contamination from dirt than the old war-surplus units, nevertheless the size of the crystal plate is generally very much smaller, calling for extra care in drive levels. Again, stability of crystals, like good wine, improves with age, while the highest order of frequency stability tends to come from crystals with fundamentals in the range 4–5MHz.

A useful survey article "Quartz crystals—gems for frequency control" by Don Nelson, WB2EGZ, appears in *Ham Radio* February 1979, pp37–44. This includes a considerable number of oscillator circuits, mostly of familar form. Several of the overtone oscillators, however, may be new to some readers and examples are shown in Figs 1–3.

The following general advice is also based on WB2EGZ's article:

When ordering a crystal for a given frequency, you must specify series resonance or parallel resonance at a specified load capacitance. It is recommended that operation should be in the positive-reactance mode when above series resonance,

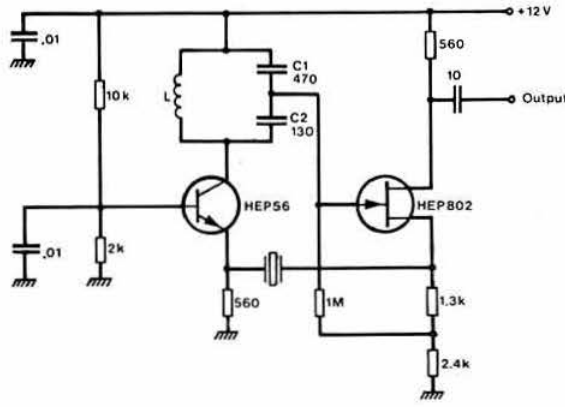


Fig 1. A typical Butler overtone oscillator (20–100MHz). The second stage should always be a fet, as the circuit is not reliable with two bipolar devices (two fets may be used). Overtone frequency determined by LC values

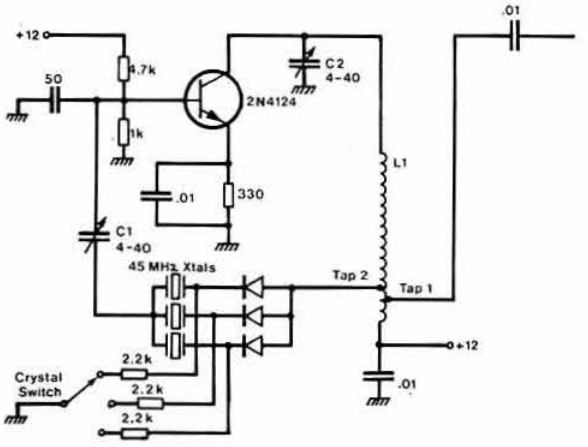


Fig 2. Overtone oscillator with crystal switching. The large inductive phase shift of L1 is compensated for by C1. Since overtone crystals have very narrow "pulling" bandwidth, the trimmer has a smaller effect than with fundamental-mode operation

and in the negative-reactance mode when below series resonance. Oscillators using fundamental crystals usually operate in the positive-reactance mode with a trimmer for exact tuning.

Crystals with frequencies higher than 20MHz are usually overtone types and it is generally practicable to excite AT- and BT-cut plates for 3rd, 5th, 7th and 9th harmonics (the overtone frequencies are approximately, but never exactly, equal to the harmonic frequencies). To use an overtone crystal most effectively, a high-Q tuned circuit must be used to excite the crystal in the desired harmonic mode, and no other resonances should be present that might excite the crystal to another mode. Overtone crystals are designed for series resonance and are not suitable for direct fm or vxo systems; they can be used for phase-lock operation. Such characteristics as temperature coefficient and equivalent resistance apply only at the design frequency and will differ for operation at the fundamental or other harmonic orders.

Old pressure-type crystal units with larger pieces of quartz than their modern equivalents will withstand higher drive levels; changes in drive level affect the frequency, and crystals operated at high drive levels may become unstable, sometimes

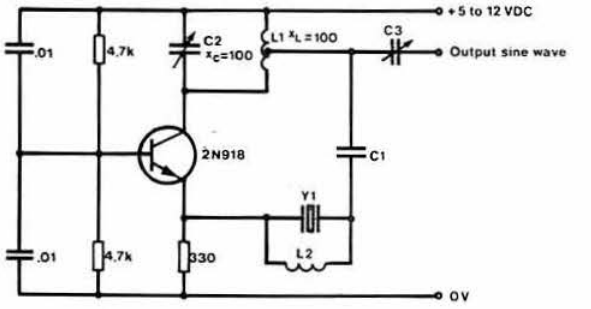


Fig 3. A 50–100MHz overtone oscillator using 2N918 bipolar transistor and AT-cut overtone crystal. L1-C2 tune to required frequency. L2 is arranged to resonate at oscillator frequency in conjunction with crystal shunt capacitance (about 6pF) to tune out effect of this capacitance. At 90MHz L2 is about 0·5μH. C3 is varied to match output

jumping frequency into a spurious mode. Excessive heating may cause a permanent shift in frequency (NT-cut crystals are particularly vulnerable to fracturing). Generally, use lowest possible drive levels compatible with good starting characteristics.

Pressure-type crystals may become inactive due to particles from the rubber gasket, but careful cleaning with alcohol or similar solvent will bring them back to life. This cannot be done with solder-seal holders, which should not be opened (or it will result in a frequency shift due to change in pressure). Natural quartz still has a higher Q than synthetic quartz, although this has the advantage of perfect crystalline structure and uniform size.

Heart attacks and geomagnetic activity

In *TT* recently (January 1979, p30) reference was made to the strange but strong correlation that has been found between sunspot maxima and virulent flu epidemics. Other medical researchers appear to have found equally odd and inexplicable links between solar activity and health matters. For example, Dr S. R. C. Malin and Dr B. J. Srivastava have reported, in *Nature*, an apparent link between the daily number of admissions to the cardiac thoracic wards of two hospitals in India and geomagnetic data in the form of daily sums of Kp (the planetary index of geomagnetic activity) normally used as a measure of the effect of solar particle flux. The data have suggested that admissions tend to increase with magnetic activity to a much closer degree than could be explained by chance. There seems no logical reason why the heart should be affected by what are, after all, relatively weak changes in the magnetic field, and the researchers admit that there may be some other cause (of solar origin?) responsible for both the magnetic and medical phenomena. It all becomes curiouser and curiouser!

Beam with multi-band element

It is still not universally recognized that a plain and simple dipole element (no traps) can be used effectively on, say, 14, 21 and 28MHz provided that the transmission line is tuned and able to withstand a high swr without undue losses. The technique is to use a centre-fed element with the whole antenna/feeder system brought into resonance by means of a suitable antenna tuning unit. For example, some years ago Ed Tilton, W1HDQ, described a 33ft 2in "guy-wire doublet" for 14/21/28MHz using any convenient length of open-wire transmission line (*ART5/6*).

In *Amateur Radio* February 1979, Steve Bushell, VK3BHQ, uses this approach for a low-cost hf beam: Fig 4. This started off as a 14MHz monoband but he soon discovered the driven element could be used effectively on 21MHz (extended Zepp)

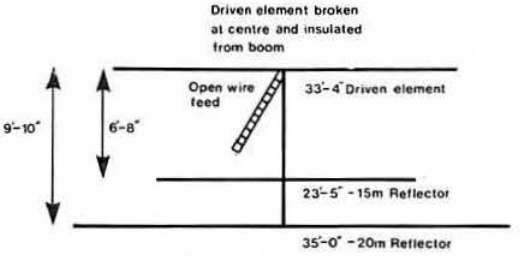


Fig 4. VK3BHQ's multi-band Yagi antenna using open-wire feeders to allow use of 33ft driven element on 14, 21 and 28MHz

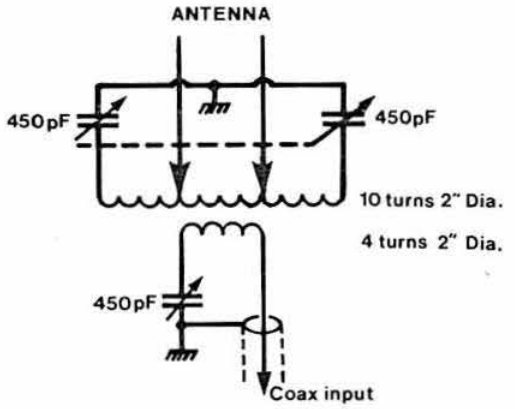


Fig 5. Antenna tuning unit to provide balanced output to the open-wire feeders of the VK3BHQ array. Taps are adjusted to provide correct matching and should be an equal number of turns from the centre of the inductor

and 28MHz (two $\lambda/2$ in phase). He added a $\lambda/2$ reflector for 21MHz but considers that even without a further 28MHz element the system also provides good forward gain on that band. Total cost was around $A45. One form of suitable atu is shown in Fig 5.

Alignment aid improvements

In *Radio Communication* January 1976, J. R. Compton, G4COM, described in detail "An alignment aid for vhf receivers" which enabled vhf receivers to be readily adjusted for maximum signal-to-noise ratio, rather than just for maximum gain. It provides a continuous read-out of the difference between the audio output of a receiver with no rf input, and the output when a wideband noise generator is connected to the antenna socket of the receiver. This unit has gained wide respect as a genuinely useful item of test gear, and follow-up items on alternative noise sources were contributed by LA8AK (*TT* February 1978, pp133-134) and ZL2APC (*TT* June 1978, p511).

Now Jan Martin Noeding, LA8AK, has come up with some modifications which he considers extends the usefulness of the unit still further. He writes:

(1) Experience indicates that the original value of capacitor C1 is too large; it is preferable either to substitute a 10nF capacitor or to remove the component altogether. This capacitor limits the noise generated and so reduces the accuracy of the instrument. After the value had been reduced it was found that the unit provided a "steadier" reading, with less "drift" of the meter. The logarithmic amplifier can be improved by using a CA3130 device which has greater bandwidth than the 741.

(2) A crystal filter in a receiver acts as a "delay line" to the signal and, when dealing with any receiver having a crystal filter, it is preferable for the chopping signal to be delayed by a corresponding time. This delay time will vary from receiver to receiver, but an average time delay for an ssb filter is about 1ms; cw filters have greater delay times. Fig 6 shows the circuit diagram of a simple means of adding a delay circuit to the multivibrator; the discrete transistors correspond to those used in the original unit. LA8AK considers that the easiest way to adjust such an oscillator without using either trimmer-capacitors or potentiometers is to use parallel connections of resistors and capacitors, as indicated. When C1 and R1 are chosen to provide the correct time constant, the frequency may be tuned up or down by *adding* resistors (R2) or capacitors (C2). The actual frequency for this application is not critical, so no final adjustments should be necessary.

LA8AK mentions that he uses only a single power supply line from a standard 12V psu, the negative voltage being supplied from a cmos inverter using an MC14049BCP device and a two-diode rectifier/voltage doubler arrangement. He also reports that LA6MQ is developing a new version of this useful alignment aid, following rather different principles and requiring only a single supply voltage.

Hypodermic needles—a warning

In reporting the use of a stainless steel hypodermic needle as an effective ic desoldering device (*TT* January 1979, p32) G4DYF confessed to obtaining a couple of used needles, although he pointed out that the size required is not normally used for making injections but for loading the syringe.

Richard Francis, SRN, G4EIE, stresses that although it is possible to obtain such needles by devious means, needles which have previously been used by medical or nursing staff can be very dangerous. He writes:

"The possibility of contracting hepatitis from a contaminated needle cannot be over-emphasized. Hepatitis is a condition which can be fatal and, although precautions are taken to prevent contaminated needles being lost, they can sometimes get through the isolation area. Although the desoldering technique is a splendid one—*not with hypodermic needles which have been used.*"

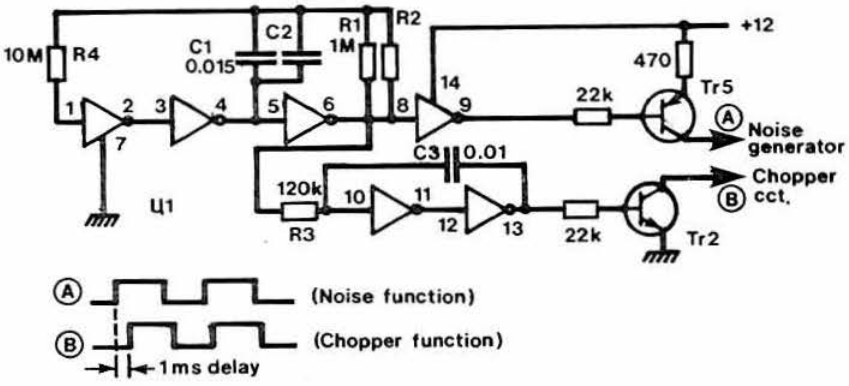


Fig 6. LA8AK's modification to the G4COM alignment aid provides a delay circuit to the chopping multivibrator

Dual-polarity and high-current supplies

A. Bayliss in *Electronics Australia* (December 1978) provides a simple solution to the problem of obtaining a dual-polarity supply (positive and negative rails with respect to 0V) for solid-state devices when using mains transformers not having a centre-tap on the secondary winding: Fig 7. This uses a form of voltage-doubler arrangement, creating a centre tap for the dc output and then using two similar zener diodes to regulate the supply so that it is balanced about 0V. Component values and ratings need to be chosen to suit the output voltage and load.

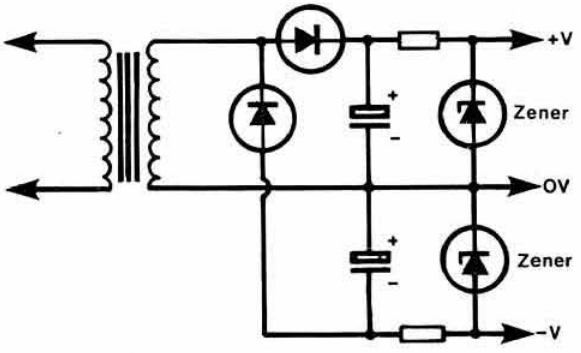


Fig 7. Dual-polarity low-voltage supply without centre-tapped transformer winding

A rather different psu requirement is beginning to make itself felt: the very high currents now demanded by the packaged solid-state power amplifiers rated at up to around 100W vhf output. For, while plenty of low-cost designs capable of providing up to around 4–5A have been published, one now needs some 15–20A. There are some ex-computer units knocking about; but another solution (suggested by Robin Hewes, G3TDR) is to use, even for fixed operation, a spare large-capacity car battery plus trickle charger. It is perhaps not an elegant solution, but well-regulated 20A supplies can be quite costly. Some readers may be tempted to suggest there is another solution, called valves, but true solid-state enthusiasts would reject that as the coward's way out!

Any other ideas for a low-budget high-current supply?

Five-state led display

In *Electronics* 15 March 1979, D. F. Fleshren describes how he uses a five-state led display to monitor a paging system. Fig 8 shows his system, which uses two relays and a 555 timer to send an appropriate signal to a dual red/green led unit (Monsanto MV5491, Xciton XC5491 etc).

Off (no power) indicates that paging has been cut off to that station or the region in which it is located.

Steady green signifies that the station is operational, but not being paged.

Steady red is the individual station's paging signal.

Flashing green tells the user that all stations in the system are being alerted.

Flashing red signals an emergency situation to all monitoring stations.

Clearly such a system could readily be adapted to meet the requirements of, say, a transceiver. It might also be possible to replace the relays by means of current steering diodes.

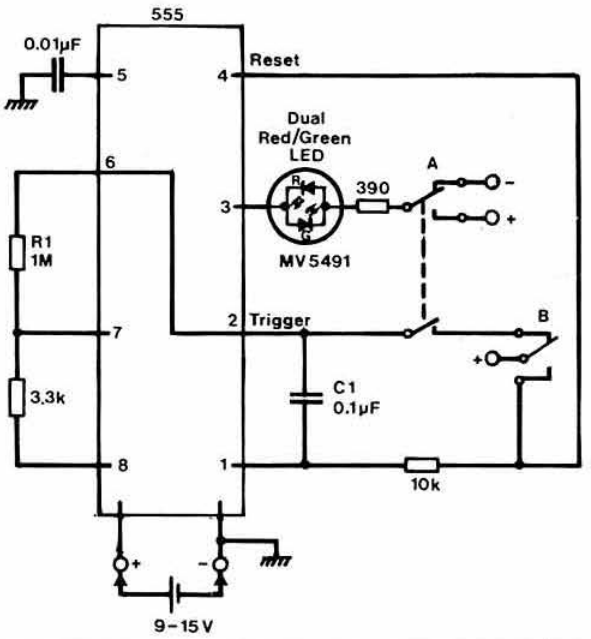


Fig 8. Five-state led monitor, with steady or flashing green/red display. While developed for a paging system, it could be adapted to amateur equipment

The original system works as follows. An external signal triggering relay, A, controls the colour of the led, changing it from green (idle) condition to red. Relay B puts the 555 timer in the astable mode, changing the dc state of the led to an on–off oscillation of about 7·5Hz at a duty cycle of about 50 per cent. The frequency can be adjusted by selection of R1 and C1. To obtain the emergency red flashing mode, both relays must be tripped by external signals. Current drain (not including relays) is about 40mA.

CW over two-core cable

Brian Castle, G4DYF, feels that there is still a role for line communication using morse code. Such a signalling system would be particularly useful to pairs of youngsters without a licence and wanting to gain practical experience of cw operating in readiness for the day when the signals can be launched through the aether. Most of us still remember the traumatic experience of finding that while the Post Office examiners are satisfied with just copying and sending, real-time, two-way operating requires in addition fluency in procedure signals, codes and abbreviations; such skills cannot be acquired readily from even the most sophisticated random code generators, tapes or records.

G4DYF considers that while circuits that provide two-way signalling are published occasionally, they almost always call for more than two wires (or two wires plus earth) between the stations if the sender is to be able to monitor his own sending. Today, wire tends to more expensive than a few extra components, and it can prove cheaper to provide a tone-oscillator and associated battery at both stations provided that only a two-core linking cable is required.

His unit makes use of two simple uni-junction transistor relaxation oscillators (reported in *TT* June 1974 by Sven

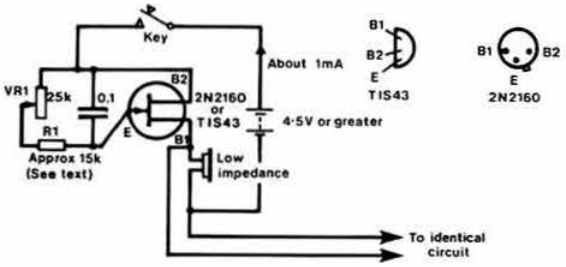


Fig 9. Two identical units provide two-way morse signalling over two-core interconnecting cable while allowing sender to monitor his keying. Note that the device is a unipolar transistor

Weber, G8ACC, from an idea by a Finnish listener), as shown in Fig 9. No blocking capacitor is required because the uni-junction devices are non-conducting in the idle condition. For privacy, cheap low-impedance earpieces can be substituted for the loudspeakers. R1 (selected to suit and usually about 15kΩ) ensures that oscillation does not stop at any setting of the RV1 frequency control. The volume is low, but adequate for personal listening.

The comment about privacy and personal listening reminds me of the day in September 1938, at the height of the Munich crisis, when I reported to my local Post Office for a morse test (yes, in those days most Post Offices still had staff with experience as manual telegraphists, so there was no need to travel miles to take the test). To my chagrin the local postmaster (who was the examiner) produced a letter from one of my neighbours claiming that I had been transmitting in morse for weeks. What he had heard was my practice sessions on an oscillator and loudspeaker!

The close-spaced pioneers

My suggestion (*TT* January 1979) that the first close-spaced rotary Yagi antenna (and the original plumber's delight) may have been the 14MHz array described by Walter Van Roberts (then W3CHO now W2CHO/K4EA) in the January 1938 issue of *Radio,* has brought in very interesting letters from the two surviving members of the "Roberts/Brown/Yagi" triumvirate. It has also been possible to make a search through the 1937-8-9 volumes of *QST* although I have not yet located the corresponding volumes of *Radio.*

As a result of the extra information gleaned, I feel it is now possible to put on record the following summary of events:

(1) The wide-spaced Yagi antenna was well established in both professional and amateur circles by about the mid-'thirties. G6FU, for instance, has drawn attention to designs and polar diagrams in *The Radio Handbook,* 1938 edition. However, such designs accepted without question the belief that reflectors should be spaced λ/4 and directors 3λ/8 (usually) from the driven element, making "flat-top" construction very difficult.

(2) The wide-spaced concept was first exploded in the long and very detailed paper by Dr George Brown of RCA in *Proc IRE* January 1937. This paper, representing some years of intensive work, covered the design of both driven and parasitically-excited arrays in monopole form, and remains now, as then, the definitive paper on this whole class of end-fire arrays.

(3) Dr John Kraus, W8JK, very quickly recognized the vital importance to amateurs of the close spacing (he acknowledges his debt to Brown's paper in his book *Big Ear*) and published the first of his many articles on 8JK "flat-top" close-spaced arrays in *Radio* March 1937 (see also *QST* January 1938). These were thus the first close-spaced flat-top rotary arrays but, although Brown's paper indicates how driven arrays can be made uni-directional, the basic 8JK arrays were *bi-directional.* It was not until considerably later that such driven elements were implemented as uni-directional hf arrays in the form of the G8PO, ZL-Special, HB9CV and, most recently, the UA3IAR antennas.

(4) The Roberts rotary 14MHz Yagi, as illustrated in *TT* (January 1979) and published originally in *Radio* January 1938, was inspired by the parasitically-excited rather than the driven array section of Brown's paper. It emerges firmly as the first, published, unidirectional beam of this type and is thus the progenitor of the vast majority of present-day amateur beams. It also emerges as the first beam to use the "plumber's delight" form of construction.

While the work of both George Brown and John Kraus has rightfully long been recognized in both the professional and amateur fields, the practical development by Walter Roberts of the close-spaced flat-top Yagi (a development acknowledged briefly in *QST* October 1938 in a note "Principles outlined by Brown, simplified by Roberts") has been overlooked and forgotten for 40 years! Roberts, incidentally, later published valuable papers in *RCA Review* on the development of the folded dipole and the stability of variable frequency oscillators (acknowledged by E. O. Seiler, W8PK/W2EB, when he developed the "Seiler" oscillator).

A couple more interesting sidelines. That part of Dr Brown's paper which inspired the development of the W8JK driven-array had previously (in 1932) been rejected by an IRE "referee". George Brown and Jess Epstein themselves built a dual-band 14/28MHz array for an amateur colleague (exact date unknown) but were too busy to respond to requests from *QST* to describe it in print. During the war close-spaced arrays were supplied to the military and resulted in the receipt of several protests from "Colonel Blimps" that the elements were too close together! Les Moxon, G6XN, has drawn attention to an ARRL *Handbook* vhf design with wide-spacing that survived in print at least as recently as the 1970s!

And Walter Roberts, now well over 80 years of age, ruefully recalls an earlier occasion of receiving "feedback" from England. In contact with a London amateur in the late 'thirties, he innocently asked him to phone his cousin and pass along some trivial family message. This was done but, unfortunately, his cousin was the then Postmaster General, who was annoyed at becoming a party to a breach of his own rules about amateur traffic handling. As Walter Roberts points out, any possible loss of revenue to the Post Office was more than made good when the incident resulted in five transatlantic cables to clear it all up!

Zip or coaxial cable?

A difference of opinion that may bring back memories to old-timers has been aired recently in the columns of *Ham Radio.* In the April 1978 issue, Evert Fruitman, W7RXV, wryly described his attempt to use cheap zip-cord cable (the modern equivalent of electric flex as used on low-wattage domestic appliances) in lieu of coaxial cable for feeding hf antennas. His advice, like *Punch* on marriage, can be summed up as "don't". He reported power losses of some 60 per cent with 30–60ft of zip-cord, even on the 3·5MHz band.

But in the February 1979 issue, Tony Garatt-Read, ex-G3VBZ/W1, comes back with an account of his successful use of zip-cord and loudspeaker cable for portable/temporary hf operation up to 21MHz, pointing out that his worst-case loss was of the order of 0·9dB which, while not comparable with RG-8/U cable, "is a figure I can certainly live with". He admits that the unknown impedance may present problems, and he has made some tests which indicate that typically this is around 100Ω and provides a good match to most real antennas at modest height.

Before coaxial cable became readily available in the 'forties, many amateurs regularly used electric flex to feed dipoles, or for "link coupling" between those widely separated stages of the old rack and panel transmitters. But one soon found that some cables when used as a link connection on 28MHz failed to deliver more than a small part of the drive even when the cable was only 2–3ft long. Different types of cable could give very different results.

Some amateurs even constructed their own coaxial cable using beads as spacers, plus what must have been a great deal of patience.

The real answer to low-cost transmission line, at almost any frequency, is open-wire line, including in this category punched-out 300Ω ribbon cable or its commercial equivalent, such as the Swedish cables made by Borens Fabriks AB (Bofa) which can have a loss of less than 1dB/30ft even at 500MHz.

Most large commercial hf installations, where antennas are often located hundreds of feet away from the station building, continue to use open-wire systems (often of the four-wire type) and restrict the use of coaxial cable to the final distribution circuits within the building. Long runs of coaxial cable represent an increasingly expensive way of losing rf power and significantly reduce the flexibility of an antenna system, as indicated in the earlier item "Beam with multi-band element".

G4BWE's simplified stereofilter

Many readers will remember the elegant form of audio signal processing (the "stereocode") developed some years ago by Dud Charman,G6CJ, and R. Harris, G3OTK, as first described in *TT* (August 1973) and with full circuit details in *Radio Communication* September 1975, pp674–81. The stereocode enables a form of "stereo image" to be synthesized from incoming signals, and these are then presented to the listener as though a small portion of the band was spread out in front of him. There can be little doubt that this form of signal processing helps an operator to really dig down among interference and pick out the wanted station. However, the use of a number of all-pass filters to form an analogue phase delay line makes the system fairly complex to implement.

Stephen Price, G4BWE, has been investigating a much simpler way of synthesizing a pseudo-stereo presentation, based entirely on amplitude and not worrying about phase. He writes:

"Although relative phase, or time delay, is undoubtedly an important factor in the operation of the complex mechanism by which the brain determines direction, or 'localization' of sound, it is true also that amplitude plays a major role. A simple experiment to illustrate this may be carried out using a domestic hi-fi system: if the amplifier is switched to 'mono' and a programme monitored on stereo headphones, the sound will appear to be positioned at the centre of the listener's head, due to the fact that equal amplitude, or proportion, of the signal is being presented to each ear. However, if the *balance* control of the amplifier is rotated from left to right, the sound appears to glide in sympathy, moving steadily from one side of the listener's head to the other as the relative amplitude of each stereo channel is altered.

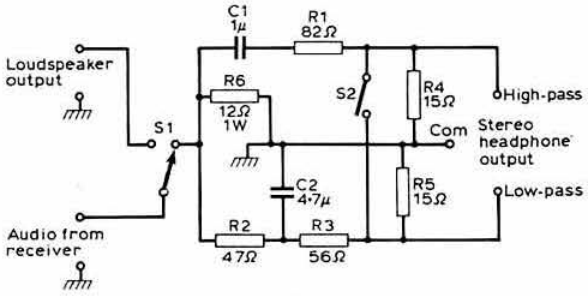


Fig 10. G4BWE's simplified stereofilter using passive cross-over network

"If an audio filter network consisting of separate high-pass and low-pass sections is interposed between the receiver and a pair of stereo headphones, it is possible to distribute the energy of the audio spectrum so that, for example, as the pitch of a cw note rises, so the signal will appear to travel from left to right. The situation is less complex with headphones than with loudspeakers, where each ear will hear some sound from each speaker. To obtain this effect on headphones it is necessary only to feed the right headphone through a high-pass section and, conversely, the left transducer via a low-pass section; in other words a 'cross-over filter' as used in hi-fi practice to feed signals to 'woofers' and 'tweeters'.

"Fig 10 shows such a simplified 'stereofilter'. C1 in conjunction with R1 and R4 form a first-order high-pass network; C2 and R2 provide low-pass filtering for the other headphone. R1 plus R4 and R3 plus R5 form potential dividers which not only attenuate the output but also provide a necessary degree of isolation between the filter function and the headphones. The stereofilter will thus be compatible with stereophones having driver impedances in the range 8 to 2000Ω/channel when fed from a low impedance loudspeaker output socket. S1 is a loudspeaker/phones changeover switch; while S2, when closed, results in a 'mono' output and, by doing so, provides a vivid demonstration of the effect of the stereofilter!"

G4BWE built his unit in a small plastics case using non-electrolytic capacitors throughout; however, reversible electrolytic capacitors of the type used in loudspeaker crossover networks could be used for C2 (4·7μF). He makes no extravagant claims for this simple form of sterofilter, and advises some experimentation with component values if, initially, the stereo image appears to be "unbalanced". It will be appreciated that the "bandwidth" of the receiver depends upon many factors, such as i.f. selectivity, and this type of filter is not intended for use with the sort of highly-peaked cw signal resulting from narrow i.f. or af filtering. However, G4BWE considers that this form of design can be justified on the grounds of extreme simplicity; the unit requires no power supply and no complex "setting-up" procedure and, finally, not only makes cw listening more enjoyable but can enhance reception of almost any transmission, even ssb (although it must sound a little as though the operator at the other end dashes across the room everytime the pitch of his voice rises—or perhaps I have got that wrong—G3VA). □

International Conference on Antennas and Propagation

by L. A. MOXON, G6XN*

A paper entitled "High frequency antennas and propagation modes in relation to the amateur service" was presented by the author on behalf of the RSGB, at the International Conference on Antennas and Propagation held at the IEE on 28-30 November 1978.

The author pointed out that amateur requirements for high frequency communication differ considerably from those of other services, and these generate a number of interesting antenna problems for which he had been seeking improved solutions. The differences also involve propagation, since the amateur is not interested in maintaining contact for long periods over a particular link but tends rather to take advantage of the prevailing opportunities, with perhaps a bias towards the longer distances. Reflecting his own interest in this field, the author presented the results of observations over the long path to Australia, which tended to prove that such propagation normally makes use of chordal hop modes without intermediate ground reflections.

In support of his belief that chordal hop propagation can involve a considerable degree of ionospheric focussing, provided the angle of radiation is low enough at both ends of the path, the author reported the results of some tests he had just completed, operating with low power equipment from steep ground slopes. These tests were conducted in conjunction with VK3MO, who was known to have achieved an abnormally low angle of radiation which had been confirmed by measurements from an aircraft. There was evidence that for best results a steep drop of at least 700 to 800ft would be required, together with an unobstructed horizon.

Such sites are difficult to find, but one near Balmeanach on the Isle of Mull, point A in Fig 1, appeared to be suitable. Bad weather made it necessary to operate from the lower point, B, but, despite this, ssb voice communication was established with VK3MO using 3W p.e.p. into an inverted-V dipole at 20ft above the slope, and it was maintained down to a p.e.p. of only 25mW. A further test some days later from a site in the Lake District, very similar to A, produced a result judged to be about 10dB better, consistent with the expected height gain, though unfortunately there was no provision for reducing the power to 2·5mW!

Even on least favourable assumptions this would indicate a total path loss comparable with the free space value, suggesting enough focussing to offset any D-layer absorption or other losses in the ionosphere. The likelihood of focussing is known to be greater the lower the angle of incidence at the ionosphere, and it is applicable only to chordal hop modes since, with conventional multihop propagation, any focussing in the ionosphere is offset by defocussing at the ground reflections. It

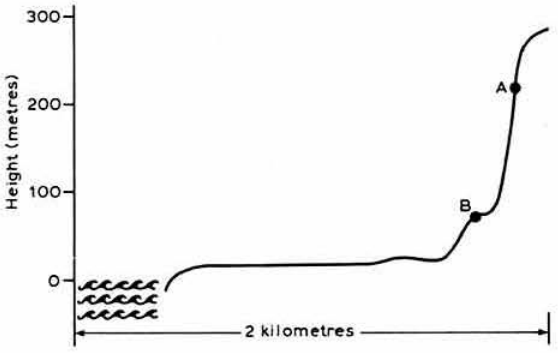


Fig 1. Profile of the Balmeanach site

was suggested that, in fact, most amateur communication over very long distances takes place via chordal hop modes.

Antenna projects described by the author included:

(a) Development of very small beam arrays, down to 10ft square for 14MHz, using large end-loading capacitances with neutralization of the resulting excessive coupling between the elements, as described in *Technical Topics*, February 1977 and June 1978. It was pointed out that most amateur beams employ close-spaced elements and thus make use of a subtractive method of beam formation, in contrast to the additive principle which is applicable to large arrays. As a result they exhibit all the characteristic features of "supergain" arrays and should be so regarded.

(b) Multiband operation without traps was described, using the "disappearing inductance" principle as featured in *Radio Communication*, April and May 1977. It was pointed out that this type of resonator, Fig 2 (a), has the particular merit of allowing any conductor to be tuned to, or away from, a given frequency without cutting into the conductor; this allows one to use masts or rigging as antennas, and can also be used to overcome nulls in the radiation pattern of an antenna caused by the presence in its vicinity of other resonant metal structures.

A new version of the linear resonator, Fig 2 (b), was described. This provides operation on three frequencies without the use of relays, and is somewhat simpler than the methods described in the original article. C1 and C2 provide resonance at 28 and 21MHz respectively but, although lower frequency resonances are not much affected by higher ones, in the absence of C3 the path via C2 acts at 28MHz like a

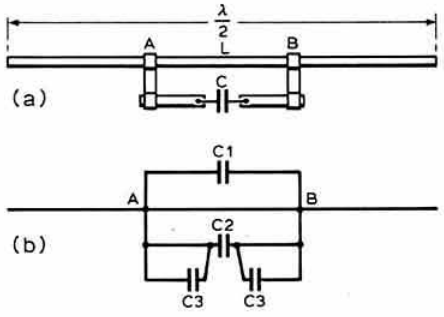


Fig 2. Two versions of the resonator

*1 Stoner Hill House, Froxfield, Petersfield, Hants.

shunt inductance which is varying with frequency, and this results in a very narrow bandwidth. The capacitors C3, which are relatively non-critical in value, form additional linear resonators which remove the effect of C2 at 28MHz.
(c) Antennas for low heights. It was mentioned that a dx capability more or less independent of height can be achieved by the use of arrays of very short end-loaded vertical dipoles. (Details of such a system for 7MHz are given in the *Radio Communication Handbook*, Vol 2, p12.67.)

The story behind the story

A non-technical description of how the tests in September/October 1978 were carried out was not included in the paper, but is appended here because of its possible interest to those amateurs who enjoy outdoor activities.

The weather in Scotland in September/October 1978 was quite apalling, and made it virtually impossible to be in the right places at the right times. Occasionally there would be a brief pause in the rain and gales, and the author would dash up the nearest west-facing slope, hoping to repeat his successes of 10 years ago ("Pocket-portable phone dx", *Radio Communication* November 1972, pp724–7) — but no luck, despite having three times as much power!

One of these locations was quite interesting, with the antenna spanning a ravine below a waterfall. It had to be "walked down" by crossing and re-crossing (as he was single-handed) the swollen stream above the waterfall. *Reception* excellent, but no dice!

What this proved was the extent to which competition from Europe has increased in recent years. Invariably any strong stations called would reply to some other G or European, and it was soon obvious that nothing could be done without skeds. There was little chance of keeping these except from relatively inferior locations, accessible by car and falling a long way short of the specification which provided the main purpose of the exercise.

Several such expeditions were made, and requests by G6DW to VK stations, asking them to listen for the author on the off-chance that he might be on frequency, resulted in contacts with VK3AD and VK3AOF. One other contact was obtained with VK6GU by gate-crashing his sked with G2MI. Meanwhile, by correspondence, and with some help from G4GI, the author had come to an arrangement with VK3MO which resulted in four contacts (100 per cent success), including the two contacts featured in the IEE paper. It is possible these may constitute some sort of record, as communication was maintained down to 25mW p.e.p. with (from the better location) something in hand, although this was not the purpose of the exercise. The idea was that reducing the signal to the noise level at VK3MO would provide the best chance of obtaining a meaningful estimate of the path attenuation.

The final test, which alone fulfilled the main purpose of the exercise, proved a bit of a cliff-hanger in more senses than one! The author and his xyl had pitched camp the night before near Silecroft in the Lake District, about three miles from the foot of the desired slope and beyond a level crossing with no other access. Then they learned, by the merest fluke, that the crossing was being closed from midnight for work on the line! Problem, to be "on location" with the antenna erected by 0730gmt, starting with a 20min walk to the crossing and a climb on foot of 700ft after driving to the foot of the slope.

Luckily it stayed fine! □

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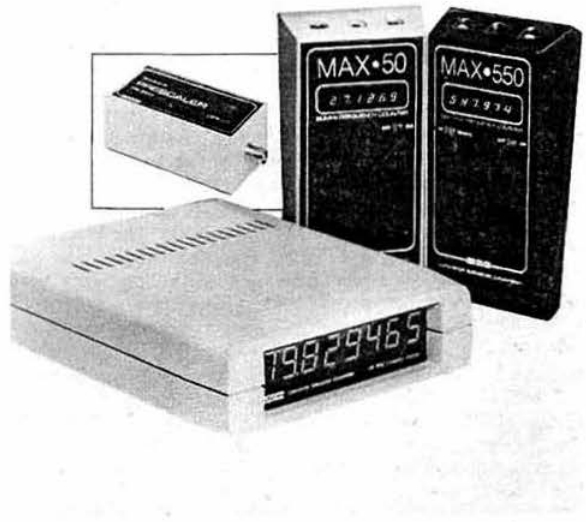

The MAX 50, MAX 550, MAX 100 (foreground) and PS500 (top left)

Now it can be told — the Fareham "saga"

by J. W. SWINNERTON, G2YS*,
member, Interference Committee

MUCH of the work of RSGB committees goes unreported, either because it is of a routine nature or because it relates to delicate negotiations, when to "tell all" would be inopportune and damaging to the interests of members as a whole. Members complain from time to time that the Society is either unaware of a problem or is pursuing a deliberate policy of "masterly inactivity".

The following is a brief account of just such a problem which has engaged the efforts of the Interference Committee and others for almost five years. Two years after negotiations began, the matter was "discovered" elsewhere in the amateur radio press and was written up into a "story" with statements that were often very far from the truth. The following is an attempt to set the record straight and to suggest what lessons can be learned from a very protracted dispute.

The saga opens

The story centres on an amateur in the Fareham area of Hampshire, the occupant of a council house. In 1974 he received a letter from the housing manager alleging that his transmitting activities were resulting in interference to neighbours' entertainment equipment and that this was in contravention of the terms of the tenancy agreement. Furthermore, the attachment of a wire antenna to the house had been made without the authority's prior knowledge or approval. On examination, the tenancy clause invoked proved to be one stipulating that the tenant should not "cause annoyance to neighbours"—a general and wide-open dictum framed with a very different purpose in mind, but to the layman capable of acting as a restriction on amateur radio. Indeed, the amateur was instructed to "cease transmitting"; non-compliance and failure to remove the antenna would lead to the service of an eviction notice.

The amateur then appealed to the RSGB for help, and the case was referred to the Interference Committee. The first reaction was to play it cool and to start again from square one, by removing the antenna as demanded and then submitting a formal application to the council, as local planning authority, for an installation which was mechanically and electrically safe. It was now 1976, and the council asked the tenant to agree to an extension of the statutory time for considering the application because it was unable to reach a conclusion. Naturally the amateur chafed at the delay, and in the meantime put up a temporary antenna pending a decision. This resulted in a peremptory order to remove it or quit.

*29 Beacon Way, Rickmansworth, Herts WD3 2PF

It becomes news

By this time the affair had become a talking point among the local amateur fraternity, and it was not long before the local press scented a story. The sub-editors had a field day, producing such journalistic gems as "Radio Ham Fisted", "Beef over Radio Hams" and "Radio Hams Get the Cold Shoulder". Ugh! Meanwhile the Society had written a "background" letter to the council and had requested a personal interview for two representatives to discuss the case. It was finally agreed that they should meet the chairman of the Housing Committee and the housing manager, and in October 1976 the author and Geoff Gwilliam, G4FJO, (representing local amateurs) went to the council offices—to find themselves faced by two councillors and the council's solicitor in addition to the two officials they had set out to meet! The meeting might best be described as polite but profitable, thanks greatly to the skill of G4FJO in putting the local point of view, while G2YS put the Society's case. The upshot was yet another return to square one, and a promise to consider sympathetically a request for the erection of a wire antenna.

However, the anti-amateur lobby was by no means content to let the matter rest, and there was a danger that the situation might deteriorate into a vote-catching exercise, since the Post Office investigators had advised receipt of no fewer than *56* complaints—41 of them in communal accommodation and 15 from council and private residents. It must be said, however, that the attitude of the PO officials was exemplary; they reported that on their visits to the amateur he appeared to be conforming to the licence conditions, and they set about the enormous task of improving the situation. Fortunately they cleared the 41 "communal" complaints at one go, by upgrading the tv distribution system to 625 lines and fitting appropriate filters. Of the remaining 15, 13 complaints were due to malfunction of the tv, one failed to show any symptoms and one proved to be an electronic organ.

Practical help

The contribution made to this happy state of affairs by two local amateurs cannot be underestimated. Peter Martinez, G3PLX, and Fred Robins, G3GVM—both highly qualified radio engineers—gave up a lot of their spare time to assist, by curing several awkward cases, in the course of which they found at least one equipment that was potentially lethal! Yet if some reports elsewhere are to be believed, these two amateurs *personally cured 40 cases of tvi!*

However, we were not yet out of the wood. Filters could be removed; sets changed, or even re-positioned; other sources of interference could be put down to "that amateur", and stories of interference problems still persisted.

Council reactions

Two developments came out of this: first, planning permission was refused for a wire antenna on the grounds that interference was still being caused, and second, the Fareham Council decided to seek the support of the Local Authorities Association for an amendment to the regulations placing *responsibility on the amateur* for any incidence of interference *however it arises*, and giving affected persons the power to seek redress. This resulted from a resolution put forward by the Policy & Resources Committee of the council at a meeting attended by the then RSGB regional representative, Les Hawkyard, G5HD. At this meeting a councillor appeared to spring to the

amateur's defence, but afterwards he voted *for* the resolution!

The matter was given a full report in the *Southern Evening Echo* which not only gave good coverage to the amateur point of view but also took the trouble to approach the RSGB directly for its comments. Full marks, *Echo*! The paper did report the view of a local councillor that the affected amateur "had no consideration for the misery he was causing residents . . . the law was biased against millions of tv owners".

The resolution was sufficient, however, to excite the interest of the local MP, who went on record as saying "these complaints must be listened to . . . a person must be stopped from being a public nuisance". Again, alas, the layman's error of taking an *effect* for a *cause*, and blaming the poor radio amateur! However, the MP's interest also prompted "Radio Solent" to feature the controversy in its programme of local affairs, when a local councillor and two neighbours—one having trouble and another whose problems had been cleared—were interviewed; here at least was an endeavour to give factual and impartial reporting. The Society's advice to the amateur was not to allow himself to be interviewed, on the grounds that its case could not adequately be set out in a brief and somewhat superficial discussion. Several members were kind enough to furnish a transcript of the broadcast.

RSGB efforts continue

Meanwhile the efforts of Peter Martinez and Fred Robins continued unabated. Early in 1977 they met three Fareham councillors for a frank discussion, and were able to bring their own trouble-shooting efforts to a successful conclusion. Meanwhile the MP was complaining that his enquiries to the Home Office appeared to have fallen on deaf ears, while the council learned from the Local Authorities Association that the problem appeared not to be widespread enough to warrant using its influence. So, as a result of local and national efforts to ride out the storm, it appeared that it was now abating.

The upshot was that the council now proposed a "one-off" tenancy agreement applicable to the amateur, and this the Society referred to its legal adviser. His opinion was that it should be amplified and amended to safeguard the amateur in circumstances where he was patently not to blame. This was submitted to the council's solicitor, and the point was also made that such an amendment should be standard to *all* tenancy agreements, not only in equity but also in view of the expansion in the amateur population and even future possible legalisation of some form of citizen's band.

The council agreed to the amendment, and also sought the Society's advice on the technical aspects of a suitable transmitting antenna to be permitted. Obviously the efforts to contain the problem had paid off: the patience and firmness of the negotiators at national and local level had borne fruit with the admission that the amateur had successfully maintained his position.

There, for the time being, the matter rests. The council has elected for reasonableness instead of confrontation, and its representatives have gained some understanding of a technical problem solved by patient investigation rather than by emotional appeal. One result has been that the Society has prepared, and distributed to all local authorities, a leaflet which sets out in simple terms the problems and the procedure for solving it. Any amateur in similar difficulties should ask for this leaflet to be referred to, or obtained from the RSGB if it has become buried in the masses of paper now manifest in local government.

Relief may come in the ultimate upgrading of EEC standards of immunity to breakthrough; at present our own electronics industry often accepts standards which are deplorably low for the sake of saving a few pence. There *are* grounds for hope, and at least one British tv manufacturer is becoming "breakthrough-conscious" with commendable success.

Lessons learned

What are the lessons to be learned from this prolonged and sometimes acrimonious dispute? In the first place, the amateur must show that he is not alone; he is in danger of isolation unless he is a member of RSGB *and seeks its advice and support at the earliest opportunity*. It is dangerous to wait until a situation gets out of hand and *then* ask for help—the road to a solution is then that much harder. Second, if a member does seek help, he is often too close to the problem to "see the wood for the trees" and is emotionally involved—any advice which the society gives is based not only on the wider interests of its members as a whole but also on a detached view. It is no use "keeping a dog and barking oneself", and once the matter has been thoroughly thrashed out with a member he must place his trust in the Society's policy and do or say nothing without prior consultation—an ill-timed comment or letter can place a favourable solution in jeopardy. In the third place, the Society has contacts and advisers who can be of material assistance, and it is often to the ultimate benefit of the case to negotiate in strict confidence. Do not assume that the Society knows nothing and does nothing: often patient enquiries are made more difficult by ill-informed criticism.

Anyone who meets an amateur who says "I don't think its worthwhile joining RSGB" or "I don't agree with the RSGB policy/organization/lack of this or that" etc, should be asked "Can you afford *not* to be a member?" The case outlined above is typical of the extent to which a considerable amount of *voluntary* time and work (amounting to hundreds of man-hours), backed by the monetary resources and facilities of the Society, have come to the help of *one* member. In addition the Society has enjoyed the confidence and support of the Home Office whenever it has been called upon, and has had the benefit of legal advice of the highest order.

The case has thrown up one aspect of legislation currently in force which has implications wider than the field of amateur radio. Local councils act as agents of the Department of the Environment in planning matters, and where a council deals with tenants of its own property it is as it were "wearing two hats". The planning and housing departments may well occupy adjacent offices, and this would seem to facilitate the reinforcement of the policy of one by the other. An amateur with a council tenancy could well suspect that a difference of opinion with the housing manager *might* be affecting his planning application for an antenna system. Any member who has such suspicions is invited to supply full details to the Society.

Acknowledgements

The Society would like to record its grateful appreciation of the work done by Les Hawkyard G5HD, Peter Martinez, G3PLX, Fred Robins, G3GVM, and Geoff Gwilliam, G4FJO, at local level; of the many members who—entirely unsolicited—sent in newspaper cuttings and photocopies, or who made transcriptions of the "Radio Solent" broadcast; and finally of its legal adviser, who by professional custom has to remain anonymous. □

Reception and processing of TIROS-N weather satellite telemetry

by J. GILBERT, G4CEB, and T. J. TERRELL, DipEE, MSc, PhD, CEng, MIEE*

(Part 2)

Transmitted signals and their reception

(continued)

Processing the received signal

This section discusses the production of a weather satellite picture, using either a previously recorded signal or a signal received during a "real-time" pass of a satellite. Fig 11 shows the block diagram of the receiver's display electronics. The system outlined is purely electronic, and each individual system-block and the overall display system is briefly discussed.

Referring to Fig 11 it is seen that the recorded signal of 2,400Hz, derived from the crystal oscillator, is fed to a pass-band filter circuit which is tuned to 2,400Hz. The limiter stage is used to clip the signal to a level suitable for input to the pll. The internal oscillator of the pll is set to a frequency in the range 2,380Hz to 2,420Hz, which enables the input signal to be locked in phase within this range. Since the recorded signals will not be played back at a constant 2,400Hz, due to wow and flutter of the tape, the output of the pll will follow precisely any changes of the input frequency. The output of the pll is a 2,400Hz square wave which is divided by conventional ttl logic (flip-flops) to the frequency of the required scan rate. This timebase is 2·0Hz for production of both video channel pictures, which are transmitted side by side in the case of TIROS-N. Another frequency is available, namely 4Hz, which is used for reproduction of single channel pictures and those transmitted by other satellites at the 4Hz scan rate.

The selected frequency is then fed to the timebase circuit which produces a sawtooth waveform output, triggered by the input pulses. When connected to the display equipment the line scan of the picture frame is reproduced. The horizontal movement of the satellite is created by the Y-axis timebase circuitry. This is a conventional operational amplifier set as an integrator with a very long integration period. Fine adjustment of the line separation is achieved with the use of a multi-turn potentiometer set to vary the integration ratio of the circuitry. By discharging the integration capacitor the line scan is reset to line No 1 of the frame and further pictures can be produced.

The scanning system has thus been arranged for the production of a picture. Since the X-timebase has been derived from the synchronizing channel of the tape recorder, this signal being locked by the pll, any variation in tape speed will only slow or quicken the scan rate, but the scan will still be in sync with the telemetry channel as both tracks are recorded simultaneously.

The display device is an oscilloscope having a storage facility. The demodulated telemetry is fed to the Z-input of the oscilloscope; as the signal is amplitude modulated the intensity

*School of Electrical and Electronic Engineering, Preston Polytechnic, Preston PR1 2TQ

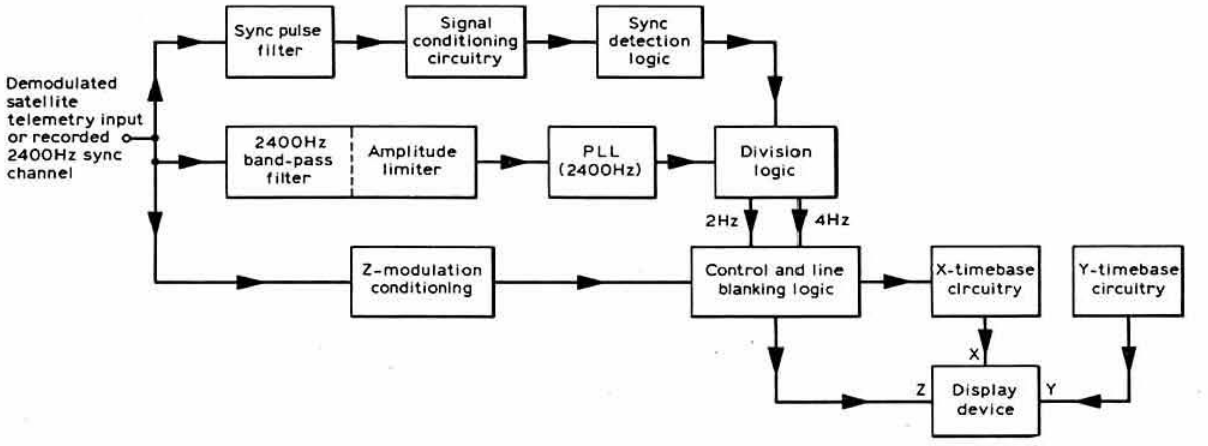

Fig 11. Block diagram of equipment used to process the received signal

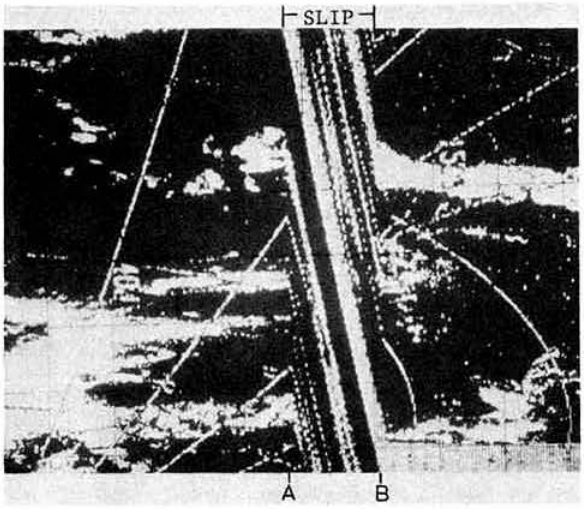

Fig 12. The pll slip/lock facility showing an example of a change of picture phasing started at "A" and locked at "B"

of the spot will vary with the applied modulation. Thus the spot will be light when cloud or ice formation is real, and dark for land or sea. With the system in operation a reproduction of the satellite scanning mechanism is observed; this produces a cloud cover picture of the area the satellite traversed.

In order to separate the infra-red and visible pictures as single frames the 4·0Hz line scan should be used; at this setting the line scan will be of a single video channel. Line blanking of the unwanted channel must be enabled to prevent interlacing of the two pictures—this can be achieved by several methods. For example, a line blanking circuit could be placed as shown in Fig 11; the triggering of this circuit would be at 4·0Hz, which would blank every other half line and thus remove the picture not required. Another method is to set the oscilloscope controls in a way that also blanks one of the pictures. If the X-timebase is kept at 2·0Hz but the sensitivity of the X-input doubled, then only half of the 2·0Hz scan will be displayed. This method works very well in practice but the results depend on the availability of an oscilloscope with the necessary controls. The slipping of the pll in the display electronics enables the required channel to be centred on the screen. Once in position, the lock is again engaged and the picture will be displayed. Fig 12 illustrates the operation of the slip-lock facility of the pll circuitry.

The quality of the produced picture also depends on the display device having a spot with a very small area, because of the small size of the oscilloscope screen. Typically, the 5103N Tektronix oscilloscope has a low spot size to screen size ratio, and is suitable for the display device. The storage facility is useful for setting the timebase to give good line definition. However, most storage oscilloscopes tend to have some display "flair", thereby reducing the picture definition. This effect is particularly bad when the cloud (white) portions of the picture tend to spread into a wide uninterrupted area. Thus, in order to obtain a picture of good quality, the storage facility may be dispensed with once the oscilloscope timebase has been initially adjusted to give a good line scan; the spot is then allowed to trace the picture on to a photographic film.

A similar procedure can be used for the processing of picture information received from "geostationary satellites". If a satellite is placed in an equatorial orbit at a height of approximately 35,000km, the orbital period will be that of the earth's rotation. Thus a satellite can be placed at a particular point in the orbit and "parked" at that location with respect to the earth. In this mode the satellite is said to be geostationary.

Transmissions in the form of wefax (weather facsimile experiment) are widely available from several geostationary satellites located at various positions above the equator, and the wefax pictures can be of various formats. The TIROS-N polar orbiting data can be received after being regenerated by computers at the World Weather Building, located near Washington, DC, USA, and in this form the polar satellite cloud cover pictures are superimposed on standard wefax grids of latitude and longitude, including outline maps of the larger land masses. Pictures of greater sections of the earth and tropical quadrants are transmitted at specified times during the day, these being detected by the geostationary satellite. Typed formats giving bulletins on schedules and information details are sent regularly.

Wefax telemetry is in an analogue a.m./fm form similar to that used on the vhf downlink for TIROS-N [17]. A single image at a time is sent with a scan rate of 4Hz. The European meteorological satellite Meteosat [18] transmits experimental wefax at frequencies of 1,691·0MHz and 1,694·5MHz, these being for southern and northern hemisphere data respectively. Other geostationary satellites, many operated by USA agencies [17], operate at a frequency of 1,691·0MHz for wefax.

When receiving signals from geostationary satellites, a fixed antenna system is used, beamed for maximum signal strength. The elevation angle in Britain for these satellites is usually quite low (for sms wefax an elevation of less than 15° is required and may necessitate a larger than 2m dish for usable signals in certain areas), thus the use of high-gain antennas with signal preamplification is advisable.

Picture interpretation

Figs 13 and 14 are examples of weather satellite pictures produced using the equipment described earlier in this article. These prints are of TIROS-N imagery recorded on 29 October

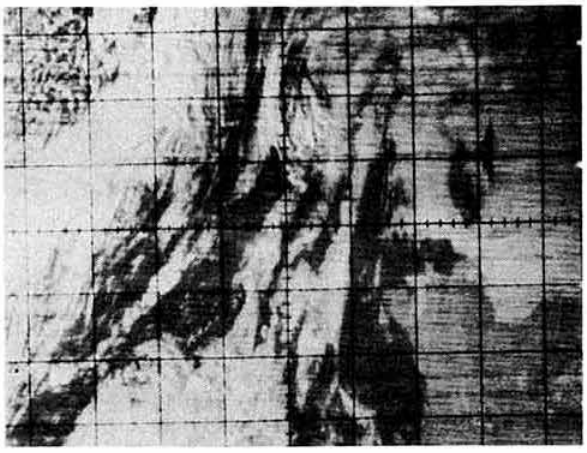

Fig 13. Typical TIROS-N imagery (recorded on 29 October 1978)

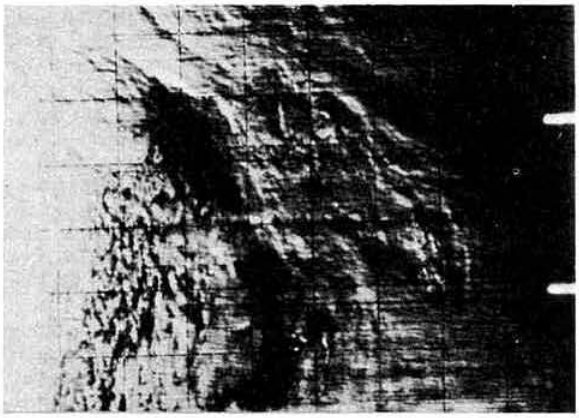

Fig 14. TIROS-N imagery (recorded on 29 October 1978) showing day to night transition

1978. Fig 13 shows the cloud cover over western France, the UK and the eastern Atlantic. The French coast appears in the lower right of the print, most of the UK is obscured by cloud—the Cornish coast and parts of East Anglia being the only cloud free areas. The signals were recorded as dusk was falling over England; this is shown by the light intensity variation across the image (the sun is illuminating the scene from the west—left-hand side of print).

As the satellite travelled farther north it passed from the illuminated side of the earth to that in shadow. This transition from day to night is clearly seen in Fig 14. The low angle of the sunlight with respect to the cloud tops highlights top surface details at the day/night zone. The cloud in the left section of this print is well lit by the sun, while that to the far right is in complete darkness. The top surface of the cloud does not appear "flat" any more, "gullys" and "peaks" of cloud gradually emerge. Long shadows from high ridges of cloud are cast far into the east. The two white markers on the right of the print are, in fact, the minute signals contained in the telemetry format. Both pictures are from the same pass of the satellite and represent the earth as seen in the visible light spectrum.

Conclusion

The major points concerning the setting up of a satellite receiving station have now been outlined. Details of practical circuitry for the individual units have been omitted because there are many articles and books (see reference list) dealing with similar items. The basic differences in requirements for a TIROS-N system and those previously written about should be considered when designing equipment.

By the end of 1979 the second satellite of the new third generation, of which TIROS-N was the prototype, should be operational. Two satellites are to be operated simultaneously, providing a southbound equator crossing at about 0730lst and a northbound equator crossing at about 1530lst.

Keeping up to date is vital for anyone interested in any of the aspects of weather satellite reception, and to this end the authors hope that this article has helped the reader to achieve, to some degree, this aim. Also it is hoped that readers who knew little of the practical aspects of such a project now have a basic understanding of how to tackle the associated problems.

Acknowledgements

The authors are indebted to NASA for supplying data and photographs, some of which, by their kind permission, are reproduced in this article. The help and co-operation of the Home Office Radio Regulatory Department in providing the statement concerning the special receiving licence is acknowledged. Finally the authors would like to thank Preston Polytechnic for providing some of the facilities that helped to make this project a success.

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[10] "Weather satellite ground station: Reception of cloud cover pictures transmitted in the 136MHz band", G. R. Kennedy. *Wireless World* November 1974.

[11] "Weather satellite ground station—2: Reception of cloud cover pictures; limiter and phase-locked loop system", G. R. Kennedy. *Wireless World* December 1974.

[12] "Weather satellite ground station—3: Conclusion of this series with the display electronics described in full", G. R. Kennedy. *Wireless World* January 1975.

[13] "The phase-locked loop", J. M. Osborne. *The Short Wave Magazine,* Vol 30, March 1972.

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[15] *The Public General Acts and the Church Assembly Measures of 1949.* Chapter 54, Vol 1. HMSO 1949.

[16] C. L. Maskaleris, Mission and Data Operations Directorate, National Aeronautics and Space Administration, Code 512. Goddard Space Flight Center, Greenbelt, Maryland 20771, USA.

[17] *Weather facsimile—a direct broadcast service from the SMS/GOES meteoroligical satellite.* NOAA, National Environmental Satellite Service, Washington DC 20233, USA.

[18] Meteosat programme is run by: ESA, 8-10 Rue Mario Nikis, 75738 Paris Cedex 15, France.

[19] *VHF/UHF Manual.* The Radio Society of Great Britain, 35 Doughty Street, London WC1N 2AE. □

microwaves

Charles Suckling, G3WDG *

1979 RSGB National VHF Convention

The lecture stream organized by the Microwave Committee at this year's RSGB National VHF Convention was, as usual, very well attended. In the first lecture, G3WDG described simple, yet very effective techniques for getting the best possible performance out of a receiving system. A brief review of the factors governing receiver sensitivity was given, and the most important points made were: (a) a preamplifier must have sufficient gain to over-ride the mixer noise, and that for microwave receivers it is usually necessary to have at least two stages of amplification before the mixer; (b) feeder losses degrade sensitivity more seriously than might be expected and, to avoid this, preamplifiers should always be mounted at the masthead; (c) in the case of wideband mixers, a filter is necessary between the preamplifier and mixer to reject noise from the preamplifier on the image frequency.

In the second half of the lecture, G3WDG emphasized the need for an automatic noise figure optimization aid for setting up preamplifiers and mixers, and recommended the G4COM design (*Radio Communication* January 1976). This device was shown working, being used for setting up a 10GHz receiver. The measurement of noise figure using ground noise and hot/cold resistors was also described, and the latter technique demonstrated with a 432MHz gasfet preamplifier connected to resistors at room temperature and at −196°C. The 4dB change in noise level was clearly audible as the preamplifier was switched between the two resistors.

The second lecture was given by G8DEK, who reviewed the application of microstrip techniques to amateur equipment. Various configurations of microstrip circuitry were described, and it was shown how directional couplers, mixers, power dividers, preamplifiers, power amplifiers and filters could all be constructed on copper laminate board using tools no more sophisticated than a razor blade and a ruler! It is a pity that microstrip does not find a wider application in amateur equipment, as the circuits are often much easier to make than the equivalent coaxial or waveguide circuits. Hopefully, after G8DEK's lecture more people will be encouraged to try this interesting form of construction.

The last lecture covered the subject of operating microwave equipment in the field, and was given by G4CNV. He outlined ways of avoiding the problems which often result in unsuccessful microwave tests, by carefully controlling the two variables—frequency and beam headings. Both these subjects were covered in some detail, as well as the engineering required to ensure success during a test. Path plotting beforehand was strongly recommended, as was the analysis of the success or failure of a contact afterwards to point out the strengths and weaknesses in one's equipment and technique.

1979 Fraser Shepherd Award

The Fraser Shepherd Award, recommended annually by the Microwave Committee in recognition of outstanding contributions to microwaves, was presented at the RSGB National VHF Convention this year to Mike Walters, G3JVL.

It is difficult to cite any one of his contributions in particular, as Mike has made so many in recent years! One of the most noteworthy of course is his development of the loop-Yagi antenna, which has been so successful that it could now be said to be the standard antenna for 1·3GHz. He is one of the pioneers of regular dx communication on 1·3GHz using troposcatter, and his operating philosophy on this band stimulated many other stations to achieve similar successes. He has always been ready to report his activities, and has contributed regularly to *Radio Communication* through this column over the years, including recent designs for high performance 10GHz filters, and a 10GHz transmit/receive converter for cw and ssb.

Narrow-band tests on 10GHz

Don Hayter, G3JHM, (Four Marks) has recently joined the ranks of 10GHz narrow-band operators. He is using the G3JVL mixer (described in *Microwaves* January 1979) and has been very active since getting it operational. His first test was on 24 February, with G3JVL. Signals were very strong, and this gave Don his first opportunity to hear ssb on 10GHz. On the following day he travelled to Hindhead Common, and copied G3JVL at 10dB above noise over the 40km obstructed path to Hayling Island. Tests were also carried out from this site over an optical path with G3BNL/P and G8ASP/P, who were operating from Old Reading, near Stanmore. G3BNL was heard S9 on narrow band, as was G8ASP on wide band. G3JHM then moved to a site near Farringdon, and copied readable signals from G3BNL over the two-obstruction path.

On 1 March, using a newly-acquired gasfet preamplifier, G3JVL was copied for the first time over the very difficult path from G3JHM's home QTH. On the following day, operating portable from a site along the G3YGF–G3JVL path, both stations were copied in QSO on ssb. Success was also achieved over the badly-obstructed 91km path between Oxford and Butser Hill, in the form of a crossband 10GHz–144MHz QSO. Over this path, G3YGF's signals had the rapid-fading characteristic of troposcatter, indicating that the path was so poor that only the scatter signal was present.

G3JHM has noticed that signals over one- or two-obstruction paths do not fade in this manner, since the scatter signal is masked by the stronger, more stable, diffraction signal. Thus it seems that rapid fading is a good test to discriminate between troposcatter and other forms of propagation.

On 25 March the 85km path from Old Reading to Butser Hill was covered for the first time, when G3JHM heard G3BNL/P. G3BNL was using 150mW to a 2ft dish, and G3JHM was using the bare mixer and a 3ft dish. Thus there seems to be sufficient gain in going to narrow band to enable obstructed paths to be covered as a matter of routine, even without twts and preamplifiers, which is a significant point. G3JHM remarks that this improvement has enabled him to work over a lot of new paths which would have otherwise been impossible on wide band.

The regular tests between G3YGF and G3JVL over the 110km path between Oxford and Hayling Island are continuing to bring forth some very interesting results. Instead of just carrying out tests at a fixed time (10pm) daily, it has recently been possible to make a number of extended observations during the day, when signals, in general, seem to be stronger. In addition a number of enhancements of 10–15dB have been noticed, and in almost every case these correspond to weather fronts crossing the path. Indeed, the best signals often seem to occur in conditions of high winds and driving rain, not usually considered ideal for microwave propagation! □

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

4-2-70

Graham Knight, GM8FFX*

RSGB National VHF Convention

This year's RSGB National VHF Convention again proved to be a very popular event, with nearly 1,000 members attending the one-day event. The trade component exhibition was very busy all day, and the RSGB bookstall was doing a roaring trade, especially in the new IARU QTH Locator Map. The number of trade exhibitors, with such delicacies as 4CX250B valves and holders, was larger than at previous conventions, and four were accommodated in an overflow exhibition in the adjacent Totton School—the venue for the lectures.

The RSGB President, John Bazley, G3HCT, welcomed a record number of members to the afternoon lecture sessions. In his opening speech the President reviewed some of the current vhf activities, and he was particularly pleased that the Society had been able to negotiate a licence for GB3PT, the rtty repeater. This had been the first time that the Home Office had issued a licence for a repeater to be specifically used for home stations. He took the opportunity to remind members that the basis for the licensing of all the other repeaters was primarily mobile use.

At the end of his speech, G3HCT presented Dave Price, GW4CQT, with the first ever WAC Certificate to be issued to an amateur for working all continents on 144MHz. Tom Douglas, G3BA, the chairman of the VHF Committee, also presented GW4CQT with an inscribed tankard to celebrate a British station attaining the first 144MHz WAC.

All the lectures drew large crowds, and some of the rooms were filled to standing room only. Three of the lectures were given by members of the Propagation Studies Committee, and G2FKZ, G3LTP and G3USF each had an audience of more than 150 members to hear their talks. Charlie Newton, G2FKZ, the IARU Region 1 auroral co-ordinator, gave a detailed account of five different types of solar event which are associated with auroral disturbances. Ray Flavell, G3LTP, explained tropospheric propagation in a very scientific manner, giving his audience an insight into the ways in which changes in the weather affect long-distance contacts on the vhf bands. Professor Martin Harrison, G3USF, played his audience some recordings of spectacular sporadic-E openings and reviewed the current theories on this unusual propagation mode. Grant Dixon, G8CGK, demonstrated slow-scan television and showed his home-made digital slow-to-fast scan converter which produced excellent pictures on a standard 625-line television monitor.

The largest crowd of the day listened to Nigel Huntley, G4CDU, who demonstrated a Pet home computer linked to a vhf station. G4CDU showed how the Pet could be programmed to receive and transmit cw and rtty, as well as assisting in making up contest entries by calculating distance and scoring. Ron Whitby, G8MEI, spoke about the design and operation of rtty repeater GB3PT, which operates on RB12 from Barkway.

The buffet and dance was again popular, with more than 100 members staying until late in the evening. During a break in the evening's entertainment the following trophies were presented: the VHF Manager's Trophy to GM3WOJ, the South of Scotland VHF/UHF Group; the Mitchell-Milling Trophy to G3PMH, the March & D ARS; the Thorogood Trophy to G3UNU, the University of Nottingham Group; the 1951 Council Cup to G3PMH/A; the Surrey Trophy to the March & D ARS; the Tartan Trophy to the South of Scotland Group, and the Hanson Trophy to Ron Thomas, BRS15822.

Bob "Boogie" Burns and his nine-piece band lived up to their name, with music which ranged from "Saturday Night Fever" to "Be Bop a Lula"—maybe next year he should be billed as "Bopping Bob Burns". The band was certainly the most popular for several years, with dancing continuing until well after midnight.

Geoff Stone is to be congratulated on organizing yet another very successful vhf convention—the venue has already been booked for next year.

New world record on 144MHz

At 1810gmt on 13 February, six months of effort by the Pretoria members of TESSA (TransEquatorial Study Group, South Africa), attempting to make two-way contact on 144MHz with the Mediterranean area, were rewarded with success. Dave Larsen, ZS6DN, assisted by Fred Anderson, ZS6PW, had a 15min cw contact with Costas Fimerelis, SV1DH, in Athens, on a frequency of 144·130MHz—at a distance of 7,100km. The 144MHz signals from Pretoria were first heard in Greece on 5 November 1978, and since that time a special frequency on the 28MHz band has been constantly monitored during 144MHz schedule times so that both SV1DH and George Vernadakis, SV1AB, could immediately report any reception of the ZS6DN signals. At 1803gmt on 11 February, cw signals from ZS6DN on 144MHz were heard in Athens, and Greek amateurs attempted to reply. However, although the SV station's signals were heard in Pretoria, no definite contact was established. At 1745gmt on 13 February, SV1DH reported on 28MHz that he was hearing signals from ZS6DN's beacon on 144·131MHz, and ZS6DN immediately went to the vhf shack on his farm, switched off the beacon and established a two-way QSO with SV1DH. Signal reports were RS 52 at both ends of the 7,100km path—with no T-report being sent, even though the contact was on two-way cw. No T-report fits the sound heard at both ends of this record-breaking contact. Although pure cw was used, the received signals were distorted and accompanied by a "rushing" sound like band limited white noise but centred on the bfo note. Attempts were made to use ssb but these were unsuccessful, although it was obvious that the signals were there as the syllabic rhythm of the voice could be heard, but the speech was unintelligible due to the "rushing" sound. The contact continued on cw with 100 per cent copy until 1825gmt, when conditions deteriorated and the QSO was terminated.

A further contact was made by ZS6DN on 16 February, this time with SV1AB who is located 10km north of the SV1DH QTH in Athens, thus breaking the record established only three days before, albeit by such a relatively short distance. This QSO lasted from 1820 to 1830gmt and the reports exchanged were also RS 52 with signals again being accompanied by the "rushing"sound. On the same day SV8JE on the island of Kefallina, on the western side of the Greek peninsula, reported reception of the ZS6DN signals from 1800 to 1825gmt. SV8JE

*PO Box 49, Aberdeen AB9·8JA

was unable to make a QSO, but this report adds a further 80km to the distance covered by the ZS6DN signals.

On 5 March there was the longest opening so far between South Africa and Greece on 144MHz. The opening started at 1750gmt and ended at 1845gmt, and during the whole opening ZS6DN was in contact with SV1AB and SV1DH. The net was also joined by Jack Anderson, ZS6LN, in Pietersburg, and the extremely long distance four-way QSO lasted for almost an hour. SV1DH was running 300W to a Jaybeam 14-el Parabeam; ZS6DN used 100W to four 10-el Yagis, and SV1AB used 200W to a Tonna 16-el Yagi.

Inspiration for all these experiments came from the successful 144MHz contacts between Ray Cracknell, ZE2JV, and Roland Whiting, 5B4WR. ZS6PW and ZE2JV have been co-operating in the study of transequatorial propagation for more than 20 years, and they must be given the credit for conceiving and planning the Pretoria to Athens experiment. The equipment and site for the South African end were provided by ZS6DN, and mention must also be made of John McCoy, ZS6JM, who erected the antennas and made daily maintenance visits to the site to ensure that all the gear was kept in perfect working condition. Doug Hutchinson, ZR6JH, has liaised between the members of the South African group, chronicled the events as they occurred, and sent the details of their magnificent achievement direct to *4-2-70*.

The Pretoria Tessa Group is also to be congratulated on the good publicity generated in the South African national press for the record-breaking contacts. Ken Young, G3ZCG, who has just returned from South Africa, has sent a copy of one of the newspaper reports, from a Johannesburg newspaper, which emphasizes the fact that amateurs are contributing to scientific research by having contacts on 144MHz over distances which seemed impossible to professional scientists.

Transequatorial (te) propagation

A great deal of scientific interest has been expressed throughout the world in the results of continuing experiments on 144MHz between 5B4WR and ZE2JV. Roland Whiting, 5B4WR, has carefully recorded the times and dates on which he was able to receive the ZE2JV beacon signals in Cyprus, a path distance of 5,978km. He was able to copy the beacon on 110 separate days in a 335-day period between April 1978 and March 1979. Since the dates for the period April to October were published in *4-2-70* (February 1979) many requests have been received for more information about this most unusual long distance path which seems to be related to transequatorial propagation. Roland Whiting has sent the following update on the information published in February. The ZE2JV beacon signals were copied in Cyprus on 3, 5, 8, 19 November; 10, 12 December; 10, 16, 20, 25, 28, 29, 30, 31 January; 1, 2, 3, 4, 8, 9, 10, 11, 12, 13, 14, 16, 17, 19, 23, 26, 27, 28 February; and on 1, 3, 5, 7, 8, 9 March.

Roland mentions the fact that the strongest signals were received during February—sometimes exceeding 30dB above 1μV. Like SV1DH and ZS6DN, attempts have also been made to receive sideband signals over the path, but the rapid flutter and fading has so far made voice signals unintelligible. With the lengthening of the te circuit in February to allow the SV-ZE contact, he has been paying special attention towards South Africa, and has listened at times when contacts between Rhodesia and Greece have been taking place, but so far no signals have been heard from ZS. 5B4WR and his colleagues in the Cyprus ARS are puzzled that these longer distance signals seem to go over their heads. Both 5B4WR and ZE2JV have assumed in the past that the te circuit was symmetrical about the geomagnetic equator, and this is confirmed to some extent by the SV to ZS contacts. He also notes with interest that the ZE2JV beacon is heard in Cyprus between 1600 and 1930gmt and that the SV to ZS contacts took place close to 1800gmt.

Les Palfrey, G4CQX, also writes from Cyprus, where he holds the callsign ZC4LP. He encloses a copy of the Cyprus club newsletter which contains some of the above information about 5B4WR and also the news that three other stations, 5B4AP, 5B4AZ and 5B4EI have also been copying signals from the ZE2JV beacon on 144·160MHz. Signals as strong as S7 have been received from the beacon by these three amateurs, who join the swelling number of operators collating information on te propagation.

The dates of the te openings between Cyprus and Rhodesia, and of the openings between Greece and South Africa, have been sent to W1JR, W1HDQ and YV5ZZ. It is hoped to publish a list of te dates for South American openings in the near future to see whether there is a definite co-relation with the above dates. The tests on 144MHz between 5B4WR and ZE2JV are to continue, and plans are in hand to try for trans-equatorial propagation on the next band up—432MHz.

Meteor scatter activity contest

The Ghent VHF Activity Group led by Mark De Munck, ON5FF, has organized an unusual contest to tie in with a special 10-week ms activity period. Every amateur is invited to take part in the contest which runs from 0000gmt 1 June to 2400gmt 15 August 1979. So as to encourage random ms operation, points will only be awarded for contacts which are not made by pre-arrangement. The contest also encourages correct operation on the ms calling frequencies by only giving points for contacts taking place off the calling frequencies; 144·100 and 144·200MHz can only be used for calling CQ on cw and ssb respectively.

To be valid for the contest, cw QSOs must take place between 144·102 and 144·120MHz. These frequencies will be identified by letters: 144·102 = frequency B, 144·103 = frequency C, etc to 144·119 = frequency S, 144·120 = frequency T.

Sideband working frequencies will also be identified by letters as follows: 144·185 = frequency A, 144·190 = frequency B, 144·195 = C, 144·205 = D, 144·210 = E, 144·215 = F, and 144·220 = G.

Stations calling CQ on the random calling frequencies should use the following procedure: CQL ON5FF CQL ON5FF . . . for 5min, thus indicating that ON5FF will listen for replies on frequency L (144·112MHz in this instance), and if anything is heard the QSO continues using normal ms procedure. During the contest period operators can move location as long as the same callsign is retained. Scoring is five points per random QSO, and stations may only be worked once in any 48h period. Stations already worked in the contest score four points for a second QSO, three points for the third contact, two for the fourth contact, and one point for the fifth and all following contacts. Only completed contacts by random ms propagation will be valid. No serial numbers shall be exchanged, and logs showing time, date, callsigns and reports sent and received should be sent to ON5FF, Koning, Albertlaan, 9000 Ghent, Belgium. The station with the highest score will receive a specially engraved trophy, and all participants will receive a certificate and details of the contest results.

OK1AIY/P, who is well known to British vhf operators for his outstanding 432MHz signals from his all-home-made station which runs 600W input

The Ghent group is to be congratulated on thinking up a novel way of stimulating random meteor scatter activity and at the same time encouraging operators to use the calling frequencies correctly. ON5FF attended the RSGB National VHF Convention, and his ms activity contest met with the unanimous support of the ms operators attending the event.

50MHz news

The west to east path from America to Europe has faded, and American signals are not expected to reappear on 50MHz until the autumn. In response to many queries from stations who were able to hear signals from WB2RLK/VE1 on 50MHz but were unable to reply on 28MHz, the Canadian station was running 1kW to an 11-el Yagi antenna 17m above ground level. Because of their ideal locations it will be interesting to see whether EI2W will be the first to work WB2RLK/VE1 in the next transatlantic 50MHz opening.

The path on 50MHz has now changed direction to N–S, and British operators G3COJ, G3FXB, G3BA and G4CBW have all been copying signals from South African beacons, and some crossband contacts have been made with the UK operators transmitting around 28·335MHz. ZS6ASO, ZS6AUB, ZS6XJ and ZS6BGQ were all good signals in the UK—the fact that ZS6BGQ was running 75W to a long wire is an indication of the excellent conditions to South Africa on 50MHz.

Garry Howarth, ZS6ASO, has sent details of the ZS 50MHz beacons. ZS6ASO is the custodian for ZS6VHF which operates on 50·040MHz and runs 50W to a four-over-four Yagi antenna. ZS6VHF has been copied all over Europe in the last few weeks, and can be copied for days on end by HB9QQ and SV1AB. Beacons are also operated from the homes of ZS6PW, on 50·025MHz, and ZS6LM, on 50·045MHz. ZS6ASO also sends news that ZS5C has been active on 50MHz and has had contacts with SV1AB and 5B4WR. ZS6XJ, at Randburg in the Transvaal, is now active on 50MHz ssb and rtty. All the African stations advise that they are listening on 28·335MHz for crossband contacts.

John Price, G3UHH, is one of many stations re-equipping for 50MHz; he can remember being a listener on the old 5m band. G3UHH requests *4–2–70* to print a list of all the 50MHz beacons, and the following should be added to the ZS beacon information above: 6Y5RC on 50·025MHz, TI2NA on 50·080MHz, VE1SIX on 50·088MHz, FX3VHF on 50·104MHz, KH6EQI on 50·104MHz, and 5B4CY on 50·498MHz. This beacon information should only be taken as a guide, and vhf operators' attention is drawn to the paragraph headed "Beacon and repeater print-outs".

Oil field vhf operation

Chris Tran, GM3WOJ, recently worked LA1EKO on the 3·5MHz band, and the operator gave his location as the Ekofisk Field in the middle of the North Sea. LA1EKO is the callsign of the club located on the field, and there are 15 operators who are licensed to use this station. The club will be operational on 144MHz ssb and fm from June onwards once a suitable antenna has been installed. LA1EKO is located in BQ QTH locator square and is therefore ideally located for vhf contacts to G, GM, LA, PA0 and OZ. GM3WOJ remarks that it would certainly add to the interest in the new RSGB QTH Squares Award if the other operators known to be on the Forties and St Ninian fields were also able to operate on 144MHz.

Beacon and repeater print-outs

Although information about beacons and repeaters is often included in the pages of *Radio Communication*, vhf operators should realize that from the time it goes to press it can become out of date. The only way to keep absolutely up to date is to order print-outs from RSGB Publications (Sales). The print-outs contain literally thousands of pieces of information about beacons and repeaters. All the data are updated on a twice-weekly basis with sometimes 100 different pieces of information being changed in a one-month period. An idea of the detail in the print-outs can be gained from the fact that the beacon list shows all the IARU Region 1 beacons in order of frequency, giving their callsigns, latitude and longitude, QTH locator, erp, antenna and beam direction, height asl, keying mode and beacon keeper. Keen beacon and repeater users will want to order new print-outs about every two months.

New IARU QTH Locator Map of Europe

The new IARU QTH Locator Map of Europe is now available from RSGB Publications (Sales). The map has been extended in coverage to meet the demands of the growing numbers of vhf operators who are now able to work over distances which were not included on previous maps. The new map measures 610 by 555mm and is ideal for mounting on the shack wall. Alistair Simpson, GM8NCM, was one of many vhf operators who bought the new map at the RSGB National VHF Convention—only Alistair bought two. He intends marking off the squares worked on 144MHz and 432MHz on separate maps. The map will be of particular interest to those operators who started chasing the new RSGB QTH Locator Squares Award which is valid for vhf contacts completed after 1 January 1979. The new map costs £1.15, and that includes post and packing in a tube to ensure safe delivery.

First four band eme amateur

Michael Owen, W9IP, has written from the University of Illinois, mentioning the visit he made to RSGB headquarters in 1978 and his plans to establish a station for moonbounce operation on 144MHz. W9IP is assembling an antenna system with eight F9FT Tonna 16-el Yagis and home-made power dividers. W9IP also sends in details of the first amateur

equipped for moonbounce on four vhf bands; WB6NMT in California has now had eme contacts on 50, 144, 220 and 432MHz, and all the QSOs were with normal amateur home-based (as distinct from large professional dish) stations. WB6NMT's antenna installation includes eight 10-el Yagis on 144MHz, and an array of eight "tandem reflector" type K2RIW Yagis for 432MHz.

Schedules wanted

Claus Neie, DL7QY, the editor of the well-known European *Dubus* magazine, and avid vhf dxer, has moved QTH from Berlin to southern Germany. The new QTH is 550m asl, has a clear take-off in all directions, and is located in square FJ61e. All the antennas are now in position, and DL7QY would welcome schedules on any band between 144MHz and 10 GHz. Contact Claus Neie, D-7181, Rudolfsberg 24, Western Germany.

British Amateur Television Club

From time to time enquiries are received from members requesting details of the British Amateur Television Club. The club publishes a quarterly magazine, *CQ-TV*, which covers all aspects of amateur television including slow and fast scan systems. The club also organizes contests—the latest issue of *CQ-TV* gave the results of the most recent event, and the winner, G8DTQ, had 17 television contacts on the 432MHz band, the best dx worked being F1BJB at a distance of 225km. Membership enquiries should be sent with an sae to Brian Summers, G8FQS, 13 Church Street, Gainsborough, Lincs.

Computer corner

The item under this heading in the March issue sparked a large reaction from readers of *4-2-70*, with 32 letters being received in the first 10 days following publication. Many letters referred to the "Xitex cw, rtty, and ASCII to vdu." This unit has not yet arrived at the GM8FFX QTH, but the specification describes the display as being made up of 64 characters in a 16-line format of 5 × 8 dot matrix. The 128-character set is full upper case and lower case alpha, numeric, Greek, and some common symbols, with some special graphics provided by the on-board character generator rom. Many readers have enquired about the cursor controls, and these include, up, down, left, right, home, screen clear, carriage return, erase to end of line or page, and direct cursor addressing, both relative and absolute. Further details when the decoder is to hand.

Trevor Tugwell, G8KMV, secretary of the Stevenage RS, has recently purchased a Pet computer and he has already programmed it for transmission and reception of rtty. He remarks on the growing interest in computers among vhf amateurs, with the Nascom 1 being particularly popular in the Stevenage area, and he has eight computerized rtty stations within fm range of his home station. G8KMV is surprised by the present Home Office ruling that G8 stations cannot contact each other on computer generated and received cw, and he takes the view that there is basically no difference between sending or receiving either rtty or cw via a computer. Trevor considers the international morse code is merely a code like Baudot or ASCII, used to transfer data from one station to another, and it is not necessary to be able to receive Baudot or ASCII by ear at 12wpm before stations are allowed to use these other codes. Your scribe wonders whether the day is far off when one can bring not only one's own key for the cw test but also one's own computer!

"Spector" data system on 144MHz

Peter Martinez, G3PLX, of Gosport, Hampshire, has been experimenting with an rtty system known as "Spector". The system is extensively used by professionals for ship-to-shore telex traffic, and G3PLX and G3YYD have now set up an amateur system on 144MHz using microprocessors to operate their rtty stations. The Spector system is very effective, as both stations work with very quick break-in, and errors due to fading, etc, merely cause a repetition of the missing characters and a slight slowing down of the rate of copy. Spector has transformed the 200km between G3PLX and G3YYD from a "sorry, look for you when conditions are better" to a "hello, what shall we talk about today" path. G3PLX feels that Spector is a very good system for vhf amateurs, and is especially useful when conditions are poor or when signals are subject to fading. He assures other vhf operators that, despite the complexity, it is not difficult to get going with cheap home computers. (It is hoped to publish an article by G3PLX on Spector in the August issue—*Ed.*)

Contacts which were only 50 per cent copy with a conventional system can be transformed into 98 per cent copy, and other QSOs which have been as poor as one per cent have been changed to 37 per cent. G3PLX feels this is not quite good enough for meteor scatter, but the principles could be used for a special ms system. On the subject of high-speed cw, G3PLX's experiments showed the human ear was much better than the mpu device. The mpu did perform much better with frequency shift keying and rtty, but he thinks the critical nature of the receiver tuning would rule out fsk for ms contacts. G3PLX feels it is going off at a tangent to use a machine to encode/decode a code system designed for human use, and that it would be better to use a system specially suited for a machine. He points out that he is not referring to Murray rtty code, which was designed for a mechanical decoder, but perhaps to a cross between coherent morse and Murray code without the start and stop bits. G3PLX has no direct experience of meteor scatter, but would like to correspond with an ms enthusiast to explore the possible link-up of ms and mpus.

Experiments by G4DGU

Since obtaining an experimental high-power licence, Chris Bartram, G4DGU, at Abingdon, has been spending a great deal of time exploring the possibility of meteor scatter propagation on the 432MHz band. Previous attempts at ms contacts on 432MHz have been rather limited, and G4DGU is not aware of any professional observations of bi-static ms propagation above 400MHz.

Research into amateur literature reveals details of only two authenticated contacts. The most recent took place between SK6AB and SM2AID, who managed a 432MHz ms contact over a 1,033km path during the Perseids shower in August 1977. The only other QSO also took place in the same Perseids shower, but five years earlier, when W0LER and W2AZL set a world terrestrial record on 432MHz by completing the first ms contact on 432MHz. Many other stations have also tried, some with promising results. W7FJ copied a 27s burst from W0DRL, and Johnny Stace, G3CCH, copied bursts from TF; however, most schedules yielded perhaps a single ping in a 6h test.

G4DGU's interest in 432MHz ms was awakened after hearing a couple of pings from SK6AB during the big tropospheric lifts in 1975. While waiting for the duct system to make its way

into central England, G4DGU listened to stations to the east working SK6AB, and noticed he could hear signals which were obviously via ms from Sweden. In 1977 a series of 432MHz 6h ms schedules were arranged during the Perseids with Karl Mohin, SM3AKW, who is located in QTH square 1W30e. Unfortunately equipment problems prevented these tests taking place, which was a disappointment for both operators, but particularly for SM3AKW who was critical of certain stations who had given up on the long schedules in the first hour. With the arrival in 1978 of the special high-power licence, G4DGU and SM3AKW renewed schedules and ran tests during every useful shower.

Although no complete contact has yet taken place, positive results have been obtained and it is felt that with the availability of the higher power a full QSO should take place during future tests. It is obvious, with only two completed contacts recorded, that 432MHz ms is such a marginal propagation mode that it is of little use for most amateur communication. G4DGU and SM3AKW are challenging the near impossible, but there is always the prospect of obtaining some unique propagation data for a field apparently not well understood by professionals.

The 432MHz band lies in the area of the frequency spectrum where the relatively well understood mechanisms of vhf ms propagation are believed to break down, or at least become modified. G4DGU's experiments suggest that 432MHz ms operators can expect very few long bursts at this frequency. Most of the signals heard were just pings, many with considerable doppler component. This effect is usually attributed to the moving head of the meteor trail. As the size of the reflecting area is relatively small, the specularity requirement postulated at vhf begins to become relaxed. However, the received power is a function of the wavelength raised to the power of six according to an article by W4LTU published in *QST* May 1974.

Thus these 432MHz pings are usually very weak, and the presence of doppler shift makes them very difficult to copy. Although the requirement for specular reflectivity from the trail begins to be relaxed, it is still advantageous to ensure that the schedule times coincide with the optimum path geometry. To this end, Dr Geoff Grayer of the Propagation Studies Committee was persuaded to write a computer program enabling the optimum times and, more importantly, beam headings to be calculated. The use of this data has contributed greatly to the partial success of G4DGU and SM3AKW, who exchanged signals, but still not enough for a QSO, during the recent Quadrantids—the first ms signals ever heard during this shower. Further tests continue.

VHF news from Russia

Radio Communication's equivalent in Russia is a magazine called *Radio,* and at times *Radio* has reprinted items from *4-2-70.* It was therefore a pleasure to receive in the mail from Roy Stevens, G2BVN, an English translation of the recent vhf pages in *Radio* which are edited by the well-known Estonian vhf operator UR2BU. Because this information has not been available before, extracts are printed below in "Grapevine" style.

1978 auroral openings review—RA3XBS in Obninsk worked 12 countries on 1 and 2 May . . . UR2RD from Island of Saaremaa in Estonia had 36 contacts during 4 June aurora . . . UQ2IV worked SM5BEI, SM5KX and OH3SE on 14 June . . . On 13 August UQ2IV and UQ2OW worked OH and OZ . . . Radio auroras are recorded as reaching the following longitudes: 29 October, 49; 30 October, 51; 31 October, 53; 2, 4 and 10 November, 61; 26 November, 53; but farthest of all was 25 November which reached 48 longitude. UA4NM worked SM5BEI at a distance of 1,700km during the 25 November aurora . . . UD6DFV, DGU, DIO and UL7AAF, are reported to be active below 144·200MHz.

Meteor scatter 1978 review—UW6MA reports incomplete contacts with DJ6CA, DL1BU and G3CCH, and he reports hearing only LZ2FA, DL7QY, SM7WT and HB9QQ . . . UQ2OW worked 14EAT on 6 August . . . During the Perseids, UA3LBO had completed contacts with F6EQQ and G3POI.

Expeditions

The Ghent Activity Group, mentioned earlier, is planning an expedition to the Isles of Scilly to coincide with the August Perseids shower and the ms competition. It is planned to use two separate transmitters simultaneously; different callsigns will of course be used. By carefully synchronizing the transmit periods on both transmissions, the group hopes to work much more dx. Ian White, G3SEK, also hopes to be in sync with the above transmissions during his expedition to QTH square XJ—otherwise there could be much QRM in the south-west during the ms contest.

The dates have still to be finalized for an expedition to Andorra by Geoff Brown, GJ8ORH. Operation will probably be on 144 and 432MHz. GJ3XQM will also be going to the mountains in Andorra, and cw schedules will therefore be possible. Further details from GJ8ORH, QTHR.

Another expedition of interest to the QTH locator hunters will be that of GI4GTY, the Lagan Valley ARS, which is going to the north-west of Donegal in the summer to activate the VP square. A possible combined expedition from the six GI counties is also being planned for July by the Lagan Valley Group and the Mid-Ulster RSGB Group. News of the latest dx expeditions will be carried on the GB2RS news bulletin.

Auroral reports

There has been a distinct lull in auroral activity during the first three months of the year. Radio auroras took place on the following dates: 2, 3, 4, 5, 6, 7, 15, 16, 20, 21, 22, 23 and 30 January; 1, 4, 16, 21, 23, 26, 27 and 28 February; 6, 10, 22 and 25 March. The aurora on 10 March was first heard by Pete Bates, GM4BYF, in Edinburgh, at 2320gmt, when the only signal to be heard on the beacon band was DL0PR. Twenty-five minutes later, the German beacon was a strong signal but it peaked up on a north-west beam heading. Cornish beacon GB3CTC could also be heard at S4 on this unusual heading, but by 2350gmt the aurorally reflected signals changed to a more normal beam heading of 30°. Lerwick beacon GB3LER could then be heard for the first time that evening at S9, but this opening only lasted for a few minutes. After completing a cw contact with EI6AS in Dublin, the opening faded away in the middle of a contact with a station in ZK square, possibly G4GBX. Auroral propagation must have been quite good for those few minutes, as *4-2-70* has since been informed that GM4BYF was also called by G3VJR, in South Yorkshire, and by G3PJX in Dorking, Surrey.

The event on 22 March was the best of that month, but it was an afternoon-only opening in mid-week when activity was not

Continued on page 446

VHF/UHF band planning

by TOM DOUGLAS, G3BA, VHF Committee chairman, and IAN WHITE, G3SEK, vhf manager

Why use R0?

The recent introduction of the GB3CF repeater on channel R0 has caused a great deal of controversy, for the input frequency of 145·000MHz is widely used for simplex traffic in the UK. Since it is quite possible that other repeaters in the future may also need to use R0, readers may be interested to know why that is necessary.

When the foundations of the 144–146MHz band plan were laid in 1972 there was no R0, only R1–R9. But by 1974 the countries in which repeaters developed more rapidly than in the UK were finding the need for another channel, so R0 became part of the European band plan, and S20 was designated the fm calling channel. At that time the RSGB view was that no more than eight repeater channels would be needed in the UK (R1–R8), and that simplex on 145·0MHz could co-exist with the use of that frequency on the Continent as the input for repeaters on channel R0.

Much has changed since 1974. The vhf world has widened: increased activity and better equipment have brought UK vhf amateurs into much more frequent contact with the Continent, and hopes of co-existence between simplex and repeater traffic on 145·0MHz have proved unfounded. Under good propagation conditions UK fixed stations operating simplex are a considerable nuisance to repeaters in France, Belgium, Holland and Germany, as their strong signals over-ride those of the local low-powered and poorly-sited repeater users. If 145·0MHz were also being used in the UK by mobile stations working through repeaters on R0, there would be far fewer problems.

Another major change since 1974 is that the UK vhf repeater system has expanded rapidly, and in the last few years has caught up with the rest of Europe. As foreseen in 1974, eight channels are still required, but R8 is no longer available since the amateur satellite service needs a wider allocation at the hf end of the band; hence R0 must be used.

A question often asked is: Why not put GB3CF on R1 or R2? The answer becomes clear to anyone who cares to plot repeater sites and channels on a relief map, as did the VHF Committee's Repeater Working Group. Seven channels are just not enough to avoid frequent interference between present or planned repeaters, so use must be made of R0.

Since there is a well-used calling channel on S20 and plenty of simplex working channels, why not leave 145·0HMz for use as a repeater input?

12·5kHz fm channel spacing

Recent advertisements for 144MHz fm transceivers have asserted that 12·5kHz spacing of channels is here; or is coming; or that the world would end if it did!

It is, of course, technically possible to split up the recommended fm allocations into channels of 12·5kHz width, and this has already been done for the UK land mobile services; but amateur service needs are quite different from those of the commercial user services. The main reason for the adoption of 12·5kHz spacing commercially was to increase the number of channels in order to accommodate more users and provide less countrywide interference from adjacent transmissions. The amateur service situation is quite unlike that of the commercial interests. Amateurs have some 15 non-allocated simplex channels between 145·20 and 145·575MHz, and quite an extensive all-mode sector between 144·5 and 144·85MHz for non-channelized operation. With such a wide spectrum of frequencies for fm users to occupy, one would find it very difficult to see the immediate necessity to increase the number of available channels. Even in areas of high amateur population density, the number of channels noticeably occupied seldom reaches double figures at its maximum, and more usually is around the five or six mark. On the repeater side, eight channels, R0–R7, are currently available and with careful planning these channels should give more than adequate mobile–mobile contacts in any given area without co-channel interference for more than 95 per cent of the time.

The extra channels obtainable by changing to a 12·5kHz spacing would be bought at the expense of several technical problems. First is the very important question of oscillator stability. Even with 25kHz spacing, the average competitively-priced transceiver available on the present-day market is far from being really stable under the exacting conditions met with, particularly under mobile operation in a vehicle where extremes of temperature often cause the transmitted frequency to be as much as 3kHz off, plus the equivalent in receiver mistuning. The situation with narrower channel spacing would be that much more difficult to contain, and almost certainly would need much more sophisticated methods of frequency control than at present employed. All this would inevitably mean an increase in the cost of the equipment.

Also, to adopt 12·5kHz channel spacing would entail a narrower i.f. filter system being employed. On 25kHz equipment this would mean changing the existing filter, resulting in further cost for purchase and fitting. To mix 12·5 with 25kHz equipment is also not really practical, as there would be a requirement on the 25kHz operators to drop their peak deviation to around ±2·5kHz, and that would be a most unpopular move.

A 12·5kHz receiver would lose out on signal to noise, particularly in the presence of impulsive noise QRM. Interference from a non-co-operative wide-deviation operator would be unbearable and cause bad feeling all round. What with lower deviation and poorer noise reduction, weak signal reception would be noticeably worse were 12·5kHz standards to be adopted.

Taking all the disadvantages into account, there seems little point in changing to a 12·5kHz spacing until the fullest possible use has been made of the existing 25kHz channels with the aid of modern synthesized equipment. However, when the time does come *eventually,* to make the change, it will be to 12·5kHz, and it is right that fm users should know this well in advance.

A.M. calling frequency

Although many people imagine that a.m. is a thing of the past, this is not so, and there are still many adherents to that very excellent mode, particularly among those new to the vhf scene. Now that the once-popular a.m. frequency of 145·80MHz is no longer available to operators because of satellite service requirements, there is a strong feeling that there should be a nominated a.m. calling frequency around which those wishing to use this mode may congregate. The VHF Committee has given this some thought recently and suggests 144·550MHz as a possible frequency which would be compatible for synthesized equipment and for simple vxos. Reactions to this proposal from the a.m. fraternity would be welcomed by G3BA. □

the month on the air

John Allaway, G3FKM *

NO apologies are offered for bringing up the matter of QSL cards yet again. GM4BDJ has received a QSL from the USA which does not indicate a signal strength report, and while this may be perfectly acceptable for DXCC it is not satisfactory for the majority of award applications. QSLs should always carry the following information as a minimum requirement: (1) the callsign of the station worked, (2) the date of the contact, (3) the time of the contact, (4) the mode and signal report—and (5), perhaps rather obvious, the confirmation that a contact has in fact taken place! Your scribe has seen cards on which this has not been mentioned and which were invalid for transmitting awards. A very important point to be remembered is that any alteration whatsoever renders a card useless for DXCC credit and that anyone submitting an altered QSL runs a grave risk of being disqualified from the club.

More photographs are urgently needed for *MOTA*—glossy black and white prints being best for good reproduction. Every effort will be made to return pictures (if this is requested) but no full guarantee can be given.

W2PV

Many readers will have heard the incredible signals which reach the UK from this famous USA station. Dr Dain Evans, G3RPE (who would normally consider the frequencies reviewed in *MOTA* to be intermediate frequencies), has passed on details of the antenna farm at W2PV which he has received from K1ZZ. It seems that there are three masts: (a) 180ft fixed, (b) 150ft fixed, and (c) 112ft rotatable. Mast (a) supports a 1·8MHz inverted-V, a 2-el 3·5MHz quad, stacked 3-el 7MHz beams—the upper is rotatable but the lower is fixed on Europe, and four 4-el 28MHz fixed beams. Mast (b) carries a 7-el 14MHz beam, stacked 5-el 14MHz beams fixed on Europe, and stacked 4-el 21MHz beams fixed on S America. Mast (c) has on it a 3-el 7MHz beam, and stacked 6-el 14MHz, stacked 8-el 21MHz, and stacked 10-el 28MHz beams. Further comment seems superfluous!

Dxpeditions

Lloyd and Iris Colvin made 12,000 contacts from Honduras using their HR0QL call, and worked 129 countries. This was the second most successful of all their expeditions, only being exceeded by the 14,000 QSOs they made from VP2MAQ a few years ago. Normally, visiting amateurs are required to use their own callsigns with a /HR suffix; however, the official responsible for issuing the licence remembered Danny Weil and managed to issue a special event radio call—HR0QL. Contrary to the information given in last month's *MOTA*, Iris and Lloyd did not return to the USA from Honduras, but moved on to Belize where they were active as VP1KG.

West Coast DX Bulletin mentions a report that Dr Selim El-Rafai, OE6EEG, has been exploring the possibilities of a visit to Abu Ail, in the Red Sea. Late April or May is the time mentioned, and it is said that three operators may take part.

Permission has been given for some activity from Franz Josef Land, and this may still not have taken place by the time this reaches readers. All bands 1·8 to 28MHz, and both cw and ssb, will be used during an around-the-clock operation. It is believed that the callsign will be R1FJ.

ZL1ADI and ZL1AMO are planning a visit to Manihiki Is to follow their stay on Pitcairn Is. This should last two weeks and take place during May. Their callsign will probably be ZK1HI.

The Wiesbaden ARC will visit Liechtenstein between 26 May and 3 June. Their callsign will be DA1WA/HB0 and they will use all bands from 3·5 to 432MHz. Their frequencies will be (cw) 25kHz from lower band edge, and (ssb) 3,780, 7,090, 14,280, 21,350 and 28,650kHz. QSLs should go via DJ0LC.

Top band

Fernando-Juan Fernandez, EA8CR, who is a vice-president of URE, has written to say that Spanish amateurs now have permission to use 1·8MHz. He has had special permission to do this for some years, but the privilege is now extended to EA, EA6 and EA9, although there are some restrictions due to the presence of other users of the band. Activity is expected to be found mostly during contest weekends.

DX news

Ken Whithorn, G3BDS, is receiving QSL cards for "3V8BA" who seems to have been using his callsign as QSL manager. 3V8BA appears to be a pirate and it is not possible for Ken to answer any QSL requests. Likewise, 3V8HA is unknown to W2RA.

SP5GH wishes it to be known that he is not acting as QSL manager for the station HV5GH. He knows nothing about such a station and will not answer any correspondence concerning contacts with it.

Amar, VU2CZ, secretary of the Amateur Radio Society of India, reports that the society was formed on 14 May 1954 and that this year is its silver jubilee. To celebrate the occasion the society's station will operate under the special callsign VU25ARS during the month of May.

Those who still need a QSL card from FY7AK or FY0BHI should send a direct application to Richard, F2QQ, who has just received a fresh supply from the printer—see "QTH Corner".

A station using the callsign 4W2AA has been heard near 14,340kHz around 2000 and asking for QSLs via I2MVS. It has been suggested that this is I2YO who visits Yemen occasionally. The signals from ST0RK should be greatly improved, as he should by now have received a new beam.

DF6SL will be DF6SL/KC6 for about one year. He is located at Truk in the E Caroline Is, and tends to be found on Wednesdays between 1200 and 1500 on 14,220kHz, and also on Thursdays from 0600 to 0900 on the same frequency.

T2T has been very active from Tuvalu. His operating schedule has been given as follows: 0430 to 0730—7,003kHz; 1000 to 1130—21,025kHz; 1800 to 1900—21,355kHz; and 2100 to 2200—28,503kHz. W5RBO is often involved in forming a "list" on the last-mentioned frequency.

ZD9GH is often to be found in the 1900 to 2100 period around 14,230, 14,250, 14,270 or 21,320kHz.

*10 Knightlow Road, Birmingham B17 8QB.

Some of the Tartan Net at the first-ever meeting: (standing) GM4GJG, GM4GGF, GM4HJQ, GM4DQK, GM8HXM, GM4FIB and GM8NGL; (sitting) GM4HFE, GM3HMU, GM4FIW, GM4DKO and GM4DCL

OK3TAB/D2A claims to be in Angola and to be called Caci. He is said to be found from 1900 on 14,275kHz, from 2200 on 14,200–14,205kHz (looking in this case for USA and Canadian contacts), and also occasionally on 21,265 and 28,600kHz. QSLs should be sent via OK3ALE.

Nicaraguan amateurs are now using special prefixes, and YN1H was signing as H7H during the WPX Contest. He was also expected to do this on 1 May, and again on 14 and 15 September and 12 October; H6H and HT0H may also be used.

The Scout Association reports that an Australian Rover Leader, Adrian Blake, is with the Australian Antarctic Expedition at Mawson, Antarctica, and will be there throughout 1979. His callsign is VK0AB and he expects to be on the air at 0930 on Tuesdays, Thursdays and Sundays, and possibly other days too. His frequency will be around 14,150kHz, and he will be looking particularly for Scout contacts.

S2BTF says that he is likely to be found on 14,205, 14,225 or 14,285kHz between 1730 and 1900, or on 14,051kHz after 1900. Father Moran, 9N1MM, keeps a schedule on 28,625kHz at 1400 on Tuesdays, and on Thursdays at 0200. He also uses 14,225kHz from 0000 and 14,245kHz from 0100.

West Coast DX Bulletin reproduces a report that HB9APN has been on the air from the Swiss embassy in Peking using the callsign HB9APN/A/BY from 1400 on 21,155kHz. This activity is said to be likely to continue until 20 May. The "BY" suffix seems to lend some doubt to the validity of the station.

ZS6BEE is the replacement who is going to Marion Is (ZS2MI) to take the place of ZS1TD.

QRP

Results of the 1979 QRP Winter Contest organized by the AGCW-DL Group have been received via G4BUE. In the Class A section (input less than 3·5W) G4BUE led with 18,423 points. He was followed by OK1DKW (4,656) G8PG (3,094), GM3OXX/A (2,346), DJ6FP (2,334) and G3DNF (2,221). Other UK scores were G3NEO (767), G4GIE (502), G4EJN (204) and G4AYS (106).

During the Commonwealth Contest G4BUE worked VE2FU and VE3IXE, running an input of only 15mW to his Argonaut! During the ARRL CW DX Contest W3MM, K8NZ, and K1ZZ were contacted with 10mW—the actual power output being confirmed later as being only 576μW. All these contacts were made on 28MHz cw.

Please note that the operating frequency of the G-QRP Club is now 3,560kHz.

The Tartan Net

The power of amateur radio to bring together enthusiasts of all callings and persuasions was demonstrated at the first-ever meeting of the Tartan Net in an Edinburgh Hotel on 12 January this year.

What started two years earlier (to the day) as a natter-net on 28MHz for two or three of Leith Nautical College's RAE "graduates" of '76 has become a regular Sunday evening QSO with up to a dozen south-east Scotland GM calls and some regular visitors from across the pond—mostly expatriate Scots. The 28MHz band lends itself to this kind of mixture of local and dx work, and the Tartan Net seems likely to continue to thrive.

One of the net's founders, GM4FIW, who pulls in the dx for the net, arranged this get-together and enabled members of the net to put faces to callsigns for the first but, evidently, not the last time.

Next "eyeball" in VE land perhaps?

Contests

The USSR "M" Contest

2100 12 May to 2100 13 May.

Phone and cw, 3·5 to 28MHz. Whole world may be worked, not just USSR. The same station may be worked on each band, but only on one mode on each. Exchanges consist of RS/T plus serial QSO number, Soviet stations will also give their oblast number. Contacts with stations in one's own continent count one point, and with those in other continents three points. Contacts with own country count only for multiplier credit. The multiplier is the total number of countries on the "R-150-S" list worked on each band added together (this list is similar to the DXCC list but also includes seven UA0 areas as separate countries—Dickson Is, Magadan, Taimir, Tuva, Chukotsk, Yakut and Sakhalin. It also includes all VP2s as one country, as KC6, KG6 and KX6 are, and also KB6, KJ6, KM6, KP6 and KW6). Final score is total points multiplied by total multipliers. Listeners may enter and should claim one point for reporting one station exchange and three for both—there is no multiplier in this section. Licensed amateurs may enter the single-operator single- or multi-band, or multi-operator multi-band section. A special badge will be sent to all who contact 10 or more USSR stations. Post logs before 1 July to: Krenkel Central Radio Club, "CQ M" Contest Committee, PO Box 88, Moscow.

QTH CORNER

FW8AD	via W7OK, W. D. Brickey, Box 95, Las Vegas, Nev, 89101, USA.
FY7AK, FY0BHI	via F2QQ, R. Gemehl, 25 rue Mauriceau, 92600 Asnieres, France.
H7H	PO Box 2616, Managua, Nicaragua.
VK2VGV/VK9	Box 214, Norfolk Is, 2899, Australia.
VP1KG	via YASME Foundation, PO Box 2025, Castro Valley, Calif, 96546, USA.
VQ9RL	1126-A 34th Street, Port Hueneme, Calif, 93043, USA.
VR6HI	C. Rademacher, ZL1ADI, Box 41066, St Lukes, Auckland 3, New Zealand.
VS5M	via N4GG, H. F. Kennedy, 275 Tollgate Trail, Longwood, Fla, 32750, USA.
YJ8KC	via ZL1BAB, W. G. Cooper, 41-A Kelvin Rd, Papakura, New Zealand.
YJ8PD	via VK3OT, S. R. Gregory, Box 414, Hamilton, 3300, Vic, Australia.
ZB2EN	via R. S. Wilkinson, G3JXE, 55 Summergangs Drive, Thorngumbald, Hull.
3D2WR	via G5RP, E. Wake, College Farm Hse, W Hendred, Wantage, Berks OX12 8RP.
4U1UN	H. Bohning, W2MZV, Box 102, Yonkers, New York, NY, 10702, USA.
K4YT/5T5	via DJ4PI, E. Neuerer, Doemigweg 6, 7505 Ettingen, W Germany.
9H31MAR	via 9H1R, R. V. Meachen, 1 Jasmin Path, St Lucia, Malta.
9N1BMK	via JA8BMK, H. Sasaki, Box 150, Asahigawa, Hokkaido, 070-91, Japan.

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

Note that contest contacts may be credited for Russian awards in lieu of QSL cards if the request is made with the log entry. This applies to the R-150-S, R-100-O, W-100-U, R-15-R, R-10-R and R-6-K awards.

The CQ WPX Contest (CW section)
0000 26 May to 2400 27 May.
Rules are the same as those for the ssb section which was held in March; and will be found on page 248 of the March issue of *Radio Communication*. Please note that G3FKM is now only able to supply summary sheets and one photocopied log form as guidance.

10th World Telecommunication Day Contest
0000 to 2400 12 May (Phone).
0000 to 2400 19 May (CW).
3·5 to 28MHz. Single-operator multi-band and club and association special multi-operator sections. Exchanges consist of RS/T plus ITU zone number (UK is in Zone 27). Contacts with stations in own country count only as a zone multiplier, with another country in the same zone as one point, with one in another ITU zone on the same continent three points, and with others five points. The final multiplier is the number of different zones worked—each counting once only. Stations may be worked on each band for credit. Logs should indicate date, time, station worked, numbers sent and received, band, continent, ITU zone (if new multiplier) and points claimed. Separate logs should be completed for each section. G3FKM has a small number of summary sheets. Logs must be posted to LABRE UIT Contest Co-ordination, PO Box 07-0004 70.000—Brasilia, DF, Brazil, to arrive before 30 August. The ITU Trophy will be awarded to the country with the highest aggregate of points earned by entrants. The top scorer in each country will receive a certificate.

In the 1978 event **G4CVZ, GW3SLA** and **GM5AXY** scored 5,120, 2,656 and 150 points respectively, and in the phone section **G3TXF** (14,625), G3MZV (12,475), G2AJB (8,517) G6NK (2,761) and G6GH (1,596 points) were listed.

The Diploma Altamira Contest
0001 9 June to 2359 10 June.
Organized by the Santander group of URE to mark the centenary of the discovery of the famous prehistoric caverns in the area. All bands 3·5 to 28MHz, ssb and cw—contact may be made with a station on each band, but only on one mode, on each day; further contacts may be made on the second day. Exchange RS/T and time. Santander stations will use the EA0 prefix. Each contact with an EA0 will count one point on ssb or two on cw, and with EA0URE two and three points respectively. Logs should list date, time, station worked, number received and sent, band, mode, and points, and QSLs should be enclosed "a QSL per band worked with each EA0 station". They should be posted before 10 July to: Diploma Altamira Contest, PO Box 1, Santillana del Mar (Santander), Spain. The winner of the contest will be invited to spend a week in Santillana del Mar at the end of September at the time of the special festivities.

Awards

The R-10-R
For contacting all USSR regions (0 to 9) during a 24h period since 1 July 1958.
The R-6-K
For 12 contacts—one each with Europe, Africa, North and South America, Asia, Oceania, plus three with European Russia and three with Asiatic Russia. Starting date 7 May 1962. It is in three classes: First (for all 3·5MHz contacts), Second (for all 7MHz contacts) and Third Class (any bands).
The R-150-S
Contacts with 150 countries of the world, including the 15 republics of the USSR since 1 June 1956.
The R-15-R
For contacts with all 15 republics of the USSR within a 24h period on cw or phone (not mixed). Starting date 1 July 1958.
The R-100-O
For contacts with 100 oblasts (all cw or all phone) since 1 January 1957. Three classes as with R-6-K.

A list of QSL cards (certified by the awards manager of a national society) plus 14 ircs should be sent to Box 88, Moscow, USSR. Note that contacts in the "M" Contest (see "Contests") may be claimed for credit for these awards in lieu of QSL cards if application is made with the contest entry log.

The Sasquatch Award
For five contacts with amateurs in the Chilliwack district of VE7—two of whom must be members of the Chilliwack ARC (VE7s AFA, AHN, AIO, AKD, AND, BEN, BHG, BYU, BZY, EWO, EX, FK, NHF, PU, QN, RS, TL and ZI). Others in the area include VE7s AGZ, AYZ, BBV, BDH, BIF, BLB, BPW, CBQ, CTO, CTW, CIX, CQO and GM. All must have been made since 1 March 1979. Send copy of log and three ircs to CARC, c/o 317 Marshall Avenue, Chilliwack, BC, V2P 3J5, Canada.

Congratulations to BRS33915 on being one of the 49 successful applicants for the **Canterbury Aero Club 50th Anniversary Award** (see *MOTA* July 1978).

The Diploma Altamira
This is being awarded to participants in the contest of the same name (see "Contests") and will be given to European applicants who score 30 points, those in N and S America require 20, and all others 10. It will be sent via the national

society, except to those who enclose five ircs for direct postage.

Fiji Association of Radio Amateurs

Upali Ranasinghe, 3D2UP, has announced that the Fijian society, FARA, has been restarted with the following office bearers: president—R. L. Northcott, 3D2CM; joint secretaries—Upali Ranasinghe, 3D2UP, and Bernard Malandain, 3D2BM; treasurer and QSL manager—Raj Singh, 3D2ER; and committee members—George Williams and Bob Hodkinson, 3D2BH. The society's address (which also applies to the QSL bureau) is: FARA, PO Box 184, Suva, Fiji.

Welcome

The following overseas amateurs joined the RSGB during February: A9XCE, DK1KR, DK6AJ, EI6BT, EI7DG, F2WW, G8EKB/W1, IS0ESS, K3JLF, K8YAH, ON4TX, ON6WS, OZ4JV, PA0BUD, SM3DPO, SM5KI, VE3AMJ, VE7TL, VK2AE, VK6WC, W9IYG, ZL2AMP, ZR5CG, ZR5DH, ZS1DP, ZS6KF, 5B4AH and 6Y5HB.

Jamboree-on-the-air

The report of the 1978 event has just been received and it indicates that this was the most successful held so far. There were 397 stations active in the UK—including nearly 100 with special GB callsigns. A record of 658 overseas Scout stations in 59 different countries appeared on the bands—slightly fewer countries than in 1972 when 64 were heard. It seems that, particularly in the USA, activities spilled over into the 27MHz citizens' band and where it is legal for Scouts to speak to each other. The 1979 JOTA will take place over the weekend of 20–21 October. Readers may like to note that world Scout frequencies are as follows: (cw) 3,590, 7,030, 14,070, 21,140 and 28,190kHz and (phone) 3,740, 3,940, 7,090, 14,290, 21,360 and 28,990kHz. Scout nets are held every Saturday in the UK at 0800 on 3,740kHz. Other nets are listed as follows: (European) 0930 Saturday on 14,290kHz; (Scandinavian) 0830 on the first Sunday of every month on 7,090kHz; (Australian) 2300 on the fourth Sunday in every month on 14,120kHz; (Norwegian) 1430 every Saturday on 3,740kHz, and (Danish) at 1030 every Saturday on 3,740kHz.

Band reports

G8KG's summary for the past month is as follows: The Zurich sunspot data for March were not available at the time of writing but preliminary reports suggest that on many days the number was well above 200, so that the monthly mean may well turn out to be in the region of 200. If this is so, then Cycle 21 is catching up on Cycle 19. On the other hand the daily solar flux levels were somewhat lower than in February, with the seven-day mean lying between 180 and 190 sfu for most of the month. If the pattern of January and February is repeated there should be a significant rise in mean solar flux during April.

The general effects of the increasing solar activity on the higher bands were very much in evidence during March. On 28MHz there were morning openings lasting several hours to ZL1/ZL2 and the western Pacific islands, and on a few mornings there were early long-path openings to eastern Australia. The onset of summer conditions was signalled by the appearance of good long-path openings to JA, VK and ZL in the evenings on 21MHz, and there was at least one similar opening to eastern VK on 28MHz at 2200.

Propagation predictions

Summer conditions prevail in the ionosphere in May. Day-time frequencies are noticeably lower in the northern hemisphere compared with winter, and this will be most pronounced on **28MHz** in traffic with North America. The conditions of certain traffic during the winter months become fewer and will only extend to a few hours in the afternoon under very favourable conditions. This worsening of conditions will not be as pronounced in traffic with Africa and South America, because the F2 mufs do not show any noticeable reductions in equatorial regions in the summer.

In contrast, the night-time frequencies will be higher than in winter, and this will lead to considerable improvement of dx conditions on **14MHz** during the night. Short skip conditions usually start in May, and they will quite suddenly facilitate contacts within Europe on **28** and **21MHz** with good results, but these conditions will be very sporadic. Changes of dx conditions on **21MHz** will be less severe, with traffic with eastern North America being possible on favourable days during the afternoon and evening, although it will most probably be best in the evening.

The start of winter in the southern hemisphere will influence, above all, traffic with South Africa, with a break in traffic between 0200 and 0700. Absorption is usually too high on this path during the middle of the day. On **14MHz** dx will first be possible with Asia and Australia in the afternoon, and later with North, Central and South America as well. Traffic will be possible all through the night until just after sunrise. With Australia, traffic will be possible during the afternoon and first half of the night via the eastern path, and during the time to sunrise via the western path. DX will be possible on **7MHz**, mainly when the whole path lies in darkness, but static and QRM will interrupt traffic. During the day **7MHz** will be best suited to local QSOs. Signals will be stronger, especially at mid-day, than on **3·5MHz**, although **3·5MHz** will provide good local traffic, and there will be no interruption by the dead zone in the second half of the night.

The provisional sunspot number from the Swiss Federal Observatory for February 1979 was 138. The highest daily number of 171 was recorded on 21 February. The daily mean number for 1978 is 92·5.

The predicted smoothed numbers for June, July and August are 159, 162 and 163 respectively.

The editor regrets that, due to staff illness, the usual "Propagation predictions" diagram cannot appear in this issue.

Interesting and unusual contacts are being made on 28MHz—G3MBA sent a recording of one with a mobile station (AX6NDZ) on the Indian Pacific express in W Australia. G3LEQ reports a number of contacts with USA stations using fm, and also mobile ssb QSOs from his car—these including one with WA2KSW/AM who was flying a military aircraft at 35,000ft, and another with VK4NJC/M who was driving a truck at the time, power output in every case was only 12W.

The following kindly provided logs from which this section was compiled: Gs 2AMV, 2HKU, G3s AAE, GVV, KSH, LEQ, LPS, SED, MBA, XBY, GM3LYY, GM4CHX, G4s BUE, EAN, EHQ, ETN, FMO, G5JL, G6GH, G8KG, BRSs 17567, 25429, 31301 and 33915.

Stations listed in italics were using cw, the rest ssb.

1·8MHz. 0100 *HI8JAG.* **0300** *KP4Q.* **2200** *DK6AS/LX.* **2300** *ED5HM,* ED5NY.

3·5MHz. 0500 KP4AM/D. **0600** *ZL.* **0700** *ZF1CF.*

7MHz. 0200 *YN1Z.* **0300** *C5AAP, VE5–VE7, 9J2BO.* **0500** *XE1AO, VR6HI.* **0600** CM, EL, *FP8FD, K9VCM/HR1, M1C, VE6–VE7, ZL.* **2300** *VK6s GU, HD, VP9IR, VU2RQ.*

14MHz. 0400 VR3AH. **0600** *VR6HI.* **0700** CE0AE, FO8, VR6HI. **0800** FB8YI, FW8AD, KA1IW, KC6GF, *VK9RH,* VK0PK (Macquarie Is), VR3AH, 5W1AX. **0900** FK8CR, VR3AH, WH4AAA, 3D2MD. **1000** *KP4AM/D.* **1500** YI1BGD. **1600** U0CR (New Siberian Is), VQ9RL. **1700** A7XAH, FH8OM, S8AAP, 6O1FG. **1800** FW8AD, JT1AN, KH2AD, KH6, KL7, TA1SU, VS500, VR1BD. **1900** A7XA, OK3TAB/D2A, FK8CR, FR7ZL/T, KC6GF, VS5M, 8Q7AH. **2000** VR1BD. **2100** W7ZGA/KH2, VP2MBU (QSL to WA4ZSX), VP8SO, *9N1BM.* **2200** UA1ABL/UA0 (Severaya Zemlya), VP8s QG, SO.

21MHz. 0000 JK1DVX/JD1, 9M8HG. **0700** *KL7MF.* **0800** 9L1CA. **0900** JA, *U0CR,* VK, ZL. **1000** AX6NDZ/rail mobile. **1600** *KP4AM/D.* **1700** OK3TAB/D2A, 5N2AIF (QSL to DJ0VT), K4YT/5T5. **1900** WA1SQB/HC8, KA1NC, 5W1AX, 9L1CA (QSL to WA3NCP). **2000** 4U1UN. **2100** HH2A, KC4AAD, VP1KG, ZD8KG (QSL to K4KBI). **2300** VK6, W6, ZL.

28MHz. 0300 *VK3YT.* **0500** UG6. **0600** JA, UJ, UL, VK, ZL. **0700** A35RB, HL9KE, JA, VE6PN, VQ9MR, VU. **0800** A6XJA, FK8CK, HM1EJ, H44s PT, JD, *KH6,* ST0RK, VR3AH, ZL. **0900** H44s PT, WH, JE1IVI/JD1, UA0, 9H79CG. **1000** H44JD. **1100** CR9AJ, D4CBS, KG6SW, KL7, VK8, ZL. **1200** OK3TAB/D2A, FK8CW, *HZ1HZ* (Ahmed, Box 1999, Jeddah), K1CO/PJ7, G4IDW/SU, SU1DP, VK2VGV/VK9, K4YT/5T5. **1300** AP2UR, OE2WSL/YK, ZL3UM. **1400** JY1, P29NDU. **1500** WA1QSB/HC8, KL7HHX, VP1KG. **1600** FG0DYM/FS7, HS1ABD, VQ9JJ, YB0. **1700** CE, *FY0EOL,* VP8HA, ZD7SD, *ZF2CL.* **1800** J6LGK, *VR6HI.* **1900** FG0DYM/FS7, HH2T, KH6, KL7, KP4AM/D, VP1KG, VQ9JJ, ZK1DR, 6D1LCH. **2000** KH6, KL7, VE7, VY1BR, W7, ZL1DH, ZL2RE, 5J4RCA. **2100** CE, HP, VK3, VP2SK, VR3AR, ZD8. **2200** CR9AJ, FK8CW (QSL to K2IJW), FM7, JA, VK2BA, VK3, W6–W7, VP2MCU. **2300** JA1BRK, VK3, ZL2-3-4. **2400** *ZL2PN.*

Many thanks to the editors of the following for news items extracted: the *West Coast DX Bulletin* **(WA6AUD),** *DX'press* **(PA0TO),** *CQ Magazine* **(W1WY),** the *Ex-G Radio Club Magazine* **(W3HQO),** *DX News Sheet* **(Geoff Watts),** and *Long Skip* **(VE3FRA).**

Please see that all information for **July** issue reaches G3FKM by **2 June,** and for **August** by **28 June. Note that August deadline is abnormally early!**

HF propagation study

Predicted hpfs (MHz × 10) for May 1979

GMT =	00	02	04	06	08	10	12	14	16	18	20	22	24
Aden	266	258	296	346	361	373	392	394	385	351	318	293	266
Ascension	312	296	288	241	366	368	402	428	421	399	356	317	312
Bahrain	243	239	293	322	343	345	359	359	366	336	299	268	243
Bangkok	227	219	270	290	296	305	305	318	321	299	270	241	227
Barbados	289	256	230	237	281	296	309	319	323	336	336	312	289
Bermuda	268	229	204	205	232	266	284	295	296	308	321	303	268
Bogota	281	242	218	218	270	285	298	313	319	327	335	309	281
Buenos Aires	300	276	262	224	173	296	355	368	371	371	351	317	300
Cape Town	279	199	150	346	368	390	415	431	423	399	351	303	279
Colombo	238	229	294	318	321	332	345	346	355	324	288	257	238
Cyprus	229	221	249	296	313	321	337	332	341	317	282	258	229
Dakar	312	296	288	246	366	368	402	428	421	399	356	317	312
Denver	215	196	181	164	171	172	210	229	242	242	242	248	215
Fairbanks	192	173	173	199	221	205	204	192	199	199	199	199	192
Falklands	197	183	169	153	210	272	368	392	383	384	352	290	197
Gibraltar	180	167	161	180	210	215	233	232	230	232	218	199	180
Hong Kong	219	219	257	266	284	281	291	293	304	290	261	224	219
Honolulu	192	173	173	199	223	230	243	219	247	241	235	218	192
Iceland	153	139	140	164	182	182	194	192	195	199	204	177	153
Jamaica	268	233	209	208	244	270	284	295	298	310	318	301	268
Lagos	313	293	288	321	366	379	415	430	422	404	354	314	313
Las Palmas	266	247	232	225	295	310	333	332	333	335	313	281	266
Lima	291	265	241	246	290	243	321	341	338	346	341	313	291
Los Angeles	199	190	176	183	169	164	196	239	247	248	253	235	199
Malta	199	188	185	239	251	263	280	272	272	268	246	225	199
Mauritius	280	220	290	355	368	379	398	408	398	366	332	301	280
Mexico	246	218	191	195	235	218	266	272	277	284	296	277	246
Montreal	239	209	188	169	195	225	244	248	260	265	272	271	239
Moscow	188	176	206	225	239	242	247	249	257	249	229	211	188
Nairobi	270	277	288	355	368	385	403	420	404	368	318	295	270
New Delhi	230	219	277	299	307	312	314	323	332	301	274	242	230
New York	246	218	191	172	194	235	247	253	265	271	284	284	246
Osaka	208	206	232	247	252	260	268	267	280	260	244	219	208
Perth	237	228	294	315	321	328	338	314	261	242	204	186	237
Rio de Janeiro	301	289	276	248	210	343	368	392	383	384	352	317	301
Salisbury	303	266	241	359	368	390	416	420	411	387	345	307	303
Seychelles	279	265	294	346	368	379	398	395	397	347	321	294	279
Singapore	230	219	277	299	307	312	314	324	332	303	274	242	230
Suva (s)	192	176	199	223	229	235	247	247	247	247	235	218	192
Suva (I)	313	295	288	308	300	276	310	218	195	187	359	315	313
Sydney (s)	219	219	257	266	284	281	277	257	229	197	196	224	219
Sydney (I)	291	266	241	265	276	235	204	211	191	168	288	312	291
Teheran	238	229	294	318	321	332	338	346	355	323	285	256	238
Vancouver	192	173	173	197	196	196	191	199	216	216	246	223	192
Wellington (s)	202	202	221	241	248	260	255	219	196	190	248	216	202
Wellington (I)	301	289	282	268	251	215	181	182	159	187	336	319	301

Bands recommended are those between hpf and half hpf.

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Continued from page 440

at a high level. Alex Dunn, GM8DMZ, at Patna in Ayrshire, first noticed the aurora at 1330gmt, and he reports that the aurora was farther to the south than usual and that it peaked on a beam heading of 50°. GM8DMZ worked all the QTH squares in Holland and had many ssb contacts with stations in Germany and Denmark. G8ODN near Carlisle also used ssb to contact 12 stations, including a very strong signal from G8LYD in Manchester, and from GW4HDF in South Wales. G8ODN also had some morse practice by copying the ac-sounding cw signals from G3UQH, in Shrewsbury, and EI5BH in Co Athlone.

Bill Duckett, G8BKF, in Shropshire, first noticed the aurora at 1550gmt, and he worked several Scottish stations on ssb. Best dx for G8BKF was GM8AOB in Fort William, Invernessshire, a station mentioned as an outstanding signal in several reports. Martin Wheeler, GM8RHH, in the Hebrides, using a TS700 and a 9-el Tonna antenna, was getting pile-ups of stations anxious to work WS square. GM8RHH reports G4HDQ and G8JHL as the strongest signals via the aurora. GM4COK in Edinburgh came home early on the afternoon of 22 March as he knew there was a possibility of a repeat following the event of 23 February. Keeping his solar rotation calendar certainly paid off for GM4COK, as he worked 30 stations, including G3FPK, LA6ZW(ET), PA0CSL(CM), F2JQ(DL), DL9AR(FM), DF6VO(GM), and, best of all, DM2DTN(GK) and DM2BYE in HM square. GM4COK beamed at 70° for most of the above contacts, and the aurora faded out with him following a contact with DB1BP at 1639gmt.

Another aurora on 25 March hovered around for most of the afternoon and evening, with auroral signals on 50MHz from Scandinavian television stations being very strong at times. SK4MPI and GB3LER did eventually show up on 144MHz at 2330gmt, but signals were weak in Aberdeen, and although it showed early signs on 50MHz this aurora failed to develop into a large-scale event.

Late news

Further auroras occurred on 29, 30 March, 2, 3 April. The event on 29 March was the strongest, with OY5NS being worked by many 144MHz stations. SM1BSA, in JR square, was another outstanding signal, being worked by GM3UU and other Scottish stations; G8DVK, G8KSS and G8LYD were the strongest G signals at Aberdeen. On 70MHz GM3YOR used the same event to work G3UKV (YM28), G4ENA (ZL08), G3FDW (ZN56) and G3OSS (ZL49); GM3YOR reports most signals were 5 9a on the lower band.

On 20 March SV1AB and SV1DH copied signals from ZE2-JV's 432MHz beacon for 15min; signals were auroral sounding and are the longest (6,300km) ever reported via te on 432MHz. Signals from ZS6LN were heard in Cyprus on 144MHz by 5B4AZ on 23 March. G3COJ had further crossband 50MHz contacts with ZS at the end of March. SMIRK No 1, K5ZMS, worked ZL1AVZ on 10 March at 2105gmt; this was his first ZL in 20 years of activity on 50MHz. SV1DH plans a 1kW beacon on 432MHz. Full details on all these items next month. □

Solar and propagation information in GB2RS news bulletins

by C. E. NEWTON, G2FKZ*

EVERY Sunday the RSGB news bulletin broadcast over GB2RS contains information about solar and geophysical events which either have affected, or may affect, radio propagation, together with forecasts of likely conditions, and this brief guide will help listeners to use this information to best advantage. The bulletin's factual data usually relate to the week up to the Tuesday preceding the broadcast, and are as up-to-date as possible bearing in mind the time necessary for data centres to obtain, collate and despatch them. Use is also made of the Meudon, France, ursigram radio transmissions of solar data, the Wednesday ursigram of Tuesday's data being the latest that can be included. Forecasts normally run from the Sunday of transmission to the following Sunday.

Solar activity

Solar information may refer to rotation numbers, each 27-day rotation having a Carrington rotation number. Interesting activity centres (such as major sunspot groups, flares, coronal holes, etc) can be referred to in latitude north or south and heliographic longitude, which gives both position on the solar disc and date of central meridian passage. (Frequently the radio effects of solar events are experienced around the time of central meridian passage, although this is not always the case.)

A solar rotation base map for up to one year ahead, using Carrington rotations and heliographic longitude (as used in the bulletin) is available from RSGB HQ. With this map, a solar calendar can be kept and central meridian dates recorded.

Solar activity refers to background flares and sunspots, mostly small in size and short in lifetime. This activity varies, depending on the number of active regions and the type of flare emissions that occur in the optical, X-ray, and radio spectrums in general. The effects are classified as:

Solar quiet: No active regions erupting.
Solar moderate: Active regions erupting but of low intensity.
Solar active: One or more active regions erupting, with high intensity bursts, or new active regions forming, or both.

Large flares can have an almost instant effect on the ionosphere, regardless of their position on the solar disc, whereas auroral effects normally occur 30 to 50 hours after the event, and usually, but not always, after central meridian passage of the event.

Large sunspots of an area in excess of 500 millionths of the visual disc are sometimes notified to the RSGB; they are given as date first seen—this depends on the weather at Hurstmonceux. Date on disc gives the total passage time from appearing over the east limb to its disappearance over the west limb. Date of disappearance, central meridian passage is given as day and fraction of day, eg 7·3. The Zurich relative mean sunspot numbers are given as soon as they are available—about two months in arrear. Zurich smoothed numbers are not usually given as they are at least six months in arrear.

Solar flares

These are divided into three types, C, M and X. C-type flares are very common and are of low intensity, about 80 to 100 per week are normal at the present time. In effect, they give the general background to the solar flux.

M-type flares are of greater intensity than C-type and can cause earth events such as magnetic storms (usually minor) and short-wave fade-outs (swf) of varying amounts. These are sub-classified M1 to, say, M4. The resulting magstorms of M3–M4 flares *usually* give Scottish-type weak auroral events. SWF is given in hours or minutes of extent, if known.

X-type flares are violent, big and accompanied by X-ray type emissions. They usually cause widespread blackouts of the hf spectrum, but there does not appear to be any definite association between auroral events and X-type flares. They are detected by satellites up to X8; in excess of that it is necessary to deduce; such as the event of 11 July 1978 which reached X15 (the largest known) although it produced no aurora.

Unless of special interest, optical flares are not normally reported in the bulletin.

2,800MHz solar flux values

The measurement quoted in the bulletin is made daily at the NRC Radio Observatory near Ottawa, Canada, at local noon (1700gmt), and is valid worldwide. The Ottawa S-figure measures solar radio emissions at 2,800MHz, the frequency which most closely approximates to the size of the visual sun. A lower frequency would, in effect, view a larger sun; a higher one would see a smaller sun; and a very high frequency, ie X-rays, would see only spots. Therefore 2,800MHz is the most appropriate frequency.

At the bottom of the solar cycle daily S-readings are below 70; at times of moderate activity they rise to 100–130, while at periods of intense activity they can exceed 200. Anything over 150 is considered high, and in the absence of any information to the contrary can be taken as a pointer to good hf propagation.

These solar radio noise figures have been adopted as one of the basic indices for predicting values of fol and foFl up to six months ahead—which are the basis of propagation predictions published in *Radio Communication*. Monthly means of solar flux are given as they become available, although these are adjusted to 1au (1 astronomical unit). This assumes that the earth is the same distance from the sun at all times, and therefore the attenuation of the 2,800MHz signal due to distance is constant. They are designated Sa.

The highest possible frequency (10 per cent reliability) figures published in *Radio Communication* are updated when some degree of confidence can be expected; this is, of course, a forecast, and is given as an upgraded reliability percentage for the following week. The basis of this upgrading is the current solar flux and A indices against the units used for the original prediction. However, the success of these ventures depends on the feedback hf operators give to the forecaster. This is a service of the RSGB Propagation Studies Committee carried out by the author, who would appreciate comments, suggestions—or brickbats.

Geomagnetic information

Every three hours the geomagnetic field is measured in three dimensions: horizontal (h), declination (d) and vertical (z). That showing the greatest variation at any time is used for computing the three-hourly *K index*. Sometimes the bulletin will refer directly to this K index, but more often it will express magnetic activity in terms of the 24-hour *A index*. The A scale is, in fact, derived from the K data, but where K is compressed into a 0–9 logarithmic scale, the scale is linear and more extended and this allows variations to be shown in rather finer detail.

Where a bulletin refers to quiet conditions this means that, over the period 0000–2359, A variations did not exceed 10 units. "Unsettled" indicates variations of 10–20 units. "Sub-storm" or "minor storm" means an A reading of 20–50. "Storm conditions" means 50–80. "Severe storm" means 100–200 or even more. (These values are in terms of mid-latitude stations—at an auroral station like College, Alaska, peaks may be as high as 400. As far as possible the bulletin uses European mid-latitude data, but where these are not available it may quote data from Fredericksburg, Virginia, a mid-latitude observatory comparable to Lerwick).

At various times reference is made to special events which either have occurred or are expected, such as:

Coronal holes. These are areas in the solar corona where helium 10830 A (Angstrom units) has been detected by the Kit Peak Observatory, USA. There appears to be a strong association between the presence of weak auroras and coronal holes. In practice it is only the more northern stations which can actively participate in this type of event, so they have tended to be called Scottish-type auroras. An A index of up to 35 or 40 can result from the passage of coronal holes past the sun's central meridian, especially if it is near the solar equator.

Proton events. These are detected by satellites if the energy level is in excess of 10MeV (mega electron volts). They are given in the bulletin as a guide to whether active regions on the solar disc are intensifying or are expected to continue active, as proton particles cause high absorption in the D region and so affect the lower hf bands. They are also responsible for polar cap absorption events which affect communication over the poles.

Solar filaments. These are tenuous streams of flare-type gas which often protrude from the solar surface. It sometimes happens that one of these in a very active region will disintegrate very rapidly with considerable consequences on earth. A disintegrating solar filament was responsible for the wide-scale visual and radio aurora of 28 August 1978. It was 0·8 of a solar diameter long, and all but the stump suddenly disintegrated. These events are unpredictable, violent and sudden. In the UK the A index can reach 100 plus with this type of event.

Interpretation of solar and geomagnetic data is undertaken in the bulletin, but, in general terms, an A index of 25 or more may produce auroral conditions over northern Europe and Scotland. However, for auroral working from the south-east at least 45 is required, or about 60 if moderately powered stations are to participate; 90+ is required for auroral working to be widespread throughout Europe.

In hf terms the ideal combination will be a relatively high S reading and a low A reading. For instance, excellent hf conditions were encountered on 5–6 November 1978 when the solar flux was 184 and the A index was minimal. □

*61 Merriman Road, London SE3 8SB

raynet

R. Bullard, G8NMW*

Home Office regulations
Under an agreement reached in March 1979 with the Home Office Radio Regulatory Division, Raynet members may, under conditions of operational oil pollution incidents, at the direct request of a county emergency planning officer or member of his staff, embark with them in craft to provide a communications link to the shore within a two-mile seaward limit.

Note: This permission cannot be used for exercise purposes and is for LIVE OPERATIONAL OIL POLLUTION EMERGENCIES ONLY.

All instances where Raynet members have been called upon shall be reported to the emergency communications manager as soon as possible afterwards.

Members are advised to ensure that life jackets or buoyancy aids are available in sufficient numbers before embarking in any small craft.

Raynet membership
Referring to Clause 4C, page 14, of the *Raynet Manual*, it shall be deemed that membership commences from the time that the prospective member receives his/her Raynet membership card from his/her controller. Persons under the age of 14 years are not eligible for Raynet membership.

National Raynet Committee
The following is a who's who of the committee, together with their job description(s):

Chairman—M. G. Barker, G8CAC. Responsible to Council and the committee to chair committee meetings.

Vice chairman—E. W. Yeomanson, G3IIR. Responsible to the chairman and committee to arrange meetings and act for the chairman in his absence.

Emergency communications manager—P. Balestrini, G3BPT. Council appointment. Responsible to council and committee for liaison between Home Office, RSGB and committee, as defined by Council.

Correspondence secretary—L. A. Crane, G3PED. Responsible to chairman and committee for dealing with the day-to-day correspondence sent to Raynet. He is the main link with ordinary members. All queries, etc should be sent to him. Items requiring a more specialized answer will be forwarded to the appropriate committee member. He deals with all group controller and organizer nominations and changes.

Minuting secretary—E. R. L. Bassett, BRS16075. Responsible to chairman and committee for production and distribution of the minutes of each meeting.

Group information officer—T. I. Lundegard, G3GJW. Responsible to chairman and committee for all group records and information on groups, their officers and operating frequencies, the user services they serve, and the area each group covers. He circulates each group annually with a questionnaire to ensure the records held are up to date and correct.

Publicity officer—R. J. Bullard, G8NMW. Responsible to chairman and committee for all publicity distributed by the committee to HQ and/or the news media. Responsible for exhibitions, displays etc. All items of publicity should be sent to him by groups.

Supplies officer—Mrs J. Balestrini. Responsible to chairman and committee for the supply of Raynet items and stationery, etc, to the groups.

Ordinary committee members—G. Cluer, G4AVV; B. L. Goddard, G4FRG; J. Maud, G8MBB; G. Lear, GW2HPG (corresponding); J. Scarborough, G3MBQ (corresponding). Responsible to chairman and committee for the general advancement of Raynet both at local level in their own areas and also at national level.

Mrs T. Crane acts as registration secretary on behalf of the committee for the recording of membership registrations and maintains registration records.

With the above information to hand it should now be easier for members to write to the committee when needing information, giving information, or with a cry for help, knowing that it can be directed to the right quarter. G8NMW will be more than happy to receive any items of news that members may care to send to him, and he will endeavour to publicise them through GB2RS, GB2ATG, RSGB newsletters and publications and, of course, through the public news media, as well as at exhibitions. If members have any ideas they would like to put before the committee please write to G8NMW or any other member of the committee. G8NMW will be particularly interested in any practical ideas members may have on promoting the Raynet image with the general public.

Last, but not least, please do not forget the RSGB National Amateur Radio Exhibition at Alexandra Palace on 11 and 12 May. The usual supplies, including new Raynet ties, will be on sale there. Hope to see you there on the RSGB stand.

*12 Moriston Road, North Brickhill, Bedford.

RSGB committees, 1979

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

Education: D. H. Adams, GW3VBP; J. Anthony, G3KQF; R. Bellerby, G3ZYE; G. L. Benbow, G3HB; L. E. Newnham, G6NZ; G. C. Oxley, G8MW; D. M. Pratt, G3KEP; W. A. Scarr, G2WS; F. C. Ward, G2CVV.
Finance & Staff: E. J. Allaway, G3FKM; P. F. D. Cornish, G3COR; D. S. Evans, G3RPE; B. O'Brien, G2AMV; C. H. Parsons, GW8NP; R. F. Stevens, G2BVN; C. J. Thomas, G3PSM.
HF: E. J. Allaway, G3FKM; R. J. Eckersley, G4FTJ; S. H. Jesson, G4CNY; J. D. Kay, G3AAE; D. J. Lawley, G4BUO; F. M. Smith, G8KG*; C. J. Thomas, G3PSM*.
HF Contests: E. J. Allaway, G3FKM; D. J. Andrews, G3MXJ; D. S. Booty, G3KKQ; R. L. Glaisher, G6LX; M. Harrington, RS20249; C. A. P. Henderson, G4FAM; P. A. Miles, G3KDB; E. L. Mollart, RS10977*; D. Thom, G3NKS; R. S. Unsworth, G3WPF.
IARU: E. J. Allaway, G3FKM; D. J. Andrews, G3MXJ; D. S. Evans, G3RPE; R. J. Hughes, G3GVV; R. F. Stevens, G2BVN; R. M. Warner, G3SAR; I. F. White, G3SEK.
Interference: S. R. Allen, G4CYR; J. Anthony, G3KQF; P. F. Jobson, G3HLF; A. S. Kessler, G4DXA*; Miss J. Maggs; J. E. Martin, GU3YIZ*; K. H. Parker, G8HTA; J. E. Swayne, G3BLE*; J. W. Swinnerton, G2YS; C. L. Turner, G3VTT.
Membership & Representation: D. H. Adams, GW3VBP; E. J. Allaway, G3FKM; D. J. Andrews, G3MXJ; J. Anthony, G3KQF; L. N. G. Hawkyard, G5HD; G. I. Knight, GM8FFX; W. F. McGonigle, GI3GXP; B. O'Brien, G2AMV; C. H. Parsons, GW8NP.
Microwave: B. Chambers, G8AGN; D. S. Evans, G3RPE; H. Griffiths, G4CNV; D. T. Hayter, G3JHM; K. S. Hutchinson, G4ALN; H. W. Rees, G3HWR; K. L. Smith, G3JIX; C. W. Suckling, G3WDG; M. H. Walters, G3JVL; I. F. White, G3SEK.
Mobile & Exhibition: P. Balestrini, G3BPT; L. N. G. Hawkyard, G5HD; R. S. Hewes, G3TDR; W. J. McClintock, G3VPK; N. Miller, G3MVV; G. W. Norris, G3ICI; D. P. S. Wright, G4FBW; E. W. Yeomanson, G3IIR*.
Propagation Studies: L. W. Barclay, G3HTF; B. Chambers, G8AGN; T. Damboldt, DJ5DT*; W. M. Dunell, G3BYW; D. S. Evans, G3RPE; R. G. Flavell, G3LTP; G. H. Grayer, G3NAQ*; R. A. Ham, RS15744*; M. Harrison, G3USF*; R. J. Hughes, G3GVV; C. E. Newton, G2FKZ; A. M. Pomfret, G3LZZ*; J. Spurling, G4AQI; G. M. C. Stone, G3FZL; A. Taylor, G3DME; R. C. Whelan, G3PJT*.
Raynet: P. Balestrini, G3BPT; Mrs P. Balestrini; M. G. Barker, G8CAC; E. R. L. Bassett, RS16075: R. J. Bullard, G8NMW; L. A. Crane, G3PED; G. B. Lear, GW2HPG*; T. I. Lundegard, G3GJW; D. J. Maud, G8MBB; S. J. Scarborough, G3MBQ*; E. W. Yeomanson, G3IIR.
Technical & Publications: R. J. Eckersley, G4FTJ; D. S. Evans, G3RPE; T. G. Giles, G4CDY; P. J. Hart, G3SJX; J. P. Hawker, G3VA; R. S. Hewes, G3TDR; P. A. Holliday, G3UVZ; P. J. Horwood, G3FRB; A. W. Hutchinson, editor; J. W. Mathews, G6LL*; M. H. McFadden, GI3VCI*; R. O. Phillips, G8CXJ; H. W. Rees, G3HWR; R. F. Stevens, G2BVN.
Telecommunications Liaison: E. J. Allaway, G3FKM; P.Balestrini, G3BPT; S. A. G. Cook, G5XB; T. P. Douglas, G3BA; D. S. Evans, G3RPE; R. J. Hughes, G3GVV; D. M. Pratt, G3KEP; R. W. Price, G4BSO*; R. F. Stevens, G2BVN; C. J. Thomas, G3PSM; F. C. Ward, G2CVV.
VHF: M. S. Appleby, G3ZNU; A. H. B. Bower, G3COJ; A. H. Dormer, G3DAH; T. P. Douglas, G3BA; G. I. Knight, GM8FFX*; R. W. L. Limebear, G3RWL*; C. J. Morcom, G3VEH*; G. M. C. Stone, G3FZL; R. J. Taylor, G4BEL; I. F. White, G3SEK; E. W. Yeomanson, G3IIR*.
VHF Contests: L. N. G. Hawkyard, G5HD; F. Mathews, G8ACJ; W. J. McClintock, G3VPK; J. H. Quarmby, G3XDY; C. Sharpe, G2HIF; G. M. C. Stone, G3FZL; C. W. Suckling, G3WDG; R. J. Taylor, G4BEL; L. V. G. Turner, G4CUT.

* Corresponding member.

your opinion

BAND PLANS...AGAIN
The Editor
Radio Communication
Sir—I would like to add further comment on the subject of the use and misuse of S20, with regard to the 144MHz band plan. Since moving to Lincoln a little while ago, I have noticed that a small group of amateurs persists in using S20 for their "rag chews". Most of them are Class A licence holders and, from the antiquity of their callsigns, can be termed "old-timers" or, as some would have it, "real amateurs". This is at the least a petty irritation, and at worst can cause real problems, as on Thursday 15 February.

At the height of the snow storms, with roads fast becoming blocked and telephones going out of action; there was the same little group sitting rag chewing on S20 for three hours. Sitting snug in their shacks discussing how many feet of snow were piling up against the garden gate, while mobiles were calling, in vain, for assistance, without being heard. I actually intercepted a distress call from a mobile on S21, after he had called in desperation for half-an-hour on S20. The same group later claimed, very self-congratulatory, to have "kept S20 open" for emergency use!

The following day, when road conditions were extremely hazardous and most telephones were out of action, a mobile at the scene of an accident was unable to summon help because the same group was on S20. They do not seem to realize how far their 10W signals from omni-directional antennas radiate beyond the station which they are working. I have tried gentle persuasion and reasoned argument without success; so, on behalf of the rest of the stations in the Lincoln area, I apologize to the mobiles who have passed through our area and called CQ on S20 without making contact.

If we could hear you, we would work you.

Prenda Peters, G8MQN

The Editor
Radio Communication
Sir—I was very pleased to see in the February issue of *Radio Communication*, in "The Month on the Air", the remarks about the use of telephony in the IARU band plan sector 3,500 to 3,600kHz recommended for cw only.

For a long time now, a group of amateurs, mostly with old-time calls, have been using telephony, mainly a.m., but with some ssb, and spreading, in some cases, very broadly.

To approach within 10kHz of them is to incur complaints of deliberate interference. This is no doubt due to the wide passband of their receivers, and it is no uncommon thing to find them 5 to 7kHz apart, quite under the impression that they are in fact netted.

In the past, in my opinion, the RSGB has only paid lip-service to the hf band plan (which, it is realized, is voluntary) by printing it in the January issue of *Radio Communication* and then forgetting about it until next January. A little more publicity at frequent intervals would help, and some remarks on the RSGB news broadcasts occasionally would be welcome, to me and to many other members.

I have written or spoken to some of the persons concerned, requesting their co-operation in observing the band plan, and in turn, I have been accused of deliberate interference myself (I usually work cw at the top end of the 3·5MHz cw sector), previously with QRP, but after being often clobbered by this group I mainly use about 100W.

I would point out that among the frequent members of this group is an RSGB area representative, and I think that if personally requested by the RSGB to co-operate in keeping to the band plan, a lot more attention would be given to a letter from that source than to all the letters or moans from individuals.

Personally, I would welcome a band plan written into our licences, and I think that the abandonment of the first year licence for cw and QRP was a great mistake, the results of which are only too apparent now.

J. Douglas, G2CAS/ON4ZD

The Editor
Radio Communication
Sir—With the advent of synthesized rigs and channel-scanning equipment, surely there is now a case for the removal of the "calling channel" restriction from S20?

This will enable those of us with limited financial resources to use all of our crystals for effective communications.

G. A. Evans, G8DXY

OUT OF THE MOUTHS...
The Editor
Radio Communication
Sir—I have recently had the chance of browsing through various issues of *Radio Communication* from over the past 10 years, and I have become increasingly aware of the constantly recurring arguments by which our hobby has been beset over that time. These have included ssb *v* a.m. *v* fm *v* cw, Class A *v* Class B, homebrew *v* commercial, band plans, repeaters, and so on and so on. I am beginning to think that people would rather talk about than participate in this hobby. Surely one of the great things about it is that there is so much scope for doing one's own thing without the sort of petty niggling at everyone else which has been going on? One fact which cannot be stressed too much is that this is the year of WARC. We should all be trying to make the fullest use of our allocations and frequencies, sensibly and enthusiastically. A good impression can be made at any time, but no time is as important as now, so please stop the grumbling.

Something else to be borne in mind is that newcomers hear *ALL* operating habits, and copy accordingly. Absolute newcomers might even be completely put off by what they hear, and the younger or more impressionable may accept everything without question. Even the worst habits seem to produce results, but the real dx chasers are a patient careful majority, and in the long run far more successful. Please, keep your good operating habits, and throw out the bad ones which can be detrimental to both you and your hobby.

The only thing that I have to add is that I am just 16, and have, I hope, many years left in this hobby. There are many other young people in a similar position. Your present actions are their future, so please help to make that future rosy.

R. M. Mackean, G4HAO

WINDING POWER TRANSFORMERS
The Editor
Radio Communication
Sir—Referring to the article "Power transformers with low voltage secondaries" in your February issue, I feel the paragraph on "Turns per volt" may be misleading.

When the original primary winding is being left untouched, the "turns per volt" has already been established for a particular transformer by the manufacturer when he calculated the number of primary turns necessary for the mains power supply voltage involved.

To find this "turns per volt", wind on a temporary test winding of, say, 10 turns after the original secondaries have been removed, and reassemble the core if this was removed. Then connect the primary to the mains supply and measure carefully the voltage developed across this winding on open circuit. From this can be calculated the "turns per volt" and the number of turns necessary for a particular voltage secondary, but increasing this number by a few turns to allow for the voltage drop that will occur under load.

I have rewound a number of transformers on these lines with complete success.

R. O. Rowntree, G3ZQA

contest news

February 432MHz Fixed Contest results

This contest was run under poor conditions. The weather was wet and miserable, and activity was judged low by some and good by others, with more stations on in the south than in the north. However, participants enjoyed the contest very much. G3VZV asks the question, "Where do all the stations go after the contest?"

The rules were liked by all, unusually, there being no adverse comments. The single-operator, multi-operator division of entrants, as recommended by IARU Region 1, is therefore judged a success for this particular contest.

Congratulations and certificates go to the winners of the two sections.

G3FZL

SINGLE-OPERATOR

Posn	Callsign	Points	QSOs	QTH	Best dx	Km
1	G4BEL	707	123	AM51b	GD2HDZ	370
2	GD2HDZ	425	41	XO68b	G8AYN	440
3	G3TDG	416	100	AL51g	GD2HDZ	430
4	G8LEF	362	56	ZN2Id	PA0HVA	455
5	G3SPJ	293	74	AL41a	G8AZA	310
6	G8DKK	287	79	ZL08d	GD2HDZ	372
7	G8FMG	286	66	ZM78a	GD2HDZ	350
8	G4CQR	278	77	ZL49d	GD2HDZ	440
9	G4FSG	276	45	AM77a	PA0VVH	317
10	G3YTE	261	61	AL13b	G2AMV	295
11	G3UBX	236	52	YM40g	G3BW	240
12	G3VZV	232	60	ZL08h	G8BCL	218
13	G8AZA	208	28	ZO69h	G3BHW	340
14	G6GN	206	44	YL48h	G8PLR	275
15	GW3UOO	187	32	YN65c	G4FSG	303
16	G8LHT	170	34	ZN34c	G3TDG	
17	G3TQF	167	41	ZM24d	G3GRS	180
18	G4ASR	163	31	YM77g	G3BW	275
19	G4CGS	158	28	ZN11d	G3GRS	337
20	G8GDZ	155	35	ZM41g	G3GRS	190
21	G5UM	152	48	ZM35b	GD2HDZ	266
22	G8BJG	132	54	AL41f	G8LEF	275
23	G3IGQ	123	49	ZL68h	G3UNU	195
24	G3VJG	118	50	ZL40g	G3WOH	269
25	G8KAX	107	43	AL32g	GD2HDZ	425
26	G8CTT	97	97	AL41j	G8LEF	280
27	G3LCH	85	41	ZL50g	G8LEF	298
28	G8DAB	79	37	ZL57a	G3UNU	179
29	G4HMF	77	19	AM76c	G8LEF	263
30	G3FIJ	64	22	AL05e	G3UNU	185
31	G3WFM	61	35	ZL30g	G3NNG	105
32	G4GGV	43	21	ZL37g	G3UNU	157
33	G8ITS	42	27	ZL40e	G3UNU	175
34	G8DXD	33	13	YM69b	G4BEL	160

MULTI-OPERATOR

Posn	Callsign	Points	QSOs	QRA	Best dx	Km
1	G3NNG	549	107	ZL23f	PA0VVH	514
2	G3UNU	544	102	ZM04c	GD2HDZ	255
3	G8OGL	458	104	ZL47f	GD2HDZ	399
4	G3XZW/A	335	15	YL75c	G4BEL	262
5	G4GRS	297	73	AL52b	G3WOH	309
6	G8KGH	265	51	YL48h	G4FSG	273
7	G4DDY	256	76	SL60h	GD2HDZ	256
8	G8ADM	148	44	ZL64a	PE1AWY	405

First 1·8MHz Contest 1979 results

The number of UK entries was one up on last year, but 10 up on the Second Contest 1978. However, there was a considerable fall in the number of overseas entrants—45 entries were received from the UK and nine from overseas. Disappointingly the only "under 18" entrant was OL8CGS.

Conditions seem to have been variable. A number of stations worked K1PBW but activity from the Continent seemed low. The earlier starting and finishing times attracted a number of comments, mostly favourable. There were plenty of stations still to be worked at the end, and the leading stations "missed out" on 20 to 30 contacts.

The winner and the runner-up each had 157 contacts, but G3VMW had more bonus points. G4BUO had 132 contacts. Combined with his score in the Second Contest 1978, the score of GM4ALK/A earned him the Maitland Trophy. In the overseas section, DJ8WL had 93 QSOs, while F9KP had 68.

Logs were mostly very good, although two had to be completely rescored. Most points were lost for incorrect callsigns.

Subject to the approval of Council, the Somerset Trophy will be awarded to G3VMW. Certificates of merit go to GM3ZSP, G4BUO, DJ8WL, F9KP, DJ0OE, PA0LOU, OK1DWF and OL8CGS. Finally, thanks go to G3USE and G3ZRZ for their most useful check logs.

G3WPF

UK SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	G3VMW	730	24	G3OGY	454
2	GM3ZSP	712	25	G2MJ	435
3	G4BUO	640	26	G4CZB	416
4	GM4ALK/A	625	27	G3UKC (G4CSC)	414
5	G3YMC/A	615	28	G3ILO	409
6	G4BWP	614	29	G3HTI	408
7	G3SYM	604	30	G4EBK	391
8	G3SJJ/A	588	31	G3SNX	387
9	G4HMS (G3HZL)	585	32	GW3JI	374
10	GI3IVJ	573	33	G3LCH	371
	G3XTJ	573	34	G3JKB	370
12	G3PDL	563	35	G4BOU	356
13	G3XTT	561	36	G3YEE	350
14	G3NOM	533	37	G4AEM	341
15	G4CNY	519	38	G3TXF	267
16	G3SJE	514	39	G3FVW	228
17	G3GC	512	40	G3AHS	219
18	G3SWC	510	41	G3SVW/A	199
19	G3OLB	502	42	G3ULY	166
20	GW3KOR	496	43	G4HSD	147
21	GI3JEX	471	44	G3EGG	141
22	G3KKQ	459	45	G8QZ	104
23	G3TKF	455			

OVERSEAS SECTION

Posn	Callsign	Points	Posn	Callsign	Points
1	DJ8WL	451	6	OL8CGS	140
2	F9KP	392	7	DJ4KWA	97
3	DJ0OE	298	8	OK1AXD	70
4	PA0LOU	241	9	OL9CJB	67
5	OK1DWF	172			

21/28MHz Telephony Contest 1979 rules

TRANSMITTING SECTION

Licensed amateurs and swls throughout the world are invited to take part in the RSGB's 21/28MHz contest. Log and cover sheets may be obtained from: RSGB, 35 Doughty Street, London WC1N 2AE. UK members should enclose a large stamped, self-addressed envelope.

The general rules for RSGB hf contests, published in the January issue of *Radio Communication*, will apply.

1. Eligible entrants. British Isles: RSGB members only.
Rest of world: All licensed amateurs.

2. Period. 0700gmt to 1900gmt on 14 October 1979.

3. Section. Single-operator only.

4. Bands. 21MHz and 28MHz only.

5. Exchange. RS plus serial number starting at 001.

6. Scoring.

(a) British Isles stations for a contact with a station in the rest of the world will score three points. The RSGB countries list will apply with VE, VK, W/K/N/A, ZL and ZS call areas counting as countries for this purpose.

(b) Stations in the rest of the world for a contact with a station in the British Isles will score three points.

British Isles stations may not work each other for points or multipliers, and stations in the rest of the world must only contact stations in the British Isles.

7. Multipliers. The total number of countries contacted on 21MHz *added* to the total number of countries contacted on 28MHz, then multiplied by the total of points scored on the two bands.

Multipliers for the rest of the world stations will be the total number of different G prefixes worked on 21MHz *added* to the number of different G prefixes worked on 28MHz, then multiplied by the total of points scored on the two bands.

British Isles prefixes are: G2, G3, G4, G5, G6, G8, GD2, GD3, GD4, GD5, GD6, GD8, GI2, GI3, GI4, GI5, GI6, GI8, GJ2, GJ3, GJ4, GJ5, GJ6, GJ8, GM2, GM3, GM4, GM5, GM6, GM8, GU2, GU3, GU4, GU5, GU6, GU8, GW2, GW3, GW4, GW5, GW6 and GW8. Contacts with GB stations will not count for points or multipliers.

8. Logs. Log sheets to be headed: Date/gmt; station worked; RS and serial number sent; RS and serial number received; multiplier; points claimed; separate logs are required for each band. Summary sheet showing multipliers worked on each band must be submitted.

9. Declaration. Each log must be accompanied by the following declaration: "I declare that my station was operated in accordance with the rules of the contest, and in accordance with the requirements of my amateur radio licence." The declaration must be signed and dated.
10. Address for logs. RSGB HF Contests Committee, c/o M. Harrington, 123 Clensham Lane, Sutton, Surrey SM1 2ND, England.
11. Closing date for logs. British Isles entrants should ensure their entry is received by 14 November 1979. Overseas entrants should submit their entries to arrive not later than 3 December 1979.
12. Awards. The Whitworth Trophy will be awarded to the leading British Isles entrant overall, and the Powditch Trophy will be awarded to the leading British Isles entrant on 28MHz. Certificates will be awarded to those placed second and third overall. Certificates will be awarded to those placed first, second and third in the rest of the world.

RECEIVING SECTION

Rules as transmitting section except as superseded below.
1. The general rules for RSGB hf receiving contests, published in the January 1979 issue of *Radio Communication,* will apply.
2. Eligible entrants. British Isles: RSGB members only.
Rest of world: All swls.
3. Scoring. British Isles swls should log only overseas stations in contact with British Isles stations participating in the transmitting section of the contest.
SWLs in the rest of the world should log only British Isles stations in contact with overseas stations taking part in the transmitting section of the contest.
Points scored by all swls will be as in the transmitting section.
4. Multipliers. As transmitting section.
5. Logs. Log sheets to be headed: date/gmt, callsign of station heard, RS and number sent by station heard, callsign of station being worked, bonus points, QSO points.
NOTE: In the column headed "Station being worked" the same callsign may only appear *once* in every *six* contacts logged.
6. Declaration. Each log must be accompanied by the following declaration: "I declare that this station was operated within the rules of the contest and I do not hold a transmitting licence in any country of the world."
7. Address for logs. As transmitting section.
8. Closing date for entries. As transmitting section.
9. Awards. The Metcalfe Trophy will be awarded to the leading British Isles entrant. The Powditch Receiving Trophy will be awarded to the leading British Isles entrant on 28MHz. Certificates will be awarded to those placed second and third overall. Certificates will be awarded to those placed first, second and third in the overseas section.

RSGB European Meteor Scatter Contest rules

1600gmt 11 August to 1600gmt 12 August 1979
Covering 144 and 432MHz bands.
All entries and check logs to VHF Contests Committee, c/o Mr C. Sharpe, G2HIF, 20 Harcourt Road, Wantage, Berkshire OX12 7DQ.
The following general rules, published in the January 1979 issue of *Radio Communication,* will apply: 1, 2, 4b, 5a, 6a, 10a, 13-22.
Additional rules
(a) All operators in the British Isles must be members of the RSGB or have a membership application in progress.
(b) All contacts must be made via the meteor scatter mode of propagation.
(c) On each band the score will consist of the product of the number of stations and QTH locator (big squares) worked. On 432MHz a multiplier of 15 will apply. The final score is the sum of the scores for the two bands.
(d) The contest exchange shall consist of:
(i) both callsigns;
(ii) a standard two-figure ms report;
(iii) the first two letters of the QTH locator, eg ZL.
(e) Conventional (IARU) operating procedures will be used.
(f) Log keeping. Entrants must keep their own logs in accordance with licence requirements. The following information shall be recorded on the contest log:
(i) date and time of start of QSO;
(ii) date and time of finish of QSO;
(iii) callsign of station worked;
(iv) report sent;
(v) report and locator received;
(vi) number of bursts and pings received;
(vii) points and multiplier claimed.
(g) Contacts must take place directly on the band in use, without recourse to any other communication medium. There is, however, no objection to scheduled contacts being arranged.

Contests calendar

5-6 May	432/1,296/2,304MHz *(Rules in March issue)*
6 May	Region Round-up CW *(Rules in March issue)*
12 May	World Telecommunication Day (Phone) *(Rules in May issue)*
12-13 May	USSR "M" *(Rules in May issue)*
13 May	DF Qualifying Event South Manchester *(Rules in April issue)*
19 May	World Telecommunication Day (CW) *(Rules in May issue)*
20 May	Region Round-up SSB *(Rules in March issue)*
26-27 May	144MHz Portable *(Rules in March issue)*
26-27 May	CQ WW WPX CW *(Rules in March and May issues)*
2-3 June	BATC Summertime ATV *(Rules in April issue)*
3 June	DF Qualifying Event Dartford Heath *(Rules in May issue)*
3 June	Gwent ATV Group (GW8OOJ) *(Rules in April issue)*
9-10 June	NFD *(Rules in February issue)*
9-10 June	Diploma Altamira *(Rules in May issue)*
16-17 June	Microwave *(Rules in April issue)*
17 June	DF Qualifying Event Burton-on-Trent *(Rules in May issue)*
23-24 June	Summer 1·8MHz *(Rules in May issue)*
23-24 June	ARRL FD
1 July	DF Qualifying Event Mid-Thames
7-8 July	VHF NFD *(Rules in April issue)*
15 July	3·5MHz Field Day
15 July	DF Qualifying Event Coventry
29 July	144MHz QRP *(Rules in May issue)*
5 August	DF Qualifying Event Salisbury
11-12 August	European Meteor Scatter *(Rules in May issue)*
18-19 August	70MHz Open
19 August	DF Qualifying Event Slade
1-2 September	144MHz Open and SWL
1-2 September	SSB Field Day *(Rules in May issue)*
8-9 September	International ATV Activity *(Rules in April issue)*
16 September	DF Final Rugby
October-November	432/1,296MHz Cumulative
6-7 October	432/1,296/2,304MHz
13-14 October	21/28MHz *(Rules in May issue)*
20-21 October	7MHz Phone
21 October	70MHz Fixed
3-4 November	144MHz CW
3-4 November	7MHz CW
10-11 November	2nd 1·8MHz
24-25 November	BATC SSTV
2 December	144MHz Fixed

Summer 1979 1·8MHz Contest rules

1. The general rules for RSGB hf contests, published in the January 1979 issue of *Radio Communication,* will apply.
2. When. 2000gmt Saturday 23 June to 0100gmt Sunday 24 June.
3. Eligible entrants. All radio amateurs licensed to use 1·8MHz. Multi-operator or single-operator entries will be accepted. There will be two sections:
(a) British Isles stations (single- or multi-operator)
(b) Overseas stations (single- or multi-operator)
4. Contacts. CW (A1) only in the 1·8-2MHz band. County code (three letters), as published in the January 1979 issue of *Radio Communication,* must be sent by all British Isles entrants after the report/serial number. Overseas entrants will only send report/serial number.
5. Scoring.
(a) British Isles stations. Three points for each contact, with a bonus of five points for the first contact with each new British Isles county, and for the first contact with each new country outside the British Isles.
(b) Overseas stations. Three points for each contact with a station in the British Isles (not EI), with a bonus of five points for the first contact with each new county.
6. Logs. Column 5 to be headed "Code received". The county code as sent must be shown on the top of each log sheet. Entries must be addressed to the RSGB HF Contests Committee, c/o R. S. Unsworth, 105 Clarendon Road, Hazel Grove, Stockport SK7 4NS.
7. Awards. The winner, and second and third placed entrants in each section will receive a certificate of merit.

SSB Field Day 1979 rules

Following requests from a number of groups, the rules for this event have been amended for this year so as to include both an **open** and a **restricted** section. This change is experimental and the inclusion of the restricted section in future SSB FD contests will depend on the support from groups in the 1979 contest.

The scoring has also been simplified in accordance with members' wishes.

1. The general rules for RSGB hf contests, published in the January 1979 issue of *Radio Communication*, will apply.

2. When. From 1500gmt Saturday 1 September to 1500gmt Sunday 2 September.

3. Eligible entrants. Any group of RSGB members resident in the prefix zones G, GD, GI, GJ, GM, GU and GW. This is a multi-operator contest.

4. Operations. Must be from one portable station, not located in a permanent building and not using a mains supply. No equipment or antennas may be installed on the site prior to 24 hours before the start of the contest. This does not apply to storage of equipment.

5. Contacts. SSB only in the 3·5, 7, 14, 21 and 28MHz bands.

6. Sections.

(a) Open section. There is no restriction on the equipment or the antennas which may be used.

(b) Restricted section. The station shall consist of a transceiver, or a transmitter and receiver. A linear amplifier may be used if desired. Only one antenna may be used which must be a single element, such as a dipole, inverted-V, long-wire vertical, etc, having not more than two support points, and not exceeding 35ft (11·5m) above ground at its highest point. Stand-by equipment may be at hand, but not connected simultaneously with the main equipment.

7. Scoring.

(a) Contacts with stations in Europe..... 1 point

(b) Contacts with stations outside Europe..... 5 points

The totals of points on each band is added to give a grand total. The total number of countries worked on each band is added to give a grand total. The final score is the grand total of points multiplied by the grand total of countries. The RSGB countries list will apply. Entrants are to provide a check list showing the list of countries claimed for each band.

8. Logs. Separate logs for each band are required.

9. Entries. To be sent to RSGB HF Contests Committee, c/o R. L. Glaisher, G6LX, 279 Addiscombe Road, Croydon CR0 7HY, postmarked not later than 17 September 1979.

10. Awards. The leading station in the open section will receive the new Northumbria Trophy. The leading station in the restricted section and the entrants placed second and third in each section will receive certificates. Certificates will also be awarded to the stations submitting the leading check log from each continent.

144MHz QRP Contest rules

0900–1700gmt, 29 July 1979

All entries and check logs to: VHF Contests Committee, c/o Mr F. Mathews, G8ACJ, Easedale, Woodway, Merrow, Guildford, Surrey GU1 2TF.

The transmitter output power shall not exceed 1W cw or p.e.p. If transmitter power reduction is required, then brief details of how this was achieved must be given.

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

DF Qualifying Event Dartford Heath

Date: 3 June 1979.
Map: OS Sheet 188, 1:50,000 Series, Maidstone and the Weald of Kent.
Assembly: 1300bst for start at 1320bst.
Location: Unclassified road off A227 opposite Shipbourne Church, ngr 593 522.

Competitors requiring tea should notify Mr A. Birchmore, 49 School Lane, Horton Kirby (Tel Farningham 862470), by 27 May.

DF Qualifying Event Burton-on-Trent

Date: 17 June 1979.
Map: OS Sheet 128, 1:50,000 Series, Derby and Burton-on-Trent.
Assembly: Lay-by reached from south-bound lane of A38, two miles north of Burton, ngr 268 270.

Competitors requiring tea should notify Mr R. Parsons, School House, Newborough, Burton-on-Trent (Tel Hoar Cross 496) by 8 June.

obituaries

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

Professor T. P. Allen, MSc, GI6YW
"TP" Allen died on 19 March aged 79. His amateur activities started in 1912, and he was licensed in 1926. In 1927 he founded Contact Bureau, one of the Society's most successful experimental links between amateurs, and he co-ordinated it for 12 years. He was a dx and cw man of considerable renown, especially in the low power field, and, as a recognized authority on cypher and cryptography, he made many contributions to this art.

For many years he wrote reviews of ARRL publications for *Radio Communication.*

Mr E. Cockayne, G3DAA
Eric Cockayne, who died on 16 March, was for many years a member of the Torbay Amateur Radio Society. Premature retirement, due to ill health, gave him the opportunity to operate on all bands, and he was to be heard daily on a long-standing 1·8MHz net.

Colonel G. Cole, MC, G4EMN
Geoffrey Cole died on 11 March, aged 62. He was secretary of the Bournemouth Radio Society, and an RSGB area representative. He devoted much time and energy in bringing amateur radio to those less fortunate than himself, and as an indefatigable worker for the RAIBC, Shaftesbury Homes and the Lansdowne tape library. He gained the Military Cross while serving in Malaysia with the Royal Lincolnshire Regiment.

Mr J. J. Glendinning, GI3RCH
John Glendinning, who died on 25 January, was a well-known character in amateur radio circles in Northern Ireland, his most recent interest being vhf.

Mr J. H. T. Hancox, G2HY
John Hancox died on 27 February, aged 81. He was a founder member of the Cray Valley Radio Society.

Mr H. S. Howells, G3POB
"Ron" Howells, who died on 7 March, served for many years in the RAF, and was one of a select group whose service entitled him to membership of RAFARS, RNARS and RSARS. He had previously held the callsign 9H1AB. A very competent cw operator and member of Tops CW Club, he took delight in a weather reporting net which he founded, and which met most days on 3·5MHz.

Mr T. C. Macnamara, G2TQ
Terence Macnamara died on 17 December 1978, aged 73. He was well known throughout the electronics industry, being a key figure in British television, and was a member of the Royal Television Society.

Mr D. Steele, GI4EMS
Dennis Steele, who died on 20 February, took up amateur radio late in life, but made up for his late start by an enthusiastic approach to the hobby. He served as secretary of the Bangor and District Amateur Radio Society for a number of years, and was the first secretary of the Northern Ireland Repeater Group, whose success in commissioning GB3NI was a measure of his drive and enthusiasm. His main interest was cw operation on the hf bands using home-constructed equipment.

Mr W. G. Wakeham, G2FRX
Gordon Wakeham died on 19 January, aged 79. He was a member and benefactor of the Torbay Amateur Radio Society and, prior to moving QTH, was a member of Plymouth Radio Club.

We have also been informed of the deaths of:
Mr M. Bates, G3GVQ, on 28 February;
Mr J. Bond, G8EHC, in June 1978;
Mr F. P. Healy, G4EVH, on 6 December 1978;
Mr F. Parker, RS31843, on 1 January;
Mr J. A. T. Pritchard-Gordon, G3PBL, on 19 February;
Mr H. Punch, G6UR, on 12 February;
Mr R. G. Stitt, RS36704;

Mobile rallies calendar

6 May—Tulip Time Mobile Rally, Grammar School, Spalding, Lincs. Details from G4EMK, tel 07782 2649.

13 May—Wessex ARG Mobile Family Picnic, Alderholt, Near Fordingbridge. Further details from G4EMN, tel 0202 20027.

13 May—Open Beach Angling Festival, Gosport and District Angling Club, Gosport, Hants. G3NGT will be operating a talk-in station on S20, 21, 22, 18, for radio amateurs who are interested in fishing. The beach faces the Isle of Wight, with ample parking and picnic space. Further details from G3NGT, QTHR (enclose sae), tel Gosport 84861.

20 May—East Anglia Radio Amateurs' Picnic, East Anglia Transport Museum, Chapel Road, Carlton Colville, Lowestoft (on B1384). Open 11am. Talk-in using GB3ATM via GB3NB (R1) GB3PO (R3), and on S22. Attractions include tram and trolley-bus rides, the Transport Museum, traders, etc. Hotel and caravan park nearby. Details from G3TWQ or G3ZNU, QTHR.

20 May—Welsh Mobile Rally, Barry Memorial Hall, Town Centre, Barry, S Glam. Open 11am. Talk-in on GB3BC and S22. Trade stands, RSGB bookstall, bring and buy, light refreshments, licensed bar, all under cover. Admission 25p. Beach and amusement park nearby. Further details from Reg Rowles GW4FOM, QTHR, tel Cardiff 565656.

20 May—Northern Mobile Rally, Victoria Park Hall, Keighley. Trade stands, children's films, refreshments, bar, etc. Details from G8DFZ, QTHR.

27 May—Hull & DARS Mobile Rally, Hull University. Opens 1200bst. Talk-in S22 G8HUC. All the usual trade stands plus some dealing with microprocessors. For xyls and junior ops, a magic show and films. Further details from G8EAH, QTHR.

27 May—Maidstone YMCA ARS Mobile Rally, Y Sportscentre, Melrose Road, Maidstone, Kent. Open 11am. Facilities will include free car parking (ample space for everyone), covered exhibition hall, bring and buy stall (usual 10 per cent commission to club funds), and talk-in stations. GB2YSC will be operational from 21 to 27 May. Details from J. C. Parker, 42 Mote Road, Maidstone, Kent, tel Maidstone 50350.

3 June—East Suffolk Wireless Revival, near Ipswich, Suffolk. Details from G4CVB, QTHR.

10 June—Elvaston Castle Mobile Radio Rally, Elvaston, Castle Country Park (5 miles SE of Derby, on B5010, signposted). 11am start. Talk-in by G3EEO and G3ZBI on GB2ECR, 144MHz fm ch 22, and 432MHz fm chs SU8 and SU20. Usual attractions including grand bring and buy sale, plus full on-site catering facilities. Rally free, but local authority car parking charge of 25p. Further details from G8PTW, QTHR, tel Derby 752358.

10 June—RAIBC Mobile Picnic, Broadlands Park, Romsey, Hants. Details from G4COM, QTHR.

17 June—Plymouth Mobile Rally, Tamar Secondary School, Plymouth, Devon. New larger venue. Start 10.30am. Talk-in GB2PRC on 144 and 432MHz, which will be operated by Plymouth RC from 16 to 18 June at the rally site. Attractions include PO tvi and tv detector vans, Oracle, usual stands, refreshments and bar. Ample free parking. Further details from G4GSZ, QTHR. Tel Saltash (075 55) 6613.

17 June—*HMS Mercury* Mobile Rally, *HMS Mercury*, near Petersfield, Hants.

24 June—Longleat Mobile Rally, Longleat Park, Warminster. Details later.

24 June—Bangor & D ARS Mobile Rally, Castlewellan Forest Park. Details from GI4AAM, tel 0247 65394.

1 July—Upton Mobile Rally, Upton-on-Severn, Worcs.

22 July—Cornish ARC Mobile Rally. Venue to be announced later. Details from G3VGO, tel 0872 864255.

29 July—Scarborough Mobile Rally and ORM, Scarborough Technical College. Details from G4EDR, QTHR.

5 August—RSGB National Mobile Rally, Woburn Park, Beds. Details from G3MVV, QTHR.

12 August—Derby Mobile Rally. Details from Mike Darn, 22 Reservoir Road, Brockwell, Chesterfield, Derbys.

19 August—Preston Mobile Rally, Park Hall Leisure Centre, Charnock Richard, Nr Chorley (new venue—well signposted, just off A49, halfway between junctions 27 and 28 on M6). Doors open 11am. Talk-in on S22. Trade stands, bring and buy, bars, buffet, plenty of car parking. Details from G8KTM, QTHR.

26 August—Torbay Mobile Rally, STC/ITT Social Club, Brixham Road, Paignton. Talk-in on S22. Trade stands, bookstall, etc. Details from G3UIQ, tel Newton Abbot 3025.

9 September—Telford Mobile Rally, Town Centre Malls, Telford, Salop (approached via A5 exit off M6, A442 from N and S, or M54 from W). Free admission and parking. Jointly organized by Telford DARS and Salop ARS. Attractions include trade stands, exhibitions, "flea market" for private sales, excellent catering and club stands. Free coach ride to Ironbridge Gorge Open Air Museum, the best of its kind in Europe. Further details from G8DIR, tel Shrewsbury 64273; 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, operational callsign to be advised. 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.

Special event stations

GB2EM, 18-20 May
A special event station will operate at the Eisteddfod Mon, Cae Bryn Eira, Llanfair P G, Anglesey, Gwynadd. Further details from GW3VVC, QTHR.

GB2TFY, 26-27 May
A special event station will be operated in conjunction with "Farming Yesteryear", an exhibition of old-fashioned farming techniques, such as horse ploughing, and including a museum, from Adamston of Huntly, Nr Huntly, Aberdeenshire. Further information from S. Sutherland, GM4BKV, QTHR, tel 691716, lunch-time and evenings.

GB2SMC, 9 June
To celebrate the centenary of St Mary's Cathedral Palmeston Place, Edinburgh, a special event station will be set up during the cathedral's centenary garden fête on 9 June. Further information from G. Marshall, GM4GVT, tel 031-332 3030, evenings.

GB2LBL, 9-10 June
The Lutterworth British Legion is putting on a show, in aid of charity, which will include a special event station at Lord Braye Stanford Hall, Leics. The main feature of the show will be a re-enactment of the Roundheads and Cavaliers Civil War. Further information from G. H. Dodgshon, G4DNC, tel Hallaton 603.

GB2EF, 9-16 June
A demonstration amateur station will be set up at the Enniskillen Festival to publicise amateur radio, and Fermanagh and its attractions. Further information from J. F. MacMahon, GI3ZIA, tel 0365 22955 ext 4775, days; or 0365 22188, evenings.

GB3LAS, 16 June
A special event station is to be operated from 9am until 6.30pm at Joseph Lucas Ltd Sports Ground, Birmingham, on the occasion of the company's annual sports. Further information from B. Price, G4DDF, tel 021-554 5252 ext 608, days; or 0922 51017, evenings.

GB3SMC, 22-23 June
SMC is to hold an anniversary exposition and symposium on communications, Unicom 21, which will include a special event station at Kempton Manor, Sunbury-on-Thames, Middx. Further information from J. B. Jenkins, G4CZJ, tel 04216 7333, days; or 0794 516287, evenings.

GB8WAS, 22-24 June
A special event station will operate from RAF Wethersfield (USAF), Wethersfield, Nr Braintree, Essex, at a Scout air activity camp for members of the Scout Association from Essex and the Greater London area. Further information from T. D. Mead, G8RXW, tel 01-854 4069.

GB2BAZ, 28-30 June
The RSGB will be operating a special event station at Alexandra Palace, London N22, for the Electronics Bazaar, an exhibition with broad electronics interest. Further information from M. J. Hawkins, G3ZNI, tel 01-837 8688, days; or Oxshot 3321, evenings.

GB2MEM, 30 June
A special event station will be operated at the Midland Electric Manufacturing Gala Day, a sports day with side shows and home and hobby crafts exhibits. The station will be located at the sports field (adjoining MEM), Reddings Lane, Tysley, Birmingham. Further information from L. G. Boswell, G4AEJ, tel 021-783 2024.

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 19 May for the July 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; 17, 31 May, 14, 28 June. 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 (Main meeting). Horwich Leisure Centre, Victoria Road, Horwich, Bolton. Following the AGM in January, new sec is 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. Mosses Community Centre, Cecil Street, Bury. Second Tuesday in each month (Lectures); 10 May ("Modifying Pye Gear" by G8EUM), 12 June ("The joys of dxing" by Chris Marcroft). Club publicity officer, Mike Bainbridge, G4ESY, 7 Rothbury Close, Ainsworth, Bury, 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; 11 May ("Phase-locked loops" by Mike Small, G4DVI), 18 May (AGM), 25 May ("Amateur radio in PA0" by Rob Tenwolde), 1 June ("Frequency synthesizers" by Bill Green, G8ALZ), 8 June (Talk by winner of homebrew contest), 15 June ("The Dolby noise reduction systems" by M. Yonge of Dolby Laboratories; tickets required, no charge but sae to hon sec please), 22 June ("Operational amplifiers" by Peter Torry, G3SMT), 29 June ("About antennas and feeders" by Bob Heaton, G3JIS), 8pm. Mondays (Informal), 8pm. Sale Moor Community Centre, Norris Road, Sale. Sec W. L. Seddon, G3VIW, 12 Barwell Road, Sale, tel 061-973 3355. 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. For details please contact G3SZV; or sec G4GCB, tel Burscough 892416. Talk-in on 144MHz. Club interests include hf, vhf, uhf, rtty, atv, QRP and contests.

Preston (PARS)—Thursdays, fortnightly; 17, 31 May, 14, 28 June."Windsor Castle", St Paul's Square, Preston. New 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; 9 May ("Ten-Ten International" by G3VSA), 8pm. Blossoms Hotel, Buxton Road, Stockport. Hon sec G3FYE. Visitors always welcome. Club net Sundays, 11am clock time, 3,692kHz.

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. 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; 16 May ("NFD final planning" by A. Smith, G4EFP), 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.

REGION 2—RR D. S. Smith, "Red Roof", Goathland, Whitby, North Yorks YO22 5AN. Tel Goathland 333.

Following information is latest received.

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)—Wednesdays, 7.30pm. Pie Hall, Denby Dale. Sec G3FGH. Visitors always welcome.

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). Note new sec Bob Murden, G4BHF, 93 Gillshill Road, Hull, Yorks HU8 0JL. Club net Tuesdays 8pm, S21 (145·525MHz fm).

Hull (H&DARS)—Fridays, 8pm. Community Centre, Fountain Road, Hull. Sec Mrs H. Rodmell, 7 Weelsby Way, Tranby Park, Hessle.

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, 7pm. (Lectures start 8pm). The 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, 8pm. 14 Back of Court House Street, Otley. Advance notice of Northern Mobile Rally, 20 May 1979, Victoria Park Hall, Keighley, Yorks. Sec G8DFZ.

Scarborough (SARS)—Mondays, 7.30pm. Scarborough Technical College, Scalby Road, Scarborough. Note new sec G4EDR.
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)—6 May, 10 June, 7.30pm. Royal Hotel, Barnsley. Sec G8PLJ.
Wakefield (W&DARS)—Second and fourth Tuesdays in each month, 7.30pm. "Holmfield House", Thornes Park, Wakefield. Sec G8RFU.
York (YARS)—Fridays (except third in each month), 7.30pm. United Services Club, 61 Micklegate, York. Sec G3WVO, QTHR.

REGION 3—RR H. S. Pinchin, G3VPE, 61 Cole Bank Road, Hall Green, Birmingham B28 8EZ. Tel 021-777 1320.

Birmingham (Midland ARS)—5 June (Construction and club station), 7pm. Brasshouse Centre, off Broad Street, Birmingham. 22 May, 19 June, 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. 6 June, 4 July, (Surplus sale), 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)—8 June (On-site meeting for NFD), 9/10 June (HF NFD—Signet Fields), 7 July (GB2BRC at Sanders Park), 13 July (Quiz), 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)—7 June, 5 July, 8pm. "Lynwood", Old Penkridge Road, Cannock. Other Thursdays, 8pm. "Acorn" public house (rear room), Town Centre, Cannock. Sec G8FWZ. Visitors welcome.
Coventry (CARS)—18 May (Visit by RSGB President John Bazley, G3HCT), 25 May (VHF night on the air), 1 June (Open night), 8 June (DF practice—see sec), 15 June (Night on the air), 22 June (Social evening—see sec), 29 June (Treasure hunt—see sec), 6 July (Preparations for VHF NFD), 13 July, 8pm. Baden Powell House, 121 St Nicholas Street, Radford, Coventry. Sec G8OMB. Visitors welcome.
Coventry Technical College (CTCARS)—Mondays and Thursdays, 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 23 May, 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.
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)—Thursdays, 8pm. "Albert Hotel", Smithfield Road, Shrewsbury. Sec G3UDA. New members welcome.
Solihull (SARS)—15 May ("Building and demonstration of a teletext decoder for Ceefax and Oracle" by Tony Rowsby, G4CQS), 19 June ("Satellites for the amateur service"—to be confirmed), 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)—First Tuesday in each month (Informal), 9.30pm. "Bird in Hand" public house, Hagley Road, Oldswinford, Stourbridge. 21 May, 4 June (Constructional evening), 18 June, 2 July (Constructional evening), 7.45pm. Library, Longlands School, Brook Street, Stourbridge. Sec G4IP.
Stratford-upon-Avon (SuponA&DARC)—Every third Friday, commencing 25 May, 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. Indoor Sports Centre, Corporation Street, Tamworth. Sec G4EUF. New members welcome.
Telford (T&DARS)—Wednesdays, 7.30pm. Phoenix Centre, Webb Crescent, Dawley. Sec G4HFX, tel Telford (0952) 727357. Visitors welcome.
Walsall (WARC)—16 May ("Hospital radio service" by Peter Moxham, G4GJU), 30 May (Discussion—Walsall Show) 13 June, 27 June, 11 July, 8pm. Forest Community Centre, Forest School, Hawbush Road, Leamore, Walsall. Sec G8KML.
Willenhall (W&DARS)—Alternate Wednesdays commencing 23 May. 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)—21 May (Natternight), 4 June ("Raynet" by Alan Dennis, G3CNV), 11 June (Natternight), 18 June ("Short wave listening"—joint discussion, beginners welcome), 25 June (Natternight), 2 July (RSGB tape lecture), 9 July (Natternight), 16 July (QSL card evening, unusual cards welcome), 8pm. Neachells Cottage, Danescourt Road, Stockwell End, Tettenhall, Wolverhampton WV9 9PH. Sec G8EDG.
Worcester (W&DARC)—4 June ("Vehicle suppression" by Bryan Hudson, G3NFX), 1 July (Upton Mobile Rally), 2 July (Discussion "Yesterday's rally"), 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.

Derby (D&DARS)—16 May ("144MHz df" theory and discussion), 23 May (Night on the air), 30 May ("144MHz df" practice), 6 June (Bring and buy sale), 13, 20, 27 June, 7.30pm. Morse classes Tuesdays and Fridays, 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. 18 May (Possible visit to Enderby police control room), 15 June (Possible visit to Radio Trent). 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 new RR would be pleased to hear from all club secretaries in the region, either by post or telephone.

The AGM of the St Dunstan's Radio Society was held on 27 February, and at the luncheon afterwards the guests included Louis Varney, G5RV, representatives of RNARS, RSARS, RAFARS, RAIBC, Mid-Sussex and Brighton clubs, and members of St Dunstan's staff at Ian Fraser House.

The G3MOW Memorial Trophy was awarded this year to Norman French, of St Dunstan's headquarters, for the encouragement, help and advice given by him to St Dunstan's radio amateurs over many years. The photograph shows Norman French (r) receiving the trophy from Louis Varney, while in the background is Bill Shea, G4AUJ, chairman of St Dunstan's Radio Society

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.
Cambridge (CUWS)—Mondays during full term (Speakers). Other Mondays (Informal), evenings. Queen's Bar. Full 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, 8pm. Chews House, 77 High Street South. Sec G3HJF.
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)—18 May (HF DF Contest, 1930bst on 1,980kHz, using G3RED/P—starting QRA to be announced). For further 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)—30 May, 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. The Red Cross Hall, The Crescent, Maidenhead. New sec P. J. Patick, G3TWG. Tel 06285 25275.
Newbury (N&DARS)—Second Tuesday in each month. Newbury Technical College. Details from sec G8LTD, tel Newbury 46078.
Newport Pagnell (Milton Keynes ARS)—14 May (Talk, "Radio and tv interference"), 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. Sec G4BHR.
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.
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; 17 May ("Personal computers and amateur radio" talk and demonstration by G8KDC and G8LFC), 7 June ("AMSAT"—confirmation from sec), 21 June (Natternight), 5 July ("SSTV"—confirmation from sec), 7.30 for 8pm. Christchurch Centre, High Street, Eltham, London SE9. Sec G4FUG.
Croydon (Surrey Radio Contact Club)—First and third Wednesdays in each month; 6 June (Talk by an equipment supplier), 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; 11 May ("Early days as an amateur" by Arthur Milne, G2MI), 8pm. Model Engineers HQ, Stoke Park, Guildford. Sec G4BHQ, tel Guildford 76375.
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, 8.15pm. Berrylands Scouts and Guides HQ, Stirling Walk, Raeburn Avenue, Surbiton. Sec G4APG, tel 01-399 8113. The society is seeking a smaller and more convenient meeting place.
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&CARS)—Wednesdays, 7.30pm. Ray's Social Club, London Road, North Cheam. Sec G2DMR.
Thames Ditton (Thames Valley ARTS)—Giggs Hill Green Library, Giggs Hill Road, Thames Ditton. For meeting details contact 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; 25 May ("Single conversion and direct conversion receivers" by Robin Hewes, G3TDR), 8pm. St John Ambulance HQ, 124 Kingston Road, Wimbledon. Sec J. W. Todd, tel 01-540 9031.

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)—7.45pm. Marle Place, Burgess Hill. Details of future events from G3PEQ.
Canterbury (East Kent RS)—7 June (Quiz). Further details from G8GHH or G3MDO.

Chichester (C&DARC)—First Tuesday and third Thursday in each month. Lancastrian Boys School. Details from G4ETU, tel 0243 88069.
Crawley (CARC)—Details of future events from G3MGL, tel 0293 20986.
Dartford (DHDFC)—Second Friday in each month. Scout House, Broomfield, 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 G8KQN, or pro G3LFZ.
Gravesend (GRS)—Mondays, 7.30pm. "Windmill Tavern", Shrubbery Road, Gravesend. Details of future events from G4GML.
Hastings (HE&RC)—Fridays. 479 Bexhill Road, St Leonards-on-Sea, Sussex. Third Wednesday in each month, 7.30pm. ITT Social Club, Crown House, 57 Marina, St Leonards-on-Sea, Sussex. 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, 5 Lambs Walk, Whitstable, Kent.
Maidstone (MYMCAARS)—Fridays; First and third in each month devoted to the beginner; 7.30pm. Y Sports Centre, Melrose Close, Loose, Maidstone. 27 May (Mobile rally—see calendar). Details of future 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; 11 May (Construction contest), 25 May ("Homebrew EQ" by G3KFE, editor *Short Wave Magazine*), 8 June (HF/VHF NFDs arrangements), 22 June (Lecture by the British Vintage RS), 6 July (Editor *Radio Communication*—provisional). 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 June ("Microprocessors" by G4CDU), 5 July ("Radio interference" by G3VWK and G3FXL), 7.30pm. SWEB Clubroom, Pool, Camborne. 22 July (Mobile rally). 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; 14 May (Talk by G3OFY). 11 June (Construction night), 16 July (Surplus sale), 7.30pm. Community Centre, St Davids Hill, Exeter. Full details from Jack Bawden, 232 Exwick Road, Exwick, Exeter EX4 2BA.
Exeter University (EUARS)—Full details from sec G4EXT, c/o "Devonshire House", Stocker Road, Exeter.
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, Budhead Road, Whitleigh, Plymouth. Full details from L. England, 62 Fullerton Road, Milehouse, Plymouth, tel 58841.
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, 7.30pm. Bath Lane, rear of 94 Belgrave Road, Torquay. Full details from G3UIQ, tel Newton Abbot 3025. Torbay net each weekday 3·760MHz, Mondays to Fridays 10.30am, Saturdays 9.30am. 144MHz net on S22, Mondays 8pm.

REGION 10—RR R. G. Barrett, GW8HEZ, 23 Carshalton Road, Beddau, Pontypridd, Glam.

Following information is latest received.
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, 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.
Pontypool (PRSGBG)—Tuesdays, 7pm. Education Settlement, Park Hill Road, Pontypool. Details from GW3JBH.
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.

Fifty amateurs gathered at Exeter University ARS headquarters on 18 March to hear a very informative lecture on international and intercontinental communication on 144 and 432MHz, presented by Chris Bartram, G4DGU, with the assistance of Keith Fisher, G3WSN.

At the same meeting RSGB Zone D Council member Les Hawkyard, G5HD, answered questions of regional interest, and on band planning for the future and licensing matters.

L to r: G3WSN, G4ENZ, G4DGU, G5HD, G8PUC, G4EXT and G8KQB. *Photo:* M. Blythe, G4HFO

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 (SARC)—Tuesdays fortnightly, 8pm. West Cross Hotel, West Cross, Swansea. Details from sec GW8CMA.
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, "Silhill", Dinas Dinlle, Caernarvon.
Bangor (UCNWARS)—Thursdays, 7.30pm. Small Lecture Theatre, School of Engineering Science, Dean Street, Bangor.
Conway Valley (CVARC)—Second Thursday in each month; 10 May (Visit to be arranged), 14 June (AGM), 12 July (Fox hunt), 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, 7.30pm. 80 Guild Street, Aberdeen (next to "Station Hotel" immediately adjacent to railway station). Programme details from sec GM4BKV.
Dundee (Kingsway Technical College ARC)—Tuesdays, 6.30pm; (6.30–7pm, morse practice; 7–8pm, arranged lectures; 8–8.15pm, coffee; 8.15–9pm, any other business and general discussion). Dundee Technical College. 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.

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.
Dunfermline (DARS)—Second Wednesday in each month, 7.30pm. CCTV Studio, Pittencrieff School, Maitland Street, Dunfermline. Details from sec GM3MGX, tel Limekilns 313.
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)—Wednesdays, 2pm. Aerial Laboratory, Top Floor, Mountbatten Building, 31-35 Grassmarket, Edinburgh.
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)—Second and fourth Thursdays in each month. 10 May (Talk by GM8FFX), 7.30pm. Riddles Court, High Street, Edinburgh. 24 May (Operating night), 14 June (AGM), 28 June (Forward planning), 7.30pm. Cannonball House, High Street, Edinburgh. Details from GM4DIJ, tel 031-337 7311.
Glenrothes (G&DARC)—Third Sunday and every Wednesday in each month; 20 May (Final NFD preparations), 17 June (HF NFD post mortem), 15 July (VHF NFD post mortem), 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 column.

Offer of the use of premises, comprising lecture room, committee room and shared use of a workshop, on any day except Thursday and Saturday. Any interested parties please contact ASTRA Ltd, 49 Almada Street, Hamilton. (Opposite Bell College and court building.)

All secretaries please note that 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. 24 June (Mobile rally). Castlewellan Forest Park. Sec GI4AAM.
Belfast (BRSGBG)—Third Wednesday in each month. (except July and August). 90 Belmont Road, Belfast 4. Details from GI3USS.
Belfast (CoBYMRC)—Tuesdays, 7pm; Saturdays, 2.30pm. Fourth Floor, YMCA, 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. 20 May (Get together). Parkanaur. Details from AR GI8RJW, tel Armagh 524453.

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 G3WUX.
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, 7.30pm. Morse classes every Wednesday, 7.30pm. Ranelagh Road School, Ipswich. Details from sec Pat Gillen, G4GVW, 37 Lancing Avenue, Ipswich.
Loughton (L&DARS)—Fridays, fortnightly; 18 May (Informal), 1 June ("Microprocessors and amateur radio" by Ted Harrison, G8NPF, and John Ray, G8DZH), 15 June (Informal), 29 June (Subject to be arranged), 8pm. Loughton Hall, Rectory Lane, Loughton. Further details from sec John Ray, G8DZH, tel 01-508 3434, evenings.
Lowestoft (L&DARC)—Fridays; 18 May (Early summer df hunt), 25 May (Visit to Sizewell power station), 1 June (Members' evening and display of modern gear), 15 June ("A retractable mast for vhf" by G3GNK), 29 June ("Was Marconi right?" tape/slide lecture by Pat Gowan, G3IOR), 7.30pm. North Suffolk Teachers' Centre, Lovewell Road, Lowestoft. Details from Brian Clay, G8GGJ.
Martlesham (MRS)—First Wednesday in each month; 6 June (Subject to be arranged), 7.30pm. Visitors 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.

REGION 17—RR *(Post vacant)*
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, Basingstoke. Details from pro Chris Jackson, G8POB, 69 Buriton Road, Harestock, Winchester.
Bournemouth (Wessex ARG)—Bournemouth School, East Way, Bournemouth.
Chippenham (C&DARC)—Tuesdays, 7.30pm. Liberal Club, 20 Gladstone Road, Chippenham (temporary premises). 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 Sundays, 6.30pm, 21·40MHz. Sec G4CHQ.
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 J. Worth, G3ZKA.
Portsdown Hill Repeater Group—Activity night on GB3PH (RB2), Mondays, 1930gmt. All stations welcome to the net. Details from G8GNB.
Portsmouth (P&DRC)—Wednesdays, 7.30pm. Portsmouth Community Centre, Malins Road, Buckland, Portsmouth. Sec G3CNO.
Salisbury (SR&ES)—Tuesdays, 7.30pm. Salisbury Activity Centre, Wilton Road. Sec G2FIX.
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 G4COM.
South Dorset (SDRS)—7.30pm. Lecture Hall, South Dorset Technical College, Newstead Road, Weymouth. Details from sec G3ZGP.
Swindon (S&DARC)—Alternate Wednesdays, 7.45pm. Clubroom, Oasis Leisure Centre. Details from sec I. Browne, 59 Kitchener Street, Swindon.
Winchester (WARC)—First Friday and third Thursday in each month, 7.30pm. "Crown Hotel". Sec Chris Jackson, BRS39944, 69 Buriton Road, Harestock, Winchester.

REGION 18—RR W. A. Ricalton, G4ADD, 4 South Road, Longhorsley, Morpeth, Northumberland.
Following information is latest received.
Durham (DUARS)—Alternate Wednesdays during term, fortnightly from 1 November 1978. Physics Dept, Durham University. Details from G3ZJY or G4FOP, or A. Jarrett, G4FRZ, Van Mildert 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)—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, 8pm. The Community Centre, Vine Street, Wallsend. Sec Alex Frazer, 35 Percy Street, Tynemouth.

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. Tuesdays (Morse classes), 7.30pm. 17 May (Film show). Hon sec A. Sammons, G8IZN. All welcome. This group is once again looking forward to the Dagenham Town Show, in July, and the new, improved, beer tent.
Cheshunt (C&DRC)—Wednesdays. Church Room, Church Lane, Wormley, Herts. Hon sec G3OJI.
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)—15 May (General discussion), 19 June (Members' interesting QSOs), 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, W13. Sec G8KPN, tel 01-997 5949. All welcome.
East London (ELRSGBG)—20 May ("More about sstv" by G4CJQ); The group will then close for meetings until the third Sunday in September. A full lecture programme is being compiled and members may obtain details from the new hon sec J. R. Holmes, G3PKQ, tel 01-558 2928 (home).
Edgware (E&DRS)—Second and fourth Thursdays in each month, 8pm. Watling Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. Programme includes regular morse code practice classes. Sec G3MNO, tel 01-907 1237. Monday evening net 2150 local on 1·875MHz.
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.
London EC2 (Post Office HQ ARG)—Wednesdays, 6pm. Room 413, "Lutyens House", Finsbury Circus, London EC2. Chairman G8EUQ, Room 28, Euston Tower, tel 01-388 1166 ext 323 (day).
Northolt (British Airways European Division ARS)—First Monday in each month. Trident Club, Western Avenue, Northolt, Middlesex. This club is open to non-BA employees by invitation. Contact G3TLG for details. Civil Aviation Sunday net 1100-1200gmt on 3·68MHz, listen for G3NAF or G3BEA. (Will sec please contact RR19.)
St Albans (Verulam ARC)—Fourth Thursday in each month; 24 May ("Microphones" by A. Bitton), 28 June ("Antenna for 144 and 432MHz" by B. Howlett, G3JAM), 7.30pm. Hon sec G8MAE, tel 0442 64751. Meeting venue was due to be altered at time of going to press, so members and prospective members should check with hon sec before visit.
Shelburne (SRC)—Wednesdays and Thursdays, 7pm. Shelburne Youth Centre, Hornsey Road, London N4. (Club members: Please ask your sec to send programme details to RR19 if you wish this entry to continue—*RR19.*)
Southgate (SRC)—Second Thursday in each month; 10 May ("Spectrum analysis" by B. Curant of Tektronix Ltd), 7 June (Working models and slide show of vintage wireless equipment by T. Constable of BVW Society—should be well worth the extra effort to visit *RR19*), 7.45pm. The Scout Hut, Wilson Street, Winchmore Hill N21. Sec J. Fitch, G8EWG, tel 01-440 7353. All welcome.
South Kensington (Baden Powell House Scout ARS)—Third Tuesday in each month, 8pm. Baden Powell House, Queensgate, South Kensington. (RR19 has not received any communication from this group since February 1978. If this club is still in existence would any RSGB members who attend meetings please telephone RR19—*RR19.*)
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; 10 May (DF hunt on 144MHz—start at Fairlands Valley car park), 17 May ("Guide dog training" by G8FOY), 7 June ("Getting started on 1·3GHz" by G8DKK), 21 June ("Top band df rx" by G4DDX), 5 July (AMSAT Phase 3 satellite information meeting—prov), 8pm. Morse 7.30-8pm. RAE courses are being run by G3SJR and G8HTC. B. A. Dynamics Ltd, Plant B, Staff Canteen. Details from sec T. J. Tugwell, G8KMV, tel 0438 54689. FM net, Mondays 1930 on 145·550MHz.
UK FM Group (London)—Second Tuesday in each month, 8pm. "The Green Man", near Great Portland Street underground (easy parking). Hon sec R. Street, G3TJA, tel 01-998 2672. All welcome.
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.

Contrary to popular belief your RR *does* read every bit of all club newsletters he receives, but it is surprising how many do not put in the forthcoming programme—there is generally a lot about history and past events (editors/secs please note). G3AAJ is also running a private competition for the best laidout details for this feature which arrive in time for compiling. To date, Chiswick, Southgate and Verulam are running neck and neck—*RR19.*

REGION 20—RR G. Mather, G3GKA, 8 Hills Close, Keynsham, Bristol.

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.

G3BCC operating the Yeovil Amateur Radio Club station G3CMH to commemorate the 25th anniversary, on 21 February, of the first long-distance short-wave contact in Britain using a transistor transmitter. The QRP transmitter is on the right, and the best distance worked with 38mW was G3EUE at 116 miles. The QRP station is operational on 3·549MHz on Thursdays at 1945bst.
Photo: **B. F. Hillard**

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 (except August), 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. Local chat channel S24, 2100 Wednesdays and Saturdays.
Yeovil (Y&DARC)—Thursdays. Building 101, Houndstone Camp, Yeovil (off A3088). Hon sec G3NOF. Club net 10.30am Sundays, 3·660MHz.

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; **28 May, 21 June, 2 Aug, 30 Aug, 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

Zygi beam, 20m, 3-el, per *Radio Communication* October '75, precision construction, works well, as new cond, £45 ono. G4HXQ NOT QTHR. Tel Clavering (Essex) 433, after 7pm.

FT101E, as new, cw filter, spare drivers and pas, dust cover, manual, multi-mobile antenna, 80, 20, 15, 10, plus base and bag, sale on behalf of G3YPK (F0DXL), £450. G8DAQ, QTHR. Tel Medway (0634) 576758.

Swan 350C tx/rx, vgc, £325; Avo 8 Mk3, £40; Avo transistor analyser, £20; Avo test set, £10; Wier dvm, £25; Heath DX40U tx, £25; all comp with manuals. *Wanted:* FT101B/E; part exch? G4HLM. Tel Tony, 01-952 0665, after 6pm.

Swan 500 tx/rx, exc cond, 80–10, 450W p.e.p., comp with ac/dc power supply, manual, etc, £250. G3YFG, QTHR. Tel 0254 82 3769, evenings.

FT200, FP200, all 10m xtals, mint, £250. G3NKL, QTHR. Tel Longridge 2511.

FT221RD/YC221, few months old, boxed, as new, £50 off list price, genuine sale. G8KOP, QTHR. Tel Dave, 01-349 1122, days.

IC215, in box, as new, leather case, S0, S18–24, S32, R5–7, RR5, £145 ono. G8RJQ, 79 Victoria Road, Cowes, IOW. Tel Mike, Cowes 295943.

Pye Cambridge FM10D, low band, one boot mount, c/w remote control, etc, part modified to 2m, spare output valves, one hand portable, unmodified, internal control l/spkr, etc, handbook, the lot, £40 ono. G8FMH, QTHR. Tel Basingstoke 23979.

SSR100, used little, very good rx, £120. G3REO, QTHR. Tel Coniston 329.

70cm–10m converter, QM70, re-aligned by maker August '78, receipted invoice sent with converter, £11. G3VCJ, QTHR.

Yaesu FRDX400, all options, FLDX400, manuals, one owner, perfect, YD844 mic, set of spare valves, £325. G3JON, QTHR. Tel Sheffield 367774; or 732333, daytime.

Creed 7B, £10. Plus loads of gear: components, incl video at give away prices, brand-new transistors, at 5p ea; 8 by 5in 15 and 8Ω spkrs, very cheap. Callers collect something free. Wright, G3HRN, 18 Granville Avenue, Newport, Shropshire. Tel 811168, anytime.

TA33Jr, in use only one year, vgc, £60 ono. Buyer collect. HW32, ac psu, hb dc psu, all in wkg cond, £70 ono. G3UOB, QTHR. Tel 01-670 4228.

2200GX, good cond, stab psu/charger, mounting bracket, £140 ono. Microwave Modules 2m converter, 28–30 i.f., £12 ono. 70cm converter, 28–30 i.f., £14 ono. STE Melan i.f. board, 28–30MHz, S-meter, £35 ono. A. Pearce, G8NVW, QTHR. Tel Bolton 40164, after 6pm.

QRT clearance: Ringo Ranger ARX2 colinear, boxed, instructions, 9ft by 1·5in steel mounting pole, both enamelled, in exc cond, £20. Pairs of new unused 6in wall mounting brackets and 12in chimney lashing kits for above, £5. 80ft UR67, good cond (50ft new and unused), £7.50. SWR200 swr/pwr meter, used very little, exc cond, orig packing, instructions, £15. G8MEN, QTHR. Tel 01-733 8878.

Trio 2200GX, as new, extras, orig packing, £130. EC10 Mk2, mains psu. *Wanted:* FT101, approx £360. G8CDP, QTHR. Tel 0609 2068, office hours.

Wavemeter, class D, No 1 Mk2, mains psu, handbook, spare valve, £10. Heath HR10B 10–80m rx, vgc, £50 ono. Furzehill 400Hz electronic tuning fork, 16V dc, £5. Manual for HW101, offers. Transistor Multiplex stereo decoder, info 12V dc, £3. Shaw, 16 Deansfield, Four Spires, Cricklade, Wilts SN6 6BP.

Avo electronic test meter, £20. Chart recorder, £10. Transverter, 7–1·8MHz, as ARRL *Handbook* 1970, with handbook, £25. *Radio Communication,* '61–'69, £10. 30 books on radio/electronics, incl Terman, Langford Smith cathode ray, Scroggie, £25. G3KWK, QTHR. Tel Redditch 41502.

Trio 2200GX, 12ch, all repeaters, two simplex, antenna broken, no mods, £60. 2m fm pa, 1W in 2W out, preamp, £10. Pye Pocketfones, tx and rx xtalled on RB14, batts, £15. Knowles, G4FPN. Tel 021-745 1363.

Pye Pocketfone PF1, xtalled RB10, toneburst, nicads, £30; Datong clipper module, in die cast box, wired for 444 mic, £30; all ono. Prefer buyer collects or plus post. G8JGK, QTHR. Tel 0245 69034.

FT7, six months old, used little, in orig carton, accessories as supplied, £260, no offers. G3TMT, 21a Pelham Road, Lindfield, Haywards Heath, W Sussex RH16 2EW.

Lafayette KT340, bandspread on amateur bands, vgc, £25 ono. BC342 rx, modern front end, £20 ono. Eagle 30W pa amplifier, wkg, o/p valves missing, £5. Ferguson 3272 cassette deck, vgc, £55 ono. PSU, 200–400V stab, + 200–900V unstab, + 6·3 at 8A, rack, £20 ono. Tel Peter, Aylesbury 26811.

TR7200G, exc cond, auto tone, orig packing, manual, fitted S0, S18–24, R3–7, R4 input, R7 full reverse, incl ASP2009 5/8 3dB whip, "no hole" mount, £140. G8DAQ, QTHR. Tel Medway (0634) 576758.

TR7010 2m ssb tx/rx, as new, one owner, 5/8 whip, £135. G3ZVC 9MHz ssb tx/rx, KVG XF-9b filter, kit constructed on commercial pcb. G3OLX, QTHR. Tel Burgh Heath 55271.

TS820, as new, £605; JR500S 160-10m rx, £60; FRDX400, 160-10-6-2m, seven filters, etc, £170; IC20XT, 10W/1W, R0, R5–7, S20–22, £90; all with handbooks. G3XYT. Tel 021-354 1566.

Back issues, must sell as clearing out shack: *Radio Communication* May '76 to December '78; *SWM* '75 and '76; *TV* '72 and '78; 20p ea plus sae; also *PW, PE, EE, RC.* Robin Bayley, 8 Field Lane, Kemberton, Shifnal, Salop.

Microwave Modules 23cm converter, 144MHz i.f., brand-new, unused, £22. VBC98C varactor diode, 13W out on 70cm, unused, £3. Sentinel low noise 2m preamp, £6. Stereo headphone amplifier, £12. QQVO3/20A, good, £1.50. G8JWC. Tel Leamington Spa (0926) 26681, after 5pm.

Minitennas, C4, 10, 15, 20, coaxial, vertical, unused, comp, £32. Buyer collects. G3CDC, QTHR.

Data rec/reprod, 1⅞ to 120in/s, seven ranges data, in/out interface, r/c 8-track 0·5 by 10·5in reels, vacuum transp, in 6ft cabinet, best offer over £100 secures. Buyer collects. G8DXC, QTHR. Tel 0353 860646, evenings.

MBM88, £15. Sinclair Scientific, £7.50. 3cm wavemeter, £8. CCTV camera, optical focus, £50. WG16, £1 per ft. G8JAI, QTHR.

Heathkit HW12 single-band ssb tx/rx for 80m, two new pa valves, ideal mobile or beginner's rig, £65. 12V dc psu for same, £10. Collection/delivery by arrangement. G3YKP, NOT QTHR. Tel Coalville 38995, any time.

TR7200G, 22ch, nine repeaters, 13 simplex, main psu PS5, digital clock and time switch, used little, comp, £240 ono. G3OUX, QTHR. Tel 0293 23890, after 5pm.

2m Pye AM10B, vgc, 11ch, fitted 9ch, plus two 144MHz tx xtals, preamp, switched a.m./fm and toneburst, handbook, circuit, spare pa, £60. 12V h/d battery to suit, vgc, £15. G8PEG, QTHR (near NEC). Tel Knowle (05645) 78218, any time.

TA33Jr tribander, £45 ono. 30ft Hamtower, comp with top plate, £50 ono. Buyers collect. G4DQB, QTHR.

Standard C826, 2m, fm, 10W, 12ch, 8ch fitted, S0, S20–22, R5–7, RR5, handbook, mobile mount, £110 ono. G3TDJ, QTHR. Tel Bude (0288) 3701.

Labgear LG50 tx, a.m./cw, 10–80m, £15. Joystick antenna, Joymatch, £20. Eddystone mech bug key, £10. Yaesu YH55 h/phones, boxed, new, £7. Tandy cassette morse course, £2. Part delivery extra all items. G4HBU, QTHR. Tel Bristol (0272) 611093; or 551055.

12SG7, 12K8, 12SK7, 12SR7, 20p ea. Unused ECF82, 6BE6, ECC81, ECC83, EL84, EF93, OA2, 6CX8, all 50p ea. Unused KW204 vox unit, £12. 1-pole 6-way ceramic switch, £3.50. G4GHB, QTHR.

300W p.e.p. output hb hf linear, self-contained psu, TT21s in AB1, £50. Berco Regavolt 8A 0–260V autotransformer, £15. Min 2m super-regen hb rx, £4. *Wanted:* urgently, Trio R599S rx, your price. G3XZV. Tel Harrogate 862147.

Holiday hotel, 100yd Blackpool cliffs and promenade, comp shack, 60ft tower, 2-el 40m and 4-el 10m Yagis, 160 dipole, ideal location, 11 bedrooms, sun and tv lounges, licensed. G3TSL, "Bryn-Garth" Private Hotel, Shaftesbury Avenue, Blackpool. Tel 52453.

Pye Cambridge FM10P, preamp, toneburst, manual, nicad charger, spare quickheats, set up on S0, S20–22, R6, £65. *Wanted:* KW2000, or similar, must be good cond. McKae. Tel 051-652 1309.

Dentron MT3000A tuner, £220. FDK2700 Mk2, multimode, £390. S/state linear, 80W, £70. Daiwa remote masthead antenna switch, vhf preamp, £25. Vibroplex Deluxe, c/case, £25. Hansen vhf pwr/swr bridge, £20. Two 4-el 2m quads, £10 ea. Shure 526T desk mic, preamp. IC215, 15ch, plus RR6, type C nicads, charger, carrying case, helical whip plus telescopic, £145. YO100 Yaesu monitorscope, £95. SP101B Yaesu spkr, £10. Xtal filter, 1·4MHz, carr/xtals, £6. SSB/cw modules, 1·4MHz i.f., data manual, £10. GM3XNE, QTHR.

M15 teleprinter, reader, £15. 500/0/500V, 0·5A stab psu, £20. Marconi TF39 sig gen, 18/100MHz, very accurate output, £8. Two 4CX250Bs, £6 pair. Maritime CR100 (no mods), £20. Many 10GHz and vintage components, sae. G8IPY, QTHR. Tel 01-977 1982.

CR100 rx, £15. G8MPX, 96 Broadlands, Hillyfield, Walthamstow, London E17 6DF.

DX160 rx, £60. Collect. *Wanted:* Heath RA1 rx. Roberts, 71 Gibbins Road, Selly Oak, Birmingham.

G2DAF tx, XF9B, psu, professionally sprayed, engraved, £60 ono. ZVC 9MHz ssb board, XF9B, rf amp, preselector, predriver board for six hf bands, 6V, 12V stab psu board, Vackar vfo die-cast box, reduction drive, £65 ono. G3XZV. Tel Harrogate 862147.

Trio TR2200G, fitted 12ch, illuminated dial and meter, auto toneburst, comp with nicads, charger, etc, £120 ono. Convergence board for BRC 2000, new, offers. G8KXM, QTHR. Tel 0782 535316, after 7pm.

Trio JR599 rx, all filters, £150. KW Viceroy Mk3A tx, 6146Bs, mic, £65. Decca/SMC monitorscope, brand-new, £65. Heathkit sig gen RF-1U, £15. KW160 a.m./cw tx, £16. Tech Assoc speech comp, £12. Callers only. Pryse, 36 Hart Road, Byfleet, Surrey.

Micro memories: a few 1702A U/V erasable proms (8 × 512), £3 ea; Creed 7B, 240V ac, £18; Bantam HP1FM, 145·0, R6, xtal/vfo on rx, case, nicad, £40; 50W valve linear amp, £5. Smith, G8DVN. Tel (home) 0623 882174, (work) 0777 706777 ext 9.

Moving sale: Heathkit SB230 conduction-cooled linear, £280; Trio TS820, remote vfo, cw filter, £675; Hy-Gain TH3 Mk3 triband beam, CDR Ham-M rotator, cable, £220. C. Kratzer, G5CAA, 8 Fairholt Street, London SW7. Tel 01-589 1816.

HC25/U 48MHz xtals for following 2m channels, R0, R4–7, S22, £1.50 ea. G8FDJ, 15 Bakehouse Road, Horley, Surrey. RH6 8MQ. Tel 74969, evenings.

TX/RX, Bosch, 2m, S20–22, R5, 0·5W, £35. QQV06-40A pa, tuned-lines, blower, rf change-over and power supply, £20. Marconi sig gen, 10–150MHz, £18. G8JZO, QTHR. Tel Reading (0734) 51592.

Trio TS520, cw filter, VFO520, MC50, heavy-duty mobile leads, £450. G3WTM, 46 Naseby, Hanworth, Bracknell, Berks RG12 4HD.

TR7200G, channels R1–7 fitted, incl mobile mount, handbook, orig packing, all in good wkg order, £95. Carr extra. Tel 0733 63851.

SB104A, fitted SBA104-1 noise blanker, HP1144 psu, £550; TR7500, £175; both immac. G3OGQ, QTHR. Tel Warrington 50177, daytime.

FRG7000 rx, digital, almost new, manual, £285. Sony CRF5090 earth orbiter, almost new, £140. Stephens James Mk2 atu, unused, £18. Owner emigrating. Buyer collects. Tel 0926 54152.

HF rx, professional performance, amateur bands, 3·5–30MHz, film scale driven linear pto, KVG, ssb and cw filters, £160. Morse typewriter, 64-character buffer fifo, variable speed and weight, £100. SAE or tel for details. G3URX, QTHR. Tel Cambridge (0223) 312827.

KW2000A, ac and dc psus, assorted spares, incl four pas, Compact 300W linear, 18AVT, £325. TR7200G, S0, S20–22, R6–7, £125. SSM 2m converter, 28–30, £13. Prefer collect. Gulliver, GW4EDQ, 30 Highbury Crescent, Cefn Glas, Bridgend CF31 4RD.

Trio 5R59D, £30. 5FP7, £4. 7BP7, £5. VDU, 80 × 13 display, Baudot 1 ASCII, £200. Cheap ttl etc: eg 7490, 26p; 7475, 35p; 7400, 11p; 74121, 23p; 741, 14p; all new. SAE for full list. G8DJM, QTHR. Tel Lye (038482) 4388.

3cm Gunnplexer tx/rx, as reviewed Nov '78, unused, with mfr's test report, £69 incl. G8APX, QTHR.

FL1, £49. DeWald TR850 50MHz tx/rx, W/50·5 xtal, £25. TA33Jr beam, collect, £60. Boomless quad spider, £10. 4X150A, £10. 5V CT, 14·5A 120V ac, £10. Knight R100 rx, manual, 120V ac, £25. 100pF, 7kV variable, £5. FT243 xtals, 3561·5, 3562·5, 3564, 3609, 3609·1, 3613·7, 3634·4, 3657·8, 3658, 3662, 3784, 3797·4, 7042, 8175, 5675, 5677·7, 5775, 13,100, 80p ea. R. Guard, Oaker Bank, Skipton Road, Killinghall, Harrogate HG3 2AR.

Synthesized 2m mobile, Kyokuto digital 2, plus SEM 48W power/preamp unit, £230. G8BZN, QTHR. Tel 0455 35621.

FT221R, in fine cond, used little since purchased new, £275. Buyer collects. G8NIW. Tel 01-651 3363.

Standard C828M 2m 10W tx/rx, 12ch xtalled, t/b, CV110 vfo, matching spkr, manuals, £175. Standard C430 70cm 10W tx/rx, 12ch, t/b, manual, £150. Standard C146A 2m 2W hand-held tx/rx, t/b, case, charger, nicads, flexi antenna, manual, Base Master, £125. G3YMS, QTHR.

Trio TS700G, SD306 preamp, exc cond, orig packing, prefer buyer collects, £350 ono. G4FAB, QTHR. Tel Wigan (0942) 31675, after 5pm.

FR101S, 10–160, all bc bands, mint, used few hours only, will deliver reasonable distance, £400. G4HBP, "Ploughman's Piece", Thornham, Norfolk. Tel 322.

Assembled Mosley RD-5 receiving trap dipole, 10–80m, with feeder, £15. Heathkit Superex headphones, model GD396, high impedance, £3. G8JBK, QTHR. Tel Grays Thurrock 70074.

Racal RA17L, mint cond, case, handbook, £200. G8AZU, QTHR. Tel Sunbury 89036.

Dynamco 0·01% dvm 2006, offers; Seiko RP101 drum printer, £25; Avo model 8, c/w leads, £18; Telequipment D53 oscilloscope, £35; Levell oscillator, £35; 2A cased variac, £8. postage extra; consider exch (cash adjustment) for gc rx. Tel Asthall Leigh (Oxford) 220.

FT221R all modes 144–148 tx/rx, as new, hardly used, fully synthesized, £320. Sailor RT142 vhf marine tx/rx, latest GPO spec, 16 xtal channels, £300. Brock. Tel Oxted 2141, evenings.

EC10 Mk2 rx, £85. TM56B vhf scan rx, fitted 10ch, S0, S20, S23, R3, R7, supply 12V, 230V, £75. RQ10 Q-multiplier, £7; PR30 preselector, £7; or £12 the two. All ono, collect or carr extra. G8SBU. Tel Fareham 232799, after 6pm.

Trio TS520, cw filter, SP520, MC10, £430. KW105, modified to 107 spec, £65. 18AVT/WB, £45. Datong rf clipper, £28. Twin meter SWR50A, £6. PBM18/70, £10. OS2100 35MHz oscilloscope, £250. G4FMD, QTHR. Tel 0371 3119.

Trio JR500S, ham bands only, no mods, works well, stable, manual, £55. Tel Coventry 22201, after 6pm.

FRG7 gen purpose comm rx, fitted fm discriminator in place of noise blanker, rx vgc, just one yl owner who is now licensed and wishes to sell, comp with Microwave Modules 28/144 vhf converter, £150 or nearest offer. Tel Aberdeen 24715.

Heath HW202 tx/rx, toneburst, HW2036 ac psu, prof built, mint, with xtals S10, S12, S14, S16, S20–23, R0, R3, R5–6, manuals, £150 ono. Tel Denis, Kidderminster 66311 ext 58, 1300–1900gmt Tues–Thurs.

Creed 444, 45 bauds, £50. Delivery to Harrow possible. *Wanted:* 70cm gear, incl tx/rx, linear amp, high gain antenna. GW8AIB, QTHR. Tel Caersws 288.

Exch: 2200GX, mint, fitted nicads, S0, S18, S20–21, R2 simplex, R4, R6–7, plus charger; for pocket 2m tx/rx, or hf linear; or sell for £120. Oscilloscope, WM8, £35. G4GQL, QTHR. Tel 01-518 1562.

Shack clearance: KW2000 dc psu, offers; 807s, 6V6GTs, VR105/30s, 6146s, VR150, 50p ea; fixed and variable resistors and capacitors; valve bases; transistors; diodes; 40763s; various bits. GW3YTL, QTHR. Tel Knighton (Powys) 528030, evenings.

KW monitorscope, exc cond, handbook, £60. GW4GNY, QTHR.

Combined gdo absorption w/meter sig gen, 1·7–180MHz, mains input, £8; five PL509s, with valve holders, £2; solid-state audio amp, 500mW, £1; all plus carr. G3BIA, QTHR. Tel 01-977 6705.

PF1 tx board, xtalled on RB2, mic insert, £8. RX xtal for RB2, suit PF1 rx, £1.50. IF xtal PF1, £1.50. Parts for PF1 rx: rf head, 50p; xtal filter, £1; loudspeaker, 50p. G4ANW, 16 Chestnut Drive, Broadstairs, Kent.

FT221R, late model, as new, fitted preamp, accessories, manual, £290; or exch Icom 202/215, cash adjustment. Technical Associates speech processor, £15. 6S6 tape reader, new, £10. G8NPM, QTHR. Tel Wickford (Essex) 4317, evenings/weekends.

TR2300, nicads, £150; Microwave Modules 500MHz counter, £49; Datong rf clipper, £35; QM70 2m conv, 28–30MHz, £10; vhf swr/pwr meter, £15; hf swr/pwr meter, £6; all mint cond, unused, boxed. G4BKM, QTHR. Tel 01-568 8497, or Denham 4358.

FR50B rx, 160-10m, calibrator, £60. HRO rx, bandspread coils, £25. Heathkit ham bands rx, 80-10m, £20. *Wanted:* KW E-Zee match, vtvm with probes, G2DAF rx, Datong audio filter, EA12 rx, 2m tx/rx. Wright, 67 Berwyn Close, Buckskin, Basingstoke. Tel Basingstoke 68649.

Versatower, 58ft post-mounting crank-up type, with winch, 20ft when closed, £175. 14-el Parabeam, 2m, £24. B40 4m rx, £15. DX100, £60. R. Heaton, "Moberly Tower", Burlington Street, Manchester M15 6HR.

Drake DSR1, superb rx, solid-state, 10kHz-30MHz continuous, synthesized, digital readout to 100Hz, a.m., ssb, cw, rtty, isb, bandwidths 6-0·4kHz, 2W output, current price over £2,000, as new, manual, cartoned, £695. East, G8PKD. Tel 01-486 8286.

Collins mechanical filters: F455-FA-15 1·5kHz rtty, F455-Y-21 2·1kHz ssb, both brand-new, £25 ea; three F455-F-05 500Hz cw, £12 ea; add postage. G3EWZ, QTHR. Tel Chester 24763, evenings.

Trio model JR599 custom special, immac cond, little used, with 50 and 144MHz, £165. KW 3-way antenna selector, Harvard stereo headphones, JVC and Winthronics radio cassettes. L. D. Ireland, "Carnhell Green", Camborne, Cornwall TR14 0NA. Tel Praze 236.

Icom IC202, used few hours only, comp with h/b 12V reg psu, 5-el Jaybeam ant, £120. Ferrograph series seven r/r stereo tape recorder, 117V 50Hz, c/w 240V transformer, £100. G3UUV, QTHR. Tel 0249 2703, after 6pm.

SB102 tx/rx, SB600 psu, SB640 vfo, all vgc, £195. Collins filters 455kHz b/w 2, 4, 8, 16kHz, sets of four, £25. Loose filters, £7.50. G3LEZ, QTHR. Tel Southend (0702) 230489.

TR2200, £45. Keyboard, £12. 12AVQ, £12. Buyer to collect. G3RTE, QTHR. Tel Potters Bar 57309.

QR666, 170kHz-30MHz, plus fm unit, £100. Belcom Liner 2, preamp, handbook, mic, £100. Callers only. 30 Duchess Drive, Bridgnorth, Salop.

KW2000B, ac psu, immac, comp service by KW January '79, £250; KW1000 1,200W linear amplifier, perfect, £150; KW110 Q-multiplier, £20; KW low pass filter, £20; or offers for the lot. *Wanted:* vhf gear, eg FT200, Europa, why? G4FRB. Tel Cirencester 5409.

Brown Bros American twin paddle key and electronic keyer, relay, as new Cowl Gill rotator; exch for twin lens reflex camera, or 2¼in² 35mm b/w enlarger, or why photographic? G2BUC, 18 Chesterton Park, Cirencester. Tel 2349.

60ft 3-section Versatower, needs replacement top section, ready for collection, cash and carry price, £150. Regency mobile converter, 80-10m, for use with mw car radio, £20. G2PU, QTHR. Tel 0223 870454.

Robot sstv 80A camera, 70B monitor; two cctv cameras; 70cm parabeam; 70cm colinear; 2ft 8-el crossed Yagi; Stolle rotator; AR22 rotator; 70cm converter, 28MHz i.f.; 70cm varactor tripler; heath OS2 'scope. G4CEQ, QTHR. Tel Downland 55908, evenings.

IC210 2m fm tx/rx, vfo, xtal channels S20, S0, rev rep, handbook (English photo-copy), £190 ono. Labgear 160 twin top band a.m./cw 10W tx, ac and 12V dc psus, circuits, £25. Buyer collects. G3KJU, QTHR. Tel 63415, after 6pm.

TR2200G, 9ch fitted, S0, S20-23, R3-4, R6-7, nicads, charger, orig packing, manual, etc, vgc, £110 ono. G8FGY, QTHR. Tel Lowestoft 61343, after 6pm.

Shack clearance: many individual items and components, some unobtainable today, eg RF27/28 units, ceramic formers, various pcbs, chassis, valves, transformers, tel for further info. Roger Alban, GW3SPA. Tel Cardiff (0222) 499022 ext 3156, weekdays only.

Memory keyer, iambic mode electronic cw sender, with 2,048-bit memory, needs 240V ac/12V dc, less paddle, £64. Tel Steve, 0494 41765.

KW202 rx, mint cond, manual, £175. KW Vespa tx, 220W i/p, with p/s, manual, mic, £95. Will separate. G4FQF, QTHR. Tel Romford 47998.

KEF, kit 2, stereo spkr kit, unused, not assembled, in orig packing, list price over £60, bargain, £35. G3UUV, QTHR. Tel 0249 2703, after 6pm.

KW2000A and power pack, used very little, very good cond, with circuit, handbook £150. Buyer collects. G3JEN, QTHR. Tel Halstead (Essex) 2331.

AIM digit capacitor meter, auto ranging 1pF-200F, v/g, cost £100, £60; logic probe, £10; Grundig Satellit 6000, 12 bands, b/spread, £60 ono; 10W stereo amp, b/new, £30; or swop all or part of above for uhf 70cm transverter, 2m linear amp, vhf freq meter, or prescaler 2-500MHz for freq meter. P. Turner. Tel 0842 61648, after 7pm.

Pye tv camera, vidicon, remote focus/lens change, £13. BC221, charts, psu, £14. Xtal wavemeter, £2. SN76666, 50p. 25in colour tv, just works, £22. Time-switch, £3. Transistor uhf tuner, £1. Scan coils, 35p. *Wanted:* 60ft telescopic mast. G8ABQ; QTHR. Tel 01-452 6724.

LM14, £15. KW2000 dc psu, £20. Marconi sig gen, TF390F, covers 150MHz, £20. Bridge, Belco BR8, new, £20. Components for grd/grid linear; two 813s, tested, good, no chassis, £60. *Radio Communication* '61-'77, *SWM* '61-'74, £2 per year. Buyer collects. G4CRM, QTHR. Tel 07014 52442.

Solartron CD711S.2 7MHz twin beam measuring 'scope, internal timebase xtal calibrator, manual, £50. Small American hi-fi amp, about 2×8W integral preamps, front trim panel missing, £10. G3TCU, QTHR. Tel Guildford 65607.

FT101E, plus FV101 350Hz cw filter, mint, £495. Buyer collects. G3HVA, QTHR. Tel Tadley 6106.

All stn portable television rx, good wkg order, model 4661 Marconiphone, would accept £5. R. Cuddington, ARS40935, "Milton Lodge", Milton Bryan, Milton Keynes.

TR2200GX, S20-24, R3, R6, RR3, RR6, nicads, helical antenna, £155. ASP629 mobile 2m antenna, incl magnetic mount, £22. Boom mic, foot switch, £13. Carr by Securicor can be arranged. G. Simmons, G4DWV, Room C302, Henry Price Building, Clarendon Road, Leeds.

Telequipment db D43 'scope, recently refurbished, in as new cond, £100. Datong speech processor, £20. Z-match /75Ω lpf/swr bridge/80Ω dummy load, all in one 19 by 10in cabinet, £55. G3LCS. Tel 0908 313379.

Heathkit linear SB200, factory assembled, vgc, £250 ono. G6GL, QTHR. Tel 09276 5914.

TE46 R/C analyser, £10. AR88D gearbox, £5. 2m converters: 2-4, 4-6, 28-30MHz, £10 ea. Starphone hb rf boards, ok 2m, £4. BCC69 lb mobile, comp, £5. Cossor 1035 sb 'scope, £15. Carr extra above. G8PXS, 18 Hawkins Road, Folkestone. Tel 76063.

Trio JR310, n/b/filter, £90 ono; Trio 9R59DS, extras, £60 ono; Heathkit IO-102 'scope, £80 ono; BC221T mains psu, charts, etc, £20 ono; all exc cond, offers accepted. Buyers collect or pay carr etc. Selling due to illness. G8HVQ, QTHR. Tel Lytchett Minster 622314, after 6pm.

FT227R, FP4 psu, near new, £190. DX100U, AR88D, £90. PF1s, RB14, £30. CD711S 'scope, £10. 2m 5/8, with mag mount, £5. Marconi stab psu, 200-400V, £5. G4HVK. Tel 021-382 4048.

AT5, with mains unit, T28, Hamgear PM2A preamp, Codar PR30. G3DMQ. Tel Reading 581481.

Yaesu FR101D, 160-10, and 2m, all modes, as new, Perspex cover, £395. MMT 144/28 transverter, used very little, £65. G4HTE. Tel Potters Bar 54905.

Heathkit 10-180 'scope 4·5MHz, 30mV/cm, 5in tube and probe, ac coupled only, exc cond, £55. Burton, 7 Springhill Drive, Crofton, Wakefield. Tel Wakefield 862597.

Trio 2200G, fully xtalled, incl all access, £110 ono. NR56 monitor rx, xtalled R3, R5-7, plus vfo, £45 ono. G8RJI. Tel Wormbridge (Herefordshire) 413.

KW2000, ac/dc, psus, Medco low pass filter, £100. Joystick, Joymatch atu, modified, £15. *Wanted:* atu (Z-match); FT75, comp; all letters answered. Grieveson, G4GXU, 6 Spinney Bank, Kings Sutton, Banbury, Oxon.

IC215E, R3-9, S0, S24, S20-22, as new, helical antenna, one year old, £140 ono. QM70 Buccaneer transverter, one year old, 40W p.e.p., £50. SEM hf auto preamp, SO239 conn, six months old, £10. G8JGK, QTHR. Tel 0245 69034.

Valves: few unused, 6BA6, 25p; 6BW6, £1.25; QS150/45, 30p; few electro mech four digit counters, five for £1. *Wanted:* valves, 12A6, 12SA7, 12SK7, 12SC7; very good HRO, comp, will collect; TCS12 handbook. Tel Bradbury (0782) 21164, evenings.

Collins 'S' line, 32S1, 75S1 separates, transceive capability, 80-10m, 100W, 230-110V transformer incl, exc performance, £550 ono. G2DAF hb linear, 80-10m, 2×813 1·7kV psu, legal limit with reliability, £50 ono. G3KKB, QTHR. Tel 021-427 1305.

Fujion 2000A direction finding rx, as used on yachts and boats, all solid-state, used little, mint cond, five wavebands, incl marine vhf, null meter, bfo, df antenna, 12V, £130. G4AYV, QTHR.

HW101, mains psu, £160. HW32A, covers comp 20m, mains psu, £60. Heathkit OS-2 'scope, £20. Large ver inductance for antenna systems, £5. HW202, mic, £40. Ten-Tec 3W, 15-40m tx/rx, £30. HW7, £30. G3ZRD, QTHR. Tel 01-650 5899.

Pye Ranger adapted fm transformers: 700V 215mA, +6·3V 2A, £4; 600V CT 50mA, +6·3 CT 600mA, +6·3V 300mA, £3; 220V 300mA, +25V 1A, +6·3V 9A, £3; 22·5V up to 4A, £2. *Wanted:* reasonable teletype or teleprinter. Heath, 103 Pollards Oak Road, Oxted, Surrey. Tel Oxted 4503.

FT101E, 600Hz cw pas, on air less than 15h, immac cond, plugs, leads, manual, orig box, about 15 months old, £500. G4GGW, QTHR. Tel 0296 623441.

FT227R, one year old, little used, mint, no mods, orig packing, £200. GM8OWX, QTHR. Tel St Andrews 77066 or 2066, evenings.

IC240, as new cond, still under guarantee, £160; would consider quality hand portable in part exch; going non-mobile. G8PYQ. Tel Erith 37710.

HW100, psu, matching case incl Z-match, £200. Prefer buyer inspects and collects. G4DUF, QTHR. Tel Wormley (Surrey) 2104.

Heath SB200 linear amp, mint, £320 ono. Datong FL1 audio filter, mint, £45 ono. G4EHE, QTHR. Tel 027 582 2725.

KW2000 tx/rx, ac psu, gc, £110. Prefer buyer collects. G3YNR, QTHR. Tel 0246 74603, after 6pm.

SWL selling: Jaybeam 2m 6-el quad, £12; MB 432MHz, 48-el, exc cond, £12. Denis Taylor, 25 High Brow, Harborne, Birmingham. Tel 021-426 5271, after 6.30pm.

MMV1296 23cm varactor tripler, 30W, Microwave Modules; as new, £25; Yaesu SP401 spkr unit, £10; Eddystone 730/4 gen cov rx, variable selectivity, xtal phasing, filter, etc, vgc, £120; various transformers, meters, chokes etc, sae list. G3OHC, QTHR. Tel 021-308 2512.

Eddystone 680X gen cov rx, sep 3Ω spkr, good cond, £45. L. J. Pink, "Gilberts Cottage", Church Street, Farringdon, Nr Alton, Hants. Tel Tisted 477.

Phone and haggle: IC22A, IC215, IC202E, C146A, Belcom AMR217B scanning rx, Belcom AMR104H scanning rx, EDL144 linear, MEL202 linear, Trio QR666, PF5UH Pocketfone, PF1 Pocketfone, Joystick antenna; all fb cond, little used. G8MXE. Tel Holsworthy (0409) 253550, day time.

AR88 hf rx, manual, spkr, in good cond, cash offers; or exch for 2m or 70cm hand-held rig. G4HDI, NOT QTHR. Tel 048483 7656 (West Yorks).

Yaesu FT202R hand-held tx/rx, fitted S20-22, 6ch availability, for particulars see *Radio Communication* March '79 p204, four weeks old, as brand-new, heavy-duty batteries, £75. Post paid. G3RDG, QTHR. Tel 01-455 8831.

FT401B, recently overhauled, comp with matching spkr, mint appearance, £300. GM3MBP, QTHR. Tel 089081 405.

AR88, orig spkr, mint, £14. Matching headphones, high quality, new, boxed, £7.50. AR88D manual, used, £3. Pair selsyns, 4in dia 50V 50Ω, with 6in dia indicator, new, £16. Collins uhf coaxial relay, with connectors, new, £9. All plus postage. *Wanted:* LM series frequency meter. G3GUU, QTHR.

Yaesu FRG7000, used only few hours, as new, unmodified, boxed, all accessories as supplied, going transceive, £310. 46 Shakespeare Road, Colchester. Tel 0206 67559.

Bantam, fitted S20, S24, case, nicads, charger, £50. Teletext decoder *WW,* in cabinet, psu, interface board, all wkg, £80. Futaba 4ch R/C tx/rx, nicads, charger, etc, 48+118in gliders, used 1h only, £150. G8ART, QTHR.

FRSDX400, 160-10m, 4m and 2m, new valves, re-aligned, vgc, £185. G4BMH, QTHR. Tel 0604 846533.

FRG7, fine tuning, immac, spotless, unmodified, one year's SMC guarantee, carton, manual, have purchased Drake, £150 plus carr. New switched-selectivity pcb completed (*SWM* version for FRG7), two mech filters, instructions, circuit, £25 post paid. BRS12234, 16 East Parade, Rhyl, Clwyd.

WANTED

Circuit/layout diagram WW2 MCR1 rx, buy or hire. GM5PJ, QTHR.

Redditch Radio Club wishes to borrow manual and/or circuit of RCA AR77, will copy and return, defray expenses, buy if necessary, for young club member. G3EVT (sec), QTHR. Tel 078971 2041.

Eddystone EA12, KW77, Hallicrafters SX101, National NC300 or HRO60, must be in good cond and unmodified. G4FMO, QTHR. Tel 0283 63767.

KW2000, ac psu, in good cond. Write preferably. Mrs B. M. Moore, G3ORU, 30 Abbey Crescent, Sheffield S7 2QX. Tel 0742 363155.

Marconi Atalanta rx. Cabinet for Hammarlund SP600 rx. Marine vhf r/t, 12V. *For disposal:* HW32A; load of test gear, valves and miscellaneous items; sae please. Cain, 18 Oaky Balks, Alnwick, Northumberland.

RTTY rx adaptor, type FAE2, with matching crt tuning indicator in 19in rack, and with manual. HAL ST-6000 demodulator/keyer, with crt indicator. Good price paid for good wkg equipment. Bragg, 6 Wherstead Road, Ipswich, Suffolk IP2 8JG.

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Trio R599D or S model rx, also S599 spkr console, only interested in immac units. G3FCW, QTHR. Tel Leeds (0532) 585044, evenings or weekends.

Eddystone 888 or 888A, unmodified, mint or vgc, with or without accessories, collection arranged reasonable distance or mutually agreed motorway oasis. Furness, GM3RUI, 33 Leslie Crescent, Westhill, Skene, Aberdeenshire.

To keep station operational: valves QQZO6-40, QQZO3-20, YL1000, YL1130; Cossor Commando spares; buy or borrow Cossor Commando CC302 handbook; Babani's *International Radio Tube Encyclopaedia,* third edition, 1958. Rycroft, G8IGZ, 4 Lanherne Avenue, St Mawgan, Newquay, Cornwall. Tel St Mawgan 226.

QTH: Hampshire, Dorset, rural area, three beds, detached, with Versatower, price £20/25,000 cash; would consider other suitable property provided planning permission for tower could be obtained. Tel 0406 362501.

18AVT/WB 80-10 vertical. S. Macdonald, GM4GUL, 5 Lower Glebe, Aberdour, Fife. Tel Aberdour 860435, evenings.

Muirhead D901 facsimile tx, suffix D preferred but others considered, price and details. McGuffie, 4 Royal Crescent, Stranraer, Wigtownshire DG9 8HB. Tel 0776 2716.

813s, pair needed, new and unused, details. GW2SB, 27 Highfield Avenue, Mynydd Isa, Mold, Clwyd. Tel 024 454 5177.

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GEC personal tx/rx, type RC550TR; info, including circuit diagram, for servicing purposes, would photocopy and return or buy. A. R. Bartle, 105 Mayfield Road, Thornton Heath, Surrey. Tel 01-684 0601 (home); or 01-432 2020 (office).

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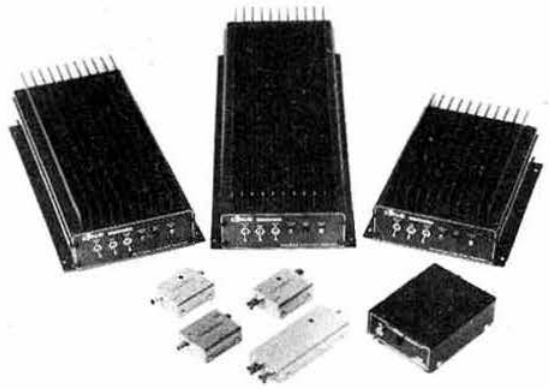

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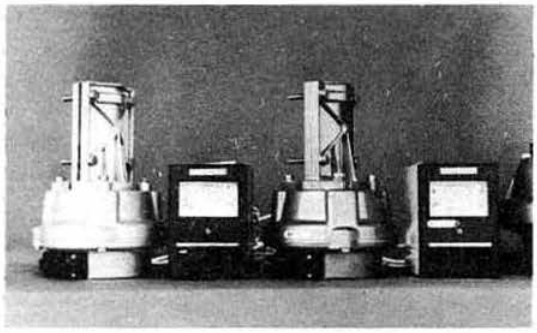

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ACCESSORIES

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SMP30 External Spk/Mic	£16.50 + 12½% VAT
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N-10 Set Ni-cad	£8.50 + 12½% VAT
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SWR25 This ever popular twin SWR and power meter covers 3·5–150MHz at **£10.50** plus 8% VAT and 25p P & P.
SWR 15 Single meter SWR and FS 3·5–150MHz at **£8.50** plus 8% VAT and 25p P & P.

UH74 SWR and power meter switchable HF, 2M & 432MHz with remote head at **£14.25** plus 8% VAT and 25p P & P.

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TS820S	160-10m transceiver 200W P.E.P. (with DG1)	814.00	3.50
TS820	160-10m transceiver 200W P.E.P.	695.00	3.50
DG1	Digital readout to 100Hz	120.00	.86
VFO820	External VFO	121.00	3.50
DS1A	12V dc inverter. Supp/fitted toc all orders TS820S/TS520S	42.00	.86
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SP820	Speaker	38.00	1.16
SP520	Matching speaker 8ohm	17.50	1.06
SM220	Monitor scope	231.00	3.50
BS8	TS820 scan board for SM220	46.50	.44
AT200	1·8 to 30MHz antenna tuner	93.00	1.06
TL922	HF Linear amplifier 160-10m/2Kw P.E.P. 2×3-500Z tubes	780.00	3.50
TS520S	1·8-28MHz SSB transceiver 200W P.E.P.	530.00	3.50
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YG3395C	CW filter	39.00	.36
SM220	Monitor scope	251.00	3.50
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PS-20	AC power supply for TS120V	51.00	3.50
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TS700S	2m all mode digital readout transceiver simply the best	537.00	3.50
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SP70	Matching speaker	20.00	.86
TR7010	2m SSB/CW mobile transceiver 10W output	189.00	3.50
TS770	2m/70cm all mode dual bander	t.b.a.	
TR7400A	2m FM 30W mobile transceiver 800 channels	336.00	3.50
TR7500	2m FM mobile 10W transceiver PLL with all 80 FM channels	235.00	3.50
PS6	Matching PSU for TR7500	58.00	3.50
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VB2300	10W booster. Available February 1979	58.00	.86
MB2	Mobile mount. Available February 1979	18.50	.86
RA1	Helical rubber antenna	6.75	.36
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TR7600	2m synthesized mobile/fixed	265.00	3.50
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LAR PS1200	Power supply unit and Ni-Cad charger for TR2200G/GX TR3200 and TR2300	24.50	.86
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TR8300	70cm FM mobile 10W transceiver fitted 4 channels	245.00	3.50
TR3200	70cm FM handy transceiver fitted 3 channels	186.00	3.50
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MC35S	50K fist microphone	13.00	.44
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LF30A	HF low pass filter 1Kw 90dB. Stop band rejection	18.50	.67
BPF2A	2m band pass filter 144-146MHz 50W rms 100W P.E.P.	28.00	.86
Mizuho SB-2M 2 metre SSB/CW portable transceiver		165.00	3.50
VHF AMATEUR RECEIVERS			
SR9	Tuneable/crystal 2m FM receiver 144-146MHz	45.00	.86
AMR217B	Scanner with 8 crystals. The best and most popular. Mains/battery	118.12	1.06
	Crystals for above. Each	2.40	.15
HF MOBILE ANTENNAS			
'G' whip tribander helical 20/15/10		21.15	1.06
'G' whip multimobile 20/15/10		24.30	1.06
L.F. coils for the above whips (Specify whether tribander or multimobile)		6.07	.66
Telescopic whips for the above		3.00	.66
Base mount for all 'G' whips		3.82	.66
Extendarod 40" booster		10.12	1.06
VHF/UHF 'J' BEAMS All 'J'-Beam products available			
ROTATORS			
AR40	(5 core cable required)	53.44	3.50
FU200	For lightweight 2m beams	39.50	3.50
DR7500	Will take 3 element tribander	105.75	3.50
DR7600	Will take 2 element 40 metre beam	150.75	3.50
DR7600P	As above but with preset or manual controller	200.25	3.50
VHF MOBILE WHIPS			
ASP201	¼ wave 2m	3.20	1.55
ASP157	¼ wave gutter mounted 2m	10.26	1.55
ASP2009	½ wave 2m	9.72	1.55
ASP677	½ wave 2m	16.20	1.55
ASP2011	½ wave disguise	27.22	1.55
ASP462	½ wave 70cms	8.21	1.55
ASP667	Colinear 70cms base station	20.00	1.55
ASP655	½ wave 2m base station	21.60	1.55
ASPA659	70cms	21.60	1.55
M161	No hole boot mount	3.20	1.55
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1N4005	600v	1A	.08
1N4007	1000v	1A	.15
1N4148	75v	10mA	.05
1N4733	5.1v	1 W Zener	.25
1N753A	6.2v	500 mW Zener	.25
1N758A	10v	"	.25
1N759A	12v	"	.25
1N5243	13v	"	.25
1N5244B	14v	"	.25
1N5245B	15v	"	.25

SOCKETS/BRIDGES

8-pin	pcb	.20	ww	.35
14-pin	pcb	.20	ww	.40
16-pin	pcb	.20	ww	.40
18-pin	pcb	.25	ww	.75
22-pin	pcb	.35	ww	.95
24-pin	pcb	.35	ww	.95
28-pin	pcb	.45	ww	1.25
40-pin	pcb	.50	ww	1.25
Molex pins .01		To-3 Sockets		.25
2 Amp Bridge		100-prv		.95
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TRANSISTORS, LEDS, etc.

2N2222	NPN (2N2222 Plastic .10)	.15
2N2907	PNP	.15
2N3906	PNP (Plastic - Unmarked)	.10
2N3904	NPN (Plastic - Unmarked)	.10
2N3054	NPN	.35
2N3055	NPN 15A 60v	.50
T1P125	PNP Darlington	.35
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MAN82A	7 seg com-anode (Yellow)	1.25
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4000	.15
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4017	.75
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4022	.75
4023	.20
4024	.75
4025	.20
4026	1.95
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4028	.75
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4033	1.50
4034	2.45
4035	.75
4040	.75
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4043	.50
4044	.65
4046	1.25
4049	.45
4050	.45
4066	.55
4069/74C04	.25
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4082	.30
MC 14409	14.50
MC 14419	4.85
4511	.95
74C151	1.90

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7400	.10	7473	.25	74176	.85	74H72	.35	74S133	.40
7401	.15	7474	.30	74180	.55	74H101	.75	74S140	.55
7402	.15	7475	.35	74181	2.25	74H103	.55	74S151	.30
7403	.15	7476	.40	74182	.75	74H106	.95	74S153	.35
7404	.10	7480	.55	74190	1.25			74S157	.75
7405	.25	7481	.75	74191	.95	74L00	.25	74S158	.30
7406	.25	7483	.75	74192	.75	74L02	.20	74S194	1.05
7407	.55	7485	.55	74193	.85	74L03	.25	74S257 (8123)	1.05
7408	.15	7486	.25	74194	.95	74L04	.30		
7409	.15	7489	1.05	74195	.95	74L10	.20	74LS00	.20
7410	.15	7490	.45	74196	.95	74L20	.35	74LS01	.20
7411	.25	7491	.70	74197	.95	74L30	.45	74LS02	.20
7412	.25	7492	.45	74198	1.45	74L47	1.95	74LS04	.20
7413	.25	7493	.35	74221	1.00	74L51	.45	74LS05	.25
7414	.75	7494	.75	74367	.75	74L55	.65	74LS08	.25
7416	.25	7495	.60			74L72	.45	74LS09	.25
7417	.40	7496	.80	75108A	.35	74L73	.40	74LS10	.25
7420	.15	74100	1.15	75491	.50	74L74	.45	74LS11	.25
7426	.25	74107	.25	75492	.50	74L75	.55	74LS20	.20
7427	.25	74121	.35			74L93	.55	74LS21	.25
7430	.15	74122	.55			74L123	.85	74LS22	.25
7432	.20	74123	.35	74H00	.15			74LS32	.25
7437	.20	74125	.45	74H01	.20	74S00	.35	74LS37	.25
7438	.20	74126	.35	74H04	.20	74S02	.35	74LS38	.35
7440	.20	74132	.75	74H05	.20	74S03	.25	74LS40	.30
7441	1.15	74141	.90	74H08	.35	74S04	.25	74LS42	.65
7442	.45	74150	.85	74H10	.35	74S05	.35	74LS51	.35
7443	.45	74151	.65	74H11	.25	74S08	.35	74LS74	.35
7444	.45	74153	.75	74H15	.45	74S10	.35	74LS86	.35
7445	.65	74154	.95	74H20	.25	74S11	.35	74LS90	.55
7446	.70	74156	.70	74H21	.25	74S20	.25	74LS93	.55
7447	.70	74157	.65	74H22	.40	74S40	.20	74LS107	.40
7448	.50	74161	.55	74H30	.20	74S50	.20	74LS123	1.00
7450	.25	74163	.85	74H40	.25	74S51	.25	74LS151	.75
7451	.25	74164	.60	74H50	.25	74S64	.15	74LS153	.75
7453	.20	74165	1.10	74H51	.25	74S74	.35	74LS157	.75
7454	.25	74166	1.25	74H52	.15	74S112	.60	74LS164	1.00
7460	.40	74175	.80	74H53J	.25	74S114	.65	74LS193	.95
7470	.45			74H55	.20			74LS367	.75
7472	.40							74LS368	.65

9000 SERIES

9301	.85	95H03	1.10
9309	.35	9601	.20
9322	.65	9602	.45

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74S188	3.00	8214	8.95
1702A	4.50	8224	3.25
MM5314	3.00	8228	6.00
MM5316	3.50	8251	8.50
2102-1	1.45	8255	10.50
2102L-1	1.75	8T13	1.50
2114	9.50	8T23	1.50
TR1602B	3.95	8T24	2.00
TMS 4044-	9.95	8T97	1.00
		21078-4	4.95
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MCT2	.95
8038	3.95
LM201	.75
LM301	.45
LM308 (Mini)	.95
LM309H	.65
LM309K (340K-5)	.85
LM310	.85
LM311D (Mini)	.75
LM318 (Mini)	1.75
LM320K5(7905)	1.65
LM320K12	1.65

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LM320T5	1.65	LM340K15	1.25	LM723	.40
LM320T12	1.65	LM340K18	1.25	LM725N	2.50
LM320T15	1.65	LM340K24	1.25	LM739	1.50
LM324N	1.25	78L05	.75	LM741 (8-14)	.25
LM339	.75	78L12	.75	LM747	1.10
7805 (340T5)	.95	78L15	.75	LM1307	1.25
LM340T12	.95	78M05	.75	LM1458	.65
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LM340T24	.95	LM709 (8, 14 PIN)	.25	NE555	.35
LM340K12	1.25	LM711	.45	NE556	.85
				NE565	.95
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Our R.F. Speech Processors, using the advanced technique of R.F. clipping, greatly increase your talk power and help your voice punch through the QRM.

They work on any rig, with any speech mode, at any power level, and on any band. Simply connect in series with your microphone to get a really punchy speech signal. MODEL ASP, our latest model, offers for the first time the ultimate convenience of instant push-button selection of the desired amount of clipping and elimination of manual level setting.

Prices: ASP **£65.00** plus VAT (**£73.13** total); RFC **£40.00** plus VAT (**£45.00** total); RFC/M **£21.50** plus VAT (**£24.19** total).

Model UC/1 Up converter

If you already own a good quality ten-metre or two-metre receiver or transceiver you are only £118 away from a really high performance general coverage receiver. Just add the magic ingredient, MODEL UC/1 from DATONG!

You get full coverage in thirty synthesised 1MHz segments from 60kHz (Rugby MSF) to 30MHz, at high sensitivity and with all the facilities and high performance of your existing rig!

For good measure UC/1 also adds two-metre coverage to ten-metre receivers.

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A versatile add-on unit for communications receivers which helps to extract wanted signals from background interference. It connects in series with the loudspeaker or headphones. The effect is similar to "I.F. passband tuning" for SSB/or RTTY reception, and bandwidth down to 20Hz (with limited a.f.c.) gives an amazing capability for pulling weak CW stations out of the QRM. MODEL FL1 is unique in being able to tune itself when notching out unwanted whistles.

Price: **£53.00** plus VAT (**£59.63** total).

Model AD170 Active Antenna

For sensitive reception right through from MSF at 60kHz to Band 1 TV DX around 50MHz, without the need for an antenna farm, MODEL AD170 is ideal. Designed for loft mounting, MODEL AD170 has no adjustments and needs no external tuning units.

Although only three metres long, MODEL AD170 has the same directional properties as a full size dipole, even at 60kHz.

Price: **£29.50** plus VAT (**£33.19** total); Special price complete with mains power unit: **£33.00** plus VAT (**£37.13** total).

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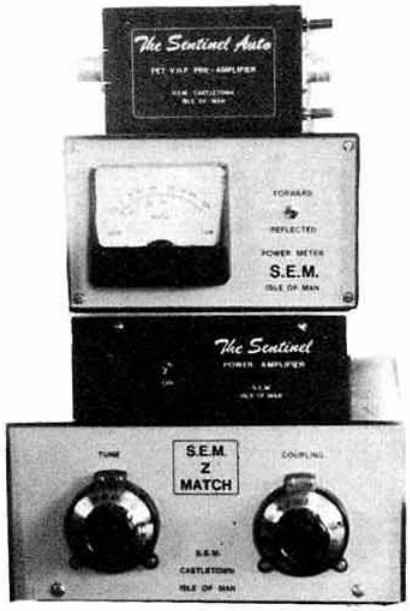

INCREASE YOUR 2 METRE RANGE
Our Sentinel range of pre-amplifiers use a J FET rather than the usual MOSFET because they give lower noise figures. They are selected for a 1dB noise figure. We also stock these units on Marine Band and Satellite Band and on other frequencies to order.

SENTINEL AUTO 2 METRE PRE-AMPLIFIER
Connects straight into transceiver aerial feeder and the r.f. switching looks after the changeover. Gain is 18dB. Any transmit mode. Price: **£17.35***. Ex-stock. 70cms version is **£20.25***. Ex-stock.

SENTINEL STANDARD PRE-AMPLIFIERS
Same as above but without the automatic r.f. switching. 2 metres is **£10.85***. 70cms is **£13.50***. BOTH IN STOCK.

THE ORIGINAL PA3 PRE-AMPLIFIER
Size 1 cu. inch to fit inside your transceiver. Gain 18dB. N.F. 2dB. Price **£6.80**. PA3/70 70cms version **£9.00**. Ex-stock.

SENTINEL 2 METRE POWER AMPLFIER/PRE-AMPLIFIER
The transmit amplfier now uses the latest type of internally matched, mismatched protected transistor, which provides four times power gain ie. 12W IN, 48W OUT. It uses an ultra linear circuit for use on all modes. The receive pre-amplifier is the same as the Sentinel above. The package is completed with an r.f. switch, with time delay for SSB use, which can be operated by the transceiver. Size: 6" × 2" front panel, 4½" deep. Price: **£59.62**. Ex-stock. Without the pre-amp, **£49.50**. Ex-stock. Yes, they do work fine with FT221s and TS700s.

SENTINEL H.F. WIDEBAND PRE-AMPLIFIERS
2-40MHz. 15dB gain. Ideal units for pepping up receivers on 15 and 10, for OSCAR reception and as an ACTIVE aerial.

SENTINEL STANDARD H.F. PRE-AMPLIFIERS—Performance as above. Price: **£9.00***. Ex-stock.

SENTINEL AUTO H.F. PRE-AMPLIFIERS
Same performance as above with a changeover relay operated by your transceiver relay for direct connection in your aerial co-ax. Price: **£12.94***. Ex-stock.

NEW! Our Forward/Reflected power meter designed for British power levels, F.S.D. 500W. ½ scale 100W, $\frac{1}{10}$ scale 1W. 1-30MHz. The pick up unit with two SO239s is 2" × 2" × 1½" and connects in the aerial lead. The meter unit is a separate box 6⅜" × 3¾" panel, 2⅜" deep, which you can put in any convenient position. Price: **£28.50** Ex-stock.

SEM Z MATCH
The updated unit uses much more reliable slow motion drives; which make adjustment and resetting easy. It will match aerials of 15-5000 Ohms, to your equipment. BALANCED or UNBALANCED at up to 1kW. SO239 and 4mm terminals for co-ax or wire aerials. Price: **£39.44**. Ex-stock.

The most popular 2 metre transverters:
SEM EUROPA C 2 METRE TRANSVERTER—200W INPUT. 2dB Noise figure. Plugs straight into Yaesu equipment for any mode 2 metre operation. Price: **£112.50**. Repeater shift if required for F.M. **£12.50**.

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STEREO CAR CASSETTE PLAYERS famous manufacturers warranty returns fully overhauled and in working order 5 watts per channel output, controls = volume, balance, tone, fast forward and rewind, auto stop. Supplied less speakers and power lead but we do supply power plug and circuit. LIST PRICE over **£50.00** OUR PRICE ONLY **£20.00.**

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PYE WESTMINSTER SINGLE CHANNEL OSCILLATOR BOARDS for W15AM 79-101MHz Tx. coil can be rewound to suit any frequency required for Tx or Rx. New @ only **80p** each. 5 for **£3.00**, 10 for **£5.00.**

STEREO CAR CASSETTE player amplifier boards with two amp. ICs NEC-uPC 1001 H2, requires 12V D.C. 3½W per channel, removed from new equipment by manufacturer, size 120mm × 45mm, supplied with circuit, **£2.25** each.

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CRYSTALS OK for 2 Mtrs ie: x4 + 10·7MHz, 33·5, 33·550, 33·600, 33·675, 33·700, 33·725, 33·750, 33·775, 33·800, all **£1.25** each. HC6U types.

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BB105 2pf @ 25v for VHF/UHF tuners etc. matched sets of 4 **80p**

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RF POWER TRANSISTORS
2N5070 30MHz SSB linear 25 watt pep output 28v stud mount with 13db gain requires only 1·25 watt drive, supplied with data sheet showing 30MHz 25 watt PA unit manufacturers price approx **£20.00** our price while they last ONLY **£5.00**
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NEOSID COIL FORMERS horizontal P.C. mounting with tags each end 4·5mm dia. 15mm long with core new unused **6p** each 10 for **50p**

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STOCK LIST NOW AVAILABLE 15p stamps please.

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