March 1979

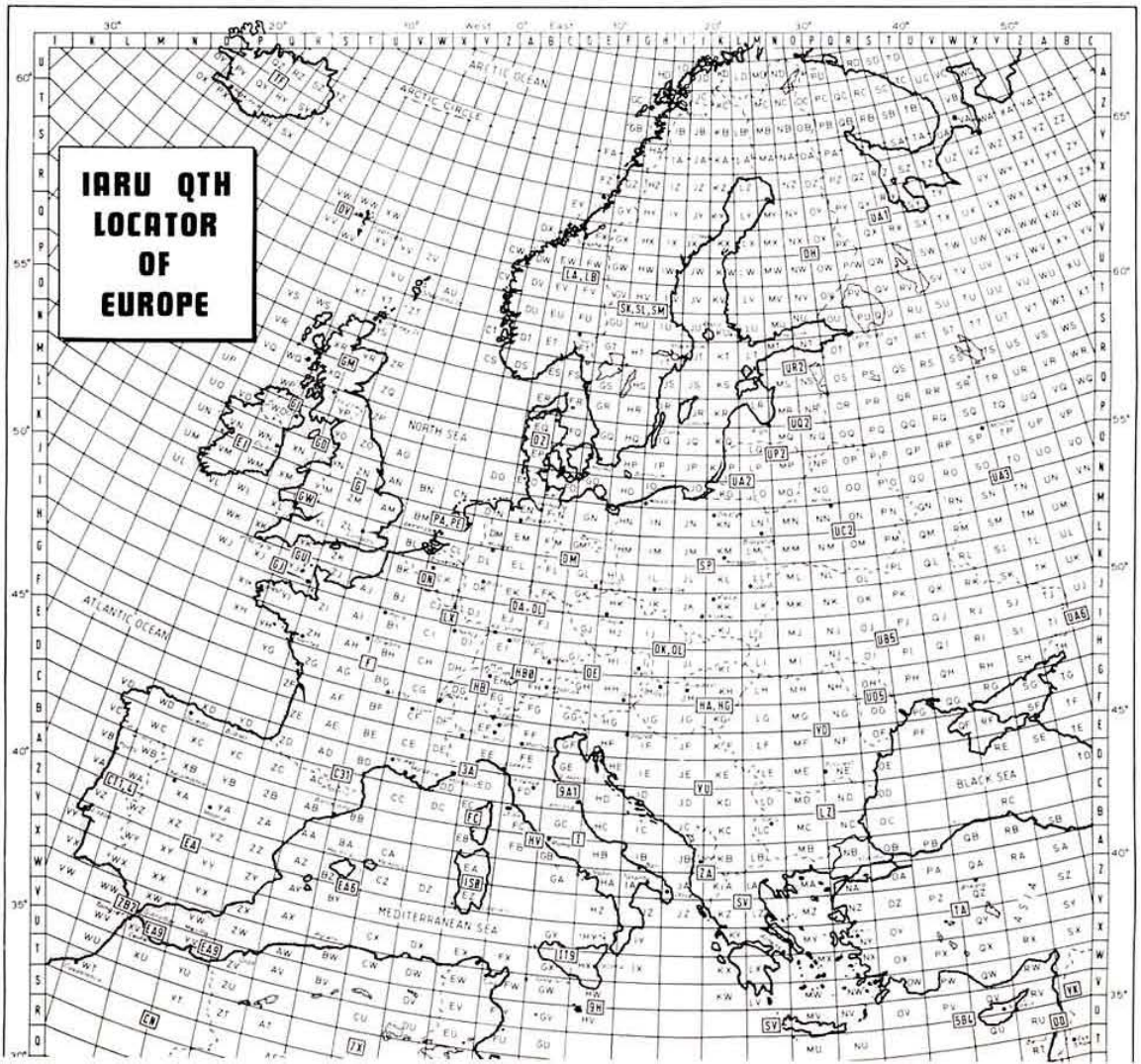
radio communication

journal of the Radio Society of Great Britain

A portion of the new

IARU QTH LOCATOR MAP OF EUROPE

(Approximately one-third scale)



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:
Audio FSK signal in
Data in from V.D.U. (e.g. G3PLX)
TTY Keyboard or Tape Reader

Outputs for:
V.D.U. or other TTL compatible equipment
TTY Magnet – single or double current
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 unit	**£90.00**
CT101 Receive/Transmit	**£93.50**
CT102 with Teleprinter interface	**£94.50**
CT103 Complete Terminal Unit	**£98.50**

All models plus **£3.00** 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.

THE PLESSEY 'RADIO COMMUNICATIONS HANDBOOK'

A superb reference book on the use of Plessey i.c.s. for transmitters, receivers, High Speed Dividers and Frequency Synthesisers, includes an improved G3ZVC type T/R module using 1600 series i.c.s. **£2.20.**

NEW 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.

40 WATT 2M PA KIT

Our 40W PA kit for FM/CW now comes complete with an attractive metal case and at the reduced price of **£19.50** inc. **VAT+65p post. Full guarantee on the transistor, EVEN IF IT HAS BEEN SOLDERED.** PA Transistors 2N6084 are available separately at the very competitive price of **£10.79+86p VAT=£11.65.** You are wasting money if you buy these elsewhere because:

* Our prices are lower
* Our kit transistors are fully guaranteed
* We know our products because we build, test and use them.

All prices include VAT but please add minimum of 30p for p&p. Data—Catalogue available at 45p + large (A4) 18½p SAE
DEPT. 903, 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

ISSN0033-780

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

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88 Broomfield Road,
Chelmsford,
Essex CM1 1SS

Tel 0245 84938

Office hours: 0845-1645

Correspondence concerning the distribution of the journal and all other Society matters should be addressed to:

RSGB Headquarters,
35 Doughty St,
London WC1N 2AE

Tel 01-837 8688

Office hours: 0915-1715

radio communication

March 1979 **Volume 55 No 3**

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Radio Communication **is published by The Radio Society of Great Britain as its official journal on the first Thursday of each month and is sent free and post paid to all members of the Society**

ABC MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

21,498 copies per issue average circulation in 1978

Closing date for contributions unless otherwise notified: 1st of month preceding month of publication

PAUL
G3VJF

ICOM®

IC-211E

£559 inc VAT

MMT 432/144R TRANSVERTER

£169.88 inc VAT

THERE IS NOTHING LIKE THE IC-211E FOR 2 METRES (AND 70cm OR OSCAR)

The IC-211E has recently become one of the best selling 2m multimodes in the world as more and more amateurs are discovering its virtues. The LSI digital synthesiser offers all sorts of interesting possibilities not easily achieved by its competitors. For instance one of our customers has modified his to double as a 70cm multimode. At the flick of a switch his Microwave Modules transvertor is switched in and the display reads the 70cm frequency. 70cm duplex is controlled by the duplex switch on the IC-211E which also offers full reverse repeat facilities and switches in the access tone for repeaters.
Another possibility is to track the 211E with the IC-701 HF transceiver for OSCAR working. Tuning on the 211 VFO knob tracks both transceivers whereas tuning on the 701 changes only the HF frequency—thus permitting correction for Doppler shift. Reverse tracking for OSCAR 7 mode B is also possible. The VFO knob, by the way, is also a delight to use. It is optically coupled to the VFO and each one of the small divisions represents either a 100Hz step, for fine tuning on SSB, or a 5kHz step for FM work or for rapidly getting from one end of the band to the other. These speeds are selected by a button on the front panel.

What else do you get for your money?
WELL, there is—

- ★ **A synthesizer to give you the accuracy you can expect from a synthesizer.**
- ★ **Frequency display to the nearest 100Hz**
- ★ **An optically coupled VFO**
- ★ **An electronically controlled flywheel brake**
- ★ **An electronically controlled tuning lock**
- ★ **Adjustable power on FM**
- ★ **A truly excellent transmission on FM, SSB or CW**
- ★ **A 10·7MHz Rx IF output for monitoring**
- ★ **A multiway output socket for interfacing with the synthesizer for keypad programming, scanning, etc**
- ★ **An excellent receiver**
- ★ **Plus all the things you expect in a decent transceiver such as vox, break-in CW, noise blanker, RIT, centre zero meter, slow or fast AGC Rx RF/IF gain control etc. etc.**

PLEASE NOTE THAT ALL MAIL ORDERS MUST BE SENT TO HERNE BAY AND NOT TO AGENTS.
ALL WARRANTY AND OTHER REPAIRS FOR SETS BOUGHT FROM THANET AGENTS MUST BE REFERRED TO OUR SERVICE DEPT IN HERNE BAY WHERE WE HAVE A GOOD RANGE OF TEST EQUIPMENT AND THE TECHNICAL SKILL TO USE IT. SETS FROM OTHER DEALERS *MUST* BE REFERRED TO THAT DEALER.

FOR DETAILS LEAVE YOUR NAME AND ADDRESS OR CALLSIGN ON OUR ANSAFONE (02273 63850) DURING THE EVENING WHEN CALLS ARE CHEAP

YOUR SOLE AUTHORISED UK IMPORTER FOR ICOM

Access

THANET ELECTRONICS

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

Access

HP TERMS NOW AVAILABLE **HP TERMS NOW AVAILABLE**

THE FABULOUS ICOM IC-701!

the systems approach!

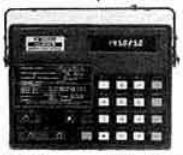
Designed for the connoisseur, the ICOM IC-701 HF transceiver brings the latest digital technology to Amateur Radio. Study a few more of the vast list of features offered with the IC-701 . . .

TWO VFO'S BUILT-IN
The second VFO, which is an optional tack-on with most other transceivers, is an integral feature in every **IC-701**. Now you can work those Yanks on 40 and 80 metres!

OPTICALLY COUPLED VFO
A VFO with **no** variable capacitors! Made under arrangement with Collins Radio, the **IC-701** maximises digital readout with positively no time lag or backlash in display stability, even when using 100Hz steps. The **IC-701**'s free wheeling dial is instantly co-ordinated with the high speed, computer controlled six digit readout using an optical chopper. There is absolutely **NO** mechanical connection between the smooth bearing mounted flywheel knob and the two dual-tracking VFOs.

COMPUTER COMPATIBLE INTERFACE
External microprocessor control from a PIA interface is possible via the 24-pin accessory socket on the rear panel of the **IC-701**. The **IC-701** can even be interconnected with the companion 2 metre **IC-211** to track frequencies for Oscar work.

REMOTE CONTROL FACILITY
The **IC-701** can be remotely controlled via the new optional **RM-3** computerised remote controller. This unit includes scan, duplex, memory and tone functions plus a touch-tone pad with digital readout. You can select frequencies and automatically change bands with this CPU controlled accessory.



CONTINUOUS OPERATION
The **IC-701** features continuous operation with a full 200w pep or 200w CW input on **all bands** and **all modes**. No need to worry about timing key-down operations as the **IC-701** is designed to handle the maximum power continuously! If the heat sink starts to warm-up a built-in fan automatically switches on. If a temperature danger point should ever be reached the fan doubles its speed and the digital display flashes to tell you to quit transmitting!

NO TUNING NECESSARY
Just select the required band and frequency and start transmitting!

ALL SOLID STATE
While the others are still fooling around with valves, **ICOM** have produced a solid-state HF transceiver including protected transistors in the final.

CROSS MODULATION MINIMISED
Cross modulation – a fact of life with some rigs – is minimised with the double balanced Schottky diode mixer used for both transmit and receive.

SMALL ENOUGH FOR MOBILE
The **IC-701** is extremely compact with dimensions 111 by 241 by 311mm (HWL) and weighs only 7·3kg. No more need to struggle with heavy rigs impossible to mount under-dash!

FULL METERINC
The front panel meter includes swr, power, ALC, compression and collector voltage/current measurement.

DESKTOP MICROPHONE AS STANDARD
A high-quality condenser electret desk microphone is included as standard equipment with your new **ICOM IC-701**.

VARIABLE POWER OUTPUT
In CW and RTTY modes power output can be continuously varied from zero to maximum 200 watts input. SSB output can easily be adjusted for novice use.

IDEAL FOR THE CW AND RTTY BUFF
The **IC-701** includes narrow CW filter as standard plus semi-break-in and sidetone facilities. The **IC-701** has switching to select either narrow or wide RTTY shift rates.

THANET TECHNICAL BACK-UP
Your new **IC-701** from THANET comes complete with the THANET one year warranty plus technical and spares support. THANET staff have been factory briefed on the service and alignment procedures.

PLUS–
- ★ **Separate front-end RF stages using dual gate MOSFETs for each band, providing optimum performance.**
- ★ **Diode matrix to define band edge parameters.**
- ★ **Operation on all bands 1·8 thru 30MHz including WWV.**
- ★ **Modes include USB, LSB, CW, CW-N (narrow), RTTY.**
- ★ **Unique ICOM bandpass tuning.**
- ★ **VOX, Semibreak in CW, RIT, AGC, effective noise blanker.**
- ★ **Built-in speech processor using advanced circuitry.**
- ★ **All filters built-in.**
- ★ **Automatic front panel light dimming to suit ambient light conditions.**
- ★ **Separate VCOs for each band to reduce spurious and birdies.**
- ★ **Receive triple conversion.**
- ★ **Built-in DC power supply, external AC PSU with speaker.**
- ★ **Full line of matching accessories to come.**
- ★ **Internal speaker.**

COMPARE THE IC-701 WITH THE OTHERS–and see how many extras you don't have to buy!

Complete with AC PSU as shown £999 inc VAT

THE ULTIMATE! IC-701 state of the art
THANET ELECTRONICS for ICOM

ICOM®

LEADERS IN THEIR FIELD

IC-215

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

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?

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!

The IC-245E is probably the only multi-mode mobile on the market. Of course, it can also be used as a base station, and many own one for just this purpose. It employs all the same technology as the IC-211E, and is in fact virtually the same electronically with the exceptions that it only operates on USB, FM and CW and does not have VOX and sidetone or full seven digit readout. As with the 211 you have access, via a multi-way plug on the back, to the LSI synthesizer for connection of a keypad, computer or other bit of home-brewed logic.
Less VAT=£354.67 With VAT=£399

IC-245E

THANET ELECTRONICS

143 RECULVER RD
HERNE BAY, KENT

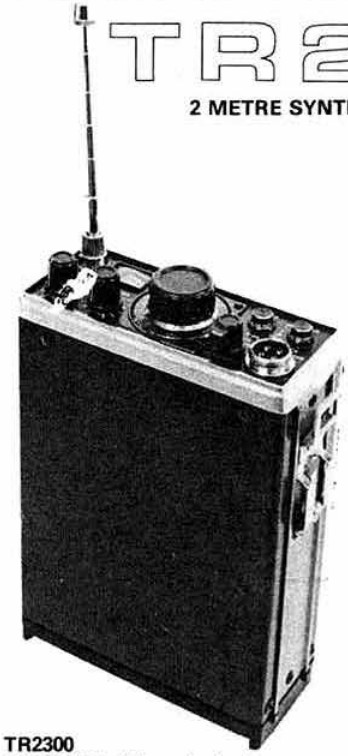
PHONE (02273) 63859
TELEX 965179

LOWE ELECTRONICS Ltd

TR2300

2 METRE SYNTHESIZER PORTABLE

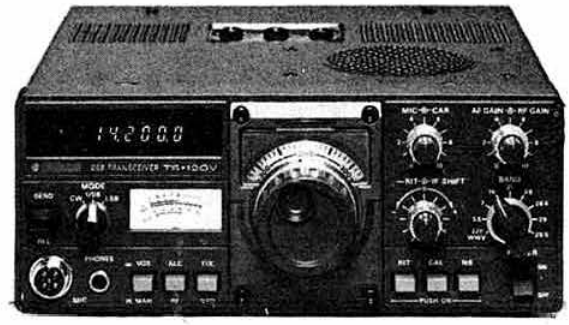
TRIO



TR2300
144–146 MHz fully synthesised.
Repeater and reverse repeater shifts.
Automatic switchable tone burst.
Over 1 watt output.
Simplicity itself to use.
Versatile; use it portable, mobile, or fixed station
Comes complete with all accessories.
Unbeatable performance and unbeatable price—**£195** inc VAT.

TS120V

MULTUM IN PARVO



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.

Frequency range: 144–146 MHz
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.**

TR7500

WHY SETTLE FOR ANYTHING LESS?

The TR7500 is still the commonsense 2 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 eyed 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 2 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.

FOR FULL CATALOGUE SIMPLY SEND 40p IN STAMPS TO MATLOCK

LOWE ELECTRONICS Ltd

AR240

FROM A. O. R.

FULL COVERAGE 144-148MHz

CHANNEL SPACING 5kHz

FULLY SYNTHESIZED

+600 and −600kHz SHIFTS

1750Hz TONEBURST

1½ WATT OUTPUT

SURELY THE MOST AMAZING HAND-HELD TRANSCEIVER YET!

NEW

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?

LS707

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

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

Introductory price LS707 £595 inc. VAT

Matching PSU. £79.50 inc. VAT (we do have a cheaper PSU available).

HC1400 £225 inc. VAT

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

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

Normal repeater and reverse repeater shifts are provided together with a fully automatic tone burst. It's too much to talk about in a short advertisement so why not call us and ask any questions. It's top quality, certainly; top value undoubtedly, at **£255** inc. VAT.

Remote frequency readout and remote control microphone available as options.

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

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

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

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

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

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. Jim, GM3SAN, 19 Ellismuir Road, Baillieston, Nr Glasgow. 041-771 0364

FOR FULL LIST OF AUTHORISED DEALERS AND AGENTS SEE NEXT PAGE

WATERS & STANTON ELECTRONICS

MAIL ORDER!

Yes, we do run one of the most efficient services in the UK. Just look at our stock! Either send us your cheque or PO adding carriage if shown in brackets, or telephone your Barclaycard or Access number. We'll get the goods to you by the quickest route. Heavy items by Securicor and smaller packages by parcel post. All sent at *our* risk and, of course, guaranteed. It pays to deal with an established company like ours—try us and see.

YAESU

FRG7 General Coverage Receiver	£210.00 (N/C)
FRG7000 Digital deluxe receiver	£367.00 (N/C)
FT101E 160-10m transceiver	£569.00 (N/C)
8 pole 350Hz CW filter	£21.75 (N/C)
SP101 Matching speaker	£21.25 (N/C)
YO100 Monitor scope	£156.00 (N/C)
FT200B 80-10m transceiver	£394.00 (N/C)
FP200B Matching AC PSU	£77.50 (N/C)
FT901DE 160-10m digital transceiver	£785.00 (N/C)
FT901DM 160-10m digital transceiver	£960.00 (N/C)
FT7 80-10m 10w transceiver	£299.00 (N/C)
FT7B 80-10m 50w transceiver	£421.75 (N/C)
FP12 12 amp PSU	£72.75 (N/C)
FT202R 2m hand-held (3 ch's)	£99.00 (N/C)
NC1 AC charging hod.	£18.50 (N/C)
YM24 Ext. mic/speaker	£16.25 (N/C)
FT227Rx 2m 10w transceiver	£239.50 (N/C)
FT225RD 2m All modes digital	£599.00 (N/C)
FL2100B 1200 watt 80-10m linear	£349.00 (N/C)
YD846 microphone (h'held)	£8.40 (N/C)
YD844A microphone (desk type)	£21.90 (N/C)

ICOM (NOTE NEW PRICES!)

IC215E 2mFM 3 watt 12 chs	£159.00 (N/C)
IC202S 2m SSB 3 watt portable	£199.00 (N/C)
IC240 2m 22 ch's 10 watts	£179.00 (N/C)
IC280E 2m FM 80 ch's 10 watts	£245.00 (N/C)
IC211E 2m All mode transceiver	£559.00 (N/C)

MICROWAVE MODULES

MMT 432/28-S transverter	£133.80 (N/C)
MMT 432/144-R transverter	£169.80 (N/C)
MMT 144/28 transverter	£88.80 (N/C)
MMC 144/2-4; 4-6 or 28-30 IF	£20.25 (N/C)
MMC 144/28 LO converter	£22.50 (N/C)
MMC 70/28 converter	£20.25 (N/C)
MMC 70/28 LO converter	£22.50 (N/C)
MMC 432/28 S converter	£29.90 (N/C)
MMC 432/144 S converter	£29.90 (N/C)
MMC 1296/144 or 28 converter	£31.50 (N/C)
MMC 28/144 10m up converter	£20.25 (N/C)
MMD 050/500mHz counter	£69.00 (N/C)
MMA 144 2m pre-amp	£14.60 (N/C)
MMD 500P 500mHz pre-scaler	£27.00 (N/C)
MMV 1296 varactor tripler	£33.75 (N/C)
MML 144/100w linear amplifier	£139.50 (N/C)
MML 432/100w linear amplifier	£247.50 (N/C)

SEM

Europa "C" 2 metre transverter	£112.50 (1.00)
CPS10 AC PSU	£56.25 (1.00)
2m converters	£20.25 (N/C)
70cms converters	£22.50 (N/C)
• 2m pre-amp	£12.50 (N/C)
• 2m auto switching pre-amp	£19.00 (N/C)
• 70cms auto switching pre-amp	£21.95 (N/C)
2m PA3 pre-amp	£6.80 (N/C)
70cm PA3 pre-amp	£9.00 (N/C)
2m 48 watt linear/pre-amp	£59.60 (0.75)

*fitted SO 239 sockets

HF auto pre-amp 2-40mHz	£14.63 (N/C)
HF pre-amp 2-40mHz	£10.69 (N/C)
HF Z-MATCH ATU 80-10m	£39.40 (1.00)

VHF MONITOR Rx's

TM56B 12v/240 AC auto scan 10 ch's	£104.00 (N/C)
TM56B Marine model	£113.00 (N/C)
SR9 12v DC Amateur model	£59.00 (N/C)
Extra xtals	£2.40 (N/C)

FDK

Multi 2700 2m All mode	£499.00 (N/C)
Multi 800D 2m 25 watts	£289.00 (N/C)
Multi 700E 2m 25 watts	£229.00 (N/C)
Multi Palm II 2m hand-held special package	£139.95 (N/C)
Multi U11 70cms Autoscan	£299.00 (N/C)
M-11/Q16 xtals £4.90 Palm II xtals £2.90	
Multi-Palmsizer 2m synthesised 40 channel hand-held	t.b.a.

DENTRON

MLA 2500 160-10m 2Kw linear	£695.00 (N/C)
MT3000A 3Kw 160-10m tuner	£275.00 (N/C)
MT2000A 3Kw 160-10m tuner	£175.00 (N/C)
160-10AT Supertuner 1Kw	£99.00 (N/C)
JR Monitor 160-10m tuner 300w	£59.00 (N/C)
W-2 160-10m PEP/SWR meter	£69.00 (N/C)
160-10m "open-wire" doublet	£22.00 (N/C)
1Kw 80-10m linear 240v GLA 1000 (March/April)	£268.00 (N/C)

AR

AR240 Synthesised hand-portable	£195.00 (N/C)

MIZUHO

2m SSB 1 watt portable	£165.00 (N/C)
Extra xtals	£3.00

NAIGAI

2200 2m 500w PIP linear	£481.00 (N/C)

ADONIS MICROPHONES

AM802G Compressor - 3 outputs	£59.00 (N/C)
AM502G Compressor - 1 output	£39.00 (N/C)

ASP MOBILE ANTENNAS

201 - 2m ¼ wave	£2.95 (1.00)
2009 - 2m 5/8th wave	£7.95 (1.00)
677 - 2m 5/8th wave deluxe	£14.75 (1.00)
462 - 70cms colinear	£6.75 (1.00)
667 - 70cms colinear deluxe	£17.50 (1.00)
Magnetic base and cable	£8.50 (1.00)
"No-hole" boot mounts	£3.50 (0.50)

HF ANTENNAS

HQ-1 20-15-10m mini-quad	£94.50 (2.50)
C4 20-15-10m vertical	£41.50 (2.00)
Mosley 20-15-10m mini-beam 600w	£89.00 (2.00)
Mosley 2Kw version	£120.00 (2.00)
TA32 600 watts 20-15-10m	£72.00 (2.00)
TA33 600 watts 20-15-10m	£106.00 (2.50)
Mustang 2Kw 20-15-10m	£132.00 (2.50)
Hy-gain 12 AVQ 20-15-10m	£42.20 (2.00)
Hy-gain 14 AVQ 40-10m	£59.00 (2.00)
Hy-gain 18 AVT/WB 80-10m	£85.50 (2.25)
Mosley TD3JR 20-15-10m dipole	£25.80 (1.00)
Mosley RD5 SWL ham dipole	£30.35 (1.00)
EL-40X 80-40 Mini dipole	£39.00 (1.00)
DX5V 5 band vertical	£59.00 (1.00)

VHF ANTENNAS (JAYBEAM)

4Y/4M 4el yagi	£14.65 (2.00)
C5/2M 5db colinear	£34.90 (2.00)
5Y/2M 5el yagi	£8.65 (1.25)
8Y/2M 8el yagi	£11.25 (1.50)
10Y/2M 10el yagi	£24.20 (2.00)
PBM10/2M 10el parabeam	£29.25 (2.00)
PBM14/2M 14el parabeam	£35.55 (2.50)
5XY/2M X'd 5 element	£18.00 (1.50)
8XY/2M X'd 8 element	£22.50 (2.00)
10XY/2M X'd 10 element	£29.80 (2.00)
Q4/2M 4el quad	£18.70 (1.50)
Q6/2M 6el quad	£24.75 (2.00)
D5/2M 5 over 5	£15.50 (1.50)
D8/2M 8 over 8	£20.70 (2.00)
SVMK vertical Kit	£5.65 (1.00)
UGP/2 Ground plane	£8.00 (1.00)
HO/2M 2m halo	£3.60 (0.50)
HM/2M Above with 24" mast	£4.40 (0.75)
C8/70cm 8db colinear	£44.45 (2.50)
D8/70cm 8 over 8	£17.45 (1.50)
PBM18/70 18 el parabeam	£21.00 (1.50)
MBM/48 70 el Multibeam	£24.50 (2.00)
MBM88/70 88 el Multibeam	£32.65 (2.00)
8XY/70 8 el X'd yagi	£27.10 (1.50)
12XY/70 12 el X'd yagi	£33.50 (2.00)
D15/1296 15 over 15	£26.35 (1.50)

ACCESSORIES

9502 rotator	£50.00 (1.75)
KR400 rotator	£95.00 (2.00)
AR40 rotator	£53.40 (1.50)
Stolle 2030 rotator	£54.00 (1.50)
Stolle 2010 rotator	£48.95 (1.50)
CDE44 rotator	£106.75 (2.00)
HAM-M MkIII rotator	£156.00 (2.00)
Shure 444 microphone	£25.95 (0.75)
Shure 201 microphone	£11.25 (0.50)
Shure 526T microphone	£31.50 (0.75)
Hand morse key	£9.50 (0.50)
EK121 Electronic "Bug"	£29.95 (0.75)
50ohm balun	£9.95 (0.50)
UR67 per metre	£0.54 (0.02)
UR43 per metre	£0.18 (0.01)
5 core cable per metre	£0.22 (0.01)
HP3A high pass filter	£2.95 (N/C)
Drake low pass filter	£18.00 (0.50)
TV1 ferrite rings	£0.30 (0.08)
Plastic antenna insulators	£0.23 (0.05)
Twin SWR meters 3-150mHz	£11.95 (0.50)

HILOMAST LTD

PNAM-1 Telescopes to 9m	£239.00 (14.00)
PNAM-2 Telescopes to 14½m	£293.00 (15.00)
SAE for details	

All prices include VAT
Carrier costs shown in brackets

THE COMPLETE HAM RADIO CENTRE

PHONE ORDERS ACCESS BARCLAYCARD MAIL ORDER RETAIL CALLERS
31 SPA ROAD, HOCKLEY, ESSEX **Telephone (03704) 6835** **Telex 897406**
AGENTS:— G3PWJ (03844) 77778 G3WRA (0432) 67864 G8NMU (0272) 669454

WATERS & STANTON ELECTRONICS

HOLD IT!
HERE'S TWO REALLY GREAT PORTABLE DEALS FOR 2M! FRESH FROM OUR FACTORY

★

MIZUHO—2M SSB/CW Hand-Held

Fitted 144·20–144·40MHz

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!

DELIVERED ANYWHERE IN UK

12 MONTHS GUARANTEE £165 inc VAT

FDK PALM II 2M FM

COMPACT—Smallest hand portable
VERSATILE—6 switched channels
ECONOMICAL—Only 1 xtal per channel
POWERFUL—1·5 watts output
3 MODES—Simplex/ +600kHz/ −600kHz
QUALITY—Built-in condenser microphone
PORTABLE—External 12 volt socket

SPECIAL PACKAGE DEAL

PALM II (2 ch's)	£121·75
NI-CAD PACK	£13·70
AC CHARGER	£4·50
BNC FLEXI-WHIP	FREE
CIGAR LIGHTER DC CABLE	FREE
	£139·95

EXTRA DEAL

Any 4 extra channels from:

R0–R7 & S15–S23	£9·00
Xtal tone burst	£7·50
Real leather case	£6·75

FREE CREDIT

Yes, here's your chance to avoid those price increases. Pay 20% deposit and providing you pay the balance by six monthly instalments, you will pay no interest. Simply calculate the total value of your purchase, send us a cheque for one fifth of the total amount, plus any odd pence to round the balance down to the nearest £1. We will arrange your free credit and send you the goods. Example—Palm II **£139.95**. Deposit **£28.95** plus **6** payments of **£18.50**. (Applies only to these two items.)

TO: WATERS & STANTON ELECTRONICS, 31 SPA ROAD, HOCKLEY, ESSEX.

Dear Sirs,

(1) Please send me free credit forms by return for the undermentioned items.
I enclose cheque/postal order for £.....

(2) Please send me full details of the following items.

Items referred to:.....

NAME.....

ADDRESS.....

CALL SIGN IF ISSUED.....

Radio Shack Ltd

188 BROADHURST GARDENS
LONDON NW6 3AY
Telephone: 01-624 7174

PRICE LIST, MARCH 1979 (prices include VAT)

R. L. DRAKE PRODUCTS

COMMUNICATIONS RECEIVERS & ACCESSORIES

R-4C Receiver – SSB, AM, SW, RTTY	£495.00
FL-250 Filter for R-4C (250Hz)	£39.60
FL-500 Filter for R-4C (500Hz)	£39.60
FL-1500 Filter for R-4C (1500Hz)	£39.60
FL-4000 Filter for R-4C (4000Hz)	£39.60
FL-6000 Filter for R-4C (6000Hz)	£39.60
4-NB Noise Blanker for R-4C	£54.00
MS-4 Matching Speaker R-4C, SPR-4, TR-4CW	£24.75
Crystals – Accessory Crystals for R-4C	£4.95
SPR-4 Receiver – General Purpose	£450.00
DC-PC DC Power Cord for SPR-4	£4.05
Crystals – Accessory Crystals for SPR-4	£4.95
DSR-2 VLF/HF Digital Synthesized Receiver	£2250.00
SSR-1 Receiver-General Purpose	£175.00

TRANSCEIVERS & ACCESSORIES

TR-7/DR-7 Transceiver with gen. cov. & Digital	£864.00
PS-7 120/240V Power Supply for TR-7	£135.00
RV-7 Remote VFO for TR-7	£139.50
MS-7 Matching Speaker for TR-7	£24.75
NB-7 Noise Blanker for TR-7	£64.80
FA-7 Fan for TR-7 & PS-7	£18.00
AUX-7 Range programme board & 1 Receive module	£31.50
RRM-7 Range receive modules (500kHz) for AUX-7	£5.40
RTM-7 Range transceive modules (500kHz) for AUX-7	£5.40
SL-300 CW Filter (300Hz) for TR-7	£39.60
SL-500 CW Filter (500Hz) for TR-7	£39.60
SL-1800 SSB/RTTY Filter (1800Hz) for TR-7	£39.60
SL-6000 AM Filter (6000Hz) for TR-7	£39.60
MMK-7 Mobile mounting kit (case, filters, cable) TR-7	£33.75
MN-7 ATU/RF wattmeter 160-10m. 250W	£123.75
MN-2700 ATU/RF wattmeter 160-10m. 2kw	£199.80
WH-7 HF wattmeter/VSWR bridge	£59.40
385-0004 Service Manual for TR-7	£16.50
TR-4CW (RIT) Transceiver AM/SSB/CW with R.I.T.	£504.00
AC-4 120/240V Power supply for TR-4 CW/T-4XC	£108.00
34-PNB Plug in Noise Blanker for TR-4CW	£72.00
DC-4 DC Power supply for TR-4CW, T-4XC & R-4C	£139.50
RV-4C Remote VFO for TR-4CW	£108.00
FF-1 Crystal Control for TR-4CW	£38.25
UV-3E 144/432 MHz FM Transceiver	£495.00
PS-3 AC Power supply for UV-3E (13.6V @ 9A)	£69.75
UMK-3 Remote Trunk kit for UV-3E	£54.00

LINEAR AMPLIFIER

L-7 Linear Amplifier 160-10m	£765.00

TRANSMITTER

T-4XC Transmitter AM/SSB/CW	£495.00

ADDITIONAL ACCESSORIES

TV-42 LP Low Pass Filter 100w	£10.13
TV-3300 LP Low Pass Filter 2kw	£18.00
RP-500 Receiver Protector	£72.00
7072 Hand mic. for TR-4CW/T-4XC	£13.50
7073 Hand mic. for TR-7/UV-3E	£13.50
7077 Desk mic. for TR-7/UV-3E	£24.75
DL-300 Dummy Load, 300 watts	£15.75
DL-1000 Dummy Load, 1000 watts	£29.70
RCS-4 Remote Control Antenna switch	£83.25
B-1000 Balun 4:1 for MN-7/MN-2700/ MN-4C only	£18.00
1525-EM Encoder mic.	£36.00

The R. L. Drake Company are no longer making the following items; however, we still have a few of each – please check our stock position before ordering:

AA-10 1w in-10w out 2m Amplifier	£45.00
WV-4 RF wattmeter 20-200MHz	£64.80

HY-GAIN ANTENNAS

18HT 6-80m Vertical Tower	£253.12
12AVQ 10-20m Trapped Vertical	£42.18
14AVQ/WB 10-40m Trapped Vertical	£59.06
18AVT/WB 10-80m Trapped Vertical	£85.50
18V 10-80m Vertical	£31.28
TH6DXX 6 element beam for 10/15/20	£230.62
TH3MK3 3 element beam for 10/15/20	£176.62
TH3JR 3 element beam for 10/15/20	£127.68
TH2MK3 2 element beam for 10/15/20	£123.46
HY-QUAD 2 element quad for 10/15/20	£190.12
DB 10-15A 10 and 15 beam	£129.38
204BA 4 element 20m beam	£174.38
203BA 3 element 20m beam	£132.19
153BA 3 element 15m beam	£70.58
103BA 3 element 10m beam	£57.38
402BA 2 element 40m beam	£177.75
511 Heavy duty spring	POA
499 Flush body mount	£11.59
417 De luxe spring	£8.83
492 Miniature spring	£4.50
LA-1 Lightning arrestor	£22.84
LA-2 In-Line Lightning arrestor	£3.71
BN-86 Ferrite balun	£15.19

YAESU

FT-202R 2m 1w Hand held Tcvr fitted 3 ch	£119.81

TEN-TEC

509 Argonaut 5w SSB/CW Tcvr 3·5-30	£247.50
540 Triton 1V 200w SSB/CW Tcvr 3·5-30	£495.00
544 Digital Triton 1V 200w SSB(CW Tcvr 3·5-30	£618.75
545 Omni-A Analogue Transceiver	£652.50
546 Omni-D Digital Transceiver	£765.00
570 Century 21. 70w CW Tcvr 3·5-29MHz	£220.50
574 Digital Century D	£281.25
405 Linear Amp. 100w. 3·5-30MHz	£112.50
210/E (1A) 115/230vac/13vdc psu for Argonaut	£27.00
251/E (9A) 115/230vac/13vdc psu for Argonaut/405	£67.50
262G/E (18A) 115/230vac/13vdc psu for Tritons	£108.00
247 Tuner	£49.50
277 Tuner/SWR	£58.50
212 Crystal 29·0-29·5MHz for Tritons	£4.50
213 Crystal 29·5-30·0MHz for Tritons	£4.50
240 Converter 160m for Tritons	£72.00
241 Crystal Oscillator for Tritons	£22.50
242 Remote VFO for Tritons	£119.25
245 CW filter for Tritons	£19.80
249 Noise Blanker for Tritons	£19.80
276 Crystal Calibrator for Century 21	£19.80
KR-1A Dual paddle assembly	£27.00
KR-5A Single-paddle keyer. 6-14vdc	£31.50
KR-50 Ultramatic keyer dual paddle 117vac/6-14dc	£85.50

BARLOW-WADLEY

XCR-30 General coverage receiver	£149.85
XCR-30 General coverage receiver with FM unit	£170.00

STANDARD

C-146A 2m FM Tcvr. 2w 5 channels (hand held) with leather case/tone burst/S20/22	£140.62
AT-19 Flexible antenna	£5.56
HP-7 Set of 10 rechargeable ni-cads	£9.56
Battery charger	£5.06
Hand microphone	£15.18
Basemaster	£24.75
Extra crystals S21/23/24 R3/4/5/6/7	£3.89

TELEX COMMUNICATIONS INC.

LIGHTWEIGHT HEADPHONES 3·2-20ohms

HFC-91 Underchin 1·5oz with foam ear-pads	£6.08
HMC-2 Underchin 1·5oz with plastic ear-tips	£9.00
HTC-2 1·6oz Twin Receiver headphone	£14.40

DUAL MUFF HEADPHONES

C-610 3·2-20ohms Dual Receiver Magnetic	6.75
SWL-610 2000ohms Dual Receiver Magnetic	£7.99
C-1210 3·2-20ohms Dynamic foam padded	£18.45
C-1320 3·2-20ohms TELEX'S finest	£25.65

BOOM MICROPHONE HEADSETS (headphones as above)

CM-610 As C-610 with high Z Ceramic microphone	£29.70
CM-1210 As C-1210 with high Z Ceramic microphone	£38.25
CM-1320 As C-1320 with high Z Ceramic microphone	£47.25
CM-1320S As CM-1320 with single headphone	£36.90

(all the above headsets fitted ptt switch)

MICROPHONES (hand held battery powered)

ProCom 1 Electret High Output	£11.70
ProCom 11 Electret Variable Gain	£17.55
CB-73R Dynamic Noise-cancelling (relay switch)	£23.40
CB-73S As above with 6-wire universal lead	£24.75

HAL COMMUNICATIONS CORP.

ELECTRONIC TTY SYSTEM

DS-3000 KSR version 3.X (ASC11/ Baudot/Morse)	£1134.00
DS-3000 KSR version 2.X (ASC11/ Baudot	£885.36
ST-6000 Demodulator/Keyer with 'scope	£432.00
ST-5000 Demodulator/Keyer	£194.40
RVD-1005 Visual Display Unit (Baudot)	£285.12
DKB-2010 Dual mode keyboard with 128 key buffer memory	£345.60

TRIO EQUIPMENT

TS 820S 160-10m Tcvr. 200w PEP (with DG-1)	£899.00
TS 520S 1·8-28MHz SSB Tcvr. 200w PEP	£575.00
SM 220 Monitorscope	£251.00
TS 700S 2m all mode dig. Tcvr.	£637.00
TR 7010 2m CW/SSB Tcvr. 10w output	£189.00
TR 7200G 2m FM mobile Tcvr. 10w fitted 10ch	£189.00
TR 7400A 2m FM mobile Tcvr. 800ch	£365.00
TR 7500 2m FM mobile Tcvr. 10w. PLL 80 FM ch	£235.00
TR 2300 2m FM portable Tcvr. PLL 80 FM ch	£210.00
TR 8300 70cm FM mobile 10w Tcvr. fitted 4ch	£267.00
TR-3200 70cm Tcvr. fitted 3ch.	£198.00
R-300 General coverage Receiver	£185.00

The above are **some** of the main Trio units—we also stock the accessories, oscilloscopes, etc.

CDE ROTATORS

AR-20	£38.81
AR-22L	£48.38
AR-30	£46.13
AR-40	£53.44
CD-44	£106.88
HAM-3	£145.13
BIG-TALK	£89.44
TAIL-TWISTER	£241.88

COAXIAL CABLE

UR-67 52ohms per metre	£0.60
UR-76 52ohms per metre	£0.20
T3234 52ohms per metre	£0.55
UR-70 75ohms per metre	£0.20
RG-174U per metre	£0.30
300ohm ribbon per metre	£0.10
14swg enamelled copper wire per metre	£0.12
4-core rotor control cable per metre	£0.20
5-core rotor control cable per metre	£0.25
8-core rotor control cable per metre	£0.35

THE FABULOUS BEARCATS ARE IN STOCK AGAIN!

WE CAN NOW OFFER 2 MODELS

Bearcat 210	£199.80
Bearcat 250	£249.75

BARKER & WILLIAMSON

331A Little Dipper 2-230MHz grid-dip meter	£81.00
334A Dummy load/Wattmeter. 1kW	£135.00
371-1 Wide-range Attenuator	£33.75
375 Protax antenna switch	£16.88
377 Coax relay	£15.30
551A Antenna switch 6-way	£15.30
595 Antenna switch 6-way	£16.20

THE AMAZING AR-240 £195.00

Synthesized, 800 channel, hand held TCVR. Complete with ni-cads and charger unit.

AMECO

EQUIPMENT

OCMK Code practice oscillator kit	£12.38
OCMW Code practice oscillator wired	£16.20
PLF-2 FET Receiver preamp	£47.25
PT-2 FET Transceiver preamp. 10-160m	£67.50

MORSE CODE COURSES

101-33 Senior Code Course. 33rpm Record	£5.40
101-T Senior Code Course. Cassette	£6.48
103-33 Advanced Code Course. 33rpm Record	£2.80
103-T Advanced Code Course. Cassette	£3.78
105-33 Gen. class supplementary course 33rpm Record	£2.80

PUBLICATIONS

3-01 Radio Electronics Made Simple	£2.00
102-01 Amateur Radio Theory Course	£3.50
23-01 Novice Class Theory Course	£2.50

ASTATIC MICROPHONES

T-UG9-D104 Golden Eagle gold-plated transistorised	£69.75
T-UPG-D104 Silver Eagle chrome-plated transistorised	£49.50
UG8-D104 The famous Crystal D104	£31.50
T-UG9-D104 Transistorised amplified D104 grip-t-t	£40.50
T-UP9-D104 Transistorised amplified p.t.t. (grey or black)	£45.00
525 DL6 Dynamic Hand Microphone. 400 Z	£12.15
400 Dynamic Hand Microphone. 'Buckeye'	£5.85
565 M6 Hand Microphone FET amplified. 'Mariner'	£31.50
D104-M Hand Microphone D104 FET amp 4-wire	£24.30
D104-M6 Hand Microphone D104 FET amp. 6-wire	£28.35
555 4-wire Hand Mic. noise-cancelling 'Trucker'	£21.60
557 6-wire Hand Mic. noise-cancelling 'Trucker'	£26.10
531 Hand Mic. mobile. High Z	£7.65
539 Hand Mic. mobile, noise-cancelling	£7.65
1104C Desk Mic. FET amplified	£36.00

SHURE MICROPHONES

201 Hand held ceramic	£14.18
202 Hand held noise-cancelling ceramic	£14.85
401A Hand held magnetic	£16.20
404C Hand held	£24.98
444 Desk model	£31.72
526T Desk model with preamp	£38.48

JAYBEAM ANTENNAS

4Y/4M 4 element folded dipole yagi	£14.85
C5/2M 5dB glass fibre colinear	£35.42
5Y/2M 5 element folded dipole yagi	£8.67
8Y/2M 8 element folded dipole yagi	£11.25
10Y/2M 10 element folded dipole yagi	£24.58
PBM 10/2M 10 element Parabeam	£29.72
PBM 14/2M 14 element Parabeam	£36.12
8XY/2M Crossed 8 element yagi	£22.50
10XY/2M Crossed 10 element yagi	£30.28
PMH/2C 2-way phasing harness	£5.95
Q4/2M 4 element quad yagi	£18.98
Q6/2M 6 element quad yagi	£24.75
D5/2M Double 5 slot-fed yagi	£15.77
D8/2M Double 8 slot-fed yagi	£21.02
SVMK/2M Mounting kit	£5.62
UGP/2M Unipole & ground plane	£8.12
HM/2M Mobile halo with mast	£4.45
PMH2/2M 2-way phasing harness for two 2m ants.	£7.82
PMH4/2M 4-way phasing harness	£18.62
D8/70cm Double 8 slot-fed yagi	£17.71
PBM 18/70cm 18 element Parabeam	£21.38
MBM 48/70cm 48 element Multibeam	£24.92
MBM 88/70cm 88 element Multibeam	£33.15
TAS 2m 5/8 mobile whip	£13.59
U5 70cm Colinear 5·6dB	£20.25
DL Double lashing chimney kit	£8.92
W6 6" wall bracket	£2.83
W21 21" wall stand-off bracket	£11.09
W24 HD 24" wall stand-off bracket heavy duty	£15.77
SPM 16' × 1" Portable Mast	£11.31
PME 4' extension for double arrays	£1.91
A4 4' 6" × 1½" mast	£2.89
A5 5' × 1" mast	£2.16
A9 9' × 1½" mast	£5.82
A10 10' × 2" mast	£10.06
CP1 Cross-over plate 2" × 2"	£2.50
JBL 59/6 6" jointing sleeve for 2" masts only	£2.12
JBL 59/15 15" jointing sleeve for 2" masts only	£5.00
JBL 29 Universal clamp 1¼" boom to 1"-2" mast	£1.20
JBL 30 Universal clamp 1" boom to 1"-2" mast	£1.20
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FROM THE WEST AND SOUTH/WEST. Follow M5 then M6 to Spaghetti Junction (see above). Alternatively, leave M5 at junction 4 or 3 and proceed to inner ring road. Turn South on ring road and leave on A47 (East). We are located three miles from this point.

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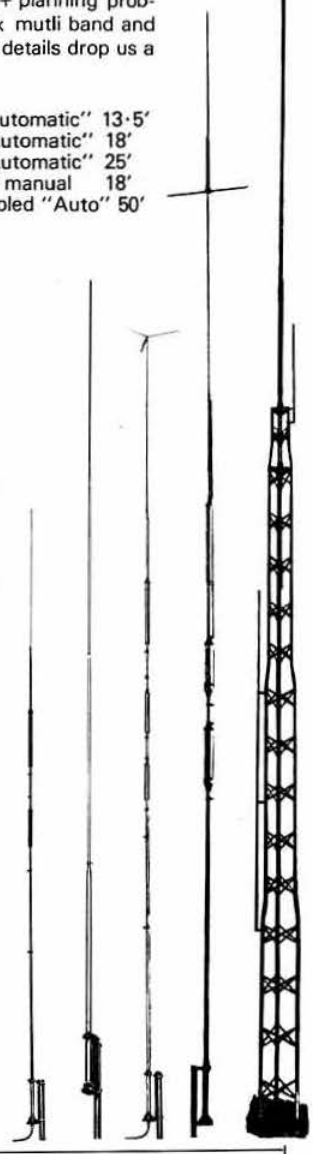

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PATRON: HRH The Prince Philip, Duke of Edinburgh, KG

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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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D. A. Evans, G3OUF

EDITOR
A. W. Hutchinson

ANNUAL SUBSCRIPTION RATES

UK corporate: £8, including VAT — **Overseas: £8.**

Associates under 18: £3. — **Students aged 18 to 21: £4.50.**
(Student applications should give the member's age at last renewal date and include evidence of student status)

Affiliated societies: £6.50 (including *Radio Communication*);
£3.25 (excluding *Radio Communication*).

RSGB NEWS BULLETIN SERVICE

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

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

SCHEDULE

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

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

RSGB QSL BUREAU

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

Current Comment

ANNUAL MEMBERSHIP SUBSCRIPTION

It is now three years since the subscription rates were fixed at their present level. The Society has been able to maintain these rates, despite the inflation familiar to all members, by improved administrative efficiency (considerably aided by our in-house data processing system), a successful publishing policy and a substantial increase in membership.

Council has reviewed the likely future expenditure of the Society and has concluded that, in order to maintain existing standards of service and facilities to members, it is necessary to increase subscriptions from 1 July 1979. The standard rate for UK corporate members (excluding those resident in the Channel Islands) will be £10 per annum. The rate for Channel Islands members, after deduction of VAT, will be £9 per annum.

Other new rates are as follows:

Associate member	£4
Family member	£4
Student member	£6
OAP member	£6
Affiliated society (without *Radio Communication*)	£6
Affiliated society (including overseas)	£10
Overseas member, surface mailing	£10
Overseas member, air mailing, PO Group A	£15
Overseas member, air mailing, PO Group B	£16
Overseas member, air mailing, PO Group C	£17

Some idea of the increases in overall expenditure absorbed by the Society over the last three years can be gained by comparing the accounts to 30 June 1975 and to June 1978. During that period, membership has increased by approximately 20 per cent and overall expenditure by about 74 per cent.

Council is budgeting for a surplus of £15,000 in the financial year ending 30 June 1979, but this could be adversely affected by any acceleration in inflation during the remainder of that year. An outline budget for 1979-80 indicates that this surplus could easily be converted into a deficit of an equal amount if subscription rates were not increased in July 1979.

Council expects that the proposed new rates will be appropriate for the next two years. However, under conditions of rapid inflation Council intends to review the situation annually.

The appropriate subscription rate will appear on the reminder notice sent to each member as his subscription becomes due. Members who pay their subscriptions by banker's order will receive a new banker's order form approximately eight weeks before their actual renewal date.

Members whose professional activities are related to amateur radio are reminded that they should be able to claim a deduction from income tax in respect of their subscription.

P. F. D. Cornish, G3COR
Hon treasurer

Reduced and waived subscriptions

Having received recommendations from the appropriate committee, Council has decided, for the present, not to disturb the existing arrangements relating to reduced and waived subscriptions.

The arrangements for reduced subscriptions apply to members who are over 65 and in receipt of a government retirement pension, who have retired from all business activities, and who have at least 15 years of unbroken membership. It is hoped that applications for reduced subscriptions will be confined to cases of hardship, but Council wishes to make it clear that there is no question of a means test. Members who wish to avail themselves of this facility should write direct to the general manager at RSGB headquarters.

In the case of disabled or sightless persons, their subscriptions may be waived by Council. The applicant should supply a medical certificate with his first application, which should also be addressed to the general manager.

QTC

amateur radio news

"Radio Communication"

January issue. Due to a mechanical problem with new machinery at the mailing contractors, a number of members received address labels for other members with their copies of this issue. This resulted in an estimated 280 members not receiving their copies in the general mailing. Where the extra labels were kindly returned to RSGB by the recipients, copies were immediately despatched to the non-recipients, but any other members who did not receive their copies should advise RSGB headquarters.

The mailing contractor has apologized for this unfortunate occurrence and has taken steps to see that it does not happen again.

February issue. Members will have noticed that this issue was printed on a better quality paper than usual. This was a result of normal paper supplies for this issue being held up at the docks by the transport drivers' strike, and we were very fortunate to obtain sufficient replacement paper at a time when supplies were rapidly drying up.

The replacement paper being of such high quality, resulted in an increased paper cost of approximately £1,000 for this issue, but it was considered preferable to pay this than to delay publication. It is expected that stocks of the normal paper will be available for the current (March) and subsequent issues.

"Radio Communication" distribution

From time to time in these pages we have explained to members that delivery of the journal is something over which the Society has no control—see January 1978 issue page 22, and November 1978 issue page xi of centre supplement.

Despite this, complaints about the spread of delivery are still being directed at, and often blamed on, the Society, instead of at the Post Office. For the benefit of new members who have not had the two issues referred to above, and other members

who have not read (or understood) the information given, the distribution system is again explained below.

Under the Periodical Publishers' Association contract with the Post Office, by which means the journal is despatched, *all copies are posted on the same day*. The posting date is broadcast in the next GB2RS news bulletin. From then onwards delivery is entirely in the hands of the Post Office and, as the journal is posted as 2nd Class mail, it receives the low order of priority which that class has. This can result in delivery being spread over several days depending on the speed at which it is handled between the post offices of despatch and delivery.

In the majority of cases delivery is made on the third or fourth working day after posting, but there are usually a few members who get their copies later without any logical reason. Invariably among the latter are a number who miss out on Members' Ads bargains and consequently feel aggrieved. This is understandable, but it should also be understood that resulting complaints should be laid at the door of the Post Office, starting with the office of delivery, and **not at the door of the RSGB.**

Attention "QST" subscribers

The ARRL has announced that from 1 April 1979 membership dues will be increased to $18 per year, with additional postage surcharges for foreign members. The present amount is $12 per year (including postage).

Before 1 April 1979 existing members may renew or extend an ARRL membership due during the next 12 months for a further maximum period of five years based on the present subscription which is £9.25 per annum (less 10 per cent RSGB membership discount). Members wishing to renew or extend their ARRL membership at the present rate have until 1 April 1979 to send a cheque to RSGB HQ—Dept QST.

After 1 April renewals will only be accepted at the new increased rate, which will be published as soon as the postage surcharge for the UK has been advised.

RSGB callsign lapel badges

The engraving of the RSGB callsign lapel badge is at present posing some problems. As from 1 March 1979 the Society will be unable to continue to offer this badge to members. It is hoped that this will be a temporary situation and the Society is seeking alternative arrangements. Any orders received after 1 March will be refunded to members. The de-luxe lapel badge and station callsign plaque are still available.

/M in West Germany

The Society has been advised by G3NBU/DJ0JR that the West German police are carrying out roadside inspections of vehicle radio installations. The instruction to the police only includes "taxi, industrial, commercial, emergency and cb". However, it is being put into operation by personnel who have difficulty in differentiating between radio amateurs and commercial users. The instruction specifically excludes radio amateurs and advises that these can be identified by a licence certificate issued by the German Federal Post Office.

Members intending to operate /M in West Germany are therefore advised to carry a copy of the police instruction and both UK and German licences.

The police instruction was published in *CQ-DL* December 1978, and a copy may be obtained by sending an sae to G2BVN.

RSGB National VHF Convention

Members are reminded that this convention takes place on 10 March 1979.

Details were published in the centre pages of the February issue of *Radio Communication* and, in addition, the following details of talk-in stations are now available:

G3UES fm S22 145·550MHz, ssb 144·250MHz;
G8PUB fm SU8 433·2MHz.

The stations will be located about one mile from the Winning Post Hotel, and are being organized by Brian Coleman, G8AZU, and members of the Echelford ARS.

RSGB Zone 3 event

On Thursday 22 March, Dennis Andrews, G3MXJ, zonal Council member for Zone 3, will give a talk on the IARU and WARC 79 to the Verulam Amateur Radio Club at the Civil Defence Hall, Chequers Street car park, St Albans, at 7.30 for 8pm.

All licensed amateurs, shortwave listeners and others interested in the future of amateur radio are invited to attend. Further details from G4DUS, QTHR, tel Rickmansworth 77616.

New callsign series

The ITU has provisionally allocated the callsign series H2A–H2Z to the Republic of Cyprus.

Radio Amateur Old Timers' Association

The next reunion of RAOTA is due to take place on Friday 27 April at The Horseshoe, Tottenham Court Road, London W1.

Full details of membership of RAOTA can be obtained from the hon secretary, Miss A. M. Gadsden, 79 New River Crescent, London N13 5RQ; tel 01-882 1272.

Radio Fraternity Lodge No 8040

Mr Kenneth Ball, GJ3FKW, was recently installed as worshipful master of this Freemasons lodge for 1979-80. The secretary of the lodge is Mr S. Howard, G8TY.

Lost and found

The theft of the following equipment was reported to the police at Crowborough, Sussex TN6 2DA; tel Crowborough 2211, in January: Comic 245E 144MHz fm/ssb/cw transceiver, serial 7102431, modified with preamp inside and switch on side of transmitter. Any information to Crowborough police.

The Manchester police recently recovered the following equipment which they believe could have been acquired over a large area: two Skyfon cb transceivers; Pye Motorphone transceiver type MF5AM, serial H4942; Yaesu digital frequency counter, serial 6C421412; Pye Westminster transceiver type W15AM, serial 30727; Icom IC22A, serial 7042; IC280E, serial 01426; Lectronics fm transverter type QM17 Cobra, serial 3856; Philips transceiver, serial 29447, marked CMT AAD; Storno 6-channel transceiver; Pye Cambridge a.m. transceiver, serial A60006; Airmech modulation meter type 210A, serial 2262, marked LTG3H; Marconi sig gen type TF810B, serial 1946017; Pye base station—transmitter type 3302 serial 3864, receiver type AM10FRY, serial 3864. All enquiries regarding this equipment to DC Zawada, Manchester CID, tel 061-855 4640.

"The Fiver" converter for "Four"

A basic two-band design intended for the constructor of limited means

by JACK HUM, G5UM*

THIS article is about basic, simple vhf converters; and right at the outset it calls for a statement of intent and a small admission on the author's part.

The inspiration for the article sprang from a note published in *Radio Communication* in July 1978 under the headline "Keep it simple" in which members were invited to submit ". . . material of an introductory nature . . . straightforward construction projects . . . for which complete step-by-step construction details are available".

It so happened that when this request was published, a basic vhf converter meeting these requirements had been completed at G5UM, mainly with the object of assessing just how simple such a device could be while at the same time delivering a reasonable performance. This converter had been built in both 70 and 144MHz versions. Older readers of *Radio Communication* will recognize it from the circuit diagram as being based on the "Quickstarter" converter of a dozen years ago; they will also probably recall that low cost was one of the objectives behind that particular design.

Now this is where the admission must be made: in search of an effective title the author felt that something like " 'The Fiver' converter for 'Four' " would tell the story in an alliterative nutshell; in truth it only tells the 4m (70MHz) part of it! In other words, one can build a three-transistor converter for the 70MHz band for about £5 (as long as one has a few components already available), but it must be admitted that the 144MHz version will cost a little more than that: it requires an extra multiplier stage and associated components, bringing its tally of transistors to four. It must further be conceded that a majority of constructors is more likely to go for the 144MHz version rather than the 70MHz one simply because there are more 144MHz people around.

Nevertheless, the 70MHz version may have attractions to the Class B operator on a number of counts that are worth brief consideration before one proceeds to the constructional practicalities. Among them are the following:

The 70MHz band is a sensitive barometer to sporadic-E openings. The operator who has listening facilities with which to monitor it (whether or not he is licensed to transmit in it: that can come later after the morse test) will be alerted to the onset of such manifestations and ready to make the most of them if they show themselves "on the next band up". This in itself may help to alleviate what can only be called "sporadic-E-itis", a condition which affects hopeful 144MHz operators who rush home from work to call "CQ sporadic-E" on 144MHz oblivious of the fact that a check on 70MHz might have told them they were wasting their time: no "E" on 70 generally means none on 144.

Second, those Class B operators who are preparing for the morse test and a possible Class A licence will need little reminding (being already vhf-orientated) that "the next band down" offers attractions peculiarly its own, of which a doubling of the transmission range available on 144MHz for a given erp is but one.

Third, much of the past neglect of 70MHz was attributable to tvi. Happily, with the almost universal transference of television viewing to the uhf spectrum this objection no longer applies: contacts may be heard going on between distant operators on the 70·2MHz ssb frequency most nights in peak tv viewing hours.

All of which suggests (one hopes!) that there may be a case for constructing not one but two converters from the information given below.

Keeping the cost down

Uppermost in the author's mind while "The Fiver" converter was being breathed into life was the need to keep costs to a minimum, not difficult if the constructor is sufficiently interested in "self training in wireless telegraphy" to have gathered together the modest number of miniature-style resistors and capacitors for which the design calls. There are no variable capacitors. The inductors are home-wound. Even a suitable die-cast box may happen to lurk unseen somewhere in the proverbial junk box, as will sundry lengths of printed circuit board.

This leaves the crystals and the transistors as being the only bought-out parts; the cost of the former can be reduced by bulk purchase if construction of the converter is done on a club collective basis.

As for the transistors, the ubiquitous BF180 is specified for all stages, not only because it is obtainable cheaply from many advertisers in this journal (20p each from some: and perhaps even more cheaply on a collective basis of buying by the dozen), but also because it "loafs along" at frequencies as low as 70MHz and 144MHz. Its home ground being uhf television may suggest that it is wasted low down on 70 and 144MHz. Perhaps it is; but there is merit in confining oneself to a single transistor type by reason of the above-mentioned hard economics of bulk purchase.

The circuit diagrams

In the diagrams of the two-band variants of this converter, components are given a common nomenclature, eg L1 is the input inductor in each version, and L3 the final i.f. inductor, omitting from the 70MHz list those additional components required in the doubler stage of the 144MHz one.

Referring to the diagrams it will be seen that signals appearing at the antenna input pass via C1 to the self-resonant inductor L1 and thence to the emitter of TR1. Output at signal frequency appears at the L2 collector inductor, which is tapped down to give an approximate match into the emitter of the mixer transistor TR2.

In the 70MHz version the crystal oscillator employs a wire-end HC18U crystal at 65MHz to deliver output from TR3

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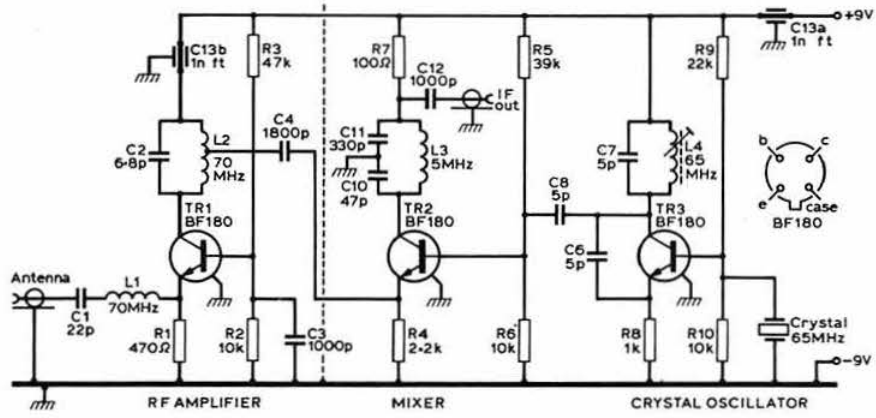


Fig 1. Circuit diagram of the 70MHz version

straight into the mixer base, producing an i.f. output of 5MHz at TR2 collector.

In the 144MHz version the crystal is at 70MHz; there is a doubler, TR4, to deliver 140MHz to the base of the mixer. Once again the i.f. output is at 5MHz.

The i.f. output appears at L3, arranged in a "pi-output" network which was suggested to the author a dozen years ago by G8ACE, and incorporated in the "Quickstarter" converter of that time, and subsequently reproduced in the RSGB *VHF/UHF Manual*. It represents a practical and convenient arrangement for obviating the need for awkward tappings on thin-wire i.f. inductors, or a separate low impedance winding to take the i.f. away to the main station receiver.

Given a 5MHz output from both converters it will be self-evident that the 70MHz version will call for a tuning range on the main station receiver of 5·025 to 5·7MHz, representing 70·025 to 70·7MHz, while the 144MHz version is tuned on the main station receiver from 4 to 6MHz, representing the band coverage of 144 to 146MHz.

To avoid i.f. breakthrough at 5MHz, careful bonding of converter to main station receiver is essential, necessitating coaxial output from the one into coaxial input into the other.

A word or two of explanation about the mixer configuration of this converter may be timely. There is a theory that injecting the oscillator signal into the base of the mixer transistor and the rf signal into the emitter (mixer TR2) will cause a loss of 10dB conversion gain, and that this can be alleviated by feeding the rf signal into the base of TR2 along with the oscillator input. The transconductance of a mixer is lower in common base than in common emitter configuration. The author's preference (always adopting the empirical approach) is to separate the signal frequency and local oscillator frequency at the mixer point. This was done in the original "Quickstarter" converter* and works excellently in the present one.

Construction: 70MHz version

The 70MHz version of "The Fiver" converter, employing as it does only three transistors, will readily fit into the lid of the small Eddystone 4½ by 2½in standard die-cast box. The input and output coaxial sockets are fitted to the metal lid itself; their shanks project through holes cut into the pcb on which the main components are mounted. The pcb is bolted to the lid with insulated side uppermost; its edges should be radiused to allow a neat and snug fit.

**VHF/UHF Manual* (3rd edition), Fig 4.51, page 4.27.

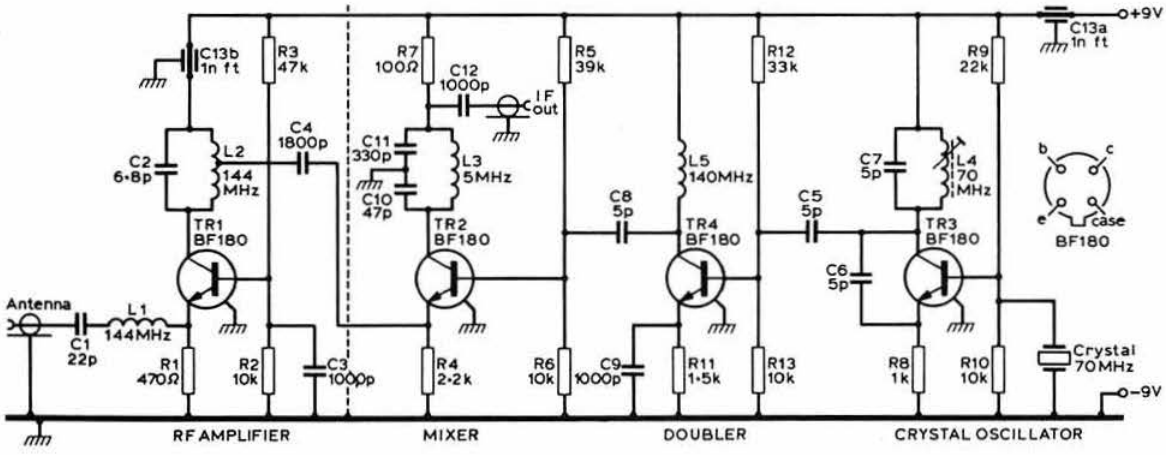


Fig 2. Circuit diagram of the 144-146MHz version

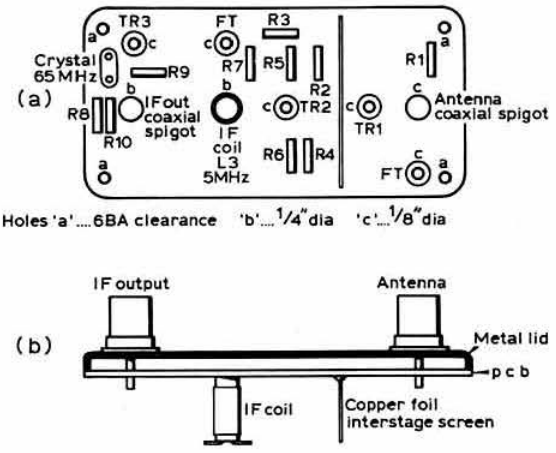


Fig 3. Suggested layout of the 70MHz version. Drilling details for the pcb are at (a), and an edgewise view at (b) shows the position of the Belling Lee coaxial input and output sockets, the interstage screen of copper foil and the 5MHz i.f. coil

Fig 3A gives drilling details for the pcb. Start by drilling four 6BA fixing holes at the corners; drill right through the pcb and the metal lid of the box so that the holes register with both.

Next, drill ¼in diameter holes in pcb and lid. Mount the Belling Lee coaxial sockets on the lid. Drill another ¼in diameter hole in the lid to give access to the i.f. inductor mounted beneath the pcb. Fig 3(b) shows how the pcb is clamped to the metal lid, coaxial sockets above, i.f. inductor below. After that, no more drilling of the lid is called for; three apertures to accommodate the transistors should be drilled and carefully enlarged so that the devices are a tight push-fit. At the points marked "FT" in the drawing of the pcb, holes should be drilled to accommodate whatever type of feedthrough capacitor happens to be available (anything around 1,000pF will be suitable).

The next job is to mount the fixed resistors in the positions shown in Fig 3(a), the earthy ends being passed through holes drilled just large enough to take the wire ends which are to be soldered to the reverse (metal) side of the pcb. The wire ends of R3, R5, R7 and R9 are left long enough to be soldered to the common junction point of the feedthrough capacitor to which the +9V line is to go, via a red lead to the battery. A black lead for −9V is to be soldered to the metal underside of the pcb. Both leads should be carried clear of the die-cast box through a small hole drilled in the side.

Now the four inductors may be soldered in. The anchor point for L3, the i.f. output coil, is the junction of R7 and C11/C12. The junction point for L4 is the feedthrough capacitor C13A, and that for L2 is feedthrough C13B. The inductor L1, which is on the same frequency as L2, should be disposed at the opposite side of the pcb at right angles to L2 to obviate feedback. A copper foil screen between the two has been found necessary in practice. After the inductors have been fitted the remaining capacitors may be soldered in; some of them use inductors as anchor points, as is evident from the circuit diagram.

Table 1. Converter components list: 70MHz version

TR1	RF amplifier, type BF180 (Mullard)
TR2	Mixer, type BF180 (Mullard)
TR3	Crystal oscillator, type BF180, at 65MHz (Mullard)
L1	RF stage input, 10/12t 24/28swg enamel or bare wire ¼in diam, ⅜in long
L2	RF stage output, as L1 but tapped 4t from cold end: C4 is soldered at this point
L3	I.F. mixer output, approx 60t 30swg, dcc, on ⅜in former with ferrite core, closewound to fill a length of ⅜in, to peak at 5·1MHz
L4	Crystal oscillator, 15t 24/28swg, enamel or dcc, closewound on a ¼in paxolin former with adjustable ferrite core
R1 to R10	As Table 2.
Capacitors	Common to Table 2 but omitting those associated with the doubler stage, TR4
Crystal	65MHz wire-end HC18U (PM Electronic Services)
Case	Die-cast box 4½ by 2½in (Eddystone)
PCB	Single sided 4 by 1⅞in, edges radiused so that board will fit inside the lid of the die-cast box
Sockets	Quantity 2, standard television coaxial (Belling Lee)

Construction: 144–146MHz version

Although the experienced constructor could undoubtedly accommodate the four-transistor 144–146MHz version in the small 4½ by 2½in Eddystone die-cast case, those coming to converter construction for the first time may prefer to give themselves (and it) more elbow room by using the 4¾ by 3¼in box. The mechanical layout suggested at Fig 4 assumes the use of a rectangle of printed circuit board 4 by 3in, to be drilled as follows:

At each corner drill a 6BA clearance hole through which a 6BA bolt will secure the pcb to the lid of the die-cast case; then a ¼in hole at the points marked "Antenna coaxial input", "IFT coaxial output" and "I.F. output". Place the drilled pcb against the inside of the metal lid and drill through the same holes. Belling Lee coaxial sockets may now be mounted on the outside of the lid; their shanks will pass through the holes already made in the pcb to connect into the circuitry on the under (non-metallic) side of the pcb.

The remainder of the drilling requirements on the pcb are shown in Fig 4 (except obvious ones like small drillings to take resistor and capacitor wire-ends). It will be noted that the components are arranged in logical "circuit diagram order", the input from the "Ant" socket through TR1 feeding TR2 from the right, and the output from the crystal oscillator chain feeding TR2 from the left.

The 5MHz i.f. inductor is identical to that in the 70MHz version already described. The three rf inductors are positioned so

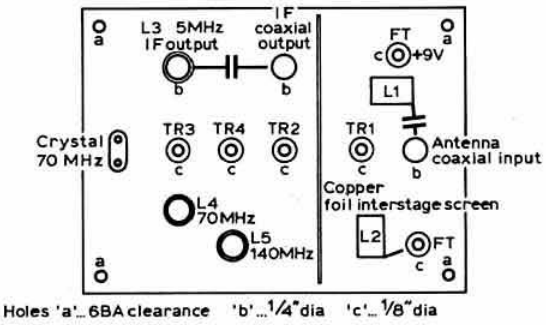


Fig 4. Suggested layout of the 144–146MHz version constructed on a 4 by 3in section of pcb to mate with the lid of a 4¾ by 3¼in die-cast case (Hole marked "IF coaxial output" should read "IFT coaxial output")

Table 2. Converter components list: 144MHz version

TR1	RF amplifier, type BF180 (Mullard)
TR2	Mixer type BF180 (Mullard)
TR3	Crystal oscillator BF180 70MHz (Mullard)
TR4	Multiplier from 70MHz to 140MHz, type BF180 (Mullard)
L1	RF stage input, 7t 24/28 gauge enamel or plain wire, ¼in id, ¾in long
L2	RF stage output, 6t as above, stretched to ¾in long, tapped one turn from cold end
L3	I.F. mixer output, as L3, Fig 1
L4	Crystal oscillator, 12t 24/28 gauge enamel or dcc, close-wound on ¼in paxolin former with adjustable ferrite core
L5	Doubler output, 5t 24 gauge enamel or plain wire, ¼in id, ¼in long
R1	RF stage emitter bias, 470Ω
R2	RF stage base bias, 10kΩ
R3	RF stage base bias, 47kΩ
R4	Mixer emitter bias, 2·2kΩ
R5	Mixer base bias, 39kΩ
R6	Mixer base bias, 10kΩ
R7	Mixer output decoupling 100Ω
R8	Oscillator emitter bias, 1kΩ
R9	Oscillator base bias, 22kΩ
R10	Oscillator base bias, 10kΩ
R11	Doubler emitter bias, 1·5kΩ
R12	Doubler base bias, 33kΩ
R13	Doubler base bias, 10kΩ
	(All resistors miniature pattern)
C1	RF input, 22pF
C2	RF output, 6·8pF
C3	RF stage base decoupling, 1,000pF
C4	RF to mixer coupling, 1,800pF
C5	Oscillator to doubler coupling 5pF
C6	Oscillator regeneration, 5pF
C7	Oscillator inductor tuning, 5pF
C8	Doubler to mixer injection, 5pF
C9	Doubler emitter by pass, 1,000pF
C10	I.F. inductor matching, 47pF
C11	I.F. inductor matching, 330pF
C12	I.F. output, 1,000pF
C13	HT line decoupling feedthrough 1n
Crystal	70MHz wire-end HC18U (PM Electronic Services)
Case	Die-cast box 4¾ by 3¾in (Eddystone)
PCB	Cut to fit inside lid

that their axes do not coincide in the interests of avoiding feedback, L1 and L2 being disposed at right angles to one another as far apart as possible while the 140MHz inductor in the collector circuit of the doubler stage is vertical.

Anchor point for the crystal is the junction of R9/R10; its other lead passes through a small hole drilled in the pcb and is soldered to the metallic underside; remember that the metallic side is "down" relative to the lid.

Commissioning

Where the converters are being built on a collective basis it is likely that a signal generator, professionally owned or club owned, will be available to assist the process of commissioning. Solo constructors, out on their own, may not be so fortunate; but where RSGB beacon or repeater signals are available (as they are over much of the country) they constitute ready-made external signal sources almost as good as a local signal generator.

Such signals are used as follows: if the nearest beacon is on 144·915MHz (eg GB3CTC) set the receiver at 4·915MHz, turn the station beam on to the beacon's direction (be sure to use the best antenna possible: no-gain dipoles on either 70 or 144MHz can be disappointing) and connect the +9V supply to the converter. Slowly rotate the core within the i.f. inductor for maximum hiss. If the receiver is equipped with an antenna trimmer, rotate this also for maximum hiss. If the battery supply to the converter is removed this hiss will disappear if the mixer is functioning correctly.

Introduce a small ferrite core into the crystal oscillator inductor L4. If the converter hiss increases squeeze the turns of the coil for maximum noise.

Perform the same operation on the 140MHz inductor L5, and finally on the signal frequency inductors L1 and L2. By now signals from the nearest beacon (or local repeater if the receiver i.f. strip is tuned to its frequency at i.f.) should appear. Final squeezing or stretching of the inductors will now peak these signals to a maximum.

If the constructor prefers, he may incorporate small trimmers (say, 3–12pF) across inductors L1, 2,4 and 5; there is room for them on the 4 by 3in pcb "chassis". But they add to the cost; given a few "dummy runs" the constructor should not find the squeezing-and-stretching technique unduly difficult.

In the prototype, slight self-oscillation in the rf stage was cured by by-passing R2 to ground by means of a 1nF miniature circular capacitor. But do not attempt to by-pass the bases of the other transistors: each one is "active", ie that of TR2 accepts oscillator injection, and those of TR4 and TR3 are equally "live".

If the 145MHz converter is built before the 70MHz version this will enormously assist the process of aligning the latter; for the 70MHz crystal oscillator in the 145MHz converter will drop a convenient signal at the bottom of the 70MHz band (strictly, 25kHz below it). Now the alignment procedure is:

Set the station receiver to 5MHz. Activate the 145MHz converter. If the crystal oscillator in the 70MHz converter is functioning correctly, a strong signal should be heard at once at 5MHz (70MHz). The signal frequency circuits of the 70MHz converter may now be peaked by the squeeze and stretch process already described for the 144MHz one. Because the 70MHz output from the 145MHz converter may provide rather too strong a signal locally, final peaking of the 70MHz signal should, if possible, be done on a weaker external signal, eg GB3SU or GB3SX beacons just below 70·7MHz if they are within range (set receiver to 5·7MHz and slowly tune downwards no more than 10kHz; if either beacon is audible locally it should be identifiable; the beam antenna will already have been orientated in its direction). Note that maximum injection hiss may not coincide with maximum signal.

A significant sentence in the foregoing paragraph deserves to be repeated: "If the crystal oscillator is functioning correctly . . .". This is basic to the success of any converter-building operation; always, it should be the first detail to check. In the case of the present converters this is readily done. When a low reading milliammeter (Avo on the 0–10mA range) was interposed between the 144MHz converter and its PP9 battery, the standing current when the crystal was oscillating satisfactorily was 4·8mA. It dropped sharply to 4·4mA when the crystal stopped oscillating. Some compression or extension of the turns of the crystal oscillator inductor L4 will serve to put the crystal in or out of oscillation; final peaking may then be done with the inductor core trimmer.

All of which may suggest that the author is a believer in the empirical approach to converter construction, which indeed he is. No blueprint for precise design and layout is prescribed in the present article; the author would be the first to agree that enhanced performance may be achieved by the constructor who is prepared to spare time changing component values slightly from those given, with a view to extracting the last

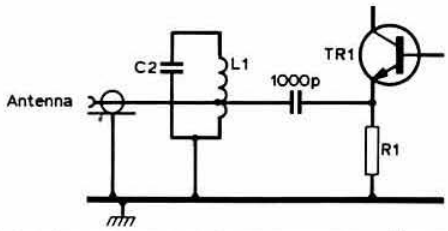


Fig 5. An alternative antenna input arrangement. The tap on the inductor is one turn from the cold end on 144MHz and two turns on 70MHz. The capacitor C1 in Figs 1 and 2 is dispensed with. In its place the blocking capacitor shown above is inserted

ounce of signal from a distant beacon—which is such a rewarding aspect of the home construction philosophy. For instance, an alternative antenna input arrangement such as the one shown at Fig 5 is worth trying. And there are other "tinkerings" which the experimentally minded may wish to embark upon rather than make a Chinese copy of what is illustrated in this article.

The psu

Convenient though it may be to give a new converter its initial testing with a 9V battery as power source, it seems logical to utilize the mains supply where this exists and to construct a small power supply unit as a battery substitute. That shown in Fig 6 can be constructed at minimal cost, with no more than a short piece of pcb as its foundation, and a 6V or 12V ac input from any available lt line (one used for a valve transmitter, for example). Shorn of sophisticated transistor stabilizing circuitry, it uses what in earlier days would have been termed "a brute force filter"; yet given enough smoothing across its output from low voltage electrolytic capacitors, it will be found to be a useful and docile unit for feeding equipment with a low current demand, such as the present converters.

Typical figures obtained when the psu was tested with the four-transistor 145MHz version of the converter were:
Input: 12·6V ac. **Output:** 17V dc off load, 13·5V on load, where load is 7mA.

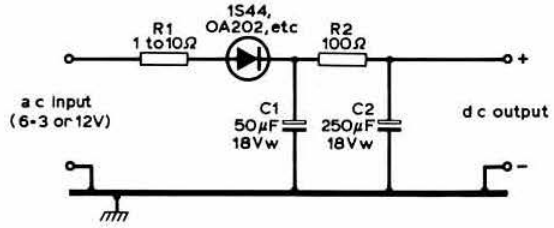


Fig 6. A simple "battery substitute" low voltage power supply unit for use with the converters. It can be constructed on a small piece of pcb, and could be incorporated in the die-cast case of the larger (145MHz) converter, where there is ample room for it. The rectifier is 1S44, OA202 or similar. R1 is 1–10Ω, R2 100Ω, C1 50μF 18V working and C2 250μF 18V working

Input: 6·3V ac. **Output:** 8·5V dc off load, 7·2V on load, where load is 3mA.

To give a comparison of the figures obtained when a fresh 9V battery (Ever Ready PP9) was used, it might be added that the converter consumption was 4·5mA.

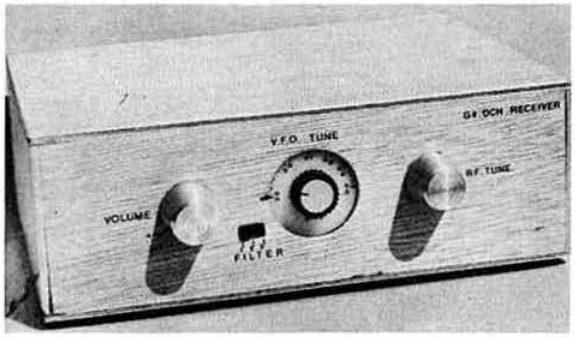
. . . and in conclusion

So much for "The Fiver" for "Four"— or "The Tenner" for "Two", for that is just about what it will cost if most of the components are bought out. No novelty is claimed for it. Certainly it is not "state of the art". But for many constructors who have not essayed the building of a vhf converter, it will provide an easy way into the delights of "tuning the entire band" instead of being stuck, blinkered and channelized, on a few all-too-popular and all-too-crowded 144MHz frequencies, with no means of "searching between the cracks". For that reason alone it will add a new dimension to amateur radio reception for many.

Later, when its limitations become apparent, the addition to "The Fiver" (or "The Tenner") of a truly latter-day amplifier such as the 3N240 or 40673 will place at the constructor's hand a converter of such effective performance as to give him satisfaction for a long time to come. But meanwhile, the present basic design will surprise him by its potential. □

The G4DCH direct-conversion receiver

by C. TUCKER, BSc, G4DCH*



Introduction

The author's original idea was to build a simple direct conversion receiver, using only a few integrated circuits, for use in his car. However, having constructed the first prototype, certain shortcomings in the design were apparent almost straight away, and various modifications to different parts of the circuit were tried until that to be described was finally decided upon. Although the original receiver was built on a single printed circuit board, design changes meant that extra boards were required. The prototype has now been developed into a 3·5MHz double sideband transceiver for mobile or portable use. The transmitter section is still being developed.

Oscillator

The design is based on a simple Vackar oscillator using a BC108 transistor, with a second BC108 acting as a buffer amplifier. As with all oscillators, to gain maximum stability all the frequency dependent components should be close-tolerance types, particularly C26, 27, 28 and 29. C33 controls the overall bandwidth and C32 tunes across it. The simple buffer amplifier removes any unwanted harmonics and reduces the amount of "pulling" caused by cross-modulating and other strong signals. The oscillator and the buffer amplifier are built into a screened box, the output being fed to the mixer stage via a feed-through capacitor.

RF stage

The incoming signal from the antenna is fed initially through a highly selective filter. T1 is a 1:1 transformer, T2 is a 1:5 transformer, and C33 between the two transformers is used to remove any unwanted broadcast stations. The resulting signal is fed directly to an SL612 integrated circuit. This was chosen for its rf gain (up to 50dB) and its rf bandwidth (50MHz), allowing the circuit to be modified for any of the shortwave bands.

Mixer

A dual-gate mosfet based on the 40673 transistor was chosen for the mixer, the advantage of which is that it can be directly fed from the rf stage without the need for an intervening tuned circuit. The incoming rf signal is fed to gate 1 of the transistor; the signal from the oscillator being fed to gate 2. The resulting audio signal is produced on the drain of the transistor, and is then amplified by a single BC108 before being fed to the filter.

Filter

A conventional circuit has been used for the filter, based on a design which appears in *Amateur Radio Techniques,* but with some modifications. The circuit uses a single LM741 having an adjustable bandwidth, controlled by RA, RB and RC, from a switch mounted on the front panel. The smaller the value of these resistors, the tighter the bandwidth. However, this does reduce the overall gain of the filter.

Audio stages

The main amplification comes from another LM741. It is worthwhile remembering that the amplification required from any d-c receiver is similar to that required by a hi-fi magnetic pickup. Hence the amplifier must be constructed according to a similar plan. To ensure stability, good decoupling of the ht lines is required. By applying the necessary feedback, sufficient gain is derived from the 741 to drive either a pair of medium impedance headphones, or, as a preamplifier source for a secondary power amplifier, to drive a loudspeaker.

The power amplifier shown in the circuit is an RS Components 3W (SL414), but any cheap audio amp ic can be used. The output from the 741 preamplifier should be fed to this amplifier via a volume control mounted on the front panel. It is this control which determines the overall gain of the receiver.

Power

The circuit was designed to be powered by 12V derived from a car battery or dynamo. The oscillator operates on a 6V line stabilized by means of a 6·2V zenner diode. The mixer and the preamplifier are operated on a 9V line stabilized by a 9V zenner diode. The stability helps to reduce any "pulling" of the oscillator which can be caused by very strong signals. Nine volts is sufficient to drive a set of headphones, but 12V is more suitable if a power amplifier is used. The overall current drain, including the power amplifier, should be no more that 50mA, so two PP6 batteries could be used instead of the car battery.

Construction

The design, consisting of the preselector, mixer with mixer amplifier, the main board oscillator, rf amplifier, filter and preamplifier, and the power amplifier, was constructed on four boards. These boards are mounted into a chassis measuring 10 by 8 by 2¼in, the box being large enough to take the transmitter circuits. If the receiver only is to be built, a smaller chassis could be used.

The oscillator and rf stages are screened from the audio sections by using double-sided pc board; all interconnection being

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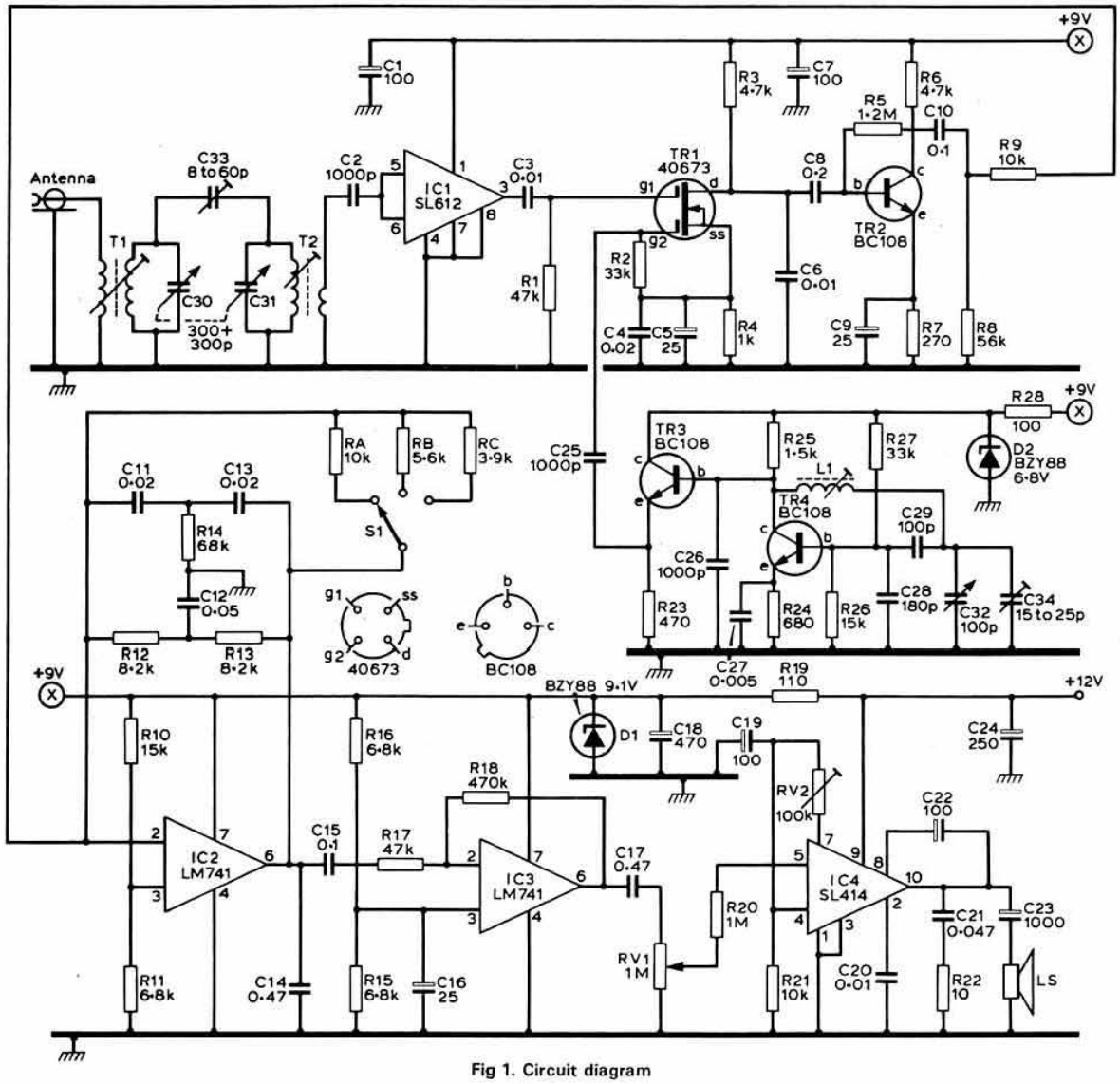

Fig 1. Circuit diagram

made by feedthrough capacitors. In these stages decoupling is achieved using 0·1μF capacitors, while the audio stages are decoupled using 100 or 470μF capacitors. Where audio sections are linked, coaxial cable is used, while components mounted on the chassis are linked to the main circuit board with stiff single-strand wire. Volume control, filter switch and preselector ganged capacitor C30, C31 are mounted directly to the front chassis. The vfo tuning capacitor C32 is controlled by a 6:1 slow-motion drive to facilitate tuning. The rear panel of the chassis has the antenna socket, power supply inlet and external speaker connections mounted on it.

To reduce microphonics, the boards and wiring should be made secure in as many places as practicable, while the chassis should be made as rigid as possible.

Alignment

Alignment is simple and requires little complex equipment, but an absorption wavemeter and a multimeter will be needed. Check that the circuit is drawing between 40 and 50mA when connected to a 12V supply. Using the wavemeter with the vanes of C32 fully meshed, adjust L1 to read 3·5MHz using the slug tune. C32 should now tune between 3·5 and 4MHz, although final adjustment of bandwidth using C34 can be left until the preselector has been tuned.

Connect a piece of wire (about 8 to 10ft) to the filter side of C2 and tune in a fairly strong signal using C32. Remove the wire and connect a good antenna to the antenna socket. Without altering C32, tune C30, C31 until the signal can easily be heard. Adjust the cores of T1 and T2 until no improvement

Components list

R1, 17	47kΩ	C1, 7, 19, 22	100μF elect
R2	33kΩ	C2, 25	1,000pF disc cer
R3, 6	4·7kΩ	C3, 6, 20	0·01μF disc cer
R4	1kΩ	C4, 11, 13	0·02μF disc cer
R5	1·2MΩ	C5, 9, 16	25μF elect
R7	270Ω	C8	0·2μF disc cer
R8	56kΩ	C10, 15	0·1μF disc cer
R9, 21	10kΩ	C12	0·05μF disc cer
R10	15kΩ	C14, 17	0·47μF disc cer
R11, 15, 16	6·8kΩ	C18	470μF elect
R12, 13	8·2kΩ	C21	0·047μF disc cer
R14	68kΩ	C23	1,000μF elect
R18	470kΩ	C24	250μF elect
R19	110Ω	C26	1,000pF s/mica
R20	1MΩ	C27	5,000pF disc cer
R22	10Ω	C28	180pF s/mica
R23	470Ω	C29	100pF s/mica
R24	680Ω 2%	C30, 31	300pF + 300pF ganged
R25	1·5kΩ 2%	C32	100pF variable
R26	15kΩ 2%	C33	8–60pF compression trimmer
R27	33kΩ 2%		
R28	100Ω	C34	15–25pF trimmer, or included in C32
RA	10kΩ		
RB	5·6kΩ	TR1	40673 mosfet
RC	3·9kΩ	TR2, 3, 4	BC108
RV1	1MΩ variable	IC1	SL612
(on/off switch may be included)		IC2, 3	LM471
		IC4	SL414
RV2	100Ω preset	D1	BZY88 9·1V
		D2	BZY88 6·8V

L1 35t 30swg tight wound on ¼in slug-tuned former
T1 Primary and secondary 35t 30swg tight wound on ¼in slug-tuned former
T2 Primary—as for T1. Secondary—7t wound on top of primary 30swg tight wound on ¼in former on cold end of primary
S1 Single-pole 3-way

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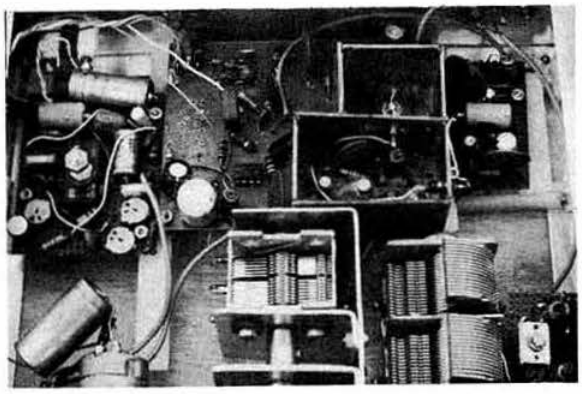
can be detected. Adjust C33 to give maximum signal strength with maximum broadcast station rejection. This will be dependent on the antenna used. The receiver is now ready for use; all adjustments to signal strength being made using the preselector, rf tuner and volume control.

Performance

Unlike some d-c receivers, where an increase in audio gain is accompanied more by an increase in transistor noise than an increase in signal strength, with this receiver an increase in audio gain gives only an increase in signal strength. The receiver performs exceptionally well using a dipole, with comparable signal strengths to the author's multiband transceiver. Using a base-loaded 4ft whip antenna from the car, there is only a minimal loss in performance, and with it most Continental countries have been logged during the early evening and are easily copyable, even when mobile. Also while mobile the receiver seems free of drift and clear of ignition noise or other electrical interference.



The internal layout. Top (l to r): main SL414 amplifier, main board, mixer and first preamplifier board. Lower centre: vfo tuner. Lower right: rf tuner and preselector filter

Conclusion

The receiver has proved to be a very useful addition to the author's existing equipment. Its performance is comparable to his communication transceiver (HW101) even using the base-loaded whip.

Although the SL612 is fairly expensive (the SL1612 should prove much cheaper) the cost of the receiver should be no more than £10 to £12 even if all the components are bought brand new. The use of only a few tuned circuits means that construction and alignment are very simple, and can easily be attempted by the novice. Plans are now under way to modify the circuit for use on the 144MHz band for vhf enthusiasts. □

Two demountable beams for 21MHz

by J. B. ROSCOE, G4QK*

THESE two antennas are intended for portable work, and can easily be dismantled—and almost as easily reassembled. The longest element is 8·5ft, which means that the array can be carried in or on the average British car, and they can also be used in a permanent location if made up with sufficiently strong materials. The prototypes possessed the considerable attraction of costing precisely nothing.

The basis of both these beams is the once-familiar "X" television antenna. In progressive urban areas these are no doubt very much a thing of the past, but in more rustic parts they are still quite common. The one used was of uncertain age, as it came with the house, but it was still robust in spite of evident corrosion. It consisted of four tubular aluminium elements, two 47in long and two 42·5in long, fastened to a central X-shaped moulded insulator. Each element, which was of split tube, was fastened by a single 2BA bolt with a spring and wing-nut. The mountings were asymmetrical, so the two lengths of element were not interchangeable: although of no consequence in this application, the elements must obviously be refitted correctly. Four new 2BA bolts and nuts were fitted, but no other replacements were required: the springs were discarded, as they offered no advantages in this application.

The elements were lengthened by inserting canes ("borrowed" from a gardening xyl) into them to form an overall length of 8·5ft. With a little care, canes were found with "knuckles" of the right size to jam in the split tubes, though more positive means of fastening (clamp, through-bolt) could always be adopted if required. Into the end of each cane, drilled if necessary, was inserted a 5in length of coat-hanger wire, bent over at the end to form a small hook. The hooks were manipulated to nip the ends of the canes, so that they did not fall out of them. The antenna wire can be attached to these hooks by nylon thread or, more conveniently, by doubled-over elastic bands.

The original tv antenna was supported by two lengths of 1in tubing, a 5ft horizontal attached to a 5ft 10in vertical. These were drilled and joined by two 2BA bolts. Allowing for a good overlap, a mast of a little over 10ft was obtained. The wire used for the antennas was "twenty-something" gauge enamelled unwound from a hefty choke. The insulators were short lengths of clear plastic tube, drilled transversely at each end, which had started life as a ball pen. The antennas were wired up with the X flat on the ground, and as they were very light the mast could be raised easily—provided care was taken not to trip over the lower wire of the array.

The first antenna is a full-wave vertical square loop. A total length of 47ft 9in, calculated for the cw end of the 21MHz band, gave adequate bandwidth for the whole band. The weight of the insulator in the centre of the bottom wire caused some sag, but this did not seem to matter and no attempt was made to support it. The antenna can be fed from a Z-match on the ground, using two separate wires of sufficient length to permit rotation of the loop through 180°—all that is required with a bi-directional array.

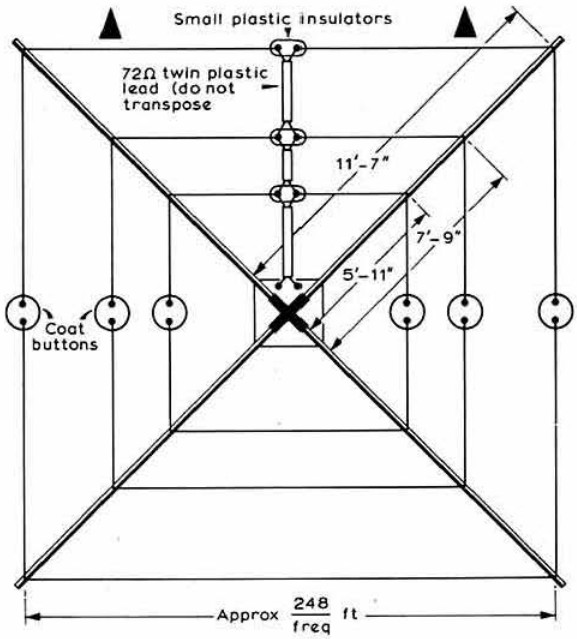


Fig 1. The VK2ABQ triband beam for 14/21/28MHz (seen looking down on the antenna) as published in "Technical Topics" September 1974

The second antenna is a single-band version of the 3-band 2-element beam designed by VK2ABQ and described in "Technical Topics" *Radio Communication* September 1974, p601. For this the X must be horizontal. The original assembly was mounted on a hinged bracket, and with a little patience and a lot of penetrating oil it was rotated through 90° without breaking anything. Two departures were made from the original design: VK2ABQ used coat-button insulators, and the first time the antenna was lowered onto a hard surface these shattered. Also, he used a simple dipole as the driven element, and this inevitably produces a feed impedance well below 50Ω. With a folded loop of wire, of total length 47ft 2in, a more useful impedance was obtained. No difficulty was found in feeding the array with 80Ω twin, and the bandwidth was entirely adequate.

The resonant frequency of these antennas, as VK2ABQ points out, is considerably affected by the odd metalwork around. There seem to be two schools of thought about how to deal with this problem. The first advocates bonding all metal booms, guy wires, etc together and earthing them: the second goes on the assumption that anything less than a quarter-wave in length can be neglected. It is not always easy to provide an effective earth in portable operation, and this second policy was adopted. However, X television antennas were equipped with central terminal boxes, and the arms could be earthed if desired.

Reference should be made to the note in "Technical Topics" or *ART* for tuning the 2-element antenna. Even with a (grid) dip oscillator it can be tricky. It is essential to tie the feeder in

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(Continued on p229)

Solar Cycle 21—progress and prospects

by F. M. SMITH, G8KG*

Introduction

At the end of 1978, Solar Cycle 21 was just two-and-a-half years old, and, since the typical rise time from trough to peak is about three-and-a-half years, the maximum will probably be reached in late 1979 or early 1980, although it could possibly be rather later. Readers who have followed the various reports in this journal and elsewhere will know that, whereas in 1974 one brave attempt at long-term prediction [1] promised very low peaks of around 50 for Cycles 21 and 22, the indications now favour a high maximum for the current cycle. In fact the "official" measure of progress, which is the 12-month mean sunspot number, passed the 50 mark in November 1977 and will probably prove to have passed 100 during the autumn of 1978, with the peak still a year or more away.

This seems a good time to review the progress so far and to take a look at the prospects for the next few years. Solar activity as it affects radio communication varies in quite a complex manner, and the classical representation of the 11-year cycle results from very heavy smoothing of the data. The discussion which follows is intended to give some idea of the more detailed behaviour of interest to the radio amateur.

A few basics

As most readers will know, the solar cycle is of interest to the radio amateur because of the connection between hf radio propagation conditions and the level and nature of solar activity. Broadly speaking, the more active the sun the higher is the muf on a given path at a given time. On the other hand, higher activity also means higher absorption of signals passing through the ionosphere, particularly in daylight and on the lower frequencies, and a greater probability of sudden radio blackouts due to solar flares, and more prolonged upsets of radio communication due to magnetic disturbances and auroral conditions (though the latter may please the vhf fraternity!).

The traditional measure of solar activity has been the daily count of sunspots, the world authority being the Swiss Federal Observatory at Zurich. There are two distinct components in the variation of this index, one due to actual changes in the sun's activity and one due to its rotation relative to the earth, the latter having a period of 27 days. Because of its considerable variability the sunspot data is often heavily smoothed, and the monthly mean, the yearly mean and the average of 12 months' observations centred on a given month (12-month running mean or "smoothed monthly number") are the most commonly used.

It is important to understand the effects of this smoothing, and the following examples may help:

(a). The highly simplified picture of the approximately 11-year cycle usually seen in textbooks and articles is obtained by plotting the yearly means, and this completely obscures the detailed variations which underlie the variability of radio propagation conditions.

(b). Most forecasts of sunspot activity, for example those published at the end of the "Propagation Predictions" in this journal, are forecasts of what the *smoothed* number for a given month is expected to be when all the necessary data has accrued. The same goes for predictions of the peak value of the cycle. A smoothed monthly number is, however, the average of the observed number for that month and those for five-and-a-half months before and five-and-a-half months after, ie it is influenced by both past and future activity. A smoothed number of 100 can result from a sequence of 13 months each with a monthly number of 100, or from any rising, falling or fluctuating sequence having the same average value. This means that the actual monthly number may differ considerably from the smoothed number. An extreme example of this was in February 1948, near the peak of Cycle 18, when the smoothed number was 143, whereas the actual mean for the month was only 86 and the lowest day in the month was only 45.

In summary, smoothed monthly numbers are a necessary part of the scientific treatment of the data but they only tell part of the story and sometimes the least interesting part from the amateur's viewpoint.

Solar radio flux

For short-term studies the sunspot count has the disadvantage that it includes all visible spots, whereas only those near to the centre of the sun's disc have a major effect on the ionosphere, and some spots are more active than others. A more direct index of solar activity as it affects radio propagation is the "solar radio flux". The sun emits radio energy on many frequencies, but the standard used is the power per square metre received on 2,800MHz which is recorded daily at local noon in Canada. In the units used, the "quiet sun" at the minimum of a cycle has a flux value around 65, while the highest recorded value was during the 1947 solar maximum when it was in excess of 450 solar flux units.

Graphs of daily sunspot number and daily solar flux show generally similar variations, but the flux variations are rather more peaky and have a stronger 27-day component since they represent changes of activity in the direction of the earth. The more the data is smoothed the more closely do the movements of the two indices correspond, the relation between their 12-month means being nearly linear. For rough-and-ready conversion the following gives answers sufficiently accurate for amateur purposes:

Smoothed monthly sunspot number = 1·1 X (smoothed monthly solar flux − 60)

When used with daily values or monthly means this will often yield a low answer because the "effective sunspot number" is lower than the observed one for reasons already discussed.

It is the solar radio flux for the previous day which is reported at 18min past each hour by WWV, and whose behaviour during the past week is summarized in the GB2RS news bulletins. Close observation shows that, when allowance

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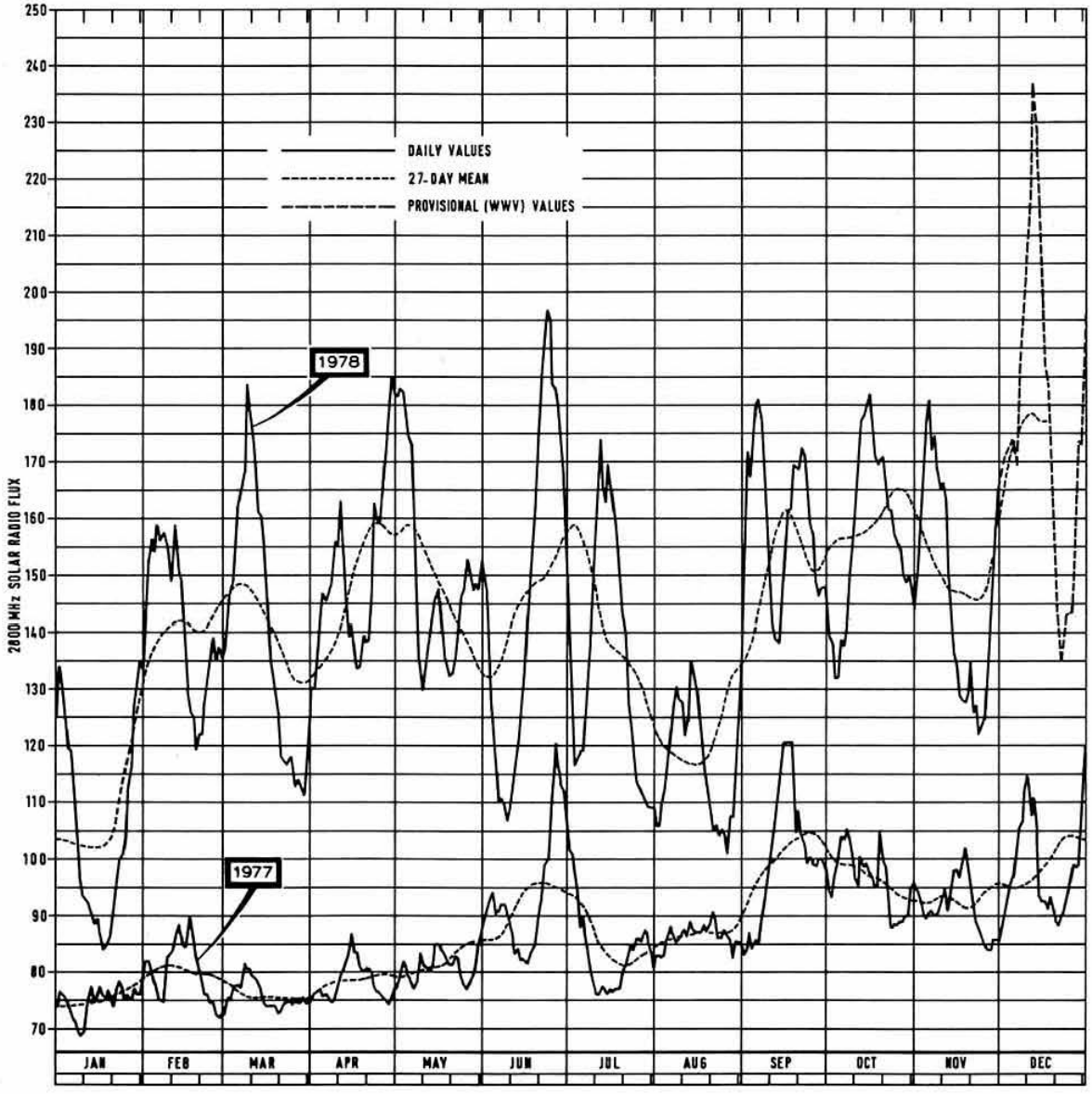

Fig 1. Variations of 2,800MHz solar radio flux during 1977 and 1978

is made for disturbing factors, hf propagation conditions follow quite closely behind the rise and fall of the solar flux. The principal disturbing factor is the quietness or otherwise of the geomagnetic field, and the WWV report also includes the "Ap" index which is a measure of this. Ap values below about 15 mean a quiet situation and stable communications, usually with low absorption. Higher values indicate increasingly unstable conditions.

In looking at Cycle 21 both sunspots and radio flux will be considered. The latter is the better basis for considering the detailed behaviour up to the end of 1978, while only sunspot numbers provide a base for comparison with activity prior to 1947. Sunspot data is taken from [2] and the Zurich monthly and annual bulletins. The 2,800MHz radio flux data is from the Herzberg Institute, Ottawa, received via NOAA, Boulder, Colorado.

Cycle 21—the past two years

The graph in Fig 1 shows the variations in the 2,800MHz flux during 1977 and 1978. The solid line links the daily values while the dotted line traces the movements of a 27-day running mean. The use of the latter tends to smooth out the effects of solar rotation and show what the sun as a whole is doing, since if the

Table 1. Three-month mean solar flux and sunspot numbers centred on February to October 1978

	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Mean solar flux	129	144	144	149	144	133	137	145	155
Mean sunspot No	71	86	83	89	81	73	88	106	119

pattern of flux variation were the same in each 27-day period the dotted curve would be a horizontal straight line.

It can be seen that there was a gradual rise during 1977 with pronounced superimposed peaks in June/July, September and December. The 27-day component due to solar rotation is evident in several places, eg in June/July, and it is interesting that the large peaks in late July, mid-September and December are each separated by three solar rotations. The 27-day mean is hardly needed for the interpretation of this simple behaviour, but it confirms that there were real peaks in mean activity in June/July and September, with a rise over the year from 74 to 104 sfu.

The pattern in 1978 was very different. The day-to-day fluctuations were much greater and, while the overall rise in the 27-day mean from the beginning of the year to mid-December was about 70 sfu, no less than 60 per cent of this was achieved in a single upward leap during the first 60 days. Subsequently the mean varied smoothly between 130 and 160 sfu with a period of about 70 days, dipping in August and showing clear signs of moving upward again toward the end of the year. There is a hint that the phase of the 70-day fluctuation may have reversed at the end of September but there is not enough subsequent data to confirm this, and short-term periodicities in solar activity do not usually persist.

The 1978 curve illustrates two important aspects of solar variation as it affects hf communication. First, it shows the wide range of the effective variation—in excess of ±30 per cent in January/February and in June. Second, it shows that the upward trend in activity is far from uniform. This trend is best seen from Table 1 which shows the three-month mean solar flux and sunspot numbers centred on February to October.

It can be seen that effective solar activity was on a "plateau" for much of the year, and this is also evident in the small inset graph at the top of Fig 2. The figures for September are interesting in that they show how the sunspot number can increase without a corresponding increase in mean flux. A similar effect is seen if the 27-day means of flux and sunspot number are compared. For the three peaks of around 160 sfu in Fig 1 in late April, early July and mid-September, the corresponding peaks in the sunspot curve are 97, 107 and 140 respectively.

For users of the hf amateur bands the behaviour in 1978 was generally beneficial. The steep rise to a plateau early in the year meant that, from February onwards, mufs were high enough during peaks in the solid curve of Fig 1 to give world-wide communication in the 21 and 28MHz bands, with periods of interesting conditions even during the summer months. Readers may find it interesting and even instructive to compare their logs with Fig 1, always remembering that there was a fair ration of magnetically disturbed days in which the benefits of high activity were not in evidence.

How high and when?

The mechanism of the solar cycle is not fully understood, so that the standard methods of prediction in the past have involved, in essence, comparing the current cycle's smoothed monthly numbers with the statistics of an "average cycle" derived from past observations. This method is not considered very effective for predicting beyond about 12 months ahead, and has an in-built time lag due to the smoothing so that, in the early stages of a cycle, the prediction of the peak can fluctuate from month to month. Using this method in October 1977, NOAA, Boulder, was predicting a peak smoothed monthly number of 115 ±52. By July 1978 the prediction had risen to 154 ±45 but subsequently fell to 146 ±40 in September because of the impact of the "plateau". The Zurich prediction, published in April, was for a maximum of 150. The most probable time for the peak remains rather constant at the end of 1979 because at this stage it is based on the typical rise time for a high cycle.

Recently a new empirical method of predicting the height of the peak has become available through the discovery of a high correlation between the mean level of geomagnetic activity towards the end of a solar cycle and the maximum sunspot activity in the *next* cycle. This method has proved very accurate in "test prediction" of past peaks and is independent of the observed sunspot data during the rise period. Cycle 21 is the first in which this method has been used for true prediction, and two similar but distinct applications of it have resulted in forecasts of 154 ±50 (95 per cent probability) [3] and 206 ±42 (66 per cent probability) [4].

The overlap region between these two is 164–204, but they are not strictly comparable because of the different probability criteria. NOAA now issues a "consensus" prediction based on a combination of the old and new methods. This, based on data up to October 1978, is 150 ±34.

In Fig 2 the three-month mean sunspot numbers for Cycle 21 up to November 1978 are compared with those for the first half of Cycles 18, 19 and 20. The cycles are aligned on their "official" minima, ie the month with the lowest smoothed number. The aim is to see how the current cycle is progressing and what we might expect to see in the peak months. The three-month mean is used so as to preserve some of the more detailed behaviour.

It can be seen that there is a general tendency in all the cycles for the rise to proceed by way of steep upward bursts lasting a few months and interspersed with periods of similar duration in which there is a slowing down or pause, or even a temporary fall, in activity. The "plateau" in 1978 is, therefore, not unusual, and similar behaviour is evident in Cycles 18 and 20 at about the same equivalent times.

It is also interesting to note that during the periods of steep rise there is not much difference between the slopes of the four cycles. It is the nature and extent of the "pauses" which mainly determines the mean rate of ascent.

Looking in detail at the relative position of Cycle 21 it can be seen that it was ahead of the other three up to the fifteenth month, at which point the first pause resulted in some loss of ground. There followed a steep ascent until month 21, by which time the current cycle had almost caught up with Cycle 19, only to lose ground again during the pause from March to August 1978 at the end of which it was just ahead of Cycles 18 and 20 at corresponding times.

The subsequent steep rise to a three-month mean value of 119 centred on October placed Cycle 21 about five months behind Cycle 19 but five months ahead of Cycle 18 and almost level with the peak of Cycle 20. There is a suggestion that another pause may be developing, but the level of activity in December (provisional Zurich number 119·1) suggests that it will not be a major one. Calculation of smoothed monthly numbers cannot yet be extended beyond June 1978, ie at the 24-month point on the graph. The corresponding values are:

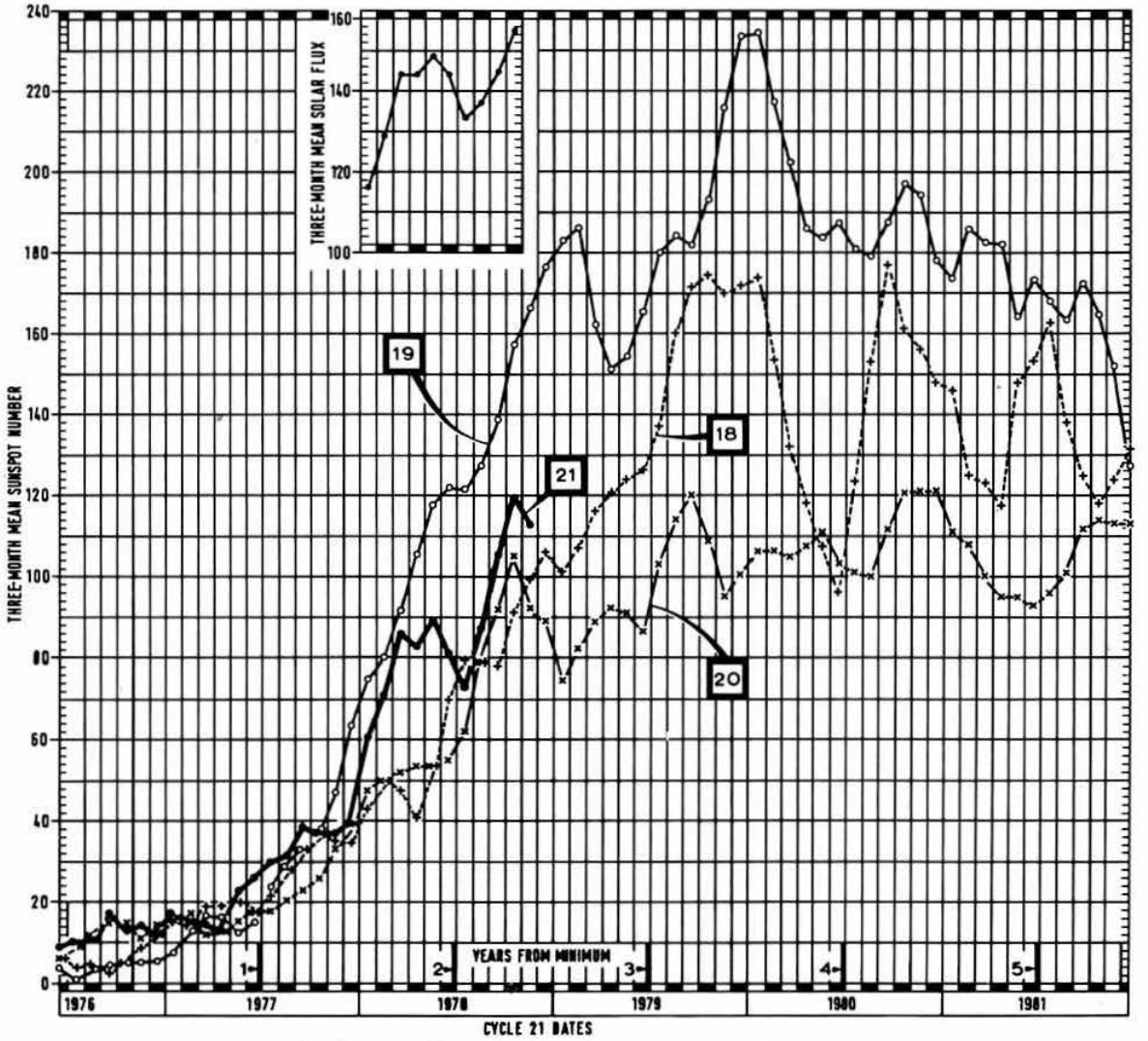

Fig 2. Progress of Cycle 21 compared with the previous three cycles

Cycle 18: 67·0
,, 19: 118·7
,, 20: 67·6
,, 21: 87·0 (Sargent's prediction in [3] was 85·1)

There is no way of predicting with certainty what will happen next. All three comparison cycles show significant pauses between the two-and-a-half and three-year points before rising steeply to a peak during the fouth year. At the worst the rise in activity could level off rather rapidly as it did in Cycle 20. On the other hand the prolonged and rather turbulent maxima which both 18 and 20 display is a feature of even-numbered cycles, whereas odd ones tend to rise steeply to a sharp maximum. On balance it seems most likely that by about mid-1979 a steep rise will begin and lead to a peak in the three-month mean of about 200, the most likely peak time being at the turn of the year, although it could be as late as mid-1980. The resulting maximum in the smoothed monthly numbers would be about 170 and the corresponding smoothed monthly solar flux would be around 215.

Table 2. Highest values of sunspot numbers for Cycles 18, 19 and 20

Cycle	Highest sunspot number			
	Daily	Monthly	Three-month mean	Twelve-month mean
18	323	201	177	152
19	355	254	235	201
20	211	136	121	111

It should perhaps be mentioned in passing that the author's own prediction of the peak value in [5] looks like proving to be correct, but at the same time it must be made clear that the formal theory of solar variation does not admit of any planetary influence. More important from the reader's point of view is the certainty that the peak will be above average and probably

one of the highest on record. For amateurs in the northern hemisphere it will be an additional bonus if the highest activity does indeed occur during the winter dx season.

The peak years

Fig 2 also gives some indications of what to expect in the peak years. In all the higher cycles the highest peak in the three-month mean curve is rather sharp and lasts only a few months, as in Cycles 18 and 19. There may well be two or more such peaks of similar amplitude, and deep clefts like the one in Cycle 18 are not uncommon—during the peak of Cycle 14 in 1906/7 the highest daily number of 179 was followed 108 days later by three days with no sunspots!

As compared with the climb, the descent is relatively gentle up to the end of the fifth year and sometimes beyond. The three-month mean is not, therefore, likely to fall permanently below the 120 mark until the end of 1981 although there is likely to be some marked turbulence during the period.

Table 2 shows the highest values of daily and monthly sunspot numbers and of the three-month and twelve-month means for the past three cycles. It looks as if we can expect values for the present cycle to lie between those for 18 and 19.

Table 3 shows, in cumulative form, the number of months in which the highest daily solar radio flux exceeded various thresholds during the past three cycles. The figures for 18 are incomplete because systematic observation did not begin until near the peak of the cycle. The table suggests that we can expect six or more months with a daily peak above 300, and perhaps one in the range 350–450 sfu.

The relative position of Cycle 21 to date is as follows:

Highest daily number = 188 (12 Dec 1978)
,, monthly number = 137·3 (Sept 1978)
,, three-month mean = 119 (Oct 1978)
,, daily solar flux = 237 (12 Dec 1978) (WWV value)

The preceding paragraphs give some idea of what we can expect over the next few years. The progress of the cycle can easily be followed by calculating three-month means from the provisional Zurich monthly numbers which regularly appear at the end of "Propagation Predictions" in this journal. Plotting the three-month mean on Fig 2 will show the general trend.

For those who wish to be right up to date, the GB2RS news bulletins usually include a brief summary of solar activity, while the reappearance of WWV on the 20MHz channel makes it much easier to copy the daily reports in all except the worst conditions.

It must not be forgotten that the frequency and severity of geomagnetic disturbances are linked to the sunspot cycle but in a rather complex fashion. Mean geomagnetic activity certainly increases as the solar cycle moves toward its peak, but may continue to rise for a further two to five years afterwards so that, on balance, optimum radio propagation conditions on the higher hf bands are to be expected before and during the solar peak. Those bands should, however, be full of interest until at least the end of 1981, and during the peak period the mufs will sometimes be high enough for long-distance crossband 28/50MHz contacts by stations in the UK, with a lesser possibility of 70/50MHz working. Suitable conditions are most likely between October and March, and in the sector from 090° to 270°. The hpf values in the "HF Propagation Study" tables in this journal are a good guide to optimum times for various paths.

A study of the positions of monthly median muf contours shows that November and December are probably the most favourable months for the direct path with North America, and there is always a possibility of contact via ground scatter from West Africa or South America. The first UK–USA 50MHz contact by G6DH was in the second half of November 1946, at a time when the mean sunspot number for the previous 14 days was 150 and the cycle was in its thirty-third month. Sunspot activity reached a similar level in September 1978 but was relatively low by November. The high flux peak in early December looked more promising but proved to be short-lived, and at the time of writing nothing has been heard of any reception of North American 50MHz transmissions in this country. This year should see higher and more prolonged peaks, and at least some will coincide with quiet magnetic conditions—as did the one in December 1978. It is also worth remembering that exceptionally high mufs can occur shortly after a "blackout" (sid) caused by a solar flare.

Table 3. Number of months in which highest daily solar radio flux exceeded various thresholds during Cycles 18, 19 and 20

Cycle	Months in which highest daily solar radio flux exceeded stated value				
	250	300	350	400	450
18	13	5	(1)	(1)	1
19	26	11	1	–	–
20	1	–	–	–	–

References

[1] "The sunspot cycle; analysis and predictions". *CQ* March 1974, pp24–28.
[2] "The sunspot activity in the years 1610–1960". M. Waldmeier.
[3] *Radio Communication* May 1978, p405.
[4] "Predicted intensity of the solar maximum", R. P. Kane. *Nature* 13 July 1978, pp139–140.
[5] *Radio Communication* July 1976, pp494–500. □

Two demountable beams for 21MHz

(Continued from p224)

position before attempting any measurements, as its position can certainly affect the tuning.

It is not easy to compare two antennas when one has to be dismantled before the other can be erected. In addition, the weather in the first half of 1978 was obviously intended to discourage portable operation. A unidirectional array is certainly more attractive, particularly when trying not to work eastern Europe. The horizontal antenna is also easier to guy; though in practice the mast was tied to a post or a stump and not guyed at all. The overwhelming advantage of the loop, though, is its ease of adjustment, since a Z-match coupled to an swr indicator will resonate a pair of old boots on 21MHz. Even allowing for this, it seems fair to say that at these very low heights the loop is inherently the better antenna, both for low-angle and for high-angle radiation. Both models could accommodate a 28MHz antenna without modification, but propagation conditions on that band have not been attractive enough to provide the stimulus for action. □

Extending the facilities of the experimental self-tutor for morse code

by M. R. IRVING, G3ZHY*

Introduction

The January 1978 issue of *Radio Communication* detailed the construction of an experimental self-tutor for morse code using the SN74S387 prom; an attempt to provide a learning aid which would simulate certain aspects of an "ideal" teacher. Since publication of the original article a number of amateurs have corresponded with the author to comment on their practical experiences with the construction and use of the tutor.

Basically, three types of comment have been received; specifically, relating to the supply of the prom, the design considerations, and modifications to the tutor. The first two types of comment were dealt with by the publication of supplementary information in *Radio Communication* July 1978, p579, and by individual exchanges of correspondence. With regard to the last type of comment—modifications, a number of amateurs have indicated that the range of facilities of the tutor could be extended to advantage by the provision of a "key" facility and a "character delay" facility. In view of the similarity of the suggested modifications, it was felt that they may, perhaps, also be of general interest to other constructors. Accordingly it was decided to incorporate them in the prototype and document the circuit changes and method of implementation in this follow-up article.

Key facility

The prototype design of the tutor was a "receive-only" unit, and did not include the facility to practice "sending" morse code. However, by the introduction of a front panel jack socket and key it is a relatively simple task to satisfy this requirement.

Initial thoughts on implementation were simply to disable the T input to the tone generator, and introduce a key "tied" to the +5V rail. However, it very soon transpired that this apparently obvious approach would not be practical, because under key-up conditions the T input to the control gate of the tone generator would be open-circuit, and therefore float to a high-level state (as do most input gates of 74 series ttl ics under open-circuit conditions). The net effect—a continuous tone would be emitted.

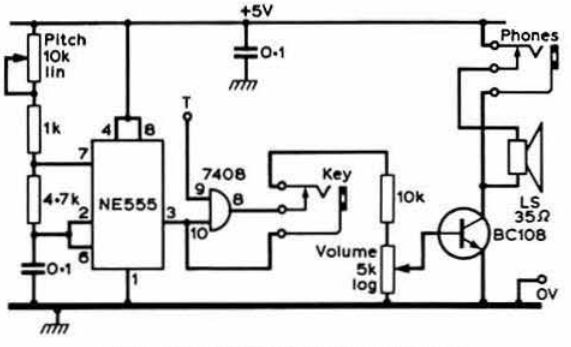

Fig 1. Tone generator (with key facility)

A slight change of approach was therefore necessary in order to achieve the desired effect, and this can be seen by reference to Fig 1. The key jack socket is connected between the control gate and the volume control circuitry in such a way that, when the jack plug is inserted, the tone signal bypasses the control gate and is connected directly to the volume control. The key facility, thus provided, still retains the full front panel control over the pitch and volume of the audio tone.

Character delay facility

There would appear to be a number of schools of thought as to the best and quickest method to learn morse code. Hence, perhaps, the variety of aids offered; records, cassettes, RSGB slow morse transmission, RAE classes etc. A number of indirect reports have been received from professional morse operators subscribing to the view that morse can be learned more rapidly if individual characters are received at speed, say at an effective rate of 18wpm, but with extended intervals between each character.

With this requirement in mind, the original circuit was examined to see if the existing HOLD facility could be extended to provide a variable-time HOLD instead of the switched RUN/HOLD capability. By deriving a variable-length HOLD signal from the character reset signal, instead of a "fixed" HOLD signal from the +0V rail, this seemed possible. Reference to Fig 2 will show the circuit which evolved, employing the two halves of an SN74123 dual retriggerable monostable multivibrator. Its method of operation is described in the following paragraph (it is assumed that details of the original article are to hand, or that they are fresh in the mind of the reader).

At the end of each and every character, a reset segment of value "00" is fetched from the rom and passed to the character generator module. This causes the tone generator to be muted and a high-level signal to be generated at pin 3 of the character reset gate (7432). This reset signal is also fed to pin 2 of the 74123, and its positive-going edge triggers the first monostable, thus producing a high-level output pulse of controlled duration at pin 13. The length of this output pulse is determined by the setting of the DELAY control, and, with the external timing components specified, delays between 0·5 and 3s can be obtained. Once the delay interval has expired, the positive output pulse at pin 13 goes low and its negative-going edge triggers the second monostable of the 74123. This in turn produces a further high-level pulse, this time at pin 5 of the 74123, which is fed to the RUN/HOLD gate (pin 12 of the 7400) and enables the character advance signal to proceed, thereby allowing the next character to be fetched from the rom. Once the next character has been

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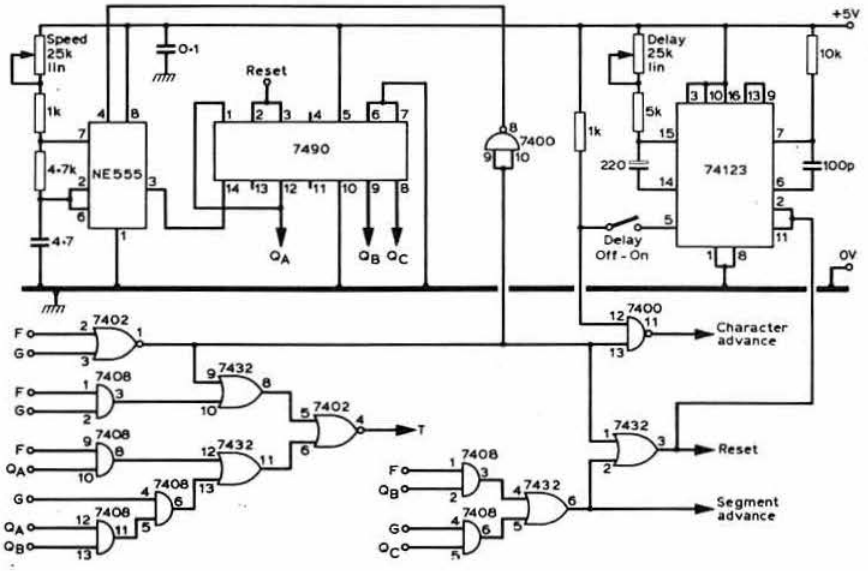
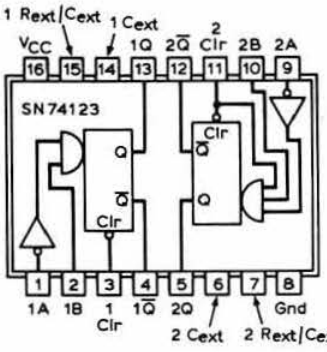


Fig 2. Character generator (with delay facility)

selected, the F and G outputs change, and a low-level signal appears at pin 11 of the 74123, thus resetting the second monostable and closing the character advance gate before the next character terminates. This cycle is repeated for each character while the DELAY mode is in operation. Fig 3 gives details of the SN74123 package and its function table.

To ensure correct synchronization of the master timing oscillator after the variable delay interval has expired, it is essential to disable the master oscillator throughout the delay period. This is achieved by applying a low-level signal to pin 4 of the NE555 timer ic (previously connected to the +5V rail). Once the delay has expired the master timing oscillator is enabled by returning pin 4 to a high-level state.

It should be noted that the new RUN/HOLD control is a 25kΩ linear potentiometer with switch. In the off position, normal free-running without delay is obtained by allowing pin 12 of the RUN/HOLD control gate (7400) to assume a permanent high-level state. To protect the tutor from spurious operation on noise, a pull-up resistor is connected between this pin and the +5V rail.



Function table

Inputs			Outputs	
Clear	A	B	Q	$\overline{Q}$
L	X	X	L	H
X	H	X	L	H
X	X	L	L	H
H	L	↓	⊓	⊔
H	↓	H	⊓	⊔
↓	L	H	⊓	⊔

Fig 3. Type SN74123 dual retriggerable monostable multivibrator

Installation considerations

It was considered desirable to incorporate the modifications in the prototype without making extensive changes to the front panel layout. Fortunately this could be achieved quite readily, albeit at the expense of a trade-off with existing controls.

The STEP facility was found, in practice, not to be used too frequently, and it was decided to replace this with the KEY jack socket. The RUN/HOLD facility, now that its range had been extended, was also removed and replaced with the new variable DELAY control. The revised front panel layout is shown in Fig 4, and it will be seen that it is only necessary to change the legend STEP to KEY, although RUN/HOLD could be changed to RUN/DELAY if this wording were considered more appropriate.

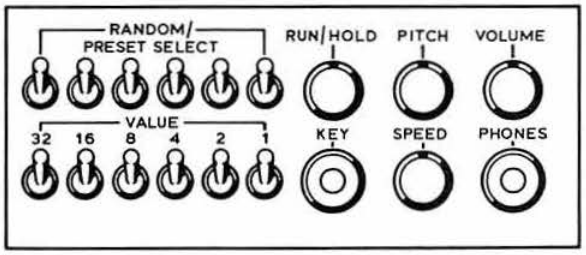


Fig 4. Revised front panel layout

The internal wiring of the KEY facility is very straightforward and presents no problem. However, the wiring of the DELAY facility was a little more difficult because of the limited space available on the main pcb. Some rearrangement of components was necessary before the additional ic socket for the 74123 and associated timing components could be accommodated. Clearly, the actual method of incorporating the modifications will be dictated by the particular method of construction adopted for the tutor.

Conclusion and acknowledgements

The above-described modifications have now been in service for some time, and practical use has shown that the general level of acceptance of the tutor, as a composite learning aid, has been greatly improved. The author wishes to thank all those amateurs who have constructed the unit, and who have subsequently taken time to write and express their views. Special thanks are extended to G4DND for his helpful correspondence regarding the DELAY facility. It is hoped that this supplementary information will be of interest to other constructors. □

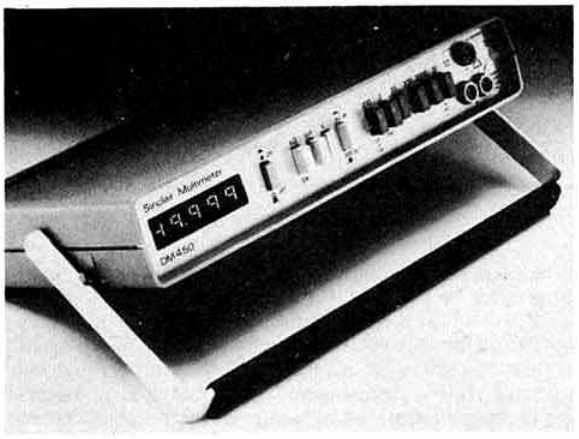
NEW PRODUCTS

Sinclair multimeters

Two new laboratory quality multimeters announced by Sinclair Radionics are designed for demanding measurement applications. The DM 450 is a 4½-digit, full five-function multimeter. It has a basic accuracy of 0·05 per cent of reading achieved by a high stability integrating conversion technique. The 3½-digit DM 350 has a basic accuracy of 0·1 per cent of reading and a total of 34 ranges.

Resolution on both units is down to 100μV, 1nA and 100Ω: dc voltage to 1,200 and current up to 10A can be handled, as well as resistance to 20Ω. A total of 34 ranges is available on both instruments. The DM 350 and DM 450, which incorporate all solid-state components and are fully protected against overload, feature forward facing, high brightness 8mm (0·3in) led displays of ultra-wide viewing angle, with automatic polarity and out-of-range indication.

Housed in slim ABS cases of rugged mechanical construction, the instruments measure 225 by 150 by 42mm (10 by 6 by 1½in) and weigh 670gm (1½lb). They combine a tilt stand and carrying handle which make them ideal for bench-top use or for carrying in a brief case or tool kit for field application.



The Sinclair DM 450

Power is from four C-size cells, and an optional ac adaptor is available where continuous use is required. Additional accessories include a rechargeable batttery pack, 30kV high voltage probe, and ever-ready carrying case with neck strap.

The DM 350 and DM 450 are available for £69 (+ VAT) and £99 (+ VAT) respectively.

For further information please contact Sinclair Radionics Ltd, London Road, St Ives, Huntingdon, Cambs PE17 4HJ. Tel 0480 64646. Telex 32250.

B & L bnc connectors

A range of 50Ω bnc connectors (to BS 9210) is now available from Belling & Lee Ltd. The initial 500Ω range is available in eight types with good performance up to 3GHz. Further information from: Belling & Lee Limited, Great Cambridge Road, Enfield, Middlesex EN1 3RY. Tel 01-363 5393.

Belling-Lee bnc connectors designed to meet BS 9210, N002 and N004 specifications

Additions to the Ambit International range

In the Ambit International range of recently introduced products there are three which will be of interest to radio amateurs. The 5A series of vhf coils are said to be the world's smallest fully-screened tunable inductors covering the range 30–175MHz. These are manufactured by Toko of Japan.

The MSM 5524 is a complete digital frequency display system with clock and various timers on a single cmos lsi. The MSM 5525 is a digital frequency display system for lw/mw/fm. The ic provides 16 diode programmable off-sets. These two items are manufactured by OKI of Japan.

Further information can be obtained from Ambit International, 2 Gresham Road, Brentwood, Essex. Tel 0277 216029 or 227050.

B-ware vehicle alarm

The system offered by B-ware Electronics Ltd is designed to give a car comprehensive protection, and is also simple to install. When the keyswitch is turned to activate the alarm, the siren will sound if any reasonably sized electrical load is applied to the battery. This means that opening doors fitted with courtesy light switches, operating the ignition circuit in any way, or turning on or off anything electrical will set off the alarm.

The alarm has the AA "Seal of approval" and their technical service report is available on request. The price of the unit is £34.74 (incl VAT). Further information and supplies from: B-Ware Electronics Limited, Fir Tree Mills, Higham, Near Burnley, Lancashire. Tel 0282 72954.

The Cornwall Raynet emergency

by W. J. COLCLOUGH, G3XC*, county controller, Cornwall Raynet

WITH snow drifts 14ft high, 70–80mph winds, temperatures down to as low as −12°C at night, traffic at a complete stand-still throughout the county, and well over 200 messages exchanged by some 40 Raynet stations involved from Saturday 30 December until Wednesday 3 January, are sufficient statistics to indicate that the emergency was very real.

During the Sunday and Monday it was almost impossible for traffic to move on any road in the county, and it was fortunate that Doug Fisher, G8DZE, owned a four-wheel-drive Landrover and managed with some difficulty to get to County Hall, Truro. There he set up a station working through the Newquay club repeater GB3NC (which seemed to have almost unlimited range) to collect reports of road conditions etc. Fortunate also that Ian Fugler, a 14-year-old swl who lives within walking distance of County Hall, was listening to the repeater, immediately grasped the situation, and made his way to see if he could be of assistance. On the Monday Spencer Evans, G3VGO, managed to get to County Hall and take some of the load off G8DZE.

The Raynet control station had to be set up on the first floor of County Hall as only a whip antenna was available, so that Ian and others had much exercise during the next three days delivering messages to and from the county emergency control centre in the basement. Further problems at County Hall arose from the staff being on New Year holiday, and only limited telephone facilities were available. This was just the situation for Raynet to show what it could do.

Raynet had a big advantage over most, if not all, of the other services supplying information to the control centre by not being hampered by lack of telephone facilities, and the fact that all the stations reporting in were scattered throughout the county—not only in towns, but in villages cut off by the snow drifts, and farms which could not get their milk to the processing factories. The primary information required by the county emergency planning officer (cepo), the user service being assisted by Raynet, was conditions on the roads and at cut-off farms, villages, and hamlets.

With more extreme weather forecast, Raynet's versatility was to be well tested, as it provided the only radio communication with County Hall until the Wednesday. At the morning conference of county council officials on that day it was decided that the highways dept and Raynet radio controls should be installed in the basement adjacent to the county emergency control. The next few hours were hectic to say the least. The author rounded up suitable antennas, feeder cable, plugs, sockets etc, and, together with G8DZE, now relieved by G3VGO, climbed out on to the roof of County Hall, in freezing conditions and gale force winds, to erect the antennas. Both complained bitterly of the conditions on the roof, and queried if this was really what amateur radio and Raynet were all about, but, in truth, they enjoyed every minute. Some 200ft of feeder had to be fed through partitions, cupboards, ventilators etc, and nothing seemed easy. By late afternoon all was complete and working.

In addition to vhf, 3,780kHz was monitored every hour, and contact was established with Somerset Raynet, G3TWO, and Avon, G4FRG. Only a small amount of traffic was passed on this frequency but weather forecast and current situations were broadcast from time to time.

Throughout the emergency the recently-formed North Cornwall Raynet Group, centred in the Bude area under the control of Paul Bruckel, G8FNA, accumulated details of conditions and passed them either to the county emergency control or to the Raynet controller who exchanged reports of conditions, weather etc on the hour every hour from 0900 to 2300 each day.

The Plymouth Raynet unit, under the direction of John Halford, G4EWZ, must be included in this report. From the beginning a link was established, first with the North Cornwall Group and then with the Cornwall control through GB3NC. They are to be congratulated on first-class watchkeeping, far into the night at times, with someone always to be found on one of the selected channels.

Not for the first time, Raynet in Cornwall had offered and given the public a most valuable and efficient service. Great credit is due to all who helped with this emergency; the discipline and operating was of an extremely high standard throughout. On Tuesday morning the author made a live broadcast on BBC South-West, giving amateur radio, and Raynet in particular, valuable publicity.

One outcome of this co-operation between Raynet and the County Council is that a permanent installation of new professional-grade antennas and feeder cables is to be ordered and erected at County Hall for the exclusive use of Raynet. These antennas will be for operation on 3·780, 70·144 and 433MHz. Raynet has also been offered certain facilities and accommodation in addition to what was already being considered by the appropriate committee, and every endeavour will be made to fulfil Raynet requirements. Some of the verbal appreciation was embarrassing, Raynet being referred to as unsung heroes by the chairman of Cornwall County Council.

The author is proud to be a Cornishman; as for the "fureigners" and "emmets", we could not do without them.

Kernow bys byken! Cornwall for ever! □

*Highview, Indian Queens, St Columb, Cornwall.

oscar news

Reference orbits

Orbits for the four operational satellites are as follows:

Oscar 7	Sunday 18 March orbit	19836	0109:11utc 079·4°W
Oscar 8	Sunday 18 March orbit	5263	0017:25utc 047·6°W
RS1	Sunday 18 March orbit	1709	0141:41utc 111·1°W
RS2	Sunday 18 March orbit	1708	0027:13utc 092·7°W

AMSAT-UK

The 1979 membership donation has been fixed at £4, with an additional supplement for overseas applicants of £1.50. A three-month orbital calendar for the Soviet satellites RS1 and RS2 is available to non-members for 50p plus an sase. Copies of a text describing a real-time tracker for RS1 and RS2 is obtainable for 40p plus an sase. Please ensure that the reply envelopes are at least large enough to take several A4 size sheets. These, and other AMSAT-UK supplies, are available from the hon secretary, G3AAJ, QTHR.

UOSAT—Britain's first amateur spacecraft?

by M. N. SWEETING, BSc, G3YJO

THE UOS-AMSAT team at the University of Surrey, in conjunction with the university's department of electronic engineering, AMSAT, and backed by British industry, has embarked upon a project to build Britain's first amateur spacecraft for launch into a polar earth orbit in 1981–2.

The mission objectives of the proposed spacecraft (to be known as UOSAT before launch) represent a departure from the traditional AMSAT Oscar satellites—so far oriented predominantly towards providing improved long distance communications for amateur operators at vhf and uhf. UOSAT will complement the Oscar series as an experimental and scientific amateur spacecraft.

Mission objectives

The mission may be viewed from three related angles:

To provide radio amateurs with a readily available tool for the study of the propagating medium through which they communicate, and to enable the amateur satellite service in particular to evaluate the suitability of novel methods and new frequencies for use in later amateur communications satellites.

To stimulate a greater degree of interest in space sciences in schools, colleges and universities by active participation.

To study the problems associated with an inexpensive spacecraft project in the UK and to establish an active body in this country contributing flight hardware to the AMSAT programme.

Payload philosophy

Notwithstanding the onslaught of the ubiquitous "black box" and the accompanying migration to vhf and uhf, there remains a very substantial proportion of radio amateurs who continue to use hf and the ionosphere for long distance communications. Indeed, even with the advent of amateur communications satellites, the ionosphere is still either the only or the preferred means of achieving long-distance communications by the majority of amateurs. There is still a "barrier" at about 30MHz between the hf user and his vhf/uhf counterpart, with satellite communication almost exclusively in the latter's domain. With this in mind, it is proposed to provide the hf amateur with a facility for gathering real-time information on the prevailing conditions of the ionosphere while at the same time introducing him to space science techniques.

Oscars 7, 8 and, before long, the new series of eliptic orbit Phase 3 spacecraft will furnish a comprehensive communications facility on the established vhf and uhf bands. Spectrum allocation is, however, limited and will inevitably precipitate a new trend towards higher frequencies for routine communications—a trend well established in the professional field. It is proposed that UOSAT be used to encourage more widespread interest and activity in microwave communication while evaluating the suitability of these frequencies for use in future AMSAT Oscar spacecraft.

Even though the Oscar series carried a strong educational flavour, the response from educational establishments in the UK has been somewhat lukewarm. Many children in the 10–16-year age group possess an innate interest in space activities; however, the hurdle of morse code (albeit elementary) for telemetry, and the RAE for active participation, does much to quench their enthusiasm. Far greater interest has been observed, among groups of school children visiting the university, in "weather pictures" taken from space—especially if they show land features. The visual image stimulates the imagination in a world where long-distance communication is taken for granted.

Payload

The payload will be considered in two components—service modules and experiment modules. The service modules will comprise all the functions fundamental to the basic operation of the spacecraft, such as the power sources, power conditioning, telemetry and telecommand systems, and will assume the highest priority during construction and testing.

The proposed experiment modules include:

Ionospheric studies experiment	Phase referenced hf beacons on 7, 14, 21 and 28MHz. Magnetometer. Radiation counters.
Education experiment	Earth-pointing slow-scan tv camera. Synthesized voice telemetry system.
Future systems experiments	SHF beacons on 1·296 and 10·47GHz. Expanded CODESTORE system. Microprocessor housekeeping system. Two-axis stabilization system.

Organization

The spacecraft will, as far as is possible, be constructed in modular form—commencing with the service modules and the simplest experiments (ie the hf beacons) and progressing through the more complex items until resources, including time, run out.

The project will be co-ordinated at the university and, while it is anticipated that much of the spacecraft will be built at the university, there will be opportunities for other amateur groups to contribute specific modules.

Resources

The resources necessary for a project of this magnitude are considerable, and fall into four main categories:

Cash. A sum of £85,000 has been raised to support personnel, components and travel.

Components. The major components, comprising 4,000 solar cells, two nicad batteries, magnetometer, and several antenna deployment mechanisms, have been located.

Facilities. Extensive and expensive test facilities are essential. Vibration, thermal, thermal-vacuum, dynamic balance and antenna test facilities have been arranged. A spacecraft

construction laboratory, an office, and workshop facilities are being provided by the university.

Manpower. The project manager will be a research fellow (G3YJO) with one other full-time assistant. There is a group of some 10 amateur and non-amateur university staff who will contribute on a part-time basis, and a number of under- and post-graduate students on a similar basis.

Opportunities

While much of the spacecraft will be built at the university, it is hoped that interested (and dedicated) amateurs or groups will contribute specific experiment modules, eg 1,296MHz beacon; 10·47GHz beacon; synthesized voice telemetry unit; and slow-scan tv camera unit.

It must be stressed, however, that undertaking a project of this magnitude requires considerable determination, self-discipline, thoroughness and skill, in addition to being able to maintain enthusiasm over an extended period.

There are also opportunities for suitably qualified persons to work full-time on the project based at the university at the following levels: research officer; research assistant; research student, and technician, with the opportunity of registering for a higher degree (where applicable).

Any individuals interested in the above positions, or any amateurs or groups interested in contributing experiment modules, are requested to send details of their qualifications and experience to: Martin N. Sweeting, G3YJO, Space Studies Group—AMSAT, Dept Electronic and Electrical Engineering, University of Surrey, Guildford GU2 5XH. Tel 0483-71281, ext 653.

Conclusions

This brief article has described the conceptual outline of what may become the first British amateur spacecraft. It must be appreciated that there is a long way to go before anything reaches the launch pad, and UOSAT may well evolve along different lines to those indicated above and carry a much-modified payload.

It should be said, however, that this project would not have even reached this early stage had it not been for the very considerable enthusiasm and practical assistance of British industry, research establishments, AMSAT, RSGB and the Department of Electronic and Electrical Engineering at the University. □

Editorial note

At its meeting on 1 February 1979 the Council of the RSGB agreed to support this project financially, if requested, up to a limit of £2,000

Science Museum lectures

"The World of Amateur Radio"

AT the invitation of the director of the Science Museum, the RSGB, represented by members of the Education Committee, presented three lectures entitled "The World of Amateur Radio" in the lecture theatre of the Science Museum, on 5 and 6 January.

The audience for each session contained a cross-section of the general public ranging in age from 7 to 70-plus. As the audience entered the lecture theatre they received a package containing RSGB publicity, leaflets describing the construction of a bfo and a morse practice oscillator, an inscribed ballpoint pen and a small packet of components. The components, being suitable for the construction of a morse practice oscillator, were supplied by courtesy of J. Birkett Ltd of Lincoln.

Mr J. Freeborn, of the Science Museum staff, set the scene for the lecture, which commenced with Len Newnham, G6NZ, describing how it all started—with a demonstration of a spark transmitter and coherer receiver—and then briefly mentioning the growth and contribution of amateur radio up to the space age and satellite communication. This was followed by extracts from the film "The Ham's Wide World", presented by Jack Anthony, G3KQF.

Bill Scarr, G2WS, presented a fascinating picture of a 28MHz cw contact he recently made with a UA9 station using simple equipment. He stressed how it was not necessary to invest in expensive commercial equipment, and he described how QSL cards are exchanged and lasting friendships formed.

During the next section of the lecture, Sy Oxley, G8MW, demonstrated the effect of the reflective layers around the earth with the aid of 10GHz equipment. G8MW and David Pratt, G3KEP, then conducted an experiment to show how a broadcast receiver could be used to receive cw by placing a small self-contained bfo or the oscillator of another receiver near to the antenna of the main receiver.

G3KEP then entered the body of the hall and invited a member of the audience to select a newspaper passage, which he transmitted on cw with a single transistor transmitter. G8MW copied this transmission over the broadcast receiver, using an external bfo, and read the passage back to the audience; this brought forth spontaneous applause on each occasion.

The formal lecture session was concluded with G3KEP contacting GB2SM via 144MHz fm and then demonstrating the resolution of an ssb signal from GB2SM using the broadcast receiver and external bfo and a home-built top band receiver.

Each lecture was conducted against a background of suitable slides and with the able technical assistance of Fred Ward, G2CVV, and Dan Adams, GW3VBP. The audience was then invited to inspect the display of equipment and publications and put questions to the team before visiting the Science Museum station, GB2SM, to look at commercial and other equipment.

Judging from the questions received and the audience reaction, this introduction to amateur radio and the simple methods of getting started was highly successful. The Society is grateful to Mr Winton and Mr Freeborn of the Science Museum for the opportunity of presenting these lectures and looks forward to co-operating in future projects.

G3KQF

technical topics

Pat Hawker, G3VA

FOR many years amateurs have suffered persistently (if not exactly in silence) from the unfortunate inability of so much domestic and personal electronic equipment (including even such vital medical devices as the early "pacemakers") to perform satisfactorily in the presence of high rf fields, whether or not the local signals are related to any frequency being actually processed in the equipment. Manufacturers (or at least some of them) are fully aware of the problem but imply that it would be uneconomical to design all appliances to withstand strong signal levels when only a small minority are ever likely to be installed alongside a transmitter. In the UK, they may point out, there are some 20 *million* homes with tv receivers, compared with some 20 *thousand* amateur transmitters. So tv receivers, radio receivers, audio amplifiers, tape recorders etc continue to produce difficult and intransigent social problems for radio amateurs: *who* has ever really been able to convince an audiophile that it is *his* equipment that is at fault?

Paradoxically, 27MHz citizen's band may turn out to be the amateurs' salvation. The operation in the USA of *millions* (over 14 million official licences) of mobile and domestic transmitters seems at last to have convinced the FCC that something *must* be done. In November 1978 FCC launched a major enquiry to determine the extent to which rfi impacts on consumer electronic products, medical products and public safety communications (ie ambulance, fire, police services etc). They are also looking into the question of the extent to which consumers are or are not aware of simple solutions to common rfi problems. In the year to September 1978, FCC received some 85,404 rfi complaints (slightly down from the 90,000 in the previous year).

High performance tv receiver

One possible outcome of the FCC enquiry may well be renewed interest in (and official funding of) the special prototype receiver developed a year or so ago by Texas Instruments: see "High performance receiver" by Darell L. Ash, *IEEE Trans on Consumer Electronics*, Vol CE-24, No 1, February 1978. Development of this highly promising design seems to have virtually ceased since US set-makers showed little interest.

This receiver used a number of techniques more akin to those found in modern solid-state communications receivers than in the average television receiver. For example, it made use of silicon uhf mesfets (metal-semiconductor field effect transistors) which are claimed to provide much superior uhf performance to jfets, mosfets or the more usual bipolars found in existing designs, particularly in terms of improved dynamic range when used in rf, mixer and high i.f. stages. Indeed the i.f. used in the TI design is 346MHz (some 10 times higher than the usual tv receiver i.f.), and the i.f. stages include two saw (surface acoustic wave) filters. The double-balanced mesfet mixer is based on the well-known active double-balanced circuit developed some years ago by Ed Oxner.

The TI engineers claim that the prototype receiver effectively met all design targets and eliminated picture image, sound image, i.f. beat, half-i.f. beat and cross-modulation distortion problems, thus providing greatly improved adjacent channel performance (which would allow more television transmitters to be operated) and intermodulation performance, while maintaining good uhf noise figures (note American uhf tv noise figures in their conventional sets tend to be very high). Noise figures in the prototype were around 8dB uhf, 6dB vhf. Indeed many of the techniques, including the use of mesfets, would be worth considering for amateur vhf/uhf receivers. But of course nobody pretends that even with mass-production it will prove possible to make and sell such receivers at the same cost as existing designs. So one suspects that, if they are ever to come into general use, the FCC will have to start firing some of its big guns—as it did in forcing American set-makers to include uhf bands in all tv receivers some years ago.

144MHz band-stop tvi filters

For a number of years a succession of editions of *ART* have drawn attention to the attractions, when dealing with tvi, of using band-pass filters at the transmitter and band-stop filters at the affected receiver(s) rather than the usual low-pass and high-pass filters. The use of band-reject filters at the receiver is particularly attractive in the case of interference from 70, 144 and 432MHz transmissions, where tv reception may sometimes be on frequencies higher than, sometimes lower than, that of the amateur transmitter.

Even a simple series-tuned resonant circuit across the tv feeder can help and may sometimes reduce local signals by 30–45dB; such an arrangement is shown in *ART*. A rather more elegant band-stop design used by the Post Office for reducing strong local (or sporadic-E) signals is the "bridged-T" filter, also described in *ART*, which when correctly adjusted can provide a tunable sharp symmetrical "null" even within the frequency band used for tv reception. Band-rejection filters of high-Q can also be made using single or double stubs made from coaxial cable.

Jan Martin Noeding, LA8AK, points out, however, that the technique of using band-stop filters to cure tvi caused by 144MHz transmissions still receives relatively little coverage in most of the handbooks. Recently he encountered a problem of severe tvi when working "aurora" with 100W output on cw. For such transmissions his beam antenna needed to be directed virtually straight at a house some 10m distant, where his signals blanketed the tv receiver and blocked reception (LA8AK does not make clear whether tv reception was (as I suspect) on vhf Bands 1/3 or uhf Bands 4/5).

The Norwegian radio and tv interference investigation team found his equipment (Kenwood TR7010 driving QQE06/40 pa) to be reasonably good; an article in the Dutch *Electron* (No 11, 1978) encouraged him to try the use of band-stop filters tuned to 144MHz and installed in the neighbour's tv feeder: Fig 1. His simple version of the *Electron* design was made up on a small piece of printed circuit board using low-cost components; the total price, including cable connectors, being not more than about £1.50–£2. The filter was aligned using a test circuit (Fig 1(a)) incorporating a 3dB pad, tuning the resonant circuits as follows:

Circuit	For 144–146MHz filter	For 144–144·5MHz filter
L1/C1	144MHz	144MHz
L2/C2	145MHz	144·25MHz
L1'/C1'	146MHz	144·5MHz

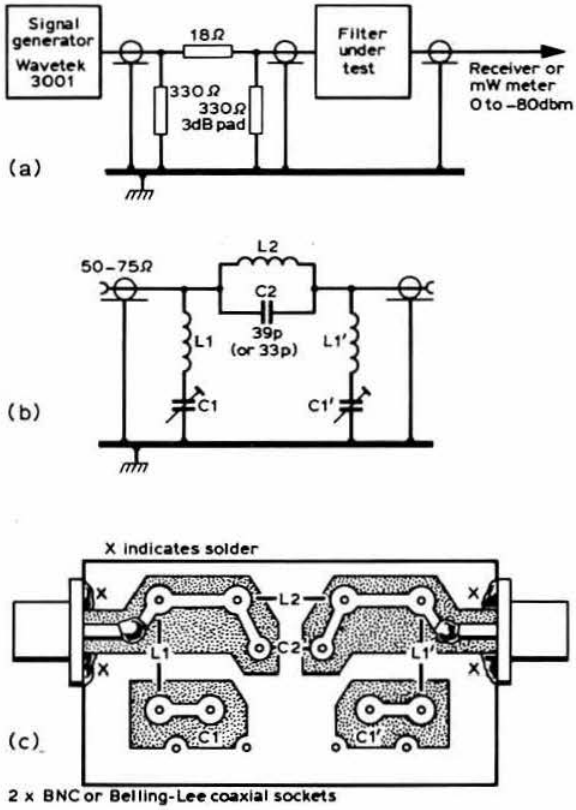


Fig 1. 144MHz band-stop filter as built and tested by LA8AK and capable of providing 50–60dB attenuation over all or part of the 144MHz band. The parallel resonant circuit (L2/C2) is tuned to centre of required rejection band by squeezing, pulling or bending turns. Series-resonant circuits trimmed for maximum attenuation at upper and lower frequency limits. C1, C1' 4-20pF trimmer (ceramic), C2 33pF ceramic, L1, L1' 10t 18swg 4·5mm id, L2 2t 18swg 7·5mm id. Alternatively L2 2t 12swg 7·5mm id with C2 39pF ceramic. (a) Recommended test circuit. (b) Band-stop filter. (c) Constructional details

A stable or crystal-controlled signal generator should be used for alignment (eg crystal calibrator). The 3dB pad is needed to prevent "short-circuiting" of the signal generator output, as this can cause false indications.

LA8AK found that this simple arrangement cured his problem completely, although impedance and return loss have not yet been measured.

Antenna lore

The antenna is not only the most important part of any amateur station, but also remains the most misunderstood part. A few years ago, M. Walter Maxwell, W2DU/W8KHK, delivered a withering attack on the many myths and fallacies surrounding the whole "standing wave ratio syndrome" (see *TT* June 1974 and *ART5/6*) and I remember once horrifying a "World Radio Club" panel by admitting that it was (is) my normal practice to tune up hf antenna systems using neon bulbs and torch bulbs rather than by using an swr meter (though I hasten to add that I have nothing against swr meters provided the readings are correctly interpreted!). But attacking antenna myths is always a dangerous business, often provoking vigorous counterblasts.

The latest to take the risk is T. King, ZL2AKW, (*Break-in* October 1978) who has come up with 13 "basic antenna facts" (slightly modified in the version given below):

(1) A dipole cut for the centre of the 3·5MHz band and fed with 50 or 75Ω coaxial cable via an antenna tuner will be just as good at the band edges as it is at the resonant frequency of the dipole element.

(2) The same dipole, fed with 300Ω ribbon or open line, again via an atu, will work on *any* band from 1·8MHz to 29·7MHz.

(3) Unless higher than 150ft, it hardly matters on 3·5MHz in which direction a dipole points: more significant will be the obstructions, trees etc which absorb some of the power.

(4) A long antenna provides more receiver microvolts than a short one (ie less than $\lambda/2$) but a transmitting antenna radiates all the power that can be fed to it (except IR losses).

(5) Antennas, and the equipment connected to them, can confidently be expected to provide better and better results on hf as a sunspot cycle goes up and up.

(6) The result of doubling your rf output power will be virtually unnoticeable, but halving input power may well be noticeable since output efficiency may be affected.

(7) A loosely-loaded transmitter sounds awful when overdriven.

(8) A tightly-loaded transmitter, when overdriven, sags at the knees and output may even be reduced.

(9) A properly tuned system is when the antenna correctly loads the transmitter.

(10) A poor antenna is always a poor antenna; but when conditions are good it will work.

(11) There are no magic formulas or magic boxes able to improve the performance of poor antennas, but it is easy to reduce dramatically the efficiency of a good antenna.

(12) A bought antenna is not a better antenna but merely a more expensive antenna; a better investment is a good book on antennas.

(13) Is your best friend afraid to tell you?

Battery eliminator for 12V rigs

Some time ago (*TT* April 1976 and *ART6*) Stephen Price, G4BWE, provided a 12V power supply intended to meet the common requirement encountered when operating hand-held or mobile rigs as fixed stations. Since these rigs usually have built-in voltage regulation there is no real need to use elaborately stabilized units for such a purpose.

A detailed description of a comparable unit, but protected against accidental short-circuits across the output, is given by Alan Wooller, ZL1AUW, in *Break-in* (September 1978). This is intended to provide sufficient output for 10W 144MHz rigs or for some of the smaller hf rigs such as the Argonaut. It is capable of providing 4A at 50 per cent duty cycle or 2A continuously, and will withstand a direct short-circuit for about 3min before seriously overheating. To achieve 4A output continuously, better heatsinking of the transistors would be required.

While there is nothing particularly new or critical about the circuit arrangement (Fig 2), the article includes some useful general advice.

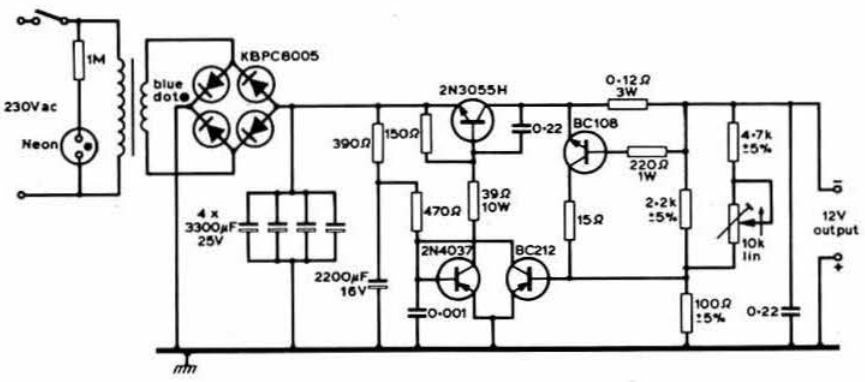


Fig 2. ZL1AUW's battery eliminator for use with low-power transceivers etc

His transformer is home-wound (primary 200 turns of 0·355m/28B&S/29swg; secondary 68 turns of bifilar wound 0·8mm/20B&S/21swg); it may be rather easier to modify an existing mains transformer to provide a winding with an output of approximately 17·4V. The main heatsink for the 2N3055H consists of two square aluminium plates (4 and 3in square) assembled together on the chassis and, as usual, insulated from the power transistor by means of the mica washer spread on both sides with silicone grease. A clip-on finned heatsink is used for the 2N4037. For the rectifier diodes a heat spreader comprises a 1½ by 1½in aluminium plate with a 5/32in hole in the middle if the KBPC 80055 bridge rectifier is used. The 3W 0·12Ω resistor can be made by winding 2in of constantan wire (0·63mm diameter) around a 1W resistor of no particular value (alternatively 1·2m (4ft) of 26swg copper winding wire). This resistor, together with the BC108 transistor, forms the current-sensing circuit which limits the output current under short-circuit conditions to about 5·2 to 5·9A (if outside this, trim the 0·12Ω resistor until the current is within range—increasing resistance will decrease output current).

A hometaxial-base 2N3055 transistor (ie 2N3055H), as made by RCA and Toshiba, is more suitable for this application than the alternative epitaxial base type. Do not attempt to use 16V electrolytics in place of the specified 25V units.

As in any three-stage feedback amplifier, there is a risk of oscillation, although the 0·22μF and 0·001μF capacitors should eliminate this in the vast majority of cases. However, if any tendency towards oscillation is found, alternative values should be tried in these positions, or additional capacitors fitted (a 0·0047μF capacitor from collector to base of the BC211 may also help). The symptoms of oscillation are wrong voltage, or "strange noises from the receiver" (if you have an af volts position on your multimeter, or connect a 0·1μF capacitor in series with the low ac-volts range, a check can be made for oscillation; anything over 0·2V rms should be viewed with suspicion).

Performance specifications include: no-load output voltage adjustable between 12 and 15V; load regulation 0·5V at 4A load; line regulation 0·1V for 10 per cent change of mains voltage; short-circuit current maximum 6A; continuous rating 2A; 4A transmit and 0·5A receive at 50:50 duty cycle; short-circuit rating 3min.

Kit sets for the unit have been produced by the North Shore branch of NZART (PO Box 33358, Takapuna, New Zealand) but there should be no difficulty in obtaining suitable components locally.

FET-input ac/dc voltmeter

The availability of operational amplifiers incorporating fet input devices such as the CA3140 (see *TT* February 1978) provides the stimulus for a sensitive fet-input op-amp ic voltmeter (*Electronics Australia* September 1978) with an input resistance of 10MΩ shunted by a capacitance of about 27pF. This has a bandwidth of from <10Hz to >300kHz (for −3dB points). Whereas a conventional 741 op-amp has a typical input bias current of just under 100nA at room temperatures, the equivalent figure for a CA3140 is some 10,000 times lower, about 10pA.

Fig 3 shows a basic dc voltmeter designed around an op-amp ic device, while Fig 4 shows the complete circuit details of the *Electronics Australia* design. The ac feature is obtained using a bridge rectifier meter arrangement, with the value of the current sink resistor reduced (S1c) by some 10 per cent to account for the difference between average and rms values of a sine waveform. The 10kΩ input series resistors, together with the built-in protection diodes on the ic chip, protect the mosfet input transistors against excessive voltages. Similarly the 1kΩ resistor in the output circuit of the op-amp gives a degree of protection to the meter movement. The 22kΩ resistor in the output circuit shunts the bridge diodes and assures that some current flows in the feedback network when no signal is being applied; this resistor and the 0·1μF capacitor shunting the meter assure stability of the circuit. The 220Ω resistor and 470Ω trim-pot across the meter provide a range of adjustment for calibration. The resistive network between pins 1 and 5 of the

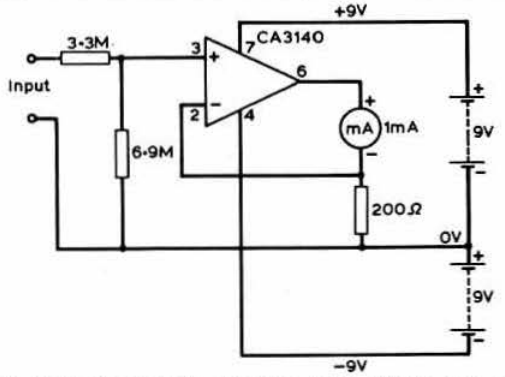


Fig 3. Basic dc fet-input voltmeter using CA3140. The input impedance is determined virtually by the input resistors

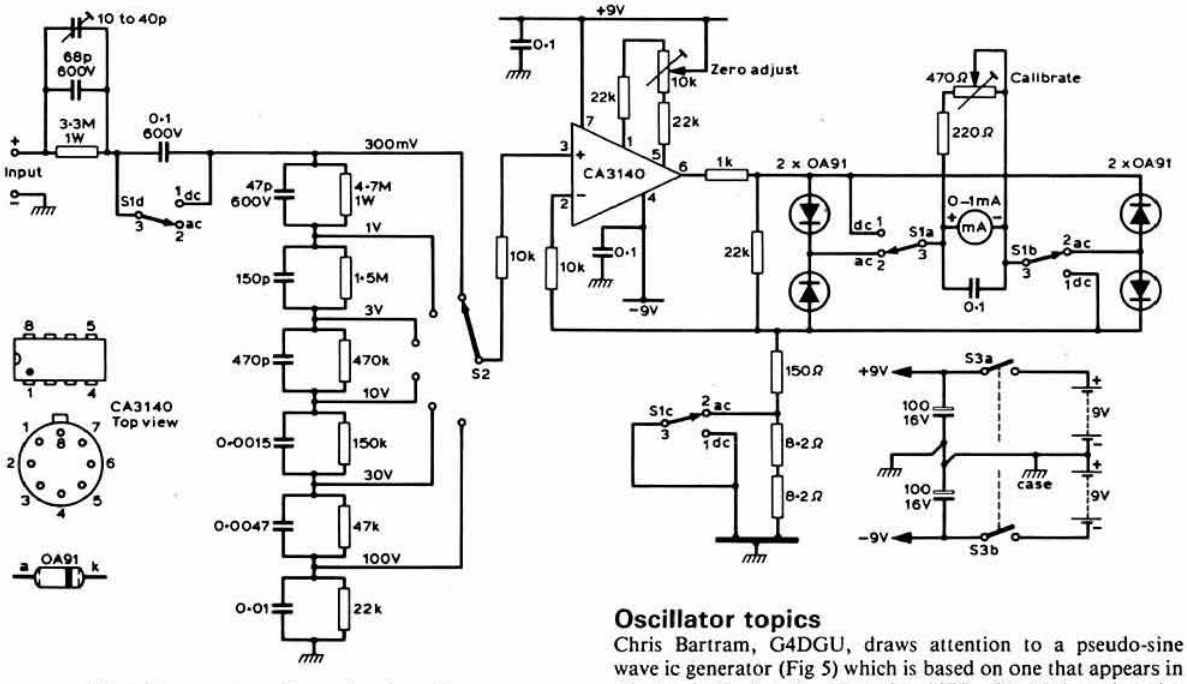


Fig 4. The complete *Electronics Australia* fet-input ac/dc voltmeter

CA3140 provide a range of offset adjustment, since output offset voltage shows up as a small deflection of the meter, with the 10kΩ trim-pot enabling the meter to be zeroed.

The article stresses that for high impedance circuits of this type it is essential that the printed circuit board, if one is used, should have the highest possible insulation resistance and should preferably be of the fibreglass type; remember that one needs to have an insulation resistance of several hundred megohms between adjacent tracks. Ideally the input voltage divider should use close tolerance components, although the *EA* prototype used a mixture of 1 per cent and 5 per cent resistors and 10 per cent capacitors, even so it proved possible to obtain overall accuracy within ±2 per cent on all ranges. The whole unit, together with the two small 9V batteries, was housed in a plastic box measuring 197 by 60 by 112mm. The original *EA* article, which runs to five pages, includes full constructional details with pcb patterns, calibration scales, panel lay-out etc: however, it is hoped that the above abridged details will help readers construct comparable units.

Oscillator topics

Chris Bartram, G4DGU, draws attention to a pseudo-sine wave ic generator (Fig 5) which is based on one that appears in *Electronic Engineering* December 1978, p25. "It is such a nice idea and it really works", he comments.

What is described as a series-mode crystal ttl clock source (ie oscillator) with no start-up problems was described in *Electronics* 25 November, 1976: see Fig 6. Not only will it start up on the genuine series-resonant frequency every time but, it is claimed, it will operate with almost any crystal from any manufacturer, and its stability is dependent on the characteristics of only two components.

Operation is described as follows. The two ttl inverters (or NAND gates with the inputs tied together) provide the necessary gain and phase inversion. The two rf chokes provide dc feedback at the inverters that forces them into a linear mode; these chokes are chosen to provide enough loop gain to drive a weak crystal, and should have a dc resistance of the order of 100Ω or less. R1 and R2 are Q-swamping resistors to eliminate oscillation of the circuit at the self-resonant frequency of the chokes. If low-Q chokes are used, these resistors may be eliminated.

Serial-mode crystals tend to have three stable modes of oscillation: the one specified, one above that frequency, and one below it. C1 and C2 are included to eliminate the higher and lower frequency modes: by lowering the impedance of the

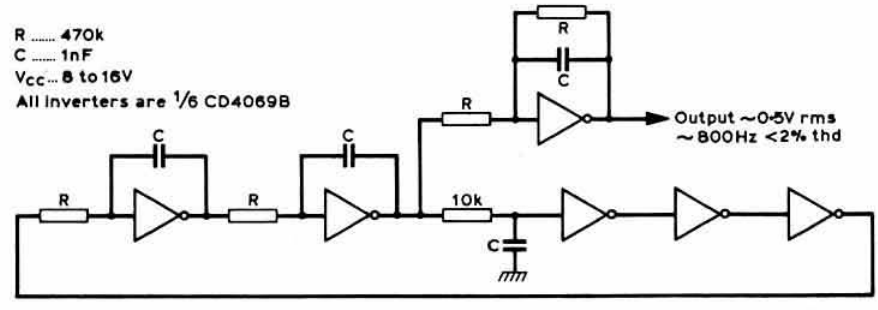


Fig 5. Integrated-circuit pseudo-sinewave generator

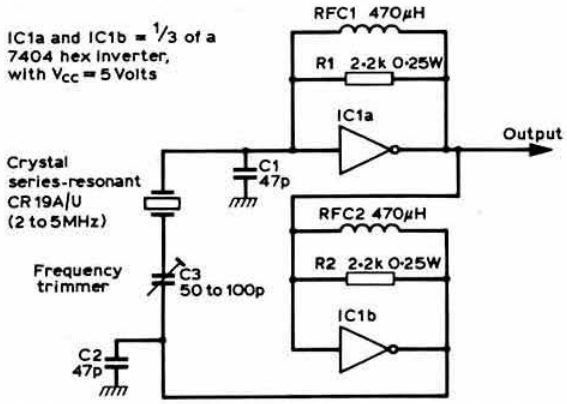
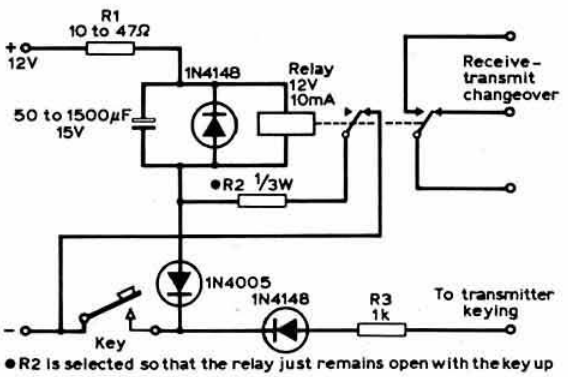


Fig 6. Series-mode ttl crystal-oscillator claimed always to start up at right frequency and suitable for use with most crystals

loop they ensure that the oscillation is on the specified frequency. Component values shown are suitable for 2 to 5MHz. At lower frequencies the values of RFC1, RFC2, C1 and C2 should be increased. Above 5MHz, C1 and C2 should be reduced in value to 22pF or less.

"Vox" for cw

Many years ago I recall a control unit being described in the *RSGB Bulletin* that provided a form of vox-like operation for cw. All switching from "receive" to "transmit" and vice-versa was done through the operation of the morse key by introducing a large capacitance across the changeover relay, so that the relay stayed "on" during the normal keying of the transmitter but dropped "out" after a slight delay when keying ceased. In fact I remember that a copy of this system was used very successfully at one or two post-war NFDs by the old Barnes & Chiswick Group, and proved a very convenient technique. The system did not catch on, partly because in those days capacitors of very large value were not easy to come by. It should be noted that such a system represents (like vox) a convenient changeover system but does not provide full break-in operation, which implies the ability to hear incoming signals between words and letters.



•R2 is selected so that the relay just remains open with the key up

Fig 7. DL5KW's "cwox" provides vox-like facilities for cw operation with changeovers initiated when keying starts or stops

In *CQ-DL* No 7, 1978, a short note by Paul Weise, DL5KW, outlines a modern form of such a "cw-vox" (or should it be just "cwox"): see Fig 7. The value of the large-capacitance electrolytic capacitors determines the delay time, and it may be useful to provide some switched values. As shown, the system is for use with "positive" keying.

Logically switching rf signals

Gian Moda, I2SWX, draws attention to an item in *Electronics* (12 October 1978) by W. B. Warren on the use of the open-collector outputs of ttl devices to provide a ready means of switching low-level rf signals. This facility can be used, for example, to select signal sources digitally in test equipment, different bandwidth filters in a receiver, and possibly for channel changing etc. When used with a 50Ω source and load, rf attenuation through the switch at 10MHz is about 1·3dB when the switch is active, and greater than 40dB when the switch is open.

Fig 8 (a) shows the basic rf switching element. When the control signal is "low", the open collector output of the NAND gate is high, so that D1 is back-biased, D2 conducts and the switch

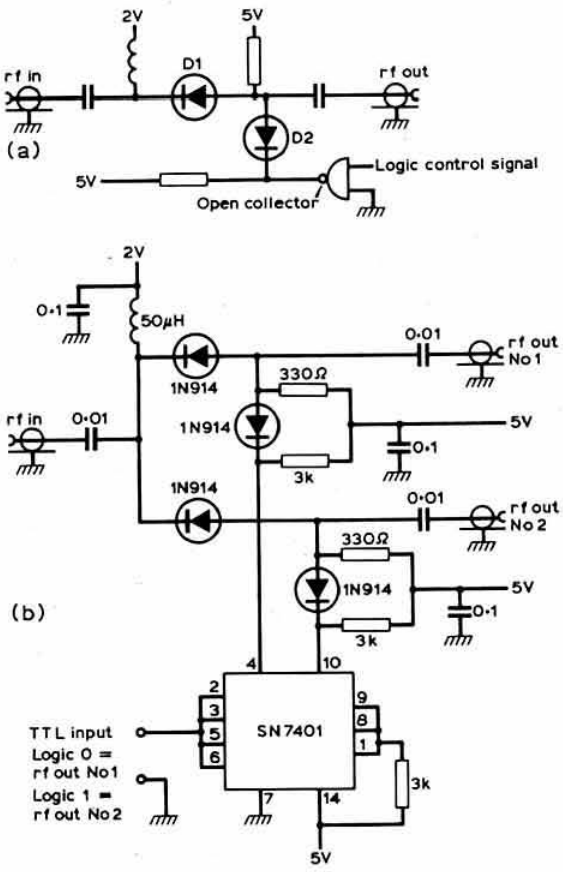


Fig 8. Digital rf switching for low-level rf signals. (a) Basic switch using open-collector ttl element. (b) How basic idea can be extended to provide single-pole, double-throw rf switch

is turned on. It is suggested that the capacitance of the open-collector output of the logic element will not affect the operation of the circuit since the reverse-biased D1 prevents the element from shunting the rf path. When the control signal changes to "high", the open-collector output falls, D1 conducts, and the dc voltage at the junction of the diodes falls to a low value. The voltage across D1 is no longer high enough to keep the diode conductive, so that it becomes reverse-biased and the rf signal does not appear at the output.

Fig 8 (b) shows the application of this basic arrangement to a single-pole double-throw rf switch with logic control for the switch provided by two 7401 open-collector NAND gates.

Matters arising

A number of brief but valuable addenda to items or topics previously raised in *TT* merit consideration:

Car ignition suppression: Alex Gordon, G8FYO, notes that a range of spark plugs with built-in resistive suppressors is available in the UK (Champion and possibly other firms). They offer the advantage of fewer contacts in the system, which should result in better suppression and reliability. They cost about 20p more than the conventional plugs, although G8FYO has found that curiously little effort is made by manufacturers or local stockists (if you can trace one actually carrying stocks!) to get such plugs into vehicles. By persistence, G8FYO eventually obtained some and suggests other amateurs might try badgering their local agents to obtain some of these useful additions to the armoury of interference-suppression aids.

Testing nicads: J. A. G. Milne, writing from Anglet, France, comments on the "new life for Pye PF1 batteries" (November 1978). He is not too happy at the suggestion of tracing defective (high internal resistance) cells with a high-resistance voltmeter, unless the cell is measured under load, since even with a 1,000Ω/V meter an internal resistance as high as 50Ω would result in a reading only about four per cent lower than normal. He considers that the old trick, when testing primary or secondary cells, of a quick flick across an ammeter would produce more convincing indications. Personally I am not too sure that high internal resistance is always the trouble with nicads, as I seem to recall reading that more commonly they develop internal short-circuits which, of course, would show up on a voltmeter: but the general idea seems a good one.

Dynamite and rf: Chris Bartram, G4DGU, feels, that the December 1978 item on this subject should have made it clearer that the major hazard comes from mf/hf rather than vhf/uhf radiation. In any case he dislikes the unqualified use of the term "erp" (by which I mean "effective radiated power with reference to a dipole") much preferring the CCIR-recommended "eirp" ("effective isotropic radiated power", see *ART*). I agree eirp becomes virtually essential when dealing with, say, microwave parabolic antennas, but in common with current UK practice in broadcasting, I still feel that, at least up to 900MHz, "erp" is an acceptable term carrying the implication that this is with reference to a dipole. On a slightly more fruitful tack, G4DGU reports that he is one of the lucky people now using a gasfet (Plessey GAT5 gallium-arsenide fet) in the front-end of his 432MHz eme receiver, with a noise temperature of about 50–55°K or about 0·69–0·75dB, and still possibly capable of improvement.

Grey-lines made easy: Marco Laanen, 6W8BC/PA0FOF, writing from Dakar, points out that 3·5MHz enthusiasts having access to a programmable calculator have a simple way of ascertaining the grey-line for the day. He writes: "Recently while drawing a great circle map around Dakar, it dawned upon me that the grey-line, being a great circle, is at the time of sunrise and sunset a great circle through the centre of the map and so forms a straight line. After some thinking I found another point on this line.

"After you calculate the time of local sunrise you can find the place on the equator where the sun rises at the same time. Now enter the co-ordinates of this place in the program used for making your great circle map and you will get an angle that describes your grey-line for that day. As a test, at midsummer and midwinter this line should touch both polar circles. I would like to try out this idea fully but my calculator has broken down."

Walter Van Roberts: From Richard Thurlow, G3WW, comes the welcome news that Walter Van Roberts, W3CHO, whose pioneer work on close-spaced, plumber's delight Yagi antennas was noted in the January issue, is still an active enthusiast, now signing W2CHO and K4EA. G3WW, who has met him several times, mentions that at his winter home in Englewood, Florida, overlooking the Gulf of Mexico, he has a *rhombic* rising just above the tree tops! He regularly joins in a four-way schedule most Sundays which includes G3WW, W2RNC and K2BH. As G3WW comments, "It's a small world". □

microwaves

Charles Suckling, G3WDG *

New address for correspondence

By the time this appears in print, the writer will have moved to a new job. Until a new permanent QTH is established, please send correspondence to the address below for forwarding.

Forthcoming round table meetings

Two round tables will be held in April. The first will be at the IBA Engineering HQ, Crawley Court, on 1 April. This will include organized demonstrations of how to use the test equipment which has now become a regular feature of this event. Equipment available will include a spectrum analyser, power and frequency measurement apparatus, a slotted line for 10GHz, and noise figure optimization equipment for 0–1GHz and 10GHz. Please bring along any equipment which you wish to measure. Further details can be obtained from G3JHM.

The second meeting will be at Sheffield University on 28 April. G8AGN may be contacted for further information.

Heliax connectors using standard N-type plugs and sockets

More and more operators are realizing the advantages to be gained in using very-low-loss coaxial cables on the lower microwave bands. Recently, reasonably large quantities of Andrews FHJ-4 cable (a 0·5in diameter foam-filled heliax cable) have become available. This is very useful indeed, having losses of only 2dB/100ft at 432MHz, 4dB at 1·3GHz and 5·5dB at 2·3GHz. The writer has found it to be quite useful even at 10GHz, where the losses are less than 2dB/10ft.

The main difficulty in using this cable up to now has been the supply of suitable connectors, which are relatively expensive when new. G3YGF has supplied details of a method for adapting standard N-type connectors to fit this cable. The resulting fittings have been tested for loss and swr up to 10GHz, and have been found to perform as well as the proper connectors.

There are two common types of N-type plug, and only the shorter, thicker version is suitable for modification. To check a particular connector, measure the overall length of the plug (with the cable clamping nut removed) and the diameter of the plug body (not the knurled nut). Suitable connectors are 1·32in long and 0·75in in diameter, while those which cannot be modified are 1·52in in length and have a diameter of 0·685in. The modifications should also work for cable mounting sockets, although G3YGF has not yet encountered a socket of the correct type. The parts of the plug which are used are the main body, cable clamping nut, centre pin, and the two ptfe washers which locate the centre pin.

The first stage is to bore out the cable clamping nut to 35/64in id, preferably on a lathe. The nut can be screwed into the body of the plug during this operation, for support. The second stage is to manufacture an adaptor piece to allow the centre pin to be fitted on to the centre conductor of the cable. This adaptor is shown in Fig 1. It is recommended to construct

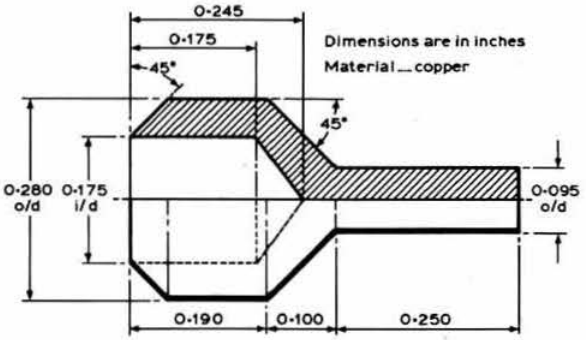


Fig 1. Centre pin adaptor

this out of copper, rather than brass, as this allows some flexibility during alignment, with less risk of the centre pin breaking off. Start by turning down a piece of copper rod to 0·28in diameter, and turn the end pin to size. The 45° taper at the end of the pin is then cut, using a chisel shaped tool, at 45°. Next, part or cut off the piece 0·2in from the large end of the taper, and refit in the lathe the other way round. Face off the cut end to the 0·19in dimension. Cut a 45° taper on this end, in the same way as before. Bore out the 0·175in diameter hole in this end, taking care not to go deeper than shown, or the walls near the taper may get excessively thin and thus weaken the adaptor.

The rear ptfe washer should be filed slightly to reduce its diameter, and its front edge chamfered, so that it is an easy fit inside the body of the plug and will not jam at an angle inside the plug during assembly.

The end of the cable should then be prepared as follows. Remove the plastic sheath 1in from the end. Mark the outer conductor at a point 0·15in from the end, and cut through all the way round, going into the foam a short distance. Remove the outer and foam by twisting. Clean the centre conductor, being careful not to scrape through the thin layer of copper.

The complete connector may then be assembled, referring to Fig 2. Tin the inside of the cable clamping nut, the pin and the inside hole of the adaptor. Mount the cable horizontally in a vice, tin the centre conductor, heat up the adaptor and solder to the centre conductor, being careful to push the adaptor on as far as it will go. Assemble the rear ptfe washer on the connector pin, and solder the pin to the adaptor. The larger ptfe washer may then be placed in position on the pin.

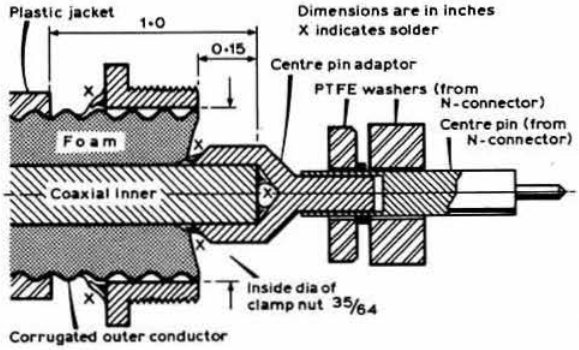


Fig 2. Assembly of plug

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The clamping nut is then positioned over the outer conductor, and the plug body screwed on to the nut fairly tightly by hand. Ensure that the pin is in the centre of the plug, and adjust if necessary by bending carefully. Slide the plug along the cable so that the centre pin is recessed in the plug by the correct amount. Hold the nut firmly in position on the cable, and unscrew the plug body. Without moving the nut, solder it on to the outer. Then reassemble the plug and check that the centre pin is still in the correct position, with the plug screwed up tightly. If it is not quite correct, some adjustment is possible by resoldering the centre pin on the adaptor in a different position.

Before reassembling finally, remove all traces of solder from the foam dielectric and cut out the dielectric to a depth of about 0·1in.

Most of the soldering can be done with a 50W iron, but the nut on the outer may need a small gas torch. This operation should be done fairly quickly to avoid melting the dielectric excessively. The finished plug may be waterproofed with self-amalgamating tape, mainly to prevent water entering the plug through the threaded portion.

Provided that the demand is not too great, G3YGF is prepared to machine parts for these connectors for those who cannot get access to a lathe.

24GHz tests

News has come in of some successful tests carried out recently on the 24GHz band. These were done by G8DEK, G3JHM and G4CNV primarily to test out and calibrate their equipment, and resulted in a one-way contact over a 3km optical path. The equipment in use consisted of a home-made Gunn oscillator at G8DEK, and a Plessey GDO33 oscillator at G3JHM/P. Strong signals were obtained over this path, and G3JHM calculates that there should be sufficient equipment potential to cover any optical path in the UK. Further tests are planned for the near future, when some longer paths will be attempted.

The only other stations known to be active on 24GHz are G3BNL and G3EEZ, although a large number are known to be building now that the GDO33 has become available. Several stations in France are also interested and it may not be too long before some cross-Channel tests are begun.

Design and construction of simple attenuators

The writer has often found the need for good attenuators capable of working at frequencies up to several hundred megahertz or higher in the course of microwave experiments. These are relatively easy to construct out of standard resistors, and can be put to a variety of uses. For example, attenuators at rf can be used as "pads" between interacting stages, eg varactor multipliers, or to follow noise or signal sources to bring their output impedance close to 50Ω. At i.f. they can be used for calibrating microwave attenuators, since their attenuation

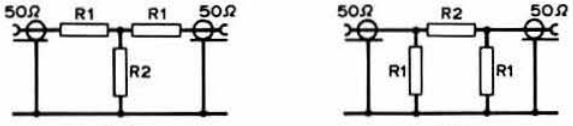

Fig 3. (a) "T" type attenuator; (b) "π"-type attenuator

Table 1. Design data for 50Ω "T" and "π" type attenuators

	"T" type		"π" type	
dB	R1	R2	R1	R2
1	2·9	433	870	5·8
2	5·7	215	436	11·6
3	8·6	142	292	17·6
4	11·3	105	221	23·9
5	14·0	82	178	30·4
6	16·6	67	150	37·4
7	19·1	56	131	44·8
8	21·5	47·3	116	53
9	23·8	40·6	105	62
10	26·0	35·1	96	71
12	30·0	26·8	84	93
14	33·4	20·8	75	120
16	36·3	16·3	69	154
18	38·8	12·8	64	196
20	40·9	10·0	61	248
25	44·7	5·6	56	443
30	46·9	3·2	53	790

is fairly predictable at lower frequencies. They may also be used for calibrating S-meters etc, and as a reference for noise measurements, eg sun and ground noise.

Two simple configurations of symmetric attenuators are the "T" type and the "π" type, depicted in Fig 3. The design of these is covered by the formulas:

$$\text{Attenuation (dB)} = 20 \log \left(\frac{50 + R1}{50 - R1} \right)$$

when $$R2 = \frac{2{,}500 - R1^2}{2R1}$$

"T" type

$$\text{Attenuation (dB)} = 20 \log \left(\frac{R1 + 50}{R1 - 50} \right)$$

when $$R2 = \frac{5{,}000R1}{R1^2 - 2{,}500}$$

"π" type

Design values for some useful attenuation levels are given in Table 1. It will be seen that in most cases the values do not coincide with preferred resistor values. This restricts the levels of attenuation which can be obtained, and the best procedure seems to be to choose the nearest preferred values to R1 and

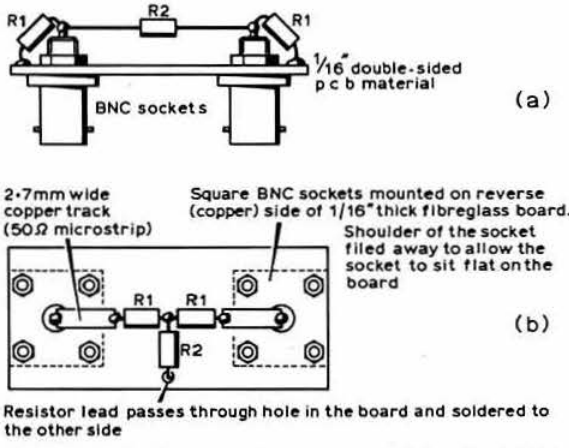

Fig 4. Methods of constructing attenuators: (a) method of construction below 500MHz; (b) method of construction above 500MHz

(Continued on p245)

4-2-70

Graham Knight, GM8FFX*

Computer corner

Many amateurs are now using microprocessors and home computers as part of their vhf stations, and *4-2-70* has already reported how Jack Pennell, G3EFP, at Pinner, Middlesex, and Peter Martinez, G3PLX, at Gosport, Hampshire, have been able to exchange programs, not on tape, but over the air on 144MHz. Recognizing the growing interest in this aspect of amateur radio, the VHF Committee has arranged a demonstration and lecture about the Commodore Pet computer at this year's RSGB National VHF Convention on 10 March.

Pet users will be interested in the new Plessey Microsystems "Petite", a "stand-alone" add-on memory specifically designed for the Pet computer. The unit is available in different memory configurations from 8k bytes through to 32k bytes, thus allowing additional storage for programs and display. Connectors are provided which allow the "Petite" to interface directly with the Pet memory port, thus expanding the memory without any internal modification being made to the computer itself.

Pet computer owners requiring even greater memory expansion will be intrigued by an American-made dual-drive "Mini-Floppy" system designed to expand on Pet computers fitted with 16k of memory. This disc system gives 100k per side, a total of 200k bytes on line. This unit, designated the DKH641, costs £989 and is available from the British importers, Lotus Sound of London.

At the other end of the scale, the KIM1 microcomputer has been reduced in price to £99.95. This is a fully-assembled microcomputer based on the 6502 microprocessor, which only needs connecting to a power supply to be operational. It has 2k bytes of rom, 1k byte of ram, a six-digit display and a keyboard. A teletype interface is provided and a standard cassette recorder can be connected to provide extra storage.

CW without a key

For a number of years GM8FFX has had a cw decoder which displayed cw signals on a screen. The latest way of using cw without any effort is to use a device being marketed in America as the "Morse transceiver". This device is connected between the user's amateur band transceiver and any visual display unit which accepts ASCII or Baudot codes. The "Morse transceiver" automatically tracks received cw from one to 150wpm, adjusting for different fists. The unit sends cw in the same speed range, and a 32-character memory can be used to assemble a message before transmission. Could the use of this operating aid mean that meteor scatter enthusiasts would no longer need tape recorders to slow down and copy high-speed ms signals? A recent clear-out of obsolete equipment in the GM8FFX shack means there is room for one of these new devices. A full report on how well the "Morse transceiver" copes with meteor scatter cw will be included in a future *4-2-70*.

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Memo to new Class A operators

It has been said before, but is worth repeating, that Monday nights are cw activity nights on 144MHz. Many new '4H--operators are taking advantage of their new qualifications, and several can be heard in the cw section on Monday evenings. Tom Waller, GM4HIG, in Aberdeen, has been a regular on cw since obtaining his licence and he is one of the GM stations who promises to QSL all contacts. Two recent cw activity nights have coincided with auroral openings during which there were certainly many stations on the band.

4-2-70 QTH Squares Award

At the time of writing, no-one has yet claimed the first 4-2-70 QTH Squares Award, details of which were given in the January issue of *Radio Communication*. Some operators have written to both the vhf awards manager and to *4-2-70* to say they were close to one of the FMD Standard, Senior, or Supreme Awards and were concerned whether these were still available. Probably they were too busy counting cards or composing pleading letters to notice the words "eventually supersede" in the January announcement. The old awards will be with us for some time yet; those operators pursuing a "Gold Leaf Supreme" can keep on studying their atlases and hoping for QSL cards from those elusive GM stations.

Interference on 432MHz

From time to time radar type interference disrupts amateur communication on the 432MHz band, and a system known as "Syledis" has been in use around the coast of Britain for some years. The Syledis navigation system is used extensively in French harbours, including Brest and Le Havre, where, of course, the portion 433-434·5MHz is not available for use by French amateurs. The system is also in use in some German ports, including Hamburg. Under lift conditions pulse type interference can sometimes be received in Britain from these Continental radar installations.

The Syledis system caused some problems last year when it was in use near the Isle of Wight. However, after negotiations between the RSGB and the Home Office, the operators were asked to reduce the height of the antennas and to change these to directional types. In reporting the co-operation received from the Home Office on that occasion, it must be pointed out that the band 432-440MHz has been allocated to amateurs on a secondary service basis. The interference to amateur operators emanated from a station of the primary service operating legally in the 432MHz band.

It has been necessary to again use the Syledis navigation system, this time in the East Anglia area, during January. Thanks to the co-operation already mentioned this period of possible interference was restricted to five days. The RSGB, together with the IARU and other European societies and their administrations, is still discussing ways of seeking a new frequency allocation for this system.

Beacons

The Society's GB3VHF beacon at Wrotham in Kent will be closing down soon for an overhaul. When it resumes transmission it will be on 144·925MHz. This change in frequency is in accordance with the agreements made at the IARU Conference in Hungary. While on the subject of IARU agreements, it is worth noting that a large group of amateurs in the London area

have been using frequencies around 144·900MHz for local nets. This is contrary to the IARU band plan, as 144·900MHz is the centre frequency of the beacon sub-band. One of the common myths is that IARU band plans are the work of the RSGB; they are in fact arrived at following discussion at International Amateur Radio Union Region 1 level and are designed for the benefit of all vhf amateurs.

"But where are you"

It would seem like plain common sense on any vhf band to announce your location when calling CQ. You may well be in a null when you are first heard by the other station, and it will save him rotating through 360° if you announce your location during calls.

Regular contacts on 432MHz

Any 432MHz Cumulative Contest invariably prompts the thought, "Where does everybody go afterwards?" A large number of stations are active during the cumulatives but few stay on the band on non-contest evenings.

Paul Widger, G8AGU, in Devon, has proved that it is possible to have regular long-distance contacts on this band using ssb during periods when conditions would normally be regarded as average. Those operators who have recently purchased equipment for the band will be interested to know that Arthur Breeze, GD2HDZ, in the Isle of Man, is active nightly on 432·185MHz at 2230gmt when he has schedules with stations in Lancashire. Jack Hum, G5UM, near Leicester, is on 432·230MHz every Monday and Friday at 2130gmt beaming to the north-west.

Further north, in Edinburgh, Peter Dick, GM4DTH, is on 432MHz television on a nightly basis. He has just increased power with a linear amplifier and is keen to receive reports on his transmissions. Another convert to television is George Szymanski, GM4COK, who hopes to put out a regular 432MHz fast scan transmission soon. He is very well located and has antennas more than 30m above ground level.

Down in the Channel Islands, Geoff Brown, GJ8ORH, is active on 432MHz most evenings and has already had contacts this year with CF, AF and YH squares. Anyone needing Jersey on 432MHz should be on the lookout for GJ8ORH's regular sideband signals.

Expeditions

A great deal of interest is already being shown in the European Meteor Scatter Contest which is to take place during the peak of the Perseids shower on 11 and 12 August. Operators are already making plans for this unusual contest, and leading the way is the Edinburgh and District Radio Society, which plans an expedition to the Outer Hebrides with operation from the extremely rare QTH locator squares of WQ and WS. The very successful G8BHH contest team is making plans for operation from North of Peterhead in ZR square, and GM4DSZ is thinking of operation from Foula Island. Expeditions to HB0 (Liechtenstein) and to OH0 (Aaland Island) are planned by two well-known groups who have sworn your scribe to secrecy in case they are inundated with requests for schedules. More news on these expeditions in next month's *4-2-70*.

Worked all continents on 144MHz?

Dave Price, GW4CQT, is close to creating a piece of vhf history by working all continents on 144MHz. Peter Blair, G3LTF, has already received his WAC moonbounce certificate for 432MHz, but so far no station in the world has yet attained a WAC on 144MHz. GW4CQT has already had moonbounce contacts with several stations in North America, including W6PO in California. Edgar Mueller, YV5ZZ, in Venezuela, was worked for his South American contact, and two QSOs were recently completed with stations in Japan. JA6DR in Karume, Fukuoka, used high power to a 40ft dish antenna, and JA9BOH, Asozima, Ohno, used a large array of eight 10-el antennas to get their moonbounce signals over the half-a-million miles between Japan, the moon and Wales.

Many American stations are also close to a 144MHz WAC, but the stumbling block for them is the fact that there is no eme activity on 144MHz from Africa. GW4CQT does not have this problem with his WAC attempt as he has already worked Africa in the shape of CN8CC during last year's spectacular sporadic-E opening. At the moment GW4CQT is very anxious for an eme QSO with the Australian continent, and he makes a plea for any station in that area who can operate on 144MHz eme to contact him for schedules. Let us hope Dave gets his Australian contact before someone organizes a moonbounce expedition to Africa.

Meteor scatter

Tim Hugill, GW4JFK, took time off from his studies at Liverpool University to operate on ms from home at Haverfordwest, Dyfed. Using 150W of cw to a 6-el quad at 30ft, GW4FJK contacted 10 stations, including DF6NA(EJ square), DJ5MS(GI15e), DL1MF(GH12a), LA3WU(CU47d), I1DMP(DF79j), and PA3AHD in CM57g. All these contacts were made on cw, with the information being sent at 400 characters/min. GW4FJK uses and recommends the "ultimate keyer" as described in *Radio Communication* May 1977. GW4FJK finds his home location only allows medium-distance contacts, but perhaps longer-distance lower-angle dx will be possible from G3OUL—the Liverpool University club station.

Derek Pellowe, G8PLY, listened with great interest to the ms activity during the Quadrantids and made a few attempts at sideband contacts. An incomplete QSO was made with a station in Sweden, but Derek's enthusiasm for meteor scatter is undaunted and he would like to have schedules for future showers. His address is 316 King's Causeway, Brierfield, Nelson, Lancashire.

Geoff Brown, GJ8ORH, worked LA2PT (FT13b), LA3WU (CU47d), OE3UP (HI70j), OK1OA (HK63e), and SM0FFS in JS51f. GJ8KNV, also in Jersey, managed a completed contact with SP9JC, but GJ8ORH had the best ms contact so far reported this year with UR2RQT in MS80e—a distance of 2,068km.

Several operators who have not yet ventured on to meteor scatter transmission have written to *4-2-70* to say they were listening attentively during the recent Quadrantids and Geminids showers. This is a very good way to familiarize oneself with the very special techniques required for successful meteor scatter operation. Many of these licensed listeners remark on the very strong signals heard from F1JG and OE5VHL.

Clive Morton, G4CMV, mentions a slow morse transmission which takes place on 144·200MHz, the sideband meteor scatter calling frequency. Even worse, apparently, takes place in London, where Tom Melvin, GM8MJV, noticed an fm net on 144·100MHz. We have already mentioned the need for all operators to observe the internationally agreed band plans, so we will refrain from further comment on these reports.

Repeater group of the month—Sussex

The Sussex Repeater Group was officially formed from a group of amateurs led by G3WPO (of AMSAT fame) who thought in late 1974 that Brighton and the south Sussex coastline should have its own 145MHz repeater unit. Tests were carried out from a number of sites, and the current location at Race Hill was soon found to be the most suitable for use on 145MHz. Equipment was acquired and the first official letter was written to the RSGB in April 1975. The response that the site was too close to GB3SN led to the decision to proceed with a 433MHz proposal but not to lose sight of the original application.

Accordingly a 433MHz repeater was commissioned, the paperwork generated and a logic system specification was agreed. G3VQN then built the first logic from ttl and, unfortunately, it had every whistle imaginable. On 15 January 1977 permission was received to turn on GB3BR, and on 12 February it went operational on a single antenna. Almost immediately there were complaints that the repeater was difficult to access, and the receiver bandwidth was too narrow, etc. The group engineering team stuck to its repeater specification, and within a week or so all the users had turned down their deviations, adjusted their tone access generators and had their rigs transmitting on the correct frequencies.

This aspect of repeater usage is often forgotten, and areas which do not have a local repeater often suffer from operators with badly adjusted transmitters.

GB3BR started with 5W erp and reasonable sensitivity, but over the following months the power and sensitivity were gradually increased, and the antenna type and pattern were adjusted until good coverage of the intended area was achieved. The initial GB3BR equipment was a Pye valve unit, and both the Mk1 and Mk2 logic systems were designed by G3VQN. The current Mk3 unit is a Storno with a very simple 11-cmos chip logic designed by G8JFT. There is no time-out, no fancy whistles or bells, and just a simple T indicator. The logic design has been supplied to about six other groups, as well as being used on GB3NX Mk2 and on GB3SR.

About three weeks before the closing date for the uhf Phase 2 proposals, three or four of the more northern Sussex Repeater Group members felt that the spot on the RSGB 433MHz repeater plan near East Grinstead should have a proposal to suit. A site between East Grinstead and Turner's Hill was chosen and in due course GB3NX was licensed. As there was no other interest from the area, the Sussex Repeater Group took the original GB3BR transmitter and receiver, grafted on a new logic and, after some comprehensive tests with extra filters, GB3NX was made operational on 13 February 1978. Proximity to Gatwick airport made the group extremely careful about transmissions on other than the required frequency. The initial set-up ran about 1W erp, and this gave good coverage as far as Devils Dyke near Brighton. However, the group's concern for the purity of output of this unit meant that a constant check on the spurious signals was kept. In mid-June a very low level spurious about 90dB down at the full 25W output, on the input frequency of another 433MHz repeater, was found. Since the group could not clear this spurious, and having found another in the uhf television band, it was decided to close this repeater down and go for a complete rebuild. GB3NX is off the air at present undergoing these alterations.

The work on GB3NX would have been completed by now but for the fact that the group's original intention to provide a 145MHz repeater was realised after a change in policy, and GB3SR came into operation on 15 November 1978—three years after the original proposal. The repeater is located at Race Hill near Brighton, and runs 8W erp on channel R3. There is standard IARU Region 1 1,750Hz tone access and a 2min time-out. An interesting technical feature is the audio processing of received signals, which ensures that the transmitted signal is significantly less than 5Hz peak deviation.

Looking to the future, the group is aware of its responsibilities in ensuring that its units continue to operate correctly and are well maintained. It has regular meetings with its neighbours, the Kent Repeater Group, and with its friends at GB3SN. At present one more proposal is in the pipeline, but this is a special case 1,296MHz unit, designated GB3DR, and assistance is to be given with the GB3HO proposal.

Details about the Sussex Repeater Group can be obtained from G8HVV or G8ETL, both QTHR.

A large amount of *4-2-70* space has been devoted to the activities of the Sussex Repeater Group because it is the first group to have sent *4-2-70* a detailed story of both their successes and their failures. To the jaundiced eye of your scribe, who usually sees letters from repeater groups reporting success followed by success, the Sussex group's story somehow rings truer of the efforts made by a few willing people to put repeaters on the air for a large number of users. Are there any more repeater groups who would like the story of their trials and tribulations published in *4-2-70*?

"International VHF FM Repeater Guide"

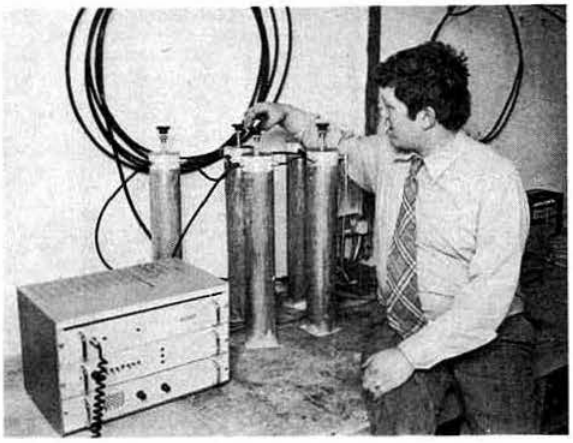
This popular guide to repeaters is being updated at the moment, and the authors, Julian Baldwin, G3UHK, and Kris Partridge, G8AUU, are keen to print the very latest information in the 1979 edition. To this end they request full details for publication from repeater group secretaries to be sent to G3UHK, 41 Castle Drive, Maidenhead, Berkshire SL6 6DB.

Pirate operation on vhf

From time to time *4-2-70* has recorded the fact that pirates operating on the vhf bands have been caught by the authorities and fined in the courts, and readers of *The month on the air* will have seen the reports from licensed radio amateurs who have had their callsigns pirated on the hf bands. *4-2-70* also receives requests to publish letters from the legitimate holders of calls being pirated on both the simplex and repeater frequencies. Unfortunately this practice is not unusual on the vhf bands, and a list of callsigns currently being pirated would be very long indeed.

It is especially difficult for the authorities to detect pirates when they use proper procedures and conduct QSOs in a normal manner. However, pirates often use callsigns which have not yet been issued, and sometimes use calls which are obviously bogus. It is stating the obvious to say that licensed radio amateurs are not permitted to contact pirates. Regrettably, some amateurs have been heard exchanging words with pirates—this seems to happen frequently on repeaters. Any amateur who speaks to an unlicensed operator is himself breaching the terms of his own licence.

Pirates on the amateur bands are nothing new—the authorities have been tracing them in large numbers for the last 50 years. Pirates on vhf seem to be on the increase; there are even taxi services using the 144MHz band illegally. Any information about pirate activity should not be sent to *4-2-70*, but to the proper authorities in the area concerned.



The Leicestershire Repeater Group came on the air with GB3CF, the 144MHz repeater on R0 on 31 December 1978. The whole project was put together in about two months of non-stop work masterminded by John Lewis, G3MYI, seen here after switching on the repeater. He built the repeater, G3CWI designed the logic, and a precision engineer in the group made the six tuned cavities. "CF" stands for Charnwood Forest, the area of Leicestershire where the repeater is located. *Photo G3XKX*

VHF success story

There is quite a story behind the attainment by Alan Scott, G4BPY, of Supreme Award No 24. Operators with poor locations will be heartened to know that his award-winning contacts were all made from a low-lying, obstructed, urban location. Alan attributes his success to maintaining regular activity and to resisting the temptation to go out portable during lifts and contests. His achievement is made all the more outstanding by virtue of the fact that all the contacts were made without having to resort to using the key. G4BPY feels it is much more of a challenge to work dx on telephony only. As he worked county No 40 on 432MHz he noticed that he had just topped 15,000 log entries in the previous five years.

G4BPY has since left his low-lying QTH and is now situated at an elevated location in Cheshire. With a clear take-off in all directions it is not surprising that his new address is 70 Top Road. Alan now looks forward to auroral openings, and he seems to be in an ideal location to start working towards the new 4-2-70 QTH Squares Award.

Transatlantic tests on 50MHz

The news in January's *4-2-70* that stations in Europe were considering transatlantic tests on 50MHz inspired G8KG to write with his comments based on a long-term study of past solar cycles. G8KG's study of the shape of the median muf contours for a smoothed sunspot number of 160 suggests that November and early December are probably the most likely months, with possibilities during all the months from October to March. (See G8KG's article on Solar Cycle 21 in this issue—*Ed*).

The first 50MHz transatlantic QSO was made by Dennis Heightman, G6DH, and Ed Tilton, W1HDQ, in the second half of November 1946. This was in the thirty-third month of that cycle at a time when the mean of the daily numbers for the previous fortnight was just 150. Unfortunately this was before regular solar radio flux observations started, so no observed flux equivalent data is available to present-day researchers. G8KG sees some pitfalls in using the standard sunspot/flux conversion when dealing with short-term bursts of activity, but, for what it is worth, the theoretical equivalent would be a mean of 200 sunspot/flux units over that 14-day period in 1946.

Coincidentally this issue of *Radio Communication* will be published in the thirty-third month of Cycle 21. The mean sunspot number for the period 15 to 28 September 1978 was 150, but this was too early in the year and the mean flux for the period was only 160 sfu. G8KG calculates that the most promising time for transatlantic tests would have been on 11 January as the mean flux for the previous 14 days was 194 sfu. He wants to make it clear that he is not asserting that a figure of 200 sfu over a 14-day period is the threshold for transatlantic 50MHz propagation, but that this figure should be used as a guide for serious experimenters on the band. He is fairly certain that there will be many possibilities of 50MHz transatlantic signals from October onwards.

More British stations have reported that they are now equipped for 50MHz reception, including GM3XLB, G3BHT, G3OUF, G4CVI and G8CKZ.

Auroral reports

Radio auroral events have occurred on the following dates 18, 19, 20, 24, 25, 26, 28, 29 and 30 December, and on 2, 3, 4, 5, 6, 7, 15, 16, 20, 21 and 22 January. Only the auroras on 4 and 7 January were large-scale events, most of the others being confined to stations in Northern Scotland. The events on 15, 16, 20 and 22 January showed up strongly on the carriers of television stations in the 48 to 54MHz band, but signals on 144MHz from the GB3LER and SK4MPI beacons were even weak with Ron Adams, GM8LHE, in Elgin.

The large-scale event on 7 January was expected by Pat Gowen, G3IOR, in Norwich, who had heard earlier auroral indications on signals received from Oscars 7 and 8, and the Russian RS1 satellite. GM8LHE heard an OH station on ssb, and he reports working many stations in LA, SM and southern England. GM8LHE reports an outstanding auroral signal from G8LVG at Chelmsford who was running just 60W of ssb. Several operators worked OY5NS, who was a very strong signal on both cw and ssb; he was using a TS700 transceiver with a small linear giving 30W of output, but unfortunately he was using a fixed beam and could not alter the heading from 45°. This could have been most interesting as the auroral signals from OY5NS peaked at 330° with GM8FFX in YR square, whereas signals during the same QSO peaked at 05° with GM8DMZ in XP square. GM8FFX and GM8DMZ made further checks on the auroral signals from the OY6VHF beacon on 144·885MHz and still found the same difference in beam headings for the peak auroral signals. The extent of this auroral opening on 7 January can be judged by the fact that stations in France were contacted from the UK, and that G4CMV in Leeds heard HB9QQ in Switzerland. This aurora started at 1600gmt and lasted until 2030gmt; signals from GB3LER returned weakly at 2315gmt but there was no second phase event.

The solar flux exceeded 200 on several days in January, with a figure of 236 being reached on 23 January. During an aurora on that day, GM4COK in Edinburgh worked LA and SM stations, and OY5NS who was a strong signal on both cw and ssb.

(Continued on p245)

swl news

Bob Treacher, BRS32525 *

The tables

Congratulations first to David Whitaker, BRS25429, who topped the 1978 HF countries table with a total of 839. Robert Small was the leading ARS station with a score of 739. Thanks are extended to all participants in the table for giving this feature an added interest and, at the same time, a degree of competition. The 1979 table will appear next month when a few more entries have been received.

Russian republics

To clear up any misunderstanding there may be concerning the Russian republics, the following may be of interest. Each separate republic counts for the countries table and for DXCC.

UA, UK, UW1, 3, 4 and 6	European Russian SFSR
UA1, UK1	Franz Josef Land (only known station active UK1PPA—cw only)
UA2, UK2F	Kaliningradsk
UA, UK, UV, UW 9/0	Asiatic RSFSR (except stations whose suffix commences with S or W which are European Russia)
UB5, UK5, UT5, UY5	Ukraine
UC2, UK2A/C/I/L/O/S/W	White RSSR
UD6, UK6C/D/K	Azerbaijan
UF6, UK6F/O/Q/V	Georgia
UG6, UK6G	Armenia
UH8, UK8H	Turkoman
UI8, UK8	Uzbek
UJ8, UK8J/R	Tadzhik
UL7, UK7	Kazakh
UM8, UM8M/N	Kirghiz
UO5, UK5O	Moldavia
UP2, UK2B/P	Lithuania
UQ2, UK2G/Q	Latvia
UR2, UK2R/T	Estonia

14, 21 and 28MHz

The 14MHz band continued to produce the rarest dx. Some of the most exotic mentioned included BV2B, FB8XV, FB8YF (via F6DZL), JT1AN, KA1IW (Ogasawara Is—via K8DYZ), KA1NC (Minami Torishima—via K4JEX), VK9XW (via VK6RU), VK0PK (Macquarie Is), VR1AY, 3D2BH, 5W1AU (via W6KNH) and 9N1MM.

The most reliable band into Japan and the Far East seems to have been 21MHz. Reports mention HL9 and 9M2 audible around 0900. USA west coast and KH6 and KL7 stations were also reported around 1600.

The 28MHz band seemed, at the time of writing, to be recovering from its December doldrums. Reports suggest that some good dx had appeared during early January. Some of the more interesting stations mentioned included CO2FA, HL9KE, JX9WT, WB8ZJW/KP2, YN1S and ZF2CI.

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

1978 HF countries table

FINAL LISTINGS

Station	28	21	14	7	3·5	1·8	Total	Mode
BRS25429	180	194	231	100	115	19	839	ssb
BRS35943	170	187	231	100	120	15	823	ssb
G-15515	179	199	225	98	99	21	821	ssb
BRS17567	201	222	242	51	81	6	803	ssb/cw
ARS8841	147	178	234	89	91	0	739	ssb/cw
BRS39965	160	173	189	63	62	19	666	ssb/cw
A9140	124	149	148	96	80	22	619	ssb/cw
BRS29641	127	138	171	74	72	4	586	ssb
A9191	131	147	170	46	68	11	573	ssb
BRS34740	108	135	152	78	53	11	537	ssb
BRS35454	106	109	147	46	66	6	481	ssb/cw
BRS38518	113	112	129	50	46	3	453	ssb
BRS32286	121	100	116	35	56	0	428	ssb
BRS40154	64	110	175	22	12	1	384	ssb
BRS20185	92	85	120	23	43	2	365	ssb
BRS34658	40	85	129	42	61	4	361	ssb
BRS37782	81	98	114	26	34	8	361	ssb
A9107	65	66	101	21	44	6	303	ssb
ARS39018	38	82	111	28	44	3	303	ssb
BRS39162	60	73	71	18	25	7	254	ssb
BRS27421	0	0	136	46	42	1	225	ssb
ARS39720	35	58	80	17	20	0	210	ssb
BRS18529	11	39	108	3	39	9	209	ssb
ARS38532	69	44	53	17	9	9	192	ssb
ARS38280	46	61	52	12	4	2	177	ssb
BRS41333	47	68	27	12	18	0	172	ssb
BRS26120	39	58	49	6	10	1	158	ssb
ARS37620	4	35	105	5	5	0	154	ssb

All-time countries table

(STARTING SCORE 500)

Station	28	21	14	7	3·5	1·8	Total	Mode
BRS25429	233	271	313	207	216	32	1,272	ssb
BRS17567	246	285	343	137	221	17	1,249	ssb/cw
BRS32525	222	272	297	192	231	26	1,240	ssb
BRS25901	200	273	309	179	182	17	1,160	ssb/cw
BRS35943	186	248	284	177	209	22	1,126	ssb
ARS8841	157	212	283	93	124	0	869	ssb/cw
BRS34740	131	187	215	126	149	33	841	ssb
BRS35454	128	187	249	106	149	22	841	ssb/cw
BRS32286	96	195	225	75	172	4	767	ssb
A9191	141	182	224	67	87	10	700	ssb

LF dx

In the January issue, mention was made of the good propagation normally experienced on the lower frequency bands during the early part of the year. Unfortunately conditions to date have not produced anything like normal dx conditions. Reports suggest that this is possibly the poorest winter dx period, especially on 3·5MHz, for many years. Grey-line propagation around 1430 seems to have provided west coast USA dx for the Scandinavians on 3·5MHz, but signals do not seem to have been audible in G-land, or western Europe in general. The only dx stations reported between 1430 and 1730 on 3·5MHz in January have been VE3BWK/4U(1512), 5B4HF(1529) and ZLs around 1715. This is very poor, considering that last winter produced KH6, KG6, DU and CR9 during the same period. Perhaps conditions will have improved during February.

Sunrise conditions on 3·5MHz have offered the occasional opening to the USA west coast but, apart from a large number of American signals, very little Caribbean dx seems to have been heard. North African dx around 2000 on 3·5MHz seems to have been the most consistent, with signals audible from CN8, EA8, EA9 and 7X most evenings.

The 7MHz band has been good to Central and South America around 0100. Stations reported include the usual PY, LU and HK, plus CM2SD, CO3VR, HI8JAG and HR1FM.

On 1·8MHz, Bob Griffiths, BRS41021, reports HI8JAG, K8CFU, N4JJ, N0FF plus KL7IEZ (real dx for this band—hope the QSL arrives). Dave Whitaker reports hearing an SP3 on the band, and he has also heard that stations in YO can now use 1·8MHz.

Expedition news

3Y1VC continues to be elusive at the time of writing, but hopefully this rare one found its way into many logs before the station left the island, which was rumoured to be at the end of February.

No further news has been obtained on the Sable Is trip, and the trip to the Laccadive Is could not land on the island because the paperwork, visas etc were not in order. It is suggested that another group would try to activate this rare spot in the near future. Serrana Bank was not visited by W9UCW and his group for much the same reason. VK2BJV/9 was on Norfolk Is for two weeks in January and was heard on 14MHz. VE3FXT had moved on to H5 and was scheduled to be active on all five bands—QSL via VE3DPB. KV4KV and WB8ZJW had also activated VP2L and VP2D during January. P29JS is hoping to activate the Andaman Is in mid-February, but at the time this piece was written the necessary visa had not arrived.

It seems that before 3Y5DQ left Bouvet Is he only made 600 QSOs, all on ssb. After his stay in Cape Town he will be returning to Queen Maud Land, which only counts as Antarctica for DXCC purposes.

Station news

Bob Giffiths is a new contributor who is also interested in hi-fi. He is keen to experiment with antennas, and he obtains pleasure in testing new designs. Apparently he has new neighbours who promptly fitted a large racing pigeon loft against his fence, and they asked if he could do anything to help their birds to avoid his wire antennas!

Martin Deeley, ARS40951, who also contributes for the first time, is a sixth-former and uses an FRG7 and a long wire. He is hoping to obtain a G8 licence during the year so his stay with this page may be brief.

David Chalmers, BRS14446, would like some help from QSL card printers who specialize in unusual designs or can produce a one-off design at reasonable cost. David's address is 5 Ashfield Drive, Summerville, Dumfries DG2 9BX.

Ian Le Breton is ARS41386 on Jersey in the Channel Is. He has been interested in the hobby for only a short while, but has a Minimitter MR44/2 receiver and an RD5 antenna which performs adequately on all bands.

David Hawes, A9191, reports receiving a phone call from A4XGY, while he was staying in Lowestoft during Christmas, who then obliged by QSLing David's reports direct.

Keith Kerr, BRS35943, writes after a long absence. He has bought a flat in Edinburgh and is getting married in July. He is still not as active as he would like to be, but comments on the amount of dx available on 14MHz. On the QSL front he has received VK9ZM, VR8O and CE9AT. Dave Whitaker mentions recent confirmations from YJ8KM, FO8DO and FK8BB on 28MHz, TI9DX and FM7AQ on 7MHz and K5YY/FH8 on 21MHz; the FM7 being his No 192 confirmed on 7MHz. It was pleasant to have an eye-ball with Dave at the RSGB AGM in December. Robert Small has received cards from ZL2UW/C, VK2AGT/LH and 9X5PM.

Finale

With so much news this time, the following correspondence is also acknowledged: BRSs 36883, 34740, 26120, 41333, 18529, 20185, 40293 and 41426 (ex A9140), and A9107.

Please do not forget to partake in the slps; details on p1046 of December *Radio Communication*. News, comments and table entries for the 1979 countries table should reach your scribe by 20 March for inclusion in the May issue. □

4-2-70

(Continued from p243)

GM4BFX in Aberdeen worked many stations with his 10W of cw, including G4DEZ in Oxfordshire and G2CIW in Chatham. GM3UU, also in Aberdeen, used 100W of cw to work eight countries. The aurora started at 1355gmt and continued until 1930gmt. At 1900gmt signals from the following beacons could be heard at GM8FFX: DL0PR, GB3LER, GB3VHF, GB3GI, GB3CTC, OH6VHF (KW square), SK1VHF (JR) and SK4MPI.

Late news

Congratulations to Dave Price, GW4CQT, who worked VK on 31 January by moonbounce, thus completing the first-ever 144MHz Worked All Continents. K5ZMS of the Six Metre International Radio Klub telephoned the news to *4-2-70* that European signals on vhf channels 1 and 2 had been received in San Antonio, Texas, on 20, 21, 22 and 23 January. Signals on 50MHz from the ZB2VHF beacon in Gibraltar were also copied in Texas on 23 January. There was another aurora on 30 January but it was confined to northern stations—GM4COK in Edinburgh worked several stations on 144MHz cw. A visual event also occurred on 30 January and was seen by observers as far south as Fife. Dave McGregor, G8MOY, will be active from Stornoway with 100W and a 6-el quad from 15 to 18 March.

Finally, send in your news items, real dx 79 entries, by telephoning the *4-2-70* answering machine at 0224 780347, by telex to "739169 MANPOW G Knight", or by post to PO Box 49, Aberdeen AB9 8JA. CU at the RSGB National VHF Convention. □

MICROWAVES

(Continued from p239)

R2. This usually results in an acceptably predictable performance, but where the approximations are too great it may be better to try the other configuration, or to use series or parallel combinations of resistors for R1 and R2.

Two methods of construction are illustrated in Fig 4. A "π" type is shown in (a) and "T" type in (b), but of course either version could be used in either design. The resistors should be of low inductance type, the common form of carbon film resistors being particularly suitable. Needless to say, lead lengths should be as short as possible. For higher power attenuators at lower frequencies, parallel combinations of 0·5W carbon resistors can be used to increase dissipation. A 10dB attenuator, built in this way to handle 10W, measured 9·5dB attenuation at 432MHz with low swr.

Provided that care is taken, these attenuators can be used up to 1·2GHz. The biggest error is likely to arise in the higher value attenuators, where stray coupling may reduce the attenuation below the expected value. For this reason it is better to use several low value stages in cascade when a high value of attenuation is required. □

the month on the air

John Allaway, G3FKM *

THE value of amateur radio as a lifesaving service to the community is well known, but there are not many recorded instances where an individual's own life has been saved by the very fact that he was a radio amateur. An extraordinary example was passed on to your scribe by G3YHM. It seems that on the evening of 1 February Jon, JX9WT, was alone in his small cabin in a remote part of Jan Mayen Is when an apparently starving polar bear appeared. Escape under such circumstances would have been most unlikely. However, JX9WT put out an SOS call, and was answered first by LA2GV who was unfortunately in a remote place without telephone communication. A further call was heard by EA8QO (who by strange coincidence is also LA7Y) who then managed to get in touch with LA4HF. In turn, LA4HF contacted a commercial group in Norway who contacted their Jan Mayen representatives who sent out a rescue party. The whole episode seems to have taken less than half an hour!

DX news

A letter from Dan Lockyer, GW3HCL, who was formerly VR1AA, has thrown further doubts on VR0M being located on Malden Is. He points out that if he were there in fact he should not be using a VR0 callsign. The VR0 prefix is not available to the Gilbert Is administration—and Malden Is is in the Southern Line Is which is under its jurisdiction. The Central and Southern Line Is use the VR7 prefix, the Northern Line Is VR3, and the rest of the Gilberts VR1. Dan himself introduced the letter "P" as the first suffix letter of VR1 stations located in the Phoenix group at the time when he was in charge of licence issuing in the islands.

Mike Townley, ZC4MT, has written to point out that although he was in fact 5A1TY during the 1959-61 period, and also VS9AMT during 1964–5, he no longer has logs for either operation. He says that he is currently active on 14, 21 and 28MHz most days, and he will be in Cyprus until mid-1980 at least; his address is in "QTH Corner".

The EU prefix which was used by UC stations at the beginning of the year celebrated the 60th anniversary of the city of Minsk. It has been announced that 20 special stations will use the RZ1 prefix next year on the occasion of the Olympic Games.

G3PDH has returned from Bahrain, where he operated as A9XBC; his present address will be found in "QTH Corner".

FR7ZL has recently been on Juan de Nova, but was due to leave at the end of February. He may still be there, and is known to favour 14,101kHz. Other reports say that he will then visit Tromelin Is and stay until the first week in April, and that a return visit to Juan de Nova will be made in June or July.

The club station in Baghdad seems to have received the FT101E which was shipped some months ago by JA1BK, and it is believed that it also now has permission to use the FTDX 500 supplied by the N California DX Foundation. YI1BGD has been worked in the late afternoon on 14,305kHz when taking part in the daily Arab-Christian Net (this commences at 1400 and is organized by I8YCP).

VQ9JJ is located on Diego Garcia in the Chagos Is and will be there for a year. He has been heard on 14MHz ssb asking for QSLs via W5RU with sae and ircs.

A51PN has been working into Europe between 1200 and 1400. He seems to prefer the high end of 14MHz where he has been contacted on both cw and ssb, and on Saturdays at 1200 he joins SEANET on 14,320kHz.

DX'press reports activity from Tchad in the form of TT0KP, who is thought to be F9KP.

A35HF says that QSLs for A35s EK, FI, HF, PT, SF, SK, SH and VV should be sent to N4TN, and that, in addition to these, A35s CR, DE, HU, RB, TV and WL are currently active from Tonga.

The Whidbey Island DX Club (of 2655 No 1250, East Oak Harbour, Wa, 98277, USA) invites readers to join its "International Island DX Net" which is held at 0300 each Friday on 14,280kHz. The club issues an award for contacting a minimum of 50 islands with DXCC status and including one with a station on Whidbey Is.

There should be increased activity from Pitcairn Is around 19 April when the *Yankee Trader*, which carries N1DX, N0BJ and K5UC, calls at the island. Activity will be mostly cw (about 25kHz above band edges) and rtty (about 90kHz up, except on 7MHz where it will be around 7,040kHz) and the callsign VR6BJ. The boat will be at Easter Is around 12 April, Samoa in mid-May, Fiji around 25 May, and at the Maldive Is late in August. Other places will be visited and QSLs for all operations go via W0PAH.

There are still two amateurs on Johnson Is; KH3AA is the chief electronic technician on the island and not very active, but KJ6BJ is often around 14,056kHz from 0600 working into Europe. WH3AAA is a novice but hoping for a full licence soon.

I2FGP may well be in Somalia again and on the air as 6O1FG at the time this is being read. His tour was to last a month and he will move around and try to operate as and when conditions allow. His transmitter is crystal controlled and not, after all, capable of split-frequency use, but it does operate on

Mike Townley, ZC4MT, operating his station

*10 Knightlow Road, Birmingham B17 8QB.

cw and has a 2·5kHz filter in the receiver section. Operating times will be mostly after 1500, especially on Fridays, and frequencies 14,025, 14,051, 14,205 and 14,282kHz. QSLs go to I0DUD.

OZ1CRH is visiting Afghanistan and Pakistan and trying to obtain operating permission. The AP part of his stay will be from 15 March to 30 May and he will possibly be AP2IJ on all bands 3·5 to 28MHz.

D68AD has been a good signal on 28MHz recently, and is often to be found around 21,200kHz between 1530 and 1730. D4CBS's much prophesied visit to Sao Thome (S9) is now expected to take place in mid-March.

Contacts with VE1MTA since 31 March 1977 do not count for DXCC as the station licence expired on that date. VO6ONT was the callsign of a station set up to celebrate the 60th anniversary of the Telephone Co of Newfoundland. QSL to VO1HP.

The Amateur Radio Club of Tonga

In a press release dated 11 December 1978, Harry Feldman, A35HF, gave details of the story of this young but very thriving society. It seems that about two years ago Bill Lang arrived from New Zealand and was granted a courtesy licence by the Tonga Telephone and Telegraph Commission to operate as A35WL. He started weekly meetings of locals, and a course in radio was started by Bill Rickertson, and later taken over by Don Greer, A35DE. Interest increased and the meetings moved to 'Atenisi University, where some 25 students took part. After one term four of these obtained licences: Sione Maile, A35SM; 'Etuate Kavanga, A35EK; Pueene Taufa'etau, A35PT, and Harry Feldman, A35HF; they were the first to be licensed in Tonga by examination. More recently Viliami Vaka'uta and Sione Kava 'Aloua became A35VV and A35SK respectively. Sam Kolekihakaufisi also became A35SF.

The club equipment consists of an elderly 750X receiver loaned by the T & T Commission, and a Knight T-60 donated by a kind ZL. The callsign is A35FI and the station has been on the air since July 1978. ARCOT has received recognition from the Tongan Legislative Assembly, and Crown Prince Tupouto'a has expressed interest in the club and agreed to open A35FI officially. There is pride in the fact that a radio amateur—A35DG—was the first to make contact with the outside world following the destructive earthquake in 1977. Plans for the future include the opening of branches in the northern islands and the organization of an emergency network.

News from overseas

A letter was received from Stephen Lowe, EP2SL, just before *MOTA* went to press. He says that many foreigners have already left Iran but that Bill, EP2FB; Leo, EP2LJ; Wim, EP2PQ (QSL via PA0WGS); Mike, EP2LI (QSL via WA4PYF); Hoss, EP2OK (QSL via K8ST); Steve, EP2SL (QSL via G3XCS); Lawson, EP2LY; Art, EP2OL; and Andy, EP2ZZ (QSL via WA4FVT), were still in Iran and active on the air. The authorities had not withdrawn operating permission, and in fact several new licences had been issued since the imposition of martial law last September.

Stephen reports that A6XB is often to be found around 14,225kHz, especially on Thursdays and Friday afternoons. A6XJA has been worked and claims to be from the Netherlands, but is not known to A6XB; however, he asks for QSLs to PO Box 2526 Dubai. A7XAH, Ahmad, is the Qatari ambassador to Iran and also holds the callsign EP2AH. He is most active on Wednesdays on 14,305kHz at 1500 (in addition to the times given in January *MOTA*), and at this time I8YCP acts as net controller. EP2SL is frequently to be found between 0800 and 1200 around 28,500kHz (except on Fridays and Saturdays) looking for UK stations. He is also active around 3,790kHz from 1930 on Saturdays and Sundays, and around 0100 on Tuesday to Saturday. He also has 1·8MHz equipment and has heard a G—anyone wishing to make a schedule is asked to arrange it via a 28MHz contact.

Kazuo Kokaji, JA3KWJ, who is presently in Zambia, visited Kenya for the second time early in 1979. He had a most enjoyable time on the air as 5Z4QT and made over 1,300 contacts, mostly on cw and covering all bands 3·5 to 28MHz. QSLs should go to his home address (see "QTH Corner") but urgent requests will be dealt with (until August 1979) if addressed to him at PO Box 383, Ndola, Zambia.

Dxpeditions

The tentative date for departure from Brunei of the group visiting Spratly Is is 27 March. This should mean an arrival date of 29 or 30 March. The callsign to be used will be 1S1B, and the group hopes to be there for a week or so and make 30,000 contacts. The ship to be used is the *Banyanda*, which was also used for the recent visit to Mellish Reef.

N6VR, WA6YNR and some other W6s will be in West Africa early this month and hope to obtain licences in several countries. They should commence about 8 March. Countries which they hope to visit include Gambia, Mauritania, Mali and the Cape Verde Is.

West Coast DX Bulletin reports that Joseph Sutter, who holds a WD6 call, will be travelling in the Pacific in his yacht *Wildfire* this summer. He hopes to visit Palmyra Is, Kingman Reef and Christmas Is.

P29JS is trying to arrange an expedition to the Andaman Is. At the time of writing he was trying to obtain an Indian licence.

Jack Laib, HB9TL, is scheduled to be on the air from the Maldive Is for a weekend operation this month. His transmitter will be crystal controlled on 14,020, 21,020 and 28,020kHz cw, and 14,195, 14,275, 21,295, 21,275, 28,595 and 28,520kHz ssb. QSLs go to Jack's home address (see "QTH Corner").

The expedition planned by K1PBW and others to Serrana Bank, which was mentioned in December *MOTA*, was delayed by transport difficulties and was re-scheduled to take place in February or March.

A group of Australian and New Zealand amateurs is planning a visit to Heard Is, and it is said that permission to land has been granted and that transport will be available. The callsign VK0HI has been issued.

The visit to Aves Is, YV0AA, is planned for 7 to 14 April but transport was not fixed at the time of writing. Some 1·8MHz activity is planned and a list of other frequencies to watch is: 3,535, 3,775, 7,025, 7,085, 14,025, 14,195, 21,025, 21,295, 28,025, 28,495 and 28,595kHz.

The Bangalore ARC's expedition to the Laccadive Is (VU4ARC) was cancelled. It is understood that landing permission was not granted.

European CW Association (EUCW)

This association was founded on 1 January 1979, founder member organizations being the Swedish CW Activity Group, the DL Activity Group CW, the G QRP Club, and the TOPS CW Club. The object of the association is to create, through its member organizations, support and encouragement for

QTH CORNER

A9XBC	M. H. Prestwood, G3PDH, c/o 6 Ann Grove, Cleethorpes, Lincs, DN35 9DA.
N4UM/C6A	Bob Patten, N4BP, 2311 W Nassau Drive, Miramar, Fla, 33023, USA.
FW0TT	Box 22572, Tel Aviv, Israel.
WA1SQB/HC8	C. Harris, 32 Walker Lane, Bloomfield, Conn, 06002, USA.
WA7JRL/SU	via W7 bureau only.
W6KG/TI5	via YASME Foundation, PO Box 2025, Castro Valley, Cal, 96546, USA.
VP2LGA	Box 1188, New York, NY, 10001, USA.
VP2LGB	via WB8ZJW, A. J. Taylor, 1153 Gulf Rd, Elyria, Ohio, 44035, USA.
VQ9JJ	Delta DX Ass'n, Box 73, Metaire, La, 70004, USA.
VR1BD	via W5RBO, R. E. Stone, Box 416, Anna, Texas, 75003, USA.
VR6BJ	via W0PAH, W. Schrenk, 444 Westview Drive, Manhattan, Kansas, 66502, USA.
ZC4MT	M. E. Townley, BFBS, BFPO 58.
5Z4QT	Kazuo Kokaji, 6-16 Higashinakano, Yokaichi, Shiga 527, Japan.
5Z4RU	c/o P. Mellor, G4BIK, 10 Greenfields, Earith, Huntingdon, Cambs, PE17 3QH.
6O1FG	via I0DUD, G. D'Aurelio, Via Antonio Fogazzaro 87, 00137 Rome, Italy.
7X4AN	H. Samson, DJ2BW, Tannenweg 2, D-5501 Osburg, W. Germany.
7Z2AP	via I8YCP, C. Pellechia, S. Giacomo D Capri 63, 80131 Napoli, Italy.
9N1MM	via W3KVQ—now at 12802 Sun Valley Dr, Sun City, Ariz, 85351, USA.

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

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amateur radio cw activity. Daily European and transatlantic cw activity periods are already being planned, and many other areas, including improved training aids for licensed and listener cw operators, are under active investigation. At the time of its foundation the EUCW represented over 1,500 licensed amateurs, and it is expected that this figure will grow rapidly.

The association does not offer individual membership, but any amateur radio club or society which supports the aims of the association may apply for membership. Once accepted they can appoint a communications manager to act as their representative on the governing body. There is no fee for joining, but each member organization is expected to bear its own clerical and postal expenses. All enquiries should be addressed to Sven Milander, SM0IX, Mjolvagen 52, S161 71, Bromma, Sweden. It should be noted that organizations joining EUCW do not need to be of the cw-only variety. Provided that it supports adequate cw activity and adequate cw training for licensed operators, any club may apply.

Contests

The CQ WW WPX Contest

0000 24 March to 2400 25 March (ssb)
0000 26 May to 2400 27 May (cw)

All bands 1·8 to 28MHz. For the first time this year's contest has a cw as well as an ssb section. Entries may be single-operator single- or multi-band, or multi-operator multi-band. There is also a multi-operator multi-transmitter section in which one signal may be transmitted simultaneously on each band. Single-operator entrants may only operate for 30 hours, and their rest period may be taken in up to five parts and must be indicated in the log. Exchanges consist of RS/T plus serial QSO number (starting from 001). Multi-transmitter entrants use separate numbers on each band. Contacts between stations in different continents count three points on 14, 21 and 28MHz, and six on 1·8, 3·5 and 7MHz. Those between stations in the same continent count one and two points respectively—however, contacts with one's own country may only be made for multiplier credit. A station may be worked on each band for credit, and the multiplier is the total number of different prefixes worked. A prefix counts once only—however many the bands on which it is worked. Final score is multiplier multiplied by total QSO points. Logs should indicate date, time, station worked, numbers sent and received, if new prefix, and points claimed. Entries must be carefully checked for duplicate QSOs, and a check list of prefixes worked should be included. Entries should be posted before 10 May for the ssb section, and before 10 July for the cw section. A small supply of summary forms and log sheets is available from G3FKM (sase please).

As in 1978 a special **QRP section** is available for stations running no more than 5W output. QRP must be clearly indicated on the summary sheet, and special low power awards will be made.

The SP DX Contest

1500 7 April to 2400 8 April (CW)
1500 21 April to 2400 22 April (Phone)

3·5 to 28MHz. Contact Polish stations and exchange RS/T plus serial number (from 001). Polish stations will indicate their powiat (county) by a two-letter index. Each contact counts five points, and the multiplier is the number of different powiats worked—each counts only once. Entries may be single-operator single- or multi-band, multi-operator multi-band (single transmitter) or listener. Listeners should log the callsign of the SP heard and the call of the station being worked, plus the code sent by the Polish station. Each SP may only be logged once per band, and each logging counts three points. Logs should indicate date, time, exchanges, multipliers and points, and should be accompanied by a summary sheet showing scoring, entry class, name and address, and a signed declaration that regulations and contest rules have been observed. A multiplier check list must also be enclosed, and entries must be posted before 30 April to PZK, SP Contest Committee, PO Box 320, 00-950 Warszawa, Poland. It is worth remembering that all PZK awards may be claimed on the basis of logs submitted in this contest and that application should be enclosed with the logs.

The Bermuda Amateur Radio Contest

0001 21 April to 2400 22 April

3·5 to 28MHz. Only 36 hours operation allowed—off periods must be clearly logged and each must be of not less than three consecutive hours. All stations must be single-operator only and must be operated from their own private residence or property. Winners of the 1977 and 1978 contests, are eligible for area awards only. Phone and cw may be used, but no cross-mode contacts are permitted, and it should be noted that *no phone contacts between VE/W and the UK should be made on 7MHz*. Contest exchanges (from Britain) should be made with stations in Canada, the USA and Bermuda (although this year stations in W Germany will also be taking part) and should consist of RS/T plus county (UK), state (USA), province (Canada) or parish (Bermuda). Each contact counts five points, and a station may be worked on each band on either cw or ssb. The multiplier for UK entrants is the total number of different VP9 stations worked on each band added together.

Top scorer in each state, province and county will receive an award, but the top scorers in Canada, the USA, W Germany and the UK will be awarded a trophy at the society's annual dinner in October. For this purpose round-trip transportation plus accommodation will be provided.

All dates and times in logs must be in gmt, and duplicates must be checked. Contestants must sign a declaration that they have complied with the rules and terms of their licences, and each log page must be clearly marked with the entrant's name and address. Logs must be received before 30 June and should be sent to: Contest Committee, Radio Society of Bermuda, PO Box 275, Hamilton 5, Bermuda.

Awards

The WARC CW Diploma

This is being issued by REF to mark the occasion of the World Administrative Radio Conference this year. A minimum of 300 contacts will be required to have been made during 1979, and they must include: one station in Geneva, 50 French stations "dealing a code number with the RST", 10 Swiss cantons, five Belgian provinces, 25 Italian provinces, eight Spanish districts, five Netherlands provinces, 15 W German DOKs, one with G, GI, GM and GW, and also with 15 other European countries. Send a certified list, together with 10 ircs, before 1 April 1980, to: F8GA, Award Manager, Square Trudaine, 2, 75009 Paris, France. The leading station in each country will be given an award.

WAZ and **WPX Award** application fees are now US $2 or 10 ircs. Please note that applications for WAZ should be addressed to W4KA, 1044 Southeast 43rd St, Cape Coral, Fla, 33904, USA, and those for WPX to Bob Huntington, W6TCQ, 5014 Mindora, Torrance, Cal, 90505, USA.

The Noviomagum Certificate

Issued by the members of the Nijmegen branch of VERON to those who have confirmed at least 10 contacts with them. Send log details (certified by two licensed amateurs) plus 10 ircs to: Award Manager, Postbox 1538, Nijmegen, Netherlands. Recent QSL cards from valid PA/PD/PE/PI stations will be found to be stamped to that effect.

Bromsgrove Silver Jubilee Award

Readers should note that applications for this award should be received by the award manager John Harvey, G8KLO, 38 Bodenham Rd, Birmingham B31 5DS, before 31 December 1979. John says that he is now in a position to answer any queries concerning the award as the backlog has been cleared.

IARU Region 1 Award

Please note that the fee to non-RSGB members for this award is 50p, US $1 or six ircs, and not as given in January *MOTA*.

Band reports

Band conditions have been quite good during the past month, with the solar flux figure exceeding 200 on many days and only falling as low as 179 on 17 January. The Ap index was usually below 10 but rose to 16 on 4/5 January. The 14MHz band has stayed open quite late at night, and 28MHz has carried a great deal of dx for 12 hours daily.

Many thanks to G2AMV, G3HB, G3KDB, G3KSH, G3LPS, GM3LYY, G4CPS, G4EAN, G4EHQ, G4ETN, G5JL, BRS17567, BRS31301 and BRS33915 for logs and information.

Stations listed in italics were using cw.

3·5MHz. 0100 EP2SL, PJ2AAX, *ZB2EO.* **0020** HI3JET, PJ2FR, *UF6, VP9.* **0700** *CN8AD, W7, YV1AD, ZL3IS.* **0800** *W6, ZL.* **2000** 5B4HF. **2100** EP2SL, *OH0,* 9H1EU.

7MHz. 0000 *FM7AV, VU2BK, YN1Z.* **0100** *FY0EOL, J28AG, VU2TS, ZF2CL.* **0600** *KL7JEF, VE7, W7.* **0800** *CM, PY.* **0900** *CM, FY, JA, M, OY, YN.* **1000** *HI, TF, YV.* **1500** *N6EO, UM.* **1600** *AA7E, JA, OX3MD. VK2AGT/LH, VK3VJ, VU2GW.* **1700** *JR6RRD, UA9, VK3MR.* **2000** *VK2QL, ZC4DZ.* **2200** *JA9BE.*

14MHz. 0000 BV2B, HI1RCD, VK9XR/MM, W6-W7, DL3LF/5V, 4S7EA. **0100** YB0WR. **0800** A35RB, BV2B, FK8CR, JA, KC6GF, VK2AGT/LH, VK, ZL. **0900** FB8YF, *JA7JT/JD1* (QSL to JH7BRG), H44DX, VK0PK, VP8QJ, VS5MS. **1000** KA1IW, *W8NMK/KG6.* **1100** KC4USV, VP2VJ. **1200** G3RSJ/HB0, *KL7,* VS6AK. **1400** FW0TT. **1600** A6XB, A7XAH, FB8XV, FR7BE, HM, KH6IS, *3V1YC.* **1700** KH6BB, *KL7, VK0JC,* VO6ONT (QSL to VO1HP), W6-W7. **1800** KL7, VR1BD, ZL. **1900** *N4UM/C6A,* HS1ABD, *S8AAA, FG7AS/VP2D,* VP8PL, VS5XU, *3Y1VC, 9X5OM* (QSL to DK3MO). **2000** A2CBX, KL7, S8AAP, *SU1MI,* VK, ZL4BO, 3Y5DQ/MM. **2100** TR8RG (QSL via DA1CZ), *4U1UN.* **2200** C6ALC, JA. **2300** D4CBS, HI, LU, PY, VK6, VK9XW, VP8, ZP, 9M8HG.

21MHz. 0800 JA. **0900** HM0S, WA7JRL/SU, VK, VS6AK, ZL. **1000** VK. **1100** KA6MF, PZ2AA, VP8QG. **1200** A51PN, D4CBS, *OY9J.* **1300** XT2AT. **1400** *WD5AJE/SU,* YB0HH. **1500** *N4UM/C6A.* **1600** W6-W7, *3Y1VC.* **1700** *FY,* S8FXT, all W districts, XT2AV. **1800** FB8XV, H5COA, TG8DX. **1900** EA9, HH2MC, HK0OA, KX6BQ, VP8RA, ZL1IS, 5W1AX. **2000** C5ABK, KA1NC, 5T5ZR. **2100** CX, LU, KC4USV, PY, ZP.

28MHz. 0800 *ZL3GQ.* **0900** H5FXT, HL9KE, VS6, VU, *9L1WS.* **1000** C5AAP, FY7BC, JT1BG, NP2AB, VK8, VS6. **1100** 7X2BK, 9K2MQ. **1200** HC1HV, W1-W5, 9G. **1300** A4XFE, *FM, FY,* JY5ZM, TG4NX, *TR8,* YN1H. **1400** *FY0EOL.* **1500** *CP, FY, HC,* SU1DP, W6KG/TI5, VP9WB, XE, ZF2CI, *3V8AA,* 5H3BP. **1600** *HK0,* YS9RVE. **1700** *FY0EOL* (BP 240 Kourou), HK0BKX, VE5-VE7, W6-W7, 5N2NAS. **1800** KH6, KL7UN, VE5-VE7. **1900** WA4LJJ/KL7.

Thanks also to the following for items obtained from their publications: *DX News Sheet* **(Geoff Watts),** *Long Skip* **(VE3FRA),** the *West Coast DX Bulletin* **(WA6AUD),** *DX'press* **(PA0TO),** *CQ Magazine* **(W1WY),** and the *Ex-G Radio Club Magazine* **(W3HQO).**

Please send all items for **May** issue **to reach G3FKM** by **3 April,** and for **June** by **7 May.** □

HF propagation study

Predicted hpfs (MHz × 10) for March 1979

GMT =	00	02	04	06	08	10	12	14	16	18	20	22	24
Aden	238	225	209	364	522	538	524	501	486	376	318	267	238
Ascension	318	298	266	238	426	515	536	514	488	477	407	335	318
Bahrain	211	197	197	351	497	524	509	488	467	359	288	238	211
Bangkok	154	150	188	326	437	475	475	455	425	335	220	188	154
Barbados	260	247	224	183	215	350	483	478	450	448	411	315	260
Bermuda	225	224	200	174	174	299	425	425	425	425	388	300	225
Bogota	249	237	224	174	225	251	474	475	444	439	401	313	249
Buenos Aires	293	277	253	210	268	412	511	501	474	463	418	324	293
Cape Town	305	263	176	288	478	503	539	489	488	464	375	324	305
Colombo	196	177	197	350	493	511	501	481	453	346	265	225	196
Cyprus	205	186	163	300	450	487	473	455	435	338	275	227	205
Dakar	317	298	266	238	428	515	536	514	488	477	411	335	317
Denver	187	162	162	168	162	163	225	326	369	362	337	251	187
Fairbanks	200	206	200	200	238	225	238	244	252	258	238	214	200
Falklands	299	284	260	215	237	425	496	503	475	464	411	327	299
Gibraltar	152	150	126	133	255	324	333	323	305	288	221	180	152
Hong Kong	150	150	191	301	401	437	450	374	317	291	199	176	150
Honolulu	200	206	194	194	225	227	201	195	225	300	251	208	200
Iceland	126	114	114	125	190	244	280	271	265	253	200	143	126
Jamaica	224	224	205	174	215	243	431	428	425	423	390	298	224
Lagos	319	298	256	261	478	531	539	514	495	477	398	328	319
Las Palmas	239	233	205	186	341	448	464	451	426	413	336	277	239
Lima	275	256	233	190	275	249	489	486	460	450	417	321	275
Los Angeles	188	174	174	174	168	163	163	300	350	350	324	225	188
Malta	174	163	138	209	335	390	388	375	360	308	232	192	174
Mauritius	251	238	213	364	525	530	526	501	488	401	337	288	251
Mexico	200	187	168	162	200	194	276	401	401	388	362	275	200
Montreal	200	177	169	174	174	241	351	375	385	382	360	262	200
Moscow	128	125	125	229	321	370	383	369	361	285	197	159	128
Nairobi	270	251	219	351	525	528	534	507	475	426	350	291	270
New Delhi	173	159	191	332	463	477	486	463	359	300	232	200	173
New York	208	190	173	174	174	237	360	388	398	393	373	271	208
Osaka	191	173	196	261	352	394	319	253	221	201	187	190	191
Perth	192	176	197	346	455	440	406	375	328	289	253	223	192
Rio de Janeiro	299	285	262	215	251	487	516	492	475	464	416	327	299
Salisbury	293	275	229	332	503	530	539	514	498	451	365	299	293
Seychelles	249	238	215	364	520	515	503	479	428	389	324	275	249
Singapore	173	159	191	332	463	486	479	463	434	337	232	200	173
Suva (s)	213	213	206	232	282	326	350	337	300	251	213	206	213
Suva (l)	324	299	262	251	351	337	300	261	251	300	463	331	324
Sydney (s)	150	150	188	301	401	415	375	350	298	280	199	176	150
Sydney (l)	272	256	234	192	300	277	239	213	197	199	301	318	272
Teheran	196	177	197	350	493	511	501	481	450	338	261	225	196
Vancouver	188	200	176	187	187	163	176	214	238	276	275	213	188
Wellington (s)	200	163	200	251	338	375	375	300	275	251	194	194	200
Wellington (l)	299	286	262	219	312	249	187	194	174	262	338	324	299

Bands recommended are those between hpf and half hpf.

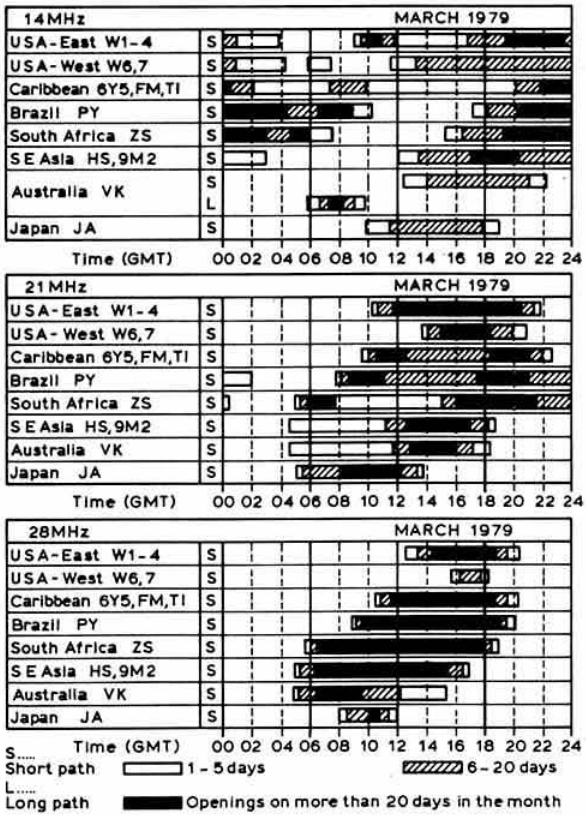
Propagation predictions

The seasonal decline in F2 daytime frequencies during the summer begins in March; this will be most noticeable on **28MHz**. Traffic with North America on this band will be less certain compared with last month, but all other continents will be heard with certainty even if only for short periods. Conditions on **21MHz** will not be affected by the above-mentioned decline in daytime frequencies. The lengthening days in March will lead to the bands remaining open longer in the evenings. Because of the seasonal change, dx will be possible on **14MHz** during the latter half of the month more often than was the case during the two previous months; but only during April will this band become an expressly night time dx band.

At present, dx via the indirect path is hardly possible, either on **14** or **21MHz**. An exception is traffic via the indirect path with Australia. This path is often more favourable than the direct one. Traffic with Alaska and Hawaii will be possible on **14MHz** in favourable conditions between 0700 and 0930gmt, and from 1700 and 1900gmt. As the great circle in this case leads through the polar light zone, traffic will frequently be interrupted by static.

The **7MHz** band will still offer usable dx chances during March when the longer part of the path lies in darkness. Eastern North America will be heard on this band from about 2200gmt until shortly after sunrise. It may be possible to work western North America from about 0330 to 0630gmt on **7MHz**, and under very favourable conditions Hawaii and Alaska from about 0430 to 0600gmt. The east coast of the USA will possibly be heard on **3·5MHz** from about midnight to 0530gmt. During the latter half of the night local traffic will be interrupted repeatedly by the dead zone.

The provisional sunspot number for December 1978 from the Swiss Federal Observatory was 119·1. During the period 19 to 26 December the daily numbers were less than 100 but during the remainder of the month they exceeded this figure, with the maximum (188) occurring on 12 December. The smoothed numbers for April, May and June are: 139, 141 and 143 respectively.



Mobile rallies calendar

8 April—White Rose Mobile Rally, Lawnswood School, Leeds 16. GB3WRR will operate during the rally. Details from G4DZI, QTHR.

29 April—Southend & D RS Mobile Rally, Fitzwymarc School, Hockley Road, Rayleigh, Essex. Details from M. Daniels, G8KLD, 25 Sweyne Avenue, Southend, Essex SS2 6JQ.

29 April—North Midlands Mobile Rally, Drayton Manor, Near Tamworth, Staffs. Details from G8BHE, QTHR.

6 May—Tulip Time Mobile Rally, Grammar School, Spalding, Lincs. Details from G4EMK, tel 0778 2649.

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

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 S20. 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. All usual attractions. 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). 11am start. Talk-in by G3EEO and G3ZBI on 144 and 432MHz. 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 G4CTZ, QTHR, tel Derby 71875.

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.

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

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.

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.

council proceedings

A brief report of the Council meeting held on 8 December 1978

Present: Dr D. S. Evans, (President, in the chair), Dr E. J. Allaway, Messrs D. Adams, D. J. Andrews, J. Anthony, P. Balestrini, J. Bazley, T. P. Douglas, W. F. McGonigle, B. O'Brien, C. H. Parsons, W. Scarr, R. F. Stevens, C. J. Thomas (members of Council), D. A. Evans (general manager/secretary).

Apologies for absence were received from Lord Wallace and Messrs P. F. D. Cornish, F. Hall and A. W. Hutchinson.

Regulation of committees by Council

The President said that under the existing procedure, committees proposed any changes in their composition, and these were confirmed by Council. However, while this procedure hitherto had worked reasonably well, problems had arisen recently associated with Council taking a more direct interest in the work of its committees.

After much discussion, Council agreed that:

(i) each committee should have at least one Council member, and preferably at least two, in order to maintain adequate representation on Council at all times;
(ii) each committee is primarily responsible for the selection of potential committee members, who later have to be confirmed by Council;
(iii) if Council feels that any aspect of the functioning of a committee needs modification, then this would normally be done by drawing the attention of the chairman to the need, and inviting his proposals regarding the change;
(iv) Council has the right to dictate all aspects of a committee's work, but it is envisaged that it would do so directly only in rare cases when the earlier approach had proved unsatisfactory;
(v) Council members may only sit on committees by invitation of the committee and with the approval of Council;
(vi) at the first meeting of the year, each committee shall elect a chairman, vice-chairman and secretary;
(vii) as is required by Article 70, all honorary officers and members of committees shall be members of the Society.

Changes in the terms of reference and constitution of committees

The main points made were as follows:

Education Committee

A letter from the current chairman, Mr D. M. Pratt, G3KEP, noted that the present terms of reference were adequate and the committee generally had adequate links with other committees. However, there could, with advantage, be better links with the Technical & Publications Committee and with the City & Guilds RAE Committee.

Finance & Staff Committee

After much discussion, Council agreed that:

(i) only Council members may be members of this committee;
(ii) the total membership of this committee should not in itself constitute a majority on Council.

The normal rules regarding co-option still apply.

Raynet Committee

No changes suggested, other than, perhaps, more direct links with the VHF Committee.

Mobile & Exhibition Committee

Changes to both the name of the committee and its terms of reference were suggested. The 1979 committee to discuss this.

IARU Working Group

It was proposed to change the name to IARU Committee to bring it into line with other committee titles.

Membership & Representation Committee

The chairman reported that the present terms of reference were entirely inadequate, and would be revised.

Technical & Publications Committee

Council agreed that No 4 of the terms of reference should now read:

4. In association with the book editor, to deal with matters relative to the production and marketing of the Society's publications.

Telecommunications Liaison Committee

Council agreed the following additions to the terms of reference:

5. To review activity in the Intruder Watch and AROS services.
6. To advise Council on the selection of the Society's telecommunications liaison officer.

No significant changes arose from the discussion of other committees.

Changes to the terms of reference of officers

The main points made were as follows:

It was agreed that the terms for the QSL Bureau manager and the recorded lecture library curator were no longer relevant as these functions had been taken over by HQ.

The terms of reference of the Intruder Watch organizer were extended to include the officer as a member of the Telecommunications Liaison Committee.

Problems associated with the collection and engraving of trophies were discussed. It was agreed that efforts to recover those awarded should begin in June each year to ensure their return in good time for the AGM.

Update of the "Green Book"

This booklet contains, *inter alia,* the standing orders and terms of reference of committees and officers. It was intended to produce a new version early in 1979 which would contain additional material, including the terms of reference of the Society's trophies.

Other business

Council agreed to accept a trophy offered by the Cumbria Group for SSB Field Day, but not one from SRCC for a runner-up.

In reply to a question from Mr Stone, the President said that he was responsible for the delay in completing the report of the Presidential Working Party. He expected to have more time in the near future for this work.

A draft document relating to waived subscriptions was discussed. It was agreed that Mr O'Brien would modify it after discussion with the general manager.

In closing, the President thanked Council for its help and patience; and Mr Stone, to warm applause, on behalf of Council thanked Mr Scarr for his most valuable service over many years.

obituaries

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

Mr D. Davies, GW3FSP

Dewi Davies died on 8 January. In the post-war years he was one of the best known dx operators, always radiating an outstanding signal, mostly generated by home-built rather than commercial equipment. He was an FOC member with operating standards of the highest order. Always looking for new worlds to conquer, he had satellite equipment ready to operate before the satellites commenced operation, and in a very short while had worked over one hundred American stations by this mode. He was a staunch member of the Port Talbot RC for many years, and his field-day operating will be sadly missed.

Mr R. R. Gorton, G4BFO

Reg Gorton died on 28 November 1978, aged 47. He was a keen dx operator who enjoyed contacting many friends throughout the world, particularly those in the Middle East with whom he shared a professional interest.

Mr A. J. Mathews, G6QM

Bert Mathews, who died on 28 December 1978 aged 65, was a long-standing member of the RSGB, and a QSL Bureau sub-manager since 1945.

He was a founder member of the Southgate, Finchley and District RSGB Group (now Southgate RC) when it was reformed about 1950, and later became a member of the Cheltenham Amateur Radio Association, which he helped to launch when the Cheltenham RS and the Cheltenham RSGB Group merged. He was also a member of the Disabled Drivers' Club, and of the Radio Amateur Old Timers' Association.

He was a keen cw man who, in his Southgate days, took an active interest in NFDs. When he left Southgate, in 1955, he presented the group with the 6QM trophy which is still competed for with home-constructed equipment.

Mr R. J. K. Sloane, GI3NRF
Bobby Sloane, who died on 25 November 1978, was a founder member of the UK FM Group (West Ulster) which recently commissioned the repeater GB3WT. He was first licensed in 1959, and was noted as a constructor with exceptional technical ability. He was active most recently on 144MHz.

Mr G. Wheatcroft, G3HMY
Gordon Wheatcroft, who died on 5 January, had been an RSGB member since 1946. He was a founder member of the Exeter ARS, and was honorary secretary at the time of his death. He was also a member of many 3·5MHz nets, and was very well known in the south west.

Mr E. K. Williams, GW8VY
Elwyn Williams, who died on 11 January, was licensed pre-war, first with the artificial aerial call 2AFW and later the radiating licence G8VY. He also operated from Singapore during the post-war period with the callsign VS1KF.

Elwyn was the classic type of radio amateur, dividing his interests and enthusiasm equally between home-construction of equipment, hf band operating and 144MHz operation using all modes. He was a senior civil servant, occupying a post as Assistant Secretary in the Welsh Office. He was a member of the Cardiff RSGB Group.

We have also been advised of the deaths of:
Mr J. McConkie, GM5VI, on 3 August 1978;
Mr J. Roscoe, GW6IL;
Mr W. Ross, GM3VJ, on 22 June 1978.

your opinion

WHEN IS A SQUARE NOT A SQUARE?

The Editor
Radio Communication

Sir—I am not a square. I do not live in a square. I do not even live in a 3D version of a square. True, I can define my QTH by two lines on a map, or even by a set of co-ordinates internationally agreed to represent a unique point (subject to the usual mathematical errors and presumptions, naturally). This point has a name that can be found without resort to one of the many codes currently in fashion. Even the GPO can find it.

But perhaps I am completely on the wrong trail. Is it that the EEC has turned its attention to such matters, being the next most important item following recent reports concerning future legislation on lawn mower noise? No doubt some of our Continental associates will welcome with sighs of relief the knowledge that their future generations will not have to bother about pronunciation of Featherstonhaugh, Culzean, Machynelleth or Sgurr a'Ghreadaidh when they tour this country with their G5 licences.

No sir; I live in a county with a name, admittedly added to recently, making it a double-barrelled one. This area is defined by natural boundaries and by sensible man-made boundaries of long-standing, which give it an interesting shape. I had always hoped one day to be able to say I had talked to other amateurs in all the other interesting shapes and so claim, for instance, a Senior Award on 432MHz—acknowledged to be the most difficult of all.

The trouble is that all committees and collections of persons empowered to investigate anything *always* think they must change things to show they have not been asleep.

NO SIR; *PLEASE*, if you must have this system, leave us our old new counties as well. We already have one system based on squares—the WAB award. Is the RSGB jealous because it does not control this?

Ex-2576286, J. P. Moore, BSc, CEng, FIChemE, G3IKR, RAOTA.
SO 981586 (YM70b).
52° 13′ 30″ N, 2° 1′ 45″ W, 150′ asl.
2110gmt 17 1 1979.
HWR.

PS They are not squares anyway, being figures of spherical geometry.

CARAVAN RALLYING

The Editor
Radio Communication

Sir—After many conversations on the air, it seems to be of general interest to those members who enjoy caravanning to organize a radio caravan rally group, the aims of which would be to organize and promote an annual calendar of events, combining the enjoyment of both amateur radio and caravanning.

I would be obliged if any members interested in participating in or organizing such a group, would contact me, enclosing an sae.

Brian Campbell, G4HPR,
66 Ellesmere Road,
Shrewsbury, Salop.

VOLUNTEERS WANTED

The Editor
Radio Communication

Sir—I have had some connection with a project known as the "White Lion Street Free School", White Lion Street, Islington. This Free School is the most active project in the rise of Free School experiments in this country which are connected to the general discontent with what is happening in the state school systems, and in the élitism of the public school sector, which came down to us from the direct action ideas of the 1960s. No fees are charged to the students.

The coverage of scientific work and technical activity in such a situation is naturally somewhat difficult. I am writing generally to radio amateurs through the Society's journal, in case there is any member who might have sympathy with such educational experiments and who would like to carry out just a little voluntary work at the Free School. I am thinking of a few simple electronics projects, up to possibly running a station at the school.

If anyone has an interest in the possibility, or who would like to make any suggestions, I would be very glad to hear from him or her in the first instance.

K. L. Smith, G3JIX,
Electronics Laboratory,
The University, Canterbury, Kent.

KUDOS

The Editor
Radio Communication

Sir—It is with much pleasure that I write to publicly record my appreciation for the service given by an advertiser in *Radio Communication*.

Having heard good reports of the F9FT Yagis that they sell, one morning I decided to order one with my credit card. During the telephone call I said that I had better obtain an N-type plug to connect to the N-type socket which (wrongly) I thought was the driven element termination, and rang off before they could verify what was required.

At about 4pm my wife rang me to say that they had sent me a *telegram* which read "PLUG NOT REQUIRED"! Apparently an attempt to reach me by telephone had failed (I did not give them my number and it is unlisted) and a letter would have taken too long. Telegrams are no longer cheap but they had obviously been prepared to spend money on making sure that I did not spend a few pence on a plug that was not required!

I thought that this sort of commitment to customer service went out of fashion years ago. It certainly contrasts sharply with the fast buck (or yen) attitude of a few firms I could name.

R. G. D. Stone, G3YDX

Sir—May I, through this column, bring to your notice and that of your readers my recent experiences with Decca (KW) of Sevenoaks, Kent.

Last year I purchased a KW2000 transceiver, secondhand, which although still in excellent mechanical condition for a piece of equipment 15 years old, generally required an overhaul and service. After contacting a Mr Ridley at Decca, it was arranged that the unit be delivered for service. This was done at short notice, and was returned to me the same day in perfect working order, after being completely re-aligned, several modifications added, and generally well looked over, all at reasonable cost considering the labour involved and the age of the equipment.

Over the past few months I have had cause to order several minor spares items for the transceiver, all of which have been in stock and sent to me by return of post, in one case with no charges involved.

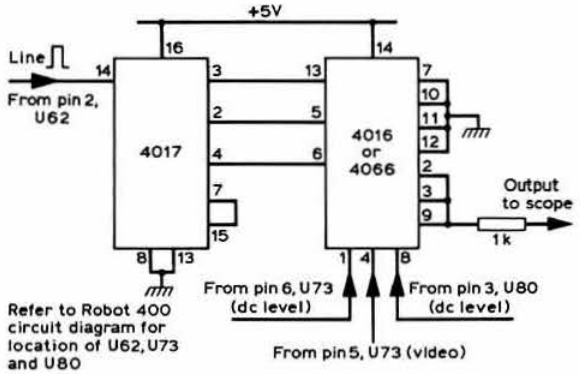
In this day and age, when some dealers tend to concentrate all or most of their efforts into equipment sales, rather than after sales service, I think that Decca (KW) offer an above-average quality of service and I can recommend them to anybody.

P. I. Martin, G4AZC

sstv scene

P. Burnett, G4BLL*

As promised in the December 1978 *SSTV Scene*, the circuit for 'scope readout to facilitate setting of the contrast and brightness controls on the Robot 400 (and copies) is given below. Fortunately no internal (or external) modifications are required to the Robot 400. The 'scope output is simply routed to the spare phono socket already provided on the rear panel, and the four input leads are tacked off the main pc board at the points noted (ie U62, U73 and U80). The 4017 is a divide-by-10 Johnson counter which in this configuration is cleared every third pulse from the fast scan line. The three sequential outputs control the switching of the 4066 quad bilateral switch which presents, in turn, the upper and lower dc levels from the comparator chain and the slow or fast scan video (depending upon mode selected) to the 'scope. A 4016, which has a higher ON resistance, may also be used successfully in this circuit. A 741S or 301 op-amp may be required at the output to increase the signal voltage if an insensitive 'scope (eg without Y-amp) or station monitor is used.



Circuit for oscilloscope read-out for correct brightness and contrast control settings on Robot 400

The circuit for the led sync tuning indicator is similar to that shown in the article "Modifications for the W6MXV and other sstv monitors" (*Radio Communication* May 1978, p404), but R139 is now replaced by a 220kΩ resistor and the input is taken from pin 1 of U63.

Letters have been received from ARS40918 and PA2JJC requesting sstv information and details of any books available. The *Slow Scan Television Handbook* by Don C. Miller, W9NTP, and Ralph Taggart, WB8DQT, published by *73* magazine, is still considered essential reading for both the newcomer to sstv and the established operator. It discusses the relative merits and drawbacks of various sstv circuitry. Full constructional details are given for a simple (but electrostatic tube) monitor by W4TB, and the well-tried W6MXV monitor which is still one of the finest P7 tube monitors available for home construction with a performance reputation even better than the "household name" commercial units. *The Complete Handbook of Slow Scan TV* by Dave Ingram, K4TWJ, as the name suggests, is a more general treatment of the subject and is recommended reading for all sstv followers.

G4CEQ queried the availability of a pc board for a 400-type scan converter. A limited number of boards are available on a first-come first-served basis from VK5PV at a cost of A$98 plus A$9 to cover registration and postage to the UK. Alternatively, negatives should be available in this country very shortly for a Japanese designed board, designated the SC77, and interface keyboard CD78. Further details next time.

The ninth World Wide SSTV Contest will be held on 17 March from 1500 to 2200gmt, and on 18 March from 0700 to 1400gmt. Two-way sstv contacts on 28MHz carry a 5× bonus value compared with contacts on other bands.

Thanks to all who have taken the trouble to write or phone, please keep *SSTV* Scene in the picture! □

*12 Standroyd Drive, Colne, Lancashire BB8 7BG.

raynet

M.G. Barker, G8CAC*

As readers will see, there has been a change of column author again this month. Sid Law, G3PAZ, has reluctantly decided to stand down as writer of this column and also as a member of the Raynet Committee. On behalf of our members I take this opportunity to thank Sid for his past work. I also have to report the resignation of John Scarborough, G3MBQ, from the committee, but he has agreed to continue as corresponding member; his place will be taken by Julian Maud, G8MBB, the area controller for Cumbria, so north of the country interests will continue to be looked after.

Raynet activities

Since the committee meeting on 9 December hardly has a week gone by without a report dropping through my letter box giving details of a group being called out somewhere. The West Midlands groups did a very fine job during the ambulance dispute ("Operation Broadshoulders" *Radio Communication*, February 1979, p147). This was followed by one of the Sussex groups being involved in passing 999 traffic after the Mayfield telephone exchange explosion, the group operated for some 24 hours before being stood down.

The North Cheshire group was called out on 28 December by the cepo to help out the social services during widespread flooding in the Warrington area. Here the group was able to help the various social welfare teams maintain contact with their HQ during the evacuation of the low-lying areas, tracing people "lost" in the evacuation, and updating information on the extent of the flooding. The extremely severe weather of the weekend 31 December had the Cornish group in action in conditions of 70–80mph winds, snow drifts 14ft high, temperatures down to −12°C, and traffic at a standstill throughout the county (see "The Cornwall Raynet emergency", p229—*Ed*).

During the same period, on the other side of the country the Norfolk groups were again called upon to set up communication links from Sheringham Police HQ to Salthouse, due to the severe risk of sea flooding. Again group members were called upon to drive through extremely hazardous conditions to set up the required links; in fact, during that period impassable roads and snow drifts seem to have been the order of the day. The York group were also asked to stand by during the York floods, while in the south some of the London groups and the Kent group were asked to stand by.

At this point may I say that we are repeatedly being taken to task for not mentioning groups' activities, but this we can only do if we know about the exercise/incident. The committee maintains an exercise/incident report file, and we would like to remind all controllers to write up and send in a short report on all exercises and especially incidents in which their groups are involved.

1979 Raynet symposiums

The committee's request for a group to host and set up a get-together similar to the very successful one held last year at Leicester has been taken up by the Avon group. It will take place on 21 April at the Dragonara Hotel, Bristol, and the cost will be £5 per person, including lunch. The room will hold some 80–100 people. Further details from Brian Goddard G4FRG, QTHR. Other groups are still finalizing arrangements in Sussex and Birmingham for later in the year. The committee would like to see one in the London area—any offers?

Group changes

It seems to be the season for changes, as we have been notified of several changes within groups. The Avon group has now completed its planned organization, with G4FRG as county controller, G8KKA (Bath/Woodstock), G3ZKI (Bristol), G8LRB (North Avon) and G3VJJ (South Avon); G3XGY is looking after Weston-super-Mare. G8NAJ had a baptism of fire taking over Solihull and Chelmsley Wood Group. Wiltshire organizer G3YWT is still looking for more members, as are all groups in the London area.

I would like to remind all groups that the annual reaffirmation of groups' activities had not been received by the committee for the past several appointments were not renewed as satisfactory reports on the groups activities had not been received by the committee for the past two years. Up-to-date information on Raynet groups can be had from G3GJW on receipt of an sae. □

*3 Burley Close, Desford, Leicester LE9 9HX.

contest news

432 MHz Cumulative Contest results

This contest proved once again to be a very popular event, and very many more stations took advantage of the increased activity than actually sent in logs. Thirty-four entries were received by the beginning of January, and all hope of receiving several others which were posted with the Christmas mail has now faded.

Over 64 per cent of the entrants submitted Sessions 3 and 4 in their logs, but it is not immediately obvious if this was due to a higher level of activity or to Sunday and Monday evenings being the most popular. Sessions 1 and 3 produced the highest scores, with Sessions 2 and 7 proving to be the least well supported. Conditions were good for the start of the contest and gradually fell back to the normal winter-time low as the event progressed.

As might be expected in an open contest, portable stations took the first three places, although the fixed stations fought back strongly to capture the next four positions in the results table. With at least two good openings to the Continent in the first four sessions, stations in the north-east were not slow to press home their advantage, and it is significant that only two southern stations sited to the east of Greenwich figure in the first 10.

G8FIS/P operating from ZO square took first place, and G8BCG/P came a close second. Both stations receive certificates for their splendid achievements. GD2HDZ triumphed over his relative isolation in the north-west to capture the best dx of the contest and to win a certificate as the leading fixed station. *G2HIF*

Posn	Callsign	Score	QSOs	QRA	Best dx	Km	Sessions
1	G8FIS/P	2,183	164	ZO55	DC6RW	788	1, 3, 4
2	G8BCG/P	2,143	244	ZN61	DC8BB	740	1, 4, 5
3	G8PUB/P	1,656	229	ZL53	DL9GSA	615	1, 2, 4
4	GD2HDZ	1,343	127	XO68	DC8BB	910	1, 2, 3
5	G3NNG	1,268	205	ZL23	DB6BX	630	3, 4, 7
6	G3DY	1,136	199	ZM40	DC8BB	490	1, 3, 4
7	G3WOH	1,064	156	YN47	G3OXH	324	3, 4, 5
8	G3UBX/P	1,048	186	YM49	GI8HXY	402	3, 4, 6
9	G3TDG	977	175	AL51	DJ9DL	492	4, 5, 6
10	G8GGP	837	143	AL52	GD2HDZ	460	1, 3, 6
11	G8OGL	774	142	ZL47	GD2HDZ	399	3, 6, 7
12	G3VJG	683	128	ZL40	DB7KB	523	1, 3, 5
13	G3PQY	662	86	ZN19	DB5AQA	773	1, 3, 4
14	G8IDZ	646	94	ZK23	G8FIS/P	403	3, 4, 6
15	G4CCH	613	137	ZN37	DC8BB	655	4, 5, 6
16	G8OHM	565	115	ZM41	G3BW	263	1, 3, 4
17	G8GHR/P	528	101	ZM80	GD2HDZ	375	1, 3, 7
18	G8AYY	503	105	ZM41	GD2HDZ	262	2, 3, 7
19	G8BJG	502	108	AL41	GD2HDZ	425	1, 3, 5
20	G8DKK	497	107	ZL08	DJ9DL	528	1, 2, 3
21	G8FUL	470	104	ZL58	GD2HDZ	418	1, 4, 5
22	G4ASR	417	65	YM77	G8FIS/P	260	5, 6, 7
23	G8DDW	361	89	AL41	PE1AGB	410	1, 2, 3
24	G8CTT	348	100	AL41	PA0ERW	370	3, 4, 5
25	G8HGN	299	69	AL31	PA0PFW	367	1, 5, 6
26	G8KAX	287	75	AL32	—	—	1, 4, 6
27	G8IFT	276	68	YM50	GD2HDZ	260	4, 5, 6
28	G3TQF	261	67	ZM24	—	—	1, 4, 7
29	G4FMD	225	49	AL02	PA0ERN	361	1, 3, 4
30	G5UM	210	52	ZM35	GD2HDZ	268	2, 4, 6
31	G8BVF	193	45	YN50	G8HVY/M	312	2, 3, 4
32	G8ABI/A	153	81	ZL39	G3AUS	255	3, 4, 5
33	G3ZOD	140	28	YN50	G8CTT	266	— 5, 6
34	G8DXD	28	10	YM69	G8FIS/P	115	2, 4, 7

Late entry (Received 25 January). G3OUL: claimed score 483, QSOs 77, Sessions 1, 3, 7.

2ND 1·8MHz Contest 1978 results

Entries were slightly down on last year's event, with 35 logs from the UK and 18 from overseas. In addition, check logs were received from G3ATU, G3USE, G3ZRZ and OK3CXF who are thanked for their contributions.

Conditions were variable, especially to OK where they were having their own dx contest, but fortunately this did not seriously affect operations and may have encouraged the larger than normal number of entries from that country. There was a noticeable lack of activity from GI and GW, but several GM stations who were active did not send in logs.

The clear winner was veteran Al Slater, G3FXB, who keyed 147 QSOs for 682 points. This was his first win in this particular contest, achieved with a TX4C, R4C and $\lambda/2$ dipole at 55ft. Runner-up was D. Coltart, G3SYM, who made 136 QSOs, and in third place was Dave Sergeant, G3YMC, with 132 contacts.

There was only one entry in the novices section, J. Watson, G4GVA, who wins a certificate of merit.

Gunter Schwarzbeck, DL1BU, with a fine score of 533 points, took the top place in the overseas section well ahead of his old rivals DK3KD and DK5PD.

The standard of log keeping was in most cases very good, and few stations had more than one or two unmarked duplicates. Most points were lost for incorrect callsigns and claiming a county code bonus more than once.

Subject to the approval of Council, the Victor Desmond Trophy will be awarded to G3FXB.

UK SECTION

Posn	Callsign	Bonus QSOs	Points	Posn	Callsign	Bonus QSOs	Points
1	G3FXB*	49	682	19	G3GC	38	449
2	G3SYM/A*	49	644	20	G3JFF	42	443
3	G3YMC/A*	49	626	21	GW3KOR	39	437
4	GI3IVJ	46	624	22	G4DUS	37	402
5	GU3MBS	47	605	23	GM3OXC	38	399
6	G4BUO	47	594	24	G4CZB	35	382
7	G3TXF	46	589	25	G3ZGC	33	377
8	G3IGW	46	570	26	G3KLX	35	375
9	G4FAM	47	567	27	G4EID	32	362
10	G3CXX	43	531	28	G4CSC/A	33	359
	G4BWP	40	531	29	G3HTI	30	329
	G3OLB	40	531	30	G3SNX	28	274
13	G3NOM	40	514	31	G4FPA	27	262
14	G3WUX/A	41	502	32	G3FVW	22	181
15	GM4ALK	40	498	33	G4GVA*	18	169
16	G3XTT	39	470	34	G3ULY	18	156
17	G3VER	39	463	35	G3ILO	1	8
18	G3SWC	40	455				

OVERSEAS SECTION

Posn	Callsign	Bonus QSOs	Points	Posn	Callsign	Bonus QSOs	Points
1	DL1BU*	44	533	10	OK1MSB	20	167
2	DK3KD*	40	429	11	DF4BO	19	151
3	DK5PD*	38	427	12	OK1DWC	17	149
4	OK1DKW*	31	317	13	PA0DZI*	13	104
5	OK1AXD	29	278	14	OK1DRY	5	39
6	OK2BTW	25	227	15	OK1OPT	4	37
7	OK2BCM	23	222	16	YU3NP	4	32
8	OK1DDL	25	221	17	OL6AUL	2	16
9	DK5PX	23	184				

*Certificate winners.
Disallowed (Rule 3): DL0FJ, Multi-op entry, claimed score 249.

Region Round-up Contest rules

TRANSMITTING SECTION

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

2. Eligible entrants. All paid-up members of the RSGB resident in the British Isles (G, GD, GI, GJ, GM, GU and GW) holding a Class A licence. Single-operator entries only may enter. Operation must take place from the home address shown on the entrant's licence, and must not be from a station belonging to a club, college, company or other organization. Callsigns issued to club stations, colleges, companies, etc may not be used.

3. When. Telephony contest: 0800 to 1800 20 May 1979. CW contest: 0800 to 1800 6 May 1979.

4. Contacts. IARU Region 1 band plans must be observed. Bands 3·5 and 7MHz. Entrants are requested to confine their operation on 3·5MHz to the 3,510–3,590kHz sector in the cw event, and between 3,600 and 3,750kHz in the telephony contest.

Reports, RS/T plus serial QSO number must be exchanged. The serial number may start anywhere between 001 and 500 and must then be continued consecutively followed by R and the operator's RSGB region, eg R07 or Region 7 on telephony.

5. Scoring. Three points for each completed contact with a station within the British Isles (G, GD, GI, GJ, GM, GU and GW). Each station may be contacted for points once only on each band. The final score is the total points on each band added together and then multiplied by the total number of RSGB regions contacted. (An RSGB region worked on each band therefore counts as a multiplier of two.)

6. Entries. (a) Each entrant must make at least 30 contacts. (b) Separate log sheets must be used for each band, with the score for each band clearly shown. A cover sheet with the combined score and a signed declaration must accompany logs, which must be sent to RSGB HF Contests Committee, c/o P. A. Miles, 28 Scotch Orchard, Lichfield, Staffs WS13 6DE. Comments and photographs suitable for publication are invited.

RECEIVING SECTION
1. The general rules for RSGB hf receiving contests, published in the January 1979 issue of *Radio Communication*, will apply.
2. When. As transmitting section.
3. Operation. As transmitting section.
4. Logging. A station may only be logged once in the column headed "Station heard" and not more that 10 times in the column headed "Station worked" on each band. Where both sides of a contact are heard, claim to be made for one station only, not both.
5. Scoring. Three points for each contact heard. Other details as in transmitting section.
6. Awards. Certificates will be awarded for 1st, 2nd and 3rd places in each section, providing at least 10 entries are recorded.
7. Entrants must operate from their home address and not from a club or other special station.

432/1,296/2,304MHz Contest rules

1600–1600gmt 5–6 May 1979
All entries and check logs to: VHF Contests Committee, c/o L. Hawkyard, G5HD, "The Eyry", Newton St Petrock, Nr Torrington, N Devon EX38 8LU. This contest is timed to coincide with an IARU multi-band event. Each band will be tabulated individually and no multipliers will be used.

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

144MHz Portable Contest rules

1600–1600gmt 26–27 May 1979
All entries and check logs to: VHF Contests Committee, c/o R. Taylor, G4BEL, 12 The Rampart, Haddenham, Cambs CB6 3ST.

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

1979 RSGB Direction Finding Contests

The full programme of eight qualifying events is published in the Contests Calendar, and competitors' attention is drawn to changes to the rules which are distributed before the start of each event. Details of the first event are given below.

DF Qualifying Event Chelmsford

Date: 22 April 1979.
Map: OS Sheet 167, 1:50,000 Series, Chelmsford & Harlow.
Assembly: 1300bst for start at 1320bst.
Location: Unclassified road just west of Pleshey, ngr 661 143.

Intending competitors requiring tea are asked to notify Mr W. Petchey, Forge Cottage, Good Easter, Chelmsford CM1 4RS (Tel 024531 612) not later than 15 April.

Barking R&ES G3XBF/G8GPK 144MHz Contest rules

1400–1800 local time 25 March 1979
The following rules apply; 4b, 5a, 6a, 9a, 10a, 13–16, 18, 19, 20a, b, d, 21.
Section 1. All amateurs residing in the county of Essex.
Section 2. All amateurs residing outside the county of Essex.
Scoring. Section 1: 1 point per contact. Total number of points multiplied by number of counties worked. Section 2: 1 point per contact. Total number of points multiplied by number of Essex contacts. In both sections, countries count as one county each. Ten points for contacts with G3XBF/P and G8GPK/A.
Contest exchange. The contest exchange shall consist of: (a) callsign; (b) RS or RST report followed by serial number beginning with 001; (c) county.
Awards. Certificates will be awarded to the winners and two runners-up in both sections. The certificates will be presented at a society function during the summer.

The ruling of the Barking committee will be final in all cases of dispute.

All entries to be sent to: A. L. Sammons, G8IZN, 80 Lyndhurst Gdns, Barking, Essex IG119XZ.

Contests calendar

10–11 March	Commonwealth *(Rules in December issue)*
17–18 March	1979 ARRL International DX (CW) *(Rules in January issue)*
24–25 March	CQ WW WPX SSB
24–26 March	BARTG Spring RTTY *(Rules in January issue)*
25 March	Barking R&ES 144MHz *(Rules in March issue)*
7 April	1,296MHz Open *(Rules in February issue)*
7–8 April	Polish DX (CW)
8 April	Low Power *(Rules in February issue)*
8 April	432MHz Open and SWL *(Rules in February issue)*
21 April	Common Market DX (CW)
21–22 April	Bermuda ARC (Phone and CW)
21–22 April	Polish DX (Phone)
22 April	DF Qualifying Event Chelmsford *(Rules in March issue)*
22 April	Common Market DX (Phone)
22 April	144MHz CW *(Rules in February issue)*
28–29 April	Helvetia 26 *(Rules in February issue)*
28–29 April	PACC
29 April	70MHz Open *(Rules in February issue)*
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 Telecommunications Day (Phone)
13 May	DF Qualifying Event South Manchester
19 May	World Telecommunications Day (CW)
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
2–3 June	BATC Summertime ATV
3 June	DF Qualifying Event Dartford Heath
9–10 June	NFD *(Rules in February issue)*
16–17 June	Microwave
17 June	DF Qualifying Event Burton-on-Trent
23–24 June	Summer 1·8MHz
23–24 June	ARRL FD
1 July	DF Qualifying Event Mid-Thames
7–8 July	VHF NFD
15 July	3·5MHz Field Day
15 July	DF Qualifying Event Coventry
29 July	144MHz QRP
5 August	DF Qualifying Event Salisbury
11–12 August	European Meteor Scatter
18–19 August	70MHz Open
19 August	DF Qualifying Event Slade
1–2 September	144MHz Open and SWL
1–2 September	SSB Field Day
16 September	DF Final Rugby
October–November	432/1,296MHz Cumulative
6–7 October	432/1,296/2,304MHz
13–14 October	21/28MHz
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

Looking ahead

10 March—RSGB National VHF Convention, The Winning Post, Twickenham, Middx.
22 April—NRSA Radio & Electronics Exhibition, Belle Vue, Manchester.
11–12 May—RSGB Amateur Radio Exhibition, Alexandra Palace, London.
21 July—BARTG Convention, Public Hall, Harpenden, Herts.
15 September—RSGB HF Convention, Birmingham.
22 September—Scottish VHF Convention, Dundee Technical College, Dundee.
30 September—Sixth Welsh Amateur Radio Convention, Blackwood, Gwent.

club news

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

Items of news and dates of forthcoming events should reach RRs by 20 March for the May 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; 1, 15, 29 March, 12, 26 April. Ainsdale Scout HQ. Full details from G2CUZ.

Blackburn (East Lancs ARC)—First Thursday in each month, 7.30pm. YMCA, Blackburn. Sec G4DGR.

Blackpool (B&DARS)—First Monday in each month. Phone G5ND (Blackpool 64508) for details of venue.

Bolton (B&DARS)—New QTH! The society now meets at the Horwich Leisure Centre, Victoria Road, Horwich, Bolton. Main meetings on first Wednesdays in each month, with informal meetings on third Wednesdays, 8pm. Hon sec G4FSN.

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; 13 March ("VHF linear amplifiers" by Polar Electronics), 10 April ("Orbiting test satellites" by G8NOF). Club projects for an hf linear amplifier, and a microprocessor project, are in hand—anyone interested is welcome to visit. RAE classes now running in conjunction with Bury College of Further education. Further details from G4FQE, tel Rochdale 32730. (Club membership now 80—a record.)

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 for first Tuesday in the month. YMCA Chester. Further details from the ASR. G3PYU.

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. 203 Droylsden Road, Newton Heath. Club call G3HOX is active on hf and vhf; Sec G8IYX.

Manchester (SMRC)—Fridays; 2 March ("Experiments with Gunn diodes" by J. McBurney, G4AUR), 9 March (Surplus equipment sale), 16 March ("Frequency synthesizers" by W. Green, G8ALZ, Racal Electronics Ltd), 23 March ("The design and construction of QRO linear amplifiers" by D. Holland, G3WFT), 30 March (Discussion evening and shack operation), 6 April (To be arranged), 13 April (Club closed), 20 April (Preparation for NRSA Belle Vue convention), 27 April (Homebrew equipment competition), 8pm. Mondays (Informal), 8pm. Sale Moor Community Centre, Norris Road, Sale. Sec W. L. Seddon, G3VIW, 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; 8, 22 March, 5, 19 April. "Windsor Castle", St Paul's Square, Preston. Sec George Loades, G3PVD.

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; 14 March ("Diversions" by G3VSA), 28 March ("Pub signs and histories" talk), 11 April (Surplus equipment sale), 25 April ("Radio astronomy" by Patrick Moore of Jodrell Bank), 9 May ("Ten-Ten International" by G3VSA), 8pm. Blossoms Hotel, Buxton Road, Stockport. Sec G3FYE. Visitors always welcome.

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, 8.30pm. "Legh Arms", Knutsford. Hon sec G3LEQ.

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 G8KKP, tel Wigan 56318.

Winsford (Mid-Cheshire ARC)—Wednesdays. RAE class 7pm to 8pm. Morse class every third Wednesday. Technical Activities Centre, rear of Verdin Building, Verdin Comprehensive School, Grange Lane, Winsford. Net nights 1·8MHz Monday, 8pm; 144MHz (fm) Tuesdays. Hon sec G3JWK.

Wirral (WARS)—First and third Wednesdays in each month, 7.45pm. Sports and Recreation Centre, Grange Road West, Claughton, Birkenhead. 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.

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)—4 March, 15 April, 6 May, 10 June, 7.30pm. Royal Hotel, Barnsley. Sec G8PLJ.
Wakefield (W&DARS)—13 March (To be arranged), 27 March (Quiz), 10 April ("Repeater operation States-side" by G4AAQ), 24 April (AGM), 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.

Birmingham (Midland ARS)—3 April, 1 May, (Construction and club station), 7pm. Brasshouse Centre, off Broad Street, Birmingham. 20 March, 24 April, 8pm. Room 118, University of Aston, Gosta Green, Birmingham. Sec G8BHE.
Birmingham (Slade RS)—First Friday in each month, 8pm. 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. 4 April, 2 May, 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)—13 April, 11 May, 8pm. Avoncroft Art Centre, Bromsgrove. Sec G4GBE.
Burton-on-Trent (BonT&DARS)—Wednesdays, 8pm. Stapenhill Institute, Main Street, Stapenhill, Burton-on-Trent. Sec G3ACR.
Cannock Chase (CCARS)—5 April, 3 May, 8pm. "Lynwood", Old Penkridge Road, Cannock. Other Thursdays, 8pm. "Acorn" public house (rear room), Town Centre, Cannock. Sec G8FWZ. Visitors welcome.
Coventry (CARS)—Fridays, 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 14 March, 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)—15 March (Natternight), 22 March (Inter club visit—see sec), 29 March ("My trip to W6—California" by Brian Wilde, G3VWH), 5, 12 April (Construction competition), 19 April ("Underground radio operation on the river Kwai" by Tom Douglas, G3BA), 26 April ("Sporadic-E" by Martin Harrison, G3USF), 3, 10 May, 8pm. "Albert Hotel", Smithfield Road, Shrewsbury. Sec G3UDA. New members welcome.
Solihull (SARS)—20 March ("Satellites for the amateur service" by Hayden Bate, G8AMD), 17 April (No meeting), 24 April ("Simple homebrew equipment" by Len Beeby, G3CES), 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. 19 March (AGM), 2 April (Constructional evening), 16 April (Easter Monday), 7.45pm. Library, Longlands School, Brook Street, Stourbridge. Sec G4IP.
Stratford-upon-Avon (SuponA&DARC)—Every third Friday, commencing 23 March, 7.30pm. The Clubroom, Swimming Pool, Bridgefoot, Stratford. Sec G4EXR, tel Stratford 5638, weekends only. New members welcome.
Sutton Coldfield (SCRS)—Second and fourth Mondays in each month, 7.30pm. Central Youth HQ, Clifton Road, Sutton Coldfield. Sec G8KRW.
Tamworth (TARS)—Second and fourth Mondays in each month. Indoor Sports Centre, Corporation Street, Tamworth. Sec G4EUF. New members welcome.
Telford (T&DARS)—14 March (Basic shack test equipment), 21 March ("Colour tv" by Brian Campbell, G4HPR), 28 March (Club project—testing completed units), 4 April (AGM), 11 April (Natternight), 18 April ("Portable outings" by Martyn Vincent, G3UKV), 25 April, 2, 9 May, 7.30pm. Phoenix Centre, Webb Crescent, Dawley. Sec G4HFX, tel Telford 727357. Visitors welcome.
Walsall (WARC)—21 March ("Measurements" by Gordon Baggott, G4GUW, and George Willoughby, G4GKC), 4 April ("RTTY" by Bob Sadler, G4FAJ, and Alf Matthews, G3UNM), 18 April (Nominations for committee members), 2 May (AGM), 8pm. Forest Community Centre, Forest School, Hawbush Road, Leamore, Walsall. Sec G8KML.
Willenhall (W&DARS)—Alternate Wednesdays commencing 14 March. 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)—19 March (Club project—capacitance meter—final testing), 2 April (Night on the air—hf and vhf), 9 April (Natternight), 16 April (No meeting), 23 April (Club spring clean and antenna review), 30 April (Natternight), 7 May (No meeting), 14 May (Home-built gear competition), 8pm. Neachells Cottage, Danescourt Road, Stockwell End, Tettenhall, Wolverhampton WV9 9PH. Sec G8EDG.
Worcester (W&DARC)—2 April (Construction contest and skittles evening), 30 April (Magazine evening), 7 May (No meeting), 8pm. "Old Pheasant", New Street, Worcester. Sec G4EKG, tel Evesham (0386) 41105. New members and visitors welcome.

REGION 4—RR *(Post vacant)*

Derby (D&DARS)—7 March (Surplus sale), 14 March (Natternight), 21 March (AGM), 28 March (Film show), 4 April (Surplus sale), 11 April ("Simple photography" by Martin Shardlow, G3SZJ), 18 April ("Repeaters GB3HH and GB3SF" by Tony Whitaker, G3RKL), 25 April (Film show), 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)—16 March ("Electrical safety and first aid" by A. W. Bass, British Steel Corporation), 20 April (Possible visit to Midlands Radar, North Luffenham, details to be announced), 7.30pm. St John Ambulance Hall, Asfordby Hill, Melton Mowbray. Sec Richard Winters, G3NVK. Top band net Sundays 11.15am, 1,950kHz.
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.

REGION 5—RR R. E. G. Kendall, G8BNE, 19 Willow Green, Needingworth, St Ives, Cambridge.

Bedford (B&DARC)—Wednesdays, 8pm. Ravensden. Sec G4FFC.
Cambridge (C&DARC)—Fridays, 7.30pm. Air Training HQ, Newmarket Road. Sec G4BAO.
Cambridge (CUWS)—Tuesdays fortnightly during full term. Details from sec G8KTJ, Queens' 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)—16 March ("Computers" by G4CYS). Regional Swimming Pool, Bishops Road, Peterborough. (This is the first of a series of quarterly lectures to which members of other clubs are invited.) 20 April (Convivial night). Venue to be arranged. Club top band net Thursdays 1930, on 1,950kHz. Further details from G3EEI.
Shefford (S&DARS)—Thursdays, 8pm. Church Hall. Hon sec G4DAQ.
St Neots (Foster Cambridge RC)—Details from John Parsons, c/o Foster Cambridge RC, Foster Cambridge Ltd, Howard Road, Eaton Socon, 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; March (Night on the air, tune-up session and natter), April (Junk sale), 8pm. Hedgerley Scout Hut, Hedgerley, Nr Slough, Bucks. New 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)—28 March (Construction contest), 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. Sec Peter Seaman, G8OTN. Tel Maidenhead 20139.
Newbury (N&DARS)—Second Tuesday in each month. Newbury Technical College. Details from sec G8LTD, tel Newbury 46078.
Newport Pagnell (Milton Keynes ARS)—Lovat Hall, Silver Street, Newport Pagnell. For details of meeting 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, 8pm. Christchurch Centre, High Street, Eltham, London SE9. Sec G4FUG.
Croydon (Surrey Radio Contact Club)—First and third Wednesdays in each month; 7 March (Surplus equipment sale), 4 April (AGM), 7.30pm. TS Terra Nova, 34 The Waldrons, Croydon. Sec G4FFY.
Crystal Palace (CP&DRS)—Third Saturday in each month; 17 March ("Intruder Watch" by Stan Cook, G5XB), 21 April (To be arranged), 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, 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. March/April programme not finalized. The society is seeking a smaller and more convenient meeting place. Sec G4APG, tel 01-399 8113.
New Cross (Clifton ARS)—Fridays, 8pm. 225 New Cross Road, London SE14. Details from R. A. Hinton, 42 Sutcliffe Road, Welling.
Redhill (Reigate ATS)—Third Tuesday in each month; 20 March ("Mobile radio" by Ray Wells, G3RIN), 17 April (AGM), 8pm. Constitutional Centre, Warwick Road, Redhill. First Tuesday in each month. "Marquis of Granby", Hooley Lane, Redhill. Sec G3XSZ.
Sutton & Cheam (S&CARS)—28 March ("Contests—a means to an end" by G3LCH), 18 April (AGM), 7.30pm. Ray's Social Club, London Road, North Cheam. Sec G2DMR.
Thames Ditton (Thames Valley ARTS)—6 March (Surplus equipment sale), 8pm. Giggs Hill Green Library, Giggs Hill Road, Thames Ditton. Sec G3ZNW.
Tolworth (Decca ARG)—New club! First Thursday in each month, 8pm. Decca Sports and Social Club, Kingston Road, Tolworth. Sec G3NFV, tel Leatherhead 72587.
Wimbledon (W&DRS)—Second and last Fridays in each month, 8pm. 9 March (Surplus sale), 27 April (Slide and film show). St John Ambulance HQ, 124 Kingston Road, Wimbledon SW19. Sec J. W. Todd, tel 01-540 9031.

REGION 8—RR D. N. T. Williams, G3MDO, "Seletar", New House Lane, Thanington, Canterbury, Kent.

Following information is latest received

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)—First Thursday in each month, 8pm. Details of future events from sec G8GHH.
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 March ("More chips"—continuing the saga, by G8KVC), 14 March (Quiz—"Can you pass the RAE?"), 21 March ("Basic soldering and construction" by G3OWQ and G8KVC), 28 March (Construction contest judging), 4 April (AGM and contest awards), 11 April, 18 April ("Gone to earth" fox hunt, by G3OWQ), 25 April ("Revealed...shack or chaos" slides, by G4GAN). Further details from G8KEN.
Eastbourne (Southdown ARS)—First Monday in each month. Details from G8CVV, or pro G3LFZ.
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. Wadsworth, G3NPF.
Kent Repeater Group—Details of membership from G3XDV, 5 Lambs Walk, Whitstable, Kent.
Maidstone (MYMCAARS)—Fridays, 7.30pm. First and third Fridays in each month devoted to the beginner. Y Sports Centre, Melrose Close,

Maidstone. Details of lectures and other events from sec J. A. Hastie, tel Medway 251387.
Medway (MARTS)—Details of events and venue from G4EVY.
Sussex Repeater Group—Information from G8HVV.
Tunbridge Wells (West Kent ARS)—Alternate Fridays. Adult Education Centre, Monson Road, Tunbridge Wells. Informal meetings on Tuesdays following the Fridays. 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; 1 March (RSGB contests manager), 5 April (AGM), 7.30pm. SWEB Clubroom, Pool, Camborne. Full details from G3VGO, tel Devoran 864255. Cornish net each weekday 10am on 3·715MHz, and on Sundays 11am on 3·682MHz. Visitors always welcome at club meetings.
Exeter (EARS)—Second Monday in each month, 7.30pm. Community Centre, St Davids Hill, Exeter.
Exeter (University ARS)—Now affiliated! 18 March ("Long distance communication on vhf" by G3SEK and G4DGU), 3pm. "Cornwall House", Exeter University. Full details from G4EXT, Exeter University. All welcome.
Newquay (N&DARS)—Alternate Wednesdays, 7.45pm. Treviglas School, Newquay. Details from G8GOR, tel Newquay 4168.
North Devon (NDRC)—Second Wednesday in each month. G4CG's QTH. Fourth Wednesday in each month. G2FKO's QTH. Full details from G4CG. A Raynet group has started, with G8OSR as controller.
Plymouth (PRC)—Alternate Mondays, 7.30pm. Whitleigh Methodist Church, Budshead 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. Full details from G4GTG, tel Plymouth 771135.
Torbay (TARS)—Fridays, with special meeting on last Saturday in each month; 31 March (G3LHJ's slides), 28 April (AGM), 7.30pm. Rear of 94 Belgrave Road, Torquay. 10 March (Annual dinner), 7.30pm. Templestowe Hotel, Torquay. Full details from G3UIQ, tel Newton Abbot 3025. Torbay net weekdays 3·756-3·764MHz, Mondays to Fridays 10.30am, Saturdays 9.30am. 144MHz net Mondays on S22 at 8pm. Visitors welcome at club meetings.

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

Barry (BCoERS)—Thursdays, 8pm. In addition, special events are arranged every fortnight. New venue: Weycook Cross, Five Miles Lane, Barry. Details from new sec M. E. Woodberry, GW8OPK, 60 Pen-y-Graig, Rhiwbina, Cardiff, tel 613635.
Blackwood (BARS)—Fridays, 7pm. Oakdale Community Centre, Oakdale, Blackwood, Gwent. Details from GW4BLE, 10 Llanthewy Road, Newport, Gwent.
Bridgend (B&DARC)—Second Wednesday in each month, 7.30pm. NCB Social Club, Tondu, Bridgend. Details from sec GW4BDV.
Cardiff (CRSGBG)—Second Monday in each month; 12 March (Constructors' contest) 9 April (Film show), 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.
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.

Plymouth RC recently put on an exhibition station in Plymouth Guildhall for the Home Improvement & Leisure Exhibition. Club president Lauraine, G4GSZ, is shown here operating the club rig as G3PRC/A

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.

Following information is latest received.
Bangor (UNCWARS)—Thursdays, 7.30pm. Small lecture theatre, School of Engineering Science, Dean Street, Bangor. Visitors welcome.
Conway Valley (CVARC)—Second Thursday in each month; 8 March (Amateur radio quiz), 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.
Grampian Repeater Group—The mode of operation of GB3GN has been altered for the winter months to give longer talk times—please do not abuse the extension. Sec GM8HGD.
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.

Sven Weber, GM8ACC, of "Seafield", Stronsay, Orkney, has been nominated as AR for the Islands area of Region 12.

REGION 13—RR A. B. Givens, GM3YOR, 41 Veronica Crescent, Kirkcaldy, Fife KY1 2LH.

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; 8 March (Talk by GM8ARV), 22 March (Construction competition), 26 April (Junk sale), 7.30pm. Cannonball House, High Street, Edinburgh. 12 April ("This is your shack" video tape), 10 May (Talk by GM8FFX), 7.30pm. Riddles Court, High Street, Edinburgh. Details from GM4DIJ, tel 031-337 7311.

Glenrothes (G&DARC)—Third Sunday and every Wednesday in each month; 18 March ("VMOS transistors" by GM3YBQ), 15 April, 20 May (HF and VHF NFD preparations), 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.

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 (QUoBRC)—First Friday in each month, 8pm. Sec GI4AAM. New members and visitors especially welcome.

Bangor (B&DARS)—First Friday in each month; 6 April ("Microwaves" by GI8AYZ), 8pm. Redcliffe Hotel, Bangor. 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 second Tuesday in each month, 8pm. Scout Hall, Mossvale Road, Dromore, Co Down. Details from AR GI4GDV.

Mid-Ulster (MURSGBG)—First Sunday in each month. GI8JPQ's QTH. 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; 8 March (Antenna demonstration by Frank Howe, G3FIJ), 22 March ("Radio astronomy" tape/slide lecture), 5 April (1979 contest programme), 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; 9, 23 March, 6, 20 April. Loughton Hall, Rectory Lane, Loughton. Further details from sec John Ray, G8DZH, tel 01-508 3434, evenings.

Lowestoft (L&DARC)—Fridays; 2 March ("Teleprinters" by Bob Lambarth, G8HAU), 16 March ("Vintage radio" by Tony Besford, G3NHU), 7.30pm. Note new venue: North Suffolk Teachers' Centre, Lovewell Road, Lowestoft. Details from Brian Clay, G8GGJ.

Martlesham (MRS)—First Wednesday in each month; 4 April (Talk by Dave Tong of Datong Electronics), 7.30pm. Details from Simon Garrett, G4EVN, PO Research Centre, Martlesham Heath, Ipswich.

Norwich (Norfolk ARC)—Wednesdays; 7 March (Club project), 14 March (Committee and morse), 21 March ("The Norwich uhf repeater" by G8GTZ, G8LUA and G8JWT), 28 March (Morse), 4 April (AGM), 11 April (Committee and morse), 18 April (Surplus equipment sale), 25 April (Morse), 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.

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) 16 March ("Antennas and propagation—multi-band antennas and miniaturized beams" by L. A. Moxon, G6XN), 7pm. Bournemouth School, East Way, Bournemouth. Sec G. D. Cole, G4EMN.
Chippenham (C&DARC)—Tuesdays, 7.30pm. Liberal Club, 20 Gladstone Road, Chippenham (temporary premises). Sec P. J. Tuck.
Fareham (F&DARC)—Wednesdays, 7.30pm. Porchester Community Centre, Room 9. Sec David James, G8GRV, tel Titchfield (032 94) 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 G3FIX.
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 (SD&ARC)—Alternate Wednesdays, 7.45pm. Clubroom above "Coldharbour" public house, Blunsdon, just north of Swindon. Sec G8KWC.
Winchester (WARC)—First Friday and third Thursday in each month, 7.30pm. "Crown Hotel". Sec Chris Jackson, BRS39944, 69 Buriton Road, Harestock, Winchester.

The Verulam Amateur Radio Club's G3PAO Memorial Lecture was held on 25 January. In spite of appalling weather conditions, the speaker, Peter Blair, G3LTF, and visitors travelled many miles to attend. Pride of place must go to the gentleman who came from Canterbury, with the Southend group being a close second. Several well-known eme enthusiasts were present, and the photograph shows left to right: Julian Gannaway, G3YGF; Chris Bartram, G4DGU; Charles Suckling, G3WDG, and Peter Blair in earnest discussion during the interval. An audience of 70 visitors and members was treated to an extremely well presented and detailed talk, covering all aspects of eme transmissions

REGION 18—RR W. A. Ricalton, G4ADD, 4 South Road, Longhorsley, Morpeth, Northumberland.
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. 15 March (Visit by RR19, G3AAJ. "90 per cent of your questions answered; I'm not perfect"—*G3AAJ*), 25 March (BRES 144MHz Contest), 5 May (First aid basics for the shack). Hon sec G8PUY, 44 St Ann's, Barking, Essex, tel 01-594 6584. All welcome.
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)—20 March (FT7 transceiver demonstration by G3OJX), 10 April ("Power measurements using an oscilloscope" by G4GRM), 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)—Third Sunday in each month; 18 March (Business meeting and metalwork demonstration), 22 April ("UK FM Group" by G3PAQ and G8IUC), 20 May ("SSTV" by G4CJQ. Last meeting until September), 3pm. "Wanstead House", The Green, London E11 (near Wanstead underground). New sec J. R. Holmes, G3PKQ, 92 Dunedin Road, Leyton E10.
Edgware (E&DARS)—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.
Harrow Weald (RSH)—Thursdays, 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. New sec A. G. Negus, G8DQJ, 17 Courtenay Gardens, Upminister, 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.
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; 22 March ("IARU" talk by D. Andrews, G3MXJ), April (To be arranged), 7.30pm. Ex Civil Defence Hall, Chequers Street car park, St Albans. New chairman Brian Pickford, G4DUS, and new sec G8MAE. All welcome.

Shelburne (SRC)—Wednesdays and Thursdays, 7pm. Shelburne Youth Centre, Hornsey Road, London N4.
Southgate (SRC)—Second Thursday in each month; March (Care and maintenance of batteries), April (Used equipment sale), May (To be arranged), 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. (Will sec please contact 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; 5 April ("Problems of mobile operation" by G3AGP), 19 April (Junk sale), 26 April (DF hunt on 144MHz), 3 May ("SSTV" by G4BWU), 10 May, 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.
UK FM Group (London)—Second Tuesday in each month; 13 March (Talk by Dr D. Evans, G3RPE), 10 April (To be arranged), 8pm. New venue: "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 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 assistance from local amateurs who could give talks on any radio topic. Hon sec R. Ball, G8JEB, tel 01-422 0414.
RR19 requests: would club secs please send club details by the copy deadline if they require this service to continue. I will put what you wish into this feature, but please abbreviate to format, as above copy.

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

Bridgwater (HPSSARS)—First and third Fridays in each month, 7.30pm. YMCA, near St John Ambulance Hall. Hon sec 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; 1 March ("Integrated circuits" by G8LAX), 16 March ("Planning permission for your antenna" by G4BSO and G3SSO). "The Old Bakery", Chester Walk, Cheltenham. Hon sec G8MZV.
Gloucester (GARS)—First and third Thursdays in each month, 7.30pm. Chequers Bridge Centre, Painswich Road, Gloucester. Hon sec G3MA.
Weston-super-Mare (WsMARS)—Second Monday in each month (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)—8 March ("Low cost receiver design" and "Low cost transmitter design" by G3MYM). Hut 101, Houndstone Camp (three miles west of Yeovil off A3088). Hon sec G3NOF. Info at main gate, S20 fm talk-in, club net 10.30am Sundays, 3·660MHz.

Chorleywood College ARC

Chorleywood College ARC must be unique, in that, although supported by sighted amateurs, all members are "yl white-stick operators", ie blind girls.

The club was formed in 1974 by Shirley Hesketh, a teacher at the school, who had recently obtained G8IWU. Meetings took place, then, as now, every Wednesday evening during term time. Helpers were John Hoare, G3PJI; Bill Craig, G6JJ; and Brian Pickford, now G4DUS.

Among the students who came along to the early meeetings was Marilyn Baker, a visiting music teacher and recent old girl of the school. Although convinced that the technical examination required to obtain a licence was quite beyond her ability, Marilyn agreed to have a try and, helped by some intensive coaching from Shirley Hesketh, she passed the RAE at her first attempt, and became G8OAA in September 1977. Next to take the plunge were students Linda Welding and Lorraine Robinson. Linda became G8PHZ, and Lorraine G4HEK, in June 1978. The two latest licences issued are to Melanie Jones, G4HKI and Sandra Davies, G4HNZ, and club helpers have been joined by Stan Pond, G4EBD; John Foster, G4AWS, and Steve Field. Shirley Hesketh, having passed her morse test is now G4HES, and Marilyn Baker is G4HGR.

The club now has a small operating room, an assortment of antennas, and a steadily growing amount of equipment, loaned or donated by friends, including a vhf transceiver which the licensed members use to make contact with other amateurs in the area and around the home counties. The club holds the appropriate callsign G4GRL, and the girls are becoming well known and popular on the amateur bands.

The club hopes to enable members to make contacts all over the world by providing modified equipment for the hf bands, and to provide vhf equipment to loan to members who have just earned their licences.

The smile of success! Lorraine Robinson, G4HEK, and Linda Welding, G8PHZ, the first two students at Chorleywood College to pass the RAE

members' ads

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

Closing dates in 1979; **27 Mar, 27 Apr, 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

Datong FL1, £40; Datong rfc, £30; Technical Associates xtal calibrator, 1MHz–1kHz markers, £13; all in new cond. G3AUB, QTHR. Tel Macclesfield (0625) 25910.

Taylor sig gen, Mod 65B, 100kHz–28MHz, £15. Two 12in Philips spkrs, 4Ω, unused, £10 ea. Philips 2204 cassette recorder, mic, one cassette, exc cond, £20. G3OML, QTHR. Tel 01-540 2713, after 7pm.

SRX30 Super 30-band rx, £115; Realistic DX160, £65; National Panasonic DR48 digital rx, £215; all mint, in makers' orig packing. Grundig Satellite 2000, £120. Mint Eddystone 750 Double Super, very good, £70. Tel York 59035.

Trio TS520 hf tx/rx, very little used, comp with all leads, etc, vgc, £380. *Wanted:* FT101B or FT101E; exch. G4EXK, QTHR. Tel Sheffield 746830.

Yaesu FL50B/FR50B, exc cond, £135. G3MYX, QTHR (Kent). Tel 0303 57991.

Trio 2200GX, S20–23, R4–7, nicads, etc, £120 ono. Multi 800D, £220 ono. Multi U–11, RB0–14, £220 ono. G8NXM, QTHR. Tel St Austell 850818.

Comp set spare valves for FT200, plus extra spare set pas, £20 no offers. Tel 01-579 2515.

Gen cov rx, 500kHz–31MHz, 6W/B, separate bandspread amateur bands, xtal filter/noise lim/product detector, etc, originally AR77, £30. Labgear speech clipper, £4. ST6 rtty tu/audio tx, £30. AN/SGC rtty tu/audio tx, prof modified all shifts, £25. G5RV cw/a.m. tx, wideband coupled, built in pwr supply, 2×5B254 150W pa, £30. New, boxed, Eagle dual imp desk mic, £13. All plus carr or collect. G3JEI, QTHR. Tel Hagley (056 286) 3157.

10m beam, ZL special polythene tubes on wooden boom, hand rotated, worked W, UK9, ZS, xyl objects on aesthetic grounds, for restoration of peace offered at £12. Western, G3TDW, QTHR. Tel Exeter 70936.

5V 12A psu, £30; ASCII keyboard, £30; both new. Three 0–30V 0·5A psus, £4 ea. Tel Swansea 74671.

Katsumi EK108A ac mains electronic keyer, £25. Class D No1 wavemeter, all wkg except fault on 4–8MHz range, manual, spare ECH35, £7 ono. *Wanted:* 144MHz fm mobile rig. Lewis, GW3YTL, QTHR. Tel Knighton (Powys) 8030, evenings.

KW202, spkr, manual, £180, or nearest; or exch for JR599CS or FRSDX400. Tel 0302 68339, after 7pm.

Datong rfc speech clipper, £32. *RSGB Bulletin* '64–'72, bound, offers? *Wanted:* FL2100B. G2AFQ, QTHR. Tel 061-764 2622.

ITC cctv camera, 2/3in vidicon, 1V video output, int syncs, good cond, 13 months old, £65; or swop other tv gear. Emmerson, G8PTH, 4 Mount Pleasant, Blean Common, Canterbury, Kent CT2 9EU. Tel Blean 471.

Liner 2, vgc, mic, preamp, mobile mount, handbook, £110 ono. SML vswr meter, six months old, boxed, £10 ono. Few Mullard 6-40A offer? Stabilized psu, dual 250V 100mA, meter, £20 ono. G8OGH, QTHR. Tel Byfleet (Surrey) 42581.

Shack clearance: HRO plus all coils, psu, £28; h/b ssb tx, all bands, psu, £15; atu, Z-match, h/b, £6; Joystick ant, and LO Z 500 atu, £20; h/b cw tx, £5; lots of odds and ends. Schiffman, G4GQL. Tel 01-518 1562.

Trio TR2200GX, 12ch, incl rubber duckie, £120; psu PS5 for Trio, £38; BPF2A 2m filter, £20; Sentinel 2m preamp, £12; KW ant switch, £5; all exc cond. Barker, G4HPS, 11 Dipton Gardens, Tunstall Estate, Sunderland SR3 1AN. Tel 226883, after 6pm.

Multi U11, £215. TR7010, £135. Scopex 4S6 6MHz 'scope, £105. QM70 40W pa, £30. SEM Z-match, new, £30. Sentinel mf converter, £10. HB9CV indoor, 2m and 70cm, £6 pair. All plus carr. G8ESK, QTHR. Tel Bradford 45611.

Creed 444, £65. UHF Storno Viscount, RB4, £30. Twin parallel tape punch, £15. Nascom computer system, £300. Comsar strobe sequencer, £30. Large teak radiogram cabinet, Garrard 301, SME arm, Shure cartridge, £45. Other items, sae list. G3TGF, QTHR.

HW7, factory built, plus HWA–7–1 psu, no mods, fb cond, £40. G4HED, QTHR. Tel Stevenage 62829.

Leak trough-line stereo fm tuner, 88–108MHz, £15; Leak Stereo 30 amplifier, £30; Goldring Lenco GL70 transcription unit, with stereo cartridge, mono 78/33 cartridge, £20; all wkg perfectly, can be demonstrated. Tel Ashtead (Surrey) 73565, any time.

Lattice tower, 20ft, crank up to 40ft, wall-mounted but could be converted for free-standing, offers. GW3XJC, 33 Maiden Street, Cwmfelin, Nr Bridgend, Mid Glam. Tel Maesteg (0656) 733729, after 6pm.

Trio TS700G, in orig packing, comp, as new, with separate vox unit (Trio), £345 ovno. G4FSY, QTHR. Tel Hemel Hempstead 59970.

Icom IC3PA psu, as new, orig packing, £35. G4EJH, QTHR. Tel Bristol (0272) 843897, evenings.

Solartron CD1015, 15MHz 'scope, £65; rotary transformers No 1 and No 2; inspect/collect. G3OJL. Tel Wells 75415.

Liner 2 Mk2, vgc (used to work 19 countries), £100; or part exch for hf rig. G8LGL, QTHR. Tel 02755 2478.

Drake R4C, cw filters spkr, FS4 synthesizer, T4XC with psu, £650. Dentron 3kW tuner, £120. G6RJ, QTHR. Tel 0473 78748, after 7.30pm.

TR2200GX, 12ch fitted, £140. Microwave Modules transverter MMT28/432, £65. Liner 2, £90. G4GSB, QTHR. Tel M. Hall (Dudley, West Midlands). Tel 54199.

Heath hf separates: SB303 rx, SB401 tx, exc cond, most options, incl separate tx xtals, cw filter, full set of spare valves, new manuals, giveaway price for quick sale, £299 comp. G3VZJ, QTHR (Reading). Tel 0734 413891.

FV401 vfo, £50. Belcom Liner 2 and Belcom regulated psu model R115E for Liner 2; this Liner 2 is not rubbish and does not need a preamp; £150. G4HMW, G8GTY QTHR. Tel Chesterfield 36496.

Comp GPO teleprinter installation, table, auto-head, printer, reperforator, psus, paper, exc cond, £65. G3CON, QTHR. Tel Cheltenham 28959.

Trio model JR599 custom special, immac cond, little used, with 50MHz and 144MHz, £165. Also Worldstar multi-band portable radio, perfect, £35. Ireland, 16 Cathebedrow Road, Carnhell Green, Camborne, Cornwall TR14 0NA. Tel Praze 236.

FL400/FR400, matching spkr, £325. FT101, 160m, fan, £275. FV101, £35. HA14 linear, mains psu, £100. KW E-Zee match, £20. BC221, orig charts, £15. Telequipment double-beam 'scope D31R, rack mounted, £30. Collect or carr. G3SEM, QTHR.

Avometer model 8 Mk5, brand-new, sealed and boxed, £65. Fet multimeter, new, guaranteed, £18. FT101E, vgc, £350. Homebrew 'scope, with 3BPI crt, £18. Duckworth, G4BG. Tel Salisbury 3579.

Eddystone 888 rx, 160–10m, c/w S-meter, plinth spkr, manual, vgc, £65. MMC 144/28 2m converter, as new, £14. Heathkit Q-multiplier, manual, as new, £5. Wright, Flat 4, 2 Harrington Road, Brighton, East Sussex BN1 6RE.

Mains transformer, 240V primary, 400V 500mA, 6·3V 4A secondaries. GEC record player, £12. R208 rx, £5. *Wanted:* Pye Bantam, pref on two, state price, will exch (part) for above. G8OYW, QTHR. Tel Stowmarket 3388, after 6pm.

HW32A 20m ssb tx/rx, HP23B psu, GH12A mic, manuals, comp stn, £90. *Radio Communication* '68 to date, 3p ea. Buyer collects/postage extra. G3MCA, QTHR. Tel 0689 56497.

Liner 2, Belcom mains psu, preamp, usual accessories, good cond, £120. HW7 QRP tx/rx, good cond, £30. G8OGY, QTHR. Tel 01-432 4284, office hours.

DX100U, SB10U, leads, mic, relay, manuals, vgc, £55. G3JNP, QTHR. Tel Gloucester 22566.

Comp double-balanced mixer module for Yaesu FT101 tx/rx, unused, manufacturer's fitting instructions, cost £18 new, £10. Omega-T extended range antenna noise bridge, model TE7-02, unused, instructions, cost £25 new, £15. G3UCT, QTHR. Tel Fleet (02514) 6998.

Vertical trap antenna, 80 and 40m, Diamond KB103, 2kW, with unused coils for radial elements, £15. G3HEA, 15 Daltry Road, Stevenage, Herts. Tel Stevenage 4251.

B40 spare valves, models A to D, full technical manual, covers all models, sae details. Admiralty stabilized dc psu, 12-15V 5A constant duty, die-cast modular chassis, £18. Jaybeam 5/8λ 2m mobile whip, new, in carton, £10. Both items plus carr. G3GUU, QTHR.

Pye Cambridge AM10B, £25. Heathkit SW717 rx, exc cond, £38. Buyer collects. G4HHB (Sussex). Tel 044 46 45182.

2200GX, mint, fitted SO, S19-24, R5-7, Raynet, comp with nicads, charger, ac psu, flexible whip, orig packing, £138. Pair 6GJ5 valves, unused, £7. Sparkrite electronic ignition, £10. GW4AEC, QTHR. Tel Llanelli (Dyfed) (05542) 53186.

FT501, digital readout, 80-10m, cw filter, good cond, 500W ip, £370 ono. G4FAW. Tel Ipswich 642751.

Exch: uhf portable tx/rx, based on Pye PF1 boards, built into single case, t/b, nicads, fitted channel RB2, nicad charger; for vhf portable tx/rx, Ultra Cub or Bantam, etc, why? G4ANW, 16 Chestnut Drive, Broadstairs, Kent CT10 2LN.

Liner 2, used mobile, £100. VHF/uhf base for 4CX250, £10. UHF Storno Viscount with control box, cables, mic, circuits, £20. Ellis, 127 Sinclair Road, Chingford, London E4 8PP. Tel 01-524 1750.

FRSDX400, clean, £130 ono. PF1s rx battery RB0, £15. Nombrex sig gen No31, £5. BSR auto-change deck, two years old, £10. Muirhead 0-61·5dB attenuator, £5. Sinclair scientific calculator, £8. All carr extra. Callers phone first. G8HNN, QTHR. Tel Worcs (0905) 22704.

Multi U11, used infrequently, first class cond, as new, now costs around £300, must sell, £225. G3SXK, 20 Westmeade Close, Cheshunt, Herts. Tel 0992 32160, evenings.

KW107 Supermatch, £65; 2m MMC 144/28 converter, £19.50; Cushcraft ARXZ 145MHz antenna, £25; Codar AT5, psu, £25; 25m BICC T3234 52Ω coaxial, £5; Walters type 51 key, very heavy-duty, £10; 20m UR67, £5; KW antenna switches, £5 ea; all as new. Craig. Tel 01-647 8539, evenings.

2m SD306 preamp pcb, £4; two-tone oscillator pcb, £4; pip-tone pcb, £4; all with data sheets. Pye FM10B manual, brand-new, £4. All items incl postage. G8BWR, QTHR. Tel 0926 48388.

Jaybeam UGP1 unipole λ/4 g/plane (2m), mint cond, £5. BC221T freq meter, late model, comp with charts, int psu, mint cond, £25. CR100 comm rx, 60kHz-30MHz, a.m./cw ssb, vgc, £25. Eddystone mech bug key, model No689, mint cond, still in orig box, best offer. Carr extra on all items. G4GQH, QTHR. Tel Bournemouth 522796, after 6pm.

KW2000 tx/rx, ac psu, £110. STE Bug 20 keyer, three memory lengths, 1,024 bits, iambic operation, superb keyer, £90. Pye Cambridge, R3, S20-22, £40. Copal clock, £5. MFJ CWF2 filter, £5. G4BYG, QTHR. Tel 0430 40584.

FT101E cw filter, £479; FV101B, ext vfo, £68; YO100 monitorscope, used a few times only, £125; all as new. G3KDH, QTHR. Tel Tring 3505.

KVG filter XF9A, plus XF901, XF902, xtals, as new, £12. G3OVT, QTHR. Tel Stevenage 50136.

Trio TS510, PS510, xtal tx/rx, mint, £195. *Wanted:* FT101E. G8OGZ, QTHR. Tel Flitwick 4343.

KW2000B tx/rx, ac psu, handbook, Shure 201 mic, £200; KW E-Zee match, £20; Drake lp filter TV-3300-LP, £15; all exc cond. G3PZZ, QTHR. Tel Wickford 2791.

Pye Bantam, xtalled S21, £45. FT220, wkg but needs attn, £185. 90W mobile fm tx/rx, S21, S24, R6, £85. G8ATB, QTHR. Tel Ware 3690, after 6pm.

Pye Bantam, xtalled, wkg, good cond, mobile 12V/16·8V psu, mounting bracket, offers. G3POQ, QTHR. Tel 0903 813183.

FT101 Mk2, 160m, fan, spare valves, £295. Wightraps, pair, £5. 2m converter, 14-16MHz, £10. Prefer buyer collects. G4GMA, QTHR. Tel Kidderminster 63463.

Storno 600 (612), all solid-state, 12V, S0, S20-24, R5-7, 48, two spare, std control box, full length leads, second control box, f/stn, full autoscan, mics, xtal t/bursts, h/book, exc cond, £140. Collect. Tel 01-648 5895.

Racal RA218 ssb adaptor and fine tuner for RA117, beautiful cond, £70. Barlow Waddley XCR30 Mk2, fm unit, 1-30MHz xtal-controlled rx, little used, cost £170, will sell at £150. G4GEN, QTHR. Tel 082 571 2205.

Eddystone 880/2 high stability rx, 0·5-30MHz, vgc; Hallicrafters SX-122 rx, 0·5-34MHz; EA-12 rx; G-whip multi/m; offers; or exch for Westminster hb a.m. set. G4AFY, QTHR. Tel Kidderminster 63358.

Trio TX599, JR599, hf separates, spare 6146s and driver valves, dynamic mic, spkr, handbooks, orig packing, £300. G4GUG. Tel 0749 3993.

Transformers: 400-0-400 400mA potted; 620-550-275-0-375-550-620 200/250mA 3kV ins. TCC 8μF 750V (5). Offers. Might deliver M5/M6 Carlisle. G4QK, QTHR. Tel 4508.

Grundig Satellit 2100 rx, 21 wavebands incl fm-vhf and 18 sw bands, ssb unit, selling because of increasing deafness, mint cond, £130 ono. Pearce, 70 Duncroft, Plumstead, London SE18 2JA.

FT2FB fm tx/rx, FP2AC pwr supply/spkr unit, £120. G8EOH, QTHR. Tel Luton 29599, after 6.30pm.

Yaesu FRG7, few months old, mint, boxed, manual, £160. Redifon, GR410/T 2-18MHz tx/rx, ssb/cw/a.m., needs some attn, all integral units incl boards, psu, atu, handset, key, £100. Cossor double-beam 'scope, wkg, £25. G4HNH, 41 West Drive, Edgbaston, Birmingham. Tel 021-472 3845.

Icom IC240 fm tx/rx, eight months old, all accessories, £170. SP401 matching spkr to FT401 or FR400, etc, £10. G4HKF. Tel Hereford 65092, after 6.30pm.

Trio 2200GX, 12ch, S16, S20-23, R0, R0R, R4-7, R6R, comp with charger, nicads, orig packing, 14 months old, vgc, £150. G4ETN, QTHR. Tel Brian, 0278 51357, after 6pm.

Multi-channel W15U Pye Westminster, xtalled RB0, RB4, RB10, SU8, SU20, control box, mobile mount, £100. Creed 7E teleprinter, psu, wkg, good cond, £22. Icom IC245E multi-mode 2m tx/rx, orig packing, £300. G4BLH, QTHR. Tel 0282 695904.

Trio TR7010, M/MT, £130; ac psu, £15; FT75, vfo, ac/dc psus, M/MT, £150; Atlas 180, £250; KW2000A, ac psu, £150; dc psu, £25; all vgc, handbooks. G3VDI, QTHR. Tel 0246 68117.

W30AM, W15AM h/b, Bantam HP1AM l/b, offers. Eddystone 880/1, £175. EC10 Mk2, £85. Redifon GR450A hf ssb exciter, £25. PF70 3ch rx board, £12. CV89A, £20. *Wanted:* 3200G, C432 70cm portable. 830, 770U, 990. Pye manuals. Ringo Ranger 2m/70cm. G8EPR, QTHR. Tel Bewdley 403773.

Liner 2, vgc, preamp, not fitted, all maker's accessories, h/b halo on mobile mount, £100. G4GBN, QTHR. Tel 061-483 0776, Mon-Fri; or 0935 862572, Sat and Sun.

Imperial electric typewriter, mint cond, 18in carriage, all facilities, service handbook; exch for 2m tx/rx in good cond. F. G. Winfield, 4 Richmond Drive, Chilwell, Nottingham. Tel 0602 256227, any time.

TS520, cw filter, VFO520, MC50, like new, packing, £450. Drake TR-3, DC-3 mobile psu, spkr, mobile mic, recent factory overhaul, exc hf mobile rig, mobile mount, £250. 18AVT, £40. Trio 2200G, S0, S20, S22 R5-7, power amp VB2200G, like new, £130. G5BOQ. Tel Byfleet 48761, evenings.

Pye eight band mains rx, one owner, fine specimen of this rare set, collector's item, £45. Hunting, 22 Northgate, Oakham. Tel Oakham 2685.

Storno 500, 1W output, hand-held, fitted S20, S22, R6, £70. Burndept 5W uhf mobile, no xtals, handset, £45. Pair Pye PF1s, batts, RBB6 xtals, £30. Pair PF1s, batts, no xtals, £25. G8HYI, QTHR. Tel Saughall 706.

Drake TR4C tx/rx, fitted noise blanker, all 10MHz xtals, MS4 psu, housed in matching spkr cabinet; Heathkit SB610 monitorscope; all fb gear, surplus to requirements; accept best offer around £300 and £50 respectively. G4CHP, QTHR. Tel Swainsthorpe 470365.

KW202, 204, brand-new, unused, not to be split, £400 no offers. Owner purchased motor cycle. Plant. "The Double R'R", Moor Lane, Brighstone, IOW. Tel 0983 740002.

KP202, S0, S20-24, nicads, helical whip, leather case, £95. 70cm 46-el multi-beam, £10. Buyer collects. G8ADP, QTHR. Tel Alton 62316.

FR101(S) up-graded with all bands 160-10m, 2m, 4m, b/c, all filters, fm, super satellite d/l, £300. Heath 40W 2m linear, £25. Ampere APB82A 2m, all-mode, linear, £75. TS700G, £335. Oscar SWR200, £20. TE18 gdo, £18. G3ASM, QTHR. Tel Stockton 583001.

Clearance: Murphy 62B rx, £40; Belcom FS1007P tx/rx, 12ch fitted, £150; Portable s/beam oscilloscope, £25; Philips valve voltmeter dc-2MHz ac, £20; 18in precision tv monitor, £20; video tapes, various; Philips LCR testers; offers? *Wanted:* PM3200 'scope manual. Robinson. Tel Stocksfield (Northumberland) 3449.

Storno CQM662, uhf, fm, mobile, Pye Vanguard control box, toneburst, xtalled on RB4, RB6, SU8, RB10, 6W rf output, manual, exc cond, £110. G3KLF, QTHR. Tel Ipswich (0473) 310442, weekends or evenings.

FDK Multi 2000, little used, £220. Yaesu FL200B, 240W p.e.p., 80-10m ssb/cw, with vox, very good, £145. G4EPQ, QTHR. Tel 01-657 7406, evenings.

Drake R4B, MS4, spkr, phones, manual, 10 xtals incl top band, £230. Tel 01-586 1214 (Hampstead).

Sony portable video tape recorder, model AV3420CE, comp with latest type camera, carrying case, mains camera adaptor CMA3CE, charger, etc, perfect wkg order, £650. Video mixer, effects generator, cameras, etc. Lindsley, G3UDV. Tel 01-874 9054, 9am-5pm; or 01-998 6225, 6-9.30pm.

FT101, 160–10m, fm tx, rx mod, 600Hz repeater shift, rev repeater, Magnum Two, £420. Kenyon, G4AYU, QTHR. Tel Blackburn 56560.
PCR rx, 6–18MHz, mains, bfo, Q-mult, £15. 15W 2m fm tx, valve/transistor, adapted AM25B, 12V dc, £20. Control box and cable for AM25B, £5. Creed 7B 'printer, 24V dc motor, £20. Carriage or collect. GW8OGI, 31 The Park, Ruthin, Clwyd LL15 1PW.
ITT Star radio telephone AM7, 4ch, 12V, manual; Pye Cambridge, 70·26, 70·375, a.m.; Pye base stn tx, modified for 4m, 30W; pref buyer collects; offers? G3NKS, QTHR. Tel Cheltenham (0242) 41099.
Holiday cottage in harbour area of St Ives, very well furnished, carpets throughout, all electric, tv, fridge, cooker, heating all rooms, sleeps five. Osborne, G3YGM, QTHR. Tel 0736 788222.
RTTY Creed 7E printer, psu, 2F reader 240V ac, 7P perforator 240V ac, rolls of paper and tape, buyer collects, all for £45. 100W linear amplifier, EDL 144, unused since overhaul by manufacturer, offers over £70. G8JNR, QTHR. Tel Armitage 491 430.
Comdel speech processor, mint cond, £25. G8TY, QTHR. Tel 01-368 3219.
MK Products sstv monitor, set of wkg pcbs, ±12V psu, £21. EHT unit, £3. G8FDJ, 15 Bakehouse Road, Horley, Surrey. Tel Horley 74969, evenings.
Colour video U-matic cassette recorder, JVC6060, comp with off-air tuner, timer, remote control, manuals, etc, all in orig packing, as new, £975. Video mixers; effects generator; high quality camera; etc. Lindsley, G3UDV. Tel 01-874 9054, 9am–5pm; or 01-998 6225, 6–9.30pm.
FT75, vfo linear, G-whip, perfect cond, £150; or exch stamp collection, 2m fm or 10–80 linear. G4BHM, QTHR. Tel Leeds 664833.
Icom IC215, six months old, fitted S20–22, S0, S24, R0–9, orig packing, exc cond, Icom case, Jaybeam VGP/2M ground plane, £150. G8PSY. Tel Hatfield 65182.
Standard C146A 2m fm h/held tx/rx, toneburst, mint cond, little used, nicads, helical, case, etc, £110, inc carr UK mainland. Bell Howell 491 Autoload Super-8 cine camera, as new, £35. Revue Super-8 editor, £15. G8NRJ, QTHR. Tel Andy, 0502 4122.
Standard 828, 10W, fitted S0, S20–24, R3–7; portable carrier, helical antenna; reasonable offers. G3YIS, QTHR (SE London). Tel 01-697 2136.
Datong model FL1 frequency agile audio filter, mint cond, £50. G4FIU, QTHR (Blackpool). Tel 0253 733910.
Creed 7B, £9. 144MHz 3-el quad, £3.50. 8-el Yagi, 75Ω, £4.50. Halo, £2. 144MHz Vibratrol 70W ss linear, £55. G8KMV, QTHR. Tel 0438 54689.
Heathkit gdo GD-1U, mint cond, unused, full set of coils, 350kHz–230MHz, £28. Class D wavemeter, 240V ac psu, £5. Carr extra. *Wanted:* Yaesu YO100 monitorscope. GW4HAT, QTHR.
FT75 80–10m tx/rx, 10 vxo channels, ac/dc psus, ideal mobile, caravan, etc, £100; or consider exch for Liner 2. Atlas 210X, nb; exch for 215X, nb. GW3GAH, QTHR. Tel 024874 2761.
TR2200G, 6ch fitted, nicads, charger, carrying case, £105. Sykes, G3NFV, QTHR. Tel Leatherhead 72587, after 6pm.
IC240, as new, R0–7, S10–24, £160; IC22A, R3–7, S0, S20–23, £100; both with mobile fittings. G3HRY, QTHR. Tel 090862 6519.
FRG7 analogue, perfect cond, little used, £110. Heathkit RA1 rx, £10. BC348 rx, free to good home. Also prof photo gear, used by amateur. G4HLT. Tel Mike, Beaconsfield 6094.
Two Storno Viscounts: one with preamp, toneburst, 7ch fitted, £40; other with 4ch fitted, £30. Tel 0276 73627.
IC240, latest model, boxed, £155. *Wanted:* Liner 2 or similar ssb equip. G8JCB. Tel Portsmouth 753916.
FT2FB, 12ch, 10W, handbook, mobile mount, etc, good cond, £95. G4FOY, QTHR. Tel Alton (Hants) (0420) 82855.
Exch: 2m mobile tx/rx, Liner 2 Belcom, mic, manual, additional facility for cw by Lowe, 4-el Yagi 2m array, in exc cond; for hf tx or tx/rx, cash adjustment. Hewitt, G3SGH. Tel Ashford 21158.
Pye gear: high band AM25B Vanguard, fmd, 6ch, 145MHz fitted, Burns FMD1 disc, cradle, lead, control box, £40; Pye FM10D, single channel, 145MHz fitted, £50; AM10B, 12·5kHz, high band, no control gear, £50; FM10B, 25kHz–145MHz, LO fitted, control box, cable, mic, 6ch, £60. Eddystone 940 rx, spkr plinth, as new cond, £150. Codar AT5 tx, mains and mobile power pack, all connecting leads, mic, new cond, £35. G3PHL. Tel Hockley (Essex) 6322.
Three Tandberg 3000X, stereo ¼-track, cross-field, triple-head tape decks, virtually new, in orig cartons, £100 ea; or exch for any good modern hf or vhf transceive or receive gear. G2TS. Tel Harrogate (0423) 502130.
Exch: HW-8 QRP cw tx/rx, comp stn, headphones, bug key; for 2m fm IC22A, 2200, KP202, etc, no ex-taxi eqpt. G3BGR, QTHR. Tel 0905 356576, after 6pm.
FT401B tx/rx, reasonable cond, £300. 4CX250B base and chimney, £20. Misc junk. *Wanted:* any old 2m tx, wkg or not, preferably high power. Rowsell, G4DEG, 12 Queenwood Avenue, Bath, Avon. Tel Bath 314059.
IC202E, as new, 10 months old, case, Icom nicads, charger, comp, in orig packing, £145. G8ARQ, QTHR. Tel 0625 585438.
KW Viceroy Mk3 ssb/a.m./cw tx, vgc, recent new pa v/vs, voltage/rf skts to drive transverter, £60. Europa B transverter, 28/144MHz, as new, £60. Trio JR500S rx, amateur bands 3·5/28MHz, WWV, £50. HB antenna hf c/o relay, £2.50. G4HBA, G8KRT QTHR. Tel 0943 74986.
FTDX560, incl 160m (Holdings mod), suitable cooling fan (not fitted), very clean, manual, £260 ono. G4EGH. Tel Stan White Jnr, 01-6339010, office hours; or 01-237 9349, evenings.
Heathkit SB101 with matching psu/spkr, £225. Homebrew 2m fm tx, 25W, tone osc xtals, antenna changeover relay, £30. G3WUW, 9 Boldrewood, Burghfield Common, Reading. Tel 073 529 3694.
RTTY equipment: Creed 7E teleprinter, £20. Creed 54/RP teleprinter, £20. Creed 6S6 auto tx, £8. CV89A tu, £15. 52 set rx, c/w mains psu, £10. Buyer collects. G8NRY, 471 Rooley Lane, Bradford, Yorks. Tel 0274 26898.
U450L 70cm tx/rx, £40. AM25T plus controller, modified for fm tx, £18. Pye Cambridge modified fm tx/rx, R6–7, S0, toneburst, £40. Add-on unit to convert 2m rig to 70cm, incl MM down-converter plus tripler, £35. G8EWV, 8 Haven Road, Crackington Haven, Bude, Cornwall.
Icom IC202E, nicads, charger, xtals for 144·0–144·6 and 144·8–145·0, only nine months old, £160. Stolle 2010 rotator, £25. G8BAS, QTHR. Tel Cirencester 2503.
Atlas 180, comp with psu, console and manual, exc cond, £285. G3XKF, QTHR. Tel Cheddington 661390.
Eddystone 730/4, £90. Heath 5MHz 'scope, 10–4540, £95. GDO GD1U, £15. Sig gen, 120kHz–130MHz fundamentals, TE20D, £25. Philips reel-to-reel recorder N4504, new, with cover and phones, £170. G3BHT, QTHR. Tel 021-308 4764.
QRO linear comps, custom mains transformer 1·5kV at 0·5A, 6V at 9A, £40. Pair brand-new boxed 4CX250Bs, £10. Pair used 4X150As, £3. Bases and chimneys, hf, £1. High voltage tune and load caps, pi-tank switch, etc. G3WXO, QTHR. Tel Milton Keynes 564419.
DJ9ZR 2m ssb tx board, YF90F filter, £35. Bantam, mid-band not wkg, £20. GEC Courier, hi-band, fm, £15. Numerous 2m xtals, £1.50 ea. Trio 9R59DS rx, spkr, headphones, manual, £50. Katsumi EK-9X keyer, £10. GM8HBU. Tel 041-649 3864.
FT200B/FP200B, as new, £275; or exch for FT101B, must also be as new, with cash adjustment. G4GQT, QTHR. Tel 0524 2389.
New TS700G, mic VOX3, SP70 spkr, boxed, handbook, air tested only; Bantex 5/8 whip; magnetic mount; 8-el 2m Jaybeam; unwanted gifts to hf man; the lot, £350 cash. Haines, G3OSH, QTHR. Tel Ilminster 3349.
Bantam HP1FM and handset, section of handbook, xtals for R5, two spare positions, rx wkg well, tx needs further alignment, ext xtal tb, £25. Pye 6ch AM10 rx, v-first-rate cond, ideal easy conversion 2m, integral mains psu, £10. TF867 sig gen, 15kHz–37MHz, comp with orig handbook, £35. Creed 7B, synchronous motor, comp, parts for second, £7. Spare sync motor, £3. VHF version of BC221, mains psu, no charts, £5. Dawson, "Dog Lane Cottage", Fenny Compton, Warks. Tel 0295 77269.
KW2000A, psu, Shure mic, spare set valves, handbook, vgc, £170. Yaesu YD844, mic, 50kΩ, unused, orig packing, £14. G4DVD, QTHR. Tel Watford 22343.
Yaesu FT2F vhf fm tx/rx, fitted seven S, five R channels, manual, boxed, £95; or exch for 2m hand-held rig. Trio JR60 rx, 0·55/30MHz, incl 2m converter, amateur bandspreads, Q-multiplier, £60. G8LVM, QTHR. Tel 0509 67309, evenings.
Storno Viscount, 2m, fm, mobile, 4ch, preamp, £38. HQ1 mini hf beam, £50. BC221 frequency meter, comp with charts, £12. Sommerkamp FT250, 80–10m, all 10m, ac and dc psus, £250. G4FBA, QTHR. Tel Pontefract 72978.
Europa 2m transverter, in SP101B cabinet, Yaesu fan cooled, coaxial relay, spare QQVO750, front panel matches FT101E, £70. Elizabethan Pathfinder lw/mw/sw/vhf/uhf, portable/mains, fm/a.m./ssb radio, as new, £100. GM4DHJ, QTHR. Tel 041-889 9010.
SSB i.f. board, Bricom, 9MHz SEI filter, mint, not used, better than ZVC, £60 ono. Disco amplifier, 100W, spkrs, SP25 turn-table, £50 ono. G4CVA. Tel Southwold 723759.
Telomast, 30ft, comp with rigging, new, unused, £35 incl carr. Also many items too numerous to advertise, sae please for list. GI3GTR, 3 Rhanbuoy Park, Craigavad, Holywood, Co Down, N Ireland.
"RSGB Bulletin/Radio Communication", '61–Dec '74, comp except seven odd copies; *SWM*, '63–'68, almost comp; free if you will collect from Crewkerne, Somerset, or could be Cheltenham later. Tel 0460 72788.

WANTED

Cowl Gill motors, good cond, will collect if local or pay carr. 2m all-mode linear, 100W +, will consider homebrew or commercial rig, possible collection arranged. G3AYA, 10 Millers Lane, Stanstead Abbotts, Nr Ware, Herts. Tel Ware 870010.

Handbook or circuit diagram for TR13046 (40ch STR9), loan or purchase. G3CYY, QTHR.
Cowl Gill motor. G3KEN, QTHR. Tel Southend-on-Sea 77779.
TX/RXs for hf and vhf. RX for hf, eg Trio, KW, Yaesu, anything considered. Can collect. Tel Bolton 592929.
Manual, circuit/dia Collins 51X-2B, spares; also for Pye Ranger. PVI-35, FW4-500, ACU, No12 tx. Any ex-WD marine or ham tx/rx. Dorsett, 15 Chalcrafts, Alton, Hants. Tel Alton 88715.
R107 and 52 set manuals, either buy at worthwhile price, or borrow for copying with suitable fee and deposit. Richards, "Castell Forwyn", Abermule, Montgomery, Powys. Tel Abermule 255.
For beginner, sw rx for amateur bands, must be in good wkg order, HRO or similar. R. Cuddington, "Milton Lodge", Milton Bryan, Milton Keynes.
Panoramic adaptor, by Panoramic Corp, or Hallicrafters; swl—amateur model. P. Karagianis, 20 Lea Road, Sonning Common. Tel Kidmore End 2085.
HF linear, KW, Heath or similar, any cond considered. *For sale:* HP13 mobile psu, offers. G3SHL, 90 Kettering Road, Market Harborough, Leics. Tel Market Harborough 64384, after 6pm or weekends.
For the Wireless Museum: very old rx, tx, valves, components, books, catalogues, magazines, callbooks, valve-tester, Voight, Hartley-Turner, spkr; collection arranged. Details please to hon curator, G3KPO, QTHR. Tel Shanklin (098 386) 2586.
Parts for B2 tx. Heath DX40 tx and vfo. Circuit diagram, LM13 freq meter; also for Geloso vfo G4/105. G4GZG, QTHR. Tel Welwyn Garden City 30185, after 6pm.
Canadian 52 set antenna feed-thro' insulator assembly, NoC2 ZA/C 00088 or CMC 114-059; Robbins-Myers rotary transformer, input 11V/25A, output 1,300V/0·12A 156W. WS53; R107; WS62; BC348; R1475; WS19 Mk3; WS62; WS22. G3UCT, QTHR. Tel Fleet (02514) 6998.
Trio TX599 tx. F. Dawson, c/o 34 Ashley Close, Ramsgate, Kent (please, if possible, give tel number and best time to call).
Ultra Cub, Bantam or homebrew portable, for use on 2m, with or without xtals and batteries. *For sale:* Homebrew uhf portable, on 70cm RB2, xtals, nicads, charger, offers or exch for above. G4ANW, 16 Chestnut Drive, Broadstairs, Kent.
HRO coils. Full set coils for HRO, individual coils or part set considered. Pateman, 38 Stubbs Lane, Braintree, Essex. Tel 0376 20900.
Urgent: Sivers Lab 50Ω coaxial relay, as recently advertised in *Radio Communication,* for 23cm project. Your price paid. G3SPJ, QTHR. Tel 01-311 8405.
Magnum Six rf speech processor, details of ic used or spare ic. Also 300Ω to 50kΩ mic transformer. ZC4AJ, GRSS, RAF Akrotiri, BFPO 57.
CV5224, 6481 or 5767 valve, state price and quantity. G8AUM, QTHR. Tel Berkhamsted (04427) 2205.
SB650 frequency display. GW3SB, QTHR. Tel Hengoed (0443) 813188.
Atlas 210X, with or without power supply, must be in perfect order and had no repairs. G3DJQ. Tel Cumnor (Oxford) 3851.
HQ1 Minibeam, or similar. G3NQX. Tel Kendal (Cumbria) 28166, after 6pm.
Urgent: manual for Heathkit DX100U tx, as QRT without same Davison, G3WVX, 75 Wensley Drive, Leeds, Yorks. Tel 0532 689458.
Linear amp, regular make, prefer non-tv valve type. G3ORB, QTHR. Tel Byfleet 42406.
KW204, must be local to Manchester for inspection (50 mile radius). G4GHB, ex-G8JJC, 18 Welch Road, Newton, Hyde, Cheshire SK14 4DJ.
Trio TX599 tx, good cond, send details. G4FDI, QTHR. Tel Bromham (Wilts) 357, after 6pm.
Bird Thru-line, plus uhf elements. WG20, WG22, WG24, guide and components. WG14 switch. IN26. G8ADP, QTHR. Tel Alton 62316.
Manual or cct diagram Geloso tx G4/228 and psu G4/229, purchase or loan. G4HQE. Tel Gerrards Cross 84360.
Transformer for Hammarlund HX50, urgently required by club; or info on rewind service; good price paid. Pearson, 3 Lorimers Close, Peterlee, Co Durham.
12V psu for Codar AT5, and/or circuit and details for same, photocopy would oblige. G4GVM, QTHR. Tel Ilfracombe (0271) 62319.
5XY or 8XY 2m Yagi with rotator, must be in good wkg order, will collect within 50 miles. Xtals for IC22a S19; or exch for RR0 xtals. G4DOV, 74 Littlewood Lane, Cheslyn Hay, WS6 7EL. Tel Walsall 27738.
FT101 2m converter, 204BA or TA33. GW4DJW. Tel 035 287 877.
Labgear top band tx; 2m, 5-10W, a.m./cw tx; dyn or xtal mic. G6HQ, QTHR. Tel 051-336 2033.
Yaesu FRDX400 or similar, in good cond, for swl. Booth. Tel 0239 820521.
Case and mounting trays for 62B/B40 rx; duff B40 for spares, especially early type with orig W plugs; plug-in units for Hughes Memoscope 104E. *For sale:* Solartron CD523S2 s/b 'scope, gwo, £20; buyer collects. G8LIU, QTHR. Tel Uxbridge 30006, evenings.

Special event station

GB3WI, 13-16 April
A station will be in operation an all bands, with talk-in on 144MHz, at the Hobbies '79 Exhibition, run by Rolleston-on-Dove Women's Institute, located at Forest of Needwood High School, Station Road, Rolleston, Burton-on-Trent.

GB2JAM, 5-7 and 19 May
Stations will be operating at two events to celebrate the 1st Scout World Jamboree 50th Anniversary. The stations, at a Scout camp from 5-7 May, and a "Scoutabout" summer fete on 19 May, will be located at Royden Park, Greasby, Wirral, Merseyside.

GBGYS, 10-12 July
A station will be operated by York ARS at the Great Yorkshire Show, the country's major agricultural show. The station will be located at the Great Yorkshire Showground, Hookstone Oval, Harrogate.

GB2DTS, 14-15 July
A station will operate at the Dagenham Town Show, Central Park, Wood Lane, Dagenham, Essex.

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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. The use of the R.F. clipping technique raises your average power level and also enhances the intelligibility of your 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. No manual knob setting or meter watching is required. Advanced circuitry does the work quicker and more accurately. Other features include: "TONE" button (for setting the transmitter microphone gain), switchable microphone impedance, full monitoring by three light emitting diodes.
The world famous **MODEL RFC** is still available and so is **MODEL RFC/M** which is a fully tested printed circuit board module as used in **MODEL RFC.**

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).

"GOOD GENERAL COVERAGE RECEIVERS COST A FORTUNE!"

True . . . but 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!
For just £118.13 **including VAT** 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.
If you want **high performance** general coverage reception, MODEL UC/1 combined with your existing amateur-bands-only rig is the answer. The fact that it costs less than even a cheap general coverage receiver is just one of life's pleasant surprises!

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MODEL FL1 is a most unusual audio filter. It is a highly versatile add-on unit for communications receivers which gives great flexibility in helping to extract the signals you want (SSB, CW, RTTY etc) from background interference. It simply connects in series with the loudspeaker or headphones. Fully variable bandwidth and centre frequency plus "flat-topped" pass-band response give similar effects to "I.F. pass-band 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 also completely unique in being able to tune itself when notching out unwanted whistles. That's why we call it the "Frequency-Agile Audio Filter". If a whistle appears on your channel, **MODEL FL1** will normally remove it from audibility within a couple of seconds . . . completely automatically! This ability makes conventional notch filters look positively stone-age and allows the notch width to be so narrow (5Hz) that you lose virtually nothing of the signal you want.

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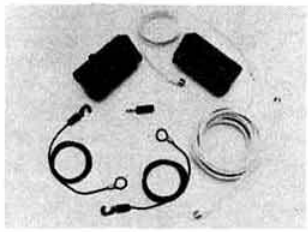

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For sensitive reception right through from MSF at 60kHz to Band 1 TV DX around 50MHz, without the need for an antenna farm, **MODEL AD170** is ideal. Designed for loft mounting, **MODEL AD170** has no adjustments and needs no external tuning units. The actual antenna comprises a wire dipole (overall length only 3 metres) together with a rather special FET/bipolar amplifier unit. The broad-band signal from the remotely located antenna is piped via TV-type coax to the interface unit (**which now contains a switchable 12dbs amplifier**) located near the receiver.
Although only 3 metres long, **MODEL AD170** has the same directional properties as a full-size dipole, even at 60kHz. Despite its small size, signal-to-noise ratios produced by **MODEL AD170** at any given frequency are similar to those from a conventional dipole cut to resonance for that frequency, and the unit makes an ideal accessory for a good general coverage receiver where space for antennas is limited.

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FP301	£98.00	FT7	£318.00	FT227RX	£253.00	YC500J	£168.50
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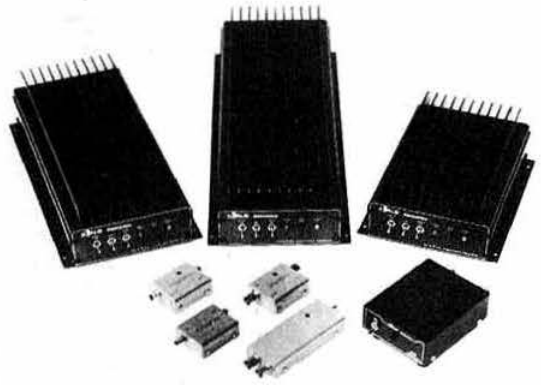

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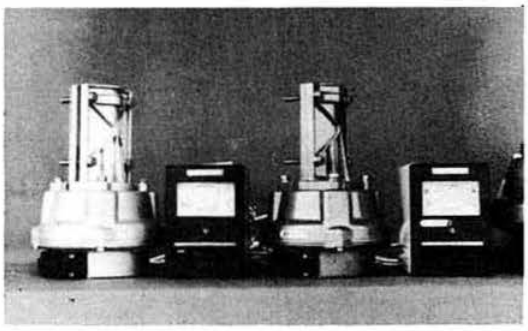

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144.030	e	e	e	e	e	e	e	e	e	e	e	e	e	e
144.4 (433.2)	a	e	a	e	e	b	e	e	e	e	e	e	e	e
144.480	e	e	e	e	e	e	e	e	e	e	e	e	e	e
144.800	d	e	e	e	e	d	e	e	e	d	d	e	e	e
144.850	e	e	e	e	e	e	e	e	e	e	e	e	e	e
145.000/R0T	a	b	a	c	c	a	a	a	b	a	a	b	c	e
145.025/R1T	a	b	a	e	e	a	e	a	e	e	e	e	e	e
145.050/R2T	a	b	a	e	e	a	e	a	e	e	e	e	e	e
145.075/R3T	a	b	a	e	e	a	e	a	e	e	e	e	e	e
145.100/R4T	a	b	a	e	e	a	e	a	e	e	e	e	e	e
145.125/R5T	a	b	a	e	e	a	e	a	e	e	e	e	e	e
145.150/R6T	a	b	a	e	e	a	e	a	e	e	e	e	e	e
145.175/R7T	a	b	a	e	e	a	e	a	e	e	e	e	e	e
145.200/R8T	a	b	a	e	e	a	a	a	e	a	a	e	c	e
145.300/S12	e	e	e	e	e	e	e	e	e	e	e	e	e	e
145.350/S14	e	e	c	e	e	c	c	c	e	c	c	e	e	e
145.400/S16	e	e	e	e	e	e	e	e	e	e	e	e	e	e
145.425/S17	e	e	e	e	e	e	e	e	e	e	e	e	e	e
145.450/S18	e	e	e	e	e	e	e	e	e	e	e	e	e	e
145.475/S19	e	e	e	e	e	e	e	e	e	e	e	e	e	e
145.500/S20	a	b	a	c	c	a	a	a	b	a	a	b	c	e
145.525/S21	a	b	a	c	c	a	a	a	e	a	a	e	c	e
145.550/S22	a	b	a	c	c	a	a	a	e	a	a	e	c	e
145.575/S23	a	b	a	c	c	a	a	a	e	a	a	e	c	e
145.600/R0R	a	b	a	c	c	a	a	a	e	a	a	e	c	e
145.625/R1R	e	e	e	e	e	e	e	e	e	a	a	e	c	e
145.650/R2R	e	e	e	c	e	e	a	e	e	a	a	e	c	e
145.675/R3R	e	e	e	c	c	e	a	e	e	a	a	e	c	e
145.700/R4R	e	e	e	c	c	e	a	e	e	a	a	e	c	e
145.725/R5R	e	e	e	c	c	e	a	e	e	a	a	e	c	e
145.750/R6R	e	e	e	c	c	e	a	e	e	a	a	e	c	e
145.775/R7R	e	e	e	c	c	e	a	e	e	a	a	e	c	e
145/800/R8R	a	b	a	c	c	a	a	a	e	a	a	e	c	e
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All at **£3.00** (£3.37), 38·6666MHz (144/28), 42MHz (70/28), 58MHz (144/28), 70MHz (144/4), 71MHz (144/2), 95MHz (342/52), 96MHz (1,296/432/144), 101MHz (432/28), 101·50MHz (434/28), 105·6666MHz (1,296/28) and 116MHz (144/28).

CRYSTALS MANUFACTURED TO YOUR SPECIFIC REQUIREMENTS

Prices shown are for one off to our amateur specs; closer tolerances are available. Please send us details of your requirements.

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Adj. tol.±30ppm	Temp. tol.±30ppm 0 to 60°C
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Adj. tol.±20ppm	Temp. tol.±30ppm—10 to 60°C.
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Delivery* normally 4/6 weeks—all other frequencies 6/8 weeks.
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Unless otherwise specified, fundamentals will be supplied to 30pf circuit conditions and overtones to series resonance.

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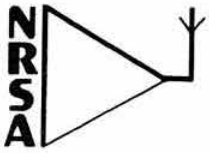

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40·250pf size 15 × 22pf bolt in type **20p**
10·40pf size 8 × 13mm PC mount **8p**
10·80pf size 9 × 14mm PC mount **8p** or 10 for **60p**

TETFER TRIMMER 1·10pf 9mm sq tab ends **25p,** 1·10pf 9mm dia. PC mount **25p**

PFTE wire ended tubular trimmer 0·5 6pf 5mm dia × 15mm long **10p**

JACKSON butterfly trimmers 10 + 10pf **50p,** 17 + 17pf **60p**

AIRSPACED CERAMIC TRIMMERS 1·15pf 10mm sq **20p,** 2·30pf 11mm sq **20p**

BY REQUEST NEW SUPPLY OF COMPONENTS FOR FREQUENCY COUNTER as March 76 R.C.

		SN7490	**60p**
NE529K	**£1.50**	SN7473	**38p**
MC10116	**70p**	SN7475	**45p**
MC10131	**£2.00**	SN74121	**30p**
SN7400	**17p**	SN74141	**75p**
SN7413	**25p**	SN74196	**£1.05**

MINIATURE NIXIE TUBE ITT 5853S 5 for **£2.50,** 10 for **£4.50**

DECADE COUNTER P.C.B. drilled and etched takes min. nixie, 7490, 7475 and 74141 ICs **75p** each. Size only 63 × 46mm.

P.C.B. EDGE CONNECTOR for above board (if required) **50p**
10,000 MFD 16vw **40p**
10 MFD 350vw **15p**

BRIDGE RECTIFIER two required **50p** each.
1N4005 rectifier diode **10p.**
5v 1 amp regulator MC7085 TO3 case **£1.60.**
6·2v zener **12p.**

1000pf 500v feedthrough caps, **3p** each 10 for **20p.**

2N706 transistor **20p** each.

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.**

10·7MHz RADIOTELEPHONE MARKER OSCILLATOR UNIT built into small die cast box with internal battery brand new supply ex-stock **£14.04** post paid (other frequencies made to order).

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.

FM RADIO FRONT END TUNER Units 88·108MHz (remove three Cs and it tunes Air Band) and 2m very high quality and stable unit with exceptional sensitivity FET RF amp. NPN mixer and separate osc. AFC and AGC inputs, works from 9·15V D.C. with circuit; new and unused BARGAIN @ **£4.00** each.

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.

SECOND CONVERSION CRYSTALS 11·170 HC6/U, 11·155 HC6/U, 10·230 HC6/U & HC18/U, all **£1.75** each, 4,000MHz HC6/U **£2.00.**

CO-AX PLUGS/SOCKETS: 50 ohm "N" plug for UR67 **70p.** "N" plus for UR76 etc. **65p,** free "N" socket right angle cable mounting for UR67 **75p.** 75 ohm "N" plug for RG164 **75p.** 50 ohm BNC right angle adaptors **50p,** SPECIAL OFFER 75 ohm BNC plugs & single hole fixing sockets ONLY **35p** each. SO239 UHF sockets 4 hole fixing **50p.** Screening shields for SO239 sockets **20p.** 50 ohm BNC plugs for min. co-ax **60p.** PL259 plug for UR67 **55p.** PL259 plug for UR43 **65p.**

DC MOTOR 12v DC as used in car cartridge players very powerul 45mm dia. 45mm long **50p.** Type (2) 45mm dia. 40mm long **45p.**

IRON CORED HASH FILTER CHOKE suitable for mobile Rx etc. rating approx 2A. size approx 25mm cube chassis mounting **20p.**

PHILIPS SYNCHRONISATION UNIT LDH4310 for MINI COMPACT CAMERA used to synchronise two cameras to one monitor new in original boxes **£7.00,** copy of handbook **£1.50.**

SEMICONDUCTORS

ZENER DIODES 400m/w 3·3v, 3·9, 4·7, 5·1, 6·3, 6·8, 7·5, 8·2, 9·1, 10, 11, 12, 13, 15, 18 & 24v all **12p** each.

VARICAP DIODES ITT210 10pf @ 4v for VHF/UHF tuners to 1GHz **15p**
ITTBA111 55pf @ 2v **12p**
BB105 2pf @ 25v for VHF/UHF tuners etc. matched sets of 4 **80p**

SIGNAL, SWITCHING & RECTIFIER DIODES
1N4148 **3p** 10 for **20p.**
XD201 (OA79) **5p**
1N54A **5p**
1N4001 50v 1A rec. **6p**
1N4004 400v 1A rec. **6p**
1N4005 600v 1A rec. **10p**
1N4007 1Kv 1A rec. **12p**
BYX94 1·25Kv rec 1A 4 for **30p**
1S920 **4p**
BYX10 1·6Kv 350m/a **10p**
HP5082-3080 VHF/UHF pin diode **50p** or 4 for **£1.50**

TRANSISTORS
BF115, **15p,** BF152 **12p,** BF166 **18p,** BF180 **22p,** BF194A **10p,** BF195 **10p,** BFY50 **20p,** BFY90 **90p,** BC108 (CIL108) plastic, **10p,** BC172, BC172A, BC172C **12p,** MPS918 (plastic 2N918) **18p,** ZTX107 **15p** ZTX310 **15p** BSX20 **20p,** ST2110 sim. to 2N918 FT950 MHz good VHF Tx driver 100 m/w **10p.**

FETS & MOSFETS
2N3819 "N" chan. fet **20p**
2N4381 "P" chan. fet **20p**
TIS88A "N" chan. fet **35p**
3N204 mosfet with max. 2·5db NF @ 200MHz 24db gain (RCA) **£1.10**

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**
40081 27MHz driver 75 m/w in 400 m/w out (12v) TO5 case **75p** each
2N2631 VHF driver 1 watt in @ 50MHz gives 7·5 watts with 28v supply **£1.00**
2N5947 marked SRF1117 FT 1·5GHz ½ watt out @ 430MHz @ 12v **65p**

FERRITE CORES mixed bag 100 **50p**

AUDIO AMPLIFIER ICs LM380 2 watt @ 12 volt into 4 ohm **85p**
TBA641A 2·4 watts into 4 ohms @ 9 volt data **£1.25**
TA7205P 5·8 watts into 4 ohms @ 13·2 volt ex-new equipment with data sheet **90p**
ESM231 18 watts into 4 ohms @ 24 volt with data new only **£1.80**
TAD110 IF amp for AM/FM receivers no data **£1.50**
CA3089E IF amp for FM receivers NBFM or WBFM **£2.00** with data sheet
NE555 timer **35p**
741 op amp **27p**

DISC CERAMIC CAPACITORS
1000pf, 2200pf, 500vw, 0·1mf 3vw, all 10 for **15p**
0·047mf 30vw 10 for **20p.** 100pf co-axial discs 500vw very small PKt 20 for **20p.**
27pf, 5000pf 500vw both types 12mm dia. 10 for **15p**
0·01 mf 2·5kv **5p** each, 1000pf 1·2kv **5p** each.

ELECTROLYTIC CAPACITORS (special offer) all axial leads. 6·4mf 25v, 20/6·4v, 20/16v, 47/16v, 32/10v, 100/10v, 150/16v, 330/4v, 470/10v, all 10 for **25p.** 1000mf 10v **10p** each. 1000mf 40v **18p** 3300mf 25v **22p**

TANTALUM BEAD CAPACITORS
1mf 35v, 2·2/20v, 6·8/10v, 15/16v, 15/35v, 22/16v, 33/10v, 47/6v, 68/6·3v all **10p** each, 150/6v **15p**

ELECTROLYTICS (can types)
1000mf 100v **40p.** 2000/18v, **12p.** 2000 + 2000/25v **20p.** 1650 + 1650/63v **60p.** 4700/40v **35p.** 10,000/16v **35p**

CERAMIC FEEDTHROUGH CAPs. 1000pf 500v. solder in type requires 3mm hole 10 for **20p**

SLIDE SWITCHES 2.p.c.o. **10p** (pre-set type **10p** 10 for **50p**

3mm JACK SOCKETS with insulating bush **15p**

PYE COILS 5mm dia. 10m sq. base P.C. mounting with core 10 for **60p,** as above but 4mm dia. 6mm sq. base 10 for **60p**

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**

SWITCHES (rotary)
3p 3 way with earthing ring + off position 1" dia. std ¼" shaft. **40p**
3 × 1 pole 12 way break before make 1" dia. std ¼" shaft. **£1.00**
2 × 1 pole 12 way break before make 1" dia. std ¼" shaft. **80p**

PUSH SWITCHES
6 banks of 6 pole change over self-cancelling 112 × 15 × 32mm + knobs **£1.00**
3 banks of 4 pole change over self cancelling for PCB or panel mounting **75p**
2 pole change over for PCB or panel mounting **25p** or 10 for **£1.75**
4 pole change over for PCB or panel mounting **30p** or 10 for **£2.00**

TOGGLE SWITCH 2 pole change over with centre off. 250v @ 10a. 34 × 17 × 25mm **45p**

GLASS FIBRE P.C. BOARD single sided 5" × 8" × 1/16", **65p**

CRYSTAL HOLDERS HC25/U **13p.** HC6/U **13p.** FT243 **13p.**

STOCK LIST NOW AVAILABLE large stamped envelope please.

THE GABLES, 20 BARBY LANE, HILLMORTON, RUGBY, WARWICKSHIRE CV22 5QJ

Printed in Great Britain for the RADIO SOCIETY OF GREAT BRITAIN, 35 Doughty Street, London, WC1N 2AE
by E. T. Heron & Co Ltd, Essex and London