



December 1977

# radio communication

journal of the Radio Society of Great Britain



Geoff Barnes, G3AOS, with members of the 1st Hale Barns (Cheshire) Group Scouts, who provided two stations: G3AOS/A operated by Geoff Barnes, and G4FXU/A operated by Roger Napper; both assisted by Martin Doig, G4CCZ, and Paul Maggs, G8NZQ. Some 150 contacts with 30 different countries were made, 20 of them with overseas Scout stations. Photo reproduced by permission of the Altrincham Guardian



## 20th JAMBOREE OF THE AIR 15-16 October 1977



Crawfordburn, Co Down, station organized by members of the Belfast RSGB Group in conjunction with Jim Butler of Scouting International. Left to right: G14CBQ, Jim Butler, G13MMF and G181HK.

Photo: Brent Burnside

The 8th Ampthill & Woburn (Flitvale) Scout Troop stations at Maulden, Beds, using callsigns G4BWP and G4DRS. Left to right: Nigel Whinnett, y1 Val, y1 Sandra, G4BWP, Paul Teague, Scout leader Steve Hatton, Paul Rance, G4DRS, Stuart Taylor, Scott Measham, Andrew Clarke, Malcolm Whinnett.

Photo: G5BQR

# AMATEUR RADIO BULK BUYING GROUP



Season's Greetings to all our many friends

## COMPONENTS FOR THE MULTIMODE 1600 TRANSCEIVER (Oct/Nov Rad Com)

We will shortly be stocking the printed circuit board and all other components for this design. Send S.A.E. for price list of all items. Complete kit—approx £215.00

## NEW PLASTIC IC's from PLESSEY

New low cost version of the famous SL600 series communication ic's are now available. The plastic versions, designated SL1600 series, are in DIL8 or DIL14 packaging according to type.

	Metal	Plastic
R.F. Amplifier	SL610C £2.45	SL1610 £1.82
R.F. Amplifier	SL611C £2.45	—
R.F. Amplifier	SL612C £2.45	SL1612 £1.82
Limiting Amp.	SL613C £4.23	SL1613 £2.13
VOGAD	SL620C £3.72	—
AGC Generator	SL612C £3.72	SL1621 £2.45
AF/VOGAD/Sidetone	SL622C £9.15	—
AM/AGC/SSB	SL623C £6.75	SL1623 £2.75
Multimode Eet.	SL624C £3.43	—
A.F. Amplifier	SL630C £2.33	—
Double Bal. Mod.	SL640C £4.10	SL1640 £2.13
Receive Mixer	SL641C £4.10	—

## G3PLX RTTY VIDEO DISPLAY UNIT

Set of printed circuit boards: £14.85. Veroboards also available at £4.30 each. Set of i.c.s including programmed 74188s, £56.15; 2513; £8.50; AY5-1013, £6.25; 2102-1, £2.85; SN74188, £4.00 each or ready programmed £9.50 per pair. 7MHz Xtal; £2.85.

## OTHER RADCOM PROJECTS

Digital Frequency Counter and Timer by G3MFJ/G3KEP—March '76. 7400, 19p; 7473, 40p; 7475, 56p; 7490, 58p; 74121, 43p; 74196, £1.62; MC10116, 72p; 5V reg, £1.90; LED, 29p; 2N706, 22p; Toggle switch, 86p; 9V mains transformer, £2.00.

SSB Transceiver by G3ZVC—Sept. '74. Complete kit £78.90

2M A.M. TX/RX by G3TDZ—Jan. '73 and VHF/UHF Manual. Complete kit for Receiver, £21.80; Transmitter, £9.40; Modulator, £3.85 (does not include PCB or transformer).

Mini D.F.M. by G3XGP—June '73. Complete kit using 1MHz clock oscillator, £41.95 (plus 50p for 30MHz i.c.s.).

Stereocode Processor by G6CJ—Sept. '75. Complete kit, £16.95.

Reprints of above articles, 20p plus SAE.

## 40 WATT 2m P.A. KIT

A kit for building a 40 watt r.f. power amplifier for boosting the output of 10-watt F.M. mobile transmitters. Automatic solid-state T/R switching is incorporated. Design as published in September 1976 edition of "Electronics Today International". Complete kit—£19.25 plus 65p post.

If ordering components, please add minimum of 30p for post and packing.

Cheques and P.O.s should be crossed and made payable to "A.R.B.B.G."

DEPT. 701, COMMUNICATIONS HOUSE, 20 WALLINGTON  
SQUARE, WALLINGTON, SURREY, SM6 RG. Tel. 01-669  
6700 Open 9am to 6pm Mon.-Fri., 9am to 1pm Sat. Closed  
for lunch 12.45 to 1.45.

## 2M SYNTHESIZER for your Trio or FDK rig

This 2m frequency synthesizer has been designed for use with the Trio TR2200 and TR7200 range of transceivers. But it may be used with any transceiver which will operate with 12MHz transmit drive and 14MHz or 44MHz (synthesizer output is 22MHz) for receive, only two screened leads being necessary for the inter-connection.

Front panel controls are provided for:

- Channel selection
- Simplex/Repeater Reverse repeater
- Fine Tune
- Power on/off

The unit is housed in an attractive metal cabinet approximately 7" x 2 1/2" x 5". Power supply requirements + 12 volt at 400mA (this is obtained via the single connection lead).

Price only £93.50 incl. VAT (Add £1.50 for ins. post).

Also model ES80/FDK for Multi-II

Both models now generally available from stock.

## VHF DFM with extended range now covering 10Hz to 250MHz

Model DFM 5

The updated version of the Catronics Frequency Meter with extended frequency range covering 10Hz to 250MHz. Size approx. 8 1/2" x 7" x 3".

- ★ Full 7 digit 0.35" amber display
- ★ I.C. memory giving a "non-blinking" display.
- ★ Automatic suppressed zeros on 3 leading digits to reduce power consumption
- ★ TTL and ECL ic's used to give good reliability.
- ★ 10MHz master oscillator for high accuracy.
- ★ 12V (—ve earth) d.c. input and 210-260V. mains psu fitted.

Price only £148.50 incl. VAT (Add £1.50 for insured post)



Now published—the AUTUMN 1977 edition which includes articles on;

- 70cm FM transceiver (Part 2)
- Frequency Multipliers
- 70cm Bandpass Filter
- Yagi antennas
- 10GHz transceiver (Part 2)
- Linear Capacitance Meter

Send £1.15 for a copy of this edition or £4.30 for 1977 subscription

VHF COMMUNICATIONS is the English language edition of the German publication UKW-BERICHTE, a quarterly amateur radio magazine especially catering for vhf/uhf/shf technology. It is published in spring, summer, autumn and winter.

All special components required for the construction of the described equipment, such as printed circuit boards, coil formers, semiconductors and crystals, as well as complete kits, are available for despatch direct from Germany. Many of the printed circuit boards, in addition to a few selected kits, are stocked in the UK. A price list of kits and materials is available—send see for your copy.

Orders to VHF Communications at address below.

**EDITOR**

A. W. Hutchinson

**Editorial assistant**

Mrs M. J. Collins

**Draughtsman**

D. E. Cole

**Secretary**

Mrs J. D. Brown

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

**The Editor, RSGB,  
88 Broomfield Road,  
Chelmsford,  
Essex CM1 1SS**

Tel 0245 84938

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

**ADVERTISING**

Advertising, other than Members' Ads, should be sent to:

**Mr C. C. Lindsay,  
2 Leyburn Gardens,  
Croydon,  
Surrey CR0 5NL**

Tel 01-686 5839

**EDITORIAL PANEL**

J. P. Hawker, G3VA  
R. F. Stevens, G2BVN

# radio communication

December 1977

Volume 53 No12

**CONTENTS**

- 932 A seasonal message from the President  
QTC
- 934 More on the Smith Chart—G. Garside, MSc, MA, CPhil, CEng,  
MIEE, MIERE, FRAS, G3MYT/VE3
- 940 Sporadic-E observations in 1977—R. A. Ham, FRAS
- 941 New products—*Sinclair digital multimeter. Adcola unit 333*
- 942 Technical topics—Pat Hawker, G3VA
- 947 4-2-70—Graham Knight, GM8FFX
- Supplement RSGB publications for Christmas
- 951 Microwaves—Dain Evans, G3RPE
- 952 The vhf man's left hand—Jack Hum, G5UM  
Oscar news
- 953 SWL news—Bob Treacher, BRS32525
- 954 The month on the air—John Allaway, G3FKM
- 957 HF propagation study. Propagation predictions
- 958 Retirement of Mr A. O. Milne  
The RSGB QSL Bureau
- 959 RSGB QSL Bureau sub-managers
- 960 Council proceedings. Looking ahead
- 961 The 1977 President's Working Party. Your opinion
- 962 Obituaries
- 963 Raynet—S. W. Law, G3PAZ  
SSTV scene—P. Burnett, G4BLL
- 964 Contest news. Contests calendar. Mobile rallies calendar
- 965 Members' Ads

*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



20,432 copies per  
issue average  
circulation in 1976

Closing date for contributions  
unless otherwise notified:  
4th of month preceding month of publication

© RADIO SOCIETY OF  
GREAT BRITAIN 1977



PAUL  
G3VJF



£185 inc VAT and delivery



## THE IC-240 STILL THE BEST CHOICE!

Are you going around in circles trying to choose which synthesized mobile to buy?

About twelve months ago there was no problem in choosing as there was only the 240 and one other which was much more expensive and difficult to tune when driving. Now it's a bit different, with two others on the market—and all claiming to be the best. Before you choose just sit down and think about what you really want from a mobile. For instance, do you really want 400 channels and do you understand the complex mathematics which enables you to fit these into two megahertz of bandwidth when each channel requires some 16kHz?

How many channels do you actually need to have available? Well, there could well be up to ten repeater channels in time in the UK and in a really busy area such as London you could well need 8 simplex. Another requirement is that you want to be able to listen on the input frequency of the repeaters to check whether a simplex QSO is possible. You want to be able to do this instantly at the flick of a switch and don't want to have to do a bit of computer programming in order to tell your rig which channel the input is on.

Most important though is that you want an ABSOLUTE MINIMUM of knob twiddling and button pressing when driving and your tone burst should work automatically as and when required. Just think how complicated it will be when the rig offering some 800 channels is required to operate on the frequency Joe has suggested: "QSY to 23" he says to you on R4 "QSY" you reply—and then your problems start when you have to do the following (perhaps while also driving at 70 MPH on a busy motorway):

- 1 What frequency is S23? — 145.575MHz.
- 2 Can I manage to QSY without looking at the dial for more than about 1/2 sec—NO, unless you work out in your head how many 10kHz steps you need to click the switchround, i.e.  $145.575-145.000 = 575\text{kHz} = 57\frac{1}{2}$  steps. (You need to memorise the repeater input frequencies of course.)
- 3 Do I have to press the 5kHz button? Well, as S23 is odd and R4 is even the answer is YES.
- 4 OH! QRX for a moment... Sorry officer I didn't see him as I was tuning my radio.

...so that really leaves you with a choice of two excellent rigs to choose from which both have 25kHz tuning steps and are easy to operate, providing easy channel selection and reverse repeat at the flick of a switch. No doubt the respective importers will both try to tell you theirs is best—so let us list the advantages of the IC-240:

- 1 It's solidly built and the several hundred already sold have shown an excellent reliability rate.
- 2 You can reduce switching down to an absolute minimum as you can arrange the channels exactly where you want them. 22 is plenty when mobile and it's easy to arrange, up to 80 if you wish, for home use (you can also get up to 148MHz if you are going to the USA!) Also you can have a scanner if you wish.
- 3 It has that superb, clear and crisp modulation which is so very characteristic of ICOM.
- 4 The receivers are very sensitive—we measured 0.1µV pd for 10dB SINAD (which for comparison is better than 0.14µV for 12dB SINAD)
- 5 It's cheaper in price but not in quality.

### YOU CAN'T GO WRONG WITH AN IC-240!

SEND FOR DETAILS OF THE NEW SUPER-SCAN ADAPTER FOR THE IC-240

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 AND SHOPS 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

HP TERMS NOW AVAILABLE

YOUR SOLE AUTHORISED UK IMPORTER FOR ICOM

## THANET ELECTRONICS

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





**ICOM****DAVE  
G4ELP**

# JUST A HEAP OF WINNERS!

The ICOM range of 2 metre gear is some of the best you can buy—for quality, reliability and excellence of performance!

Add to this the oft' praised service of THANET with our well qualified technical staff and range of good test equipment and you need have no worries in buying

**ICOM** from **THANET**

## FOR MOBILES

**IC-240.** The well tried and highly popular FM synthesized rig. If you know a friend with one you will know we have every right to boast about the excellent quality of the signal it puts out. (Perhaps that is why we have sold so many!) Now available with Super-Scan as an extra. By the way this is the same size as the SSB unit on the IC-245E.

**IC-245E.** The leader in multi-mode mobiles. Fully synthesized to give full band coverage in 100Hz or 5kHz steps. LED readout of frequency to the nearest kHz. FM, USB, CW, Normal or Reverse Repeat or split frequency working with any spacing, automatic tone burst etc. An excellent bit of engineering which can also serve as a base station.

## FOR PORTABLES with a decent power output and large battery capacity

**IC-202.** The 3W SSB portable which is tunable over all the sideband pitch and can be used, when fitted with extra crystals, to cover 144-145 and 145-8 to 146MHz. Used by many as a prime mover for something bigger because of its excellent clean signal. By far the most popular VHF SSB only set on the market. There are a lot about!

**IC-215E.** (£149, with 8 channels, for a limited period). The big boy in FM portables, with Rx sensitivity and transmission quality every bit as good as a base station (and better than many!) A healthy 3W of FM and sensible batteries with 4 times the capacity of those used in most other portables—so that they don't run flat on you in the middle of a QSO quite as often. Despite this and its rugged construction it is still easy to carry around. Lots of these about also!

## FOR BASE STATIONS

**IC-211E.** The leader of them all. Fully synthesized VFO with 7 digit LED readout to the nearest 100Hz. FM, CW, LSB, USB. There's nothing quite like it. Most would make this their choice if it wasn't for the problem that you have to pay more for the best! (With these days of inflation it isn't silly to think about HP). See October's ad for more details.

**ALL PRICES INCLUDE VAT. AND DELIVERY IS FREE ON MAIL ORDERS FOR TRANSCEIVERS. WHY NOT POP A NOTE ON THE ANSAFONE FOR A PRETTY COLOURED BROCHURE AND DETAILS?**

**THANET ELECTRONICS**  
HERNE BAY KENT  
02273-63859

**SHOPS**

**THANET NORTHERN**  
WOMBWELL S. YORKS  
0226-756229

## OTHER AGENTS (PHONE FIRST—All evenings only except Norfolk and Burnley)

**LONDON**—Terry G8BAM (01-556 9366)  
**SCOTLAND**—Ian GM8DOX (079683 3223)

**NORFOLK**—Ted G3FEW (05088 632)  
**WALES**—Tony GW3FKO (0222 702982)  
**BURNLEY** (0282 38481)

**MIDLANDS**—Tony G8AVH (021 329 2305)  
**NORTH WEST**—Gordon G3LEQ (Knuttsford (0565) 4040)

FOR ALL MAIL ORDERS AND SALES DURING BUSINESS HOURS

**ICOM**

FROM

**THANET ELECTRONICS**  
HERNE BAY  
(02273 63859)



## **SUPER-SCAN with the IC-240**

**£265 inc. VAT**

**IC-240 alone £185 inc. VAT**

**Superscan alone £77.62 inc VAT  
(i.e. £69 + VAT)**

**Fitting charge £6 inc post back to you.  
(We would prefer to fit it ourselves)**

## **A Merry Christmas and A Happy New Year to you from Icom and Thanet**

Yes—the festive season is upon us again and if you are hoping to get a new rig for Christmas you should have been working on your own particular Santa for some time now. To make your chances a little better, if it's an IC-215 you would like, we are offering a limited number of sets at the special price of £149, fitted with 8 Channels.

After Christmas comes the end of the year and a time to reflect on 1977. There has certainly been a lot of change here at Thanet during the past twelve months. — We have introduced you to the new synthesized models and sold a great number. Many more people have discovered during the year just how good ICOM equipment is and the few who have had the misfortune for anything to have gone wrong have discovered what a good service we try to give you. We now have two full time engineers to check out everything we sell and some £54k's worth of expensive test gear to enable them to do their job properly. In addition we have opened another shop in the North at Wombwell, near Barnsley.

Thank you to all those who came along to see us at the Leicester Show. It was good to see you. If you came after Friday lunchtime you will have seen one of the very early demonstration models of the new ICOM HF rig, the IC-701. ICOM went to a lot of trouble to fly this over from Osaka and we were pleased that we managed to get it through customs in time. Since the show ended we have confronted it with signal generator, spectrum analyser, power meter and scope and, most important of all, a good antenna. It really is a lovely rig to handle and performs every bit as well as we expected of a rig reared in the ICOM stables. We know that it is going to be yet another winner. The Band Pass tuning on SSB and the superb CW filter make the receiver a delight to listen to, and the built in RF speech processor provides excellent, clear modulation with plenty of punch. The synthesizer works every bit as well as that in its brother the IC-211E and it is going to make a good HF companion for this set.

We don't know exactly when there will be any for sale—hopefully in the spring—but keep your ears open and you may hear a few demonstrators being put through their paces on the air!

Many thanks for your custom during the past twelve months—May you all have many happy hours playing wireless!

### **73 AND A HAPPY CHRISTMAS FROM**

**PAUL G3VJF**

**DAVE G4ELP**

**PHIL G4CZU**

**FRASER G8FEZ**

**at Herne Bay**

**PETER G3TPX**

**PETE G4DYG**

**at Wombwell**

**GORDON G3LEQ**

**TERRY G8BAM**

**TONY G8AVH**

**TED G3FEW**

**at various other**

**IAN GM8DOX**

**TONY GW3FKO**

**DON G3TRK**

**spots in the UK**

*Congratulations to G8BBW who won the IC-215 in the raffle at the Leicester show with ticket number 142!*

**ICOM® from THANET**

**HERNE BAY (02273) 63859**

# AMATEUR ELECTRONICS UK

MAIN  
AGENT



ATLAS RADIO INC. SOLE  
AGENT



SWAN PLUS-  
ELECTRONICS

~~~~~ A Happy Christmas To You All ~~~~~

## YOUR KEENEST BUY FOR YAESU MUSEN!



AS DIRECT  
IMPORTERS  
WE OFFER  
YOU...

THIS IS THE FABULOUS FT-227R  
THE RIG THAT LEAVES THEM ALL  
STANDING. Our Special Price £189  
VAT included!

1. LOWEST PRICES
2. LARGEST RANGE
3. HIGHEST STOCKS
4. TOP AFTER-SALES SERVICE
5. BEST DEMONSTRATION FACILITIES



SINCERE THANKS TO ALL OUR  
FRIENDS WHO CAME TO OUR  
STAND AT LEICESTER—IT WAS  
GOOD TO SEE YOU—WE HOPE  
YOU LIKED OUR PRICES AND  
WIDE RANGE INCLUDING THE  
EXCITING NEW MODELS FROM  
YAESU & SWAN—KEN PERFECT  
G3FIK

£2.50 FOR 25 PENCE!! 25 pence brings the latest Yaesu catalogue with our  
Credit Voucher for £2.50. A couple of stamps obtains the FT-227R, SWAN or  
ATLAS leaflets or our used equipment list.

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

**FROM SOUTH AND EAST.** We are located approximately two miles from Junction 5 of the M6 from which follow signposts to Birmingham. Within 1/2 mile turn right at Clock Garage and proceed towards city. After one mile look for traffic lights at Fox & Goose and immediately over the lights take minor left fork into Alum Rock Road. We are located one mile from this point.

**FROM NORTH.** Leave M6 at Junction 6 (Spaghetti) and follow left fork down to traffic island beneath motorway complex. Take third turning off to Lichfield. One mile further on follow A4040 to the right and within 100 yds. veer again to the right, approximately one mile further on brings you to the Fox & Goose. Turn right and see preceding directions.

**FROM THE WEST AND SOUTH WEST.** Follow M5 then M6 to Spaghetti Junction (see above). Alternatively, leave M5 at Junction 4 or 3 and proceed to inner ring road. Turn South on ring road and leave on A47 (East). We are located three miles from this point.

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

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

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

**AGENT: WALES & WEST—ROSS CLARE, GW3NWS, CAERLEON 422232.**

**508-514 ALUM ROCK ROAD  
BIRMINGHAM 8**

**021-327 1497  
Telex 337045 6313**







# WATERS & STANTON

TELEPHONE HOCKLEY (03 704) 6835 (2 LINES)



## QUARTZ-16

£169 inc. vat! and 24-hour delivery  
(fitted 10 channels)



### A POPULAR CHOICE—WHY?

This superb transceiver is now selling faster than ever before. With FDK's reputation for quality, reliability and above all, after sales service, little wonder. (It really amazes us that some customers are kept waiting for spares when the UK importer should have them in stock.) Very rarely do our customers have to wait for FDK spares as we have taken the elementary precaution of making sure that we have most items to hand in our workshop. It ties up capital but it also makes for a happy customer!

## NEW!

### MULTI 800-D FM TRANSCEIVER for versatility and safer driving

#### NEW DESIGN—ADVANCED CIRCUITRY

This is the latest answer to the digital synthesized revolution by FDK. And yes, you've guessed it, FDK have come up with some pretty unique features that will make operating that little bit easier. This brand new design, based on an LSI chip driving a PLL, gives direct frequency readout on both transmit and receive.

#### ALL CHANNELS—DIRECT READOUT

All channels from 144-146MHz are covered in 5kHz steps and there's no guessing what frequency you have set the transceiver to. You get true frequency readout on both transmit and receive. If you wish to work R4 you simply switch to "600kHz" and dial up "5-700". Press the transmit button and the display reads "5-100". You can instantly monitor the repeater input channel by flipping to +600kHz and immediately the receiver display changes to "5-100". Pressing the transmit button this time will display "5-700".

#### AUTOMATIC TUNING—REMOTE DISPLAY FOR SAFER DRIVING

Tuning is a new luxury not before enjoyed. There's no cranking of dials with the multi-800D. Turning the dial knob through 5 degrees either side of centre nudges the tuning up or down 5kHz. A further rotation of the dial in either direction starts the auto tuning. The further you turn the knob the faster the tuning rate up to 500kHz per second. The dial knob is spring loaded so that immediately you release it, it will spring back to the central position and tuning will stop. As an aid to the faster tuning rates an audible bleep sounds from the receiver each time a 100kHz point is passed. Finally for safer driving a remote digital display is available that plugs into the back of the Multi-800D so that the frequency can be viewed easily, irrespective of where the transceiver is mounted.

#### COMPREHENSIVE MEMORY—IT NEVER FORGETS!

No digital display would be complete without a built-in memory and the FDK Multi-800D has something rather special. Press the memory button and you can instantly programme a second frequency and store it. At any future time you select memory, the programmed frequency will appear. And what's more, if you switch the transceiver off and disconnect it, both memory and last frequency in use will be stored ready for when you next use the transceiver. You can also use the memory to programme any other repeater shift such as 1.6MHz etc. Whenever you tune the Multi-800D it will never forget.

#### 25 WATTS OUTPUT—FULLY VARIABLE

In case you thought that we had already exhausted all the possibilities with the Multi-800D here's something else you should consider. The Multi-800D runs a full 25 watts output from 1 to 25 watts. Many of you will have seen the pre-production model at Leicester. Brief specification sheets on the Multi-800D are available together with illustration on receipt of a stamped addressed envelope.

Provisional price £239 inc VAT. Remote display £10. Delivery end of December

## The fast-selling 2m FM Transceiver Now . . . 145.50 reads "S20"

Yes, the latest version now has a calibrated dial giving direct readout in European "S" & "R" channels

#### SOME QUESTIONS ANSWERED

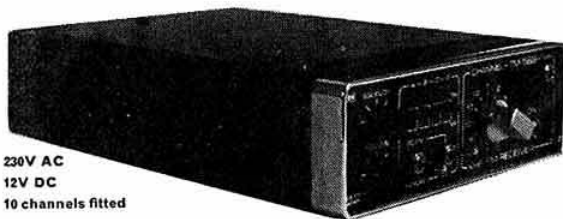
It covers 144-146MHz, any frequency, not just the 25kHz spots! It is easy to QSY without having to wind the channel knob all the way round. For example if you fit S20 in the priority position "A" you can immediately flip from say R7 to S20 in a second. Low power is available but only in the low power position! (In the high power position you will typically obtain 12 watts output.) Extra channels can be added simply by plugging in additional crystals, thus ensuring complete freedom of movement throughout the band and, more important, a clean spurious free transmission. Tone-burst is automatic but with the facility of switching it out so that a distant repeater can be worked without switching on the local one. A remote vfo is available for complete coverage of 144-146MHz with the addition of a synthesizer available soon.—It also costs a lot less!

#### TECHNICAL POINTS

On the more technical side we can add that such things as helical filters, 10-7MHz crystal filters, 455 ceramic filters are all included in the design. The transmitter is completely protected against open circuit of high SWR and the modulation is crisp and clear. The standard frequencies fitted are S0, S20, S21, S22, S23, R3, R4, R5, R6, and R7. Included with the Quartz 16 is microphone, power cord, fuses, plugs, table stand and English manual.

**FREE CREDIT (6 months) Deposit; Q-16 £43; M-11 £55;  
M-U11 £59. SAE for details**

## TM56B AMATEUR VHF MONITOR RECEIVER



230V AC  
12V DC  
10 channels fitted

#### A PLEASURE TO OWN

Tune into the exciting world of amateur radio with this advanced monitor receiver. Listen to your local amateur radio stations both fixed and mobile, direct or through the your local repeaters. From the comfort of your fireside chair, using the built-in 230 volt. AC power supply, this receiver will open up the whole new world of VHF Amateur Radio for you. Alternatively the necessary hardware supplied enables you to power the TM56B from your car radio battery for true mobile operation.

#### GREAT VALUE

Little wonder that the first two shipments of these beautifully engineered receivers were sold out within weeks of the advertisements appearing. We really are amazed at their superb performance at such a low price.

#### SOUND DESIGN

The design is well and truly tried and tested, and the circuitry is almost identical to the receiver section of the FDK mobile transceivers. Both sensitivity and selectivity leave nothing to be desired and the auto-scan enables the popular calling channels to be continually monitored for activity.

#### NO HIDDEN EXTRAS

The receiver is supplied complete with all leads, circuit diagram, crystals for channels S0, 20, 21, 22, 23, R3, 4, 5, 6, and 7 plus space for a further 6 channels, making 16 in all. An additional matching desk top aerial is also available at £2.50 extra.

£85 including delivery. Order yours today.

# ELECTRONICS

TELEX 897406

FAST  
MAIL ORDER  
SERVICE

**FDK**

**FDK**

## Multi-2700 Mk II

ANOTHER WINNER!

### MULTI-2700—THE COMPLETE STATION

The FDK Multi-2700 is a front-line all-mode transceiver that incorporates every conceivable feature to ensure maximum enjoyment. In fact, apart from a mains plug and an aerial, there is little else we can sell the owner of a Multi-2700. All in all it is an unbeatable transceiver at an unbeatable price.

### ALL MODES—ALL OCCASIONS

All modes are provided AM FM SSB and CW. For SSB operation VOX is included and for CW, fast break-in is provided with completely adjustable side tone. The 2700 can be used at home with its internal 230v AC PSU or taken out to the local high spot and run from 12v DC. This really has to be the QSO machine that you will never tire of.

### BEAUTIFUL TO OPERATE—BEAUTIFUL TO HEAR

The transmitted audio quality of the 2700 is second to none. Its crisp, clear, quality reflects the manufacturer's knowledge that a clean signal sells more products! The Optimised 16-9MHz 8-pole crystal filter gives clean SSB signals and good selectivity. On FM, direct modulation of the VCO gives smooth but penetrating audio. Typical power output is 16 watts but the flip of a switch and you have 1 watt on all modes. (An internal adjustment permits the power to be adjusted from approx 1 watt to 6 watts for driving linears or transverters.) The Multi-2700 has a built-in receiver RF pre-amp—no problems here with a deaf receiver.

### DUAL VFO CONTROL

Until you have handled the Multi-2700 you cannot appreciate the advantages of dual vfo control. The conventional analogue VFO with its dual speed silky smooth feel, permits accurate tuning on all modes with 1kHz readout. It also covers a complete 1MHz segment at a time resulting in minimum band switching. The flip of a switch and you have full synthesized control of your transceiver. The bright LED display allows the transceiver to be immediately set to any 2 metre channel. A VFO control ensures the synthesizer can be used equally well on SSB, CW or FM. The versatility



IN STOCK NOW

of dual vfo control is quite amazing. For example: use the analogue vfo at the SSB end of the band and the synthesizer on the FM channels; set the synthesizer to the "sked" frequency and continue normal operation on the analogue VFO; set analogue VFO to DX frequency whilst continuing normal tuning of the adjacent frequencies on the analogue VFO—the combinations are endless. Repeater shifts are completely taken care of. The Multi-2700 has +/— 600kHz shifts and 1.6MHz for 70cms operation.

### ITS VERSATILITY IS ENDLESS

Inter-continental contacts are possible via OSCAR. Press the OSCAR button on the front panel and you bring in the 28MHz downlink receiver converter to enable true transceive operation through the satellite. An audio SPEECH PROCESSOR can be switched in to permit extra punch, the amount of compression being adjustable to suit the operator. RIT operates on all modes and both vfo's. A NOISE BLANKER is included for really excellent suppression of ignition pulses. The receiver section covers 143 to 149MHz (Tx covers 144-148MHz  $\pm$  1.6MHz shift only). Apart from the 2 existing repeater offsets one further shift may be programmed. AGC control is continuously variable, as is the VOX DELAY and ANT-VOX etc. All pre-set controls are easily reached through the top hatch of the transceiver. Separate centre zero and rx S-meters are provided. We could go on but if you have read this far perhaps it is time you sent off for the 4-page brochure giving full details of this beautiful transceiver at a really competitive price. £489 inc VAT and Securicor delivery.

WE ALSO STOCK YAESU, BELCOM, MICROWAVE MODULES, SEM, JAYBEAM, HY-GAIN, KEN, STOLLE, CDE, MINI-PRODUCTS, KATSUMI, SAGANT, BANTEX, ASP, POLAR, MOSLEY, G-WHIPS, SEIWA, etc.

**FDK**

## 70 cms FM! IN STOCK NOW



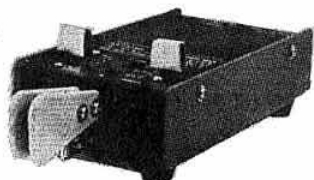
MULTI U-II OF COURSE

### COMPARE ITS FEATURES:

★ AUTOSCAN ★ 10 CHANNELS FITTED ★ RECEIVER IRT (ESSENTIAL) ★ AUTOMATIC TONE-BURST ★ 27 CHANNEL CAPABILITY ★ MIC, BRACKETS, CABLES, Etc., Inc.

SEND SAE FOR 4 PAGE BROCHURE  
£249 inc VAT and 24-hour delivery.

## NEW! EK-I2I DE-LUXE ECONOMICAL ELECTRONIC KEYS



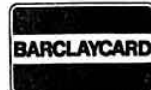
- ★ BUILT-IN PADDLE
- ★ AUTO/SEMI SELECTABLE
- ★ EXTRA HAND KEY TERMINAL
- ★ PLUG-IN BOARD
- ★ DC 150V/DC 1A MAX
- ★ TRANSISTORISED KEYING CIRCUIT

- ★ AUDIO MONITOR TERMINAL
- ★ SPACE-DASH RATIO ADJUSTABLE
- ★ 6-30 W.P.M.
- ★ POWER REQD: 4-6V 50ma or 4 x HP7 cells.

PRICE INC VAT £29.95

FDK CASH BONANZA RESULTS. £100 J. Will, Blackburn Lancs. £30 B. Thwaite, Chelmsford, Essex. £20 W. Hall, Caterham, Surrey.

MAIL ORDER & HEAD OFFICE: HOCKLEY AUDIO, 31 SPA ROAD, HOCKLEY, ESSEX. TEL. 03-704 6835 (2 lines)  
ALL PRICES INCLUDE VAT CARRIAGE AT COST



AGENTS—G3XTX J.R. Electronics, 196 Collier Row Lane, Romford, Essex. Tel. Romford (0708) 68956.  
G3OQT Bredhurst Electronics, Willowbrook, School Lane, Bunbury, Cheshire. Tel. Bunbury (0629) 260708  
GM3GRX Eric Simpson, 6 Drossle Road, Falkirk, Stirlingshire. Tel. 0324-24428

MONDAY TO SATURDAY 9 A.M. TO 5.30 P.M. EARLY CLOSING WEDNESDAY





# South Midlands

wish to you all a

## YAESU MUSEN 2-YEAR GUARANTEE DIGITAL FRG-7!! WITH 100Hz READOUT AND OVER-RANGE??

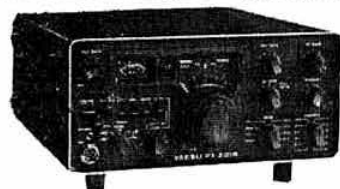
**SMC PROUDLY PRESENTS A READOUT MODULE FOR THE FRG-7 INCREASING THE READOUT ACCURACY 100-FOLD**



The FRG7 is a general coverage solid state receiver with specifications unparalleled in its price range. It uses a Barlow Wadley Triple-mix, drift cancelling loop for continuous, spin-tuned inclusive coverage of 0.5 to 30MHz.

The receiver is sensitive (0.5uV for 10dB, S + N/N (SSB)) and stable with A.M., SSB and CW modes catered for. A 3 position audio filter, RF attenuator, dial lamp conservation switch, recorder and phone sockets are fitted. It is mains powered, but should the supply fail, or portable operation be required, 8 dry cells are automatically switched in.

FRG-7 Analogue Readout £145 + VAT SMC COUNTER £50 + VAT  
FRG-7 Digital Readout £199 + VAT YH55 Headphones £8 + VAT



FT221R

**TAKE LOOK AND A LISTEN—AN FT221R WITH A 2-YEAR GUARANTEE WAITS HERE FOR YOU!**

The new FT221R uses a 'single knob' tuned digital synthesizer employing a photoelectric sensor for an optical system which eliminates both noisy, unreliable rotary switches, and crystal banks. Full coverage of 2 metres in 5kHz divisions with a  $\pm 600$ kHz shift plus a memory feature which permits recall of any entered frequency or particular offset. Bright, large, digital readout gives unequivocal readout of the frequency in use. The receiver offers 0.3uV (for 20dB S + N/N) sensitivity into a  $\pm 6$ kHz ( $\pm 6$ dB) bandwidth whilst maintaining a remarkable immunity to overload and image problems. The 20W DC input transmitter features Hi/low power outputs, AFP, tone burst on repeaters and an out of band inhibition trip etc.

**THE FT221R NEW FROM YAESU EX-STOCK FROM SMC AT A REMARKABLE £167.50 + VAT  
THE FT101E complete HF station—Ex-Stock**



FT101E

The FT101E. A complete mains or 12V. DC station contained in a compact 30lb. package, 260W, PIP of SSB (with in-built RF speech processor) 180W, CW and 80W or AM 10 to 160m (inc. 10MHz RX). The sensitive and selective (permeability tuned RF stages and 8 pole crystal filter) receiver offers: threshold adjustable noise blanker, switchable 25 and 100kHz calibrator,  $\pm 5$  kHz clarifier (with separate on/off switch), etc., etc. The VFO is stable and linear (readout to 1kHz), external VFO or crystal control can be selected, with LED indicators illuminated accordingly. Carrier level is adjustable for: tune up, AM and for CW operation, whose performance with the semi break-in keying, with side tone, and the optional filter installed is of a high order. Linear and transmitter provisions are made with sockets for: relay contacts, ALC output, all internal HT supplies, low level RF heater links and switches, etc., etc.

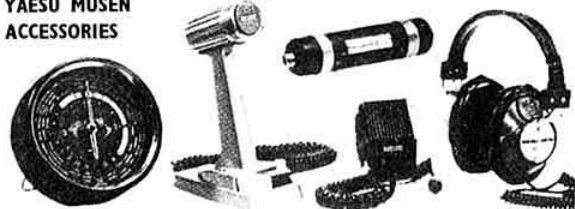
**New service manual for the '101' series in stock £12.00**

- QTR24** World time clock, battery powered, analogue readout £13.00 (+ 8%)  
**YD844** Desk microphone, 50Kohm impedance P.P.T. with lock and micro-switch £18.00 (+ 12%)  
**YD846** Hand microphone, 500ohm or 50Kohm (state which) P.P.T. £7.50 (+ 12%)  
**FF50DX** Low pass filter sharp cut off type c/w 2 PL259's £15.25 (+ 12%)  
**YH55** Communications headphones low impedance, well padded £8.00 (+ 12%)

All YAESU items carriage free by Securicor or post (all + VAT prices)

**SEND LARGE (A-4) SAE FOR FREE YAESU CATALOGUE—NEW 23 PAGE STOCK LIST, etc.**

### YAESU MUSEN ACCESSORIES



## SOUTH MIDLANDS COMMUNICATIONS LTD.

OSBORNE ROAD, TOTTEN  
SOUTHAMPTON, SO4 4DN

Hours of business: 9-5.30; 9-12.30 Saturday



Head Office, Showrooms  
Cables: Aerial Southampton  
Telex: 477351 SMCMM G  
Tel: Totton (04216) 7333 (3 lines)

**EVENINGS—AGENTS—ALL QTHR**

G3ZUL Stourbridge (03843) 5917 Brian Kennedy  
GMBDOX B. of Allan (078683) 3223 Ian McKechnie  
GW3TMP Pontyodkin (035287) 846 Howarth Jones  
G13WVY Tandraee (0763) 840656 Mervyn Anderson



# Communications Ltd

Very Merry Christmas



**CHRISTMAS OFFER—all below POST FREE (PORTABLE ITEMS ONLY—ORDERS RECEIVED BY DEC 25th)**

## SMC MONITOR SCOPE



The MONITORSCOPE is a convenient Test Instrument allowing "on the air" monitoring and testing of Radio Transmitters operating in the frequency range 500kHz to 30MHz with a power rating of up to 2Kw PEP (1Kw average).

The Monitorscope is designed to be connected between the Transmitter or Linear Amplifier antenna socket and the Antenna or Antenna Tuning Unit. A visual display of the Transmitter "envelope" is provided. This will allow the Transmitter to be "talked up" to a full power output whilst watching for "flat topping" which would cause distortion and loss of readability also the "splatter" produced would create interference to Stations on adjacent frequencies. By using the 2-tone Test Generator which is incorporated, an SSB Transmitter may be adjusted to ensure that it is operating in a linear condition, necessary for good quality SSB transmission. Likewise, amplitude modulation and Morse Keying characteristics can be observed. A flexible screened lead is provided for connection to the Transmitter audio or microphone input.

## 12-Volt Power Supply

ODR 123C

12v. DC from 240v. AC 3 amps. (5A peak) 3 1/2 lbs. 3" x 4 1/2" x 6".  
£12.55 (+ 8% VAT)



## Antex (Kuranishi) Coax Switches



1:05 : 1 VSWR, 0.2dB loss,  
40dB isolation, 200W handling all 150MHz  
KSWI 3 SO239 sockets (+8% VAT) £7.70  
KSWIA 2 SO239, 1 PL259 plug (+8% VAT) £8.20

2 metre, SSB/CW/FM, RF sensing with override, "Microstripline" techniques 12V D.C. 10W drive 2" x 6" x 10" (11") (VAT + 12%), free delivery.  
(Over 15 different models—S.a.e. details)  
PA10/160/BL 145MHz 160W output £160

KLM



## LEADER ANTENNA COUPLER

LAC895  
3.5-30MHz, 50/75 coax (SWR < 5) and single wire (10-250 ohms) feed transformed to 50 ohm. Wattmeter 20 & 250W FSD, SSB 500W PIP. .. £72

## ULTRA BAL 2000

Ferrite Balun 3-30MHz  
50/75 ohms 1 : 1 2000W PIP  
UBI (+ VAT 12%) £9.00



## Coax Relays

12v DC 50 ohms. Silver plated.  
P. & P. 30p (VAT + 8%)  
Power crosstalk (at 500 MHz)  
CX120 50W 35dB Cable entry £9.50  
CX230 300W 40dB BNC sockets £17.90  
CX600N 600W 40dB N sockets £21.50

## CUSHCRAFT VHF-UHF COLINEARS

RINGO RANGER-ARX2-6dB gain over 1/2 ground plans. Uses 3 x 1/4 in phase and 1/4 stub, ultra low angle radiation, approx. 10' high. (Illustrated). LOW PRICE. EX-STOCK. (+12% VAT)  
ARX2 6dB Ringo Ranger £21.50 ARX 450 £21.50

## S.M.C. (Jack Tweedy) LTD

Roger Baines, G3YBO  
79 Chatsworth Rd,  
Chesterfield, Derby  
Chetfield (S24) 34982  
8-5 Tues-Sat

## NORTHERN (LEEDS) BRANCH

The Chambers, No. 3 The Parade  
North Lane, Headingley, Leeds  
Tel: Leeds (0532) 782326  
Open 9-5pm Tues-Saturday 9-8pm Thurs.

## S.M.C. (Jack Tweedy) LTD

Jack Tweedy, G3ZY  
Ham Shack, Roughton Lane,  
Woodhall Spa, Lincs  
Wdhi Spa, (0528) 52793  
8-5 Tues-Sat (+ appl)

## SWR Meter with Power Indications

SWR25

Twin meter SWR25 Up to 160 MHz.  
Calibrated to 3 : 1 SWR SO239 connectors.

£10.00 (+ VAT 8%)



## Coax Slide Switches

Up to : 1kW, 1-5 GHz, 0.3dB loss, 1:2 : 1 VSWR,  
50dB isolation, 50 ohm "N" or "PL" fittings. Ex-Stock P. & P. 30p (VAT + 8%)  
TW2S10 1 in 2 out nickel SO239... £5.40  
TWS150 1 in 5 out nickel SO239... £9.35  
TWS220 2 in 4 out nickel SO239... £9.35



2 or 70. Superb RF sensing and dc bias arrangements for all modes. C/w mounting bracket 12V dc 10W drive 2-5" x 5-2" x 7-5" (8-5") (+ VAT at 12%), free delivery

APB82A 145MHz 80W out £102.15  
APB57A 432MHz 45W out £102.15  
APB87A 432MHz 80W out £216.95

## AMPERE



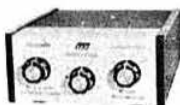
## LEADER WATTMETERS—NEW!

LDM885 Through line (illustrated) (P&P £0.75)  
1-8-54MHz, 20-200-1000 W FSD .. £41.50 + 8%  
LPM880 Absorption .. 1-8-500MHz .. £64.00 + 8%  
5-20-120 W FSD .. ..



## MFJ ANTENNA TUNERS

10-160m, 200W, 12 postn. Inductor  
16010 2 variables SO239's 3 1/4" x 3 1/4" 4"  
SOLD OUT! (+ VAT) £29.50  
16010ST 3 variables SO239's & Binding (+ VAT) £49.50



## TRANSISTOR DIP OSCILLATOR LEADER

LIM815  
1-5-250MHz on fundamentals battery c/w earphone and 6 plug in coils 2kHz modulation  
1-15MHz. Crystal facility. .. £38.50 (+8%)  
LIM870  
Antenna impedance meter 1-8-150MHz  
0-1kohm direct reading c/w load .. £38.50 (+8%)

## TELESCOPIC TILTING

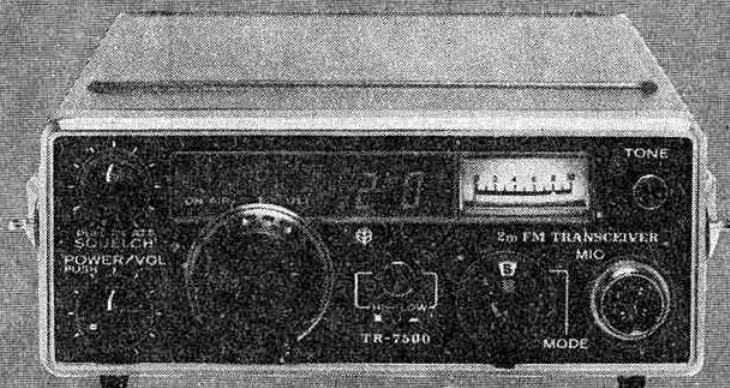
Telescopic (20' sections) with full tilting facility allowing for easy antenna maintenance and alterations. The relatively low unit weight and superior design of ground post allows easy and cheap installation often without resorting to concrete. SAE for further details.

## VERSATOWERS

SEE FAR RIGHT

## TR-7500

Why settle for anything less?



### TR7500

We were delighted to see that a recent round of "It's A Blowout" contained one game which involved a contest between the owner of a TR7500 and someone who was using an FT\*\*7R. In case you didn't see this game, I should explain that the rigs started out set to S0 (i.e. 145-000) and Neddy Boring then called out channel numbers to which the operators had to go. The start went roughly as follows:

**Neddy Boring**—"Go to S20". TR7500 driver turns main knob 20 steps until display reads 20. FT\*\*7R driver thinks "S20? that's 145-500 so with a four digit display it should read 5500. I'll have to tune the main dial 55 steps to get there." 1st round to TR7500.

**Neddy Boring**—"Down to S19". TR7500 driver turns main knob down one click to 19. FT\*\*7R driver remembers quickly that S19 is 145-475 so display should read 5475 but then discovers that he has to turn the main knob down three clicks to 5470 then push an auxiliary button to raise the frequency by 5kHz to 145-475—but he's getting quicker. 1st round to TR7500.

**Neddy Boring**—"Operate on R7". TR7500 driver turns knob 12 steps (from S19) until display reads 7 and sets mode switch to N (Normal repeater). Pushes "TONE" button to activate automatic tone burst. FT\*\*7R driver thinks "R7? that means 145-775 to listen to the output so turn main knob 30 steps until display shows 5775 and then turn TX offset knob to 600 to get the necessary shift". Wastes further ten minutes trying to find switch for tone burst cunningly hidden on rear panel of set (try using it in a car.)

**Neddy Boring**—"Listen on the repeater input". TR7500 driver returns mode switch to S (Simplex) with the flick of a finger. FT\*\*7R driver thinks "Oh no" and turns his main channel knob 60, yes sixty steps to get to the repeater input channel. By this time, the FT\*\*7R driver is beginning to show signs of mental stress but the TR7500 driver is sitting back sipping gin and tonic.

**Neddy Boring**—"Back to normal repeater operation". TR7500 driver restores mode switch to N and carries on sipping. FT\*\*7R driver changes hands and turns his main channel knob through another 60 yes sixty steps to get back to R7.

**Neddy Boring**—"Now operate reverse repeater". TR7500 driver yawns and sets his mode switch to R (Reverse repeater). FT\*\*7R driver drags himself to the rig, turns the channel knob 60 steps (yes again) to get to the repeater input frequency and then sets his offset switch to +600.

**Neddy Boring**—"Now to S23". TR7500 driver turns main channel switch from 7 to 23 and restores mode switch to S (Simplex). FT\*\*7R

driver starts mumbling to himself "I'm on R7 input and the display shows 5175 but I'm transmitting 600kHz up which means 145-775 and S23 is 145-575 but it's 400kHz away so I have to turn the knob 40 times but then I'll be transmitting outside the band so I have to reset the TX offset and-and-and". At this point, the attendants were called and the poor FT\*\*7R driver was carried off into the shadows. The sound of a shot shortly afterwards signalled the end of his misery—no you fool, they shot the FT\*\*7R!

This story is not intended to be entirely for amusement. It illustrates the very real problems encountered when a piece of equipment is incorrectly designed from the operator's stand point and also shows how a recent comparison table between certain rigs was carefully compiled so as to hide these design inadequacies.

If you are considering the purchase of a 2 metre FM mobile transceiver, read the specification carefully, but at some point, consider the use of the rig under real operational conditions and you will discover that TRIO design means good design of all aspects, and any of the happy TR7500 owners will confirm this for you.

Oh, I forget to mention that the contest was judged by his Highness Ram Jam Butti, the Maharajah of Htuol which I believe is a backward little community somewhere in the Far East.

#### TR7500 BASIC SPECIFICATION

|                   |                                                                 |
|-------------------|-----------------------------------------------------------------|
| Frequency range   | 144-146MHz                                                      |
| Channel spacing   | 25kHz (current European band plan)                              |
| No of channels    | 80 simplex<br>10 repeater<br>10 reverse repeater                |
| TX output         | 13-15 watts (High power)<br>1-5 watts (low power)               |
| Repeater access   | Automatic, using TRIO 1750Hz tuning fork oscillator             |
| RX sensitivity    | 0.2 microvolts or better for 12dB SINAD                         |
| Method of display | LED showing correct channel number i.e.<br>20 = S20, 7 = R7 etc |
| Size              | Not much bigger than a 2200GX!                                  |
| Weight            | Not much heavier either!                                        |
| Quality           | The very best—ask anyone.                                       |

**DON'T SETTLE FOR ANYTHING LESS THAN**

THE TR7500—£225 inc VAT.

**A Merry Christmas and a Happy New Year to all our Friends and Customers**

**LOWE IN LEEDS** 27 Cookridge Street, Leeds. 0532-452657

## TS-820

The ultimate transceiver...TRIO's TS-820. No matter what you own now, a move to the TS-820 is your best move. It offers a degree of quality and dependability second to none, and as the owner of this superb unit, you will have at your fingertips the combination of controls and features that, even under the toughest operating conditions, make the TS-820 the leader that it is.

Unprecedented demand plus the painstaking care TRIO lavishes on each TS-820 created an initial backlog of orders but happily we can now supply the TS-820 from stock. Once you have operated the TS-820, you will not be satisfied with anything else.

### Features

**SPEECH PROCESSOR** • An HF circuit provides quick time constant compression using a true RF compressor as opposed to an IF clipper. Amount of compression is adjustable to the desired level by a convenient front panel control **IF SHIFT**. The **IF SHIFT** control varies the IF passband without changing the receive frequency. Enables the operator to eliminate unwanted signals by moving them out of the passband of the receiver. This feature alone makes the TS-820 the pacesetter that it is. **PLL** • The TS-820 employs the latest phase lock loop circuitry. The single conversion receiver section performance offers superb protection against unwanted cross-modulation. And now, PLL allows the frequency to remain the same when switching sidebands (USB, LSB CW) and eliminates having to recalibrate each time.



### Specification

FREQUENCY RANGE: 1.8-30MHz  
MODES: USB, LSB, CW, FSK  
INPUT POWER: 200W PEP on SSB  
160W DC on CW  
100W DC on FSK  
ANTENNA IMPEDANCE: 50-75 ohms  
CARRIER SUPPRESSION: > 40dB  
SIDE BAND SUPPRESSION: > 50dB  
SENSITIVITY: (10dB S/N) < 0.2µV  
SELECTIVITY: SSB 2.4kHz (-6dB)

4.4kHz (-60dB)  
CW 0.5kHz (optional filter)

IMAGE RATIO: > 60dB  
IF REJECTION: > 80dB  
POWER SOURCE: 120/240 Vac  
50/60Hz  
13.8 Vdc (optional DC converter)

WEIGHT: 16kg (35.2lb)  
TS820 £645 inc VAT, DGI readout £127

## The Portables

**TR2200GX**. Represents the very best of TRIO design. It is the latest in the line of continuous progress from the first TR2200 and maintains the TRIO tradition of top quality at a reasonable price. The TR2200GX has all the features that you could want—high power output; sensitive receiver; flexible use from internal batteries or external supplies using the power lead supplied; built in removable telescopic antenna with flexible whip available; built in metering of signal strength, transmit output and battery condition; fitted with twelve channels at low, low prices; in short, all that you could want.

All operator controls are placed for maximum convenience on the top face of the rig and a protective carrying case is included in the price.

**VB2200GX**. This is the matching 10 Watt mobile amplifier for the TR2200GX (and all previous models). It is self contained and of very small size but produces well in excess of 10 Watts for 2 Watts of drive. It contains a regulated power supply for the TR2200GX and has positive SWR protection for the PA transistor. The amplifier may be switched out of circuit if required, but still supplies power for the TR2200GX.

**TR3200**. Not content with having the lead in 2 metre handy portables, TRIO have gone a step forward and produced the best 70 cm. portable rig to match.

The TR3200 is really terrific; over 2W output with switched reduction to 40 mW for local contacts; tailored speech response with a new limiting amplifier and new microphone



give you crisp speech quality.

Excellent receiver performances with double IF filtering at 10.7 MHz and 455 kHz with five limiters to guarantee noise free performance on even the weakest signals. 12 channel capability with three channels factory fitted with crystals for SU8, 18 and 20. Supplied with all accessories as the TR2200GX and including a new high gain 5/8 wave antenna.

Don't forget, the following accessories are provided FREE with the TR2200GX and TR3200—

Removable antenna, carrying case, shoulder strap, battery charger, external power lead. Prices including 12½% VAT.  
TR2200GX: £139 (3 channels) £169 (12 channels) VB2200GX: £45  
TR3200: £182 (3 channels)  
MBla: £9.70. NiCad pack: £9.72

50p in stamps will get you the full catalogue plus the antenna book

**HEAD OFFICE** 119 Cavendish Rd, Matlock, Derbyshire. 0629-2817 or 2430





# Western

**At last . . .**

**. . . the Mast**

**TO SOLVE ALL YOUR ANTENNA SUPPORTING PROBLEMS**

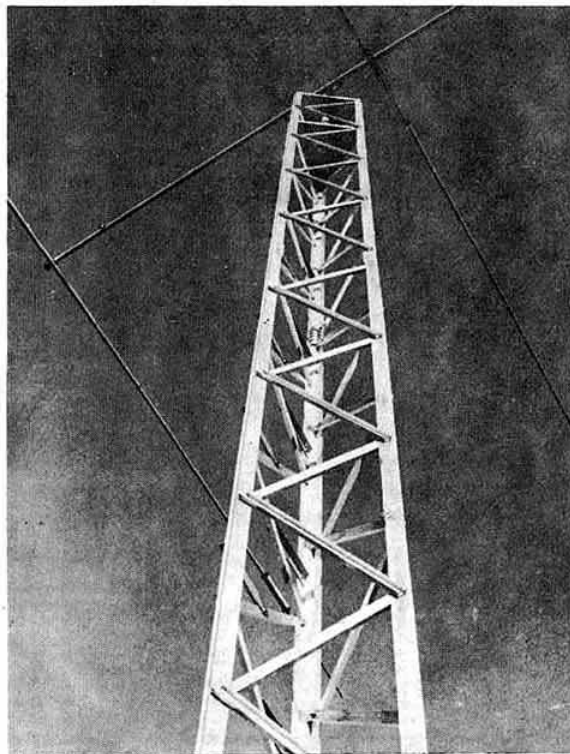
## ALUMAST

**SUPERB VALUE . . . STRONG . . . LIGHTWEIGHT . . . ANOTHER 'WESTERN' QUALITY PRODUCT**

**LISA CAN LIFT IT . . . and she's only 8!**



**ALUMAST TYPE 375/PSS/3**



Consider these star features:

- ★ One 10' section weighs only 11kg.
- ★ Easily assembled by one person.
- ★ Self-supporting . . . no guys.
- ★ Can be extended to 200 feet!
- ★ Climbing rungs incorporated.
- ★ Corrosion resistant high strength alloy.

**PRICES (CARR. PAID). VAT 8% EXTRA.**

**375/PSS/3. 30' self-supporting ALUMAST**

**. . . only £111.00**

|                                                 |        |
|-------------------------------------------------|--------|
| TP-1. TOP PLATE, takes 1 $\frac{39}{32}$ " mast | £6.50  |
| RMP-1. ROTOR MOUNTING PLATE                     | £4.00  |
| FB-1. FIXED BASE                                | £12.00 |
| HB-1. HINGED BASE                               | £21.00 |
| 375/PSS/1. ADDITIONAL 10' SECTIONS              | £37.00 |

**there's no better buy!  
Here's why . . .**

Some firms just drive round in their ROLLS-ROYCES!

At 'Western' we plough back our PROFITS to give you better value. So instead of buying a "Rolls", we have purchased high, speed, hydraulic punching machinery to bring you an accurately manufactured mast at a price way below anything else on the market.

**So you see, the more you buy from 'Western' . . . the better savings YOU will make.**

## Western . . .

**YOUR SINGLE-STOP SOURCE**

# Electronics (UK) Ltd

**YAESU . . . and . . . Western**

NAMES SYNONYMOUS with SERVICE and VALUE since we first introduced YAESU

**THE NEWEST LEADER—FT227R FROM**  
THINK HARDER NOW BEFORE BUYING!



ONLY

**£180**

INC. VAT

EX. STOCK

**COMPARISONS! Have you ever tried it?**

Confusing, isn't it—turning from one ad to another, some giving one piece of information, others not: some showing data in one form, some in a different form. How can you decide on which 2 metre FM rig to buy?

**LET US HELP YOU . . .** Take as a basic requirement—10 watts FM, with a good receiver, freedom from "funnies," and no need to spend extra later to extend flexibility. **NOW READ ON . . .**

| CHANNELS AVAILABLE BY FRONT PANEL CONTROL . . .        | Yaesu FT227R<br>400<br>(800 over 4 MHz) | Trio TR7500*<br>80 | Icom IC240*<br>22 | Digital H*<br>400 |
|--------------------------------------------------------|-----------------------------------------|--------------------|-------------------|-------------------|
| FULL 4 MHz COVERAGE (144-148) WITHOUT MODIFICATION . . | YES                                     | Apparently NOT     | Apparently NOT    | Receive only      |
| FREQUENCY STEPS . . . . .                              | 5 kHz                                   | 25 kHz             | 25 kHz            | 5 kHz             |
| TRUE FREQUENCY DISPLAY . . . . .                       | YES                                     | NO                 | NO                | YES               |
| FREQUENCY MEMORY FACILITY . . . . .                    | YES                                     | NO                 | NO                | NO                |
| REPEATER SHIFTS . . . . .                              | YES                                     | YES                | YES               | YES               |
| TONE BURST . . . . .                                   | YES                                     | YES                | YES               | EXTRA             |
| FACTORY-FITTED HIGH/LOW POWER SWITCH . . . . .         | YES                                     | YES                | NOT YET           | YES               |
| PRICE (including VAT) from WESTERN . . . . .           | £180                                    | £225               | £198              | £264†             |
| PRICE COMPARISON . . . . .                             | LOWEST                                  | £45 MORE           | £19 MORE          | £84 MORE          |

\* All details taken from advertising.

† Tone Burst £11.25 extra.

**NOW . . . YOUR CHOICE IS CLEAR . . . THE YAESU FT227R SCORES ALL ROUND!**

**BE THE FIRST WITH THE BEST! LET YAESU DO YOUR TALKING**

**NEW 1978 YAESU MODELS: FT-901 AND FT-7 HF TRANSCEIVERS**

**HURRY! FT-221R STILL ONLY £336.37 (inc.), FT-101E ONLY £448.87 (inc.)** Please send SAE for details

*A Happy Christmas and a 'Western' 1978 to you!*

**Western Electronics (UK) Ltd**

HEAD OFFICE (All Mail/Enquiries)

**FAIRFIELD ESTATE  
LOUTH, Lincs, LN11 0JH**

Tel. Louth (0507) 4955/6

**Our Agents**

Southern: Alan Paxton, G4BIZ, Chandlers Ford, Hants  
(04215) 65015

Scotland: Alan Cameron, GM3OGJ, Alloa (0259) 214653  
N. Ireland: Les Lyske, G13CDF, Newtownards (0247) 812449

**Opening hours:**

LOUTH: 9-12; 1-5pm Mon-Fri. By appointment Sat 9-12.  
LEICESTER: May's Hi-Fi, Churchgate (Tel: 0533-58662)  
Mon-Sat 9-6pm; closed Thur.



# THE ENTIRE RANGE

Did YOU know that we have the widest range of professional quality VHF and UHF equipment available to meet the most stringent requirements of the discerning amateur radio enthusiast, who is continuously endeavouring to keep his shack up to date. We have listed our complete range of products below, and we are pleased to introduce three new products.

**NEW PRODUCT** \* A DC power supply, **MMP12/3**, which provides 12.5 Volts at 3 Amps to power any of our equipment from a mains supply.

**NEW PRODUCT** \* A new version of the highly successful 144 to 432MHz linear transverter, **MMT432/144 R**, which now includes a 1.6MHz repeater shift.

**NEW PRODUCT** \* A new version of our standard 28MHz to 432MHz transverter, **MMT432/28**, which now includes a 2MHz upshift facility for OSCAR operation etc., **MMT432/28S**.

As space only permits a brief description of each of our products, please do not hesitate to contact us by post, telephone or telex for any technical details, or to request detailed data sheets for any of the products mentioned below. We have experienced sales and technical staff who will be only too pleased to assist you with any queries you may have.

## 144MHz

- MMT144/28** : 144MHz linear transverter.  
Features: 10 watts RMS output power.  
30dB receive gain.  
2.5dB noise figure.  
Aerial changeover achieved by a PIN diode switch.  
I.F. : 28-30MHz.  
Price : £88.88 inc. VAT (£79 + VAT).
- MMC144/28** : 144MHz receive converter utilising protected dual gate MOSFETS.  
Typical gain: 30dB. Noise figure 2.5dB.  
Other I.F.'s : 12-14, 14-16, 18-20, 24-26, 28-30MHz.  
Price : £20.25 inc. VAT (£18 + VAT).
- MMC144/28LO** : As above unit, but has an extra buffer amplifier at 116MHz for use in transverters.  
Provides 5mW at 116MHz.  
Price : £22.50 inc. VAT (£20 + VAT).
- MMC144/2** : Double conversion 144MHz receiver converter which achieves good image rejection at low intermediate frequencies.  
Other I.F.'s : 2-4, 4-6MHz.  
Price : £20.25 inc. VAT (£18 + VAT).
- MMA144** : Low noise preamplifier with two independent outputs.  
Typical gain: 18dB. Noise figure 2.5dB.  
ALSO AVAILABLE FOR 70 and 136MHz.  
Price : £14.63 inc. VAT (£13 + VAT).

## 1,296MHz

- MMC1296/28** : 1296MHz receive converter utilizing a hybrid ring mixer, with a matched pair of schottky diodes driving a MOSFET I.F. amplifier.  
Typical gain: 25dB. Noise figure: 8.5dB.  
Other I.F.'s : 28-30, 144-146MHz.  
Price : £31.50 inc. VAT (£28 + VAT).
- MMV1296** : 1296MHz varactor tripler.  
Will accept up to 30 watts of 432MHz drive and achieves 60% efficiency.  
Price : £33.75 inc. VAT (£30 + VAT).

## 70MHz

- MMC70/28** : Receive converter for 70MHz.  
Similar to MMC144/28.  
Other I.F.'s : 4-7, 14-17, 18-19, 28-29, 70MHz.  
Price : £20.25 inc. VAT (£18 + VAT).
- MMC70/28LO** : Similar to MMC144/28LO.  
Features buffered local oscillator facility at 42MHz for transverter use.  
Price : £22.50 inc. VAT (£20 + VAT).

## POWER SUPPLY

- MMP12/3** : Compact matching 12.5 volt 3 amp PSU for our transverter range.  
Price : £56.25 inc. VAT (£50 + VAT).
- Features** : Current limits at 3 amps.  
Output Regulation: Better than 25mV.  
Ripple: Less than 25mV.

## 432MHz

- MMT432/28S** : 432MHz linear transverter.  
Now fitted with 2MHz upshift facility for OSCAR operation.  
Features: 10 Watts RMS output power.  
30dB receiver converter gain.  
3dB noise figure.  
Aerial changeover achieved by a PIN diode switch.  
I.F. : 28-30MHz.  
Price : £135 inc. VAT (£119 + VAT).
- MMT432/144R** : 432MHz DOUBLE CONVERSION linear transverter.  
Now fitted with a 1.6MHz repeater shift.  
Features: 10 Watts RMS output power for 10 Watts 144MHz input.  
10dB receive gain.  
3dB noise figure.  
Aerial changeover achieved by a PIN diode switch.  
I.F. : 144-146MHz.  
Price : £169.88 inc. VAT (£151 + VAT).
- MMC432/28** : 432MHz receive converter featuring 2 RF amplifiers and a MOSFET mixer.  
Typical gain: 30dB. Noise figure: 3.8dB.  
Other I.F.'s : 14-16, 18-20, 28-30, 144-146MHz.  
Price : £27 inc. VAT (£27 + VAT).

## DIGITAL PRODUCTS

- MMD050** : Six digit 50MHz frequency counter.  
Frequency range: 0.45-50MHz.  
Input sensitivity: Better than 50mV RMS.  
Price : £86.96 inc. VAT (£82 + VAT).
- MMD050/500** : Six digit 500MHz frequency counter.  
Two ranges: 0.45-50MHz.  
50-500MHz.  
Price : £85.32 inc. VAT (£79 + VAT).
- MMD500P** : Combined version of MMD050 and MMD500P.  
Divide by 10 prescaler to give 500MHz capability when used with MMD050 or similar counter.  
Fully TTL compatible.  
Output level is 2.5 Volts p.p.  
Input sensitivity: Better than 200mV.  
Frequency range: 50-500MHz.  
Price : £27 inc. VAT (£25 + VAT).

INCIDENTALLY, ALL OF OUR PRODUCTS ARE FULLY GUARANTEED FOR 12 MONTHS

# MICROWAVE MODULES LIMITED

BROOKFIELD DRIVE, AINTREE, LIVERPOOL L9 7AN  
TELEPHONE: 051-523 4011. TELEX: 628608 MICRO G



# All 2 metre frequencies at the flick of a switch.

## The Heathkit HW-2036 transceiver.

- \* True digital frequency synthesis
- \* No Channel limitations
- \* Frequency controlled by front panel switches
- \* True FM circuitry
- \* Minimum 10W output—extensible
- \* No signal generator required
- \* Safety control circuit to prevent out-of-band operation

The Heathkit HW-2036 transceiver employs a voltage controlled oscillator (VCO) and a 1 MHz crystal time base, so you can select any 2 MHz frequency simply with front panel switches.

It's fast, easy and precise.

There are a host of other features too, including outstanding audio quality.

The specification below shows how good it is. For more details, send for a copy of the Heathkit catalogue.

### SPECIFICATION

#### RECEIVER

Sensitivity: 0.5  $\mu$ V for 12 dB SINAD (or 15 dB of quieting).

Squelch Threshold: 0.3  $\mu$ V or less.

Audio Output: 2W typical at 10% THD (5 kHz deviation).

Image Rejection: -45 dB or greater.

Spurious Rejection: -50 dB or greater.

IF Rejection: -80 dB or greater.

Internally Generated Spurious: Below 1  $\mu$ V equivalent.

Band Width: 6 dB at 15 kHz minimum and 60 dB at 30 kHz.

Modulation Acceptance: 7.5 kHz minimum.

Current Consumption: 700 mA maximum squelched.

#### TRANSMITTER

Power Output: 10W minimum into a 50  $\Omega$  load.

Harmonic and Spurious Output: -70 dB within 20 MHz of carrier, -45 dB elsewhere, -40 dB harmonics.

Modulation: FM, 0 to 7.5 kHz adjustable.

Duty Cycle: 100% with infinite VSWR.

Tone Encoder: 3 tones, 70 to 200 Hz, approximately  $\pm$  700 kHz deviation.

Transmitter Offset: 0 (simplex), -600 kHz, +600 kHz with crystals supplied. Provision for one additional offset crystal.

Current Consumption: 2.6A maximum at 13.8V.

#### GENERAL

Speaker: Built-in 2 in  $\times$  6 in speaker, jack for additional external speaker.

Frequency Coverage: Any 2 MHz segment from 143.5 to

148.5 MHz. Both receiver and transmitter must be aligned for same 2 MHz segment.

Frequency Increments: 5 kHz.

Frequency Stability:  $\pm$  0.0015%.

Operating Temperature Range: 15  $^{\circ}$ F to 125  $^{\circ}$ F.

Operating Voltage Range: 12.6V to 16V DC (13.8V DC nominal).

Dimensions: 2.75 in high  $\times$  8.25 in wide  $\times$  9.875 in deep.

Weight: 6.25 lb.



## HA-202 Amplifier for 40W power output

- \* Draws 7W
- \* Delivers 40W
- \* A perfect match for the HW-2036

## 2-Metre Amplifier for 10W power output

- \* Draws up to 1.5W
- \* Delivers up to 10W
- \* Ideal for hand held or portable rigs

## AC Power Supply

- \* 120 and 240 V AC input options
- \* 13.8V DC output
- \* Perfect for the HW-2036

When you receive your copy of the Heathkit catalogue, you'll find full details of all this equipment — plus many more quality kits for the amateur radio enthusiast.

Don't delay. Use the coupon now.

To: Heath (Gloucester) Limited, Department RC-127  
Bristol Road, Gloucester, GL2 6EE.  
Please send a copy of the Heathkit catalogue.  
I enclose 11p in stamps to cover postage.

Name \_\_\_\_\_

Address \_\_\_\_\_

Showrooms at 233 Tottenham Court Road, London  
(01-636 7349) and at Bristol Road, Gloucester  
(Gloucester 29451).

HEATH

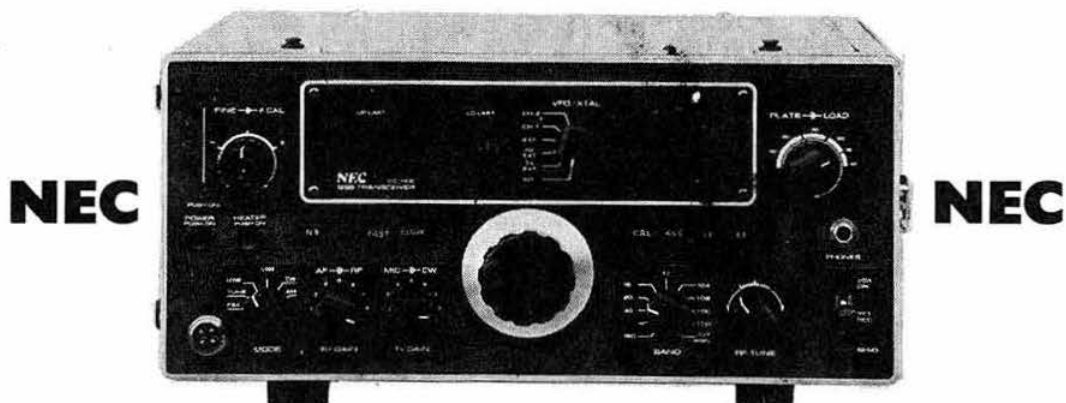
Schlumberger

The world's biggest producers of electronic kits.

# William Munro (Invergordon) Limited

distributors for

## NEC Amateur Radio Equipment



### CQ110E Transceiver (Ex Stock) £645 plus VAT £80.63, Total £725.63 (Price includes Securicor Delivery)

|                    |                                                                 |
|--------------------|-----------------------------------------------------------------|
| Frequency Range    | 10m—15m—20m—40m—80m—160m and 11m and WWV 15MHz on receive only. |
| Mode               | LSB—USB—CW—AM—FSK—FAX/SSTV                                      |
| Power Requirements | 100/110/117/200/220/234 Volts AC or 13.5 Volts DC               |
| Input Power        | 280 watts PEP (240 watts on 28MHz)                              |

Digital Readout—Separate Crystal Filters for each of LSB, USB, and CW. AC and DC power units are built in. Switched metering for "S" meter, Relative Output, Plate Current, and ALC for setting MIC Gain. The following accessories are supplied with the Transceiver—Microphone, DC Power Cable, AC Power Cable, 5 RCA Plugs, 2 Spare Fuses, 2 Jack Plugs, 2 Allen Keys and a 60 page instruction book. Built-in speaker with 3 watts output. A hybrid design utilising the best features of valves and semiconductors is used to give a high performance. 7 Valves—49 Transistors—19 FETs—128 Diodes—25 ICs. The use of the RCA low noise beam deflection valve (7360) as receiver mixer gives the CQ110E high sensitivity combined with remarkable crossmodulation characteristics.

### CQ 301 2KW Linear Amplifier—10 to 160m with built-in power supply and 2 EIMAC 3-500Z Valves Ex-stock. £760 plus VAT £95, Total £855. (Price includes delivery)

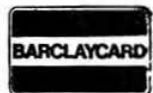
**We also stock** Antennas and Accessories—Microwave Modules—Modular Communication Systems—Polar Electronic Developments—Antex Products Components etc.

**Used Equipment** FT301D/FP301 £625, VAT incl.

#### NEC EQUIPMENT IS AVAILABLE FROM

Thanet Northern, 64 High Street, Wombwell, Yorks. Tel: (0226) 756229  
Cambrian Communications (Tony Blackmore), 2 Joseph Parry Close,  
Llandough, Penarth, S. Glam. CF6 1PL. Tel (0222) 702982

*We Wish You All a Merry Christmas and a Happy New Year*



100 HIGH STREET, INVERGORDON, ROSS-SHIRE IV18 0DN.

Telephone 0349 852351

Telex 75265

HIRE PURCHASE

INSURANCE



# MODULAR ELECTRONICS

PROPRIETOR: P. J. CRAIG, G8CQS

95, HIGH STREET, SELSEY, NR CHICHESTER, WEST SUSSEX. PO200QL.

Telephone: Selsey (024-361) 2916.

SOLE DISTRIBUTOR TO THE AMATEUR RADIO MARKET FOR THE PRODUCTS OF SOLID STATE SCIENTIFIC INC.

MANUFACTURER OF R.F. POWER TRANSISTORS USING ADVANCED ALUMINIUM NICHROME METALLISATION FOR RUGGED RELIABLE OPERATION

ALL PRICES EXCLUDE VAT AT 8%

| Type     | Specification          | Frequency              | Price        |
|----------|------------------------|------------------------|--------------|
| 2N4427   | 1w                     | 10dB                   | 12-5V 175MHz |
| 2N3896   | 1w                     | 10dB                   | 28V 175MHz   |
| 2N5913   | 2w                     | 7dB                    | 12-5V 470MHz |
| 2N3553   | 2-5w                   | 9dB                    | 28V 175MHz   |
| 2N6080   | 4w                     | 12dB                   | 12-5V 175MHz |
| SD1143   | 10w                    | 10dB                   | 12-5V 220MHz |
| 2N6081   | 15w                    | 6-3dB                  | 12-5V 175MHz |
| 2N6082   | 25w                    | 6-2dB                  | 12-5V 175MHz |
| 2N6083   | 30w                    | 5-7dB                  | 12-5V 175MHz |
| 2N6084   | 40w                    | 4-5dB                  | 12-5V 175MHz |
| RP2127   | 70w                    | 6-8dB                  | 12-5V 175MHz |
| SD1019-5 | 100w                   | >6dB                   | 28V 175MHz   |
| 2N5944   | 2w                     | 9dB                    | 12-5V 470MHz |
| 2N5945   | 4w                     | 8dB                    | 12-5V 470MHz |
| 2N5946   | 10w                    | 6dB                    | 12-5V 470MHz |
| SD1136   | 10w                    | 5-5dB                  | 12-5V 470MHz |
| SD1088   | 25w                    | 6-8dB                  | 12-5V 470MHz |
| SD1089   | 40w                    | 4-3dB                  | 12-5V 470MHz |
| 2N5590   | 10w                    | 5-2dB                  | 13-6V 175MHz |
| 2N5591   | 25w                    | 4-4dB                  | 13-6V 175MHz |
| 2N5179   | Gen. purpose amp. F.T. | -900MHz TO72           |              |
| 2N5031   | UHF amp. N.F.          | -2-5dB at 1450MHz TO72 |              |

TRW. Very Low Noise. 3GHz F.T. "T" Pack (Pin layout same as BFR90/91) interchangeable improved low cost replacements for same in most circuits. (470MHz applications).

|       |                      |       |
|-------|----------------------|-------|
| TP890 | 2-7dB N.F. at 450MHz | £1.50 |
| TP893 | 2-0dB N.F. at 500MHz | £2.00 |
| TP491 | 1-6dB N.F. at 500MHz | £3.10 |

MULLARD. 5GHz F.T. "T" Pack for 1296MHz

|       |                       |       |
|-------|-----------------------|-------|
| BFR90 | 3-2dB N.F. at 1250MHz | £3.50 |
| BFR91 | 2-5dB N.F. at 1250MHz | £4.00 |

NEW  
The very latest FANTASTIC PERFORMANCE "D" MOS DUAL GATE MOSFETS. UNBELIEVABLE INTERMOD AND CROSS MOD PERFORMANCE WITH TYPICAL NOISE FIGURES AT 144MHz OF 1-5dB. Not a misprint 1-5dB... SIGNETICS SD306 with data only £2.90+8% VAT.

SURPLUS RF POWER. Small quantities only. Check availability before ordering.

STRIPLINE STUD RF CATV TRANSISTOR. Sim 2N5947. 5W Diss. FT 1.2GHz at 75ma. High gain. Only 80p + 8%. In-house coded.

1N5139 WIRE END VARACTOR. 7p(4V) 5w Input

suitable for Multiservice. Only 55p + 8%.

HP5082-3080 UHF pin diodes. 65p + VAT (8%)

2N4429 1w out at 1GHz 28v only £1.00 + 8%

Small Signal Transistors and MOSFETS, +8%

40673-85p. 40841-60p. 3N204 Third Generation

MOSFET-£1.20. BFS28-90p. 2N2369-15p. BC107-

12p. BF115-30p. BFX89-90p.

BFY90 £1.00. BC149 8p(12.5%). CIL108 8p(12.5%).

Dual Mixer VHF/UHF FETS Type E420 (dual E300)

Ideal for mixers.

With data only £1.00 + 8% marked WD383 (Pye)

UHF Antenna Changeover Relays. Magnetic

Devices 951-170-12V 50 ohm good VSWR to 1296MHz.

Direct cable entry for RG43 or similar cable. Price

£5.75 + VAT 8%

Heatsinks suitable for Transistor amplifiers. Single

sided types. REDPOINT TYPES. Prices Reduced. VAT

at 8%

4Y1 4-5 deg. C per W 4" x 2-36" with mounting area

1-26" £0.70.

6M1 2-6 deg. C per W 6" x 3-60" with mounting area

1-37" £1.10.

DAU 4-5 deg. C per W 52" x 120mm £0.55.

Due to weight, postage is 25p on EACH Heatsink. No

other goods under this postage charge.

Components. VAT at 12-5% unless marked otherwise.

DAU Superior Quality PTFE Film Trimmers.

7mm 1-5-9p-18p.

7mm 2-0-18p-18p.

Mullard 7mm 1-6p-15p.

Surplus 10mm 2-5-25p-18p.

3-5-13p 7mm3pin CERAMIC TRIMMERS 7p ea + VAT

Jackson Tetter PTFE 2-10p ONLY 25p + VAT.

Mica Compression Trimmers. Very suitable for the

Collector tuned circuit of Power amplifiers.

Clyden. 10-50p-15p. Handles 50w.

Radiospares. 4-40p-22p. Handles 70w.

RADIO FREQUENCY CHOKES

12 uH. 0-22 uH. 0-33 uH. 0-88 uH. 33 uH. 20 uH.

1000 uH. All at 12p + VAT.

FERRITES. Only genuine Mullard with correct

characteristics. VAT 8%

FX1115 single hole 4p. FX1888 6 hole 16p. FX2049

double aperture transformer core Ue-200 10p.

PLUGS AND SOCKETS by COLINE. VAT at 8%

BNC single hole Socket 55p.

BNC 50 ohm Plug UR43 type 58p.

Amphenol UHF Socket 4 hole fixing SO239 Silver Plate

48p.

\*N\* Plugs RG43 cable, 50p

INTEGRATED CIRCUITS VAT 8%

MOTOROLA MC12013 Prescaler with MTTL output.

Divides by 10 or 11 typical toggle frequency 800MHz.

5V supply. Easy to use with datcopy. £10.50.

PRESALER BOARD (Tested and complete). 5.0

volt supply. Negative earth. Uses the Motorola

MC12013P divider in ÷ 10 circuit. Complete input amp.

Typ Sens. At 432 is 30 mV. Only £21 + VAT. at 8%

MOTOROLA MC1495L. Uses: Multiplier, Bal Modu-

lator, Phase Det. etc. With Datcopy. £1.75 VAT 8%

MOS SCL4001AE 18p VAT 8%

CERAMIC CAPACITORS. VAT 12-5%

Disc Erite type 1000pf-2.5p. Disc Erite type 200pf-2.5p.

Feedthrough Solder In type: 1000pf Erite-8p. 50pf Erite-

7p.

HIGH QUALITY FINISHED UNITS

Transverter M.E.T. 432-28-10 compatible with the FT101

or similar. Full 10w output with low intermodulation

products £76 + VAT 12-5%. Transverter M.E.T.

432-50-10 as above but with 50MHz IF £74 + VAT. Both

above have better N.F. than 2-7dB with 28dB RX gain.

M.E. FM15-1. Better than 13w out when driven with the

2200g or similar 1w FM equipment. £35 + VAT.

M.E. FM15-2. Better than 14w out when driven with the

2200GX or similar 2w FM equipment. £35 + VAT.

M.E.L. 202-25 Typ 25w clean SSB from the ICOM IC202

fully automatic changeover. Also suitable for the ICOM

IC215 on FM £37 + VAT.

M.E.L. 40. 40w Linear amplifier. Made to your drive level

of from 9 to 13w. You specify the drive level. £48 + VAT.

M.E.L. U4 300mW for full 4w output at 432MHz. No

switching. BNC connectors £24 + VAT.

M.E.L. U10 2-5w for full 10w output at 432MHz. No

switching. BNC. £29 + VAT.

PREAMPLIFIERS FOR 144 AND 432MHz

PA1. 50 ohm in and out. Uses latest 3N204 device. Type

N.F. 2dB gain in 10 to 20dB. 1" square fits most gear.

Only £5.50 + VAT.

PA.U1 for 432MHz. Gain 11dB N.F. 2-4dB. 55mm

square. £5.50 + VAT. The U1 has been parametered

for compromise N.F. and has improved intermod

performance. Use the U2 for min N.F. but be warned it

has poorer intermod performance.

PA.U2. Gain 12dB N.F. 2dB. The best low noise

performance. Uses the TRW TP491. Only £7.50 + VAT.

Both of the UHF preamplifiers can be supplied, boxed

and tuned with BNC connectors for additional £4.50.

As supplied to the Ministry.

RF POWER MODULES. Complete tuned and

tested, ready to install in your home-made rig. Low

cost units. 92 x 55mm Tuned to 50 ohm in/out.

PM2-10 10w out 13-5dB gain only 400mW drive £15 +

VAT. (12½%)

PM2-15 15w out 10-5dB gain only 1-3w drive £18 + VAT.

PM2-25 25w out 8-5dB gain only 3-5w drive £17.50 +

VAT. (12½%)

The above are for 144MHz use with 13-8V supply.

PM70-4 4w out 10dB gain only 400mW drive £16.75 +

VAT. (12½%)

PM70-10 10w out 5-7dB gain only 2-7w drive £16.75 +

VAT. (12½%)

PM70-10a 10w out 8dB gain only 1-5w drive £17.75 +

VAT. (12½%)

The above are for 432MHz use with 13-8V supply.

Specials can be made for 384MHz for use as injection

source for 1296MHz equipment.

Complete boxed tested PRESALER.

Input requirement only Typ 30mV. Boxed with BNC

in/out. 5V supply. Adequate output to drive any

50MHz counter. Divides by 10 up to min 500MHz Typ.

600MHz, and you don't have to feed the rig in to get a

measurement. Only £25 + VAT at 8%

CONVERTERS

MEC432-28 and MEC 432-144 NF <2.5dB, £21 + VAT

For 2 meter amplifiers using the following transistors. SD1143 2N6081 2N6082 2N6084. Shows how to build complete amplifiers on single sided blank PCB and a drop of superglue. FM and SSB. Cost only 50p and only 20p when the transistor is ordered at the same time.

POSTAGE: SMALL COMPONENTS 30p. HEATSINKS SEE LIST.

PREAMPLIFIERS 40p. LINEARS/TRANSVERTERS 90p.

MINIMUM ORDER: £1.50 U.K. VAT FREE EXPORT MINIMUM £15

BUSINESS HOURS 09.00 - 13.00, 14.00 - 17.00



BARCLAYCARD  
OR ACCESS  
OVER £10



**TRANSMITTING  
EQUIPMENT  
SOLD ONLY TO  
LICENCED  
AMATEURS**



AN **EBC** COMPANY

Opposite South Harrow Tube and Bus Stations

**SERVICES**

194A Northolt Road  
South Harrow, Middx  
England. Tel: 01-864 1166



**YAesu MUSEN (ADD 12½% VAT)**

|                                            |                                               |                                                   |                                                |
|--------------------------------------------|-----------------------------------------------|---------------------------------------------------|------------------------------------------------|
| FT301 T/Rx 1-8-30, 100W<br>12v. .. £485.00 | FT223 T/Rx 2m. FM 23 chnl.<br>12v. .. £139.50 | YP150 Dummy load/watt-<br>meter .. £44.00         | FTV250 Transverter 2m. 12/<br>230v. .. £139.00 |
| FT301D Digital Readout<br>'301' .. £585.00 | FR101DD Digital readout<br>'D' .. £480.00     | FF50DX Low pass filter .. £15.25                  | YD844 Desk microphone .. £18.00                |
| FT301S 10W PEP '301' .. £340.00            | SP101B External speaker .. £15.50             | QRT24 World time clock .. £13.00                  | YV500E 500 MHz 0-02 P.P.<br>M. .. £285.00      |
| FV301 External VFO .. £62.00               | FL101 Tx 1-8-30 MHz 230v. .. £325.00          | YD846 Hand mic. .. £7.50                          | YC500S 500 MHz counter 1.<br>P.P.M. .. £225.00 |
| FP301 PSU/Speaker .. £79.00                | FL2100B Linear 1-2 KW PIP .. £248.00          | FR101S Rx 1-8-30, 12/240v. .. £299.00             | YC500J 500 MHz counter<br>10 PPM/ .. £155.00   |
| FP301D FP301 + Clock,<br>Ident .. £125.00  | FT101EE T/Rx 1-8-30 AC/DC .. £408.00          | FR101D De luxe 'S' BC,<br>FM .. £390.00           | YV355D 220 MHz counter<br>AC/DC .. £139.00     |
| FT200B T/Rx 3-5-30. .. £249.00             | FV101B External VFO .. £62.75                 | FR101SD Digital readout<br>'S' .. £387.00         | YC355 35 MHz counter AC/<br>DC .. £105.00      |
| FP200B AC PSU/Speaker .. £54.00            | YC601 Dig. Display 101 and<br>401 .. £110.00  | FT2Auto T/Rx 2m. FM Auto<br>Scan .. £215.00       |                                                |
| FRG7 Rx 5-30 Cont. AC/DC .. £145.00        | YC301 Monitor scope .. £123.50                | Sig 80R T/Rx, 2m. FM 80<br>25 kHz 12v. .. £220.00 |                                                |
| FT221/R T/Rx 2m. 'All<br>Mode.' .. £339.00 | YO100 Monitor 2 tone osc. .. £118.00          |                                                   |                                                |

**ROTATORS Inc. Carr. & VAT**

|                                       |
|---------------------------------------|
| AR30 antenna rotator .. £44.40        |
| AR40 antenna rotator .. £51.70        |
| CD44 antenna rotator .. £106.85       |
| Ham II antenna rotator .. £145.00     |
| CD bearing .. £4.21                   |
| Stolle 2010 antenna rotator .. £46.50 |
| Stolle 2030 antenna rotator .. £51.05 |
| Stolle alignment bearing .. £11.25    |

**HY-GAIN ANTENNAS Inc. Carr. & VAT**

|                                         |
|-----------------------------------------|
| 12AVQ 10-20m. vertical 2kW. .. £39.90   |
| 14AVQ 10-40m. vertical 2kW. .. £55.60   |
| 18AVT/WB 10-80m. vertical 2kW .. £75.90 |
| TH3 JNR 10-30m. yagi 600W. .. £108.00   |
| TH3 Mk3 10-20m. yagi 2kW .. £165.00     |
| BN86 balun 2kW. .. £13.50               |

**BANTEX**

**VHF WHIPS (Carriage 90p) VAT 12½%**

|                                   |
|-----------------------------------|
| BGA FG 2m. fibreglass .. £8.75    |
| 701, ½ 70 MHz fibreglass .. £4.00 |
| 144½, ½ 145 FG or SS .. £3.50     |
| B5 ½ 145 MHz FG .. £6.35          |
| BGA SS 2m. siless steel .. £8.50  |
| BSU ½ 432 MHz .. £5.00            |
| UCL Mid loaded .. £8.00           |
| TLM Trunk lip mount .. £5.75      |
| MB Magnetic base .. £8.50         |
| Unwanted base deduct .. £0.50     |

**SMC  
MONITOR SCOPE**

£69+8% VAT

**FRG-7 DIGITAL**

£199+12½% VAT

**★ ★ ★  
FOR VISITORS TO  
LONDON**

PLACE YOUR ORDER BY  
PHONE  
WE'LL DELIVER TO YOUR  
HOTEL OR MEET YOU ON  
DEPARTURE, AND ACCOM-  
PANY YOU TO THE LAND-  
ING OFFICER TO ARRANGE  
CARRIAGE OF YOUR PUR-  
CHASE.

★ ★ ★  
**POWER SUPPLIES  
SWR BRIDGES,  
ETC., ETC., ETC.**

★ ★ ★  
Overhauls, Realignments and  
Repairs of most equipment under  
the care of G3JXC

★ ★ ★  
Guaranteed delivery in 36 hours  
anywhere on UK mainland.  
Post items excluded.

★ ★ ★  
London—Phone before 2 p.m.  
we'll deliver same day.

★ ★ ★  
good used Rigs and Receivers  
always in stock.

★ ★ ★  
**LENDARIG SERVICE**

**CRYSTAL FILTERS AND CRYSTALS £3.75 a pair (Carriage paid, VAT 12½%)**

| YAesu                                                                                      | OTHERS                                                                    |                                               |
|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------|
| FT2F, FT2FB, FT2 AUTO, FT224,<br>FT223, (6, 12, 18 MHz Tx, 14, 44, 52<br>MHz Rx).          | TR2200(GX). C146A C826MB. MS2,<br>MR2 (12 MHz Tx and inc. 44 MHz<br>Rx).  | YF30F350 350Hz FT101 CW pl £18.00             |
| SIMPLEX S (0, 12, 16, 19, 20-24).                                                          | SIMPLEX S (0, 20-24).                                                     | YF30H350 350Hz FT101 CW 8pl £20.75            |
| DUPLEX R (0-9) and IR (0-9) T & R.<br>FT200B, FT301(S). FT221(R). FT101-<br>(EX), FT75(B). | DUPLEX R(3-7) at least. A large<br>selection of inverse receive crystals. | YF30F600 600Hz FT101 CW 8pl £18.00            |
| FR101(S) all £2.20 each.                                                                   | CONVERTER CRYSTALS £2.20 38-<br>666(2m), 42(4m), 50-5 (70cm).             | YF30H12 12kHz FT101 FM 8pl £20.75             |
|                                                                                            |                                                                           | YF90H600 600Hz 9MHz CW 8pl £18.00             |
|                                                                                            |                                                                           | YF90F2-4 2-4kHz 9MHz SSB 6pl £18.00           |
|                                                                                            |                                                                           | YF90H12 12kHz 9MHz FM 8pl £18.00              |
|                                                                                            |                                                                           | YF107H600 600Hz 10-7MHz CW 8pl £18.00         |
|                                                                                            |                                                                           | YF107H2-4 2-4kHz 10-7MHz SSB 8pl £18.00       |
|                                                                                            |                                                                           | YF107H12 12kHz 10-7MHz FM 8pl £18.00          |
|                                                                                            |                                                                           | Carrier crystals (9 or 10-7MHz) HC18/U ea. £2 |

**MISCELLANEOUS — ALL CARRIAGE PAID**

|                                                                             |                                                                        |
|-----------------------------------------------------------------------------|------------------------------------------------------------------------|
| JD 110 Power, VSWR, Field<br>Strength Meter £9.00 + 8% VAT                  | 1WS 150 1 in 5 out .. £11.75 + 8% VAT                                  |
| SWR 50 SWR/Power Twin<br>Meters .. £11.50 + 8% VAT                          | TWS 220 2 in 4 out .. £11.75 + 8% VAT                                  |
| ODR 123 240 AC 12v. Power<br>Supply 3 amps (5 amps Peak)<br>£12.50 + 8% VAT | Trap Dipoles 10-80 Meters 500<br>Watts PIP 14 swg .. £19.40 + 12½% VAT |
| CO-AX Slider Switches<br>TWS 120 1 in 2 out £5.50 + 8% VAT                  | 1 kw PIP 14 swg .. £22.30 + 12½% VAT                                   |

★ ★ ★  
HP facilities promptly available  
with up to 3 years to pay  
★ ★ ★  
Part Exchange welcome of  
unmodified Equipment  
★ ★ ★

G3JXC G4FME  
G4ENV



Just telephone your card number  
or send your Cheque with Order



01 - 864 -1166



## COUNCIL

### President

Lord Wallace of Coslany

### Executive Vice-President

D. S. Evans, PhD, BSc, FIM, G3RPE

### Immediate Past-President

E. J. Allaway, MB, ChB, MRCS, LRCP, G3FKM

### Honorary Treasurer

J. O. Brown, LLB, FCA, G3DVV

### Telecommunications Liaison Officer

R. F. Stevens, G2BVN

### Ordinary members

P. Balestrini, TEng(CIE), MITE, G3BPT

J. Bazley, G3HCT

C. H. Parsons, GW8NP

D. M. Pratt, BTEch, MIEE, MIERE, G3KEP

R. F. Stevens, G2BVN

G. M. C. Stone, CEng, FIEE, FIERE, G3FZL

C. J. Thomas, G3PSM

### Zonal members

Zone A. B. O'Brien, G2AMV

Zone B. J. Anthony, G3KQF

Zone C. D. J. Andrews, G3MXJ

Zone D. W. A. Scarr, G2WS, MA, FBIS

Zone E. D. M. Thomas, GW3RWX

Zone F. W. F. McGonigle, G1GXP

Zone G. A. M. Allan, GM3ZBE

## REGIONAL REPRESENTATIVES

Region 1—W. M. Furness, G3SMM

Region 2—R. C. Andreang, G4CMT

Region 3—H. S. Pinchin, G3VPE

Region 4—T. Darn, G3FGY

Region 5—P. F. Chilcott, G4BBA

Region 6—F. S. G. Rose, G2DRT

Region 7—N. A. Smith, G3HFO

Region 8—D. N. T. Williams, G3MDO

Region 9—H. W. Leonard, G4UZ

Region 10—R. G. Barrett, GW8HEZ

Region 11—P. H. Hudson, GW3IEQ

Region 12—F. Hall, GM8BZX

Region 13—A. B. Givens, GM3YOR

Region 14—I. McKechnie, GM8DOX

Region 15—H. J. Campbell, G18FOK

Region 16—R. E. G. Kendall, G8BNE

Region 17—L. Hawkyard, G5HD

Region 18—P. J. Fay, G3AKG

Region 19—(Post vacant)

Region 20—G. Mather, G3GKA

## HONORARY OFFICERS

### Awards managers

hf—C. R. Emary, G5GH

vhf—Jack Hum, G5UM

### Emergency communications manager

P. Balestrini, G3BPT

### Intruder Watch organizer

S. A. G. Cook, G5XB

### Microwave manager

D. S. Evans, G3RPE

### QSL Bureau manager

A. O. Milne, G2MI

### Slow morse organizer

M. A. C. MacBrayne, G3KGU

### Taped lecture library curator

S. W. Coursey, G3JJC

### Trophies manager

P. A. Miles, G3KDB

### VHF manager: I. F. White, G3SEK

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

# RADIO SOCIETY OF GREAT BRITAIN

35 Doughty Street, London WC1N 2AE

Telephone 01-837 8688

Founded 1913

Incorporated 1926

Member society, International

Amateur Radio Union

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

## The national society representing all UK radio amateurs

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

### GENERAL MANAGER AND SECRETARY

G. R. Jessop, CEng, MIERE, G6JP

### 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)

OAPs with 15 years' membership: £4.50. 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 | GM3UAG, Ellon, Aberdeenshire (NNW)                          |
|      | 144-50 | G8GK, Croydon, Surrey (NE)                                  |
| 1015 | 3-65   | G13GAL, Belfast (N Ireland)                                 |
| 1030 | 3-65   | G2CVV, Derby (N Midlands)                                   |
|      | 144-50 | GM3UAG, Ellon, Aberdeenshire (SW)                           |
|      | 144-50 | G3PWJ, Brierley Hill (NW)                                   |
| 1045 | 144-50 | G8CDP, Middlesbrough (NW)                                   |
|      | 144-50 | G8GK, Croydon, Surrey (SW)                                  |
|      | 144-50 | G3SMT, Stockport (NNW)                                      |
| 1100 | 3-65   | G5VO, Bridlington (NE England)                              |
| 1115 | 3-65   | G3LEQ, Knutsford (NW England)                               |
|      | 144-50 | G13TLT, Bangor, Co Down (N)                                 |
| 1130 | 3-65   | GM3TCW, Wishaw, Lanarkshire (S Scotland)                    |
| 1145 | 3-65   | GM3HGA, Aberdeen (NE Scotland)                              |

An rty 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 rty enthusiasts.

## A seasonal message from the President



IT would appear to be a Presidential custom to look back over the past 12 months in the seasonal message. As usual we have had our problems but at least we have faced up to them and made attempts through the Presidential Working Party to improve, in a rapidly growing and influential Society, efficiency and contact with membership. It is strange that in a Society devoted to the means of communication our main effort has been to establish more efficient lines of communication with membership. It is for this reason that the Regional Representatives Conference was revived after a lapse of time. This proved to be constructive and successful. It most surely must become a regular fixture providing two-way contact between regions and Council.

The Presidential Working Party quite rightly sought the comments and criticisms of members individually and collectively. The response was good and all points have been, or are being, carefully considered, and recommendations are now coming before Council. I must, in this context, pay a personal tribute to the valuable and considerable work put in by Dain Evans and John Allaway. If any praise is to be given they are the people to receive it and deserve it.

My wife and I have managed to attend and enjoy a number of social functions in various areas, the most valuable aspect of which has been to meet informally so many individual members. It was sad that my visits to

Cheltenham, Norfolk and Northern Ireland societies had to be postponed due to my wife's unfortunate accident, and we both would like to express our appreciation for the many kind messages received. Local clubs and groups, in my view, play a vital part in co-ordinating activities and provide a vital means of activating and publicising amateur radio activity throughout Great Britain.

On the question of publicising amateur radio we are apt to overlook this important question, and it was therefore a great privilege and pleasure to be able to visit BBC Cardiff and view the excellent film on amateur radio produced by the BBC, a copy of which has been presented to the Society. The film may shortly be featured in a programme on BBC2. We are grateful to our members who were directly involved in this invaluable venture in a professional capacity. I was also fortunate in being able to publicise the Society and Raynet in moving the Loyal Address last year at the State Opening of Parliament and in a debate on the problems of retirement (shades of 80m!).

I would like to express my sincere thanks to the staff at headquarters. Doughty Street staff have endured a degree of unfair criticism and at one period were under considerable strain, now happily removed. It must be understood they are key workers in our organization and deserve both our thanks and support.

During the coming year some changes take place. David Evans takes over as general manager and we wish him well. George Jessop has served the Society well as Council member, President and general manager; the old warrior (he will love that phrase) has still much to offer in experience and expertise which we need and no doubt will use. John Brown retires as treasurer, leaving as legacy a good financial position, and we thank him for his services. Dain "microwave" Evans takes over as President, deserving all the support we can give him.

I would like to express my sincere thanks for all the support and friendship extended to me during my period of office.

Finally may my wife and I wish all members and families, together with all our staff, a very happy Christmas and a successful New Year.

*George, BRS3003634  
Lord Wallace of Coslany*

# QTC

## amateur radio news

### The President's reception

On 3 November Lord Wallace of Coslany, assisted by members of the Telecommunications Liaison Committee and the IARU Working Group, was the host at a reception in the House of Commons for officials of the Home Office and other organizations with whom the Society is in contact. Among those attending from the Home Office were: Mr

J. L. Bantock, assistant under-secretary of state; Mr D. E. Baptiste, head of division; Mr A. S. McLachlan, deputy director of the Dept of Radio Technology; Mr M. Goddard, principal, and Mr C. E. Godsmark. Also present were Dr J. A. Saxton, special adviser to the Home Office; Dr F. Horner, Director of the Appleton Laboratory; Mr R. W. Cannon, director of Cable and Wireless, and Col J. D. Parker, secretary-general, International Maritime Organization.

In his welcome to the Society's guests, Lord Wallace included the following comment on special licences:

"The Home Office has asked me to say that it is grateful for the restraint exercised this year by clubs and groups, by not pressing for special event licences with personalized

## 1978 Presidential Installation

The installation of Dr D. S. Evans, PhD, BSc, FIM, G3RPE, as 44th President of the Radio Society of Great Britain will take place on

**Saturday 21 January 1978  
7 for 7.30pm**

in the

**Members' Dining Room,  
House of Commons,  
London SW1**

Admission will be by ticket only. Tickets will be limited to two per member, and the total number available will also be limited.

**Single ticket.....£2.50      Two tickets.....£4**  
**Dress:** informal (men, lounge suits)

Applications for tickets should be addressed to: The General Manager, RSGB, 35 Doughty Street, London WC1N 2AE.

callsigns, while all amateur licences are being replaced. With two months to go, only 3,000 out of 23,000 remain to be processed.

"Therefore, I am pleased to announce that as from 1 January 1978 the Home Office will reintroduce special event licences; the first assignment will be GB3MSA for the Marconi commemorative station at Poldhu in January."

### Area representative, Grampian

In the election for a representative for the Grampian area of Region 12, Mr G. M. Grant, GM3UKG, received two votes; and Mr A. Wills, GM8KMO, received 14 votes.

### Radio Amateurs' Examination

Each year the RSGB arranges an examination centre for the RAE at University College, London. Many of the candidates travel long distances to the London centre not knowing that there may be other centres nearer. Unfortunately, the City and Guilds of London Institute is unable to provide a list of centres prior to the closing date for applications.

The Society proposes to publish a list of centres where the examination may be taken and this information will be given in the February issue of *Radio Communication*. College lecturers and instructors for the RAE are requested to send details of where the examination may be taken, together with the closing date for applications and the fee where possible. Please send the details on a postcard addressed to RSGB (Education) at Society headquarters, to arrive before the end of the year.

### Welsh Amateur Radio Convention

This year's convention held at Blackwood, Gwent, attracted 600 visitors. Among the attractions were lectures on Ariel 5, amateur radio in the Seychelles, and optic fibres; the BBC Wales amateur radio film *Another Man's Meat*; an exhibition of vintage amateur radio equipment, and a trade show. The convention was opened by the Mayor of Islwyn, and was featured in the local press.

### New callsign series

In accordance with the Radio Regulations, the ITU has allocated provisionally the callsign series P4A-P4Z to the Netherlands Antilles.

## 75th anniversary of first two-way wireless transmission between the USA and Europe

During the week 14-22 January 1978, special event stations on both sides of the Atlantic will be celebrating the 75th anniversary of the first two-way wireless telegraph transmission between the USA and Europe. Station KM1CC will be operating from the original Marconi station location at South Wellfleet, Cape Cod, and station GB3MSA will be worked from the Poldhu Hotel with antennas on the site of Marconi's original Poldhu station, near Mullion in Cornwall.

The historic message from President Theodore Roosevelt to King Edward VII was transmitted by Marconi himself at Cape Cod, and he received the reply from King Edward sent from Poldhu.

In December 1902 Marconi had been making experimental transmissions across the Atlantic from his station at Glace Bay, Canada, and had sent messages to King Edward in England and King Victor Emmanuel in Italy. The Cape Cod station also came into operation about this time and it was on 19 January 1903 that Marconi made the first transmission of wireless telegraph messages between the USA and Great Britain.

The control operator at Cape Cod, Robert J. Doherty, has obtained special approval to reproduce the famous sound of the 240Hz Marconi rotary spark gap by audio means, and will be using this to contact stations throughout the world on cw. Operation will be on all bands 1.8 to 28MHz cw, ssb, rtty and sstv.

At the Poldhu Hotel will be ex-GEC man A. H. Hammett, together with other members of the Cornish Radio Amateur Club.

It is expected that a message from President Carter will be transmitted from KM1CC during the celebration.

### Stolen equipment

The following equipment was stolen from the owner's car at Dallington, Northampton, on 13 October: Trio 3200 uhf transceiver, serial number 320094, modified with an internal NE555 automatic toneburst; Trio 2200 vhf transceiver, serial number 750179, modified with a BNC plug instead of a telescopic antenna; pair Pye PF1 Pocketphones, serial numbers unknown, the receiver having a non-standard plastic case with one half in grey plastic.

Any information to S. J. Purser, G8GHZ, or to Mereway Police Station, Northampton.

*The editorial staff extend  
their best wishes to readers  
and contributors for a  
joyful Christmas and a  
happy New Year*

## More on the Smith Chart

by G. GARSIDE, MSc, MA, CPhil, CEng, MIEE, MIERE, FRAS, G3MYT/VE3\*

In an earlier article [1] the reader was introduced to the basic principles of the Smith Chart and its use as an impedance diagram for the solution of transmission line problems.

To regard the Smith Chart solely as an impedance diagram overlooks some of its chief merits, in particular the possibility of substituting parallel combinations of resistance and reactance for the equivalent series networks and vice-versa. In many cases it is much more convenient to work in terms of parallel networks, or to make use of answers to problems obtained by means of the chart, when these are expressed in parallel form. This, however, requires an understanding of admittance, and a main object of the present article is to familiarize the reader with the use of the chart as a highly flexible device allowing him to wander at will through impedance, admittance and transmission line territory, uninhibited not merely as explained in [1] by changes of characteristic impedance but also such obstacles as series-to-parallel substitutions.

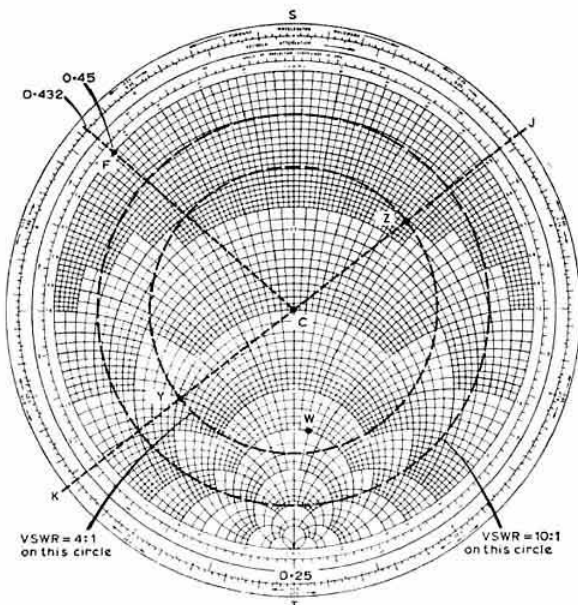
Readers of [1] will recall that the chart is basically a piece of graph paper for plotting resistance against reactance, but differs from ordinary graph paper in the following respects:

- (i) The Smith Chart is *round* and the axes are scaled in such a way that values of resistance and reactance, no matter how large, can be represented on a plot of finite extent. (Contrast this with a conventional graph whose axes must be extended indefinitely in order to represent larger and larger impedances.)

- (ii) Constant resistance lines are *circles*, tangential to the periphery of the chart, and with centres located on the diameter ST (Fig 1). The zero resistance circle coincides with the periphery of the chart, while the tiny circles close to the point of tangency correspond to very high values of resistance.
- (iii) Similarly, constant reactance lines are also circles, centred off the chart, and tangential to the diameter ST. Two families of circular "reactance-arcs" appear on the chart, on opposite sides of diameter ST, one applicable to inductive reactances, the other to capacitive reactances.
- (iv) The usual version of the Smith Chart is "normalized". That is, resistance and reactance scales are expressed as multiples or fractions of a reference value; this enables one set of scales to be used to solve problems associated, in particular, with transmission lines of various characteristic impedances. Thus if the circuit of Fig 2(a) has in a particular case values of  $R = 150\Omega$  and  $X_L = 20\Omega$ , and if the chart has been taken as normalized to  $50\Omega$  (a popular coaxial line impedance) for the duration of the problem, then the circuit is represented by point W on Fig 1, lying at the intersection of the resistance circle labelled  $\frac{150}{50} = 3$  with the inductive

(positive) reactance arc labelled  $\frac{20}{50} = 0.4$ . Note that if

this same point W on the chart occurred during the solution of a matching problem for 600Ω twin-feeder (with the chart then normalized to 600Ω) the represented circuit would then consist of a resistance of  $600 \times 3 = 1,800\Omega$  in series with an inductive reactance of  $600 \times 0.4 = 240\Omega$ . Thus it is imperative at the outset to choose a normalizing factor (scaling factor) for the chart, and stick to it. (However, a modest amount of mental agility will enable certain useful "re-definitions" to take place even during the course of a problem—for example, the immittance transfers discussed next.) Ordinarily, the choice is simply to make the centre of the chart (which corresponds to one "unit" of pure resistance) equal to the characteristic impedance of the transmission line with which the problem is concerned. Throughout this article transmission lines are assumed to be lossless, and hence to have a purely resistive characteristic impedance; these assumptions are a valid basis for tackling most amateur problems in this field provided it is realized that coaxial cables are lossy devices and swr measurements at the transmitting end will usually be somewhat optimistic. Typically, a short-circuit at the antenna will appear as an swr of only 4.5 at the transmitter if the line loss is 2dB. Treatment of lossy lines by means of the chart is covered in the references.



**Fig 1. Smith chart showing series-parallel immittance transfer, and constant-VSWR circles**

\*21 Albion Crescent, Bramalea, Ontario, L6T 1L3, Canada.

### Immittance transfers

As indicated above, a particularly important use of the Smith Chart is for the computation of equivalent series and



parallel networks. It is a fact that for every network like that of Fig 2(a), there is a network like that of Fig 3(a) which behaves (at the same frequency of interest  $f$ ) in a manner indistinguishable from the circuit of 2(a). Just as the impedance of the series circuit of 2(a) (composed of resistance and reactance in series) was the natural vehicle for description of the circuit, so for the parallel circuit of Fig 3(a) the natural terminology is that of an admittance, composed of a conductance (the reciprocal of resistance) and a parallel susceptance (the reciprocal of reactance). For reasons whose explanation would require some mathematical digression, capacitive susceptance is conventionally taken as positive, while inductive susceptance is negative (the reverse of the reactance situation). As with resistance earlier, conductance is assumed positive throughout.

At this point a couple of examples may help to dispel restiveness, and to convince that series-parallel transfers have considerable utility. The way in which the chart is used to deal with admittances will also hopefully become clear during the course of the working.

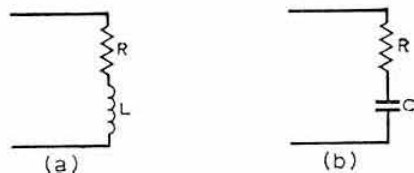


Fig 2. (a) Series-configured inductive and (b) capacitive impedances

Suppose first that an antenna is measured to have the form of Fig 2(a) with values  $R = 23\Omega$  and  $X_L = 34\Omega$  (at the frequency of interest), and suppose the antenna is to be fed with  $75\Omega$  coaxial cable. Evidently, a very poor match would be the result (in fact the vswr will be seen later to be about 4:1). What is to be done? The golden rule is always first to obtain the other equivalent circuit representation. In this case a series circuit has been encountered; we seek the parallel version. Referring to Fig 1 the steps are:

- Normalize the chart to  $75\Omega$  (because of the cable in use). Then the series-circuit representation of the antenna has resistive scale value of  $\frac{23}{75} = 0.31$  and (inductive) reactive scale value of  $\frac{34}{75} = 0.45$  and may be plotted on the chart as point Z.
- Draw the chart diameter JK passing through Z and the centre of the chart (point C).
- Measure the distance CZ and mark point Y at the same distance (CY = CZ) along diameter JK on the opposite side of C from Z.
- The chart co-ordinates of Y, with the chart re-labelled as an admittance chart, and re-normalized to the coaxial line admittance  $\frac{1}{75}$  mhos will give the component values of the equivalent parallel representation of the antenna (Fig 3(a)).

To continue the example, the chart co-ordinates of Y are 1.03 (conductance) and 1.5 (inductive susceptance) giving rise to values of  $1.03 \times \frac{1}{75}$  mhos (conductance) and  $1.5 \times \frac{1}{75}$  mhos



Fig 3. (a) Parallel-configured inductive and (b) capacitive admittances

(inductive susceptance). Now a conductance of  $\frac{1.03}{75}$  mhos is a resistance of  $\frac{75}{1.03}\Omega$  and a susceptance of  $\frac{1.5}{75}$  mhos is a reactance of  $\frac{75}{1.5}\Omega$  and so the components in Fig 3(a) are in this case a resistance of  $73\Omega$  in parallel with an inductance having reactance  $50\Omega$  at the frequency of interest. But in terms of the equivalent parallel representation, the resistive part of the antenna circuit is seen to form an excellent match to a  $75\Omega$  line. In fact, all that is necessary to secure a match is to add, in parallel with the antenna terminals, a capacitive susceptance of  $\frac{1.5}{75}$  mhos, to cancel that of the equivalent parallel inductive susceptance (in effect, the parallel coil is "tuned-out" by the addition of a parallel capacitor).

The finished circuit of Fig 4(a) will result in a flat, well-matched transmission line, delivering all of its power into the antenna. Hence the golden rule mentioned earlier—there is always the chance that the alternative circuit representation will suggest a simple matching solution. Of course the example given was "cooked" to illustrate the point, but on both 14MHz and 21MHz just such good fortune was encountered while matching the author's 3.5MHz inverted-V for these bands. (28MHz is another story!)

A second, abbreviated, example will demonstrate the reverse transfer; suppose a load admittance of the form of Fig 3(b) occurs, with values  $R' = 411\Omega$  and  $X_{C'} = 667\Omega$  and is to be matched to  $300\Omega$  twin feeder. The steps are:

- Normalize the chart to  $\frac{1}{300}$  mhos and plot the load admittance (conductance value  $\frac{1/411}{1/300} = 0.73$ , susceptance value  $\frac{1/667}{1/300} = 0.45$ ) as point Y (Fig 5).
- Locate the diametrically opposite point Z on Fig 5 (equidistant from the chart centre) and read off the co-ordinates of Z as 1.0 (resistive) and 0.6 (reactive). Considering these as co-ordinates on an impedance chart normalized to  $300\Omega$  then gives the equivalent circuit of Fig 2(b) with values  $R = 300 \times 1.0\Omega = 300\Omega$

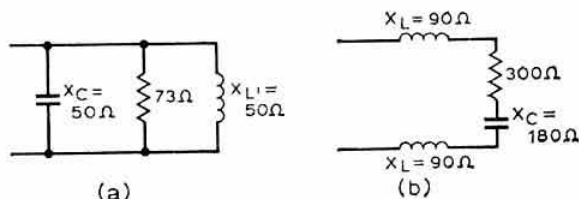


Fig 4. (a) Equivalent network resulting from the inductive-antenna matching example. (b) Equivalent network resulting from the capacitive-antenna matching example

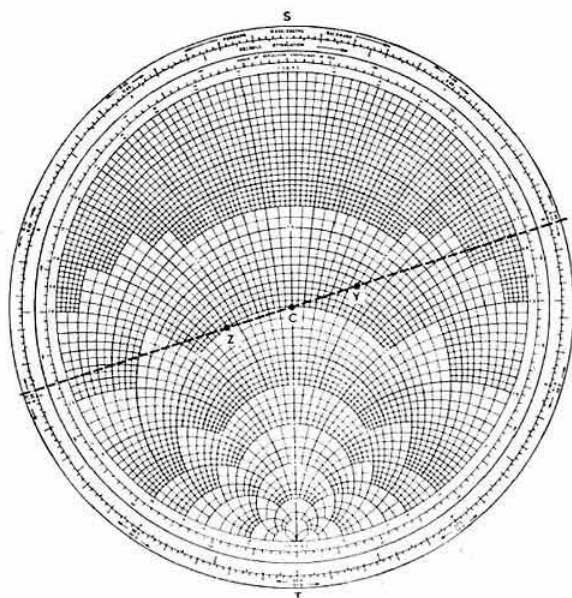


Fig 5. Smith chart showing parallel-series immittance transfer

and  $X_c = 300 \times 0.6\Omega = 180\Omega$ . Again notice that the resistive part in this circuit configuration offers a good match, and all that is necessary is to insert series inductive reactance of value  $180\Omega$  to cancel the capacitive reactance. The final matching arrangement is shown in Fig 4(b), where half the necessary inductance has been inserted in each leg, to preserve the balanced nature of this particular feeder system. Incidentally, a fast way to realize inductance values is via the use of the ARRL L/C/F Calculator [2].

### Transmission-line quantities

The particular point about the previous examples involved the possibility of a matching correction *at the antenna terminals themselves* (or measurement terminals if applicable). Normally, of course, another parameter must be considered, viz: a length of feeder, either because the system necessarily already possesses a certain feeder length, or because it is hoped to achieve a matching correction by the deliberate inclusion of an extra (series or shunt) section of transmission line. This leads naturally to the requirement that it must be possible to determine the input impedance (or admittance) of an arbitrary length of transmission line (of arbitrary characteristic impedance) when terminated at its output in an arbitrary load impedance. (The number of times the word "arbitrary" appears in this sentence is one indication of the complexity of the associated mathematics!) Furthermore, the one transmission-line parameter which most amateur stations will (at least claim to) be able to measure is the voltage standing wave ratio. It turns out that the input-impedance problem and the vswr value are elegantly related on the Smith Chart by virtue of the following facts:

- (i) If a circle is drawn on a Smith Chart, with its centre coincident with that of the chart (see Fig 1) then loads

corresponding to all points on such a circle (normalized in terms of the impedance or admittance of the line in use, remember) *cause the same vswr* if used to terminate the line. Moreover, the value of this vswr (conventionally greater than unity) occurs at the intersection of this circle with the diameter ST (on the side of centre providing a number greater than one). For example, the smaller circle of Fig 1 corresponds to all terminations producing a vswr of 4:1 while the larger indicates all terminations producing a vswr of 10:1.

- (ii) Even more importantly, if a particular impedance is known to terminate a transmission line, entering its vswr circle at its (normalized) value and following the circle round the chart will indicate the impedance value present at the input to the line when the (electrical) line length corresponds to that moved through on the peripheral scale calibrated in wavelengths. For example, a  $50\Omega$  line is terminated in an impedance consisting of a resistor of  $25\Omega$  in series with an inductance having reactance of  $75\Omega$  at the frequency of interest. On Fig 6 the corresponding normalized

co-ordinates are  $\frac{25}{50} = 0.5$  (resistance) and  $\frac{75}{50} = 1.5$

(positive reactance) plotted as point Z. The constant vswr circle centred at the chart centre and passing through point Z is constructed. The line CW has been drawn so that the angle between CW and CZ (as measured on the peripheral scale) is  $0.2\lambda$ . The movement from Z has been in a clockwise direction (corresponding, according to the labelling of the peripheral scale, to a movement (backward) away from the load towards the transmitter) and so if the load of  $25\Omega$  resistance in series with  $75\Omega$  inductive reactance were

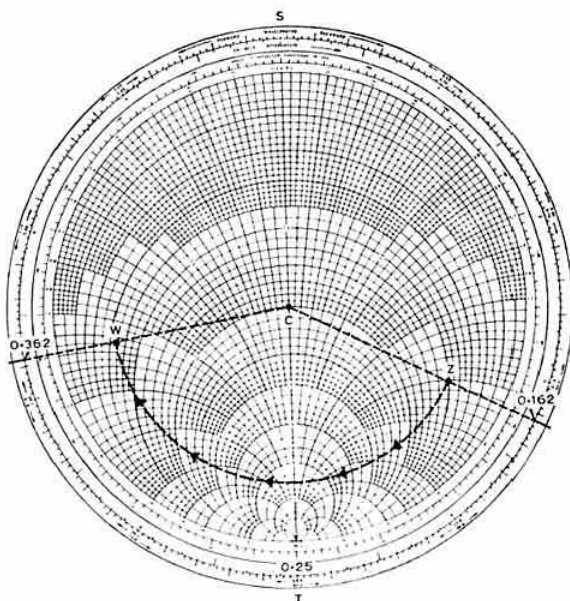


Fig 6. Smith chart showing impedance change along a transmission line

connected to a measuring instrument through  $0.2\lambda$  of cable (electrical, taking velocity factor into account) the instrument would measure  $17.5\Omega$  resistance in series with  $56\Omega$  capacitive reactance—obtained by “de-normalizing” the chart co-ordinates of point W (the new reactance being capacitive since point W now lies to the left of diameter ST).

A number of points on the constant vswr circle can immediately be seen to be of particular importance:

- (i) The circle crosses the diameter ST at two points. These are the (two) *purely resistive* loads which cause the vswr in question. Line lengths corresponding to a movement around the vswr circle from some arbitrary entry point to one of these points are those for which the arbitrary load may be made to “look like” a pure resistance. Thus on Fig 6 the line length ( $0.25 - 0.162$ ) =  $0.088\lambda$  (movement from Z round to T) makes the initial inductive load look like a pure resistance of  $7 \times 50 = 350\Omega$ .
- (ii) The circle crosses the unit resistance circle at two points. These points correspond to those terminations producing the observed vswr, and which, in addition, have a series resistance term *equal to the line characteristic impedance*. One of the points also contains residual series inductive reactance, the other series capacitive reactance. The line length transferring from our arbitrary entry point to one of these points is often the first half of the matching solution, since all that then remains is to cancel the residual reactance by the correct application of an external reactance (which may be a physical coil or capacitor, or another section of transmission line) of the opposite sign. The manner in which these points are utilized in practice will be presented in some detail in the next section.

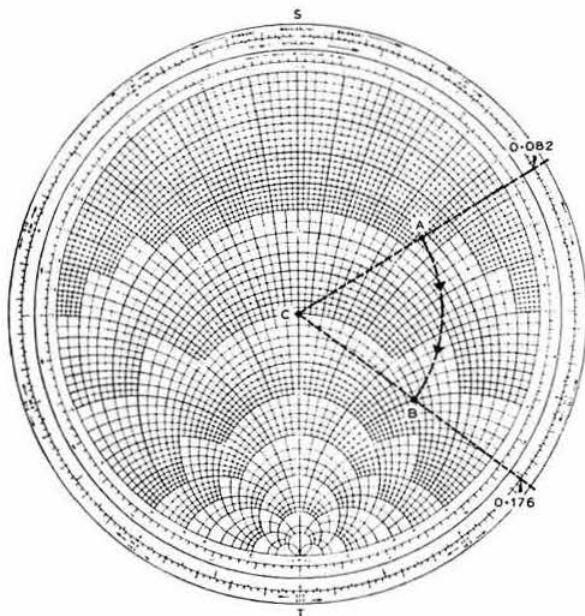


Fig 7. Smith chart construction for the beam antenna problem

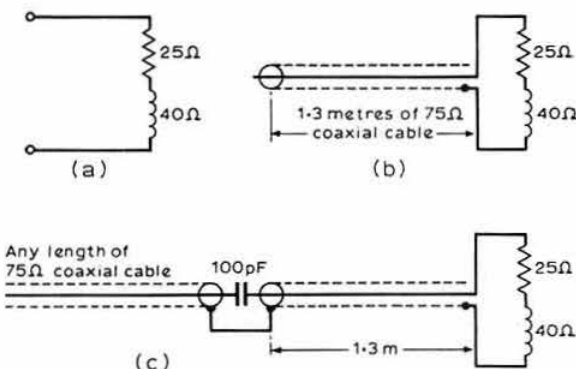


Fig 8. Stages in the beam antenna matching problem: (a) shows antenna impedance at 14.3MHz (Point A of Fig 7); in (b) cable input impedance is now  $75\Omega$  in series with  $112\Omega$  ind reactance (Point B of Fig 7)

### Matching antennas

Though the operations involved are admittedly awkward to describe, (as evidenced by the previous paragraph) after a little practice they are very easily and rapidly performed. (And this is definitely an area in which facility is only acquired by *doing*).

Accordingly two possible matching schemes will be described in detail for two antenna problems. The first is a hypothetical system, the second is based on the author's experience with a 3.5MHz inverted-V. The first problem has initial data produced by measurements at the antenna terminals, the second uses admittance data measured at the base of an existing feeder.

**Problem 1.** A close-spaced beam antenna has been constructed for the 14MHz phone band, with centre frequency of interest 14,300kHz. The impedance at the coaxial input terminals to the integral balun has been measured to be  $25\Omega$  resistance in series with  $40\Omega$  inductive reactance. Design a means of matching the antenna to  $75\Omega$  coaxial line. (Though this example is hypothetical, it is reasonable—close-spaced beams tend to have low resistive values, and the common gamma-match type of balun involves an inductive term.)

### Solution

- (i) Since the initial measurement is in terms of a series impedance combination, normalize the values to a  $75\Omega$  impedance chart. Hence the beam input impedance is plotted as  $\frac{25}{75} = 0.33$  (resistive) and  $\frac{40}{75} = 0.53$  (inductive) reactance (Fig 7, point A).
- (ii) Construct the constant-vswr circle, centred at the centre of the chart and passing through A as shown. (vswr  $\approx 4:1$ ).
- (iii) Moving clockwise around this circle, locate its first point of intersection with the unit-resistance circle—point B on Fig 7. Observe the peripheral wavelength scale measurement of this movement as  $0.176 - 0.082\lambda$  (the wavelength values corresponding to lines CB and CA respectively). Hence an electrical line length of  $0.094\lambda$  is indicated. For a velocity factor of 0.66,

this is a physical length of  $0.66 \times 0.094 = 0.062\lambda$  and since a wavelength at  $14.3\text{MHz}$  is  $\frac{300}{14.3}\text{m}$  this is a

physical length of  $1.3\text{m}$  of  $75\Omega$  coaxial cable. Figs 8(a) and (b) show the progress so far. De-normalizing the co-ordinates of point B in Fig 7 gives the input impedance of this short section of line, viz: a resistance of  $75 \times 1 = 75\Omega$ , in series with an inductive reactance of  $75 \times 1.5 \approx 112\Omega$ .

- (iv) Evidently the resistive portion of the input impedance to this matching section of line is now correct, and it only remains to cancel the reactive portion. This clearly requires the insertion of a series capacitor, having reactance equal to the residual inductive reactance at point B. From the chart the latter is  $75 \times 1.5 = 112\Omega$ . Thus the required capacitor is  $C = \frac{1}{2\pi f X_c} \approx 100\text{pF}$  and Fig 8(c) shows the final matched configuration. The input terminals may now be fed with any length of  $75\Omega$  coaxial cable.

Note that the matching scheme presented is by no means unique, and indeed many other systems are feasible. Readers may like to try one alternative, which involves the insertion of a step (i)(a) above to reflect point A through the centre of the chart and hence obtain an equivalent admittance representation. This leads to a shunt inductance matching system, which some may regard as more convenient.

**Problem 2.** A W3DZZ trapped dipole (2) is erected in the inverted-V configuration, with dimensions suitable for  $3.5\text{-MHz}$  operation as lowest-frequency band. The antenna is centre-fed through  $50\Omega$  coaxial line via a 1:1 balun. Measured at the base of this line, at a frequency of  $28.500\text{MHz}$ , the admittance consists of a resistance of  $15\Omega$  in parallel with a capacitive reactance of  $16\Omega$ . Devise a scheme to transform this admittance to one of  $\frac{1}{50}\text{-mhos}$  for presentation to the transmitter. (This is an actual situation encountered by the author.)

#### Solution

- (i) Since the initial measurement is in terms of a parallel admittance combination, normalize the values to a  $20\text{mmhos}$  chart (ie chart centre corresponds to  $\frac{1}{50}\text{mhos} = 20\text{mmhos}$ ). Hence the input admittance at the base of the feeder is plotted as  $\frac{1/15}{1/50} = 3.33$  (conductance) and  $\frac{1/16}{1/50} = 3.13$  (capacitive susceptance). This is point D of Fig 9.
- (ii) Construct the constant-vswr circle, centred at the centre of the chart and passing through D as shown. ( $\text{VSWR} \approx 6.5$ ).
- (iii) Moving clockwise around this circle, locate its first point of intersection with the unit-conductance circle—point E on Fig 9. Observe the peripheral wavelength-scale measurement of this movement as  $0.309 - 0.225\lambda$  (corresponding to lines CE and CD). Hence an electrical line length of  $0.084\lambda$  is required. The de-normalized co-ordinates of point E then indicate that the input end of this short section (the other end being attached

to the base of the original feeder, of course) would then appear as a conductance of  $20\text{mmhos}$  in parallel with an inductive susceptance (we crossed the chart diameter SCT during the  $0.084\lambda$  movement) of  $2.2 \times 20 = 44\text{mmhos}$  (the admittance co-ordinates of point E being 1.0 for conductance, 2.2 for susceptance).

- (iv) The  $20\text{mmhos}$  conductance would now offer a match to the  $50\Omega$  line ( $20\text{mmhos}$  line!) if a cancelling capacitive susceptance of  $44\text{mmhos}$  were connected across the input to this matching section. The required capacitor is  $c = \frac{1}{2\pi f X_c} = \frac{1/X_c}{2\pi f} \approx 250\text{pF}$ . Fig 10(a) shows the final matched configuration.

Note that again this is just one of a number of possible solutions. Also notice that the vswr in the existing feeder will still be 6.5:1, even though the transmitter "sees" a matched load.

#### Open- and short-circuit line sections

If a length of line is terminated in either an open-circuit or a short-circuit its behaviour is special in a number of ways:

- (i) Maintaining the assumption of lossless lines, such sections cannot absorb or dissipate power; their input impedance is accordingly either purely reactive, or one of the only two possible resistive values consistent with no power dissipation—zero ohms, or infinitely many ohms.
- (ii) The input impedance of such sections is indicated on the Smith Chart just as before—merely remember to enter the chart at point S (for a short-circuited section), or point T (for an open-circuited section)—see Fig 1. The constant vswr circle then coincides with the periphery of the chart, and all values of reactance (positive and negative) are obtainable by varying the line length

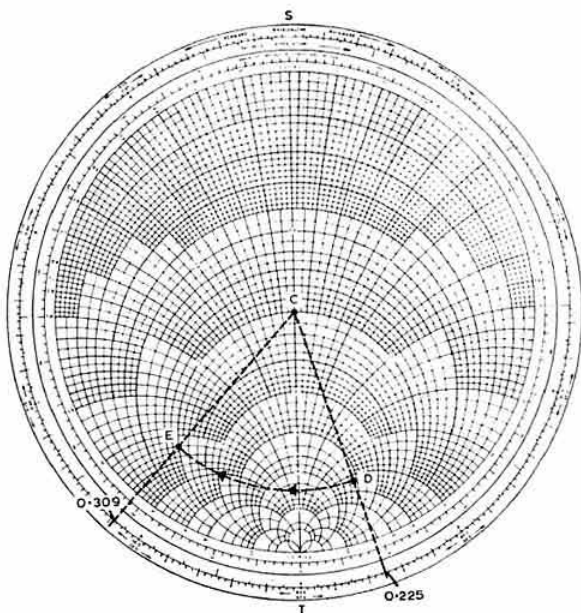


Fig 9. Smith chart construction for the inverted-V dipole problem



as indicated on the peripheral wavelength scale. A favourite utilization of such sections is to provide for the "cancelling" reactance or susceptance mentioned earlier. For example, in the solution to Problem 2 above, the final step required a shunt capacitor of 250pF: that is a capacitive reactance of 22.5Ω approximately on 28.5MHz. If a high-quality, low-loss capacitor with good breakdown characteristics is not available, a further section of line can be used (a shunt, open stub). If the same type of cable is used for the stub (it need not be, of course, but its use is often more convenient mechanically) then the chart is normalized to 50Ω, and the desired normalized reactance co-ordinate is  $\frac{22.5}{50} = 0.45$ . Then, noting from

Fig 1 that the peripheral wavelength distance between T and the line CF passing through the reactance arc marked 0.45 at the periphery of the chart is 0.432-0.250 = 0.182λ (measured clockwise), the alternative implementation shown in Fig 10(b) results for the matching solution. There is often confusion about the sign of the reactance exhibited by these stub sections—a simple way to work out the answer is to consider very short stubs; a very short, open stub "looks like" two bits of wire side by side—clearly a capacitor; a very short, closed stub resembles a single bit of wire, ie a small inductor. This capacitive (or inductive) nature is retained (although the reactance changes as discussed) as the length is increased to λ/4; thereafter the sign of the reactance reverses (and similarly for each subsequent λ/4) and open (short)-circuit stubs become inductive (capacitive) respectively for lengths between λ/4 and λ/2. In the example above, it was already known that a capacitive stub was required and so an open-stub was chosen, with entry to the chart at point T. (Note that if this had given rise to an inconveniently short piece of cable one solution to the difficulty would have been to use a short-circuit stub of length greater than λ/4.)

## Conclusions

The purpose of this article has been to present, in a mathematics-free format, the fundamental characteristics and uses of the Smith Chart. Use of the chart has been described merely for equivalent immittance transfers, and for the manipulation of transmission-line impedance as a function of position with respect to the load impedance, the latter topic being presented in terms of elementary antenna-matching schemes, since these are of most immediate interest to a majority of amateurs. A later article will provide design and construction notes for a simple rf admittance bridge which may be used to obtain measurements of impedance/admittance permitting "entry" to the chart.

It must be pointed out that the Smith Chart is a tool of far greater versatility than could be suggested in a short article; an introductory article along similar lines, but requiring an acquaintance with j-notation is due to W1DTY [4]. Readers seeking a very readable exposé of a wide range of Smith Chart applications and capabilities (still at a very modest mathematical level) can do no better than consult the work of its originator [5] which includes a description of various "overlay" grids for use in conjunction with the basic chart; a treatment of negative-resistance charts (capable of

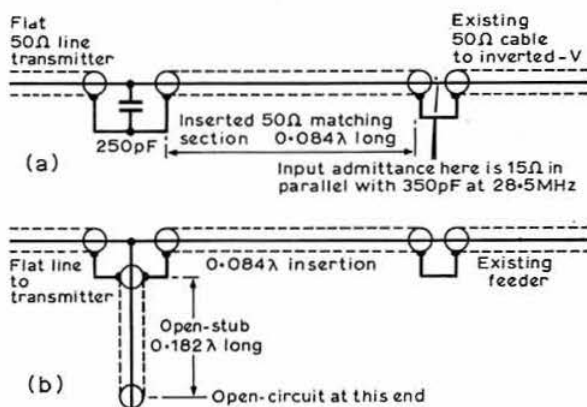


Fig 10. (a) Matching solution for the inverted-V dipole problem (b) Alternate solution for the inverted-V dipole problem using a capacitive stub

dealing with, for example, waveguide amplifiers); the effects of line-loss terms in the manipulations; a description of various "slide-rule-like" Smith Chart instruments, and which features an extensive bibliography. Converts to the surprising potential of this piece of "bent graph paper" will also find interesting the derived Linvill Chart dealing with rf amplifier stability and gain [6].

Other rf bridge and similar articles have appeared in the literature [7, 8, 9] and as a final recommendation for personal experience the plastic Smith Chart "slide-rule" (with a regular circular slide-rule on the reverse) available in the USA from Amphenol RF Division (Amphenol RF Calculator, at \$3) is excellent value for money, if you can get hold of one! [10]

## Acknowledgements

Thanks are due to Warwick Gibbons, G8LPS, and Les Woollicroft, for helpful, critical manuscript checking.

## References

- [1] "The Smith Chart", L. A. Moxon, BSc, CEng, MIEE, G6XN, *Radio Communication* January 1977, p22.
- [2] L/C/F Calculator, type A. ARRL Newington, Conn 06111, USA.
- [3] *The ARRL Antenna Book*, ARRL, Newington, Conn 06111, USA. 12th edn, 1970, pp193-195, 204.
- [4] "How to use the Smith Chart", Jim Fisk, W1DTY, *Ham Radio Magazine* November 1970, pp16-27.
- [5] *Electronic applications of the Smith Chart*, Phillip H. Smith, McGraw-Hill, 1969.
- [6] "Using Linvill techniques for rf amplifiers", P. M. Norris. *Motorola Application Note AN-166*.
- [7] "Amateur Measurement of R + jX", Doyle Strandlund, W8CGD. *QST* June 1965, pp24-27.
- [8] "A simple bridge for antenna measurements", H. S. Keen, W2CTK. *Ham Radio Magazine* September 1970, pp34-38.
- [9] "An absolute method of measuring standing wave ratio and aerial impedance", N. Ashton, G3DQU. *RSGB Bulletin* May 1967.
- [10] Amphenol RF Calculator. Amphenol RF Division, 33 E Franklin St, Danbury, Conn 06810, USA. □

# Sporadic-E observations in 1977

by R. A. HAM, FRAS\*

THE 1977 sporadic-E season began during the morning of 4 May and ended in grand style, 94 days later, on 5 August. This is approximately eight days less than the 1975 and 1976 seasons. During this year's season sporadic-E reflections influenced the normal paths of radio signals between 40 and 80MHz on 37 days compared with 33 days in 1976, 38 days in 1975, and 37 days in 1974.

Although there were no major disturbances prior to the start of the 1977 season there were, however, minor events which took place on 3 and 5 January, 14 February, and on 12, 16, 22 and 25 April. Throughout each period, prolonged bursts of signals from Polish broadcasting stations in the 70MHz band, and television sync-pulses from Russian transmitters in the 50MHz band, were heard simultaneously.

The author made observations daily at approximately 0800, 1230 and 1800ut, and the sporadic-E events recorded at these times are indicated by the dark squares in Fig 1 under times A, B and C respectively.

## Continental broadcasting stations

On 35 of the 37 days indicated in Fig 1 the influence of sporadic-E extended to 73MHz with signals from many eastern European broadcasting stations reflected towards the UK. Fig 2(a) shows the radio frequency distribution and

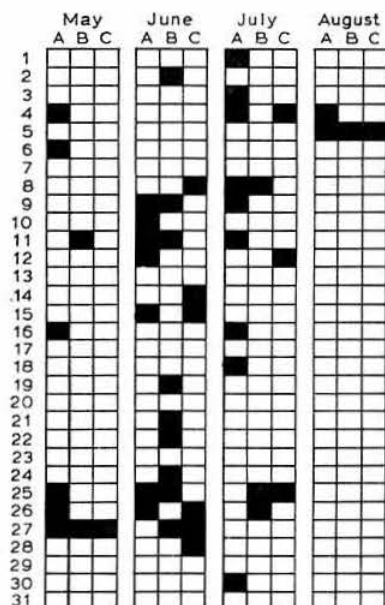


Fig 1. Monthly distribution of sporadic-E

the number of times that the signals were heard by sporadic-E. These fm signals were very strong in the UK when sporadic-E was present.

The 35 days when sporadic-E disturbed the frequency range of 65-73MHz are listed below with the comparative figures for 1974, 1975 and 1976 respectively:

|                                                                   | '74 | '75 | '76 |
|-------------------------------------------------------------------|-----|-----|-----|
| May: 4, 6, 11, 25, 26, 27                                         | 2   | 10  | 8   |
| June: 2, 8, 9, 10, 11, 12, 14, 15, 19, 21, 22, 24, 25, 26, 27, 28 | 13  | 6   | 5   |
| July: 1, 3, 4, 8, 9, 11, 12, 16, 25, 26, 30                       | 5   | 6   | 10  |
| August: 4, 5                                                      | 9   | 7   | 2   |

As in previous years all of the Continental broadcast signals were subject to deep and sharp fading at the beginning, and shortly before the end, of each event.

## European radiotelephone stations

These two-way radiotelephone signals are obvious to the observer without knowledge of the language being used. Fig 2(b) shows the distribution of these signals heard by the author during the period. The total number of radiotelephone signals heard was 141 compared with 213 in 1976, 160 in 1975, and 178 in 1974. This year the main activity was around 40 and 44MHz.

## Electronic devices

"Electronic devices" is a general term used to describe the host of tones, teleprinters, and various beacons which appear between 40 and 50MHz when the E region is disturbed. Fig 2(c) illustrates the radio frequency distribution

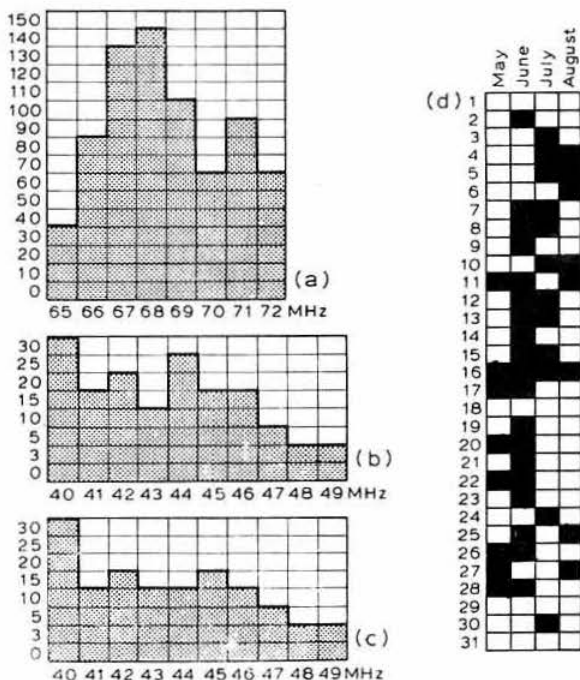


Fig 2. (a) East European fm stations heard in the UK during periods of sporadic-E. (b) European radiotelephone signals heard between May and August 1977. (c) Electronic devices heard during sporadic-E events. (d) Days on which the IBP station DL0IGI was heard

\* Faraday, Greyfriars, Storrington, Sussex.

of these signals heard during the 1977 season and shows once more that the main activity in this field is also around 40MHz.

#### Major events

There were six major events during the 1977 sporadic-E season, of which three (9 and 25 June and 5 August) lasted all day; two (24 June and 8 July) occurred at midday, and one on 14 June which carried on for most of the evening. On 14 June and 5 August strong signals from 46 east European broadcast stations were received between 65 and 73MHz, but previous records were broken at midday on 8 July when the count was 63.

#### 28MHz band

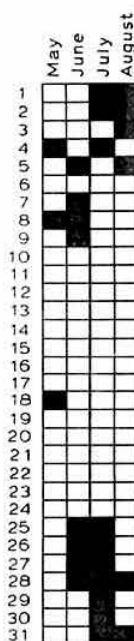
Sporadic-E conditions affecting the 28MHz band were identified on 47 days, Fig 2(d) (compared with 54 days in 1976 and 42 days in 1975), when strong signals were received, often for long periods, from the International Beacon

Project station DL0IGI on 28.195MHz, situated near Salzburg. During the first three months of this observation there were frequent short-skip openings on 28MHz compared with very few in the same period of 1976.

#### Solar activity

The sun was more "active" during the 1977 sporadic-E season than in previous years. The author recorded 21 days of activity at 136MHz throughout May, June and July compared with only four days for the same period in 1976, and this may well account for the increase in short-skip openings on 28MHz mentioned earlier. There was, however, a complete turnabout for August when only six days produced solar radio noise at 136MHz compared with 14 days in August 1976. After continued observation the author still cannot prove any direct connection between sunspot activity and sporadic-E disturbances.

Fig 3. Monthly distribution of solar radio noise recorded by the author at 136MHz



## NEW PRODUCTS

### Sinclair digital multimeter

A new, high accuracy, personal digital multimeter from Sinclair Radionics is now available in the UK at less than one third the price of existing 3½-digit meters. Designated the PDM35, this hand-held unit is also competitive in price with traditional low-cost analogue meters.

Weighing only 6½oz (175gm), measuring 6in by 3in by 1½in (155 by 75 by 30mm), the PDM35 is truly portable, fitting easily into a coat pocket, brief case or tool kit. It has been designed to meet the precise requirements of the electronics engineer, field serviceman and the hobbyist. The PDM35 incorporates all the features that an international survey of these groups highlighted as key requirements, particularly a full complement of dc voltage ranges, dc current ranges and resistance ranges. Sinclair reports that there was a very low demand for ac current ranges, although ac voltage measurement was considered a necessity (mainly for checking power line availability).

AC (1V-500V) and dc (1mV-1kV) voltage measurement can be made with an accuracy of one per cent of reading, as can dc current (1mA-200mA). Resistance can be measured up to 20MΩ and the resistance ranges can also be used to measure forward voltage drops of semiconductor junctions. The dcV input impedance is 10MΩ with 1mV resolution.

DC current resolution is down to the nanoamp level. Range selection is by a simple, but reliable, slide switch, easier to use than a rotary, and as fast as push buttons.

This new Sinclair instrument also features auto-polarity (which can also be used for nulling measurements) and a 3½-digit bright red led display angled for ease of reading. Maximum reading is ±1,999. Over-range is indicated by horizontal bars on most significant digits and zeroing of other digits. Power is from an internationally available alkaline or zinc-carbon PP3-size transistor radio battery. For bench use there is an ac line adaptor.

The PDM35 is supplied complete with leads and test prods, operating instructions and a carrying wallet. It is obtainable from Sinclair Radionics Ltd, London Road, St Ives, Huntingdon, Cambs PE17 4HJ, at £29.95 plus £2.40 VAT and 65p p & p, a total of £33.

### Adcola unit 333

This new unit features two basic parts—a hand soldering tool and a control box to which it is connected via a plug. The control box can be linked to either an existing transformer or to a 24V 60VA ac mains source. Plug-in iron or copper bits are used, and the temperature is controlled by a dial on the control box which provides a range of 120-420°C. There is positive earthing, a siliconized input cable and suppression to eliminate mains spiking. A full range of spares is available, if required.

The price range is from £21. Further information can be obtained from Adcola Products Ltd, Adcola House, Gauden Road, London SW4 6LH. Tel 01-353 1174.

# technical topics

Pat Hawker, G3VA

IN any analysis of the pros and cons of modern home-construction one cannot, unfortunately, leave out of account the difficulties caused by the enormous number—it must now be in tens of thousands—of different semiconductor device type numbers and the problem of finding out pin connections, device ratings and characteristics etc that this creates for those without immediate access to good professional libraries of device information. I admit that I cannot offer any answer to this very real problem or the related problem of identifying unmarked ex-equipment devices. It is enough to make even the most semiconductor-conscious constructor become nostalgic for the days when a small valve data book would give him all the information he was likely to need!

## The homebrewer's "code"

In *Break-in*, August 1977, D. Archer, ZL2BIX, takes a light-hearted but pertinent look at some of the pleasures and problems of home construction and comes up with some ideas, as the following brief extracts indicate:

"To be any good at homebrewing you need a philosophy. Don't waste your time making it look like commercial gear—that is like an artist trying to make a portrait look like a photograph!

"Don't let anyone tell you that you can't build gear as good as the commercial stuff (you probably can't, but don't let them tell you!).

"Don't be bullied into solid-state if you feel happier with valves... if you've got them and don't mind the bigger size, use them!

"Don't let any member of the family buy you presents of shirts, socks etc; presents should not be what you need but what you want. Leave lists of components lying about with prices and where they can be bought.

"Apart from scrounging, the easiest way to keep down costs is to buy components as a group to get quantity discounts.

"Don't be scared of integrated circuits, the only tricky thing is the printed circuit.

"Never begin construction until *all* the components are set out in a box and labelled.

"Don't keep your homebrew gear under cover... every piece you build and get going should inspire others to follow."

Some years ago W2LYH in *QST* summed it up as: "The

true member of the amateur hacksaw-and-file fraternity can never be content with equipment except that which he has built himself. He is not concerned with such things as 'resale value' but only with taking whatever parts are at hand, mixing them with a few of his own ideas, and trying to create something useful."

As one of the majority of amateurs who today uses more commercial than home-made equipment, my own objective is much more modest. It is simply to keep alive at least some elements of homebrewing in every amateur station. Even where the main equipment is factory-made it is possible to think first in terms of home construction for the ancillary units. Power supplies, control systems, antenna matching units, antennas etc are all areas where a homebrew approach can be effected quickly and economically by any of us. By keeping at least a foot in the homebrewing door an amateur need not feel that he has surrendered the old traditions; the sort of thinking that still requires a real egg to be added to a cake-mix! It is easy enough to say that one can retain technical interest in factory equipment, but one learns far more from building at least some part of the station no matter how few components are involved.

## Some receiver ideas

In *Electron* No 6, 1977, E. J. R. Hubach, PA0FIN/OH1ZAA outlines an approach to a 3-5MHz "dx-receiver" that incorporates a number of interesting ideas and a change to the type of gain-distribution normally found in a superhet receiver where most gain is concentrated in the i.f. stages. By shifting the gain into the af stages, it would appear that PA0FIN is able to take a leaf out of the direct-conversion book in order to make effective use of multi-pole audio filters to back-up the 9MHz crystal filter.

Fig 1 shows the basic outline, and the use of a 5-0 to 5-5MHz vfo in conjunction with the 9MHz i.f. suggests that the receiver could also be used very simply on 14MHz.

The front-end is shown in Fig 2. The first stage consists of two FT0601 dual-gate MOSFETs with R adjusted to provide a total drain current of around 20mA, used as a source follower directly into the MD108 double-balanced mixer. The i.f. output goes to an emitter-coupled broadband matching stage with the signal then passing through the XF9B crystal filter, and then, apparently, directly to a balanced product detector. There seems no reason why good linearity should not be achieved in this way right through to af, so permitting more rewarding use of the af filter which is a special Cauer low-pass filter for which no details are given.

It must be stressed that this article gives only an outline and is not a detailed constructional description, and indeed may at this stage represent a design exercise rather than a completed receiver; nevertheless it is an extremely interesting approach to the gain-distribution problem underlined by Ian White, G3SEK, last month in connection with vhf receivers of wide dynamic range.

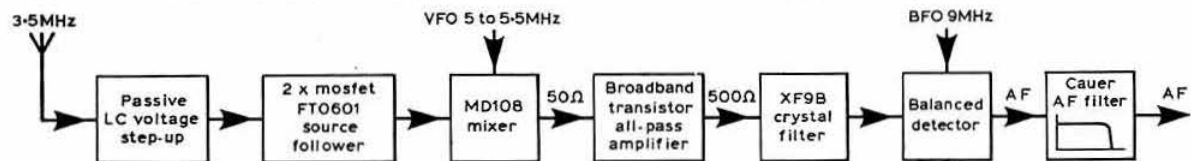


Fig 1. Block outline of PA0FIN's proposals for a 3-5MHz "dx-receiver" which would preserve signal linearity up to the af stages



The need for a sensitive and relatively expensive meter with conventional dip meters can be overcome in several ways: for example *TT* (June 1976) provided information on a dip meter using a thermionic EM87 magic-eye tuning indicator as both oscillator and indicator. With an all-semiconductor approach E. O. F. Siefken, PE0LSD, shows in *Electron*, September 1977, that it is possible to use a light emitting diode as the indicator by using a voltage-doubler rf detector and dc amplifier: see Fig 3.

The unit also includes a 400Hz RC oscillator to provide a tone-modulated signal; the depth of modulation can be varied by means of the 5k $\Omega$  linear potentiometer. Resistor  $R_x$  should be chosen so that the collector potential of the RC oscillator transistor is about half of the supply voltage, which is the rather high figure of 22.5V. It is stated that with six two-terminal coils a range of 0.4 to 200MHz can be achieved; for the highest frequency range a hairpin "coil" is formed from 8cm of silvered-copper strip. The other coils are not critical and can be wound on any convenient formers and adjusted to provide overlapping ranges. The tuning capacitor is a 2-by-250pF gang.

periods. Such power sources include: (1) various forms of primary cells; (2) various forms of secondary cells recharged either from a local source or from vehicles or ac mains away from the site; (3) thermo-electric generators using propane or butane gas; (4) hand and pedal generators; (5) wind generators; (6) steam or water generators; (7) diesel and petrol-electric generators; and (8) solar arrays. I have left out of this list fuel cells and nuclear (isotope) sources since they are not real possibilities for amateur operation.

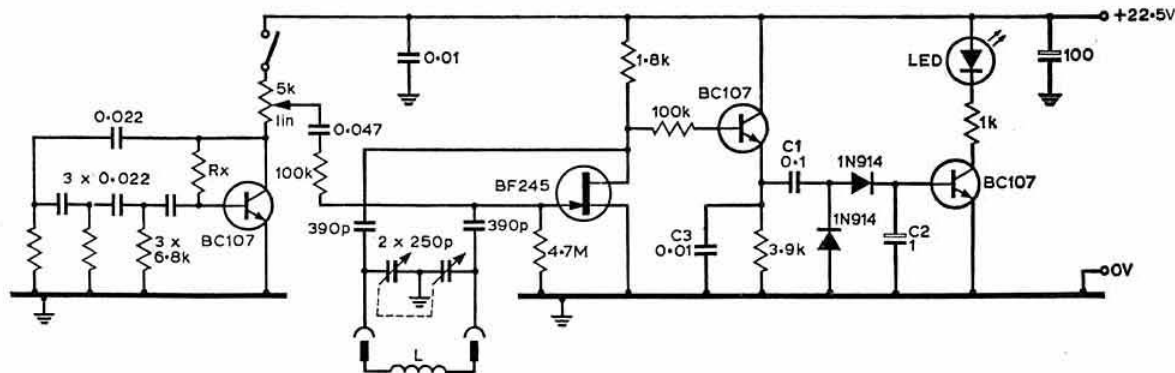
An interesting article in *Radio-ZS*, August 1977, by R. T. Hubbard of the Department of Roads, draws attention to a system which has been used since 1972 for mountain-top vhf communication repeaters and which has proved very successful: Leclanché air-cells with a nicad reservoir battery.

He notes that although thermo-electric generators are widely used for this type of application and were initially used in the South African system, it was found that good access tracks are needed for fairly frequent refuelling of the unattended stations, while holding large stocks of propane gas on the remote site increases the fire hazard. He notes that it is usually mandatory to use propane rather than the less expensive butane/propane mix.

While wind generators are superficially attractive, they may prove totally unsuitable for very high sites due to high maximum wind velocities which tend to damage the speed-governing mechanisms or even wreck the entire installation. Solar powering has not yet proved a wholly reliable system in some parts of South Africa due partly to intemperate weather.

However, a system based on primary batteries, plus the

Several recent items in *TT* have discussed the various forms of power source which would permit operation of radio equipment independently of mains supplies over extended



RADIO COMMUNICATION December 1977

use of vented nickel cadmium cells as a reservoir battery to cope with occasional heavier demands, has been found to be entirely free of major disadvantages. He claims that running costs (compared with the earlier thermo-generators) have been reduced by some 80 per cent, and the initial cost is only about 10 per cent.

In effect, primary power is provided by a bank of 12 air-depolarized cells having an electrolyte of caustic soda and a capacity of 2,000Ah. These cells are air-depolarized, rather than using manganese as in the conventional Leclanché cell. In these cells (which are not a new invention) the carbon element consists of a porous block of special construction which allows it to remain dry even when partially immersed in an electrolyte, yet permits gases generated by the action of the cell to mix freely within the pores and so cause hydrogen to combine with oxygen in the air, through the catalytic properties of the carbon. It is stated that this form of construction allows the cells to have much greater capacity and far less weight for a given output compared with cells using chemical depolarizers, and to have exceptional shelf-life.

The cell is in a black moulded case and is taken to the site before filling with water. Once the cell is connected and water added it is ready for immediate service. The cells used in this application when empty weigh about 10kg and require 5l of fresh tap water. They can supply a maximum of 1A in conditions of continuous discharge, enough for about about 5W of transmitter power. To allow higher powers to be used, a nicad battery is trickle charged via a current-dependent resistor from the air cells. With a 3A load on transmit the repeaters can operate for about *three years* from the bank of air cells which would then be discarded and replaced. The cost, per station, of a set of batteries is around the £80 mark in South Africa.

I remember a time when many homes in the UK used large wet Leclanché cells to operate door bells; these seemed to run for ever provided they were occasionally topped up with tap water and were used for applications where the cell had long periods of rest between use. I must admit that I have never come across the air-depolarized cells described in the South African article, and do not know who manufactures them, but clearly they would be worth considering for such applications as powering repeaters at sites without ac mains. Indeed, in South Africa the system has proved cheaper than the use of ac mains power for remote sites, and a number of repeaters that were mains-supplied have been converted. The air cell is proving more reliable and offers freedom from line surges.

In a Leclanché cell the electrical energy results from the dissolution and loss of weight of the zinc electrode but a depolarizer is needed to prevent the deposition of hydrogen on the positive plate. I seem to remember that at one time it

was (and possibly still is) part of school physics to make your own simple cells. This suggests an interesting target for the dyed-in-the-wool homebrew enthusiast: to build your own battery of sufficient efficiency to supply a low-power solid-state transceiver!

### G4CLP/VK6WA squelch adaptor

Leigh Harrison, G4CLP/VK6WA, was recently in need of a squelch arrangement for use with a much-used vintage BC348 receiver used in conjunction with a vhf converter. A problem was the lack of space, coupled with a desire not to butcher the old war-horse. The answer proved to be the circuit shown in Fig 4.

The only modification to the receiver was simply to gain access to the age line and the speaker leads, neither presenting any difficulty.

During quiescent periods the relay contacts terminate the output transformer with a suitable load resistor; when activated it switches the audio output to the loudspeaker (the relay changeover is not included in the diagram but will be readily grasped from the above explanation).

G4CLP feels that this arrangement could be attractive to anyone using a valve receiver and looking for a simple way of providing squelch by means of an add-on unit.

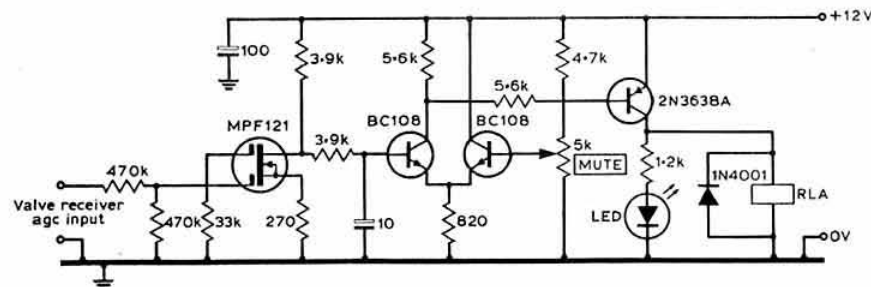
### RMCS compact vhf antenna

Alan Williams, G3KSU, draws attention to an information sheet issued by the National Research Development Corporation about a new compact ferrite vhf antenna, for walkie-talkie transceivers or domestic portable radios, devised by R. J. DREWETT of the Antennas and Propagation Research Group, Royal Military College of Science, Shrivenham.

These notes that the conventional ferrite-rod antenna is considered unsuitable for use at vhf (but see the November *TT* for mention of the BBC "active" ferrite-rod antenna). Portable units use whip or rod antennas which have a number of disadvantages: (1) they can be inconveniently long; (2) when used without ground planes they become highly directional, sometimes requiring awkward positioning for good reception; and (3) they are vulnerable to accidental or deliberate damage.

The RMCS antenna consists basically of a ferrite rod on to which a wire is wound in groups of turns in alternately a left-hand and right-hand sense (see Fig 5) so that it forms a  $\lambda/4$  resonator. The antenna is tuned to the required frequency by winding excess turns and then successively clipping them off from the open-circuit end. Similar antennas, it is stated, can be made with dielectric or with conducting cores.

An antenna using a ferrite rod 200mm long has been tested by RMCS at 79MHz (bandwidth 5MHz) with a portable transceiver, and a 130mm antenna with similar



**Fig 4. The VK6WA/G4CLP add-on squelch arrangement which can be readily used with most valve receivers. The relay RLA acts to change over the audio output of the receiver from a dummy load to the loudspeaker**

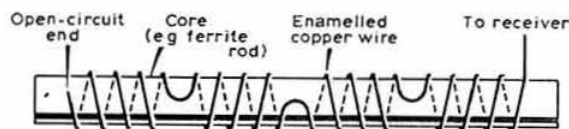


Fig 5. Basic design of the compact  $\frac{1}{4}$  vhf antenna developed at the Royal Military College of Science

bandwidth has been used for broadcast reception at 94MHz. In laboratory conditions with a large ground plane (eg vehicle roof) the gain of the RMCS antenna is markedly less than that of a whip antenna at the same frequency. However, in tests without the ground plane the performance of the compact antenna approaches that of a whip antenna except that it is less directional.

The performance, it is stated, is influenced both by wire geometry and the shape, size and material of the central rod.

The shortened helical-wound vhf/hf antenna is of course well-established but I have not previously seen reference to the idea of reversing the sense of the windings every few turns, and the idea might well prove worth investigating for amateur applications. The antenna is the subject of a patent application and the purpose of the NRDC information sheet was to bring it to the notice of manufacturers with a view to licensing agreements.

### Miniature mains power unit

It has been calculated that it is around 300 times cheaper to operate equipment from the mains supplies than from even the cheapest form of primary battery. It is therefore extremely useful in domestic situations to be able to substitute a miniature mains unit for a battery, particularly if the mains unit is small enough to fit into the battery space of the portable equipment. M. Faulkner in *Wireless World* (October 1977) provides circuit details (Fig 6) of a miniature switched-mode unit suitable for this type of application, providing 6V at up to 50mA and isolating the equipment from the mains connections. The voltage-dropping capacitor C1 together with the zener diode ZD1 and rectifying diode D1 provide about 15V across the smoothing capacitor C2. This powers the single transistor oscillator for the inverter working at about 13kHz. This frequency permits the use of a very small transformer using a pot core such as the Philips/Mullard P14/8 337. Wire size is given as 37 gauge and the primary windings are bifilar wound. Provided that TR1 and ZD1

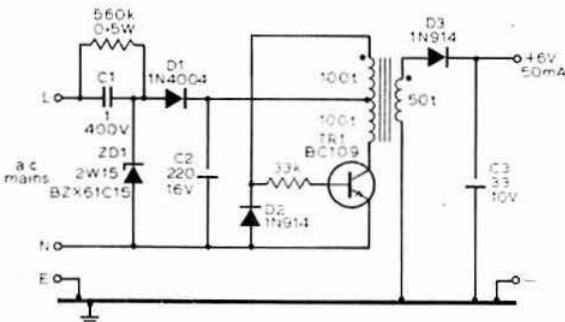


Fig 6. Miniature switched-mode power supply which can be made small enough to fit the battery compartment of portable equipment (*Wireless World*)

have sufficient heat-sinking, the unit should be able to withstand indefinitely open or short-circuit conditions. It would possibly be wise to check the insulation of the transformer windings before assembly. It is stated that the unit requires an earthed shield to reduce radiated switching noise, and we suspect that when used for a sensitive receiver it may be found necessary to add some additional rf filtering.

### Tape auto-keying

Since publication in the September *TT* of the high-sensitivity automatic keyer used by ON8FM, which requires an af input of only about 0.1V, I have heard from two old friends, both of whom do in fact use tape recorders for making automatic calls: Charles Bryant, GW3SB, and Roy Wilkins, G2ALM. Incidentally G4DUS found an error in the relay-driver transistor type number given by ON8FM. The 2N2631 is an npn device; this should be 2N1613 and the "50" capacitor is 50nF.

GW3SB was interested in the ON8FM circuit since he had used a comparable arrangement a few years ago. However, he experienced great difficulty in keeping rf out of the unit: as soon as the first symbol was transmitted there was sufficient rectified rf to keep the keying unit turned on. The use of rf chokes eventually overcame this particular problem although it was then found that it was not possible to key satisfactorily above about 20wpm, possibly due to the mechanical relay.

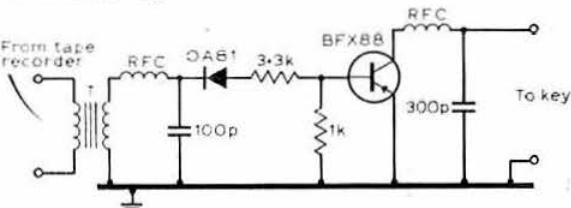
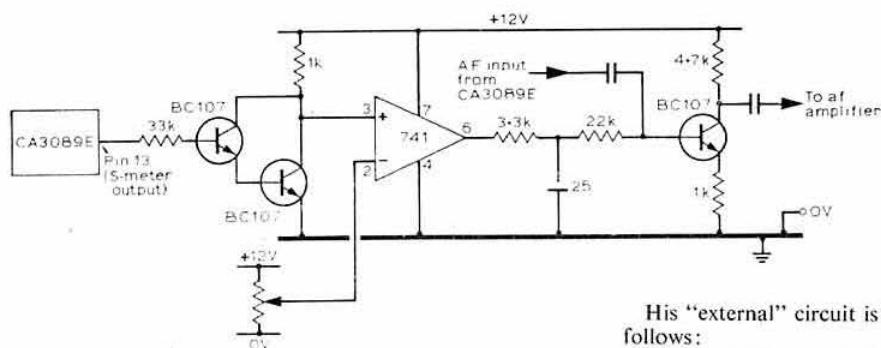


Fig 7. GW3SB's tape recorder auto-keyer is permanently connected across his morse key and needs no additional power supply

In the end he gave up using both the relay and the rather elaborate keyer in favour of the arrangement shown in Fig 7. T1 is an old loudspeaker transformer connected to provide an impedance step up, and the system is used with the grid-block keying of an HW101, using an old Civic tape recorder with the internal speaker silenced (the HW101 has its own side-tone). The unit is left permanently connected in parallel with the morse key. One advantage is that no power supply is needed for the keyer, although this might be lost with a small cassette recorder since an additional stage of amplification might be needed. While the BFX88 has proved a suitable transistor with the HW101, when using any other rig it would be advisable to check the voltage across the key with the key up, and the current flowing with the key down.

G2ALM is currently using cassette recorder auto-keying for fixed station and as part of a control system that helps him become one of the relatively few British amateurs using cw for hf mobile operation (and very effectively too as I discovered in recent contact with G2ALM/M on 3.5MHz). He also uses quite a simple transistor amplifier arrangement in conjunction with a sensitive reed relay, taking the af output from the loudspeaker socket of the recorder rather than the usual low-level socket. The whole system fits into a convenient control system with remote switching of the



recorder etc. At an early stage of development he ran into the unexpected problem that his reed relay was fast enough to follow the rectified af note, resulting in A2 mcw transmission. This was cured by connecting a suitably high-value capacitor across the reed relay winding.

**Thank you, Mr Morse**

In introducing the September *TT* notes on morse keys and keyers I was careful not to suggest to anyone that they should feel obliged to use cw, but only to emphasize that considerable pleasure can result from so doing. Alan Williams, G3KSU, adds some further ways in which cw adds to his enjoyment of the hobby. He writes:

"Although I am no expert, cw is a mode which gives me great pleasure. I can make contact (and even converse after a fashion) with people of all races—neither of us knowing the other's language—something quite impossible on phone. Not only that, but it is often *quicker*—just listen to someone trying to get a callsign over with a mouthful of phonetics!

"I do not know what communication advantage cw has over ssb, but I would think 20 to 30dB, taking into account the reduced bandwidth (say 100Hz), full 'modulation' (100 per cent compared with, say, 50 per cent allowing for heavy rf peak clipping) and the mode itself ('digital' versus 'analogue').

"Sufficient to say that I recently worked all USA call areas and 25 states in one week using just 2W input to a bent indoor ground-plane antenna on 21MHz cw. Not only does cw get through, but with power levels of this order *what is tvi?*"

Like many others, G3KSU has been suffering from that confounded Russian woodpecker and wonders if someone could come up with an *audio* add-on box which would kill the pulses? One can of course clip them very effectively with the unit shown in the November *TT* (Fig 4) but the duty cycle of the pulses after passing through selective filters is such that this does not really overcome the problem—and one would imagine that this would apply to most forms of noise blanking.

### Improving squelch with a CA3089E receiver

The CA3089E integrated circuit forms a popular "heart" for amateur fm receivers, and Mike Warrington, G4EMW, feels that other readers may be interested to learn how he achieved more effective squelching than proved possible using the in-built squelch facility of the device itself. With the ic alone he found the squelch action rather too like a volume control.

His "external" circuit is shown in Fig 9 and operates as follows:

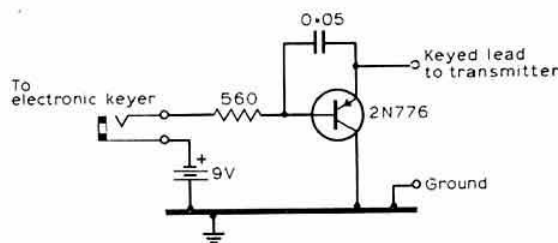
With a signal present the current output from pin 13 of the CA3089E causes the voltage at pin 3 of the 741 op-amp to fall below that at pin 2 (set by the squelch control potentiometer), causing the output of the 741 at pin 6 to fall to around 1.5V. In this condition the third transistor is normally biased and acts as a low gain (approximately five) af amplifier, allowing the af signal from the CA3089E to pass through to the main af amplifier.

With no signal present the current output from pin 13 falls, causing the voltage at pin 3 of the 741 to rise above that at pin 2. As a result the output voltage at pin 6 of the 741 rises to around 10V. As a result the third transistor is now saturated and the af signal from the CA3089E can no longer reach the main af amplifier.

The 25 $\mu$ F capacitor is included to prevent audio from being switched on and off rapidly by any noise spikes, etc.

## Up-rating an electronic keyer

A problem sometimes encountered when attempting to use a modern electronic keyer (or indeed a tape auto-keyer) with an older-style transmitter is that a relatively high current may need to be controlled. Mike Lonneke, W0AAD, in *QST* (August 1977) suggests the use of the simple transistor arrangement shown in Fig 8. This enables him to use an electronic keyer having a maximum handling capacity of 35mA to key his DX100. Battery drain is given as only 1mA.



## Tailpiece

A low-cost 1-500MHz double-balanced mixer package, type SBL1, has been introduced by Mini-Circuits Laboratory (UK agents Dale Electronics, Dale House, Wharf Road, Frimley Green, Camberley, Surrey). In quantity the USA price is only \$3.95 per unit in quantities of 10-49; \$2.95 in quantities of 500 or over.



# 4-2-70

Graham Knight, GM8FFX\*

## Beacons

The East German beacon DM0VHF on 144-990MHz in QTH locator FN28f is now running 10W output to a pair of big-wheel omni-directional antennas. The beaconkeeper is Rudolf Luebeck, DM2BGB, Obotritenring 123, 27 Schwerin DDR, who would appreciate any reception reports.

The Cyprus beacon 5B4CY on 144-139MHz has been heard in Greece, Malta and Sicily. F1 keying is used and a 40W transmitter feeds a six-over-six slot-fed Yagi firing north-west from a sea-coast site at Coral Bay on the western part of the island. The QTH locator for the beacon is QU12b and all reception reports will be acknowledged by a special QSL card. The beaconkeeper is 5B4AZ, Post Office Box 1267, Limassol, Cyprus.

The French beacon FX3VHF at Lannion on 50-100MHz uses 70W to a stack of two 5-el beams. All reports on reception of this beacon should go direct to F8SH, Serge Canivenc, 6 Rue Pont Hele, Kervolan, 22 Perros-Guirec, France. Costa Rica already has the TI2NA beacon on 50-080MHz and further 50MHz beacons are being planned by Jimmy Bruzon, ZB2BL, for Gibraltar, and by Jacky Bouvier, FY7AS, for French Guiana. FY7AS is already well known for his moonbounce achievements and his station is located at the French space centre at Kourou which is an ideal site for a further 50MHz beacon.

The Lerwick beacon, GB3LER, in QTH locator ZU65f, which only came back into service on 30 August, has already been heard in 11 countries. The two 8-el Yagis which fire the signals north-east and south simultaneously seem to be working well as many stations have sent reports of reception both by tropo and via the aurora. It is certainly proving to be an exceptionally good auroral indicator as the separate auroral report details in depth.

Mike Dormer, G3DAH, is the first British station to receive a special QSL card confirming reception of FX0THF, from beaconkeeper F2UP. The beacon is still on 144-741-MHz but is expected to move to 144-895MHz soon. FX0THF is a good indicator of 144MHz conditions to the south and it has recently been copied at S4 as far north as Cleveland.

The GB3NEE beacon on 144-130MHz is presently being used as the test bed for a new amplifier for GB3TW. G4BDE is building an rtty identification unit which will enable the beacon to be used by teleprinter enthusiasts. The existing frequency shift keyed callsign will be retained interspersed with the new rtty identification.

## Fast-scan television on 144MHz

At the recent Lancaster Convention Grant Dixon, G8CGK, gave a most impressive demonstration of transmitting television pictures on 144MHz. He showed his home-constructed digital converter which changes slow-scan signals back to 625 lines for display on a standard television set. The digital converter uses a multiplicity of integrated

circuits accommodated on plug-in panels to make up the necessary 64K memory. Grant's demonstration drew gasps of astonishment from the large audience when he switched in the converter and transformed what had been a small fading picture on a long persistence slow-scan monitor into an excellent-quality large-screen 625-line picture.

G8CGK played a recording of John Logie Baird's "phonovision" signal which occupied 10kHz on the medium wave, and compared this piece of television history with the sound of modern amateur slow-scan signals. He showed first-class pictures recorded during 144MHz contacts made from his home at Ross-on-Wye in Herefordshire with other television amateurs. The most outstanding pictures were those exchanged during a 144MHz QSO with FIBUU in Bordeaux.

Grant was recently invited to demonstrate his pictures at Lynx Electronics, where he impressed the professionals with the contacts recorded on his video tape recorder—a standard £16 Philips cassette!

## Malvern Hills to QSV

The GB3MH repeater which is located on the Malvern Hills, Worcestershire, has been operating on R7 since December 1974. The Mid-Severn Valley Repeater Group has requested a change of frequency to avoid co-channel interference with the Crystal Palace Repeater GB3LO and with the West Wales repeater GB3WW. The VHF Committee and its Repeater Working Group have agreed in principle to a change of frequency to R3.

GB3MS is the callsign assigned to the Mid-Severn Valley Group's new RB0 Phase 2 repeater which is located on the same 900ft asl site as GB3MH. Two uhf ground-plane antennas separated by 10ft are located just below the vhf repeater antenna. GB3MS is already proving popular with the locals and a scramble is now on for RB0 crystals.

## Repeater groups of the month

Last month 4-2-70 featured the UK FM Group Western which is responsible for a total of six repeaters. This month three smaller groups are featured, all of them licensed under Phase 2 and having their repeaters on the air.

On 13 October GB3SV on RB0 became the first of the new Phase 2 repeaters to become fully operational. It is located at Bishop's Stortford, serving the Stort Valley, and runs 25W erp from a vertically-polarized collinear antenna. The chairman of the group, G3DNQ, reports that G8JUQ, G3WMM and G3XSE are the operators mainly responsible for putting GB3SV on the air so promptly after the new licences were issued. The group is also extremely grateful to Jeremy Royle, G8ACN, of amateur television fame, for the supply of the American cavity filters. GB3SV has no time-out, uses IARU tone access and is available 24 hours a day. Many operators using the repeater are travelling on the M11 motorway which at present terminates at Bishop's Stortford. Soon the motorway will be extended to carry traffic from London to Cambridge, and a large increase in the usage of GB3SV is anticipated from motorists who will be passing through the Stort Valley and able to access the repeater for part of their journey.

The GB3LE RB4 repeater came on the air on 14 October and is located at Markfield, 12km west of Leicester. The use of a hexalator and eight cavity filters allows a single Jaybeam stacked-dipole antenna to be used for both transmission and

\* PO Box 49, Aberdeen AB9 8JA.

reception. The repeater antenna is 740ft asl and serves the community in Leicestershire; linking operators from Loughborough to Melton Mowbray with Leicester. GB3LE had a great deal of use at the end of October from amateurs visiting the Leicester exhibition. Visitors travelling home to the north from Leicester found that soon after leaving the GB3LE area they were able to work stations via the new Nottingham 432MHz repeater GB3NM. The chairman of the group is Jack Bennett, G3PVG; and the secretary is Geoff Dover, G4AFJ, who is willing to provide further information on GB3LE.

Nottingham repeater GB3NM on RB6 is located at Mapperly, three miles north-east of Nottingham's city centre, and was commissioned by a team comprising Ron Dawes, G3SEN; Doug Bell, G3RWP; Alan Jesson and another listener, Ken Abbott. GB3NM is on 24 hours a day and uses separate vertical dipole antennas for transmission and reception. An interesting feature is that afc has been incorporated into the repeater receiver; it is able to pull in signals which can be up to 5kHz off frequency and retransmit them without the usual resultant distortion. Mike Barker, G8CAC, of 21 Greenwood Avenue, Nottingham, is the secretary and contact man for this group which had more than 50 different stations using its repeater in the first week of operation.

### International VHF Convention 1978

The 1978 RSGB International VHF Convention will be a one-day event at the Winning Post Hotel, Whitton, Twickenham, on Saturday 25 February. A comprehensive programme of lectures is being arranged for the afternoon and these will take place in the Whitton School which is adjacent to the hotel.

A first-class trade exhibition of components and accessories will take place in the hotel—just the place to get that 4CX250B valve base or those elusive RB0 crystals. The emphasis of this event will be on home construction, and to this end there will be a special exhibition of homebrew vhf equipment. The convention organizer, Geoff Stone, G3FZL, says: "These displays have in the past shown some equipment of almost professional standards but this year we hope to include items made with the use of ordinary facilities. There is a need to show that the average amateur, with no special tools or test equipment, can produce home constructed vhf gear at a fraction of the cost of equivalent commercial items."

Informality will be the keynote of the evening entertainment, which will include a buffet meal and music provided by both a band and a disco. Prizes are already being donated for the evening raffle—the winner of the tv game should be kept off the vhf bands for at least a week. Some overseas visitors have already booked their travel tickets to attend what will truly be an International VHF Convention. Full details of the programme and ticket arrangements will be published in *Radio Communication* next month.

### Data on 144MHz

Peter Le Fevre, G8AWZ, is one of the ever-growing number of stations sending data on 144MHz. Using home-built equipment, he has already had contacts with eight German stations. The basic circuit is a message generating display kit as described in last year's *ETI Magazine*. Peter has modified the kit by adding a line cursor and doubling the lines from eight to 16. Line stepping has been incorporated so

### REAL DX 1977

70MHz  
144MHz  
432MHz

G3DAH—GM3ZBE  
GW4CQT—UW6MA  
GD8EX1—OE3HJW

670km  
3,100km  
1,560km

that writing is always done on the bottom line. The keyboard is a converted Honeywell unit and the complete project took three months to construct. G8AWZ is well sited on the coast of Norfolk and is QRV on 144-600MHz looking for more dx contacts.

Jack Pennell, G3EFP, in Pinner, joins the vhf operators mentioned in 4-2-70 in October who are using video display units in conjunction with 6-800 microprocessors. He recently received two programs for his microprocessor—they were sent to him by G3PLX in Hampshire on 144MHz. The transmission of the programs took just 45s at 110 bauds. The result was that G3EFP's microprocessor was instantly programmed to handle rtty, to send morse code on a keyboard, and to receive cw on the vdu. The two programs received off-air on 144MHz ran first time.

The transmission of data on vhf is attracting more and more attention. Will we all soon be exchanging programs instead of QSL cards?

### Auroral reports

This is the time of year for good auroral openings and there have certainly been plenty during the last few months. During September and October there were 13 auroral events logged at Aberdeen in a single 38-day period. For those who keep auroral calendars these events occurred on 11, 13, 19, 21, 22 and 26 September and on 4, 5, 8, 11, 14, 15, 18 and 19 October. Although it is not the rule that auroral events repeat, it is worthwhile keeping a calendar to indicate the possibility of a repeat after an approximate 27-day interval. This can vary by a day and is due to the sun's rotational period relative to the earth. As can be seen from the above dates, four of the October events are repeats of September auroral openings. By the time this is read there may well have been further repeats. To assist in the forecasting of auroral openings the GB2RS news bulletin frequently carries reports of solar flares and magnetic disturbances, and it also gives the dates of any auroral events which have taken place in the preceding seven days.

It is interesting to listen in Aberdeen to GB3LER on 144-965MHz, as it can be heard direct 24 hours a day. At this time of the year it is worthwhile leaving the beam slightly more to the north-east, at about 40°, as GB3LER is proving to be an exceptionally good auroral indicator. On some of the dates given above the only auroral signals to be heard were from the GB3LER beacon. On all 13 openings GB3LER was the first auroral signal to be heard at Aberdeen. If the event is a weak affair probably only GB3LER will be heard. Frequently its auroral appearance indicates that a major event is about to occur, and as the GB3LER signal gets stronger other beacons can soon be heard: SK4MPI on 144-960MHz is usually the next to go auroral. If the Swedish beacon gets above S4, DLOPR will also be heard via the aurora. These are the first three beacons to be

### STOP PRESS—NEW VHF MANAGER

At its meeting on 19 November, Council appointed Ian White, G3SEK, as the Society's vhf manager.

# RSGB REPEATER STATUS

| Callign | QTH                     | Channel | Status | Information | Callign | QTH                     | Channel | Status | Information |
|---------|-------------------------|---------|--------|-------------|---------|-------------------------|---------|--------|-------------|
| GB3AR   | North Wales             | R*      | P      | G3LEQ       | GB3MR   | Cheshire                | RB4     | O      | G3LEQ       |
| GB3AT   | North London            | R1      | LR     | G4DCP       | GB3MS   | Malvern Hills           | RB0     | O      | G2AFD       |
| GB3AV   | Aylesbury               | RB2     | L      | G4BKS       | GB3NA   | Barnsley                | R3      | O      | G3VQA       |
| GB3AW   | Ashmansworth, Berks     | RB10    | L      | G4EEE       | GB3NB   | Tacolneston, Norfolk    | R*      | P      | G8GTZ       |
| GB3BC   | Mid Glamorgan           | R6      | O      | GW3GHC      | GB3NC   | Cornwall                | R5      | O      | G3XC        |
| GB3BD   | Bedford                 | RB4     | O      | G8FMG       | GB3NH   | Northampton             | RB14    | L      | G8GHZ       |
| GB3BF   | Bedford                 | 23cms   | AP     | G8FMG       | GB3NI   | Northern Ireland        | R5      | AP     | G13TLT      |
| GB3BK   | Upper Basildon          | RB6     | O      | G4CCC       | GB3NK   | Chelsfield, Kent        | RB4     | O      | G8GGP       |
| GB3BM   | Birmingham              | R5      | O      | G8AMD       | GB3NR   | Nottingham              | RB6     | O      | G4AFJ       |
| GB3BN   | Bracknell               | RB0     | L      | G8JWD       | GB3NR   | Norwich                 | RB0     | AP     | G4ABB       |
| GB3BR   | Brighton                | RB6     | O      | G8HVV       | GB3NS   | Banstead, Surrey        | RB10    | O      | G8CUX       |
| GB3BS   | Bristol                 | RB10    | L      | G8BIR       | GB3NT   | Newcastle Upon Tyne     | RB0     | L      | G4DOB       |
| GB3CB   | West Midlands           | RB14    | O      | G8IMN       | GB3NX   | East Grinstead          | RB2     | L      | G8HVV       |
| GB3CE   | Wivenhoe, Essex         | RB14    | O      | G8GNF       | GB3OX   | Oxford                  | RB4     | L      | G4DED       |
| GB3CF   | Leicester               | R*      | LR     | G8CAC       | GB3PB   | Peterborough            | RB10    | L      | G8IXT       |
| GB3CH   | East Cornwall           | RB2     | L      | G8EWW       | GB3PF   | Lancashire              | RB6     | AP     | G4BLH       |
| GB3CI   | Corby, Northamptonshire | RB2     | O      | G8AMG       | GB3PH   | Portsmouth Hill, Hants  | RB2     | O      | G8GNB       |
| GB3CK   | Ashford, Kent           | RB0     | L      | G3XDY       | GB3PI   | Hertfordshire           | R6      | O      | G3ZY        |
| GB3CR   | Mold, Clwyd             | RB6     | O      | G3LEQ       | GB3PO   | Suffolk                 | R3      | O      | G3ZNU       |
| GB3CS   | Central Scotland        | R6      | O      | G3SNO       | GB3PR   | Perth                   | R*      | AP     | G4DQJ       |
| GB3CV   | Coventry                | SHF     | P      | G8IAM       | GB3PT   | Hertfordshire           | RTTY    | P      | G8MEI       |
| GB3DM   | Boston, Lincs           | RB*     | AP     | G3NNQ       | GB3PY   | Cambridge               | RB14    | O      | G8IGS       |
| GB3DT   | Wimbourne, Dorset       | RB0     | L      | G8AAY       | GB3RC   | (Portable emergency)    | R*      | P      | G8EIA       |
| GB3DY   | Derbyshire              | RB10    | O      | G3ZYC       | GB3RF   | Burnley                 | R7      | O      | G3RXH       |
| GB3ED   | Edinburgh               | RB14    | L      | G8ARV       | GB3RR   | (Emergency portable)    | R*      | AP     | G3WVXZ      |
| GB3EK   | Margate                 | RB2     | O      | G3XDY       | GB3SD   | Weymouth                | RB14    | O      | G3EGV       |
| GB3ER   | Exeter, Devon           | RB10    | O      | G4CUE       | GB3SE   | Caldbeck, Cumbria       | R*      | AP     | G3ART       |
| GB3EX   | Exeter, Devon           | RB0     | AP     | G8GRF       | GB3SF   | Sheffield University    | Linear  | P      | G3RKL       |
| GB3FC   | Lancashire              | RB2     | AP     | G4BLH       | GB3SN   | Hampshire               | R5      | O      | G8CKN       |
| GB3FR   | Lincolnshire            | R*      | P      | G3NNQ       | GB3SP   | Pembroke                | RB4     | L      | G4WCBR      |
| GB3GA   | Abingdon                | UHF     | P      | G4DPA       | GB3SR   | South Sussex            | R*      | AP     | G8HVV       |
| GB3GL   | Glasgow                 | RB14    | O      | G8HBU       | GB3ST   | Stoke-on-Trent          | RB2     | O      | G3LEQ       |
| GB3GN   | Aberdeen                | R7      | L      | G8HAT       | GB3SU   | Buxton                  | 10MHz   | P      | G3RKL       |
| GB3HH   | Buxton, Derbyshire      | R4      | L      | G3RKL       | GB3SV   | Bishop's Stortford      | RB0     | O      | G3DNO       |
| GB3HR   | Bushey Heath, Herts     | RB14    | O      | G8BBE       | GB3SY   | Barnsley                | RB6     | AP     | G3TPX       |
| GB3HS   | Lincolnshire            | R*      | P      | G3KOC       | GB3TV   | Luton                   | TV      | P      | G4ENS       |
| GB3HU   | Hull                    | RB10    | O      | G8IWA       | GB3TR   | Torquay                 | R4      | P      | G3UIQ       |
| GB3IH   | Ipswich                 | RB4     | O      | G8CJL       | GB3TS   | Middlesbrough           | RB14    | L      | G8DKU       |
| GB3KR   | Dover                   | R4      | O      | G3XDY       | GB3TW   | Tyne & Wear             | R5      | O      | G4DOB       |
| GB3KL   | King's Lynn, Norfolk    | RB4     | AP     | G4ABB       | GB3UL   | Northern Ireland        | RB2     | AP     | G13TLT      |
| GB3LE   | Leicester               | RB4     | O      | G8CAC       | GB3US   | Sheffield               | RB0     | L      | G3WXL       |
| GB3LH   | Shrewsbury              | RB4     | O      | G3UQH       | GB3VH   | Bath                    | 23cm    | AP     | G3VEH       |
| GB3LI   | Liverpool               | RB10    | O      | G3LEQ       | GB3WH   | Abingdon, Oxfordshire   | R*      | P      | G4DPA       |
| GB3LL   | North Wales             | RB4     | O      | G3LEQ       | GB3WS   | Sudbury, Suffolk        | RB6     | O      | G4FZZ       |
| GB3LO   | London                  | R7      | O      | G4EVA       | GB3WW   | West Wales              | R7      | O      | GW3VPL      |
| GB3LR   | North Wales             | 2.70    | P      | G3LEQ       | GB3WY   | West Yorkshire          | RB10    | L      | G3UGF       |
| GB3LT   | Luton                   | RB10    | O      | G4ENS       | GB3YL   | Great Yarmouth, Norfolk | RB14    | AP     | G4ABB       |
| GB3LV   | Hertfordshire           | RB2     | O      | G4DCP       | GB3YS   | Yeovil                  | RB2     | AP     | G8KME       |
| GB3LW   | Central London          | RB6     | O      | G8DVP       |         |                         |         |        |             |
| GB3MA   | Central Manchester      | RB4     | L      | G3LEQ       |         |                         |         |        |             |
| GB3MC   | Manchester              | 23cm    | P      | G3LEQ       |         |                         |         |        |             |
| GB3ME   | Rugby                   | RB6     | O      | G8DLX       |         |                         |         |        |             |
| GB3MF   | Manchester              | SHF     | TV     | G3LEQ       |         |                         |         |        |             |
| GB3MH   | Malvern Hills           | R7      | O      | G2AFD       |         |                         |         |        |             |
| GB3MK   | Milton Keynes           | RB0     | L      | G8IJS       |         |                         |         |        |             |
| GB3ML   | Blackhill               | RB10    | O      | G8HBU       |         |                         |         |        |             |
| GB3MP   | North Wales             | R6      | O      | G3LEQ       |         |                         |         |        |             |

AP—RSGB awaiting proposal.  
P—full proposal received.  
L—licensed but not yet operational.  
LR—licence refused by Home Office.  
TV—television proposal.  
O—fully operational.  
\*Channel number to be designated.

heard at Aberdeen, and if the event continues to build up GB3GI(144-137MHz), GB3DM(144-130MHz), GB3VHF(144-150MHz), OZ7IGY(144-930MHz) and LA4VHF(144-890MHz) will also put in an appearance in that order.

There has been speculation in the past as to whether the polarization of signals changed when returned from the auroral curtain. It has been noted at GM8FFX that horizontally-transmitted beacon signals are always received best on a horizontal antenna. Auroral notes can be heard best on the vertical signals transmitted by repeaters if received on a vertical beam antenna. At no time has any change of polarization been observed on any auroral signals.

During the weaker 144MHz events there was not much activity as only GM stations were able to work via the aurora. Slightly stronger events have had stations like GM8LHE, G18KIA and GW8CFQ all with S9a signals. Eric Price, G3KPU, in Doncaster, noticed GB3LER with an auroral note first and then went on to work GM8DMZ and GM8EYB, both of whom are in XP square. Derrick Dance, GM4CXP, near Peebles, was on cw for most of the events; he has now been in 42 auroras and worked 10 countries on the key in one October event alone. Dennis

Boniface, G4DSC, is another to make use of cw's undoubted advantage during auroral openings to work many LA stations, and SM0DJW in QTH square IS10d. EI9Q, Dick Madigan in Waterford, was a much sought after signal in the openings with many stations wanting to work square WM65d.

The best of the 13 events took place on 18 October; GM4DSZ first noticed the aurora at 2130gmt and Julian Broadhurst, G8LIC, reports it faded at 0216gmt. A very large number of European stations took part in this major event: Simon Freeman, G3LQR, in Suffolk, worked LA2PT, LA6HL and SM5FVH in QTH square IT25c; and LA6HL, G18KIA, LA2PT, GM4BYF and GM4CXP could all be heard working strings of stations on 144MHz during this event. The best dx was worked by George Szymanski, GM4COK, located in Edinburgh, using 100W of cw to a 14-el Parabeam 80ft above the ground. He worked SM5CPD (IT70h), SM3AKW(IW30e), SM3FGL(IV53g), SM5FVH, SM3COL(IW06f), SM5AGM(JT42j) and many Norwegian stations in QTH squares ET, FT, CS and CU; top of his dx list being OH3PF located north-east of Helsinki in QTH square LV39f.



## Tropo reports

Several excellent tropo openings occurred towards the end of October on 144MHz. John Barrett, G8NUV, in Sheffield, used 10W to a vertical dipole to work PE1AUX and DF2EX on fm. On ssb John Hays, G3BDQ, near Hastings, used an IC202 and a 6-40 amplifier to work nine East German stations, nine in Czechoslovakia, SP6FUN(1L53c), SP9KDE (JK55c) and OE2CAL/P. G3BDQ found conditions the best since 1958. Alistair Simpson, GM8NCM, in Kirkcaldy, used 10W from an FT221R to work 80 Continental stations, including DC0TP(FN05f), DC8BB(EL24c), DM2DTN (GK07c), and over 1,500km to OE3WBA/P3 in QTH locator HH25a. John Aitken, in the far north on Orkney, worked his share of the Continental dx; his best contact being OK1KEP near Prague.

During the openings on 432MHz John Quarmby, G3XDY, at Ipswich, worked DM2BCD(GM05g), DK5AJA(FL33b), OE3XUA(HH10b), SM0FFS(JT51f) and SK6AB in FR30c. John Tye, G4BYV, in Norfolk, worked DJ7FM/M (EI51b), SM5DWC at a distance of 1,250km, and heard SM1BSA in JR22e at 0930 on 18 October. Simon Freeman, G3LQR, spent some time on 432MHz before going to 1,296MHz and worked DM2AKL(GL), OE3XUA(HH), OK1AIY(P(HK)), OK1XW(P(HK)), and his first Polish station on the band—SP9FG in JJ square. On 26 October G8IXN, in Cornwall, worked SM7HAE in QTH locator GP56b.

Richard Baker, GD8EXI, contacted more than 40 Continental stations from his location at Port Erin(XO77h) including OE3HJW/3 in HH17f at a distance of 1,560km. This may be a new British record and it is certainly the best dx worked on 432MHz this year.

## The grapevine

UW6MA, located near the Black Sea, is looking for more meteor scatter skeds after his successful contact with GW4CQT ... G3NSM was back on the air again (after getting his latest book published) just in time to catch the big 432MHz openings ... Lots of interest at Leicester in Microwave Modules' solid-state 100W output 432MHz linear ... Several letters received from Class B operators who would like to be able to transmit a tone at the end of

A special meeting of the Leicester VHF Group was held on 21 October to celebrate Jack Hum's 50 years of amateur radio. The photographs, by Deryk Wills, G3XKX, show a general view of the gathering and Jack Hum with his wife, Grace. Jack is holding the certificate of the award which reads: "The Supreme Award to Jack Hum, G5UM, for his unique 50 years of service and dedication to the true spirit of amateur radio"

transmissions like many European countries allow ... There are thoughts of a vhf repeater for Fort William ... Edinburgh & DARC wonder if a 432MHz beacon in Edinburgh would be appreciated by the band of interest—contact GM8MJV ... The VHF Committee recommends 145-250 MHz for those sending slow morse on fm.

## Late news

A strong auroral event on 27 October was followed by three weaker events on 28, 29 and 30 October. SM7BAE heard an unidentified G3 station via moonbounce on 144MHz on 5 November—this was probably from the G3PIA group who were calling a K5 station who was Q5 in Oxford via eme. The antennas on FX3VHF, the 50.1 MHz beacon, have been changed to beam south and on 26 October signals were copied at G3DAO. On 27 October the 50MHz signals peaked to S6 at ZE2JV in Salisbury, Rhodesia. A Forestry Commission worker was convicted at Corven Magistrates Court for jamming GB3MP from Denbigh Moors in north Wales. Full details of all these items next month.

## Finally

One year has now passed since I started writing the 4-2-70 pages in *Radio Communication*. Special thanks are due to the correspondents who have written the 658 letters received during the last 12 months at PO Box 49 Aberdeen. It is impossible to acknowledge them all individually but their help in preparing the 4-2-70 pages is greatly appreciated. □





# microwaves

Dain Evans, G3RPE \*

## OTS

The latest news on the future of this satellite is that the replacement is now due to be launched in April. As noted earlier, this geostationary satellite is expected to provide a useful permanent beacon on a frequency close enough to 10GHz to be useful for aligning equipment, as well as for propagation studies.

## Local disaster

Nearer home, G3WDG had a fire in his /A station in Bristol and lost all his 10GHz equipment except for a large dish, a klystron and the odd flange. The most grievous loss was that of a complete twt amplifier which was destined to boost the beacon GB3IOW, and this comes at a time when these devices are proving so useful, as is noted below. He also lost his 144 and 432MHz equipment as well as car batteries and an EC10 receiver. A few days after the event, he moved his /A QTH to Oxford—a coincidence, not a consequence.

## Operating news

Harold Meerza, BRS34348, (Chatham) provides some interesting observations on a rather unusual opening on 1,296-MHz on 11 September. While propagation conditions are often good to the east, it is rare for them to be good to the west at the same time. However, on that day he copied G3AUS in Devon, G8ACE in Winchester, G6XM in Wiltshire and PA0EZ, all at S9. His best dx was PE0MVJ (DM62f) who was S5 when working G3JXN. GB3AND, rarely heard, was S2-3 on that day. He also reports that on 19 September GB3DD increased in strength from its usual just above the noise to S6 for an hour, and could be heard on any beam heading or with the psu to the preamplifier switched off. His receiver uses a DJ1EE preamplifier feeding a G3WDG/G3LTF interdigital filter on the input of a Microwave Modules converter, with the antenna a G3JVL loop-Yagi.

During the period 14-18 October dx was also available, and G4BYV passes on the information that some of the dx G3LQR worked was QN5GF (CK), DL7YCA (GM), DK2UO (DL), DF1EQ (DL), DJ3ZU (DL), DC6BUA (EK), DC6SJ/P, (EK) and DC7HM (GM). G3LQR was also heard by SM0DFP (ET). His best dx was a contact with OK1KIR/P in GK on 16 October, which must be something of a first. The distance involved must be in the region of 1,000km. G4BYV himself worked ON5GF (CK), DJ6MB (DK), DJ5BV (DK), DC3QS (DM), DC8BB (EM), DF8QK (DM), DK0SF (FL) and DC6MV (DK), which is a most respectable score by any account.

G8ARH (Surrey) says that he, G8BCO and G4DDK are all building narrow-band equipment for 5-7GHz. This should

provide a useful stimulus to activity on this band. He is also building ssb transverters for 1-3 and 2-3GHz.

D. Williams, G3JAG, writes that he is now operational on 10GHz with a Gunn oscillator transmitter, a receiver also using a Gunn oscillator and built around a directional coupler, and an 18in dish as antenna. He has a good portable site which is line-of-sight from Cumbria to N Wales and the Isle of Man, and also good to the south-east, and he is interested in making contacts. His address is: 30 Skelgate, Dalton-in-Furness, Cumbria LA15 8BD.

G3JVL (Hayling Is) reports more results at home using the flyswatter (periscope) antenna, the general design of which was described in the August *Radio Communication*. He uses a reflector 31 by 45in made from 24g perforated mild-steel sheet. This is mounted 35ft agl with the feed (a dish 17in diameter) set 16ft below. Using the data given in the article, the overall gain of the system should be a most respectable 32dB, and this is equivalent in gain to a dish 2ft in diameter with zero feeder loss. The best dx so far? With a narrow-band 6W transmitter, a 132km contact over the very non-optical path from Hayling Is (3m asl) to G3WDG in Bristol—immediately before the fire. The s:n ratio was about 10dB in a 2kHz bandwidth, which implies that in principle a much smaller transmitter could have been used.

What appears to be a record contact for New Zealand took place on 17 July over a 58km path between Cape Rodney, North Auckland, to One Tree Hill which is in the centre of Auckland. ZL1BPW, ZL1TFS, ZL1TKZ and ZL1TUV were the stations involved.

I4BER recently had his first super-refraction contact over a 113km path. This is perhaps the start of an effort which could produce some remarkable dx—conditions in the Mediterranean should be ideal for this mode of propagation. He also reports that the current Italian record now is 280km. This was set by I4CHY/6 and I4TTZ/6 at one end, and I4BTU/3 at the other, over a presumably optical path between sites 1,700m asl. Their equipment used Gunn oscillators with horns as the antenna—and it was raining.

These new records provide an excuse to attempt to make for the first time a table of national records at this frequency. These are obviously incomplete and probably inaccurate, but nevertheless seem worth airing.

|             |       |                |       |
|-------------|-------|----------------|-------|
| UK          | 521km | Czechoslovakia | 210km |
| USA         | 426   | France         | 184   |
| Holland     | 306   | Australia      | 150   |
| Italy       | 280   | Belgium        | 90    |
| Switzerland | 230   | New Zealand    | 58    |

G4DDK (Staffs) has sent in a list (and a map) of the 10GHz contacts he has made this year, mostly during the cumulative contests. Of the 21 contacts recorded, the average length is 82km, seven exceeded 100km, and two exceeded the Microwave Award distance of 150km. A remarkable feature of these efforts is that the contacts were made entirely over land paths, mainly along the Wales/England border. The cumulative contests generated much activity which is currently being summarized.

W1CF of Microwave Associates reports that so far over 500 "Gunnplexers" have been sold in 20 countries, which one would hope implies a fair amount of 10GHz activity. Data on both speech and tv circuitry for use with these devices will be passed on when it becomes available in the near future. A version of the "Rocloc" stabilizing system which was first applied to klystrons has also been developed. □

\* 4 Upper Sales, Chaulden, Hemel Hempstead, Herts HP1 2AJ.

# The vhf man's left hand

by JACK HUM, G5UM\*

UNQUESTIONABLY the most important document in the radio amateur's station is THE LICENCE. Next in importance comes THE LOG. Each deserves the distinction of the capital letters.

Third in importance is THE CALL BOOK, the vhf man's left hand (his right hand holds microphone, morse key or pen for making that "... indelible entry ... at the time of sending or receiving"). Yet it is a strange circumstance that a substantial number of vhf people have not yet come to realize the very practical value which THE CALL BOOK holds for him (and her) more than for any other category of operator.

This fact was recognized when the first edition of the *RSGB Amateur Radio Call Book* was published all those years ago in the autumn of 1951 (its cover price 3s 6d!). The foreword emphasized that "... the Council of the Radio Society of Great Britain hope that it will meet a real need especially among VHF workers (the author's italics, but their capital letters for very high frequency!) and others who regularly make inter-British Isles contacts".

The statement is as true today as it was 26 years ago. Without the *Call Book* the vhf/uhf operator cannot know whether a weak signal just audible above the noise is a distant one within his beam lobe or a nearer one sitting in a null. A quick look at the *Call Book* will tell him whether and where to turn the antenna. If he is one of the increasing number using non-directional (generally vertical) antennas, identification of the position of a distant station will tell him if the other man is likely to be workable with the erp available.

There is one reservation to be made to the above observations: between one edition of the *Call Book* and the next an increasing number of new licensees inevitably becomes "ex-directory" as the year progresses. The need always to announce one's location if one is not QTHR ("My QTH is correct in the current *RSGB Call Book*") should be self-evident: the other man listening then has the needed information to tell him where to direct his beam. Anyway, it is common courtesy always to state one's location during the course of a CQ call and at intervals when a contact has been set up. There is always the chance that the other man may not have the *Call Book* at his left hand!

Three documents, then, should be present at all times at the vhf user's operating position: the log, the *Call Book*, and a simple index from which previous QSO information may be retrieved. All three documents should be kept together during active operating sessions: the value of all of them is reduced by the absence of any one of them.

By way of a final nostalgic flashback it might be mentioned that the first (1951) edition of the *RSGB Amateur Radio Call Book* carried 40 pages of callsigns, that the "3H -" block had just been completed, and that the Class B licence was still more than a dozen years away. By 1972 the publication had increased in size to the extent that square-back binding became necessary, and by 1977 there were no fewer

than 164 pages of callsigns, of which some 40 were Class B vhf-only. Any member who holds a complete set of all the *Call Books* from then until now has a concise history of the development of amateur radio in these islands.

And what of 1978? See for yourself when you get your copy of the latest edition of the *RSGB Amateur Radio Call Book*. If you are not in it, remember always to identify yourself when you are on the air! □

## oscar news

### Schedule changes for Oscar 7

With effect from 1 January 1978 the spacecraft will be commanded to two days on Mode B followed by one day on Mode A; 1 and 2 January will be Mode B, with 3 January on Mode A and so on. If through the use of high power, or other cause, the transponder changes modes it will not be recommended on that day. It is understood that the W6PAJ orbital calendars will show the revised schedule which is intended to ensure long life for Oscar 7.

### Satellite band plan

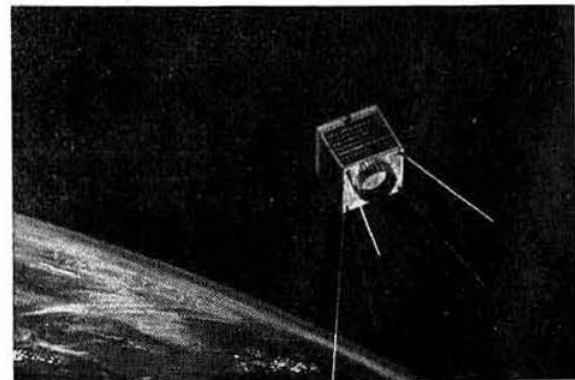
Also effective 1 January 1978 is a new simplified band plan intended to apply to all present and future spacecraft, ie Oscar 7, A-O-D and the Soviet RS series. The downlink passband will be divided into three areas—the lowest frequency third will be for cw stations, the centre third for mixed-mode operation and highest third for ssb stations. This pattern conforms to terrestrial usage of amateur bands and is simple to follow.

### Soviet RS series

Latest information indicates that the first satellite is now unlikely to be launched before 1978. Directly the orbital parameters have been confirmed, predictions and revised Oscalator tracks will be available.

### AMSAT-UK

Enquiries regarding membership of AMSAT-UK should be sent to G4EZN, QTHR, enclosing an sase. □



Artist's impression of A-O-D in orbit

\*27 Ingarsby Lane, Houghton on the Hill, Leicester LE7 9JJ.

# swl news

Bob Treacher, BRS32525 \*

## RSGB 7 and 21/28MHz contests

The improvement in conditions should obviously have increased swl participation in both these events. In the 7MHz phone contest there seemed to be slightly more G participation, and indeed the number of European stations willing to swap numbers certainly increased. Conditions during the 24-hour contest were good, with ample dx signals on the band after midnight for those taking part seriously. Several Gs had a great deal of pleasure working into Central and South America with apparent ease. Many, however, seemed to prefer their beds to 7MHz dxing, and G activity through the night was poor. During the Sunday morning everyone seemed to find it hard going, with very few new stations being noted. This contest, from a listener's point of view, is an ideal way of collecting those rare 7MHz dx countries, and it also provides the opportunity to log the majority of the European continent.

The 21/28MHz phone contest on the previous weekend was highlighted by superb conditions on 21MHz to both the USA and Japan. Every call area of both these countries was audible at the writer's QTH. By comparison, 28MHz was disappointing; the day before the contest the band was wide open to the Far East but, alas, conditions just did not prevail long enough. However, W6s and W7s were audible on 28MHz at around 1540 to provide several useful multipliers. If you missed this year's events, why not make a resolution to "have a go" next year?

## QSL Bureau

After many years service to swls and transmitting amateurs alike, Arthur Milne, G2MI, has retired from his job as QSL Bureau manager. On behalf of all listeners who have sent Arthur cards to despatch to foreign parts, I would like to send him a very big "thank you". Mr E. G. Allen, G3DRN, has now taken on the job, so all outgoing cards should be sent to him at 30 Bodnant Gardens, London SW20 0UD.

Our QSL sub-manager, Dave Borne, G4CYW, has asked me to pass his 73 to everyone for Christmas and the festive season. He hopes everyone is pleased with the service he provides, and he is always pleased to hear from any of his "clients", pointing out that most people are just numbers to him.

## The mailbox

Neville Spry, BRS17567, has been right back through his logs to the early 'fifties and has updated his all-time list with dramatic results, as will be seen when the list is next published. Neville's QSL return is now 305 out of 317, helped by recent confirmation from Palmyra and Kingman Reef. ZL1AA/K on Kermadec Is has been heard on 14MHz operating split frequency. The 28MHz band was in exceptional shape during October, with some very good openings

\* 392 Rochester Way, Eltham, London SE9 6LH.

RADIO COMMUNICATION December 1977

## 1977 HF Countries Table

| Station  | 10  | 15  | 20  | 40  | 80  | 160 | Total | Mode   |
|----------|-----|-----|-----|-----|-----|-----|-------|--------|
| BRS35608 | 103 | 165 | 187 | 160 | 102 | 36  | 753   | sw     |
| BRS17567 | 102 | 181 | 236 | 71  | 119 | 5   | 714   | ssb    |
| BRS38876 | 54  | 133 | 174 | 100 | 115 | 41  | 617   | ssb/cw |
| BRS35454 | 91  | 146 | 201 | 66  | 95  | 17  | 616   | ssb/cw |
| BRS32286 | 84  | 146 | 173 | 57  | 110 | 4   | 574   | ssb    |
| BRS35943 | 63  | 129 | 188 | 77  | 101 | 10  | 568   | ssb    |
| A8841    | 68  | 145 | 219 | 48  | 69  | 0   | 549   | ssb/cw |
| ARS37223 | 5   | 140 | 163 | 57  | 83  | 15  | 463   | ssb    |
| BRS38356 | 67  | 128 | 153 | 44  | 69  | 0   | 461   | ssb    |
| BRS25901 | 33  | 84  | 173 | 66  | 76  | 13  | 445   | ssb    |
| A9191    | 39  | 112 | 156 | 32  | 50  | 0   | 389   | ssb/cw |
| ARS39015 | 43  | 121 | 135 | 40  | 46  | 2   | 387   | ssb/cw |
| BRS37583 | 31  | 76  | 108 | 43  | 53  | 4   | 315   | ssb    |
| BRS37782 | 38  | 79  | 109 | 26  | 52  | 5   | 309   | ssb    |
| BRS37884 | 24  | 46  | 76  | 36  | 70  | 2   | 254   | ssb    |
| A9107    | 21  | 40  | 109 | 13  | 30  | 1   | 214   | ssb    |
| ARS37790 | 0   | 46  | 84  | 26  | 24  | 2   | 182   | ssb    |
| ARS38280 | 19  | 48  | 65  | 16  | 25  | 1   | 175   | ssb    |
| A8837    | 24  | 43  | 74  | 17  | 11  | 0   | 169   | ssb    |
| BRS20185 | 12  | 50  | 78  | 11  | 9   | 0   | 160   | ssb    |
| BRS36910 | 20  | 40  | 76  | 3   | 5   | 3   | 150   | ssb    |
| A9199    | 21  | 41  | 47  | 17  | 11  | 2   | 139   | ssb    |
| BRS37587 | 2   | 16  | 32  | 23  | 55  | 4   | 132   | ssb    |
| BRS38934 | 17  | 15  | 38  | 11  | 24  | 1   | 106   | ssb    |
| A9098    | 5   | 11  | 48  | 14  | 20  | 3   | 101   | ssb    |
| BRS38940 | 2   | 13  | 69  | 2   | 2   | 1   | 89    | ssb    |

to W6/7 and the Far East. Some of the countries reported on the band include: 8P6, HI, FM7, KZ5, A2, 9Y4, A4, YK, KG6, VS6 and CR9.

Dave Sharred, ex A8312 and BRS38876, will obviously be reporting to *Month on the Air* instead of this page, but after he has completed his time at Manchester Polytechnic. Deryk, G3XKX, reports that the late G3NKC was Dave's uncle. After G3NKC's death Deryk urged Dave to re-activate the call when he obtained his ticket.

Crosbie Rodgers, BRS32286, tells us that the Dumfries & Galloway ARC is one year old now and has 28 regular members plus a few who drop in to club meetings from outlying districts. Crosbie, as secretary of the club, has arranged frequent visits to the Maryport and Carlisle clubs.

Robert Maskill, BRS35454, comments on improved hf conditions, and his main aim during the winter is to improve his all-time figures on 7MHz. It can be a very worthwhile band with much dx to be heard if your shack has a decent amateur bands receiver. Robert suggests that "Equipment used" should be added to the countries table so that those chasing the leaders can see what they are up against. I do not think we have the space at the moment but perhaps we can include this type of information in the 1978 table.

Robert Small, A8841, reports receiving the JY1 QSL card stemming from his father's QSO. Robert has been very active and has provided a list of exotic Pacific dx heard on 14MHz; with sunspots improving the hf bands, conditions will now be much better than this time last year—or that is the theory anyway!

Two new correspondents this time—John Holmes, BRS38934, who has an FRG7, and John Wilkinson, BRS-39015, who owns an Eddystone 740. Both put first-time entries into the countries list. Letters are acknowledged from A9107 and BRSs37583, 36910, 37782 and 38280.

## Increased space

Following the decision to increase the size of *Radio Communication* by 16 pages in alternate issues, an additional six pages per year have been allocated to *SWL news*. This means a whole page every month in future, and news, comment and table-scores for the February issues should reach your scribe by 30 December. □

# the month on the air

John Allaway, G3FKM\*

THIS month's *MOTA* is the first for many years that does not show the address of the Society's QSL Bureau as "via G2MI...etc." After nearly 40 years, during which millions of QSLs have passed through his hands, Arthur Milne has decided that it is time to begin the slow process of passing along the task to a successor. Mere statistics of the G2MI efforts would be most impressive, but surely the most impressive of all is that there is probably no amateur in the British Isles who has never received a card sorted by Arthur! As one who has received more than his fair share this way, G3FKM would like to say a very sincere "thank you" on behalf of all British amateurs for a job incredibly well done. May G2MI continue to have many more years of happiness collecting his own cards via G3DRN!

Christmas and the New Year is once again imminent and your scribe would like to wish all readers a very happy and peaceful festive season and a successful New Year, at the same time saying "thank you" for all their support during 1977.

## News from overseas

Bob and Christine Halsey, G8JMC and G8MUM, are now in Iran and have the callsigns EP2PI and EP2PY respectively. They operate on 14 and 21MHz, mostly between 1400 and 1600, and will be active using rtty when a printer can be obtained. Bob points out that the Iranian QSL bureau has closed down as the APO number in New York is no longer available; as a result, cards being sent via the bureau are being returned to their senders. Other active expatriate British EP2s are Alex, EP2IK (GW3IRK); Gary, EP2GL (G3FBB); Brian, EP2MZ (G8KFR); Alfred, EP2TW (G3PGG); and Max, G4ALX, who is in the process of getting a licence.

In a most interesting letter to your scribe, Sanna Keita, ORS39103, writes from Banjul in Gambia to say that he expects to receive his C5 licence in the near future. He is looking forward to the formation of a Gambian radio society. Nic Smit, ORS37627, who lives in Amsterdam, has now become PA3ACL and hopes to be heard on the hf bands in the New Year.

Bob Weston, G8BXU, has written to say that he was ZD8RW between 13 July 1972 and 16 December 1976. Since then the call has been re-issued to an American on the island. Bob's wife Anne also held the call ZD8AW, and QSLs for contacts with either can be supplied—either via the bureau or direct to the address in "QTH Corner".

Robin Francis, G3RWU/VP5TI/VP5RF, is now resident in Moroni, Republic of Comoro. He will be there for two years and hopes to obtain a D6 call which he intends to use on all bands 1.8 to 28MHz. His address is BP 15, Moroni, Grand Comori, Republique de Comoro.

Sanna Keita, ORS39103,  
of Gambia



## DX news

Stations in Portugal are being allowed to use CT50 prefixes until the end of the year. This is to celebrate the 50th anniversary of Rede dos Emissores Portugueses and it seems that

they use the 50 in addition to their normal number—eg CT50/1AA.

New licensees in Japan are now being allocated JK prefixes in some areas.

There seems to be considerable activity from the VP8 area just now. There is a net of VP8 stations which is often to be found on 14,120kHz at 2000. Those looking for a contact with S Orkney might like to know that a list of those wanting to contact VP8PL is sometimes taken by GM3ITN between 1700 and 1800 on 14,197kHz. This is then passed to VP8PL at about 1900 on 14,127-14,130kHz. VP8PL has also been heard and worked on 21,160kHz at 1900.

Jim Smith, P29JS, operates from 0600 to 0800 and again from 1200 to 1400. His frequencies are given as 3,502/5, 7,002/5, 14,002/5, 21,002/5, 7,085, 14,195 and 21,300kHz, but he has also been worked on 28MHz during recent openings. He hopes to visit the Solomon Is.

Two Japanese amateurs working at a television station in Uganda have applied for 5X5 licences. TR8MFB and TR8-UCV are currently active from Gabon—the former works for Gulf Oil and is mostly to be found at weekends on 14MHz ssb. The latter is also on at weekends, seeming to favour the period 1000 to 1500, and he also likes 28MHz.

Henri, F6EAY (ex-FL8BH), should be on Crozet Is by now and may operate from FB8WE from 1 January. Following this he may go on to the other French Indian Ocean territories FB8X and FB8Z. W4LZZ will probably act as his QSL manager.

A South African radio operator should have arrived on Tristan da Cunha in early November, together with the first batch of civilians going back to the island following the volcanic activity of a few years ago. He will keep schedules with S African stations and also ZS2MI.

Not much activity is heard from Malagasy at the present time, but 5R8AL is reported to be found fairly regularly on Tuesdays and Wednesdays between 1600 and 1700 in the 14,105-14,120kHz slot.

JTOJDT is a new station in Mongolia. He is running 50W to a Windom antenna but hopes to have a 2-el quad. He has been heard after 0400 on 14,215kHz.

WA4WTG recently visited a fellow amateur and discovered thousands of QSL cards destined for TT8AC, SV0DB and SV0WT, and going back to 1974, which had not been answered! He is trying to clear the backlog. W1YY (Jim Simon, 2463 Stone Drive, Ann Arbor, Mich, 48105, USA) has received no logs from FM7AQ for more than a



year. He does, however, have logs for TU2DQ contacts from 1971 to 1973, and for FL8DS for 12 July 1972 only. WA4-WTG has logs for FY7AE/TJ1BF (for 1972 only), 4X4NJ, 4X4UF, 4X4VB, 4Z4DX, 8P6AH, 8P6BN, 8P6CP, 8P0A and VP2LJ.

VP8OA now QSLs via G4FIY (see "QTH Corner") as do VP9IR, ZB2DN and ZD8RR. N0RR (formerly WB6-LTJ) assumed the duties of QSL manager for AP5HQ from 17 October—he also has QSLs for past FK0DX, FW0AA, and FW0DX contacts.

Harald Lofhede, SM6CSB, will be in Equatorial Guinea until the end of the year. He is working on an ITU contract and has applied for a 3C licence. His equipment will only operate in the transceive mode, but if he does get permission to use it he has plans to obtain more gear.

SM0AGD made over 2,500 QSOs from Bangladesh before moving on to Pakistan. He will go on from there to several locations in the Middle East, and he may appear on the air from some of them during the next few weeks.

F6BBJ has told G3RCA that he will visit FR7/G, FH0BKZ, etc, starting this month. He will not be going to Clipperton Is as previously rumoured. The new crew for FB8W was due to leave on 15 November—current FB8WE activity is very erratic and when they arrive there should be a considerable improvement. G3RCA also says that P29JS reports that Kazu, ex-ZK2AR/A35AF, has serious domestic problems and is not QSLing. Jim is trying to get JA1KSO to take over the task, and cards for his own visit to VR4 (see earlier paragraph) will be dealt with by F6CYL. The holder of the re-issued VK9NI call will be on Norfolk Is for two years.

The address given for C5AR in the *Call Book* is incorrect—please QSL only via G3LQP. He will be back in the UK at Christmas.

## Dxpeditons

VE3FXT was expected to be G3WNE early in November, and then to operate from 4U1UT for a few days before going on to 7P8BE where he expected to be on the air from 18 November to 1 December. As already mentioned in a previous *MOTA*, he should then be ready to open up from the new Bantustan homeland called Bophuthatswana on 6 December. This operation should be assisted by up to 12 other operators and it will be for 24 hours daily on all bands 1.8 to 28MHz. An attempt will be made to go on the air from Malawi around Christmas as 7Q7PV.

Meredith and Ted Henry returned to Los Angeles in mid-October. Their round-the-world trip had given them great pleasure and they made 6,200 contacts from their stops at KC6/DX1TH, 9M8TH, HS1WR, S88TH and EA7VU/EA9—most were made from S88TH (3,200 on 14, 21 and 28MHz). QSLs should start to go out in November.

Jacky, 3B8DA, hopes to go to Rodriguez Is as 3B9DA this month. This time he should have a beam with him.

In the item last month on "GM3WBB's tour, the call-sign should have read GM3WBZ.

## Welcome

The following overseas amateurs joined the Society during October: F5JX, LA7DU, OZ1DJF, PA0VVH, SM4IJM, VK4AAB, VK4ZEM, VK7NGH, WB2KTM, WA6OZF, K7RVS, ZS6ASO and 7X4MD.



Neville Jackson, G3IAD

## SSTV

Congratulations to Neville Jackson, G3IAD, who has been issued with the first European CQ DX Award on two-way sstv. He now has a double first—he received the first British SSTV WAS in December 1975. The latter was number 18. G3IAD has been on sstv for three-and-a-half-years and has a rotary V-shaped dipole at 40ft. The first station in the world to obtain the CQ DX Award for 100 countries was W8YEK—Neville's is number two.

## Top band news

G3YMC reports that there were several openings into New Zealand during the first two weeks in October at our sunrise time. Contact was made with ZL3GQ on the 4th, and G3CW1 also worked ZL3GQ on the 9th. A rather dubious ZL3NC was around on the 24th, but his signal strength at a time before the true peak of conditions caused raised eyebrows. G3CW1's contact was RST579 both ways, and G3YMC's RST 459 out/559 in. The annual tests to Japan started during November and a very weak JA3ONB may have been heard on 3 November. Japanese amateurs use 1,907.5 to 1,912.5kHz—an area very prone to interference from local UK phone. It would be very much appreciated if band users could try to avoid these frequencies between 2100 and 2215 until mid-January—and also to believe that there *could* be JAs around when asked to QSY!

## KM1CC

During the week of 14 to 22 January 1978 a special station using the callsign KM1CC will be on the air from Cape Cod, Mass, celebrating the 75th anniversary of the first two-way radio-telegraphic transmission between the USA and Europe by Guglielmo Marconi in 1903. It will operate from the original Marconi station location in South Wellfleet, and will be sponsored by the Barnstable Radio Club of Cape Cod. Operation will be on 1.8 to 28MHz using cw, ssb, rtty and sstv. A 144MHz fm and 70MHz ssb station will also be on the air. The FCC has given special permission for the use of A2 transmissions on all bands and the famous sound of the 240Hz Marconi rotary spark gap 1903 station will be reproduced for cw contacts. QSLs should be sent to the address in "QTH Corner".

## QTH CORNER

**CW9A** via RCU QSL Bureau, Box 37, Montevideo, Uruguay.  
**EP2PI** R. Halsey, 16 Normanton Way, Histon, Cambs (or via RSGB).  
**EP2PY** Mrs. C. Halsey, 16 Normanton Way, Histon, Cambs, (or via RSGB).  
**GJSCCX** DK6AS, A. Soechting, August-Bierweg 1, D-3180, Wolfsburg, W Germany.  
**GJSCCE** DK6AJ, J. Duske, Finkenweg 1, D-3180, Wolfsburg-Wendisch, W Germany.  
**HH5HR** (Phone QSOs) K4UTE, 8201 Cassie Rd, Jacksonville, Fla, 32221, USA.  
**HH5RB** (CW QSOs) W4ORT, 1045 Le Brun Drive, Jacksonville, Fla, 32205, USA.  
**HH5TW** R. Bostick, US Embassy, Bangkok, APO, San Francisco, Cal, 96346, USA.  
**HSIALC** HB9AZW, P. Jung, Kapfenbühlweg 14, CH-8049 Zurich, Switzerland.  
**HSIALD** ARI QSL Bureau, Via Scarlatti 31, I-20124 Milano, Italy.  
**IK50ARI** W1GAY, Duncan Kreamer, Main St, Vineyard Haven, Mass, 02568, USA.  
**KM1CC** W6SP, J. W. Browning, 25 Parsons Lane, Los Altos, Cal, 94022, USA.  
**S79S** Box 491, Mahe, Seychelles.  
**S79WHW** WB4IWW, D. McCluskey, 604 19th Court South, Birmingham, Ala, 35205, USA.  
**TR8UCV** BP 4110, Libreville, Gabon.  
**VP8OA** G4FIY, R. Rafferty, 6 The Grove, Blythe Bridge, Stoke-on-Trent, Staffs.  
**XF4JJ** XE1VW, J. Ramirez, Saratoga 375, Col. Hipodromo, Miguel Hidalgo, Mexico 10, DF, Mexico.  
**YJ8KC** ZL1BAB, W. G. Cooper, 41-A Kelvin Rd, Papakura, New Zealand.  
**ex-ZD8RW** R. Weston, 52 Fishweir Fields, Bradpole, Dorset DT63HF.  
**ZL1AA/K** ZL1BKL, Mrs M. Lister, PO Box 230508, Hunters Corner, Papatoetoe, New Zealand.  
**ZL1YL/K** A. F. Cresswell, ZK1DR, PO Box 127, Rarotonga, Cook Is.  
**ex-ZL5AC**

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

## Contests

### The ARRL 28MHz Contest

1200 10 December to 2359 11 December.

Stations in the 50 US states and Canada send RS/T and their state or province. Others send RS/T and a serial contact number starting from 001. Stations not land based send their ITU region. Each completed contact is worth two points; four if with a USA novice or technician. The multiplier is determined by the US states, Canadian provinces, DXCC countries and ITU zones (for non-land based stations only) worked. Note that W and VE do not count separately as countries. It is suggested that 28,000 to 28,100kHz and 28,500 to 28,600kHz be used for cw and ssb respectively, and that novices and a.m. stations should be sought in the 28,100 to 28,150kHz and 28,800 to 29,000kHz sections respectively. Contacts via Oscar are permitted. Certificates will be awarded to the highest scoring single operator in each DXCC country—multi-operator awards will be made if there are three or more entries from a country. Note that the same station may be worked on both cw and phone, but that cross-band contacts are not allowed. Logs should be posted before 19 January to ARRL Communications Dept, 10 Meter Contest, 225 Main St, Newington, Conn, 06111, USA.

### The Spanish DX Contest

2000 3 December to 2000 4 December (Phone).

2000 10 December to 2000 11 December (CW).

Unfortunately details of this contest were received too late for them to be published in this column early enough for readers to see them before the phone section took place. It covers all bands 3.5 to 28MHz for single-operator entrants only. Exchanges consist of RST and serial QSO number, starting from 001. Contacts with Spanish stations count one point and the multiplier is the total of EA call areas worked on each band added together. Certificates will be sent to the

top scorers in each country—provided that they have scored at least 100 points. Logs should be accompanied by a summary sheet showing details of how the score was worked out and a signed declaration that rules and regulations were observed. Name and address in block letters should also be included and logs must be postmarked no later than 15 February and posted to: URE International Contest, PO Box 220, Madrid, Spain.

## AGCW-DL Contest

0900-1200 1 January.

CW only—3,500-3,600kHz, 7,000-7,040kHz and 14,000-14,100kHz. (Preferred QRGs 3,560, 7,030 and 14,060kHz). Classes for different maximum input (a) 500W, (b) 100W, (c) 10W, and (d) listeners. Full rules may be obtained from Noel Phelps, BR535608, Fair Haven, Station Road, Patney, Devizes, Wilts, SN10 3RD.

In the 1977 Bermuda Contest UK scores were as follows: G4CNY (93,355 points), G3VPW (78,045), G3ZBA (43,200), G4DSE (32,690) and G6CJ (29,900). N American top scorer was VE3KZ with 68,146 points, and leading VP9 was VP9IG with 679,470. G4CNY and VE3KZ were in Bermuda to receive their winner's certificates when this was being written.

## Awards

A very suitable Christmas present for those interested in awards would be a copy of the Society's publication *Amateur Radio Awards*. This contains full details of all the world's major certificates and answers many of the queries which arrive on the writer's desk!

## Band reports

Conditions on the hf bands during the past few months have been much better than they were at this time last year, and in a letter to your scribe G8KG says that close observation of the 21 and 28MHz bands during the past three months suggests that solar activity is rising quite a bit more rapidly than the official forecasts. It could be that the present steep rise will only lead to a temporary peak of the type which characterized Cycle 20 (see G8KG's article in the July 1976 issue of *Radio Communication*). If, on the other hand, it is sustained, we should be seeing three-monthly mean numbers in the region of 50 by the end of the year. Readers are advised to treat the official propagation forecasts as being somewhat pessimistic and to expect the hpf values in the HF Propagation Study tables to be reached or exceeded on a significant number of days in the month.

Undoubtedly 28MHz has been the "star turn" during the period under review. All continents have been worked, and several readers have increased their 1977 countries total to well over 100—G4DYO has now reached 142. October is always a peak in 28MHz conditions and it is important to continue to use the band—1.9MHz of empty space is not a good argument for more frequencies!

Many thanks to the following for supplying information for this section: G2s, CDT, DHV, HKU, G3HB, G5JL, G6GH, G3CWI, GM3LYY, G3RCA, G4s EHQ, EZT, G14GDV, G8MFS, SP3AGE, BR5s 17567, 25429, 31301, 38356 and A8713.

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

**1.8MHz.** 0000 EA8CR. 0300 HH5TW, VE1AXT, 0400 N4IN/3. 0500 CY3IXE, W1HT, W1MX, W4NV. 0600 HH5TW, WB5NBC, K8JK, W7FS, W9HT, ZL3GQ. 0700 ZL3GQ. 2000 OH0RJ, 4U1ITU. 2200 HB0BA, ZB2A.

3.5MHz. 0300 OH9TH/SU (QSL to OH9RJ). 0600 FO8EX, ZL1YL/K, ZL2OM.

7MHz. 0000 EA9FC, JA7BA, 0800 HH5RB. 2000 KA6ML, OD5LX. 2200 CN8CC, VP9HO, 2300 J6AM.

14MHz. 0700 P29JS, ZL1YL/K. 0800 BV2B, C21NI, CR9AJ, FK8s, AI, CC, CD and KAA, KC4AAA, KX6BU, TT8HV, VR4CF, VR4DN, YJ8RD, ZK1DR, 5W1AN. 0900 FB8WA, HS1WR, JA5 KC6BS, KL7s, VK0CC, VK0KH, 3D2DM. 1000 KG6SL, P29CC, VK9NI. 1100 ST2IV, ZL1AA/K. 1300 HM0U, YJ8KW. 1400 VS6HJ. 1500 DU8JJ, FP8AP, J28BA, VS5MM. 1600 CR9AJ, FB8ZL, KL7BZO, W6/W7s, 3B8DA. 1700 5R8AL. 1800 FO8DO, KL7HMD, PJ9CG (QSL to K1JX), 9X5RG (QSL to DK3MO). 2100 HH2MC, HH5TW, KC4AAA, VP8PJ. 2200 VK6JJ, VP2SQ. 2300 HK0CLS.

21MHz. 0800 FK8CR, JA5, SU1CR, ZLs. 0900 JD1ALC. 1000 P29JS. 1100 FK8s, HH5RB, VP2VDH (QSL to K6SDR). 1300 FR7BE, HS1WR, HZ1HZ, KG6JIR, YB0ACP. 1400 HK0BKX, MID, ZE2PL. 1500 VP1AJ, VP9DX, W6/W7s. 1600 S79R, 4A1U (XE1AV). 1700 C5AAC, VC9UM, 3D6NP. 1800 CE0AE, W6/W7s, ZL1YL/K. 2000 OX3AP, ZD8JAM, 9Q5AL.

28MHz. 0600 U18FF. 0700 VK6RL. 0800 U18s, UL7s, VU2DK. 0900 JA5, VK6s. 1000 OH9TH/SU, VK8CC/M, OE2WSL/YK. 1100 CXs, EA9FH, FR7BE, 6W8FA, 9G1JX. 1200 J28AY, JY3ZH, PJ9CG, SU1CR, VP8NO. 1300 FG7AS, HD1DX, VP2s MSA and MUU, YB0ACK. 1400 AXGY, CEEZ, FM0CF, HH5HR, OA8CG, YB2SV, 6W8MM (QSL to WA1SQB), 9L1SL/A. 1500 C5ABK, HP1XWA, VP8s, VP9AD, 3D6BE. 1600 CE, CW0A, HC, Hs, Ws, W6/W7s, W7HYW (Wyo), W7KW (Ariz). 1700 A2CBW, VP2GAH, VP8s NO, NX and PG. 1800 CPs, FM7s, HC2EY, PJ2FR, S79R, W7AO. 1900 HC1GZ.

Very many thanks to all correspondents, and especially to the authors of the following for information: *DXpress* (PA0TO), *CQ Magazine* (WIWY), the *ExKG Radio Club Magazine* (W3HQO), *DX News Sheet* (Geoff Watts), *RSZ Newsletter* (9J2KL), *Long Skip* (VE1AL/3), and the *West Coast DX Bulletin* (WA6AUD).

Please send all items for January issue to reach G3FKM no later than 5 December, and for February by 7 January. □

## HF PROPAGATION STUDY

Predicted HPFs (MHz × 10) for December 1977

|                | GMT | 00  | 02  | 04  | 06  | 08  | 10  | 12  | 14  | 16  | 18  | 20  | 22  | 24 |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| Aden           | 145 | 140 | 128 | 230 | 345 | 371 | 352 | 342 | 246 | 195 | 159 | 155 | 145 |    |
| Ascension      | 167 | 163 | 155 | 138 | 295 | 359 | 354 | 335 | 329 | 248 | 202 | 185 | 167 |    |
| Bahrain        | 138 | 136 | 124 | 227 | 340 | 361 | 348 | 314 | 218 | 183 | 148 | 141 | 138 |    |
| Bangkok        | 119 | 111 | 108 | 195 | 323 | 357 | 329 | 268 | 188 | 138 | 117 | 115 | 119 |    |
| Barbados       | 150 | 139 | 128 | 136 | 229 | 361 | 351 | 340 | 300 | 199 | 168 | 150 |     |    |
| Bermuda        | 125 | 122 | 116 | 107 | 121 | 164 | 328 | 254 | 343 | 294 | 181 | 145 | 125 |    |
| Bogota         | 148 | 131 | 133 | 120 | 133 | 186 | 351 | 357 | 341 | 303 | 196 | 166 | 148 |    |
| Buenos Aires   | 166 | 155 | 145 | 138 | 188 | 295 | 321 | 333 | 336 | 275 | 202 | 180 | 166 |    |
| Cape Town      | 163 | 164 | 143 | 191 | 321 | 370 | 352 | 342 | 308 | 219 | 194 | 182 | 163 |    |
| Colombo        | 135 | 131 | 121 | 229 | 338 | 370 | 354 | 318 | 220 | 168 | 140 | 133 | 135 |    |
| Cyprus         | 130 | 133 | 124 | 178 | 309 | 357 | 335 | 318 | 232 | 176 | 143 | 135 | 130 |    |
| Dakar          | 167 | 135 | 155 | 136 | 295 | 355 | 354 | 335 | 329 | 248 | 202 | 185 | 167 |    |
| Denver         | 97  | 100 | 97  | 101 | 110 | 111 | 120 | 220 | 314 | 242 | 143 | 112 | 97  |    |
| Fairbanks      | 107 | 116 | 125 | 125 | 110 | 119 | 114 | 125 | 130 | 122 | 107 | 107 |     |    |
| Falklands      | 167 | 157 | 158 | 138 | 232 | 286 | 305 | 333 | 335 | 267 | 202 | 181 | 167 |    |
| Gibraltar      | 101 | 96  | 92  | 86  | 176 | 243 | 244 | 233 | 204 | 143 | 116 | 108 | 101 |    |
| Hong Kong      | 103 | 91  | 100 | 155 | 281 | 271 | 202 | 164 | 136 | 114 | 100 | 93  | 103 |    |
| Honolulu       | 105 | 110 | 122 | 119 | 110 | 136 | 128 | 121 | 128 | 147 | 122 | 107 | 105 |    |
| Iceland        | 65  | 65  | 67  | 68  | 83  | 164 | 234 | 235 | 201 | 125 | 82  | 67  | 65  |    |
| Jamaica        | 128 | 122 | 120 | 110 | 122 | 157 | 315 | 357 | 340 | 296 | 181 | 145 | 128 |    |
| Lagos          | 164 | 163 | 150 | 147 | 319 | 366 | 355 | 336 | 318 | 235 | 200 | 185 | 164 |    |
| Las Palmas     | 143 | 139 | 135 | 124 | 224 | 324 | 328 | 313 | 295 | 224 | 174 | 157 | 143 |    |
| Lima           | 155 | 143 | 145 | 135 | 148 | 199 | 359 | 347 | 343 | 298 | 201 | 172 | 155 |    |
| Los Angeles    | 101 | 101 | 101 | 101 | 111 | 120 | 120 | 152 | 304 | 214 | 138 | 110 | 101 |    |
| Malta          | 112 | 114 | 108 | 114 | 243 | 296 | 285 | 276 | 220 | 155 | 125 | 102 | 112 |    |
| Mauritius      | 148 | 145 | 129 | 220 | 343 | 370 | 355 | 346 | 267 | 199 | 172 | 152 | 148 |    |
| Mexico         | 105 | 107 | 97  | 97  | 103 | 147 | 166 | 329 | 329 | 277 | 153 | 125 | 105 |    |
| Moscow         | 88  | 83  | 84  | 98  | 227 | 298 | 298 | 265 | 176 | 119 | 97  | 93  | 88  |    |
| Nairobi        | 154 | 149 | 130 | 208 | 345 | 371 | 354 | 346 | 276 | 205 | 182 | 169 | 154 |    |
| New Delhi      | 128 | 116 | 114 | 214 | 329 | 342 | 307 | 221 | 176 | 143 | 125 | 120 | 128 |    |
| New York       | 105 | 107 | 102 | 98  | 106 | 126 | 238 | 337 | 332 | 280 | 155 | 125 | 105 |    |
| Osaka          | 105 | 103 | 97  | 107 | 199 | 172 | 140 | 134 | 115 | 103 | 91  | 91  | 105 |    |
| Perth          | 135 | 129 | 120 | 229 | 337 | 332 | 300 | 277 | 218 | 166 | 139 | 130 | 135 |    |
| Rio de Janeiro | 167 | 157 | 157 | 138 | 206 | 323 | 347 | 333 | 336 | 267 | 204 | 181 | 167 |    |
| Salisbury      | 158 | 152 | 136 | 201 | 340 | 370 | 354 | 347 | 288 | 210 | 191 | 176 | 158 |    |
| Seychelles     | 147 | 145 | 128 | 227 | 345 | 370 | 354 | 342 | 255 | 197 | 164 | 164 | 147 |    |
| Singapore      | 128 | 119 | 114 | 214 | 329 | 362 | 346 | 305 | 199 | 149 | 125 | 120 | 128 |    |
| Suva (S)       | 114 | 120 | 122 | 114 | 116 | 195 | 219 | 199 | 152 | 111 | 101 | 105 | 114 |    |
| Suva (I)       | 164 | 173 | 158 | 141 | 272 | 262 | 253 | 224 | 190 | 238 | 204 | 185 | 164 |    |
| Sydney (S)     | 103 | 91  | 100 | 155 | 281 | 276 | 275 | 247 | 157 | 114 | 100 | 93  | 103 |    |

|                | GMT | 00  | 02  | 04  | 06  | 08  | 10  | 12  | 14  | 16  | 18  | 20  | 22  | 24 |
|----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| Sydney (I)     | 157 | 145 | 147 | 135 | 161 | 247 | 219 | 176 | 161 | 206 | 200 | 173 | 157 |    |
| Tehran         | 136 | 131 | 121 | 229 | 338 | 365 | 348 | 310 | 211 | 166 | 139 | 130 | 136 |    |
| Vancouver      | 100 | 110 | 119 | 114 | 114 | 116 | 122 | 135 | 188 | 169 | 126 | 106 | 100 |    |
| Wellington (S) | 112 | 108 | 107 | 93  | 181 | 274 | 285 | 213 | 133 | 103 | 86  | 97  | 112 |    |
| Wellington (I) | 167 | 161 | 161 | 139 | 239 | 228 | 173 | 168 | 181 | 225 | 206 | 181 | 167 |    |

For information on the use of this table, see page 284, *Radio Communication* April 1976. Please send reports to Mr J. Spurling, G4AQI, 15 Tibbs Hill Road, Abbots Langley, Watford, Herts WD5 0EE.

## Propagation predictions

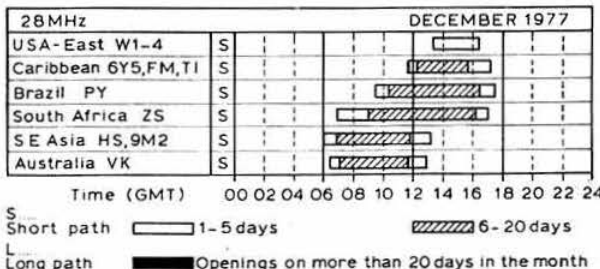
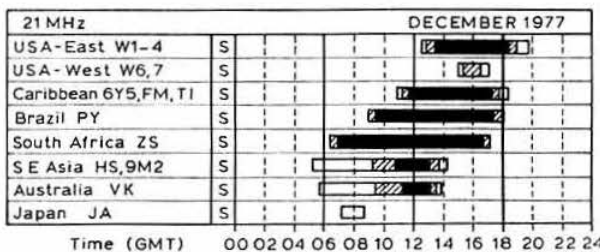
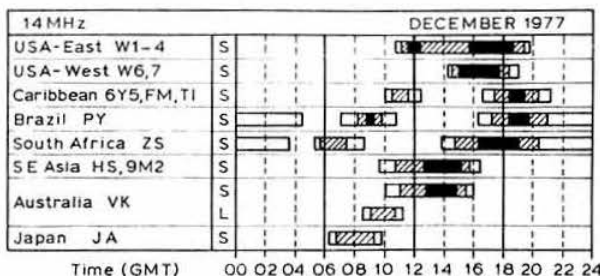
Experience shows that during December conditions are worse than during the two previous months due to shorter days and low F2 frequencies. The present rising sunspot activity will compensate for this, however, so conditions on 28MHz will only be slightly worse than in the previous months.

Traffic with all continents will be possible on 21MHz but the early sunset will mean that the band will close for dx about 1830gmt.

The 14MHz band will remain open for dx until about 2030gmt; the most favourable time for WAC on this band being between 0700 and 1200gmt. Some dx will be possible via the indirect path (where the longer part of the path lies in darkness), and before noon traffic with South America, east Asia and Australia should be possible in this way, and with western North America in the late afternoon. Under exceptional circumstances traffic with Central America, South-East Asia and eastern North America will be possible around midday.

There are no noticeable changes on 7 and 3.5MHz compared with last month, but distances covered will vary from day to day.

The provisional sunspot number for October 1977 was 41.3 with solar activity evenly distributed throughout the month. Predicted smoothed sunspot numbers from the Swiss Federal Observatory for February, March and April are 45, 48 and 50 respectively.



Short path 1-5 days 6-20 days  
Long path Openings on more than 20 days in the month



## Retirement of ARTHUR MILNE, G2MI

Champion sorter and doyen of QSL bureau managers

There are many facets to our hobby but very few amateurs have not experienced pleasure from obtaining QSL confirmation of radio contacts.

In the old days photographs of amateur radio stations nearly always included impressive displays of QSL wallpaper, whereas nowadays the shack walls are usually adorned with framed operating awards. One man has been primarily instrumental in making this possible.

At the end of this year G2MI and his wife, relinquish responsibility for the RSGB QSL Bureau after 38 years. During that very long period it is estimated that close on 50,000,000 (yes 50 million!) QSL cards have passed through their hands.

Until his retirement from the Post Office a few years ago G2MI somehow managed to cope with his mammoth task largely, one suspects, by severely reducing his time on the air. Even since his retirement his personal activities have been limited by the number of hours he has had to spend every day sorting cards.

Now G2MI is really retiring and in thanking him for so many years of devoted service to amateurs, not just in the UK but around the world, all his friends will want to wish him many happy years of operating after the completion of a job very well done.

Thank you, from us all.

G3AAE

## THE RSGB QSL BUREAU

The purpose of the RSGB QSL Bureau is to facilitate the exchange of QSL cards between RSGB members and other radio amateurs.

Most national radio societies operate a QSL bureau for the benefit of their members. Some make an extra charge for this service, while others, of which RSGB is one, provide it free as a service to their members.

Use of the bureau is not claimed to be the quickest way to exchange cards but it is the cheapest, especially in these days of high postal charges.

### HOW THE QSL BUREAU OPERATES

Cards for distribution via the bureau should be despatched only to the QSL Bureau Manager at the address shown opposite. There is no limit to the number of cards which may be sent at any one time.

When the cards arrive at the bureau those destined for abroad are sorted into countries, tied into bundles and despatched in bulk to the appropriate overseas QSL bureaux, most of which are operated by member societies of the International Amateur Radio Union.

Cards for despatch to stations within the UK are sorted into one of the following groups:

|                                  |                   |
|----------------------------------|-------------------|
| G2                               | G4BAA-BZZ         |
| G3 and 4 two-letter and G5 calls | G4CAA-CZZ         |
| G6 and G8 calls                  | G4DAA-DZZ         |
| G3AAA-DZZ                        | G4EAA-EZZ         |
| G3EAA-HZZ                        | G4FAA-FZZ         |
| G3IAA-KZZ                        | G4GAA-HZZ         |
| G3LAA-NZZ                        | GB series         |
| G3OAA-PZZ                        | GD                |
| G3RAA-TZZ                        | GI                |
| G3UAA-VZZ                        | GJ                |
| G3WAA-XZZ                        | GM                |
| G3YAA-ZZZ                        | GU                |
| G4AAA-AZZ                        | GW                |
|                                  | BRS and A numbers |

Each of these groups is in the charge of a sub-manager whose task it is to associate the cards which reach him from the QSL Bureau Manager with the envelopes which he holds in file.

### Sending cards through the bureau

[1] Print the call sign of the person to whom the card is addressed clearly and in large letters on both sides of the card so that it may be seen at a glance.

[2] Sort UK cards into the appropriate groups, USA cards into call areas (viz K1/W1, K2/W2, etc), and all other cards into countries. The cards so sorted should not be tied separately or spaced with paper markers, or put into separate envelopes.

[3] Pack all the cards the same way up.

[4] Pack the cards securely; the use of flimsy envelopes may result in cards breaking loose in transit.

[5] Weigh all packets carefully before despatch in order to ensure that adequate postage is prepaid.

[6] Choose QSL cards which do not exceed normal postcard dimensions, viz 5½in by 3½in. Large cards invariably have to be folded, while small cards are difficult to handle. As packets going abroad are sent by printed paper post, large cards render the packets unstable.

[7] If the station has a QSL manager, it helps to put this on the card, ie via .....

### Collecting cards from the bureau

(1) Supply your QSL Bureau sub-manager with stamped self-addressed envelopes of suitable size and strong material. The addresses of sub-managers are published, with any amendments, from time to time in *Radio Communication* and in the annual *RSGB Amateur Radio Call Book*. Amendments are also broadcast over GB2RS.

(2) Print your call sign, BRS or A number in the TOP LEFT HAND CORNER of each envelope.

Envelopes are normally returned when the weight for which postage has been paid has been reached; those who



wish to collect cards at less frequent intervals should mark the envelope "wait 6" etc. Envelopes should be numbered and "Last envelope" marked on one so that the recipient automatically knows when to renew the supply. Envelopes stamped with higher value postage stamps are not sent until the appropriate postage weight of cards has accumulated. Make sure the envelopes you send will accommodate a large postcard.

## GENERAL NOTES

- (1) Licensed UK amateurs who are non-members of the RSGB may send stamped addressed envelopes to their sub-manager for collection of their cards, but they may not send cards for distribution.
- (2) Cards for amateurs who have neglected to send envelopes are retained for three months, after which the cards are destroyed. Amateurs who do not wish to collect cards should notify the QSL Bureau accordingly.
- (3) Overseas members of RSGB in countries where there is no QSL service operated by the IARU member society for that country, may send their cards to the RSGB QSL Bureau for distribution.
- (4) Overseas amateurs who are not members of the RSGB may send cards addressed to UK stations only direct to RSGB QSL Bureau.

(5) The facilities of the RSGB QSL Bureau are available both to transmitting and receiving members of the Society. Listeners are reminded, however, that their reports should contain sufficient information to be of genuine value to the transmitting amateurs concerned. Reception reports relating to short-wave broadcasting stations cannot be accepted.

All QSL cards and correspondence relating to the RSGB QSL Bureau should be sent to the QSL Bureau Manager at the address below and not to RSGB headquarters.

Adhesive address labels are available free of charge on receipt of a stamped addressed envelope.

Envelopes for the collection of cards and correspondence concerning incoming cards should be sent to the appropriate sub-manager.

**QSL Bureau Manager**  
**Mr E. G. Allen, G3DRN,**  
**30 Bodnant Gardens,**  
**London SW20 0UD.**

The RSGB QSL Bureau is available as a FREE service to all members.  
 Help the bureau by observing these simple rules.

## RSGB QSL BUREAU SUB-MANAGERS

(At 1 November 1977)

|                                       |                                                                                     |                    |                                                                                   |
|---------------------------------------|-------------------------------------------------------------------------------------|--------------------|-----------------------------------------------------------------------------------|
| G2:                                   | J. W. Russell, G2ZR, 55 Holcombe Close, Bathampton, Bath BA2 6UP.                   | G4BAA-BZZ:         | R. F. Rawlings, G3WBV, 74 The Lindens Fieldway, New Addington, Surrey CR0 9EL.    |
| G3 and G4 two-letter calls, G5 calls: | Mrs C. Pope, G4CMM, 136 Ridgeway Drive, Bromley, Kent BR1 5DD.                      | G4CAA-CZZ:         | P. Jobson, G3HLF, 41 The Avenue, Gravesend, Kent DA11 0NA.                        |
| G6 calls; G8 calls:                   | Mr and Mrs A. J. Mathews, G6QM, 62 Ashlands Road, Hesters Way, Cheltenham GL51 0DE. | G4DAA-DZZ:         | D. Buckley, G3VLX, 16 Wood Ride, Petts Wood, Orpington, Kent BR5 1PX.             |
| G3AAA-DZZ:                            | C. A. Bradbury, BRS1066, 13 Salisbury Avenue, Cheltenham GL51 5BT.                  | G4EAA-EZZ:         | P. C. Barry, BRS22730, 32 Rutland Avenue, Sidcup, Kent DA15 9DZ.                  |
| G3EAA-HZZ:                            | S. L. Newport, G4DEV, 101 Elbank Road, Eltham, London SE9 1QJ.                      | G4FAA-FZZ:         | Mrs A. R. Burchmore, G8LXK, 49 School Lane, Horton Kirby, Dartford, Kent DA4 9DQ. |
| G3IAA-KZZ:                            | P. Lumb, G3IRM, 14 Linton Gardens, Bury St Edmunds, Suffolk IP33 2DZ.               | G4GAA-HZZ:         | B. R. George, G3ZOH, 43 Magnolia Drive, Biggin Hill, Kent.                        |
| G3LAA-NZZ:                            | C. A. P. Henderson, G4FAM, 76c The Avenue, Beckenham, Kent BR3 2ES.                 | GB:                | C. Turner, G8NL, 56 Sunny Bower, Tottington, Bury, Lancs BL8 3HL.                 |
| G3OAA-PZZ:                            | J. H. Brazzill, G3WP, 43 Forest Drive, Chelmsford, Essex CM1 2TT.                   | GD:                | W. P. Waid, GD3GQX, 1 Mount William, Summer Hill, Douglas, Isle of Man.           |
| G3RAA-TZZ:                            | Mrs C. Pope, G4CMM, 136 Ridgeway Drive, Bromley, Kent BR1 5DD.                      | GI:                | R. P. Parsons, G13HXV, 45 Erinvale Avenue, Belfast BT10 0FP.                      |
| G3UAA-VZZ:                            | M. Newton, G3UKW, 2 Marlowe Court, Garforth, Leeds, LS25 1PR.                       | GJ:                | L. D. Woolf, GJ8AAZ, 57 Elizabeth Avenue, St Brelades, Jersey, CI.                |
| G3WAA-XZZ:                            | F. G. Rylands, G2VF, 39 Parkside Avenue, Millbrook, Southampton, Hants SO1 9AF.     | GM:                | D. R. Macadie, GM6MD, 11 Marchmont Road, Ayr KA7 2SB.                             |
| G3YAA-ZZZ:                            | H. R. Boutle, G2CLP, 14 Queen's Drive, Bedford.                                     | GU:                | W. E. Butt, GU2FZC, "Meo Voto", Green Lanes, St Peter Port, Guernsey, CI.         |
| G4AAA-AZZ:                            | C. Johnson, BRS31379, 118 Harvest Road, Smethwick, Warley B67 6NG.                  | GW:                | J. L. Reid, GW3ANU, 28 Waterston Road, Cardiff CF4 2SS.                           |
|                                       |                                                                                     | BRS and A numbers: | D. Borne, G4CYW, "Roughways", Chub Tor, Yelverton, Devon PL20 6HY.                |

# council proceedings

A brief report of the Council meeting held on  
23 September 1977

**Present:** Lord Wallace (President, in the Chair), Dr E. J. Allaway, Messrs D. J. Andrews, J. Anthony, P. Balestrini, J. Bazley, J. O. Brown, Dr D. S. Evans, Messrs W. F. McGonigle, B. O'Brien, C. H. Parsons, D. M. Pratt, W. A. Scarr, R. F. Stevens, G. M. C. Stone, D. M. Thomas, (members of Council), G. R. Jessop (general manager/secretary), Mrs H. M. Allin (minutes secretary).

Apologies for absence were received from Messrs A. M. Allan, C. J. Thomas and A. W. Hutchinson.

## QSL Bureau

Dr Allaway reported on this question. The possibility of housing the bureau at HQ was not thought to be practical financially. The committee had interviewed Mr E. G. Allen, G3DRN, for the post of QSL Bureau manager. After discussion it was agreed that Messrs Brown and Stone would report on the suitability of the arrangements proposed by G3DRN.

## Financial report

Mr Brown spoke of the excellent results for the year ended 30 June 1977 (published in the November issue), and approved the figures subject to adjudication by the auditors.

Mr Brown then reported that the accounts for July and August 1977 were substantially very good, with a surplus of £4,000. The cost of *Radio Communication* was over £1,000 less than budgeted.

## HQ report

Mr Jessop said there was an urgent need for someone to assist with routine queries and to eventually become general manager, and he wondered if the general manager/secretary's work should in fact be segregated. Membership queries were not being dealt with satisfactorily at present and Mr E. W. Yeomanson, G3IIR, who had been acting general manager during Mr Jessop's recent holiday, had spent much of his time sorting out such problems.

It was agreed that Mr Yeomanson should be thanked for relieving Mr Jessop.

Mr Stevens referred to the Articles of Association which were at present printed in five sections. These were now in the process of being amalgamated to form one document and Council's agreement was required before proceeding. Any amendment would take several months to be approved by the Registrar of Companies. After some discussion it was agreed to have 1,000 copies printed now.

## Membership and representation

It was resolved:

- (i) to waive the subscriptions of seven members;
- (ii) to accept reduced subscriptions from 24 members;
- (iii) to grant life membership to Mr B. A. Pope, G3UEW;
- (iv) to grant affiliation to: Brighton & District Radio Society; Edbro Radio Club, Bolton, Lancs; Ormskirk Radio Club; Pye (Lowestoft) Amateur Radio Club; North Bristol Amateur Radio Club; Winchester Amateur Radio Club.
- (v) to approve the appointment of Mr I. McKechnie, GM8DOX, as regional representative for Region 14;
- (vi) to approve the appointment of the following area representatives: Messrs M. S. Appleby, G3ZNU, Ipswich; R. S. Hewes, G3TDR, SW area of Region 7; G. Lancfield, G3DWQ, Preston; J. Korndorfer, G2DMR, NW area of Region 7; A. Thorne, G3ART, S and W Cumbria; C. C. Walker, G3VTS, Cheltenham.

## President, 1978

Mr Brown proposed that Dr D. S. Evans be President of the Society for 1978. This was seconded and agreed unanimously.

## Honorary treasurer

Mr Brown had notified his intention to withdraw from this office at the end of the present year.

Dr Allaway proposed a vote of thanks to Mr Brown for his services. This was endorsed by all present.

## Regional Representatives Conference

Much discussion took place on the timetable and agenda for the above, which had been prepared by the M & R Committee. There was some concern at the restricted agenda and limited time.

Mr O'Brien felt that if the cost was kept down, these conferences could be held more often.

## 1977 President's Working Party

Dr Evans spoke of the possibility of electing extra vice-presidents with a view to their taking on extra responsibilities and possibly forming a committee, together with the President, immediate past-president and treasurer.

Dr Evans raised the question of swl representation on Council. Mr Bazley thought it dangerous to single out the swls as they were not the only group without representation on Council. After much discussion Mr Stevens suggested that the idea be aired in *Radio Communication* to try to provoke the nomination of an swl member for election to Council.

Dr Evans asked Council to consider a proposal from the HF Contests Committee that an HF Committee be formed. Mr Andrews said that it was felt there was not enough representation in the various uses of hf and a proposal had been sent to the President's Working Party, which would draw up the terms of reference, for the appointment of an hf manager. These proposals were unanimously approved by Council.

## RAE syllabus

Mr Pratt spoke of the Education Committee's concern at the exclusion of valves and thermionic emission from the RAE syllabus, and said he had written to Mr R. J. Hughes, G3GVV, chairman of the RAE Advisory Committee. Mr Scarr agreed that it was a most serious matter and he would also write to Mr Hughes. It was agreed that Mr Pratt should again write to Mr Hughes expressing the views of Council.

## Committee minutes

Council received the minutes of the following committee meetings: Raynet (14.5.77, 2.7.77 and 3.9.77); Repeater Working Group (21.5.77); Mobile & Exhibition (31.7.77, 12.5.77 and 13.9.77)—the tentative date for the 1978 RSGB National Rally was noted as 8 August; Telecommunications Liaison Committee (9.6.77 and 4.8.77); Propagation Studies Committee (13.6.77 and 22.8.77); HF Contests Committee (16.6.77 and 18.7.77); Finance & Staff (23.6.77, 11.8.77 and 18.8.77)—at the 23 June meeting it was agreed to draw £1,500 of the 6% Lambda debentures before the AGM; VHF Contests (23.6.77 and 28.7.77)—a recommendation that the vhf trophies be presented, but not retained by the recipients, at the VHF Convention, was agreed; Education (2.7.77); Interference (8.7.77); Technical & Publications (13.7.77); Membership & Representation (14.7.77); VHF (16.7.77 and 20.8.77)—Dr Evans spoke of the recommendation to form a separate Microwave Committee; terms of reference would be provided for the next meeting.

Mr Stone spoke of the VHF Committee's recommendation that a limited number of traders in components and accessories be invited to attend the VHF Convention. The emphasis was to be on home-construction and it was felt that it would be valuable to have such traders present. Mr Stone stressed that it was not planned to be a trade show of "black boxes". Much discussion ensued and the recommendation was approved by a majority decision.

## Trophies

Recommendations that Mr A. Slater, G3FXB be awarded the ROTAB Trophy, and Mr G. Peck, BR515402, the Founders Trophy, were approved. There was no recommendation for the Calcutta Key.

Council also approved the recommendation of the Technical and Publications Committee that the Norman Keith Adams Prize be awarded to Mr F. M. Smith, G8KG; the Courtenay Price Trophy to Mr J. P. Martinez, G3PLX; the Wortley-Talbot Trophy to Mr J. A. Hardcastle, G3JIR; and the Ostermeyer Trophy to Mr N. Davies, G8IBR.

## Looking ahead

**21 January**—RSGB Presidential Installation, House of Commons, London SW1.

**25 February**—International VHF Convention, "Winning Post", Whiston, Middlesex.

**2 April**—Northern Radio Societies Association Convention and Exhibition, Belle Vue, Manchester. Details from G8BCG or G4BVE.

# The 1977 President's Working Party

The following is a brief summary of a second batch of letters received by the working party. Some of the points made have already been expressed in the earlier summary given in the August issue of *Radio Communication*, but others are new; in some cases prompted by the first summary. What perhaps does not come over is the nature of individual contributions. These range from a few hundred words to a detailed analysis which takes up 16 pages of typescript. Some of the ideas expressed have already influenced Society policy, and many more will in time have an effect. A report will be produced in due course.

## Council

Stagnation within Council ... Council appears to be self-perpetuating ... Lack of sufficient details on which members can judge performance of elected member ... Council to include chairmen of major committees, hf, vhf and microwave managers, telecomms liaison officer, development officer, as well as existing members ... Election to Council does not always seem fair ... Election system based on affiliated club or RSGB group electing delegates to appoint RRs who in turn would appoint zonal members ... Council to be made up of only of zonal members, two from each zone.

## Representative system

Newly-licensed non-club members often have little idea of form of representative system—an information sheet should be supplied ... A proportion of committee members to be elected on a regional basis ... Would welcome guidelines on duties as RR ... RRs are in unique position to improve the image of the Society and neutralize the "London-based" fallacy. More care required in their election, and more support ... Societies such as Royal Signals, Royal Navy and the Bedford Club have no RR to send their club news to ... Representatives appointed in terms of their interests rather than for areas ... More ordinary regional meetings ... Present regional and zonal boundaries to be re-examined to take account of shifts of population ... Regional administrator more appropriate title than RR ... Copies of non-confidential Council and committee minutes to be circulated ... Representative system adequate, but names of ARs should be included in the "Club News" section of *Radio Communication*.

## Club-Society links

Club-Society links, rather than AR/RR links, should be the main link between HQ and membership.

## Member-Society relationships

More democratic generation of Society policy than is presently afforded by the unelected committees on which the Society relies ... Members feel that their opinions are never sought on matters of fundamental importance ... Difficulty of members influencing policy at AGM ... Tougher action on members convicted of indictable offence ... Few members know how to get on committees ... HQ staff changes should be explained to members ... Long-service certificate for unbroken Society membership ... Family membership needs to be reviewed ... While members felt that the Society was gaining in strength, it lacked "bite" when acting on behalf of members.

## Provincialization

HQ moved to a more central location ... A proportion of committee members to be elected from regions ... Delay to *Radio Communication* in outlying areas ... AGM to be held in provinces.

## General organization and administration of Society

Members at loss to know whether or not an enquiry is being dealt with or has even been received ... Amateurs on the whole dislike letter writing, so any letter implies that he is concerned ... Separate business activities from hobby ... Breakdown of organization by frequency rather than function ... Designation of hf, vhf and microwave managers with particular responsibility for international affairs ... need for R & D manager to ensure that valuable technical and scientific work done by amateurs is not lost ... Delay in supply of books of up to several months ... "If they cannot be bothered to answer my letter, I cannot be bothered to write my subscription cheque" ... HQ closed at the time working people want to call ...

Why are certain individuals on several committees? Lack of volunteers? ... Why the need to send in wrappers ... Written communication with HQ much better.

## Member services

Use of QTHR most irritating: not all can afford each new call book as published ... Call book could include "Does not QSL" where appropriate.

## Relationships with outside bodies

Importance of Society reflecting the proper image of today's amateur radio enthusiast to the general machinery of Government and involved outsiders ... Lack of information on how WARC 79 is likely to affect amateurs—compared with that given in QST etc ... Convert Class B to Novice (with 5wpm morse) with limited period to up-grade to Class A ... More details of negotiations between the Society and Home Office.

## Contests

All contests, not just Society ones, should be listed in contests calendar ... Persuade ARRL to reduce their long contests to one whole weekend, or better still to 24h each, to improve outlook of non-contesters ... Should be necessary only for club to be affiliated—not each operator.

## Publications

More articles for beginners including quick-start and sure-fire items ... Articles in *Radio Communication* too technical and too few on hf ... Too few for newcomers ... *Radio Communication* lacks "human" touch ... More feeling in obituaries ... Books to be fully referenced ... *Radio Communication* on tape for blind members? ... A number of members would be prepared to pay more for a larger magazine.

**Letters were received from:** G3CMH, sec Yeovil ARC; G8BNE, RR Region 16; G3WVJ, president, Echelford ARS; G4AVV, member; G3UIQ, sec, Torbay ARS; G4BBA, RR Region 5; G5HD, RR Region 17; G3IDG, member; G3YWO, sec, Cray Valley RS; G4EOL, chairman, Norfolk ARC; G3VPE, RR Region 3; GM3YOR, RR Region 13, sec Glenrothes DARC; G4AVV, Crystal Palace DRC.

## your opinion

### "HAM SPIRIT"

The Editor

*Radio Communication*

Sir—While I realize that you do not purport to agree with the views expressed in "Your Opinion", I had not realized that it had sunk to such a bad taste level of personal character attacks as those aimed at me by G2CYV in the September issue.

They hardly reflect the true ham spirit he glibly talks of.

I trust you will be sufficiently fair minded as to print this letter.

M. K. Dunn, G3KTL.

The Editor

*Radio Communication*

Sir—I am very active on 80m, cw and ssb, but I prefer cw: no trouble at all in reading any country by this mode! But you know, the 80m band is very busy and the noise level is very high, and also every morning we have some British stations using a.m. and fm in the cw band. My QTH here is 20km NE of Paris, and I receive those stations very strongly. To those stations I said that is cw band, only for cw; but they laugh at me!

Also in France cw operators have the same problem because of about 40 stations in south part of France using a.m. in the exclusive cw band. French authority is not interested by this problem in spite of many infractions from those operators. Is the British Government anxious by those problems? I hope it is more authoritative than ours!

By the way, what is the "Ham spirit"? Where is the "Ham spirit in 1977?"

S. Vantalón, F6BWF

## THE NEW RAE

The Editor

Radio Communication

Sir—The article on the new RAE in your September issue lists some of the reasons for the introduction of multiple choice questions. The disadvantages were not discussed. One is the danger of exposing the candidate to the wrong answer, which he may select and from then onwards believe to be true. Another is the implication that the stated answer is complete, eg poor frequency stability of an amateur transmitter can result in operation outside the amateur bands; however, it can also cause other problems.

In connection with the syllabus, transistor theory must be included but to drop valves is ill-advised. About the only adjustments on the modern transmitter are in connection with drive and tuning of the pa valve(s) and it is these which are responsible for a large proportion of cases of bad transmissions.

By reduction in the syllabus relating to basic electricity and magnetism the extent of self-training and scope for technical investigation will be reduced. There is no case for this.

R. A. Bastow, G3BAC

The Editor

Radio Communication

Sir—The item by Mr R. J. Hughes in respect of multiple-choice questions for the City and Guilds No 765 is of considerable importance to those who have not passed it. Many experienced amateurs compare each successive paper with the one they took. Due to the time lapse, and their experience, they generally feel that the examination is too easy now, and that guesswork will succeed in future.

My experience as a full-time lecturer in further education is that the multiple-choice method is as effective as any other. This method when used as part of other electrical examinations produces results which relate to the performance of students over a three-year period.

The technique used by City and Guilds demands only four choices. One of these is exclusively correct, so it is not possible to have a "none of these" or "any of these" choice. Care is taken to avoid ambiguity, therefore no confusion can arise between questions which of necessity must be somewhat alike.

Multiple choice examples taken from amateur radio examination papers from other countries are not, in my opinion, as precise as those to be used here. Since I have set some of the questions discretion is necessary, examination of the circuit diagrams used in RSGB publications making an analysis of the function of each component would be relevant. When numerical examples are used, it is usually unnecessary to evaluate completely. The distractors will exhibit the common errors made by students.

If any modified, simplified licence becomes available for persons wishing to communicate for recreational purposes (eg mountain climbers, small boats on inland lakes) then a multiple choice examination could be designed to satisfy limited requirements. This could be compared to the driving test with HGV, PSV, IAM, and Police tests.

Since the multiple-choice method will save time and money in the marking of scripts, I feel that a simple practical test relevant to the licence should be conducted, say within 12 months of receiving the first licence.

F. A. Fear, TEng, (CEI), MITE, G8CVR

## ANTENNA POLARIZATION

The Editor

Radio Communication

Sir—The time must surely have arrived for amateurs to agree upon a common plane of polarization for vhf operation on 144 and 432 MHz. It seems unnecessary to have two antennas, one vertically polarized for fm operation, the other horizontally for ssb and cw operation.

Multi-mode mobile operation can be very frustrating, having to change antennas every time one changes mode. I would imagine that most amateurs agree that one common plane of polarization would be desirable. The problem would be in which one to use.

No doubt there are theorists who can prove that in specific situations one is better than the other; but if one plane of polarization had had overwhelming advantages over the other we would all be using it by now. It seems that history not technology has produced the current situation. Which then should we opt for? From the practical point of view vertical polarization would seem to win.

First, because mobile antennas would be unobtrusive, omnidirectional and could have gain, unlike the unaesthetic halo antenna whose appearance gives it attraction to small boys with itchy fingers. Second the vertical's omnidirectional characteristic with gain is difficult to obtain with horizontally-polarized antennas. Set against these advantages the beamwidths of horizontal multi-element arrays may be subject to criticism.

The idea of converting repeaters to omnidirectional horizontal polarization appears a daunting task, unlike converting beacons to omnidirectional vertical polarization.

Mobile operation is here to stay and probably all non-amateur mobile operation throughout the world uses vertical polarization.

Perhaps the RSGB may care to sound out their European counterparts and see how they feel about standardization. In the meantime I will continue to put out fruitless CQs on ssb when mobile, using my vertical antenna.

G. W. Ilbury, G3MMW

## obituaries

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

### Rev Fr J. Ford, G3SXF

John Ford, who died recently, was, for a long time, an invalid in St Angela's Convent, Clifton, Bristol. He was, however, able to maintain contact with old friends through a transceiver supplied by their generous donations.

### Mr R. B. Forge, G3FRG

Mr Forge, who died on 25 October aged 54, was a life member of the RSGB. At one time he was morse instructor for the ATC, and was one of the first stations in the Worthing area to obtain permission to use 432MHz. At his local club he gave much encouragement to younger members.

### Mr F. W. Hennig, G3GSW

Frank Hennig, who died on 21 July, was well known as a BBC personality both at home, in radio and television, and overseas as presenter of World Radio Club.

### Mr E. Hubbard, G5OX

Eric Hubbard, "OXO", died on 18 October in his mid-seventies. He was active on vhf for many years and had just started again on 3.5MHz. A life member of the RSGB, he was first licensed in 1922 when he worked on 440 and 200m.

### Mr J. E. Maxwell, G13ML

Teddy Maxwell, who died on 11 October aged 70, was a well-known Ulster amateur, active on vhf and hf. He was a lecturer in radio subjects at the College of Technology, Belfast, until his retirement.

### Mr R. Radford, G2IM

Reg Radford, who died on 5 October aged 78, was one of the Society's oldest members. After active service in the Royal Navy, during the first world war, he joined 2LO-BBC and remained with the BBC until his retirement from a senior position in Broadcasting House. He was a past-chairman of the Edgware & District Radio Society; a past-president of the BBC Amateur Radio Club, and a member of RNARS and ARRL. Active only on cw, he took part in many contests and field days, and also lectured on home construction, antennas and "old times".

### Mr J. Stonier, G3SAY

Jack Stonier, who died on 11 July, was a very active member on the 144MHz and hf bands.

### Mr K. Viljoen, ZE4JP

Kenneth Viljoen, and his wife Ann, who died on 1 October during a terrorist ambush in Rhodesia, were both well-known members of the Mashonaland branch of the Radio Society of Rhodesia.

The Society has also been informed of the deaths of:

Mr W. Butler, G3PCB, and Mr T. A. T. Davies, G2ALL.



# raynet

S.W. Law, G3PAZ \*

Season's greetings to all of our 2,000 members and may 1978, the Raynet 25-year jubilee, be the greatest since radio amateurs proved their usefulness to the community in that memorable year of 1953.

## Committee matters

Members of the Raynet Committee and their ladies met for the annual dinner at the Mount Pleasant Hotel on Friday 25 November, and on the following day, the last Raynet Committee meeting of the year was held at the nearby RSGB HQ. Despite the great deal of work to be settled, members declared the successive events an all-round success from all points of view.

It was noted from the minutes of the 3 September meeting that several group controllers had inadvertently been omitted from the July controllers list; this will be rectified in the next list. The matter of the scope of the present Raynet insurance was also raised and this is now to be given close attention by certain well-qualified persons.

Applications for Raynet lectures continue and will be dealt with at the earliest possible date. The Raynet stand at the Woburn RSGB rally was a very satisfactory effort, with four committee members in attendance. The visitors book on the stand was signed by 63 people, and many enquiries were dealt with during the show. It has been suggested that a Raynet controllers' symposium might be held in 1978, and comments and suggestions are invited from those interested.

Confirmation has been given for the appointment of a sector controller (airports) for Surrey. This is, of course, an obvious requirement in view of the special risks in that area due to increased traffic. A proposal has been put forward that a Raynet Association be formed, somewhat on the lines of the existing body in Kent. Once again, any suggestions or comments will be welcomed by the Raynet Committee.

## Group news

The Raynet Trophy for 1976 has been awarded to Mr G. Lear, G2HPG, in recognition of his outstanding work performed to create interest in Raynet during the last year and resulting in the formation of the large and efficient W Glamorgan group (of which G2HPG is controller). A certificate of merit is also to be awarded to the Anglia Raynet Group for sustained efficient operations in the best spirit of service to the community. Avon Raynet had special permission to operate during the royal visit to the County of Stafford Jubilee and also in Portsmouth on the occasion of Navy Day. In Dorset, G3ZDQ is still in business as organizer for the county and would be delighted to be overwhelmed with applications for membership; as would G3IMI for Harrow Weald, G8KHB for Hull, G3AWY for the Portsmouth area, and G3PQH for the Torbay area. Norfolk and NE Suffolk did a great job at the Royal Norfolk Show but are sorry to lose their area controller for the central area, G3PCB. The post has now been taken over by G3SEM.

SE London pulled a real surprise exercise with "Matchstick"—nobody knew where it was to be until the organizers literally dropped a matchstick on a map of the area and started the callout! As it happened the location was Norbury, but it could have been anywhere; just as real emergencies come out of the blue. Someone asked recently how they could find the incident officer at a disaster. Answer—look for a bright tabard (waistcoat) on a police officer and read the large legend on the back! There is no reason why Raynet personnel should not wear an orange tabard with a suitable insignia on the back, and the matter has already been discussed in committee. As always, we welcome comments.

Many reports must be held over for lack of space, but we will continue to include as many as possible in 1978. Keep up the good work.

**Hon Registrations Secretary: Mrs L. A. Crane, "Greta Woods", Bromley Road, Ardleigh, Colchester, Essex.**

# sstv scene

P. Burnett, G4BLL \*

Digital scan conversion for both transmission and reception of sstv continues to command the number one position in the slow scan "top twenty", with, or so it would appear, nearly every American sstv station using the Robot 400. This particular commercial unit also continues to gain ground in this country with nine now in use on the bands.

Robot owners may be interested to know that a colour conversion kit (pcb and technical details) should now be available from Don Miller, W9NTP, Waldron, Indiana, 46182, USA.



**Don Miller, W9NTP, photographed during colour demonstration at this year's Dayton Convention. (Photo: W2DD)**

The WB9LVI converter has been undergoing some "facelifts", with improved performance being achieved by the use of a matched pair of diodes (CR3 and 4 in the two-phase clock-driver circuit) with a forward resistance of around 40Ω. WB9LVI is working on modifications to provide 256 pixels per line and 64 grey shades. Exciting news leaked into the grapevine that W3LY and a colleague are "deeply involved" in the development of "limited motion" capability for the WB9LVI converter—more news of this (hopefully) next time.

Those readers who noted the remarks in the last column regarding correct lighting for camera work may be interested in a suggestion recently demonstrated over the air by G3IAD. This involved the use of red illumination which replaced the usual tungsten lighting. The pictures transmitted exhibited excellent contrast, but no direct comparison between the two methods of lighting was possible at the time. Later experiments carried out by the writer in conjunction with G3UEU to compare both modes of illumination produced no definite conclusions. It is thought that an apparent improvement in picture quality may be evident when using red lighting simply due to the generally lower, but probably more acceptable to the camera, level of illumination. It is well known, for example, that "bright spot" reflections can seriously degrade picture quality, especially with "automatic" cameras. Can anyone throw any further light on this subject?

Staying with G3IAD, he worked a new station, EP2MT, for a 100 countries now confirmed—congratulations, Neville—who's next in the sstv countries worked stakes, we wonder?

A new sstv "bible" and a must for every slow-scanner's book shelf is *The Complete Handbook of Slow-Scan TV* by Dave Ingram, K4TWJ, now available from RSGB Publications (Sales). Eight chapters include: Understanding sstv Gear, Digital Scan Converters and SSTV Satellite Communications.

Thanks to all readers who took the trouble to write, especially G3KRC (sorry Keith, unable to use the photographs due to lack of space), swl Simon Robinson and W2DD.

Please keep the sstv information rolling in; deadline for the next issue is the last week in January.

\* 130 Alexandra Road, Croydon, Surrey CR0 6EW.

\* 319 Leeds Road, Nelson, Lancs BB9 8RW.

# contest news

## RSGB HF Contests Championship 1977-8 rules

1. RSGB hf contest general rules do not apply.
2. No entries for the championship are required.
3. The championship will be decided on the basis of RSGB hf single-operator contests held between 1 October 1977 and 31 July 1978.
4. Points will be awarded to the leading 10 UK stations in the results published in *Radio Communication* as follows:

| Contest            | 1   | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 |
|--------------------|-----|----|----|----|----|----|----|----|----|----|
| 21/28MHz Telephony | 80  | 70 | 60 | 50 | 40 | 30 | 20 | 15 | 10 | 5  |
| 7MHz CW            | 70  | 60 | 50 | 40 | 30 | 25 | 20 | 15 | 10 | 5  |
| 7MHz Telephony     | 70  | 60 | 50 | 40 | 30 | 25 | 20 | 15 | 10 | 5  |
| 2nd 1.8MHz         | 40  | 35 | 30 | 25 | 20 | 15 | 10 | 5  | 0  | 0  |
| 1st 1.8MHz         | 40  | 35 | 30 | 25 | 20 | 15 | 10 | 5  | 0  | 0  |
| Commonwealth       | 100 | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 |
| Low Power          | 30  | 25 | 20 | 15 | 10 | 0  | 0  | 0  | 0  | 0  |
| R Round-up CW      | 60  | 50 | 40 | 35 | 30 | 25 | 20 | 15 | 10 | 5  |
| R Round-up Phone   | 60  | 50 | 40 | 35 | 30 | 25 | 20 | 15 | 10 | 5  |
| Summer 1.8MHz      | 40  | 35 | 30 | 25 | 20 | 15 | 10 | 5  | 0  | 0  |

5. Points gained by stations using the same callsign entering two or more of the 10 individual contests will be totalled and a table published in *Radio Communication*.
6. Club stations. To be eligible for inclusion, a club station must be operated by the same single operator during each contest. In the event of a club station meriting an award, the award will be made to the operator concerned and not to the club.
7. Awards. The winner will receive the G2QT trophy. A certificate will be awarded to the runner-up.

## Affiliated Societies Team Contest 1978 rules

There is no significant change to the rules for this year's event—the timing remains 1300-1700gmt. Entrants are invited to forward comments on the rules and the contest with their logs.

1. The general rules for RSGB hf contests published in the January 1977 issue of *Radio Communication* will apply.
2. When. 1300-1700gmt, Sunday 15 January 1978.
3. The Affiliated Societies Team Contest is a competition between teams of stations, each team representing an RSGB affiliated society. Each such society is encouraged to enter as many stations as it can, but its placing will be determined by the aggregate scores of the five highest scoring stations in its team.
4. (a) Eligible entrants. Each operator must be a member of the society he represents, but need not be a member of the RSGB.  
(b) Each station may be single- or multi-operator, but no operator may use more than one callsign during the contest period.  
(c) All stations representing a society must be operated within 25 miles of the normal society meeting place.  
(d) No station may represent more than one society.

(e) A society may enter more than one team. In the case of a society with national coverage, eg RNARS, each team may define a different society meeting place, but this should be a place of recognizable significance, eg a naval base. For all purposes other than the indication of affiliation each such team entry will be considered to be entirely separate.

5. Contacts. CW (A1) only in the band 3,510-3,590kHz.
6. Exchanges. RST, serial number commencing with 001, and "AFS". Stations active during the contest but not submitting an entry are requested not to send "AFS".
7. Scoring. Five points for each contact; plus five points for each "AFS" received subject to confirmation by corresponding log entry.
8. Logs. Column 5 to be headed "AFS received".
9. Entries. (a) Each individual entry shall conform to the general rules. All such entries from one society are to be sent in one package to: RSGB HF Contests Committee, c/o D. Thom, G3NKS, 37 Whittington Road, Benhall, Cheltenham, Glos GL51 6DB (packages underpaid and bearing postage-due stamps are liable to be returned to the sender).

(b) Each package must include a declaration signed by an officer of the society that each entrant is a member of that society.

(c) Packages must be postmarked not later than 30 January 1978.

10. (a) An individual entry will be invalid if more than 20 per cent of the points claimed are for contacts with members of the entrant's own team.

(b) If it is clear that an entrant has deliberately failed to send "AFS" to certain stations, then the entry will be disqualified and the points claimed by his team for contacts with that entrant will be disallowed.

11. Awards. (a) The Edgware Trophy will be awarded to the leading affiliated society.

(b) A certificate of merit will be awarded to the station having the highest individual score.

## RAFARS Members Contest

1300-1800gmt, 29 January.

Modes: ssb, a.m., fm, cw.

Bands and points: 3.5MHz (2), 14MHz (3), 144MHz (5).

Contest call: "CQ RAF".

QSOs to be numbered, commencing with 001.

Check lists from HQ RAFARS. Lists to be submitted by 25 February.

Books to value of £10 to the winner.

## Contests calendar

1978

|                |                      |
|----------------|----------------------|
| 15 January     | Affiliated Societies |
| 22 January     | 70MHz CW             |
| 11-12 February | First 1.8MHz         |
| 4-5 March      | 144/432MHz and SWL   |
| 11-12 March    | Commonwealth         |
| 19 March       | 70MHz Open           |
| 1 April        | 1,296MHz Open        |
| 2 April        | 432MHz Open and SWL  |
| 9 April        | Low Power            |
| 22-23 April    | 144MHz CW            |
| 6-7 May        | 432/1,296/2,304MHz   |
| 7 May          | Region Round-up CW   |
| 21 May         | Region Round-up SSB  |
| 27-28 May      | 144MHz Portable      |
| 3-4 June       | HF NFD               |
| 17-18 June     | Microwave            |
| 24-25 June     | Summer 1.8MHz        |
| 1-2 July       | VHF NFD and SWL      |
| 16 July        | 3.5MHz FD            |
| 30 July        | 144MHz QRP           |
| 13 August      | 70MHz Open and SWL   |
| 2-3 September  | SSB FD               |
| 2-3 September  | 144MHz Open and SWL  |
| October—       |                      |
| November       | 432MHz Cumulative    |
| 7-8 October    | 432/1,296/2,304MHz   |
| 14-15 October  | 21/28MHz             |
| 21-22 October  | 7MHz SSB             |
| 22 October     | 70MHz Fixed          |
| 4-5 November   | 7MHz CW              |
| 4-5 November   | 144MHz CW            |
| 11-12 November | 2nd 1.8MHz           |
| 3 December     | 144MHz Fixed         |

## Mobile rallies calendar

- 19 March 1978—White Rose Mobile Rally, Lawnswood School, Leeds. Details from G4DZL.
- 14 May 1978—East Suffolk Wireless Revival, near Ipswich. Details from G4EVN.
- 10 June 1978—Scottish Amateur Radio Mobile Rally, The Palace of Arts, Bellahouston Park, Glasgow. Details from GM4FDM.
- 11 June 1978—Elvaston Castle Mobile Rally. Details later.
- 17 June 1978—RNARS Mobile Rally, HMS Mercury. Details from G4DIU, tel Havant 79464.
- 25 June 1978—Longleat Mobile Rally. Details from G4FRG.
- 16 July 1978—Hornsea ARS Mobile Rally, Hornsea School, Hornsea, North Humberside. Details from G8KFK.
- 23 July 1978—Cornish Mobile Rally, Truro. Details from G3NKE, tel Camborne 712419.

# members' ads

These subsidized flat-rate advertisements are accepted as a service to members of RSGB. They must be submitted to 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* wrapper addressed to the advertiser, as proof of membership, and a remittance by postal order or cheque (stamps not accepted) for 75p for 40 words or less. Excess words must be paid for at the same rate of 75p for 40 words or less. They will not be acknowledged. Those not clearly worded or punctuated will be returned. No correspondence concerning this service can be entered into.

The closing date for each issue is the 1st of the preceding month, but no guarantee of inclusion in a specific issue can be given. Valid advertisements not published in the issue following receipt will be held over until the next issue.

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.

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

**Do not post to RSGB HQ or Advertising Representative.**

## FOR SALE

**R1294** microwave rx, £15. Strip chart recorder, £15. R1392 rx, £5. TF144 sig gen, £10. TF517 sig gen, £5. Furzehill xtal calibrator, 1MHz xtal, £3. VHF sig gen, type 253, £4. Buyer collects. G8BFP, QTHR. Tel 061 794 3706.

**FRG7**, as new, nine months old, manual etc, audio filter kit, £140, carriage extra. Wanted: JR500S, unmarked mint cond, manual. G3FK, QTHR. Tel Breamure 436.

**Drake R4C** rx, fitted noise blanker, 1.5kHz cw filter, additional xtls, offers. G4CHP, QTHR. Tel Swainsthorpe 470365.

**HW101** plus HP23B, set spare valves, mint, £200, no offers. 1M-4100 counter, 500MHz pre-scaler kit, £50. HD1250, £20. BLY53A, £1.50. Birketts low-noise tranny, £1.50. 23cm loop antenna, £10. 4-el quad loop for two, £6. 14-el long Yagi for 70cm, £5. UR67, FHJ-4, callers only, QQVO3-20, £1. QQVO3-10, £1. QQVO2-5, £1.50. E180-F, 50p. Valves, new, mostly Mullard. Bargains, call or see list. G3ZYL, QTHR. Tel Bracknell 22169, weekends.

**Heathkit HW32A**, 20m, ssb, tx/rx, HP23B mains psu, Trio SP5DS spkr, GH-12A mic, new pa tubes fitted, manuals, cables, all mint, £70 ono. G3XOU, QTHR.

**Unusual offer of late G2IM**. Nearly brand-new, KW2000E and KW 107, mic, cost £500 from makers trade price, used twice, original boxes, one of the last of the lot, best offer over £400. G4KD. Tel 01-959 3528, (could be seen at RSGB).

**Trio 7200G**, 10ch fitted, £125. ICS, RAE courses, £15 both, plus carriage. Baker. Tel 0245 69034.

**Pye F27** tx, AM10 rx, 144MHz base stn, 6ch, no xtls, fm, toneburst, 30W rf, in 19in rack, all wkg cond, £40 ono. Heathkit Mohican with 144MHz conv, matching 10W a.m. tx, all 12V, wkg, will split, £40 ono. Will deliver locally. G8BDM, QTHR.

**Tower 30ft** in 10ft sections, climbing steps, int tube mount, AR22 rotor, TA33JR 3-el beam, Sony 9in tv rx mains/batt, needs att. Offers. Foster, G3VOF, QTHR. Tel Ingrebourne 73366.

**Yaesu FL50B**, £65. FR50B, £65. Pye Cambridge, 3ch fm, £25 ono. Wanted: FT200 or KW2000. G4ADE. 53 Denbrook Avenue, Tong, Bradford, West Yorks. Tel Bradford (0274) 682363.

**Racal RA17 Mk2**, RA117E, HRO plus coils, 45ft mast, T4188 tx, Marconi aircraft tx, 2m transverter, AS whip, G-whip, Advance sig gen, coaxial relays, Eddystone 898 drive, meters, components, spares etc. Enquiries and callers welcome. Tel West Drayton 43694, after 6pm.

**Trio 7200G**, 5 simplex, 5 repeater ch, mint cond, hardly used, boxed, all accessories, £140 ono. G8GUH, 5 Worksop Road, Swallownest, Sheffield, S31 0WA. Tel Gerry O'Hara, Rotherham 62966, 9-5pm.

**Magnum 144/28** transverter, good cond, Microwave Modules receive converter, £85 ono. EI9D, QTHR. Tel 01(Dublin) 860635.

**T/recorder**, suit cw, £10. Bug key, £10. Chan 10 antennas (for rods), £1. Stab psu 185V 750mA, £10. Various pot, mains trans, £4. React/res bridge, lab type, maybe collectors item, £10. 75V 20kVA trans, £10. Advance sig gen, 30MHz, £25. Gramplan pa amp, 15W, £20. Plus postage, packing. G3JES. Bolton, 168 Downs Road, Canterbury. Tel 51441, evenings.

**TS520 Trio**, cw filter, spkr, £350. Trio lp filter, £10. Liner 2, little used, £110. Heath electronic keyer HD1410, £28. HM102, swr, power meter, £25. Both as new. Unused XF9A filter, both xtls. G3UC. Tel Heysham 51760.

**Ex-swl disposal**. 40kHz-31MHz, 358X Eddystone, 27-8-143MHz uhf Hallicrafter, a.m., ssb, cw, fm, £70 ono. Can separate. Rayer, Longdon Heath, Upton-on-Severn, Worcs. Tel Upton-on-Severn 2244.

**Recording tape**, super quality 1in magnetic tape, 11in dia bulk reel, contains more than enough to fill four 7in reels, in plastic case, locking lid, £2.65 incl post and packing. G3AZI, QTHR.

**Drake R4C** rx, exc cond, £330. Drake lp filter, £12. Magnum Four, 4m transverter, £90 ono. Microwave Modules 4m converter 28MHz i.f., £14. G4CNY, QTHR. Tel 0432 3237, evenings.

**Two Creed 7E** t/printers, £25 ea. Two Applied Communications Corporation, USA, telephone terminal units for above, £30 ea. G8DUF, QTHR. Tel 0704 76241.

**FT221**, KW2000, ac/psu, SR4ZA 2m tx/rx, Eddystone S640, all exc cond. Offers. G3OMK, QTHR. Tel 0509 61778.

**Mint cond stn**, FT277/FT101B cooling fan, makers' box, £339. 18AVT/WB, £39. 2m Europa B, £69. 10XY, twin feeder, 6-way polarization switch box, £20. KW 50W dummy load SO239, £10. KW E-Zee match, £15. GW4DTV. Tel Prestatyn 88358.

**Trio JR599** custom special rx, 160-2m, all modes, a.m., ssb, cw filters, £150. G8DDW, QTHR. Tel 01-858 3921.

**2200GX**, fitted 12ch, two antennas, nicads, vfo-30G, 15W pa, switchable preamp, £200. Pocketphones, on 433-2MHz, less batteries, £25. AM25B Hi-band Vanguard, £15. MC1496L double-balanced mixers, 10 for £6. Wanted: Thuline elements. G3TGF, QTHR. Tel Orpington 26802.

**KW Vespa Mk2**, pu, mic, handbook, circuit diagrams, £65. Homebrew self-contained 50W phone/cw tx, £12. Wanted: small scope b/w 6MHz, u/s one acceptable if comp. G3HOH, QTHR. Tel Luton 881020.

**Pair Pye Pocketphones**, nicads (9V, 18V), xtls for RB6, £24. Bi-fix counter, rotary spit, infra-red grill, new, £19 (worth £40 plus). 15 Chapel Fields, Swinford, Leics, LE17 6BS.

**Eddystone EC10 Mk2** rx, vgc, £110. Mosley Mustang Mk2, 3-el beam, 2kW traps, £30. Homebrew twin-paddle electronic keyer, £15. GM4FEO, QTHR. Tel Helensburgh 2539, after 6pm.

**FR50B** rx, 10 to 80m, vgc, handbook, £75. Buyer collects. Dunham, 5 King Street, Wimblington, March, Cambs. Tel 0354 740660, evenings.

**Standard C828** 2m 12ch fm tx/rx, 1W/10W, as new, used mainly as base stn, ASP antenna, gutter mount, £160. G4AJG, QTHR. Tel 01-505 7207.

**Heathkit HW12**, £50. Or exch for HW32 or good rx. G3TEP, 17 York Crescent, Alnwick, Northumberland.

**"Rad Comms"**, 1974-76, SWM 1973-76. PW 1974-76, £2 per year. Rad Constructor 1975, £1.50. Odd PE, Elektor, 20p. Buyers collect. G8KLI, QTHR. Tel 427 4678 (B'ham).

**G4ZU** 3-el beam, £10. 2m converter, 6CW4 front end, 28/30 i.f., £5. Valves 6/12V metal, valve rectifiers, 50p ea plus p/p. Ask I may have it. Bantex 2m whip, magnetic mount, 4m whip, £5 the two. G3OSH. Tel Ilminster 3349.

**JR310**, spkr, manual, £70. AR88D, fitted S-meter, Viceroy Mk4, extra half-lattice filter, manual, tog £100, separate, £45 and £65. TD2 trapped dipole 80/40, £17. Buyers collect. G4DAZ, QTHR. Tel 0234 870296, after 6pm.

**FR400S DX**, four filters, manual, mint, in carton, £185. NATO marine morse key, vernier gap adjustment, superb, brand-new, original packing, £22.. W/spaced split stator differential, 250pF each section, all brass, brand-new, £9. CD523S manual, £3. Wanted: SP600/JX. G3GUU, QTHR.

**Pye car radio**, 9 band, mw 200-500m, sw 3.1-18MHz, £15. Boot mtg FM10D, less rf bd, 4 pa coils, £5. Comdel rf speech processor, £20. Two 6V/1Ah lead-acid batteries, £2 ea. G4AKD. Tel Cambridge 46107.

**Like new**, Yaesu twins FL400 tx, FR400 rx, original cartons, perf, sacrifice, £495. G3LMH, QTHR. Tel 0962 881644.

**Liner 2**, mint cond, forced sale, £100 ono. TW communicator, top band, 12V, £30 ono. G8HSF, QTHR. Tel 061-795 8133.



**FT2FB** fitted R4-R7, 144-48, S0, S20-23, immac, £145. *Wanted:* TS7200, G3ION, QTHR. Tel Southampton (0703) 769706.

**2m**, 8 over 8, £8. 2m 8-el, £4. Brand-new UM3 mod tx, £5. Carriage extra. *Wanted:* gen cov rx, cw filter for FT101B, FL2100B linear. G4WBCA, QTHR. Tel 0792 27496, after 6.30pm.

**6ch**, 12V Ledex switch (only), ex Cambridge, £2. 50yd 75Ω coaxial cable T3278, unused, overbuy, £6 plus post. RF ammeters, 5A, 8A, used, £1.50 each plus post. Valves 866A, 807, 6L6G, 815, QQZ04-15, QQV03-20A, (ptfe bases), 5CPI and base, unused. G2BPC, QTHR.

**Astronomical** telescope 70mm dia refractor, three interchangeable eye pieces, giving 100, 40 and 25 times magnification, small finder telescope attached, moon and sun filters (sunspot counting), tripod, other accessories, £32. G3TCK, QTHR. Tel Telford 505255.

**JVC** 3060UK tv/radio/cass, as new, in box. Exch for 70cm tx/rx, Multi-U11 IC30, C430. G8BHD, QTHR. Tel Swanley 68091.

**Automatic** noughts and crosses machine, contains 29 PO relays, thousands of contact points, uniselector, three int psus, ind lamps, push buttons etc, clear perspex case to see works, £20. Buyer collects, very heavy. G3XFM, QTHR.

**IC22A**, 12ch fitted toneburst, accessories, £130. Buyer pays transport. Not now mobile. G4FKL. Tel Sunderland 73350.

**SB10U** ssb adaptor for Heathkit DX100, comp with handbook, £20. *Radio Communication*, *RSGB Bulletin*, 1960-76 comp except for two issues, odd issues 1954-9, £2 per year, plus carr. QST comp 1947-9 and 1951-9, £3 per year plus carr. *ARRL Handbook* 1953 and 1956, *Radio Communication Handbook* 3rd edn, £2.50 ea plus carr. *Wanted:* Handbooks and info on Elliott VM1020AD vhf tx/rx and Cossor 1035 Mk3 oscilloscope. G3CWW, QTHR. Tel 0484 842330.

**Low voltage** psu, sig gen mw/lw, r subtit boxes, Tradippper gdo original box, 4W audio amps, valve supply psu, 35 xtals, 60 valves, 4m rf amp valved with psu, 35m uhf coaxial new. See lists. Rose Cottage, Coalport, Salop.

**Rotators:** Stolle 2010/220, unused, £32. Stolle 3001/220, good cond, cable, £20. Stolle 2010/220, older but reliable, cable, £15. G3XJS, QTHR. Tel Holmer Green (04947) 2344.

**Tandberg** series 15 two-track reel-to-reel tape recorder, three speeds: 1½, 3½, 7½ ips, dust cover, reels of tape. G4EMW, QTHR. Tel Halifax (0422) 60279.

**Creed** 7E teleprinter, control box, psu, box of rolls, £35. Maslen BRS36106, "Broome Knowe", Dulanin Bridge, Grantown-on-Spey, Scotland. Tel Dulanin Bridge 254.

**Liner 2**, 144-100, 144-560 preamp, mic, mobile mount, £115. Trio 9R59D, £15. Microwave Modules, 2m converter, £10. Datong processor, £15. Jaybeam 8-el, 2m, £10. CDE AR20XL rotator, comp, 30ft mast, control cable etc, £35. G3ZCC, QTHR.

**Mains** trans, oil filled, many types, £2 ea. HC6U, HC18U xtals, 3-233MHz to 45MHz, £1 each. Valves 6263A, 6264A, 2C42, 2C46, 4X150D, 829s, with bases, £2 ea. RF meters, many types. *Wanted:* rx, type 208, 3 or 4-el 4m antenna. G4CXG, QTHR. Tel 0428 51394.

**Trio JR310** rx, good cond, handbook, 10AZ filter, calibrator, £75 ono. Heathkit HW7, good cond, handbook, audio filter, £35 ono. Eddystone dial 898, used, unmarked, £8. Johnston. Tel 0247 878851, evenings.

**2m** thick film pa module, Mullard 437 BGY, 150mW in, variable up to 18W out, 13-8V supply, new, £18. Codar AT5, mains psu, offers. N. Booker, 7 Howard Close, Tewkesbury, Glos GL20 8QT.

**HW32** tx/rx, 20m, Heathkit, £30 or offers. Two oscilloscopes, wkg, circuits, one homebrew, other ex-RAF, £50 or offers. You could not even buy the components for that! G4GLM, 63 The Drive, Edgware, Middx, HA8 8PS. Tel 01-958 5113.

**BC221M** psu charts, manual, phones, recently checked with dfm, vgc, £25. Pair 1132s, one wkg 88-108MHz, other faulty but comp, £5 pair. Class D wavemeter, manual, £7. MFJ audio cw filter, £10. G4ELW, QTHR.

**Hy-Gain**, 12AVQ, new, £25. BC221D, as new, £15. Valves: 6146, £3; G78, £5; new, boxed. Medco low-pass filter, 75Ω, 2kW, new, £6. Mains trans, 475-0-475V, 450mA, £5. Other shack items. G3SEF. Tel Cheslyn Hay 415369.

**Back issues** PW; Jan, June, Nov 1967, Feb, Oct, Dec 1966, Mar, Apr, May, July, Aug 1968, 35p ea incl postage. Robin Bayley, A9203, 8 Field Lane, Kemberton, Nr Shifnal, Salop TF11 9LR.

**Wavemeter**, range 160 to 220MHz, five valves, and 5MHz xtals, wooden case, full instructions, circuit, comp, £5. Griffiths, 172 Robin Hood Lane, Hall Green, Birmingham B28 0LD. Tel 021-777 5374.

**Codar AT5**, comp, ac psu, mic etc, circuit diagram, mint cond, £40. Europa, 2m transverter, comp, ext ant c/o relay, little used, mint cond, £50 ono. G6XD, QTHR. Tel Teignmouth 2611.

**Going QRT.** FT101B, very clean, no faults, £300. FL1000 linear, £60. IC22A 12ch, R7 and R5 inputs, £120. 18AVT, approx 100ft RG8U, £25. PSU, o/p 12V 10A, OK for IC22A, £20. Bantex 3λ with mag mount, slight damage, £8. G3YJD. Tel Watford 45133.

**18 AVT/WB**, 80-10m vertical, £34. Buyer collects please. Tel Barrow-in-Furness (0229) 42336.

**Drake 2B** rx, 2BQ Q mult, £180. Vespa Mk2, ac psu, £75. KW Vanguard, £15. Shure mics; 444T, £15; 401A, £4. Nombrex sig gen 31, £10. Class D, £7. AEC SWR50, £6. *RSGB Handbook*, fourth edn, £3. G3WWF, QTHR (for late G3ZWX). Tel Leeds 825519.

**FT101** Mk2, exc cond, ssb, a.m., cw, full 160m-10m, cw filter, fan, 12V dc integral psu, ideal base or mobile rig, £310. G4FTT. Tel Byfleet (09323) 44103, after 6.30pm or weekends.

**Trio JR310**, 160-10, SP5DS, LS, vgc, £65. MARC NR56 2m rx, 144-146, £38. Heathkit HW30 2m tx/rx, no xtal, £18. Prefer buyer collects, or carr extra. P. Barker, 11 Dipton Gardens, Tunstall Estate, Sunderland, Tyne & Wear SR3 1AN. Tel Sunderland 226883.

**B40** rx, vgc, manual, £20 ono. 80V commercial stabilized psu, gauss meter, test-set unit, recently re-calibrated standard voltmeter 0-160V, relays 12V 1250Ω, two and four pin c/o, 'scope tube (5FP7). Offers. G4FNL, 38 Highbank, Brighton. Tel 0273 555526.

**Datong** FL1 filter, mint, £35. 10XY 2m ant, phasing harness, £15. ARX-2 Ringo Ranger 144MHz, pair National pa valves, 6146 type, new, £7. G3ZCK, QTHR. Tel 0232 56221, ext 36, 9 to 5pm.

**SB101**, SB640, SB600, HP23, £225. SB301, cw filter, £110. SB200, £215. HP13A, £35. TR2200G, 10ch, homebrew 10W amp, mounting bracket, £120. G3AAM, QTHR. Tel 021-422 4113.

**TR2200GX**, fitted S20, S22, R7, comp with nicads, accessories, brand-new, original packing, three months old, £120. Trio JR500S and SP5D, good cond, £40. *Wanted:* KW2000, FT200 or similar tx/rx. G4PYG. Tel Tonbridge 359291.

**IC225** synthesized 144-146MHz 2m fm, mobile or fixed, auto toneburst, £160 ono. *Wanted:* Sony TC377 stereo reel to reel tape deck or similar. G3YRU, QTHR. Tel 01-998 8466.

**Europa** solid-state 2m transverter, 28-30 i.f., £50. G4BRF, QTHR. Tel Polperro 349.

**Belcom** Liner 2 Mk2, vgc, comp with accessories, £120 ono. G4EMJ, QTHR. Tel 08867 685, evenings.

**Icom** 222 cw/ssb 2m tx/rx, xtalled 144-0 to 144-8, little used, brand-new battery charger, nicads, Revco mobile ant, prefer hf, £160. G4EGW, QTHR. Tel 031-669 8844.

**FT200B**, FP200B, 18 months old, perf cond, £250 ono. G4BQV, QTHR. Tel Horndean (0705) 592629.

**TS500**, PS500, 80-10m, 180 p.e.p., ssb-a.m., exc cond, (KW E-Zee match), £175. G3MJH, QTHR. Tel Windsor 60189.

**Yaesu** FRG7, new May '77, £135. Trio MC50 dual impedance mic, wired for Yaesu equip, £18. G-whip Multimobile 71 for 10, 15, 20, with 40, 80, 160m coils, three telescopic whips, two bases, £28. G4MDHJ, QTHR. Tel 041-889 9010.

**Five**, seven or eight track paper tape punches, electro-mechanical tape readers, £11 the pair, carr extra. G8AJZ, QTHR. Tel 0274 880452.

**Xtals:** FT243-8650, 8125kHz, 50p ea. HC6U-33-95556MHz, 10-6910 MHz, 8704-605kHz, 5350-0kHz, 75p ea. HC6U wire ends-3579-545kHz, 75p ea. HC25U-34-025MHz, 75p ea. HC18U-4429-189kHz, 75p ea. HC6U-24-200MHz, HC18U-24-050, 72-525MHz, £1 ea. 150W rf transistor, 30MHz max, offers. G8CGK, QTHR.

**Yaesu** FT2FB mobile tx/rx, 10ch, fitted 144-25, 144-48, 144-60, S0, S20, S21, S22, R5, R6, R7, vgc, toneburst fitted, £120 ovno. Buyer collects or arranges carr. 31 Aldbourne Road, Burnham, Bucks. Tel Burnham 3756.

**Eddystone** S640, £20. TCS12 rx, manual, £8. Class D wavemeter, £5. Gelofo vfo 4/101, £3. RCA vvm, £5. 807 modulator, psu, £15. GEC miniscope, wobulator, £10. Buyers collect. G3DVQ, QTHR. Tel 01-660 9471.

**Liner 2**, preamp, perf, £95. *Wanted:* HF bands linear. G3RWF, 55 Fox's Covert, Fenny Drayton, Nuneaton. Tel Atherstone 4161.

**Heathkit** HW17A 2m tx/rx, fitted dual gate mosfet preamp, other modifications, new dial, Heathkit HG10B vfo, works with above, £50 ono. G8LBK, QTHR. Tel Forbury 73322.

**Trio TR7010**, immac, extra 4ch with remote vfo, used as base stn only, comp with cradle accessories, box, £150 ono. G8KAG, QTHR. Tel Sheffield 334514. (Or G5NV, QTHR. Tel Sheffield 335481.)

**Ceefax** and Oracle give you Oscar predictions, amateur radio items, the latest news and much, much more. *Wireless World* teletext decoder, wired into modern solid-state 19" colour tv, £325. G8FKL. Tel Workshop 86849.

**Going abroad**, must sell. FT101B, £315. FTV250, mint, £110. MMC144/28LO, £15. MMC432/28LO, £15. Modular Electronics 432/28 tvtr, £60. MBM46, £5. All items good wkg cond. Write, P. Bacon, G3ZSS, Brackenridge, Brocton Heights, Nr Stafford ST17 0TN.

**FDK Multi** 2700, £420. Eddystone 840, £50. R1475 rx, 2-20MHz, £15. Codar rx T28, 160-80m, £15. Modular Electronics transistorized 2m linear, mains psu, 16W, i/p, 70W o/p, £35. Microwave Modules 23cm varactor, £22. Boxed QQV06-40, £5. S. Sherratt, 32 Springfield Way, Cranfield, Beds MK43 0JN.



**AC microvoltmeter**, level L type TM3B, 15µV-500V, exc cond, £70. G8FPT, QTHR. Tel Andy, 01-504 4942.

**Meters**: 57 assorted, most 2 1/2 in round, some square, incl 7 thermo ammeters, £225 the lot. Buyer collects or pays transport. Might suit club for re-sale to aid funds. G3RWY, QTHR.

**Heathkit HP-13B** mobile psu, £28. Hustler mobile ant, mounting spring, 80, 40, 20, 15m coils, £20. 240V 3A Variac, £3. 220/110V 5A isolation trans, £4. TE-15 gdo, £10. All above onco. G4EIP, QTHR. Tel 0522 65675.

**Selling** quartz crystal clocks, cmos divider, ic driving hands via pulse motor, 2in dia face, takes few mA at 9-12V, wkg, less outer case, £4. 4CX250s, ex eqpt, £2. All post paid. Adamson, "Woodend", Victoria Road, Kingsdown, Deal, Kent CT14 8DY.

**FRG-7**, new and vgc, fine tuning, original packing, £140. **Wanted**: KW2000B, ac psu mic. A. R. Butler, 1a Elm Grove, Upper Hale, Farnham, Surrey, GU9 0QE. Tel Farnham 25835.

**DX100U** Heathkit tx, covering 160 to 10m, 150W input on cw and a.m., wkg order, clean cond, £30. G3FIE, Tel Leicester 773870.

**RTTY stn**: Creed 54RP and 7B, 2F reader and tuning unit, control unit covering all above, *Teleprinter Handbook*, rolls of paper and tape, all for £75. Going overseas. G5YD, QTHR. Tel Shanklin 3750.

**Heathkit DX60B** tx, matching vfo, as new, 80-10m, 90W input, cost £160, offers? B40D rx (min valves), immac wkg cond, S-meter, £65. B40A rx, wkg, £25. AM10D Cambridge, less rf board, otherwise comp, £10. G3ZOH, QTHR (Kent). Tel Biggin Hill 71342.

**SSR-1** Drake rx, as new cond, £120 onco. **Wanted**: 50-100kHz coil pack, type J for HRO mx rx. G4AVE, QTHR. Tel Merstham (Surrey) 2971, evenings.

**Liner 2**, £100. QM70 2W 28/144 transverter, £35. MM 5W a.m. tx, £12. 70cm tripler, £7. Carr extra. G8HPD, QTHR. Tel Wheathampstead 3307.

**Pye Cambridge FM10B** 6ch, comp, auto t/b, xtals, S0, £45. Starphone SF1 on SU8, charger BC1 and batteries, £55. Xtals HC6U, 4-01333, 6-035, 8-012, 8-0375, 8-04855, 8-7825, 10-245MHz, £1 ea. QQVO3-10s, new, 75p ea. QQVO3-20s, new, £1.50 ea. P&P extra, all items. G8CPB, QTHR.

**Components and units**: accumulation clearance! Meters (analogue and digital), capacitors, transistors, ics, connectors, displays, relays (incl coaxial), switches, ferrites, coils, psus, transformers, motors, leds, valves, manuals. New/used. Eight pages, 700 items, stamp appreciated. 114 Green Lane, Sunbury-on-Thames, Middx.

**FT101E**, cw filter, mobile mount and G-whip, £390. FV101B vfo, £50. Emoto rotator, 102LBX, mast mounting bracket, £47. Osker SWR200, pwr/swr meter, £15. All as new and little used. G3KNJ, Tel Watford 44069, after 6pm.

**Codan PR40** transistorized pre-selector, £6. Heathkit HW7 tx/rx, £30. Trio 9R59DS, matching spkr, £40. G3AHO, QTHR. Tel 01-684 4405.

**7010**, as new, £140. Pye Ranger 2m a.m. tx, tunable i.f., 4-6MHz, £12. Ex-RAF 1540, 2m, £9. Heathkit RG1 rx, £12. No52 set, psu, £10. G8BCU, QTHR. Tel 061-437 4851.

**Yaesu** matching separates FR101, FL101 (processor), mint, view London, demonstrate, cost £721, accept first £500. OS8B/U 3in scope, £20. UHF sig gen, £6.50. Brand-new 3-500Z valves, £30. Tel 01-568 1331.

**FT200**, FP200, fully xtalled, 10 with QM70 transistor transverter, comp stn, 80-2m, hardly used, comp for £260. G3ZVC tx/rx board, comp for £35. Kokusai filter, xtals, £7. AR22 controller, £6. G3CDJ, QTHR. Tel 0604 35508, evenings.

**Eight bamboos**, 12ft, for quad, price £7. G4DMS, QTHR. Tel Towcester (0327) 50632.

**Trio 9R59DS** gen cov rx, fitted integral Sentinel 2m converter, marker oscillator, stabilizer, £55. Telford TC7 tunable i.f. 28-30MHz, bandsearcher module, £35. G4CTZ, QTHR. Tel Derby (0332) 71875.

**TR2200GX**, eight months old, S0, S20-23, R4-7, R6R, nicads, charger, case, £140. 2N6081 pa, £12. PSU/plinth and base mic, £15. 2-el, zl, special, £3. Whole package, £160. G8FKC, QTHR. Tel Radstock 4216.

**IC240**, all accessories, orig packing etc, immac cond, very little used, under guarantee, £150. Gone multi-mode. Jaybeam 10Y/2m Yagi, new, unused, £10. Buyers collect. G8MES, Tel Sheffield 389229.

**ZVC** ssb board with QC1246AX, comp, no time to finish project, £40 onco. Saxon SA100 100W audio amp, psu, £25. HSC Morse records handbook, £2. **Wanted**: HW32A, HW12A, HP23A, KW77, FR50B. G4CVA. Marsh Cottage, Shepherds Lane, Southwold. Tel 723759.

**SB104**, SB604, new unopened kits, save nearly £70 on current price, delivered Midlands or London area, £495. G3RJS. Tel 01-878 5442.

**Antennas**: 70cm MBM46, £10; 2m 8Y, £5; Group C tv MBM46, £5; FM band 8Y, £7; (Both these brand new). 20wpm Morse course, £1.50. All onco, prefer buyers collect antennas. **Wanted**: 4CX250 chimney. G4GED, QTHR. Tel 01-575 1454, after 6pm.

**Trio TR7200G** fm 2m tx/rx, fully xtalled, 10 repeaters, simplex S15 thro' S24, S32, S0, mic, mobile mount etc, going multi-mode, £195 onco. G8AUL, QTHR. Tel 0484 712719, after 6pm.

**FT101**, matching vfo fan, cw filter, spkr, as new cond, 160m, £300. Multi 2000, as new cond, £200. G4BQF, QTHR. Tel Canvey Island 62394.

**IC202**, 12 months old, as new cond, 2m ssb rig, £135 or part exch, cash adjust, for FT221R or TS700. G8KOM, QTHR. Tel Littlewick Green 2453.

**FT220**, good cond, £190. AT5 and mobile psu, T28 rx, G-whip, £45. Skywood CX203 comm rx, £45. Sanyo 11XA-670 portable rx, £18. G4DVJ, QTHR. Tel Southend (0702) 46629.

**TR7200G**, fitted 11ch, virtually new, all accessories, auto toneburst, £130. G3KAJ, 15 Linden Grove, Hatwood Park, Chorley, Lancs. Tel Chorley 71343.

**Trio TS510**, PS510, matching remote vfo 5D, ssb/cw filters, mic, vgc, KW E-Zee match, £180 onco, carr extra. G4ARL, QTHR. Tel Hitchin (0462) 55054.

**Panda** hf tx, cw, a.m., 150W, £20. Yaesu YO100 monitorscope, £80. Johnson 20hp outboard s/shaft with remote gear change, £275. Tel Kirkburton 2744.

**Liner 2**, pre-amp, vgc, £115. DJ9ZR 2m ssb tx, XF9A filter, vxo, 12-24V inv, £25. Pye Boot Cambridge, 6 ch, all xtalled, all accessories, £35. Various bits and pieces. Phone for details. G8FRA. Tel Coventry 415815.

**Yaesu FTD401** 560W p.e.p. tx/rx, cw filter, mic, spkr, manual, £250 onco. Hayes, Beckford Farm, Saint Peter, Bungay, Suffolk. Tel 098 682 265.

**4CX250B** uhf ptf bases, £3.50. Transistorized fm 2m rx, R5 xtal, £14. Londex type 50Ω coaxial relays, N-type plugs, £6. Collins cw filter F455F05, £6. 12V nicads: 225mAh, £1.50; 0-8Ah, £3; 2 Ah, £5. 12V 0-5A variable stabilized psu, £4. All good ex equip, carr extra. G8ENI, QTHR. Tel Cheslyn Hay (0922) 415374.

**Garex** 2-mobile Mk2, 6ch, 145-0 MHz supplied, also vfo 12V or mains speaker, £80. Extra xtals 8MHz, HC6U, £1.50 ea. Buyer collects. G8HBO, QTHR. Tel 01-399 8196.

**Heath RA1** rx, £25. Teletype 15, tuning unit, all supplies in neat rack, £40. Akai X1800 SD tape recorder (stereo), all speeds, plus eight track, hardly used, £110. G3PBQ. Tel 021-373 2282.

**Trio 2200W** 2m fm pa, unused, £30 onco. Xtals: HC6U, 2020-83, (S20); 2021-527 (S22); 6058-333, 6062-5 (S20); 6064-58 (S22); 9056-017 (144-9); 9053-125 (144-85); 9087-5 (145-40); 9093-75 (145-50); 9096-87 (145-55); £1.20 ea. G2CDX, QTHR. Tel 0603 20097.

**Yaesu FT75**, ac psu, dc psu, vfo, £160. Trio JR500S rx, £60. KW Vanguard tx, £15. Hudson base on 4m, £7.50. Heath HW30 2m tx/rx, £15. Ex-army vhf portable, £10. Codan PR30 preselector, £2. G4AXA, QTHR. Tel 01-857 3639.

**TF144G**, £10. Freq meter TS69A/AP 341-1,000MHz, cal charts, £25. VTVM TF1041, £20. CT38 elect t/meter, £20. Creed 75/RP tx, psu, £35. 13A variac, £12. CV psu, 25V at 8A, £12. G4DVH, QTHR. Tel St. Helens 53018.

## WANTED

**On behalf of** ex-G Canadian amateur: *T and R Bulletins* from about 1936 to 1939, with articles by or about late Brian Groom, GM6RG. Complete copies, or photostat copies of articles. Details and offers to G2UX, QTHR.

**Plug-in** modules for Redifon GR410/T as follows: ssb gen/demodulator, i.f. unit, audio unit; must be wkg, in good cond. G4JY, Tel Kinner 3467.

**Surplus** conversion handbook, manual for D1 Advance sig gen, manual for AT5 Codar tx, buy or copy. Mains psu for AT5. G8HCF, QTHR.

**Circuit** or manual of early Viceroy, cw filter for TS510, good quality Morse key. All replies acknowledged. ZS2GH, 87 Verwoerd Road, Uitenhage, South Africa, 6230.

**£25 offered** for good CR100, must be mint, unmodified, later model. For sale: five RG-240A (GU-50), £1 ea plus post. G3EGC, QTHR. Tel 0204 51502.

**Xtals** 3in-pin between 7017 to 7070kHz, or possible 3in-pin types any size/shape. Offers to G2DWH, QTHR.

**Eddystone** mod 990R vhf communications rx, must be first class, no junk. G2HIX, QTHR. Tel 0246 6215, evenings.

**KW2000E** and KW1000 or similar combo; Swan 350, 500 or 700; Datong FL1 filter; 2m QRO linear; 70cm QRO linear; psu or psu/modulator unit for LG300. G3AZI, QTHR.

**Moving** coil meter for Airmec valve voltmeter type 712, or comp instrument, valves type ECC 807. Will collect. G8IHA, QTHR. Tel Derby 880506.

**DX100U** or LG300, good cond. G3RSF, QTHR. Tel Harlow 21043, after 6pm.

**Mu-metal** screen for DG7-36. G3YOZ, QTHR. Tel Danbury 2710.

**Manual** or circuit plus mains psu for R216 vhf rx. G4DJB. Flat 2, 18 Western Elms Avenue, Reading.

**Matching** modulator/psu for Labgear LG300 tx unit, good cond please. G3JFC, Tel Crayford 522489.

**KW2000B** or KW2000E, must be good cond, similar tx/rx considered, cash waiting. R. D. Hawke, G4FPG, Basque Close, Hastingleigh, Nr Ashford, Kent TN25 5JB. Tel Elmstead 312.

**Trio** TS520 tx/rx, first class cond essential. G3WEX. QTHR. Tel 021-354 4265.

**EA52 valve**. Beales, 2 Wood Close, Tostock, Suffolk IP30 9PX.

**HRO 10m** and 20m bandspread coils. Urgent. G2VF, QTHR.

**HQ1 Minibeam**. G4DBV, QTHR. Tel 021-427 1684.

**Xtals** in holders, with fundamental frequencies in ranges 7000 to 7025, 8000 to 8002, 14000 to 14050kHz. Offers to G2WS. 2 Fairway Close, Weston-super-Mare.

**Info exch** with enthusiastic experimenters of consistent long distance uhf contacts, 70cms or tv, particularly concerning parabola dishes, low noise amplification, diversity reception, allied topics not available via text books. E15CD. Des Walsh, Ballyllynch, Carrick-on-Suir, Eire.

**Quality** morse key, heavy type, and gdo. Also 'scope and two-tone oscillator for monitoring ssb output. All letters answered. G3WXT, QTHR.

**SB200** linear, must be mint, prefer factory-built model. Price and details to GW3TMP, QTHR. Tel 035-287 846.

**Collins** mechanical filter for 75A-4 6kHz F455J-60 for a.m. reception, Collins part number 526-9091-00. All letters acknowledged. GM4AGS, QTHR. Tel Newport-on-Tay 3113.

**Two** Pye Bantam fm battery packs, (battery cond unimportant). Ex-army 62 set, wkg order. Manual or circuit (or copy) of Heathkit SB10 ssb adaptor (USA version). Cheap or poor rx for young swl. G4GCB, QTHR. Tel Burscough 892416.

**Telequipment** D75 oscilloscope or similar modern portable with same spec, urgently needed. Exch Philips video recorder, or pay cash, your choice. 69 Vicarage Road, Watford, Herts. Tel Watford 31601.

**RTTY** perforator or reper, repairable non-wkg unit considered, must be cheap. Also unpunched paper tape manual for Solartron 'scope, type CD614, and valves type Z759. Details and prices to G3NPF, QTHR. Tel Horsham 66290.

**FR50B**, in good wkg cond. Bergius, Firbank, Kilmory Road, Lochgilphead, Argyll. Tel 0546 2738.

**KW2000B**, AR88LF, both good wkg cond. G5RM, QTHR.

**Sony** TV-306UB, mains/batt, any cond, plus raster or monitor, transistorized, not over 9in. Tel 01-648 5895.

**RX**, ham band or gen cov. Also tx or tx/rx, all-band; psu for R1475; 2A3 valves; vertical antenna; HC6U xtals, 8+MHz; wavemeter; info on Collins R278/B rx. G3HVI, 46 Golborn Avenue, Meir Heath, Stoke-on-Trent, Staffs.

**TV** 70cm equipment or components, linear amplification milliamps to watts, preferably solid-state. Circuits or details of 33/39MHz i.f. modulator and conversion to 70cm. Recent copies *BATC News*, for copying. Des Walsh E15CD, Ballyllynch, Carrick-on-Suir, Co Tipperary, Eire.

**TX-type** tuning capacitor 500pF (3kV); morse key, Air Ministry covered type (long stroke); info on Majestic 8-valve domestic radio rx C1938 (American made), mains standing model. M. Colmer, 26 Beech Avenue, Brentwood, Essex.

**External** vfo unit for Atlanta. G3RK, QTHR. Tel Wangford (Suffolk) 619.

**Special school** (G4DHD), for disabled and partially blind pupils, urgently requires the following: KW E-Zee match, swr, pwr meter, dummy load 3-band beam. Can collect. Burton, G2JR. 149 Longfellow Road, Coventry. Tel 0203 455021.

**The** Wireless Museum requires early books, magazines and catalogues. Also very old rxs, txs, components, valves, etc. Please send details to curator, G3KPO, QTHR. Tel 098-386 2586.

**HF tx/rx**, prefer remote vfo, or separates. Any good compact equip considered. For sale: Pye AM25, £10. Hudson FM118, £12. Both with control unit. G3KVX, QTHR. Tel 0264 53721, evenings only.

### Going out portable?

Many contest stations use the 4CX250B when they're out in the hills, hammering the rig 24 hours at a time. The 4CX250R is a superbly "ruggedised" version of the 4CX250B which is ideal for portable use. It will supply all the power you need—and go on doing so, hour after hour, contest after contest. We stock the '250B, the '250R and the fabulous 4CX350A plus bases and chimneys; get them now from CAMBRIAN ELECTRONICS, P.O. Box 10, Stanmore, Middx. Technical enquiries to G4FRX on 01-602 5855.

CAMBRIAN ELECTRONICS—EIMAC STOCKISTS.

## LUCKY 13-YEAR-OLD



The draw taking place for the raffle run by the Leicestershire Repeater Group at the ARRA Exhibition at Leicester. The first prize was a Drake SSR-1 receiver donated by Radio Shack Ltd, and was won by 13-year-old Martin Partridge of Great Barr.

The two OMs are G8MVG (I), the raffle organizer; and G3PVG, the Leicestershire Repeater Group's chairman; but (sadly) the YLs were not, apparently, identified by photographer Deryk Wills, G3XKX.

## KITS — RTTY — KITS RTTY — KITS — RTTY

### 3 NEW KITS

**K1** — Rtty Terminal, Unit, active filters, audio input to keying output.

**K2** — Power Supply for above.

**K3** — Hardware Kit to box above includes drilled anodised panels, meter etc.

ALL USUAL RTTY-SSTV UNITS  
STILL AVAILABLE

PLEASE SEND S.A.E. FOR DETAILS

## M.K. PRODUCTS

5 LANCASHIRE DRIVE, BELMONT,  
DURHAM

Telephones: Durham 63111, Jarrow 898239

# **DRAKE TR-4CW** RIT



## **THE FABULOUS TR-4CW TRANSCEIVER NOW WITH RIT FROM RADIO SHACK LTD.**

UK IMPORTERS OF: R. L. Drake, Astatic Microphones, Atlas Transceivers, Bearcat Scanning Receivers, Hal Rtty and Microprocessors, Nye Morse Keys, MFJ Filters, Hy-Gain Antennas, CDE Rotators, Hustler Mobile Antennas, Omega-T, Prestel Field Strength Meters.

## **TRIO at Radio Shack Ltd.**

ALSO: Jaybeam, Microwave Modules, Bantex, and all the run of the mill amateur items.

**We decline to make exaggerated claims to greatness**

**SECURICOR  
B.R.S.**



**DRAKE ★ SALES ★ SERVICE**

### **RADIO SHACK LTD.**

**188 BROADHURST GARDENS, LONDON NW6 3AY**

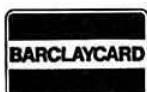
*Just around the corner from West Hampstead Underground Station*

**Telephone: 01-624 7174.**

**Cables: Radio Shack, London NW6. Telex: 23718 Radack G. Giro Account No: 588 7151.**

*Open Monday-Friday 9-5, Saturday 9-12.30. Closed for lunch 1-2.*

**HIRE  
PURCHASE**



# STEPHENS-JAMES LTD-G3MCN

47 WARRINGTON ROAD, LEIGH, LANCs WN7 3EA TEL 0942-676790

## The Communications Centre of the North West

Whether it is HF—VHF—or UHF we have a range of equipment to suit your purpose. We can supply a wide range of equipment from most of the world's leading manufacturers. It would be impossible in this space to advertise all the specifications of a quarter of the equipment we can supply. Send us 25p in stamps or P.O. and we will forward you all the information you require. If it is just a general enquiry please forward SASE. Our mail-order service is one of the finest in the country. All orders of equipment in stock are despatched the same day. Terms are C.W.O. but we are pleased to accept order on receipt of your ACCESS or BARCLAYCARD number. We ship to all parts of the world, and would be pleased to quote air or sea freight cost on orders from overseas. We can arrange HP terms with a deposit of 20% and the balance payable over 8, 12, 18, or 24 months. We have a wide range of secondhand equipment which changes daily so it is rather difficult to print a list but a quick telephone call will confirm what is available at that date. All secondhand equipment carries a three month guarantee. Carriage is extra on most items but we would be pleased to quote. Some of the carriers who promise to deliver in 24 hours often don't and they are not immune to the fact that people do drop cartons.

Our range covers all the requirements of up to date Amateur activities. Transmitters, Transceivers, Receivers, Linear Amplifiers, Antennas, Test equipment, etc and you can find on our shelves equipment, some imported direct, by ATLAS—BELCOM—COMTEK—DECCA—DRAKE—CALLETTI—G. WHIP—HY-GAIN—JAYBEAM—MICROWAVE MODULES—NOVEL—OMEGA—CDR—S.T.E.—SWAN—TECHNICAL ASSOCIATES—TRIO—YAESU, to name a few.

Our location is such that we can be easily reached from North, South, East or West. Situated on the A574 just off the A580 (East Lancs Road). Turn at the GREYHOUND MOTEL and we are about 1/4 mile on your right. NO PARKING PROBLEMS AT ANY TIME. We are 5 1/2 miles from the M6 and 6 miles from the M62.

Shop hours are 9.30 to 5.30 Monday to Friday; 9.30 to 5pm on Saturday.

### TRIO

|                                |         |
|--------------------------------|---------|
| TS820 HF Transceiver           | £645.00 |
| DG1 Digital read out option    | £127.00 |
| TS520 HF Transceiver           | £432.00 |
| TS520S HF Transceiver          | £489.00 |
| TS700S VHF Transceiver         | £542.00 |
| TR7500 VHF FM Transceiver      | £225.00 |
| PS6 Power supply               | £57.00  |
| TR7200 VHF Transceiver         | £189.00 |
| PS5 PSU with clock             | £58.00  |
| TR2200GX 3 channels            | £139.00 |
| TR2200GX 12 channels           | £169.00 |
| TR3200 70cm Transceiver        | £182.00 |
| TR8300 70cm Transceiver        | £227.00 |
| R300 General coverage receiver | £184.00 |

### YAESU

|                                |         |
|--------------------------------|---------|
| FRG7 General coverage receiver | £162.00 |
| FR101S Receiver                |         |
| FR101D Receiver                |         |
| FR101D Digital Receiver        |         |
| SP101B Speaker                 |         |
| FT101E Transceiver             |         |

POA

### DECCA

|                             |         |
|-----------------------------|---------|
| KW E-Z Match                | £32.63  |
| 3 way antenna switch        | £9.00   |
| KW103 SWR/Power meter       | £19.15  |
| KW107 Antenna Matching Unit | £95.63  |
| KW109 Antenna Matching Unit | £118.12 |
| KW Antenna Traps            | £9.56   |

### TECHNICAL ASSOCIATES

|                                   |        |
|-----------------------------------|--------|
| RX Band Pass Filter               | £27.57 |
| RX Band Pass Filter PCB Only      | £14.58 |
| RX Peak and Notch Filter          | £27.57 |
| RX Peak and Notch Filter PCB Only | £14.58 |
| Audio Compressor                  | £25.31 |
| Audio Compressor PCB Only         | £13.06 |
| Preselector Mk1                   | £29.25 |
| Preselector Mk2                   | £25.87 |
| Crystal Calibrator                | £20.52 |

### S.T.E. MILAN

Full range of Receivers, Transmitters, Transceivers for 2 metres. AR10, 28-30MHz tunable I.F. £37.50. AD4 FM discriminator £5.00. Send SASE for full details.

### MICROWAVE MODULES

Converters, Transverters, send SASE for full details.

### G-WHIP

|                                           |  |
|-------------------------------------------|--|
| HF Mobile antenna range                   |  |
| CALLETTI                                  |  |
| VHF Antenna mobile range                  |  |
| JAYBEAM                                   |  |
| VHF-UHF Mobile and Home stations antennas |  |

### BANTEX

VHF mobile antennas

### ACCESSORIES

|                                  |        |
|----------------------------------|--------|
| Single meter SWR                 | £9.50  |
| Twin meter SWR                   | £11.50 |
| 50 ohm dummy load                | £24.00 |
| Nye King Morse Keys              | £6.90  |
| HyMound Morse Keys               | £8.10  |
| Junkers Morse Keys               | £28.86 |
| Katsumi Electronic Keyers        | £60.75 |
| Antenna Insulators               | 18p    |
| SWL Tuning Units 2-30MHz         | £17.50 |
| SWL Tuning Units 550kHz to 30MHz | £23.00 |

Send SASE for full details of Rotators, antennas, etc.

Good clean equipment wanted. Spot cash paid. If you have equipment surplus to your requirements we would be pleased to sell this on commission for you.

Part exchanges always welcome.

Season's Greetings to Our Clients Throughout the World

INSTANT HP ARRANGED  
BARCLAYCARD & ACCESS  
FACILITIES

## NEW! TONE BURST GENERATOR TBG-2



★ Crystal controlled for dependable repeater access.

★ Small size, fits any transceiver. 22-54L x 12-50W x 11-60H.

Just connect in the push-to-talk line 5-15V, +ve or -ve earth. 16-way DIL package may be soldered on to a PCB or simply glued into a convenient position.

Supplied with full instructions. £8.00 each + 12 1/2% VAT, post free.

OEM enquiries invited for these and logic compatible crystal oscillators (IQXO), 240Hz-20MHz.

INTERFACE QUARTZ DEVICES LTD

29 Market St., Crewkerne, Somerset. Tel: (0460) 74433. Telex: 46283

## CRAYFORD ELECTRONICS

G8AYN

G8IWX

### ANTEC HELICAL FLEXIBLE AERIALS

We can supply a wide range for frequencies from 68-500MHz. They are constructed using a tapered copper-plated steel helix, and covered in a neoprene material, giving strength and flexibility. All are currently ex-stock.

For 145MHz:—

|          |                                       |       |
|----------|---------------------------------------|-------|
| FX2200GX | For Trio 2200GX                       | £3.25 |
| FXUHF    | With PL259 plug                       | £3.85 |
| FXBNC    | For modified 2200, 2200G, KP202, etc. |       |
| FXminTNC | For Pye PF70, etc.                    | £4.22 |
| FX500    | For Sorno 500 series                  |       |

For 433MHz:—

|           |                              |       |
|-----------|------------------------------|-------|
| FXUBNC    | With BNC plug                | £2.76 |
| FXUminTNC | For Pye PF70 UHF series      | £2.13 |
| FXU4      | With 4BA thread—modified PFI |       |

Other available, 1/4 unit coming soon for 3200GX

SAE Enquiries and lists Post 20p VAT EXTRA 12 1/2%  
6 LOVELACE CLOSE, WEST KINGSDOWN, SEVENOAKS, KENT.  
TN15 6DJ 24 Hr. Answer Service 047485 2577



# NEW !! Active Receiving Antenna

MODEL AD170

A COMPACT INDOOR ACTIVE DIPOLE FOR 60kHz TO 70MHz

Continuing our policy of constructive innovation we are proud to introduce what we think is the first broadband active dipole antenna at a price which puts it within easy reach of the Radio Amateur or short wave listener.

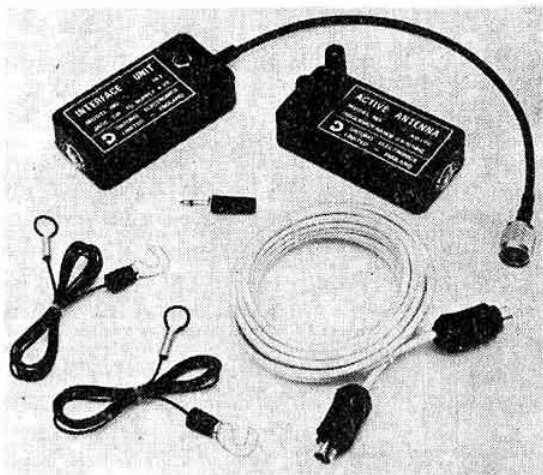
The Datong Active Antenna is designed for indoor mounting only but in all electrical respects it is in the

same league as the active antennas the professionals use, and for which they pay prices comparable to a complete amateur bands transceiver. The same performance advantages which make active antennas attractive to professionals make Model AD170 especially attractive to the amateur. They include:

- ★ Ultra broadband coverage from 60kHz to 70MHz.
- ★ Ideal for remote mounting (eg. loft or attic) since no tuning adjustments are required.
- ★ Only 3 metres long yet signal-to-noise ratios in the LF and HF ranges are comparable to those from much larger conventional antennas.
- ★ Uniform sensitivity over the full frequency range minimizes receiver intermodulation effects.
- ★ Balanced dipole configuration gives choice of polarization plus useful directivity and eliminates dependence on ground plane or earth connection.
- ★ No need for expensive accessories such as antenna tuner units or matching units.

Although active antennas give lower signal strengths than large conventional antennas, received noise levels are also lower and therefore signal-to-noise ratios are comparable when used with modern sensitive receivers.

Model AD170 is supplied complete with the accessories shown in the illustration, ie. interface unit, head unit, 4 metre coaxial connecting cable (extendable if necessary), two 1.5 metre dipole elements, spare jack plug. A separate DC power supply is required (12V at 80mA) and this plugs into the interface box and feeds the antenna via the coaxial cable. A suitable mains power unit is our new Model MPU described below.



## NEW !! MAINS POWER UNITS MODELS MPU AND MPU/I

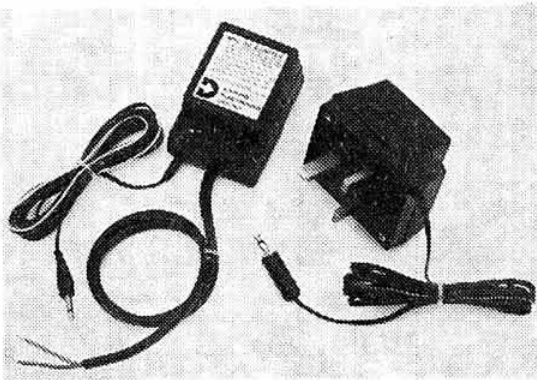
These power units are good quality mains adaptors designed and made in the UK to our specification for use with our products. They will operate Models FL1, AD170 and UC/1 from a 240 Volt AC mains supply with a minimum of fuss and a maximum of safety.

Double insulation, short circuit proof transformer, thermal cutout, and sound construction to the latest stringent safety standards take care of the safety, and a choice of fused integral 3 pin plug (specify Model MPU) or 18" mains lead (specify Model MPU/I) take away the fuss.

The output voltage is unswitched and varies from 15.5 Volts off-load to 11 Volts at 200 mA (max.) with a 240 Volt AC supply. The units will also operate Models FL1 and AD170 (but not UC/1) from a 220 Volt mains supply.

Normally a 3.5mm jack plug is fitted (suitable for AD170). If specified at the time of ordering we can fit plugs suitable for UC/1 or FL1 at no extra charge.

**PRICES (NOT INCLUDING VAT):**  
AD170 £29.50, MPU and MPU/I £5.50,  
AD170 + MPU or MPU/I special package  
price £33.00, FL1 £53.00, UC/1 £105.00,  
RFC £40.00, RFC/M £21.50.



All prices are subject to VAT at 12½%. Prices include delivery within U.K. Our other products are available as normal. Please see previous advertisements or write for more details. More data on any product plus complete price list showing accessory leads etc., available on request.

**DATONG ELECTRONICS LIMITED**

Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE.

Tel: Pudsey (0532) 552461.



# P.M. ELECTRONIC SERVICES

N.B. NEW ADDRESS

2 ALEXANDER DRIVE, HESWALL, WIRRAL, MERSEYSIDE, L61 6XT

Tel: 051-342 4443 (4.30-7.00pm)  
Cables: CRYSTAL, BIRKENHEAD. Telex: 627371

VAT—PRICES EXCLUDE VAT, WHICH SHOULD BE ADDED AT THE HIGHER RATE (12½%) FOR ITEMS MARKED (H) AND AT THE LOWER RATE (8%) FOR ITEMS MARKED (L)—OVERSEAS ORDERS (Inc. Eire and Channel Isles) NO VAT CHARGEABLE.

## 2M TX & RX CRYSTAL AVAILABILITY & PRICE CHART

| CRYSTAL FREQUENCY RANGE<br>USE (TX or RX) and HOLDER | 4MHz-TX-HC6/U | 6MHz-TX-HC25/U | 8MHz-TX-HC6/U | 10MHz-RX-HC6/U | 11MHz-RX-HC6/U | 12MHz-TX-HC25/U | 14MHz-RX-HC25/U | 16MHz-TX-HC25/U | 18MHz-TX-HC6 & 25/U | 36MHz-TX-HC6 & 25/U | 44MHz-RX-HC6/U | 44MHz-RX-HC25/U | 48MHz-TX-HC6 & 25/U | 52MHz-RX-HC25/U | 72MHz-TX-HC25/U |
|------------------------------------------------------|---------------|----------------|---------------|----------------|----------------|-----------------|-----------------|-----------------|---------------------|---------------------|----------------|-----------------|---------------------|-----------------|-----------------|
| 144-030                                              | b             | b              | b             | b              | b              | b               | b               | b               | b                   | b                   | b              | b               | b                   | b               | b               |
| 144-4/433-2                                          | a             | b              | b             | b              | b              | b               | b               | b               | b                   | b                   | b              | b               | b                   | b               | b               |
| 144-480                                              | b             | b              | b             | b              | b              | b               | b               | b               | b                   | b                   | b              | b               | b                   | b               | b               |
| 144-800                                              | b             | b              | b             | b              | b              | b               | b               | b               | b                   | b                   | b              | b               | b                   | b               | b               |
| 144-850                                              | b             | b              | b             | b              | b              | b               | b               | b               | b                   | b                   | b              | b               | b                   | b               | b               |
| 145-000/SO                                           | a             | a              | a             | a              | a              | a               | a               | a               | a                   | a                   | a              | a               | a                   | a               | a               |
| 145-050/R2T                                          | a             | a              | a             | a              | a              | a               | a               | a               | a                   | a                   | a              | a               | a                   | a               | a               |
| 145-075/R3T                                          | a             | a              | a             | a              | a              | a               | a               | a               | a                   | a                   | a              | a               | a                   | a               | a               |
| 145-100/R4T                                          | a             | a              | a             | a              | a              | a               | a               | a               | a                   | a                   | a              | a               | a                   | a               | a               |
| 145-125/R5T                                          | a             | a              | a             | a              | a              | a               | a               | a               | a                   | a                   | a              | a               | a                   | a               | a               |
| 145-150/R6T                                          | a             | a              | a             | a              | a              | a               | a               | a               | a                   | a                   | a              | a               | a                   | a               | a               |
| 145-175/R7T                                          | a             | a              | a             | a              | a              | a               | a               | a               | a                   | a                   | a              | a               | a                   | a               | a               |
| 145-200/R8T                                          | a             | a              | a             | a              | a              | a               | a               | a               | a                   | a                   | a              | a               | a                   | a               | a               |
| 145-300/S12                                          | b             | b              | b             | b              | b              | b               | b               | b               | b                   | b                   | b              | b               | b                   | b               | b               |
| 145-350/S14                                          | b             | b              | c             | b              | b              | b               | b               | b               | b                   | b                   | c              | c               | b                   | b               | b               |
| 145-400/S16                                          | b             | b              | a             | a              | a              | a               | a               | a               | a                   | a                   | a              | a               | a                   | a               | a               |
| 145-500/S20                                          | a             | a              | a             | a              | a              | a               | a               | a               | a                   | a                   | a              | a               | a                   | a               | a               |
| 145-525/S21                                          | a             | a              | a             | a              | c              | a               | a               | a               | a                   | a                   | a              | a               | a                   | a               | a               |
| 145-550/S22                                          | a             | a              | a             | a              | c              | a               | a               | a               | a                   | a                   | a              | a               | a                   | a               | a               |
| 145-575/S23                                          | a             | a              | a             | a              | c              | a               | a               | a               | a                   | a                   | a              | a               | a                   | a               | a               |
| 145-600/S24                                          | a             | a              | a             | a              | c              | a               | a               | a               | a                   | a                   | a              | a               | a                   | a               | a               |
| 145-650/R2R                                          | b             | b              | b             | a              | b              | b               | b               | a               | b                   | a                   | b              | a               | b                   | a               | b               |
| 145-675/R3R                                          | b             | b              | b             | a              | b              | b               | b               | a               | b                   | a                   | b              | a               | b                   | a               | b               |
| 145-700/R4R                                          | b             | b              | b             | a              | b              | b               | b               | a               | b                   | a                   | b              | a               | b                   | a               | b               |
| 145-725/R5R                                          | b             | b              | b             | a              | b              | b               | b               | a               | b                   | a                   | b              | a               | b                   | a               | b               |
| 145-750/R6R                                          | b             | b              | b             | a              | b              | b               | b               | a               | b                   | a                   | b              | a               | b                   | a               | b               |
| 145-775/R7R                                          | b             | b              | b             | a              | b              | b               | b               | a               | b                   | a                   | b              | a               | b                   | a               | b               |
| 145-800/R8R                                          | a             | a              | a             | a              | a              | a               | a               | a               | a                   | a                   | a              | a               | a                   | a               | a               |
| 145-95                                               | a             | b              | a             | a              | a              | b               | b               | b               | b                   | a                   | b              | b               | b                   | b               | b               |

PRICES: (a) £2.36, (b) and (c) £2.90 + VAT (H).

AVAILABILITY: (a) and (c) stock items, normally available by return (we have over 4,000 items in stock). (b) Four weeks normally but it is quite possible we could be able to supply from stock. N.B. Frequencies as listed above but in alternative holders and/or non-stock loads are available as per code (b).

ORDERING: All we require to know is (1) Output frequency, (2) Crystal frequency range, (3) The holder, and (4) Either the load capacitance (pfs) or equipment. It is not essential to give the exact frequency, though it would be of assistance to quote it if known.

### JAPANESE AND AMERICAN EQUIPMENTS

With the ever increasing popularity of Japanese equipments we have further expanded our range of stock crystals. We can now supply for YAESU (FT2F, FT2FT, FT2 Auto, FT24), most of the ICOM range and the TRIO-KENWOOD range. We can also supply from stock crystals for the HEATHKIT HW202 and HW17A.

YAESU FT21 CRYSTALS NOW IN STOCK, ALL AT £2.90 + VAT (H). All popular channels—For repeater use advise xtal frequency required as earlier models have different shift xtals to later FT21R. We can also supply the crystal to give NORMAL "tune to RX" working (as FT21R) For 70 cm we can supply the 1.6 MHz shift xtal for direct use with a MICROWAVE MODULES MMT432/144 which we can supply for £13.90 + VAT (H). SPECIAL OFFER! If ordered with transverter 70cm shift crystal FREE!

### RACAL COMMUNICATIONS RECEIVER RA-117E

Communications Receiver Racal RA-117E, Frequency Range 1-30MHz in 30 Bands 1MHz wide. Effective Scale Length 145ft 6in corresponds to 100KC/S. Power 100-125 or 200-250 a.c. Internal Speaker. Crystal Filter. Bandwidth 100Hz to 13kHz in six bands, with S-Meter, Two IF stages. Slow Motion BFO, uses 27 Valves (BG7 and BG9). As new condition, with handbook and circuit (in metal louvered case) £300.00. (Carriage approx £10). All our sets are bought direct from the Govt. All are bench tested and checked in our own workshop before despatch, for full Calibration. Send SAE only for any enquiries. Trade terms on quantities. Working demonstration on Ritty etc, in our works by appointment.

Racal MA197B Selector-protector. Good used condition £35, or in metal louvered case £50. Carr. £10.

**JOHNS RADIO 424 Bradford Rd, Batley, Yorks. Tel: 0924-478159**

### CRYSTALS FOR THE NEW BRITISH 70CM CHANNELS

We are stocking the following channels RB0 (434-60/432-00), RB2 (434-65/433-05), RB4 (434-70/433-10), RB6 (434-75/433-15), SU8 (433-20), RB10 (434-85/433-25), RB14 (434-95/433-30), SU18 (433-45) and SU20 (433-50)—TX and RX for use with: PYE UHF Westminster (W15U), UHF Cambridge (U10B), Pocketfone (PF1) and STORNO CQL/CQM 662 all at £2.36 plus VAT (H). For the U450L Base Station we have the TX crystals for all the above channels plus the RX crystals for SU8 and RB14 also at £2.36 plus VAT (H). The RX crystals for RB2, RB4, RB6, RB10, SU18 and SU20 for use in the U450L Base Station, together with the TX and RX crystals for the remaining SU channels (SU12-433-30-RTTY, SU18-433-40 and SU22-433-55) for all the above equipments are available at £2.90 plus VAT (H) delivery as per class (b) 2m items.

### 4m CRYSTALS FOR 70.28MHz—HC6/U

TX 8-7825MHz and RX 29-7800MHz .. .. at £2.36 each + VAT (H)  
RX 6-7466MHz .. .. at £2.90 each + VAT (H)

10-245MHz "ALTERNATIVE" I.F. CRYSTALS—£2.36 + VAT (H). For use in PYE and other equipments with 10-7MHz and 455kHz I.F.s to get rid of the "birdy" just above 145-0MHz. In HC8/U, HC18/U and HC25/U.

CRYSTAL SOCKETS—HC8/U, HC18/U and HC25/U (Low loss) 16p each + VAT (H) + 10p P. & P. per order (P. & P. free if ordered with crystals).

### CONVERTER/TRANSVERTER CRYSTALS—HC18/U

All at £3.00 + VAT (H). 38-666MHz (144/28), 42MHz (70/28), 58MHz (144/28), 70MHz (144/4), 71MHz (144/2), 95MHz (342/52), 95MHz (1,296/432 144), 101MHz (432/28), 101-50MHz (434/28), 105-666MHz (1,296/28) and 116MHz (144/28).

### CRYSTALS SPECIALLY MANUFACTURED FOR AMATEUR USE TO CUSTOMERS REQUIREMENTS

Now supplied to our new improved amateur specification (temp. tol.  $\pm 30$ ppm 0-60°C. adj. tol.  $\pm 30$ ppm) as follows: In HC8/U 1.5-2MHz £3.95 + VAT (H) and HC6/U 2-105MHz and HC18/U and HC25/U 4-105MHz £3.00 + VAT (H). Delivery usually 4-6 weeks. Please give circuit conditions (i.e. load in pf etc.) when ordering. Fundamentals (1-5-21MHz) will be supplied to 30pf circuit conditions, and overtones (21-105MHz) to series resonant conditions unless otherwise specified. For details of closer tolerance crystals please send S.A.E.

### TEST EQUIPMENT FREQUENCY STANDARD CRYSTALS—

100kHz In HC18/U, £2.95 + VAT (L).  
1MHz and 5MHz In HC6/U and 10MHz and 10-7MHz In HC6/U and HC25/U, £2.90 + VAT (L).

### BURNS ELECTRONICS

We are the Northern Appointed Agents for BURNS KITS etc. and can supply most of their products from stock.

### MODULAR COMMUNICATIONS SYSTEMS

For the RTTY enthusiast we can recommend and supply the "MCS" range of products. This includes terminal units, AFS keys, magnet drivers for TTL interface, telegraph distortion measuring adaptor, RTTY audio processor, power units, etc. etc. For the CW man we have the "MCS" CW filter which gives three stages of active filtering. Please send S.A.E. for full details of the "MCS" range.

### ANZAC MD-108 DOUBLE BALANCED MIXER

5-500MHz supplied with full details for only £5.95 plus VAT (L).

### CRYSTALS FOR PROFESSIONAL USE

#### CRYSTALS TO COMMERCIAL SPECIFICATIONS

We can supply crystals to most commercial and MIL specifications, with an express service for that urgent order. Please send S.A.E. for details or telephone between 4.30-7pm and ask for Mr. Norcliffe.

TERMS: CASH WITH ORDER—MAIL ORDER ONLY—S.A.E. WITH ALL ENQUIRIES—PRICES INCLUDE P. & P. (BRITISH ISLES) EXCEPT WHERE STATED—OVERSEAS CHARGED AT COST.

## SALE! SALE! SALE! EX HIRE EQUIPMENT

### FDK Multi-II

2 metre 10 channel plus auto-scan plus tone burst, usual price £219 **SALE £178**

### MICROWAVE MODULES

70 cms. 144 to 432 transverter usual price £149 **SALE £125**

70 cms. 28 to 432 transverter usual price £109 **SALE £90**

2 metre Mosfet Pre-amp usual price £14.60 **SALE £12.50**

2 metre 144 to 128 Mosfet Converter usual price £24.75 **SALE £17**

All include VAT and carriage **SAE for details**

### BOOTH HOLDINGS BATH

(Incorporating Ham Hire and Rent-a-Rig) (Member of TAFA)

6 Golf Club Lane, Saltford, Bristol T12730. G3XOD, G3NXU after 7pm Saltford 2402. G8DPH Windsor S1767 after 7pm.



## LEE ELECTRONICS LTD

ESTABLISHED FOR MORE THAN TWO DECADES

01-723 5521

CLOSED THURSDAYS

G8JVL

400 EDGWARE ROAD, PADDINGTON, W.2

LONDON'S LARGEST STOCKISTS OF YAESU  
SPECIALISTS ● STANDARD ● ICOM ● ANTENNA  
● JAYBEAM ● REVCO ● QM70 ● ETC

### SPECIAL EXCLUSIVE OFFER

Perspex Dust Covers designed and manufactured by us to keep your Yaesu equipment in mint condition. Suitable for Models FT101, 101B, FL101, FR101, FT201, FT101E, FL2100, FT277, FT238A, FRG7, etc. Price £4.00 each inc. VAT. Carriage 45p.  
FT301, FT221, FT220, FT620, £3.00 each inc. VAT. Carriage 45p.

## YAESU MUSEN PRICES FREE DELIVERY WITHIN U.K.

|                              |      |                                  |         |                              |        |                                |         |
|------------------------------|------|----------------------------------|---------|------------------------------|--------|--------------------------------|---------|
| FT301 T/RX 1-8-30, 100W 12V  | £485 | FT221R 2m, "All mode"            | £339    | FR101DD Digital readout 'D'  | £480   | YC501 Dig. Display 101 & 401   | £110    |
| FT301D Digital Readout '301' | £585 | FT227 10W, 400ch mobile, digital | £167.50 | SP101B External speaker      | £15.50 | YO301 Monitor scope            | £123.50 |
| FT301S 10W PEP '301'         | £340 | FT223 T/RX 2m, FM 23 ch, 12V     | £139.50 | FL101 T.X. 1-8-30MHz 230V    | £325   | YO100 Monitor 2 tone osc       | £118.00 |
| FV301 External VFO           | £62  | FTV250 Transverter 2m 12/230V    | £139    | FL2100B Linear 1-2kW PIP     | £248   | YP150 Dummy load/wattmeter     | £44     |
| FP301 PSU/speaker            | £79  | YD844 Desk microphone            | £18     | FT101EE T/RX 1-8-30 AC/DC    | £408   | FP50DX Low pass filter         | £15.25  |
| FP301D FP301 + Clock, Ident  | £125 | FR101S Rx 1-8-30, 12/240V        | £299    | FV101B External VFO          | £62.75 | QTR24 World time clock         | £13.00  |
| FT200B T/RX 3-5-30           | £249 | FR101D DeLuxe 'S' BC, FM         | £390    | FC301 Antenna Tuner unit     | £79    | YD846 Hand Mike                | £7.50   |
| FP200B AC PSU/speaker        | £34  | FR101SD Digital Readout 'S'      | £387    | YC500E 500MHz 0-02 P.P.M.    | £285   | SIG80R T/RX, 2m, FM 80 x 25kHz | £195    |
| FRG7 RX-5-30 cont. AC/DC     | £145 |                                  |         | YC500S 500MHz Counter 1 PPM  | £225   | 12V                            | £195    |
|                              |      |                                  |         | YC500J 500MHz Counter 10 PPM | £155   | YV35SD 220MHz Counter AC/DC    | £139    |

ALL + VAT 12½% EXCEPT MONITOR SCOPE, CLOCK, COUNTER, WATTMETER, + 8%

### MICROWAVE MODULES DESPATCHED TO ANY PART OF THE WORLD POST FREE

|                                          |      |                               |     |                        |     |                                                     |     |
|------------------------------------------|------|-------------------------------|-----|------------------------|-----|-----------------------------------------------------|-----|
| MMT144/28 Transverter                    | £79  | FREQUENCY COUNTERS            |     | CONVERTERS             |     | ATV435/51 converter                                 | £24 |
| MMT432/28, Transverter                   | £97  | MMD 050, 50MHz counter        | £52 | MCC70, 4m converter    | £18 | MCC1296 converter 28 or 144MHz IF                   | £28 |
| MMT432/144, Transverter                  | £133 | MMD 050/500MHz counter        | £79 | MCC70/LO, 4m converter | £20 | All 2m converters can be supplied                   |     |
| MMP 12/3 Power supply 12V, 3A stabilized | £50  | Divide by 10 prescaler, 500p. | £25 | MCC144, 2m converter   | £18 | with IF outputs of 2-4-12-14-18-28MHz.              |     |
| MMT 432/28S Transverter                  | £119 | VARIABLES                     |     | MCC144/LO 2m converter | £20 | 70cm models with IF outputs of 28-14-18- or 144MHz. |     |
| MMT 432/144R Transverter                 | £151 | MMV 1296, 23cm varactor       | £30 | MCC432, 70cm converter | £24 |                                                     |     |

ALL MICROWAVE MODELS SUBJECT TO VAT IN U.K. 8% ON FREQUENCY COUNTERS, ALL OTHER MODELS 12½%

### A.S.P. MOBILE AND BASE STATION ANTENNAS

|                         |        |                            |       |                                    |        |                                                                         |  |
|-------------------------|--------|----------------------------|-------|------------------------------------|--------|-------------------------------------------------------------------------|--|
| Asp201, 1w 2m mobile    | £3.25  | Asp393 1w 3dB 2m mobile    | £17   | Asp E462 70cm 3dB mobile           | £7.23  | Special offer A.S.P. A680 U.K.                                          |  |
| Asp2009, 3dB 2m. mobile | £5.95  | Asp no hole boot mount     | £3.70 | Asp E667 70cm 5dB mobile           | £16.90 | 6dB 144/148MHz Co-linear                                                |  |
| Asp629 1w 3dB 2m mobile | £7.60  | Asp magnetic mount         | £8.95 | Asp A659 UK 70cm 5dB, base antenna | £15.45 | Power handling 350w. Length approx. 12ft. List £51 special offer £41.50 |  |
| Asp677 3dB 2m mobile    | £13.50 | Asp cutter clip less cable | £3.85 |                                    |        |                                                                         |  |

All above prices + VAT at 8% carriage free

#### ICOM RANGE

|                   |         |
|-------------------|---------|
| IC215 2m          | £144    |
| IC202 2m SSB      | £152.90 |
| IC22A 10W Mobile  | £145    |
| IC240 10W Mobile  | £176    |
| IC245E 10W FM/SSB | £352    |
| IC211E 10W FM/SSB | £470    |

All transceivers + 12½% VAT

#### STANDARD RANGE

|                 |      |
|-----------------|------|
| C146 2m H/held  | £118 |
| C860 10W Mobile | £130 |
| C826 10W Mobile | £159 |

#### KYOCUTO DIGITAL II

|                        |      |
|------------------------|------|
| 10W mobile 400CH Tx/rx | £235 |
|------------------------|------|

#### J-BEAM ANTENNAS

ALL MODELS IN STOCK

#### F.D.K. RANGE

|                          |      |
|--------------------------|------|
| Multi U1 70cm mobile     | £221 |
| Multi 11-2m mobile       | £184 |
| Multi 2700 Fm/ssb. Tx/rx | £435 |

#### HELICAL ANTENNAS

|                              |            |
|------------------------------|------------|
| 2m with 13 NC                | £3.85 each |
| 2m with ph 259               | £3.85 each |
| 2m for IC215.                |            |
| Trio 2200 Gx, standard C146A | £3.25      |
| All + post 25p. + 12½% VAT.  |            |

#### ICOM ACCESSORIES

|                        |                  |
|------------------------|------------------|
| Extals S21 or S22      | £4.50 pr.        |
| ER Case 202/215        | £6.67            |
| Mobile Bracket 202/215 | £10.23           |
| Helical Antenna        | £3.25, p & p 25p |

#### J.V.L. 6dB CO-LINEAR

DC grounded, low angle radiation pattern, fully adjustable for max gain and min SWR £29.00 + £1.50 p & p All above items + VAT 12½%



## FRG-7-DIGITAL-DISPLAY

Yes. The world famous FRG-7 is now available with digital read-out fitted by Lee Electronics in place of kHz dial ... Special Price £180 + VAT

For customers who already own FRG-7's we can supply the digital read-out complete with installation instructions £37.00 + VAT

FRG7 Digital £180

FRG7 with analogue dial £145.00

FR7 Perspex cover as illustrated £3.50

All plus 12½% VAT

### SE HABLA ESPANOL

WILL CUSTOMERS KINDLY NOTE WE WILL BE CLOSED FOR STOCKTAKING FROM 4 to 16 JANUARY INCLUSIVE  
FREE PARKING AT REAR OF SHOP

# GAREX (G3ZVI)

## BRITISH MADE V.H.F. EQUIPMENT

### TWOMOBILE

### FOURMOBILE

Companion units for 2 or 4 metres. They feature Tx, Rx and PSU for 12V DC input in a single unit 12 x 8 x 4". Full coverage tunable AM/FM Rx with excellent V.F.O. stability even under mobile conditions. Professional grade sensitivity AND selectivity. Crystal controlled AM/FM Tx, with superb audio quality. Based on popular R/T components for ease of servicing and ready availability of spares. Comprehensive handbook and low-cost after-sales service. Prices: **Twomobile £135; Fourmobile £121.50** (inc. VAT).

We stock the popular **NR56VF-1** 2m Rx., with switched 144-146MHz V.F.O. and 11 xtal controlled channels, idea for fixed, portable or mobile use. Built-in L.S., 12V DC operation. **£54** inc. VAT. (xtals **£2.50** each). **NOW WITH IMPROVED V.F.O.—EXCLUSIVE TO GAREX.**

An s.a.e. brings you full details of any of the above. Credit facilities available and part-exchanges welcome.

### NEW COMPONENTS:

**Relay** GPO type 3000, 152 coil, pull-in current approx 200mA. 1M + 1B contacts, ideal for psu cut-out. **80p** each, 5 + : 70p.

### Integrated circuits (full spec.)

723 voltage reg. TO5 metal case, 2/37V out at 150mA for 5/40V in **75p**  
 SN7660 FM quadrature detector **75p**  
 CD4001 AE quad. 2-input NOR gate for tone-burst gen. **25p**  
 NE555 Timer for tone-burst gen. or time-out indicator **55p**  
 709 (To5); 741 (DIL8) Op Amps **30p** each.

### Rectilinear pots

multiturn, preset, p.c. mtg.  
 10, 20, 25, 100, 250, 500, 2.5k, 35p each, any 5 + : 25p

**BNC 50ohm free sockets.** 20p each; 12 for **£1.45**; 50 for **£4.90**.

**Neons** Panel mounting, type JH8, 8mm hole, 240V, red, amber or clear; 35p each, any 5 + : 30p, 10 + : 27p.

**Miniature**, wire end 8p each, 10 + : 6p, 100 + : 4p.

**L.E.D.'s** Panel mounting, type JH5, 6.5mm hole, red: 48p, green or amber: 72p Any 5 + , less 10%.

**Logic probe** type JH 320, **£11.95**.

**Resistor Kits.** E12 series, 22Ω to 1M, 57 values, 5% carbon film, 1/4W or 1/2W (please state). **Replenishments available**

**Starter pack**, 5 each value (285) **£2.95**  
**Mixed pack**, 5 each 1/4W + 1/2W (570) **£5.40**  
**Standard pack**, 10 each (570) **£5.40**  
**Giant pack**, 25 each (1425) **£13.25**

**PL259 UHF Plugs** + reducer 68p each, 5 + : 60p.

**SO239 UHF Socket panel mtg.** 55p each, 5 + : 45p

**NICAD RECHARGEABLES**—physically equivalent to zinc-carbon types.  
 AAA(U16) **£1.64**; AA(U7) **£1.15**; C(U11) **£3.07**; D(U2) **£4.94**; PP3 **£5.20**.  
 ANY 5 + : less 10%; ANY 10 + : less 20%.

**Slide switches**, min. DPDT 18p each; 5 + : 14p. 2 pole 3 position 22p each; 5 + : 18p

**Toggle switches**, min. full range SP thro' to 4P C/O; see list.

**GAREX FM detector conversion** ready assembled with full fitting instructions. Tailor made, easy-fit design for AM Cambridge, replaces squelch board with minimum of other modifications. **£5.40**, Transistor Vanguard (AM25T) version with modified squelch circuit, **£5.94**.

**FM/AM facility** requires SPCO switch or relay.

**CRYSTALS FOR 10 METRES**: (HC25U) 28.500MHz Tx plus 28.045MHz for Rx (455kHz I.F.) make that "C.B." w/ legitimate **£4.50** pair.

**INTER SERIES ADAPTOR KIT.** Super value, up to 40 different combinations of BNC, UHF, N, TNC & C series connectors, male and female. Complete in PVC wallet, **£19.95**.

We are stockists of **REVCO** aerials for V.H.F.—Amateur, glider and P.M.R. band types available.

Authorised distributor for **J. H. Associates Ltd.**, professional quality switches, indicators and special products.

Lists available covering Revco & J. H. products.

### EX-EQUIP. ITEMS (GUARANTEED)

**Toroidal inverter transformers** (with circuits) **£2.80**

Input 12V DC, output 300V 200mA (doubled) **£2.40**

Input 12V DC, output 160/260V 150mA (doubled) (Ranger) **70p**

**HT choke** suitable for 2-3kHz Inverters

**Mains transformers**, multi-tap primaries

170-0-170V 90mA, 50V 50mA, 6-3V, 3-3A, 5V 2A (5-5 lb) **£2.95**

135-0-135V, 50mA, 6-3V, 3-3A **£3.40**

Auto 0-100-110-150-200-230-240-250, 200VA **£3.65**

**HT chokes**, 5H 80mA, 4H 240mA, 1-25H 350mA, 1-8H, 125mA **£1.55**

**Butterfly trimmers** large 2 x 17-5p, 2 x 10p **85p**

**10-7 IFT** (valve type) 2 1/2 x 1 1/2 square double tuned 35p; 2 for 45p; 6 for 95p

**Mobile PSU** 12V DC input (floating for + or - E) transistor inverter 170, 220 or 380V DC at 180mA, output, fully smoothed, chassis section, self-contained, fully wired and tested, with circuit. **£5.45**

As above, but partly assembled (as cut out) complete with all components, circuit, finish-it-yourself **£4.60**

**PRICES ARE INCLUSIVE OF UK POST AND PACKING AND VAT**

Mail order only. Sole address for orders and enquiries

### GAREX ELECTRONICS

7, NORVIC ROAD, MARSWORTH, TRING, HERTS HP23 4LS

PHONE CHEDDINGTON (STD 0296) 668584

6.30pm-9pm AND WEEKENDS ONLY S.a.e. with all enquiries please.

G4DSG

**D. P. HOBBS LTD.**

G3HEO

## The Component Specialists

"Yaesu" FRG7 general coverage Communication Receiver **£163.12**

**QM70** 432 & 434MHz Dual-Band Converter 28-30 **£31.50**

**QM70** 28/144 Scorpion Transverter **£109.00**

**Cobra** 2M/70 CMS FM. Transverter with Mic. Audio **£86.00**

**2 Metre** Solid-State Linear Amp. **£52.00**

**28/144** Solid-State Transverter **£60.00**

**144/28** Converter **£19.00**

**432/28** Converter **£27.00**

**Microwave Modules** 2 Metre Converters 2-4, 4-8, 28-30 MHz IF **£20.25**

**MMC** 144/28 LO 2 Metre Converter **£22.50**

**MMC** 70 4 Metre Converter any IF **£20.25**

**MMC** 432-70 CMS Converter any IF **£24.75**

**MMC** 1296-23cms Converter any IF **£28.13**

**MMA** 144, 2 Metre Pre-Amp **£14.63**

**MMT** 432/28MHz Transverter **£109.13**

**MT** 432/144MHz Transverter **£149.83**

**MMT** 144 28MHz Transverter **£88.88**

**MMV** 1296/70 23cms Varactor tripler **£33.75**

**NR56 VF1** 2 Metre Monitor receiver **£54.00**

**FDK** Multi-11, 2 metre transceiver **£199.69** 23 channel

**FDK** Multi-U11 23 channel 70cms transceiver fitted 5 repeater and 4 simplex channels Auto-Scan on 433.5, 433.2, 433.4 and 433.45MHz **£249.00**

**50K.OHM** Push-to-Talk Microphones **£5.25**

**Microwave Modules** counters 50 MHz **£66.96**

**50MHz** Counter with Built-in 500MHz Pre-Scaler **£85.32**

**500MHz** Prescaler **£27.00**

**Bantex** 2 metre Mobile aerials **£7.14**

**Bantex** Magnetic Mounts **£10.40**

**Jaybeam** aerials ALL in stock

**PRICES INCLUDE "VAT"**

PART EXCHANGE WELCOME

ACCESS OR BARCLAYCARD

**11 King Street, Luton, Beds. 20907**

**R.T. & I. offer the finest selection of first-class new and fully overhauled second-hand communications and electronics equipment in the U.K.**

- Constantly changing stocks of a vast range of equipment.
- Cash or Hire Purchase terms easily arranged.
- Part exchanges welcomed.
- We are 'spot cash' buyers for almost all electronic equipment.

Send S.A.E. for our latest list of over 50 receivers and many other interesting items.

## R.T. & I. ELECTRONICS LTD.

Ashville Old Hall, Ashville Road, London E.11 Tel: 01-539 4966

## LYE COMMUNICATIONS

**238 Stamford Road, Brierley Hill, West Midlands, DY52QE**

### Tone Burst/Timeout Timer.

Dual purpose unit provides tone burst plus timeout indication of 1/2 sec. pulses of 1750Hz. Will drive a loudspeaker or a LED. Nominally set at 53sec. Can be adjusted. Size 55 x 45mm. **£7.60**

### Tone Burst

Standard 1750Hz. tone burst. **£4.00**

### Fm. Detector

Positive or negative earth between 400kHz. and 1.6MHz. State type and frequencies. **£5.25**

All 9-15V. Guaranteed 12 months. Inclusive p & p etc. SAE enquiries.



| DIODES/ZENERS |       |      |     | SOCKETS/BRIDGES |              |    |      | TRANSISTORS, LEDS, etc. |                           |               |      |
|---------------|-------|------|-----|-----------------|--------------|----|------|-------------------------|---------------------------|---------------|------|
| 1N914         | 100v  | 10mA | .05 | 8-pin pcb       | .25          | ww | .45  | 2N2222                  | NPN                       | (Plastic .10) | .15  |
| 1N4005        | 600v  | 1A   | .08 | 14-pin pcb      | .25          | ww | .40  | 2N2907                  | PNP                       |               | .15  |
| 1N4007        | 1000v | 1A   | .15 | 16-pin pcb      | .25          | ww | .40  | 2N3906                  | PNP                       |               | .10  |
| 1N4148        | 75v   | 10mA | .05 | 18-pin pcb      | .25          | ww | .75  | 2N3054                  | NPN                       |               | .35  |
| 1N753A        | 6.2v  | z    | .25 | 22-pin pcb      | .45          | ww | 1.25 | 2N3055                  | NPN 15A 60v               |               | .50  |
| 1N758A        | 10v   | z    | .25 | 24-pin pcb      | .35          | ww | 1.10 | TIP125                  | PNP Darlington            |               | .35  |
| 1N759A        | 12v   | z    | .25 | 28-pin pcb      | .35          | ww | 1.45 | LED Green, Red, Clear   |                           |               | .15  |
| 1N4733        | 5.1v  | z    | .25 | 40-pin pcb      | .50          | ww | 1.25 | D.L.747                 | 7 seg 5/8" high com-anode |               | 1.95 |
| 1N5243        | 13v   | z    | .25 | Molex pins .01  | To-3 Sockets |    | .45  | XAN72                   | 7 seg com-anode           |               | 1.50 |
| 1N5244B       | 14v   | z    | .25 | 2 Amp Bridge    | 100-prv      |    | 1.20 | FND 359                 | Red 7 seg com-cathode     |               | 1.25 |
| 1N5245B       | 15v   | z    | .25 | 25 Amp Bridge   | 200-prv      |    | 1.95 |                         |                           |               |      |

| C MOS |      |      |      | - T T L - |      |        |      |        |      |               |      |
|-------|------|------|------|-----------|------|--------|------|--------|------|---------------|------|
| 4000  | .15  | 7400 | .15  | 7473      | .25  | 74176  | 1.25 | 74H72  | .55  | 74S133        | .45  |
| 4001  | .20  | 7401 | .15  | 7474      | .35  | 74180  | .85  | 74H101 | .75  | 74S140        | .75  |
| 4002  | .20  | 7402 | .20  | 7475      | .35  | 74181  | 2.25 | 74H103 | .75  | 74S151        | .35  |
| 4004  | 3.95 | 7403 | .20  | 7476      | .30  | 74182  | .95  | 74H106 | .95  | 74S153        | .35  |
| 4006  | 1.20 | 7404 | .15  | 7480      | .55  | 74190  | 1.75 |        |      | 74S157        | .80  |
| 4007  | .35  | 7405 | .25  | 7481      | .75  | 74191  | 1.35 | 74L00  | .35  | 74S158        | .35  |
| 4008  | .95  | 7406 | .35  | 7483      | .95  | 74192  | 1.65 | 74L02  | .35  | 74S194        | 1.05 |
| 4009  | .30  | 7407 | .55  | 7485      | .95  | 74193  | .85  | 74L03  | .30  | 74S257 (8123) | .25  |
| 4010  | .45  | 7408 | .25  | 7486      | .30  | 74194  | 1.25 | 74L04  | .35  |               |      |
| 4011  | .20  | 7409 | .15  | 7489      | 1.35 | 74195  | .95  | 74L10  | .35  | 74LS00        | .35  |
| 4012  | .20  | 7410 | .10  | 7490      | .55  | 74196  | 1.25 | 74L20  | .35  | 74LS01        | .35  |
| 4013  | .40  | 7411 | .25  | 7491      | .95  | 74197  | 1.25 | 74L30  | .45  | 74LS02        | .35  |
| 4014  | 1.10 | 7412 | .30  | 7492      | .95  | 74198  | 2.35 | 74L47  | 1.95 | 74LS04        | .35  |
| 4015  | .95  | 7413 | .45  | 7493      | .40  | 74221  | 1.00 | 74L51  | .45  | 74LS05        | .45  |
| 4016  | .35  | 7414 | 1.10 | 7494      | 1.25 | 74367  | .85  | 74L55  | .65  | 74LS08        | .35  |
| 4017  | 1.10 | 7416 | .25  | 7495      | .60  |        |      | 74L72  | .45  | 74LS09        | .35  |
| 4018  | 1.10 | 7417 | .40  | 7496      | .80  | 75108A | .35  | 74L73  | .40  | 74LS10        | .35  |
| 4019  | .60  | 7420 | .15  | 74100     | 1.85 | 75110  | .35  | 74L74  | .45  | 74LS11        | .35  |
| 4020  | .85  | 7426 | .30  | 74107     | .35  | 75491  | .50  | 74L75  | .55  | 74LS20        | .35  |
| 4021  | 1.35 | 7427 | .45  | 74121     | .35  | 75492  | .50  | 74L93  | .55  | 74LS21        | .25  |
| 4022  | .95  | 7430 | .15  | 74122     | .55  |        |      | 74L123 | .55  | 74LS22        | .25  |
| 4023  | .25  | 7432 | .30  | 74123     | .55  | 74H00  | .25  |        |      | 74LS32        | .40  |
| 4024  | .75  | 7437 | .35  | 74125     | .45  | 74H01  | .25  | 74S00  | .55  | 74LS37        | .35  |
| 4025  | .35  | 7438 | .35  | 74126     | .35  | 74H04  | .25  | 74S02  | .55  | 74LS40        | .45  |
| 4026  | 1.95 | 7440 | .25  | 74132     | 1.35 | 74H05  | .25  | 74S03  | .30  | 74LS42        | 1.10 |
| 4027  | .50  | 7441 | 1.15 | 74141     | 1.00 | 74H08  | .35  | 74S04  | .35  | 74LS51        | .50  |
| 4028  | .95  | 7442 | .45  | 74150     | .85  | 74H10  | .35  | 74S05  | .35  | 74LS74        | .65  |
| 4030  | .35  | 7443 | .85  | 74151     | .75  | 74H11  | .25  | 74S08  | .35  | 74LS86        | .65  |
| 4033  | 1.50 | 7444 | .45  | 74153     | .95  | 74H15  | .30  | 74S10  | .35  | 74LS90        | .95  |
| 4034  | 2.45 | 7445 | .65  | 74154     | 1.05 | 74H20  | .30  | 74S11  | .35  | 74LS93        | .95  |
| 4035  | 1.25 | 7446 | .95  | 74156     | .95  | 74H21  | .25  | 74S20  | .35  | 74LS107       | .85  |
| 4040  | 1.35 | 7447 | .95  | 74157     | .65  | 74H22  | .40  | 74S40  | .25  | 74LS123       | 1.00 |
| 4041  | .69  | 7448 | .70  | 74161     | .85  | 74H30  | .25  | 74S50  | .25  | 74LS151       | .95  |
| 4042  | .95  | 7450 | .25  | 74163     | .95  | 74H40  | .25  | 74S51  | .45  | 74LS153       | 1.20 |
| 4043  | .95  | 7451 | .25  | 74164     | .60  | 74H50  | .25  | 74S64  | .25  | 74LS157       | .85  |
| 4044  | .95  | 7453 | .20  | 74165     | 1.50 | 74H51  | .25  | 74S74  | .40  | 74LS164       | 1.90 |
| 4046  | 1.75 | 7454 | .25  | 74166     | 1.35 | 74H52  | .15  | 74S112 | .90  | 74LS367       | .85  |
| 4049  | .70  | 7460 | .40  | 74175     | .80  | 74H53J | .25  | 74S114 | 1.30 | 74LS368       | .85  |
| 4050  | .50  | 7470 | .45  |           |      | 74H55  | .25  |        |      |               |      |
| 4066  | .95  | 7472 | .40  |           |      |        |      |        |      |               |      |
| 4069  | .40  |      |      |           |      |        |      |        |      |               |      |
| 4071  | .35  |      |      |           |      |        |      |        |      |               |      |
| 4081  | .70  |      |      |           |      |        |      |        |      |               |      |
| 4082  | .45  |      |      |           |      |        |      |        |      |               |      |

| 9000 SERIES |     |                 |      | LINEARS, REGULATORS, etc. |      |                  |      |              |      |  |  |
|-------------|-----|-----------------|------|---------------------------|------|------------------|------|--------------|------|--|--|
| 9301        | .85 | LM201           | .75  | LM320K5 (7905)            | 1.65 | LM340T24         | .95  | LM723        | .50  |  |  |
| 9309        | .35 | LM301           | .25  | LM320K12                  | 1.65 | LM340K12         | 2.15 | LM725        | 1.75 |  |  |
| 9322        | .85 | LM308 (Mini)    | .75  | LM320T5                   | 1.65 | LM340K15         | 1.25 | LM739        | 1.50 |  |  |
| 95H03       | .55 | LM309H          | .65  | LM320T12                  | 1.65 | LM340K18         | 1.25 | LM741 (8-14) | .25  |  |  |
| 9601        | .75 | LM309K (340K-5) | .85  | LM320T15                  | 1.65 | LM340K24         | .95  | LM747        | 1.10 |  |  |
| 9602        | .50 | LM310           | 1.15 | LM339                     | .95  | LM373            | 2.95 | LM1307       | 1.25 |  |  |
|             |     | LM311D (Mini)   | .75  | 7805 (340T5)              | .95  | LM380            | .95  | LM1458       | .95  |  |  |
|             |     | LM318 (Mini)    | .65  | LM340T12                  | 1.00 | LM709 (8,14 PIN) | .25  | LM3900       | .50  |  |  |
|             |     |                 |      | LM340T15                  | 1.00 | LM711            | .45  | LM75451      | .65  |  |  |
|             |     |                 |      | LM340T18                  | 1.00 |                  |      | NE555        | .50  |  |  |
|             |     |                 |      |                           |      |                  |      | NE556        | .95  |  |  |
|             |     |                 |      |                           |      |                  |      | NE565        | .95  |  |  |
|             |     |                 |      |                           |      |                  |      | NE566        | 1.75 |  |  |
|             |     |                 |      |                           |      |                  |      | NE567        | 1.35 |  |  |

| MEMORY CLOCKS |       |  |  |  |  |  |  |  |  |  |  |
|---------------|-------|--|--|--|--|--|--|--|--|--|--|
| 74S188 (8223) | 3.00  |  |  |  |  |  |  |  |  |  |  |
| 1702A         | 6.95  |  |  |  |  |  |  |  |  |  |  |
| MM5314        | 3.00  |  |  |  |  |  |  |  |  |  |  |
| MM5316        | 3.50  |  |  |  |  |  |  |  |  |  |  |
| 2102-1        | 1.75  |  |  |  |  |  |  |  |  |  |  |
| 2102L-1       | 1.95  |  |  |  |  |  |  |  |  |  |  |
| TR 1602B/     |       |  |  |  |  |  |  |  |  |  |  |
| TMS 6011      | 6.95  |  |  |  |  |  |  |  |  |  |  |
| 8080AD        | 15.00 |  |  |  |  |  |  |  |  |  |  |
| 8T13          | 1.50  |  |  |  |  |  |  |  |  |  |  |
| 8T23          | 1.50  |  |  |  |  |  |  |  |  |  |  |
| 8T24          | 2.00  |  |  |  |  |  |  |  |  |  |  |
| 2107B-4       | 4.95  |  |  |  |  |  |  |  |  |  |  |

## INTEGRATED CIRCUITS UNLIMITED

7889 Clairemont Mesa Blvd., San Diego, CA 92111 U.S.A.  
No Minimum

All prices in U.S. dollars. Please add postage to cover method of shipping. Orders over \$100 (U.S.) will be shipped air no charge.

Payment should be submitted with order in U.S. dollars.

All IC's Prime/Guaranteed. All orders shipped same day received.

Phone (714) 278-4394 BARCLAYCARD/VISA/ACCESS/AMERICAN EXPRESS

### SPECIAL DISCOUNTS

| Total Order    | Deduct |
|----------------|--------|
| \$35 - \$99    | 5%     |
| \$100 - \$300  | 10%    |
| \$301 - \$1000 | 15%    |
| \$1000 - Up    | 20%    |

# SEM P.O. BOX 6, CASTLETOWN, ISLE OF MAN Tel. PORT ERIN (0624) 833714

## NEW! SENTINEL V.H.F. TRANSMIT POWER AMPLIFIER AND RECEIVE PRE-AMPLIFIER

A new concept in add on units to improve 2 metre performance on transmit and receive. On transmit the Power Amplifier produces a power gain of 4, up to a maximum of 12 watts in, for 48n watts out. The circuit is suitable for all transmission modes. The receive pre-amplifier has the same performance as our Sentinel or Sentinel Auto. Supply voltage is 13.6 nominal (12-15V) 5mA on receive, up to 6 amps on transmit. Size: 6" x 2" front panel, 4 1/2" deep. Sockets are SO239. Price: £53.00 + VAT = £59.62. Also available without the receive pre-amplifier at £44.00 + VAT = £49.50.

### NEW! SENTINEL TOP BAND CONVERTER

Already very popular, Top Band (Marine Band) to 20 metre converter. If you miss being able to listen on 160 metres, this provides the answer. 1.8MHz-2.3MHz in 14-14.5MHz out. Size: 2 1/2" x 1 1/2" x 3". Power 9-12V, 5mA. Price: £18.00 + VAT = £20.25.

### IN STOCK.

### NEW! THE SENTINEL AUTOMATIC 2 METRE PRE-AMPLIFIER

Contains an RF operated relay for connecting straight into your transceiving aerial co-ax. Performance: 1dB N.F., 18dB gain from selected FETs. Supply 12V nominal. Size: 1 1/2" x 2 1/2" x 4". Price: Belling Lee sockets £13.00 + VAT = £14.62. SO239 sockets £14.50 + VAT = £16.31. IN STOCK.

### THE SENTINEL STANDARD 2 METRE PRE-AMPLIFIER

Same circuit as the one above but without the RF switching. Price: £7.75 + VAT = £8.72. IN STOCK.

### THE PA3

Size only about 1 cubic inch to fit inside your transceiver. N.F. 2dB., gain 18dB. Price: £5.57 + VAT = £6.27.

### SENTINEL H.F. PRE-AMPLIFIER

These are wideband pre-amplifiers from 1-40MHz. N.F. 1dB., gain 15dB. Input and output impedances 50/75 ohms. Size: 2 1/2" x 1 1/2" x 3". Price: £7.00 + VAT = £7.87. IN STOCK.

### SENTINEL H.F. PRE-AMPLIFIER with change over relay.

Same specification as above but including a change over relay for switching straight through. This can be operated by your transceiver for direct connection in your aerial co-ax. Price: £9.00 + VAT = £10.12. IN STOCK.

### SEM "Z" MATCH

A compact and attractive A.T.U. 80-10 metres tested at 1kW into 50 ohms. Slow motion calibrated dials. Size only 8 1/2" x 4" x 7 1/2". SO239 and screw terminals for co-ax fed or wire aerials. Balanced or unbalanced. Price: £32.00 + VAT = £36.00. IN STOCK.

### SEM EUROPA C

Now includes a relay controlled by the ON-OFF switch for switching the H.F. equipment between the Europa or your H.F. aerial. i.e. NO PLUG CHANGING.

\* Receive converter—2dB N.F. 30dB gain with MOSFETS.

\* Transmit converter 200MW drive for 200W input.

\* Spurious output—80dB.

\* Size only 9" x 4 1/2" front panel, 4" deep.

Price only £100 + VAT = £112.50. IN STOCK.

Complete to plug into Yaesu equipment.

Complete power supply for Europa £45.00 + VAT = £50.62. IN STOCK.

For our Sentinel 2 metre and 70cm converters, see our previous adverts or send for full details. Our 70cm units cover 432-434 and 434-436MHz as required.

## ALL OUR PRODUCTS CARRY A 12-MONTH GUARANTEE

To order: C.W.O. or credit card. We take credit card orders from anywhere in the world, just phone or send your card number for same day service. We welcome trade enquiries from anywhere in the world. If you require more detailed information or help do not hesitate to ring or write.

# CB ELECTRONICS G3LRB G3SMI

UNIT 3, 771 ORMSKIRK ROAD, PEMBERTON  
WIGAN WN5 8AT Phone Wigan (0942) 216567

## THE BEST IN THE NORTH-WEST

Not just another new firm, but people with a wealth of technical experience and know-how relating to amateur radio techniques, requirements and servicing, who will always be pleased to advise and assist in all respects whether it be sales, service or information.

### HOW TO FIND US

From M6 Junction 26 follow signs for Wigan A577. At first traffic lights (T junction) turn right towards Wigan. At next traffic lights you are there BUT turn left, then 10 yards turn right BY TELEPHONE KIOSK and shop is slightly to your right. Plenty of parking space. Distance from motorway 1/2 mile.

From Wigan follow A577 for Skelmersdale to traffic lights at Pemberton (Ye Olde White Swan Hotel on your left). Turn right then 10 yards and right again by telephone kiosk. Distance from Wigan 2 1/2 miles. Closed Wednesday

**AT LIST PRICES**  
YAESU  
UNIDEN  
ELECTRONIC DEVELOP-  
MENTS  
J. BEAM LTD.  
HY GAIN  
C.D.E.  
BELCOM  
S.S.M.  
WESTERN ELECTRONICS  
F.D.K.

**MAIN DISTRIBUTORS OF SCS EQUIPMENT**  
2M10-80L; 80W, 144MHz amplifier.  
HF3-100L; 100W, 3-30MHz amplifier.  
DX555P; VHF counter with HF generator.  
PA144n; 144MHz Low noise pre-amp.  
SAE for details

Part exchanges welcome  
H.P. and credit terms  
S.A.E. all enquiries

# REG. WARD & CO. LTD. G2BSW G8CA

| K.W.                                                                                                | SHURE MICROPHONES                             |
|-----------------------------------------------------------------------------------------------------|-----------------------------------------------|
| 103 VSWR Meter and combined Power Meter ..                                                          | Model 444 £19.20 Model 201 £9.50              |
| 107 Combined E-Z March, VSWR and RF Power Indicator, Dummy Load and Antenna Switch for 3 outlets .. | YAESU                                         |
| KW Dummy Load. 50Ω (encased with SO239) ..                                                          | FT101E Transceiver .. £429.00                 |
| Trap Dipole Co-axial Feeder ..                                                                      | FT200B Transceiver and FP200 PSU .. £289.00   |
| 3-way Antenna Switches (for co-ax) ..                                                               | Yaesu 301D all solid state tcvr .. £599.00    |
| KW prices apply only to original stock, as new stock is liable to increase.                         | FR101 S Receiver .. £299.00                   |
| All above prices plus VAT at 12 1/2%.                                                               | FR101 D Receiver .. £390.00                   |
|                                                                                                     | FT401B .. £365.00                             |
|                                                                                                     | FT224 VHF/FM 2m Mobile Transceiver .. £148.00 |
|                                                                                                     | YO100 Monitorscope .. £118.00                 |
|                                                                                                     | FT221 .. £339.00                              |
|                                                                                                     | New G/C Receiver FRG.7 .. £144.00             |
|                                                                                                     | S.E.M. Z-match .. £28.00                      |

### USED EQUIPMENT

KW201 Rx and handbook, complete with external Heathkit "Q" multiplier, £130.00

### AGENTS FOR G2DYM ANTENNAS

Valves for Yaesu, etc., 6BZ6, 6GU8, 6KD6, 12AX7A, 12BY7A, 12AU7, 6JS6C, 6146, 6HF5, 6LQ8, 6EA8, 6GK8, 6146B, 6KD6, RCA Valves for KW equipment, etc.  
Sentinel 2m Presmps and 2m converters/Europa transverters, J Beams and Stolle rotators, 140' 14g ant. wire, Insulators, 52 & 75 ohm co-ax, and UHF plugs, sockets and reducers, G-Whip mobile antenna, Wightraps, Mast couplers. Hy-Gain verticals, SWR 10 (Twinmeter), SWR/PWR Meters.

### AMTRON KITS

TRADE INS WITH PLEASURE. OUR STOCK OF GOOD SECOND-HAND EQUIPMENT CHANGES DAILY—LET US KNOW YOUR REQUIREMENTS. Due to currency fluctuations price of imported equipment are liable to alteration. ADD 12 1/2% VAT to all prices except used equipment.

HP TERMS AVAILABLE

CARRIAGE EXTRA ON ALL ITEMS

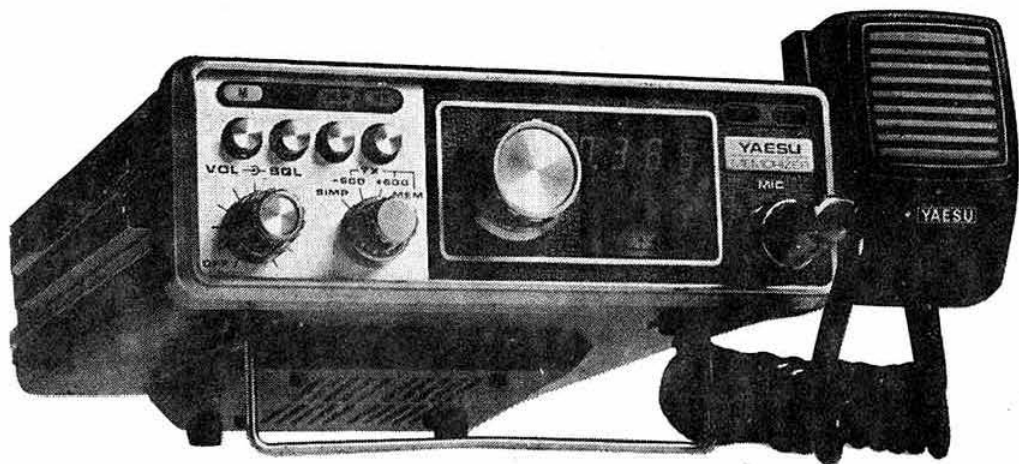
### ACCESS/BARCLAYCARD

AXMINSTER, DEVON EX13 5DP Telephone 33163



# YAESU

**proudly announces a new  
synthesised 2m FM transceiver  
FT-227R**



The world famous Yaesu state-of-the-art technique has brought computer theory into VHF communications.

**What** are the frequency splits for repeaters? Don't worry! Yaesu has computerized it. In addition to a conventional  $\pm 600\text{kHz}$  split, any transmitter offset frequency is memorized with a touch of a push-button.

**What** was my last frequency channel? Don't check! A touch of a push-button will bring you back to the memorized channel instantly.

**Why** only one knob to select a channel out of 800 channels? Yaesu utilizes a "OPTICAL COUPLING" system to select each channel in 10kHz steps and the channel may be offset 5kHz higher with a touch of a push-button. Thus 800 fully synthesized channels are provided with one knob and no rotary switches to get oxidized and noisy.

**When** will the FT-227R be available? NOW!

Many, many other features such as automatic encoder-decoder for tone guarded squelch (TGS) (optional), Tone burst accessed repeater operation, automatic final protection, busy channel indicator, high-low out-put selection, diecast front panel, and famous Yaesu quality throughout!

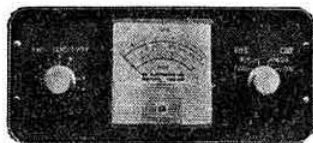
And all at a most attractive price. See your dealer today for an informative catalogue.

Amateur Electronics,  
508-514 Alum Rock Road  
Alum Rock,  
Birmingham B8 3HX

South Midlands Communications Ltd.  
S.M. House, Osborne Road,  
Totton, Near Southampton,  
Hampshire SO4 4DN

Western Electronics (UK) Ltd.,  
Fairfield Estate,  
Louth,  
Lincolnshire LN11 0JH

# Professional Performance with KW



**Decca-KW 103 Combined Swr/RF Power Meter** is an instrument for measuring a 50 ohm coaxial line feeding an Aerial System or Dummy Load (1) Standing Wave Ratio, (2) RF Power with two ranges 0-100 & 0-1000W when used with a 50 ohm Dummy Load.



**Decca-KW 1000 Linear Amplifier** for SSB and CW 10-60 metres, 1200 watts p.e.p. Input SSB, can be 'driven' by most 100 watt Transceivers and Transmitters. Employs a pair of T160L Tubes in grounded grid, Pi-section Input and output circuits. Built-in 2-4Kv P.S.U.

NOTE: The well-known KW LOW PASS FILTER passing 3-30MHz is available from stock.



**Decca-KW Dummy Load** is air convection cooled and has been designed as a purely resistive 50 ohm load up to 30MHz. Power capability up to 1000W.



**Decca-KW 107 Antenna Tuning System** incorporates E-Z match, SWR/RF Power Meter, Dummy Load, Antenna switch. High power version KW 109 is available.



**Decca-KW Balun Mk.II.** The Decca-KW Balun is broadband -3 to 30MHz, rated up to 2KW p.e.p. 1:1 Ratio. 50 ohms 'unbalanced' feed to 'balanced' output. Waterproof moulded case. Suitable for dipole and Beam aerials.

**Other KW Favourites**  
KW E-Z match; KW Traps (the original and the best) KW Trap Switch; Stockists for Hy-COR Rotators; Shure Microphones etc. KW spares are normally stocked for a minimum of five years after manufacture of equipment. Write or 'phone for catalogue.



Serving Radio Amateurs World-Wide

**Amateur Radio Products DECCA COMMUNICATIONS LTD**

Crampton Road, Otford, Sevenoaks, Kent TN14 5EA. Tel: Sevenoaks (0732) 50611

Write or phone for catalogue.  
\*Easy terms available on equipment over 12, 18 or 24 months.

## C&C electronics

10 West Park London SE9 4RQ  
Telephone 01-852 9397



### CRYSTALS

THE MADE TO ORDER CRYSTAL SPECIALISTS  
1-OFF CRYSTAL PRICES

|                            | Group |                       |        | Price  |
|----------------------------|-------|-----------------------|--------|--------|
| Fundamentals               | 1.    | 0-030 to 0-099MHz     | 100ppm | £14.25 |
|                            | 2.    | 0-100 to 0-369MHz     | 100ppm | £9.75  |
|                            | 3.    | 0-370 to 0-739MHz     | 100ppm | £10.00 |
|                            | 4.    | 0-740 to 1-499MHz     | 100ppm | £9.75  |
|                            | 5.    | 1-500 to 1-999MHz     | 30ppm  | £3.45  |
|                            | 6.    | 2-000 to 3-999MHz     | 30ppm  | £3.00  |
|                            | 7.    | 4-000 to 24-999MHz    | 30ppm  | £2.25  |
| 3rd Overtones              | 8.    | 21-000 to 54-999MHz   | 30ppm  | £2.25  |
|                            | 9.    | 23-000 to 216-999MHz  | 30ppm  | £2.95  |
| 5th Overtones              | 10.   | 55-000 to 104-999MHz  | 30ppm  | £2.95  |
|                            | 11.   | 105-000 to 119-999MHz | 30ppm  | £8.25  |
|                            | 12.   | 120-000 to 130-000MHz | 10ppm  | £12.00 |
| 5th, 7th and 9th Overtones | 13.   | 130-001 to 216-000MHz | 10ppm  | £20.00 |

Unless otherwise requested fundamentals will be supplied with 30pF load capacity and overtones for series resonance operation.

**HOLDERS** 0-030 to 0-200 MHz HC13/U, 0-170 to 196-000MHz HC6/U. 4-000 to 216-000MHz HC18 or HC25/U. Prices on application for other holders.

**DELIVERY** Groups 1 to 4, 12 and 13—6 to 8 weeks. Groups 5 to 11—4 to 6 weeks.

**DISCOUNTS** 5% mixed frequency discount for 5 or more crystals within any price group. For orders of same frequency and spec discounts start at 5 off in groups 1, 4, 12 and 13. In all other groups discounts start at 10 off. Special rates for bulk purchase schemes incl free supply of xtals for UK repeaters.

### CRYSTALS FOR POPULAR VHF TRANSCEIVERS

Crystals supplied in approx. 5 weeks to any stated frequency for the following VHF Tx's: Heathkit, Icom, Ken, Standard, Trio and Yaesu. Price £2.50 per crystal. LOW FREQUENCY STANDARDS (8% VAT) 100kHz in HC13/U. Price £2.95. 1000kHz in HC6/U. Price £2.80.

CRYSTAL SOCKETS HC6/U and HC25/U. Price 16p.

MINIMUM ORDER CHARGE £2.00

PRICES ARE EX VAT—

PLEASE ADD 12% UNLESS OTHERWISE STATED

All prices include postage to UK and Irish addresses. Crystals supplied to any specification for industrial, mobile radio or marine use, etc. State equipment/specification when enquiring. Please send see with all enquiries.

## SAMSON ETM-3C KEYERS

Professional-grade C-MOS keyers built for dependable Marine & Commercial use world-wide—Backed by Spacemark service.

Only 1 µA battery idling current! ETM-3C, £63.88

**ETM-4C MEMORY KEYER**—Has ETM-3C features plus 4 separate memories (2 combinable). Erase/Rewrite memories as often as desired. Send CQs etc. just by pressing a button!

**JUNKER PRECISION HAND KEY**, £28.64

**BAUER SINGLE-PADDE KEY UNIT**, £10.85

88mH TOROIDS for rty, cw, sstv, filters, 90p each

**SSB 90° AUDIO PHASE SHIFT NETWORKS**, octal based.

All prices postpaid and include 12½% VAT. Please send stamp with all enquiries.

## SPACEMARK LTD.

THORNFIELD HOUSE, DELAMER ROAD, ALTRINCHAM, CHESHIRE  
(Tel: 061-928 8459)

## T.M.P. ELECTRONIC SUPPLIES

### AMIDON TOROIDAL CORES

NEW SIGMA RF-2000 SWR/PWR meters similar to OSKER expected

in by time this ad appears. Price approx. £26.00

OMEGA TE7-01 noise bridges £21.00

W2AU BALUNS 1:1 and 4:1 £11.50

NYE-VIKING MORSE KEYS (Brass) £8.75

TOROIDAL BALUN KITS, Core, Wire, Data £3.35

ARCHER De-Luxe Metal Cabinets 5½" x 3" x 5½" £3.50

### USED EQUIPMENT

Liner 2 unmodified and as new £125.00

ARAC 1022m & 10m receiver £80.00

FDK TM58B monitor receiver 10ch 5 repeater 5 simplex automatic scan, 12V operation, demo only £70.00

Carriage extra on equipment, accessories post paid.

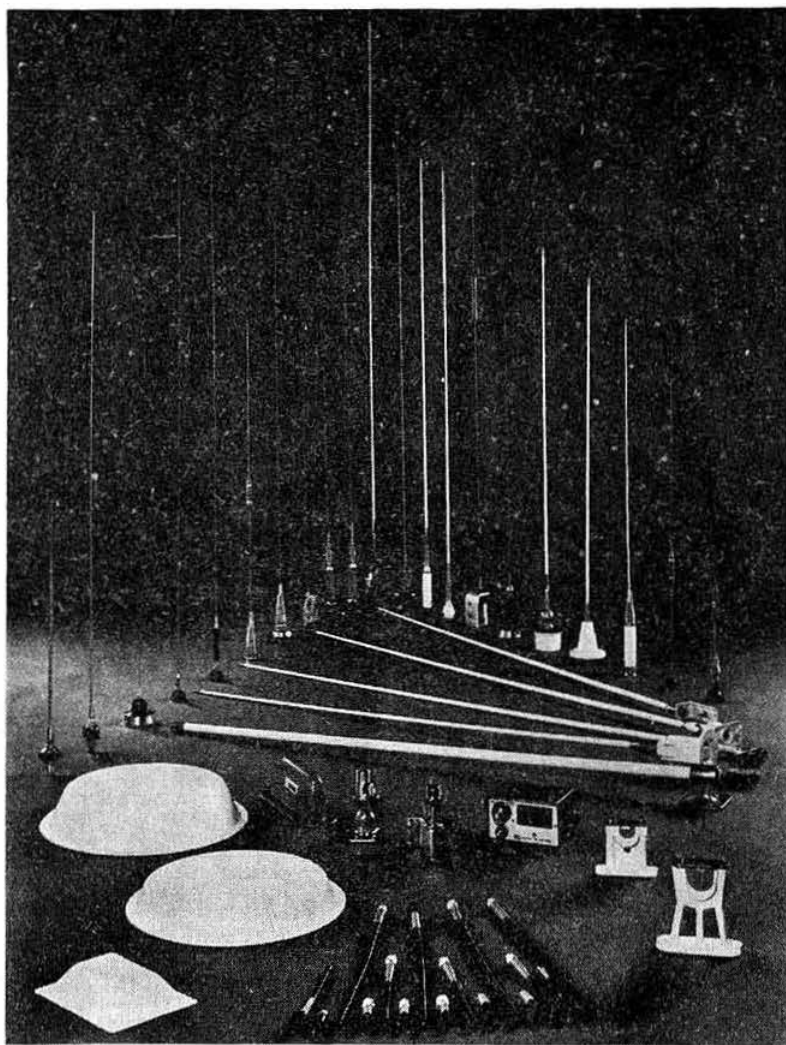
PO Box 39, Mold, Glywd, CH7 1EH, N. Wales  
Tel: Pontyodkin 846 STD 035 287



---

# Antenna Specialists UK Limited

for the widest choice for the discerning amateur



For further information regarding the Antenna Specialists range  
contact stockists listed below:

Lowe Electronics Ltd., Matlock, Derbyshire. 0629-2817

Thanet Electronics, Herne Bay, Kent. 02273-63859

Thanet Electronics, Wombwell. 0226 756229

Lee Electronics, London. 01-723 5521

Radio Shack, London. 01-624 7174

Waters & Stanton, Hockley, Essex. 03-704 6835

Amateur Radio Exchange, London. 01-579 5311

The Amateur Radio Shop, Huddersfield. 0484-20774

C.B. Electronics, Wigan. 0942-216567

Ian McKechnie, Bridge of Allan, Scotland. 0786-833223

Leeds Amateur Radio. 0532-452657

Commercial Communications, Luton. 0582-21884

Electrosearch Ltd., Winterbourne, Bristol. 0454-773968

Catronics Ltd, Wallington, Surrey. 01-669 6700

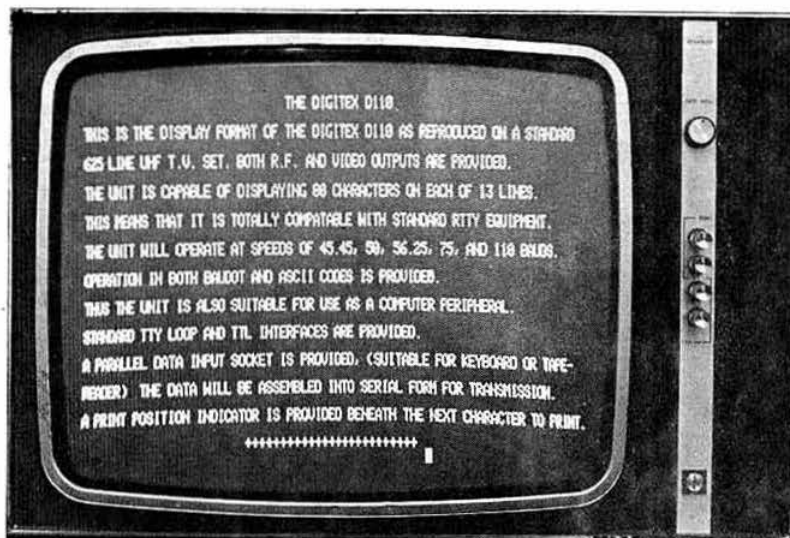
---

## ANTENNA SPECIALISTS UK LIMITED

Bandet Way, Thame Industrial Estate, Thame, Oxon. Tel: 084-421 3621/2. Telex 837206

---

# Every Picture Tells a Story!



**YOU ARE LOOKING AT AN ACTUAL UNRETOUCHED PHOTOGRAPH OF THE NEW DIGITEX D110 VDU IN ACTION—AT LAST HERE IS AN ALL-BRITISH UNIT BUILT TO THE HIGHEST PROFESSIONAL STANDARDS AND AVAILABLE AT A PRICE WHICH WILL MAKE ITS COMPETITORS GASP! A COUPLE OF STAMPS BRING FULL DETAILS BY RETURN POST**

## AMATEUR ELECTRONICS UK (SOLE AGENTS)

508-514 Alum Rock Road, Birmingham 8

021-327 1497 or 021-327 6313, telex 337045

## Commercial Communications antenna specialists

### ANTENNAS AND MOUNTING OPTIONS

**ASP 201** 1 wave 108-512MHz £2.58  
**ASP 629** 1 wave 130-174MHz 3dB gain £6.61  
**ASP 677** 1 wave 130-174MHz 3dB gain £11.95  
**ASPE 462** 1 gain 420-440MHz 3dB gain £6.50  
**ASPE 567** colinear 420-440MHz 5dB gain £14.95  
**ASP 655** 1 wave 130-174MHz 3dB gain, base station antenna £19.95  
**ASP 658UK** colinear 420-440MHz 5dB gain, base station antenna £19.95  
**K220** Mag mount with cable, fits 629, 677, 667 £7.69  
**K220A** Mag mount with cable, fits 201, 462 £7.69  
**K263** trunk lid mount, fits all £3.70  
**ASP332** gutter mount, fits 629 £7.10  
**ASPR 332** gutter mount, fits 677, 667 £7.10  
**K126** shock spring, fits 629 only £4.95  
**UR57** Coaxial cable, attn. 0-68dB/100MHz, 5-2dB/1000MHz per 10m, 50Ω £0.50 per m.  
**UR76** Coaxial cable, attn. 1-6dB/100MHz, 5-2dB/1000MHz per 10m, 100MHz, 5-2dB/1000MHz per 10m, 50Ω £0.15 per m.  
**PTT** Microphone with clip £4.95  
**322** Speaker in black/silver case £4.95  
 Add 12% VAT & 50p p+p each item

**RUN YOUR MOBILE RIG AT HOME WITH OUR**  
 13-8V d.c. stabilized psu, 3j amps. £28  
 13-8V d.c. stabilized psu, 6j amps. £35

Add 12% VAT & £2.00 p+p  
 Wall brackets 12" stand off, p+p £1.  
 Wall brackets 18" stand off, p+p £1.  
 Chimney bracket, 12", p+p £0.75.  
 Lashing kit for above (state length), p+p £0.50  
 Raw Bolts 1", p+p £0.50 per 5. £0.25  
 Guying rings 3 or 4 way, p+p £0.50  
 Guy wire per metre, p+p £0.50 per 10m £0.12  
 Guy tensioners (claw strainers), p+p £0.50  
 Guying stakes, p+p £1.00 per 3 £1.00  
 9' x 1 1/2" Mast, p+p £2.00 any quantity £3.50  
 10' x 2" Mast, p+p £2.00 any quantity £7.00  
 Terms: Cash with Order. Callers by appointment

17 Lancing Road, Luton, LU2 8JN Tel: (0582) 21884

### AMBIT international—the radio component source

Listed here is a selection of popular components for the radio constructor/enthusiast. Our latest catalogue includes more information on our AM/FM tuner modules—with all those hard-to-get bits, like coils, filters, trimmers etc.

**TOKO coils:** Ambit now holds over 200,000 in stock

AM IFTs for 455/470kHz 1st, 2nd and 3rd £0-30  
 FM IFTs for 10-7MHz Also detectors £0-33  
 Ratio discriminator coils for 455kHz or 10-7MHz £1-35  
 Tunable chokes of 2, 3.5, 7, 11-8, 23, 36mH £0-33  
 S.18 molded VHF coils: 0-09, 0-12 and 0-18μH ex-stock £0-33  
 Special molded spiral formers with two slugs and can £0-25  
 Various RF and oscillator coils—see catalogue for details.

**TOKO FILTERS:** Low cost and high performance

MFH41T/MFH71T 4 or 7kHz Bandwidth, 455kHz mechanical filters with matching transformers £1-95  
 CFT series ceramic filters for 455kHz 6 and 8kHz BW £0-55  
 2kHz 6 element mechanical filter for 455kHz SSB Tx/Rx—'MFL' £9-95  
**FOIL trimmers—Mullard and Dau types**

1-8pF, 3-30pF, 7-45pF in 7-5mm diameter: 18, 23 & 26p resp. £0-26  
 7-80pF 10mm diameter type

**VARICAP DIODES—VHF and MF/HF wide range tuning diodes**

BA102—30p; BA121—30p; BB104—45p; MVAM2—£1-35  
 NEW MVAM125: 20 to 400pF with 25V bias available in singles or sets for multi stage tracking 90p each, 3 for £2-65.

**ICs for Radio:** The best and most recent popular types:

HA1197 AM system, though suitable for SSB and NBFM IFs, 80dB AGC, meter stable to use £1-40  
 HA1137 FM IF system sim to 3089 with better mute £1-95  
 TBA651 Linear RF/IF gain block with AGC £1-81  
 TBA120 FM detector block with gain £0-75

Please remember to include VAT (usually 12-5% except where marked \*) and our flat rate 22p P&P charge. Catalogue 40p inc. Please accompany enquiries with an SAE. Price list leaflets available FOC with an SAE.

37 High Street, Brentwood, Essex, CM14 4RH

Telephone (0277) 216029 after 3pm if possible—tnx.

# J. BIRKETT

**RADIO COMPONENT SUPPLIERS**

Member of the ARRA

1K or 2.2K CARBON POTENTIOMETERS at 22p each.  
 SUB-MINIATURE AIR SPACED TRIMMERS 5p or 10p at 18p each.  
 MINIATURE 5 TURN POTENTIOMETERS 5k, 10k, 20k at £1 each.  
 DUAL 100K WW GANGED POTENTIOMETER at 50p.  
 X BAND GUNN DIODES with data at £1.65.  
 FM4 CERAMIC 10-7MHZ FILTERS at 50p each.  
 1000µF 40 V.W. ELECTROLYTICS size 1½" x 1" at 3 for 35p.  
 12 ASSORTED P CHANNEL FET'S for £1.  
 50 TANTALUM BEAD CAPACITORS assorted at £1.50.  
 TBA 120S FM I.C.'S Untested with data 6 for 60p.  
 100 MULLARD C280 CAPACITORS Assorted at 57p.  
 10 ASSORTED MULTI TURN TRIMPOTS for 60p.  
 25 ASSORTED SKELETON PRE-SET POTENTIOMETERS for 57p.  
 TRANSMITTING VARIABLE CAPACITOR 80p at £1.30.  
 COIL FORMERS ½" Dia. with core at 5p each. 6 for 25p.  
 UNMARKED GOOD 400MW ZENERS 3.3V, 6.8V, 10V, 11V, 12V, 13V, 16V, 24V, 30V, 33V, 36 Volt. All at 10 for 40p.  
 CERAMIC TRIMMERS 2.5 to 6p, 0 to 8p, 3 to 10p, 4.7 to 20p, 0 to 30p. All at 10p each.  
 TUBULAR TRIMMERS 3p, 6p, 8p, 12p. All at 5p each.  
 DAU TRIMMERS 2 to 9p at 10p, 5 to 38p at 10p, 8 to 125p at 12p, 8 to 140p at 15p.  
 5 GANG VARIABLE CAPACITOR 250 + 250 + 20 + 20 + 20p at 75p.

200 ASSORTED 1/3, ½ WATT RESISTORS for 75p.  
 UNMARKED GOOD VHF TRANSISTORS 2N 3866 at 3 for 75p, 2N 3553 at 3 for £1.10.  
 50 ASSORTED BC 107-8-9 TRANSISTORS Untested at 57p.  
 50 AC 128 TRANSISTORS Branded but Untested at 57p.  
 SPECIAL 2GHZ STRIPLINE NPN TRANSISTORS at £1 each.  
 TRANSISTORS SIMILAR TO BFY 90 But 3 Lead 2 GHZ FT at 10 for £1.  
 MINIATURE 10 x 10PF DIFFERENTIAL AIR-SPACED TRIMMERS at 22p.  
 ELECTROLYTIC CAPACITORS 20 + 20µf 450v.w., at 20p, 32 + 32µf 275v.w., at 10p, 32 + 32µf 350v.w., at 20p, 50 + 50µf 275v.w. at 15p, 3300µf 40v.w., at 50p, 4700µf 63v.w., at 60p.  
 MINIATURE ROTARY SWITCHES 2 Pole 4 Way at 20p, 1 Pole 11 way at 40p, 3 Pole 3 Way at 40p.  
 BELLING COAX PLUGS 15p each. COAX SOCKETS at 15p each.  
 MAINS TRANSFORMER 240 Volt Primary Output 10 Volt 1 amp Twice, 20 Volt 1 amp Twice at £4.50 (95p p.p.).  
 DUAL GATE MOSFET'S LIKE 40673 at 33p, 4 for £1.10.  
 ELECTRET MICROPHONE INSERT with Fet Pre-Amp at £1.25.  
 RCA CA 3089Q F.M. I.C. at £1.10 each.  
 100-0-100µA TUNING METERS 1½" x 1½" at 90p.  
 WIRE WOUND VARIABLE RESISTOR 1.2K 6 Watt at 22p.  
 30 ASSORTED 1 OXAL CRYSTALS 5200 to 7900KHz at £1.10.  
 FM FRONT END 88 to 108MHz with conversion to Aircraft Band or 144MHz at £3.  
 MULLARD FM PLUS 455KHZ IF STRIP with details for use with above unit at £4.  
 FT 243 CRYSTALS 8040, 8100KHz at 75p each, 7620, 7720, 7900, 7966-7, 8166-7, 8233-3, 8300, 8366-7, 8483-3, 8583-3, 8650, 8716-7MHz. All at 40p each.  
 50 TUNING VARACTOR DIODES Untested for 57p.  
 VERNITRON FM 10-7MHZ FILTERS Type FM 4 at 50p each.  
 DIE CAST ALLOY BOXES sizes 4" x 2" x 1" at 55p, 4½" x 2½" x 1½" at 65p, 4½" x 2½" x 1½" at 85p, 6" x 3½" x 2" at £1.15. Please add 20p for post and packing unless otherwise stated on UK orders under £2. Overseas orders at cost.

PLEASE ADD 20p FOR POST AND PACKING ON U.K. ORDERS UNDER £2 UNLESS OTHERWISE STATED, OVERSEAS ORDERS AT COST.

**25 THE STRAIT, LINCOLN LN2 1JF.**

**Telephone 20767**

## "Mosley"—the tested and proved Antennae

Send for HANDBOOK containing full details of Antennas and other technical information. 33 pages 50p. Refundable upon purchase of Antennas.

### SOME ANTENNAS

|           |                                         |         |
|-----------|-----------------------------------------|---------|
| Mustang   | 3 Elements, 10, 15 and 20 metres        | £108.00 |
| TA-33 Jr. | High Power Model incl. Balun            |         |
|           | 3 Elements, 10, 15 and 20 metres        | £98.50  |
| TA33 Jr.  | 3 Elements, 10, 15 and 20 metres        | £85.00  |
| TA32 Jr.  | 2 Elements, 10, 15 and 20 metres        | £58.50  |
| TA31 Jr.  | Rotary dipole, 10, 15 and 20 metres     | £36.00  |
| ELAN      | 3 Elements, 10 and 15 metres            | £69.50  |
| TD-2      | Trap Dipole 40 and 80 metres            | £32.50  |
| TCD-2     | Trap Dipole 40 and 80 metres compressed | £39.50  |
| V-3 Jr.   | Trap Vertical 10, 15 and 20 metres      | £26.50  |
| Atlas     | Trap Vertical 10, 15, 20 and 40 metres  | £48.00  |

### SWL ANTENNAS

|       |                                               |        |
|-------|-----------------------------------------------|--------|
| SWL-7 | Dipole 11, 13, 16, 19, 25, 31 and 49 metres   | £25.00 |
| RD-5  | Dipole 10, 15, 20, 40 and 80 metres           | £25.00 |
| Orbit | Vertical 11, 13, 16, 19, 25, 31 and 49 metres | £43.00 |

Prices correct at time of going to press.

**MOSLEY ELECTRONICS LIMITED**

Administrative Address only

(All antennas available ex works carriage and VAT extra)

196 Norwich Road,  
 New Costessey,  
 Norwich. NR5 0EX  
 ENGLAND



## Become a radio amateur.

Learn how to become a radio-amateur in contact with the whole world. We give skilled preparation for the G.P.O. licence.

Free!

Brochure, without obligation to:

**BRITISH NATIONAL RADIO & ELECTRONICS SCHOOL**

P.O.Box 156, Jersey, Channel Islands.

NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_ (Block caps please)

WAA RCK12

## FOR THE DISCERNING VHF LISTENER.

QM70 now produce what must be the most comprehensive range of VHF/UHF Receiving Converters available today. Listed below are examples from our range:

|              |        |               |        |
|--------------|--------|---------------|--------|
| 70/28MHz ..  | £19.00 | 144/28MHz ..  | £19.00 |
| 432/28MHz .. | £27.00 | 432/144MHz .. | £27.00 |

### PLUS OUR NEW DUAL BAND CONVERTERS

These Dual Band Converters have been specially designed to enable the UHF listener to listen to BOTH the 432-434MHz section and the 434-436MHz section of the 70cm band "AT THE FLICK OF A SWITCH."

|                  |        |                   |        |
|------------------|--------|-------------------|--------|
| 432-434/28MHz .. | £31.50 | 432-434/144MHz .. | £31.50 |
|------------------|--------|-------------------|--------|

All our Converters are available with either BNC or Belling Lee sockets. Please state clearly which are required at the time of ordering.

## FOR THE 2 METRE OPERATOR.

### 28/144MHz SOLID STATE TRANSVERTER.

All solid state circuitry employing high gain low spurious mixer configuration. Fully metered and LEDs to indicate tx/rx condition. Measuring 250mm x 125mm x 50mm, attractively styled. 2W output (linear and clean). Built-in ant c/o relay. The grp man's delight or use it for driving a high power linear amp. Relay contacts already built in for switching external linear. Receive side employs a superb FET converter. SO239 ant socket. Supplied complete with harness for your sab transceiver. £60.00

### SCORPION 28/144MHz HIGH POWER TRANSVERTER.

- ★ Electronically stabilised DC line to both the local oscillator and receive converter.
- ★ 116MHz crystal oscillator for spurious free reception and transmission.
- ★ Receive converter 30dB gain; 3dB noise.
- ★ Highly linearised transmit mixer.
- ★ Inductive coupling in all transmit stages ensures a clean spurious free signal.
- ★ QQV06-40A final power amplifier in a high Q circuit.
- ★ Up to 100 watts p.e.p. output.
- ★ Built in aerial change over relay.
- ★ All power and switching from your HF transceiver.
- ★ Whatever mode your hf transceiver will supply will be faithfully transverted to transmit on the 2m band.
- ★ PA current meter.
- ★ Full output even at band edges—OSCAR MEN PLEASE NOTE.
- ★ Sturdy attractive construction.
- ★ Superior ventilation gives no trouble with overheating.

£109.00

### 2 METRE SOLID STATE LINEAR AMPLIFIER

All solid state 50W rms output 2m linear amplifier. Just connect in the antenna line of your 2m transceiver and leave the rest to the built in RF sensing aerial c/o relay. Accepts FM, SSB, A.M. and CW with switchable hang-time for SSB operation. Supplied complete with DC power cord and SO239 input and output sockets. £52.00

## FOR THE 70 Cms OPERATOR.

### COBRA FM TRANSVERTER.

This unit is designed to be used in conjunction with a 2m fm transceiver to allow the operator access to the 70cm band in both simplex and repeater modes. The normal functions of the 2m transceiver are retained and 70cm operation may be achieved "at the flick of a switch." 70cm received signals are converted down in a linear manner to the 2m band. The 2m transmit signal is tripled in frequency to the 70cm band. Because the COBRA has its own built-in audio stages, frequency deviation on 70cm is pre-set from within the COBRA thus avoiding the necessity of any adjustments to the 2m transceiver.

### FEATURES

- ★ Switchable Built in Audio Amplifier and Limiter.
- ★ Tone Burst adjustable in frequency, amplitude and duration.
- ★ All Receive/Transmit/Switching accomplished by built-in RF Sensing.
- ★ Controls include 2m/70cm Switch; Tone Burst On/Off Switch; Illuminated Relative RF Power Output Meter, Microphone Input/Output Sockets.
- ★ Reverse Polarity Protected.
- ★ Fused DC Line.
- ★ Weight 1kg.
- ★ Size = 105 x 60 x 230 (all dimensions in mm).
- ★ 12V DC Nominal. (Negative Earth).

£86.00

### COUGAR FM TRANSVERTER.

This unit is similar to the Cobra FM Transverter as detailed above but does not incorporate the Tone Burst Generator and Audio stages. £60.00

Agents: Peter Avill G3TPX, Darton 2517. Gordon Adams G3LEQ, Knutsford 4040. (Both QTHR).

Amateur Electronics. Amateur Radio Exchange. Crayford Electronics. D P Hobbs. Lee Electronics. Thanet Northern. Waters & Stanton.

All prices include VAT and UK Mainland carriage. All units guaranteed for 12 months. Large SAE for full descriptive literature.

**QM70 ELECTRONICS LIMITED**

Savernside South, Bewdley, Worcestershire DY12 2DX. Bewdley 400070. Manufacturers and suppliers of VHF equipment to the Amateur and Professional user

# BREDHURST ELECTRONICS

## FOR VHF IN THE NORTH WEST

### FDK

|                                                        |         |
|--------------------------------------------------------|---------|
| MULTI II 2m FM fitted 7 channels                       | £209.00 |
| MULTI U11 70cm FM fitted 9 channels—SPECIAL OFFER—ONLY | £230.00 |
| MULTI 2700 2m all mode                                 | £489.00 |
| VFO for MULTI II                                       | £89.00  |
| AC PSU for MULTI II                                    | £63.50  |
| TM56B Scanning 2m RX fitted 10 Channels                | £25.00  |
| Quartz 16 2m FM fitted 10 channels                     | £169.00 |

### ELECTRONIC DEVELOPMENTS

|                          |         |
|--------------------------|---------|
| 2m linear 100W output    | £151.00 |
| 2m transverter 28/144    | £151.90 |
| 70cm linear 50W          | £151.90 |
| VHF absorption wavemeter | £19.00  |

### YAESU

|                      |         |
|----------------------|---------|
| FRG7 Gen coverage RX | £162.00 |
|----------------------|---------|

### ANTENNA SPECIALISTS

|                             |        |
|-----------------------------|--------|
| ASP 677 2m 1 wave           | £15.20 |
| ASP 629 2m 1 wave           | £8.52  |
| ASPE 687 70cm 5dB collinear | £19.04 |
| ASPE 462 70cm 3dB collinear | £8.15  |
| ASP 655 2m Base Stn.        | £16.27 |

### SCS ELECTRONICS

|                       |         |
|-----------------------|---------|
| 2m solid state linear | £108.00 |
| HF solid state linear | £123.75 |

|             |                          |         |
|-------------|--------------------------|---------|
| SECOND HAND | Multi-II, ex-demo model  | £180.00 |
|             | Trio JR-599 custom model | £190.00 |

HP — PART EXCHANGE — ACCESS — BARCLAYCARD

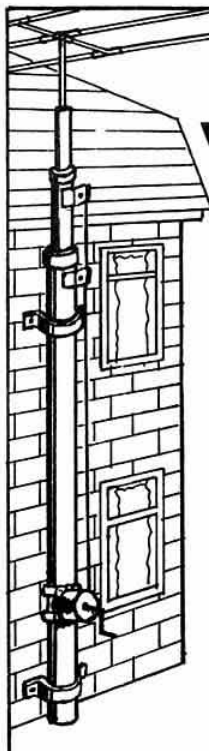
CALLERS BY APPOINTMENT

ALL PRICES INC. VAT

**WILLOWBROOK, SCHOOL LANE, BUNBURY, TARPORLEY, CHESHIRE. Tel Bunbury (0829) 260708**

Northern Distributor for Waters and Stanton G3OQT

## TELESCOPIC HILOMASTS WINCH OPERATED



These masts are hand winch operated, of robust construction and are suitable for use under inclement conditions. The sections are of aluminium alloy with fittings of stainless steel. A self-sustaining epicyclic geared winch has been selected for complete safety. Each section extends simultaneously by a stainless steel wire rope system. The sections are fitted with full length keys to prevent rotation.

They will support large 3 element antennas providing that the maximum operating heights specified in the following table are not exceeded.

| Wind speed (Un guyed) | WTM/1                  | WTM/2                  |
|-----------------------|------------------------|------------------------|
| 55 mph                | Fully extended 43 feet | Fully extended 56 feet |
| 70 mph                | Fully extended 43 feet | Retract to 43 feet     |
| 80 mph                | Retract to 36 feet     | Retract to 36 feet     |
| 100 mph               | Retract to 29 feet     | Retract to 29 feet     |

Also manufacturers of Pneumatic Hylomasts.

## HILOMAST LTD

The Street, Heybridge,  
Maldon, Essex, CM9 7NB  
Tel: Maldon (0621) 56480



**The Shop with  
the Smile!**

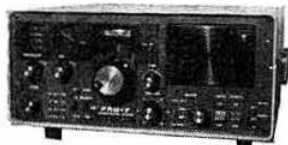
# AMATEUR RADIO EXCHANGE

Proprietors: Brenda Aptaker, Bernard Godfrey (G4AOG)



After one year's trading we send Season's Greetings to all our enthusiast friends and customers and look forward to seeing you all again soon in the New Year ... to browse ... to buy ... to have a cup of coffee and a chat either way!

## WINTER LISTENING



Also available from us with special 2m converter and accessories, all for just an extra **£17.00**

### FRG-7

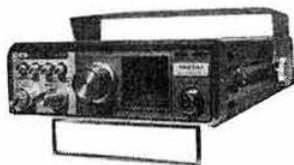
the finest general-coverage synthesised communications receiver on the market, now available in two versions.

**ANALOGUE at £162 inc VAT**  
**DIGITAL at £223.00 inc VAT**

## WINTER TRANSMITTING

### FT227R

a new era in 2m transceivers, with 400 fully synthesised channels, 5 kc spacing, memory button for recall of previous channel,  $\pm 600$  kc for Repeater or any other off-set on push-button, tone-burst, Hi-Lo power, sub-audio tone squelch, and many other features—All for just **£189 inc. VAT**

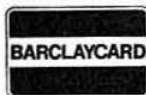


PHONE FOR DETAILS OF CURRENT STOCKS—NEW AND SECONDHAND—AND OPENING HOURS

**EASY TERMS UP TO  
3 YEARS**



**CREDIT SALES  
BY TELEPHONE**



**SECURICOR  
DELIVERY**

**2 NORTHFIELD ROAD, EALING, LONDON W13 9SY. Tel: 01-579 5311**

## G. W. M. RADIO LTD.

ALL PRICES include VAT and Post/packing

**RECEIVERS 62H.** 19" rack mounting 14 valve Aircraft Channel Receiver. Factory reconditioned as new. Covers 100-150Mc's crystal controlled but with suggested simple tunable conversion instructions. Power needed 250V DC 100 mA and 6-3V 4 amps. Very solidly built, £15.

**AIR TRAFFIC CONTROL Receivers.** Pye R120. 19" rack mounting. Xtal controlled in range 117-133 Mc/s. Speaker and AC mains supply built in, good clean condition, £13. Suitable 10 watt A.M. Transmitter by G.E.C. also rack mounted and has AC supply £15. THESE AND OTHER HEAVY ITEMS COST A LOT LESS IF COLLECTED—CARRIAGE IS VERY EXPENSIVE! i.e. the above two items £20 collected.

Manufacturers surplus major assemblies to make 430 Mc/s all-transistor Transmitter/Receiver to operate from 12V DC. Two boards, pull out aerial and speaker. Uses 2N5915 output transistor (51 watts) and is F.M. One rig already in use as Repeater station, £18.50. Circuits and instructions (also available separately) 50p.

**DPCO JENNINGS** Vacuum relays, 48v coil, new, £5.

**AIRLITE** model 62 head and boom mike sets, £5.50.

**ISOLATION TRANSFORMERS.** Double wound 0-250In, 0-115-250 out or vice versa. 250 watts. 5" x 4 1/2" x 3 1/2", weight 12 lbs, shrouded type, £4.50. **WATTMETERS.** Absorption AF No. 1 (CT44) 200 microwatts to 6 watts at 2.5 ohms to 20,000 ohms, £12.

**BC221 FREQUENCY METERS.** Complete with charts, less power supply. These are recently recalibrated, £20.

**B44 Mk 3.** 60 to 75 Mc/s xtal controlled AM, no battery lead or mike, £10. Last of the many.

**VALVE VOLTMETERS** CT208. Mains powered, 1-100v DC 1.5-150v AC. Complete probe and mains lead, £18.

**NOISE GENERATOR** CT410. 15kc/c-160MHz, 8 minute timer, 5-25-100 ma Diode Current, metered. Output impedance 10-2000 ohms, attenuator and power meter. AC mains powered, £14.

**AKG** Lightweight **HEAD & MIKE SETS**, model K58. Mike 2/300 ohms, headphones 75 ohms. Ideal for Mobile use and in excellent condition. £5.50.

**U450L** UHF Tx Rx chassis. OK for 70 cm-FM. Mains powered and complete except cabinet. £44, or Tx £27, Rx £22.

Carriage charges are for England and Wales only.

Terms: Cash with order

Early closing Wednesday

**G. W. M. RADIO LTD. 40-42 PORTLAND ROAD,  
WORTHING, SUSSEX**

Telephone 34897

## THE AMATEUR RADIO SHOP

G4MH

13 CHAPEL HILL, HUDDERSFIELD. Tel. 20774

## XTALS

**WE HAVE APPROX 4,000 HC6U XTALS TO CLEAR**  
**at 75p EA INC POST. FREQUENCIES from 3.5MHZ**  
**to 50MHZ.**  
**S.A.E. LIST**

|                                         |                 |
|-----------------------------------------|-----------------|
| Morse Key's High Speed                  | £2.65 inc post  |
| Standard                                | £1.00 inc post  |
| 3-way Antenna Switch 500w               | £5.75 inc post  |
| Lo-pass Filter 500w.                    | £3.75 inc post  |
| S.W.R. and 2 Meters SWR-PWR             | £11.75 inc post |
| S.W.R. and 1 metre switched             | £8.75 inc post  |
| K.W. Antenna Switch                     | £9.00 inc post  |
| K.W. Dipole Kit (2 traps and "T" piece) | £9.56 inc post  |
| K.W. Balun ("T" piece)                  | £9.56 inc post  |

## SECONDHAND GEAR

Heath, KW, Collins, Yaesu. SAE LIST. (Always a Good Selection)

CLOSED ALL DAY WED. LATE NIGHT THURS. 8pm



SERVICES

194a NORTHOLT ROAD, SOUTH HARROW, MIDDLESEX, ENGLAND

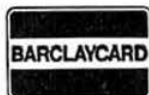
## SST T-1 RANDOM WIRE ANTENNA TUNER



**GUARANTEE** All SST products are guaranteed for 1 year. In addition, they may be returned within 10 days for a full refund (less shipping) if you are not satisfied for any reason.

All band operation (160-10 metres) with any random length of wire. 200 watt **output** power capability—will work with virtually any transceiver. Ideal for portable or home operation. Great for apartments and hotel rooms—simply run a wire inside, out a window, or any place available. Toroid inductor for small size:  $4\frac{1}{4}'' \times 2\frac{3}{8}'' \times 3''$ . Built-in neon tune-up indicator. SO-239 connector. Attractive bronze finished enclosure.

only £23.40 including VAT and carriage



TELEPHONE  
01-864 1166



## Seasons Greetings to all Radio Amateurs

We regret that there is absolutely nothing exciting about what we stock. To keep you calm, we have **Tailor-mades** such as:

Barlow-Wadley, Decca/KW, Drake, Grundig, Sanyo, Sharp, Shure & Yaesu, etc., all at normal list prices.

For the Frantic Constructor we offer:

Amtron-kits, Antex/Weller/Isotip Soldering irons, AVO and other Multimeters, CBM Calculators, Jaybeam antennae, R.S. Components, Stolle Rotors, TMK & Tech instruments, etc.

For the Studios we have:

RSGB Publications, Bernard/Babani books, World Radio Handbook, ARRL Handbook, Towers Transistor Selector, etc.

For the Prudent we have these, all tax paid, all in splendid cndx., Used,

|                      |      |                 |      |
|----------------------|------|-----------------|------|
| Drake R-4B Rx.       | £250 | Drake MS-4 L/S  | £15  |
| Drake T-4X Tx.       | £325 | Shure 44T Mic.  | £25  |
| with AC PSU          |      | Yaesu FT-75     | £150 |
| Heathkit HR-1680 Rx. | £150 | with DC-75 PSU  |      |
| Yaesu FV-50B VFO     | £28  | Trio QR-666 Rx. |      |

SAE all enquiries please. Shop hours 09.15-1300 & 14.15-17.30. Early closing Wednesday.

**L. HARDIE** (GM2FHH)  
542 George Street, Aberdeen AB2 3XL  
Tel. 0224-20113

## YOU OWE YOUR RIG A GOOD ANTENNA!

The World-famous JOYSTICK VFA (Variable Frequency Antenna) SYSTEMS continue to prove their worth in many amateur stations worldwide and in Government communication. Tunes continuously 0.5-30.00MHz and can be installed in any location. Comes in easily assembled form, carriage paid, 12½% VAT included. Glowing testimonials from many users on our files.

**SYSTEM 'A' 250w.** p.e.p. OR for the SWL £36.00

**SYSTEM 'J' 500w.** p.e.p. (Improved 'Q' on receive) £42.60

### PARTRIDGE SUPER PACKAGES

Complete Radio Stations for any Location

All Packages feature the World Record Joystick Aerial (System 'A'), with 8ft feeder, all necessary cables, matching communication headphones. Delivery Secured our risk. **ASSEMBLED IN SECONDS! BIG CASH SAVINGS!**

**PACKAGE No. 1.** As above with R.300 RX. SAVE £17.28! £210.55

**PACKAGE No. 2.** Is offered with the FRG7 RX. SAVE £12.21! £193.11

**PACKAGE No. 3.** Budgets may come and do their worst—so here is a lower-price, high-quality package, featuring the all-solid state SMC 73 Rx, with all the Partridge extras. SAVE £17.28! £154.86

**RECEIVERS ONLY,** inclusive delivery etc.

**R.300 £184.50 FRG7 £162.00 SMC 73 £128.81**

For further details, send 9p stamp.

You can phone our Access or Barclaycard number, ring 0843 62535 (or 62839 after office hours.)

**BOX 6, PARTRIDGE ELECTRONICS LTD**  
Partridge House, Prospect Road, Broadstairs, CT10 1LD  
**G3CED** (Callers by appointment) **G3VFA**

# NEW!... Exclusively for the ICOM IC-240... SUPER-SCAN

Here's the product that increases the versatility of your IC-240. Adds a whole new dimension to 2 metre FM for IC-240 owners.



- ★ Scans 40 channels in 25kHz steps from 145.000 when scan mode is selected.
- ★ Locks out unwanted occupied channels at a touch of a button.
- ★ Adjustable scan rate.
- ★ Adjustable pause period.
- ★ Manual mode feature lets you tune 144.000-147.975MHz. In 25kHz steps and manually select a desired channel.
- ★ Automatic safeguard on out of band transmission.
- ★ Automatic  $\pm 600$ kHz shift of transmit frequency when repeater mode is selected.
- ★ Large six digit display shows frequency to 5kHz.
- ★ Display always shows frequency in use including transmit frequency when ptt is operated.

- ★ Easy installation.
- ★ +9V available when repeater down mode is selected.
- ★ State of the art cmos logic.
- ★ Dimensions approximately 6" w. x 1.1" h. x 5.5" d.

★ Available now.

★ Low, affordable price.

**£69.00 plus VAT (12 $\frac{1}{2}$ %)**

**CONTACT THANET ELECTRONICS, HERNE BAY,  
OR LEE ELECTRONICS FOR FURTHER DETAILS.**

**J. YU, 21 LANGLEY AVENUE, SURBITON, SURREY, KT6 6QN.**

## ROBOT SSTV



**ROBOT 400** Solid state slow to fast, and fast to slow, Scan-Converter with Digital Random Access Memory, for full brightness, non-fading pictures of unbelievable definition on a normal TV set. Slow scan picture transmission from a standard CCTV camera (S.a.e. for details please):

|                                                  |         |
|--------------------------------------------------|---------|
| 256 line conversion kit for '70' series monitors | £668.00 |
| Daylight viewing hood for '70' series monitors   | £12.50  |
| 15 foot camera cable for '80' series cameras     | £11.50  |
| Grey scale test tape (Cassette)                  | £8.00   |
|                                                  | £3.00   |

### SECONDHAND

|                                                       |         |
|-------------------------------------------------------|---------|
| ROBOT '80A' SSTV camera and macro lens.—MINT          | £255.00 |
| PYE LYNX camera (all transistor) with lens.—EXCELLENT | £85.00  |

All prices include VAT and carriage

Compliments of the Season to everyone

## AERO & GENERAL SUPPLIES

Nanaimo House, 32 Rufford Avenue, Bramcote, Nottingham, NG9 3JH  
Tel. (0602) 397586



## AMCOMM SERVICES

194A NORTHOLT ROAD  
SOUTH HARROW  
MDDX. TEL: 01-864 1166

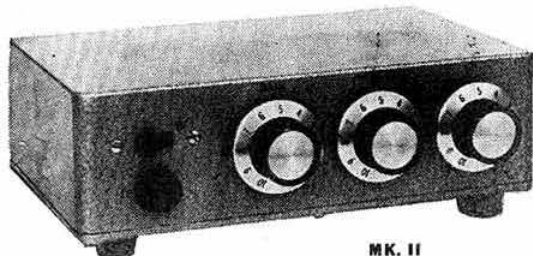
**Transmitting equipment sold only to licensed Amateurs**

### USED EQUIPMENT all with 6 months Guarantee

|                                              |         |
|----------------------------------------------|---------|
| Heathkit SB101 Transceiver, superb condition | £225.00 |
| Swan CX700 Transceiver                       | £250.00 |
| Yaesu FT200/FP200 Transceiver—Mint           | £230.00 |
| FT101E—Immaculate                            | £370.00 |
| Belcom Liner 2                               | £110.00 |
| FRG7 Mk II                                   | £135.00 |
| FT221R                                       | £310.00 |
| FL101                                        | £275.00 |
| FR101 Digital Receiver with 2 metres and FM  | £275.00 |
| KP202 Hand Held                              | £85.00  |
| Drake SPR4 Receiver                          | £340.00 |
| Eddystone EC10 Mk II                         | £85.00  |
| YO 100 Monitorscope                          | £85.00  |
| KW 2000 B                                    | £190.00 |
| KW 2000 E                                    | £225.00 |

**TRADES WELCOME — EASY TERMS — ALL CREDIT  
CARDS — CARRIAGE EXTRA — CLOSED WEDNESDAY**

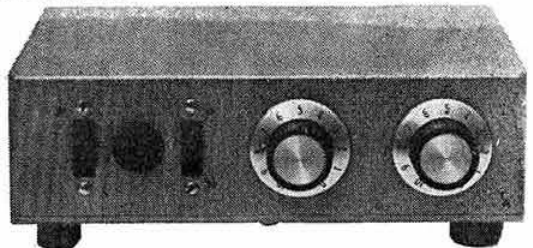
# TECHNICAL ASSOCIATES COMMUNICATION AIDS



MK. II

**AUDIO COMPRESSOR** ★ Suitable for SSB/AM/FM ★ pure compression, no clipping! ★ 24 to 26dB of compression, with less than 1% distortion ★ fast attack time in the order of 200 microseconds ★ variable decay time, on front panel ★ variable noise gate on front panel prevents ambient noise level tripping vox or being tx in pauses in speech ★ all functions routed to output in "off" position ★ goes between mic and tx no mode involved ★ these compressors have been tested alongside commercial rf clippers, the only difference at the receiving end was superior audio quality, £22.50 + VAT (12½%)

**PRINTED CIRCUIT MODULE A.C.F.** Assembled and tested including all pots £12.50 + 12½% VAT.

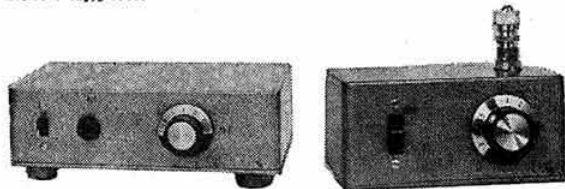


**RX PEAK AND NOTCH FILTER** ★ no gimmicks ★ all integrated circuits ★ will clear QRM in seconds ★ 1 watt o/p stage ★ headphone socket ★ goes between RX and loudspeaker ★ by-pass switch ★ notch-width control for optimum width of notch ★ tune control allows you to put the notch or peak where you want it ★ runs from internal PP9 battery or any supply from 9V to 15V ★ will also peak up CW signals, £24.50 + VAT (12½%)

**PRINTED CIRCUIT MODULE P.N.I.** Assembled and tested including all pots £13.50 + 12½% VAT.

**RX BAND PASS FILTER** ★ 9 integrated circuits ★ 1 watt o/p stage ★ headphone socket ★ 8 switched positions of filter ★ high pass—2.5kHz-2.00kHz-1.5kHz-200Hz-110Hz-80Hz ★ Bandwidths selected for optimum readability on AM, SSB, FM, CW ★ giving the operator total control over bandwidth and QRM conditions ★ makes the poor RX superb and the superb RX better ★ runs from internal PP9 battery or any supply from 9V to 15V, £24.50 + VAT (12½%) (Below, left)

**PRINTED CIRCUIT MODULE B.P.I.** Assembled and tested in 8 way rotary Switch, £13.50 + 12½% VAT.



**XTAL CALIBRATOR** ★ a de-luxe unit with seven ranges down to 1kHz ★ Switch selected from front panel ★ 1MHz-500kHz-100kHz-50kHz-10kHz-5kHz-1kHz ★ Radiates from its own 8in. ant. ★ Markers usable from 1MHz to UHF ★ complete with ant., ready to use, just connect a 9V battery, £19.00 + VAT (8%) + 25p P. & P. (Above)

**THE TECH ASSOCIATES PRE-SELECTOR.** Peaks all signals, amateur bands + broadcast bands ★ tunable from 1.6MHz to 31MHz ★ three switched bands ★ R.F. gain control to prevent strong station overload ★ S.O.259 I/P and O/P sockets ★ two transistors, F.E.T. R.F. amp + bi-polar emitter follower for 50-75Ω O/P ★ two types available.

★ **TYPE 1** with ant. changeover relay for transceiver use, £28.00 + 12½% VAT + 75p P. & P.

★ **TYPE 2** for S.W.L. without ant. relay, £23.00 + 12½% VAT + 75p P. & P.

34 GRIMPLE MEADOWS, PANNAL, HARROGATE, NORTH YORKSHIRE.  
TEL: HARROGATE 870248

## CLASSIFIED ADVERTISEMENTS

Private advertisements 15p per word, minimum £3.00.

Trade advertisements 25p per word, minimum £5.00.

Box Number 75p extra to wordage or minimum.

Semi-display 1/12 page (1½" × 3") (35 × 76mm) £21.0 0.

1/16 page (1" × 3") (22 × 76mm) £15.00.

Please write clearly. No responsibility accepted for errors.

Latest date for acceptance—4th of preceding month.

All classified advertisements must be prepaid.

Copy and remittance to: C. C. LINDSAY,

2 Leyburn Gardens, Croydon CR0 5NL. Tel 01-686 5839.

Members' Ads must be sent to the Editor at Chelmsford.

## FOR SALE

**G.I. AMATEUR SUPPLIES** G1321A for Trcvrs, Rx, Tx, Antennas, Mics, etc. Trade-in's welcome. Large stocks at 10 Church Street, Enniskillen, N. Ireland. Tel: (0365) 22955.

**QUALITY QSL CARDS.** S.a.e. for samples by return post (including Silver Jubilee styles—if requested). Quick delivery. Compalith Printing Services, 115 Promenade, Cheltenham, Glos. GL50 1NW.

**QSL CARDS, LOGBOOKS.** Samples 9p. Beaprint (G3OYI) Meltham Road, Honley, Huddersfield.

**QSL CARDS,** printed to your own specification on white gloss cards. Send SAE to Caswell Press, 11 Barons Way, Woodhatch, Reigate, Surrey.

**RCA VALVES, NEW BOXED,** 6146A, £4.65 each; 6146B, £5.50 each. Matched pairs, 50p extra. Prices inclusive. By return post. A. E. White, G3HCU. Tel: (Dorking) 0306-730 215.

**GAREX TWO-MOBILE AM/FM 2 metre transceiver.** Absolutely as new—in perfect working order. Very little used. Further details and offers write to J. Champion, 28 Hamilton Place, Stockbridge, Edinburgh.

**3M TRANSCEIVERS.** New Microwave Associates "Gunplexer", AF in, IF out, with horn, £81 inclusive; see mfrs full technical details. G8APX, Salewheel House, Ribchester, PR3 3XU.

**QSL and LISTENERS CARDS.** We offer high quality cards, rapid turn-around and competitive prices. Try us! Sae for samples. G3VZF, 5 The Close, Radlett, Herts.

## SITUATIONS VACANT

**AGENTS WANTED** to sell Radiotelephone Equipment. Details, MDH Radiotelephones, Munster House, Priory Road, Milford Haven, Dyfed. Tel: 06462 5534 (after 6 pm).

**RECRUITMENT SERVICE** for engineers and secretarial staff. Positions in UK and overseas. Ditton Associates, Employment Consultants, 4 Portman Mews South, London W1H 9AU. Telephone 01-629 0762.

**TUTOR/WRITER WANTED** for work at home. Must be qualified Radio Amateur. Teaching exp. an advantage. Write: Walkers Advertising Associates Limited, Royde House, Midvale Road, St. Helier, Jersey. Channel Islands.

## LOSING DX?

Maybe your ANTENNA is FAULTY. Measure radiation resistance 20-200 ohms and resonance 1-150MHz with an Antenna Noise Bridge, only £3.20.

**UNDERPOWERED? SOUND** one "S" point LOUDER with a Speech Compressor.

**FOUR times TALK POWER** for only £8.50.

**FREE DX** from tiring whistles and CW interference with a Tunable Audio Notch Filter. Get DX OTHERS CAN'T HEAR for only £7.50.

**WASTING POWER?** Check your LINEAR fast with a Two Tone Oscillator. Regain TOP PERFORMANCE for only £7.40.

**DIAL UP** the DX with a Crystal Calibrator. Switched EQUAL LEVEL 1MHz, 100, 25kHz markers to VHF for only £13.80.

**EXPLORE 100-600kHz** with an LF Converter. Antenna tuner for 50 ft wire, feeds your 3-5-4MHz receiver. Snoop low for only £8.80.

Each easy-assembly kit includes ALL parts, printed circuit, case, wire etc, instructions, postage, money back assurance, so SEND off TODAY.

**CAMBRIDGE KITS** 45 (RZ) Old School Lane, Milton, Cambridge.



## ELECTRONICS ENGINEER (MAINTENANCE)

Salary within the range £2616 p.a. to £3699 p.a.  
plus pay supplement  
(salaries under review)

An electronics engineer is required to work at the BBC's Engineering Training Centre at Wood Norton, located 3 miles from Evesham. The Department is responsible for training the engineering and technical operations staff employed by the BBC.

The successful applicant will be concerned with the maintenance, modification and commissioning of Radio and Television broadcasting equipment.

Appropriate training will be given when necessary. Transport is provided from Evesham to the Centre.

Qualifications: At least HNC or City & Guilds Full Technological Certificate in Telecommunications (Course 271). Normal colour vision and hearing are essential.

Write for further particulars and a staff application form to **The Engineering Recruitment Officer, BBC Broadcasting House, London, W1A 1AA** quoting Reference Number 77. E. 4078, and enclosing a self addressed envelope at least 9" x 4" (no stamp is required). Closing date for completed application forms is fourteen days after publication.

## UNIVERSITY OF SHEFFIELD

**RESEARCH TECHNICIAN (GRADE 5)** required for the Space Physics Group within the Department of Physics for an initial period of 18 months from 1st December 1977. The successful candidate would be primarily concerned with the development and construction of scientific payloads for use with ionospheric research sounding rockets. Experience of design and/or construction in one or more of the following areas would be advantageous: low noise analogue circuitry (DC-100kHz), radio frequency circuitry, 100MHz-1500MHz, ultra reliable equipment for use in extreme environments and/or prolonged periods of unattended operation.

A current driving licence is essential and duties may include some travel both within the U.K. and abroad for periods up to several weeks.

Commencing salary will be either £2,889 or £2,983 p.a. Please write to the

**Deputy Director of Services**

(Ref. S 846/RC) The University, Sheffield, S10 2TN.

## FIELD & BENCH ENGINEER REQUIRED

for work on radio telephone equipment.

Phone 01-573 4541

## SENIOR LABORATORY TECHNICIANS

### BBC Research Dept., Kingswood Warren, Tadworth, Surrey.

Duties include field strength survey measurements of existing VHF and UHF transmitters and assisting in the planning and testing of sites for new transmitters.

Although based at Kingswood successful candidates will be required to travel and work for periods anywhere in the U.K. - this will include working some weekends.

Candidates, male or female, should possess an H.N.C. or equivalent qualification and have knowledge of the use of radio frequencies as applied to the broadcasting bands. Ability to drive essential. Good opportunities for promotion to Engineering Technician.

Starting salary according to experience in the range £2,923 - £3,483 rising to £3,880 as a Senior Laboratory Technician, and ultimately to £4,792 as an Engineering Technician. Salaries quoted include pay supplements and an increase above these levels is also due to be implemented with effect from 1st October 1977. Pensionable post.

Write for application form to Research Executive, BBC Research Department, Kingswood Warren, Tadworth, Surrey, KT20 6NP, quoting reference 696/JME or telephone Mogador 2361.

# BBC

## G2DYM ANTI-T.V.I. AERIALS

AERIALS INDIVIDUALLY DESIGNED BY EX-B.B.C. TRANSMITTER AND AERIAL ENGINEER. ALL CUSTOM BUILT FOR THE TRANSMITTER OR S.W.L. G5RV's, G2DYM's, WIDE-BAND S.W.L. TYPES, DESIGN AND ADVISORY SERVICE. Details—7" x 10", 12 1/2" S.A.E. and 3 9/16" stamps.

**LAMBDA ANTENNA STUD FARM, WHITEBALL, WELLINGTON, SOMERSET.**

### LOADS OF CABLES . . . .

UR43, 50 ohm Coax standard at 10p per m, pp 2 1/2 per m.

UR67, 50 ohm low loss 1" dia at 30p per m pp 4p per m.

UR70, 75 ohm standard at 10p per m pp 2 1/2p per m.

UR95, 50 ohm miniature Nylon at 4p per m, pp 1p per m.

Mains 3 core 5 amp PVC at 9p per m, pp 2 1/2p per m.

Mains 3 core 10 amp PVC at 14p per m, pp 3p per m.

500 mixed Carbon Film Resistors for £2 pp 50p

100 m equipment wire 5 m x 20 colours for £1 pp 35p

**W. H. WESTLAKE, G8MWW, CLAWTON, HOLSORTHY, DEVON**

### FOR QUICK SALE

BC221AH frequency meter with power supply, £22; TRIO 9R59DS, £45; HOME BREW 1KW LINEAR AMP, HF band, buyer collects £20; 1185-0-1185 VOLT 360MA TRANSFORMER plus bank of five 350V 400mfd electrolytic capacitors, £15; SANYO MR-410N portable/mains cassette recorder (no RFI problems with this), £15; AVO 9 MK II, £25; 2 x 20FT LIGHT ALUMINIUM ALLOY THICK WALL TUBING (scaffold poles) 2 inch OD with J-Beam coupling to give 40ft MAST, plus bearings to rotate mast and numerous K-clamp fittings to mount mast to house or support pole, a bargain at £30; 10 ELEMENT 2 METRE J-BEAM £10; All c.n.o. GM4DQX, QTHR. 041-638 3386 eve after 7.30 pm. (private sale).



# RSGB BOOKS MAKE IDEAL CHRISTMAS PRESENTS

JUST PUBLISHED!

## RSGB AMATEUR RADIO CALL BOOK 1978

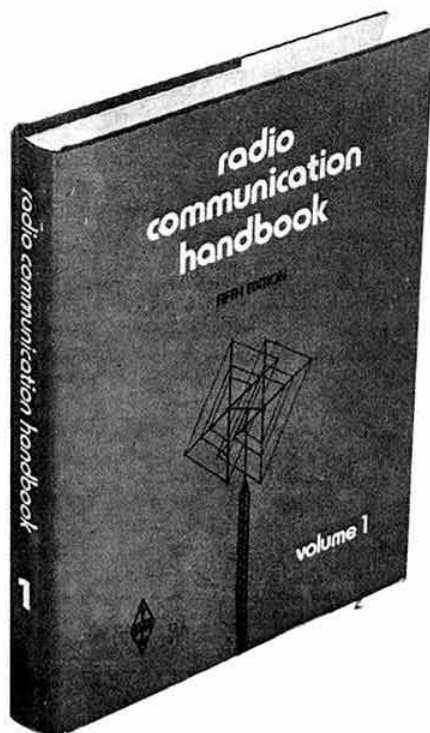
This latest edition incorporates 7,043 new callsigns and amendments notified by the Home Office between August 1976, when the previous edition closed for press, and September 1977, together with corrections notified by licence holders.

It also includes valuable operating data such as band plans, beacons, special callsigns, repeaters, QSL Bureau, amateur radio

prefixes, ITU zone list and beam headings. Lists of societies affiliated to the RSGB and of RSGB groups also form part of this popular annual without which no amateur station is properly equipped.

184 pages

£3.21 inc p & p



## radio communication handbook

First published in 1938, the *Radio Communication Handbook* has long been a standard textbook on the theory and practice of amateur radio. Its almost encyclopedic coverage of this fascinating subject draws on the practical experience, gained over many years, of a multitude of radio amateurs in this country and abroad. The text, which has been completely revised and reset for this fifth edition, is supplemented by hundreds of line diagrams, together with many photographs, charts and tables, making this probably the most valuable all-round reference book a radio amateur can possess.

Chapter titles in Volume 1 are: *Principles; Electronic tubes and valves; Semi-conductors; HF receivers; VHF and uhf receivers; HF transmitters; VHF and uhf transmitters; Keying and break-in; Modulation systems; RTTY.*

Chapter titles in Volume 2 are: *Propagation; HF aeriels; VHF and uhf aeriels; Mobile and portable equipment; Noise; Power supplies; Interference; Measurements; Operating technique and station layout; Amateur satellite communication; Image communication; The RSGB and the radio amateur; General data.*

Volume 1 464 + xvi pages

£9.36 inc p & p

Volume 2 324 + xii pages

£8.12 inc p & p

## VHF/UHF MANUAL

by D. S. Evans, PhD, AIM, G3RPE, and G. R. Jessop, CEng, MIERE, G6JP

Since 1969 the RSGB *VHF/UHF Manual* has been a bestseller around the world as the standard textbook on techniques and equipment for amateur radio transmission and reception at frequencies over 30MHz.

Packed with ideas, information and constructional details of tried and tested equipment, each specialist topic contributed by an acknowledged expert in the field.

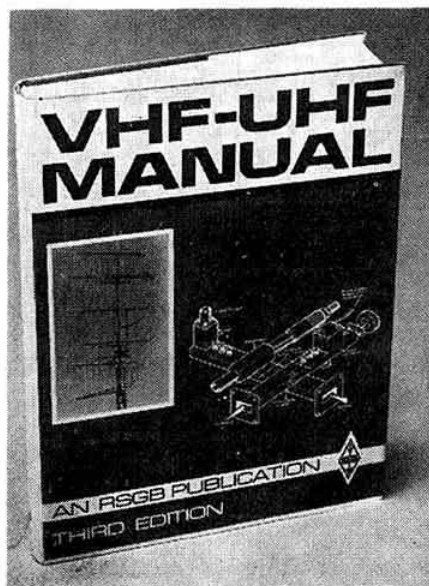
Chapters on receivers, transmitters, space communications, filters, aeriels, microwaves and much more. Simple amateur television is covered and a data section provides valuable facts and figures to help the constructor. Many of the designs make use of integrated circuits, and the microwave chapter gives details of equipment for use up to 24GHz.

"Without a doubt, this is the standard textbook on the subject and anyone with only the slightest interest in vhf/uhf operation should have a copy." *Radio ZS*

"No serious vhf-er should be without this book. The reviewer's copy is always kept close at hand." *QST*

404 + xii pages

£6.82 inc p & p



## OSCAR—Amateur Radio Satellites

by Stratis Caramanolis

The first half of this book discusses the background to the subject, including orbital geometry, satellite anatomy, communication principles and telemetry, in some detail. Only after the reader has a clear understanding of the basic principles of communication satellites does the book go on to describe satellites of the Oscar series and how they can be used for education, communication and experimentation, including QRP tests and slow-scan television. Various methods of plotting Oscar orbits are discussed and the reader is shown how to interpret published orbital data.

Throughout the book, relevant equations and worked examples are given where desirable, and the text is amply illustrated with many diagrams, charts and photographs.

This is the book every serious Oscar user will want to own. Chapter titles are as follows: Planets and their orbits; Satellites and their orbits; Anatomy of a satellite; Satellites as relay stations; Fundamentals of telecommunication via satellites; Telemetry systems; Satellites of the Oscar series; Operating with amateur satellites; Learning with AMSAT—Oscar satellites.

190 pages

£2.00 inc p&p

## Amateur Television

edited by A. Hughes, TENG (CEI), MITE

Now that a separate licence for television transmission is no longer required, it is likely that interest in this fascinating branch of amateur radio will grow. This booklet covers all aspects of amateur television, including sstv and colour tv, and should prove of interest to enthusiasts as well as newcomers.

Chapter titles are as follows: Background; Aerials and reception; Transmitting; Operating techniques; Licences; Picture sources; Monitors; Recording; Slow-scan tv; Colour tv.

105 pages

£2.20 inc p&p

## The Complete Handbook of Slow-scan TV

by Dave Ingram, K4TWJ

First published in 1977, this is the comprehensive and up-to-date guide to setting up and operating a slow-scan television station. Basic principles are covered in detail but the real value of the book lies in the wealth of practical information on circuits and operating methods. Commercial equipment is also featured. A "must" for the sstv enthusiast.

Chapter titles are: Introduction to sstv; Understanding sstv gear; Setting up the sstv station; Operating procedures; SSTV monitor circuits; Digital scan converters; Round-up of existing gear; SSTV satellite communications.

304 pages

£5.83 inc p&p

## Getting to know Oscar from the ground up

edited by Joel P. Kleinman, WA1ZUY

First published as a series of articles in QST, this booklet is intended to supply all the basic information one needs to get started as an Oscar operator.

Contents are as follows: Space communication is for everyone; Getting started; Finding Oscar—it's easy; How to use Oscar Mode B; The benefits are yours; The Oscar-locator; The newest Oscar; Toward the ultimate amateur satellite; What Phase III will do; You ... and AMSAT Phase III; Oscar goes to schools; Satellites can save lives; Oscar's vital statistics; The rise and fall of the Oscars.

45 pages, plus Oscarlocator map

£2.75 inc p&p

## Radio Amateurs' Examination Questions and Answers

Compiled by the RSGB Education Committee

This book is a collection of model answers to typical Radio Amateurs' Examination questions, and should prove invaluable to candidates as a revision aid. It demonstrates that adequate answers to such questions need not be "long winded", and will assist the candidate in developing a concise answering style which could save valuable examination time.

The book is arranged in the same format as the examination, with chapter titles as follows: Elementary electricity and magnetism; Elementary alternating current theory; Thermionic valves and semiconductors; Radio receivers; Low-power transmitters; Propagation; Aerials; Measurements.

118 pages

£2.00 inc p&p

## Radio Data Reference Book

(4th edition)

by T. G. Giles, G4CDY, and G. R. Jessop, G6JP

It is a sad fact of life that the more textbooks one has, the longer it seems to take to dig the odd fact out of them, whether one wants to know the input resistance of a common-emitter stage, the attenuation of UR77 cable, or just the BBC1 channel number of the Llanddona uhf tv transmitter! Then again, one might be left struggling through a pile of dusty volumes trying to find the melting and freezing points of soft solder, the transconductance equation of a fet, or the clearance size of an M5 screw. Phew!

As you have probably guessed, all these little gems are in this new edition of the *Radio Data Reference Book*, and much more. As before, the aim of the book is to present a wide range of essential reference data in convenient form without needless repetition of basic theory.

The text has been completely revised and a good deal of new material added, including sections on transistors, heatsinks and modern filter design. For greater ease of reference it has also been rearranged into nine subject areas, as follows: Units and symbols; Basic calculations; Resonant circuits and filters; Circuit design; Aerials and transmission lines; Radio and tv services; Maps and meteorological data; Materials and engineering data; Mathematical tables.

190 + x pages

£3.65 inc p&p

## Solid State Design for the Radio Amateur

by Wes Hayward, W7ZOI and  
Doug DeMaw, W1FB

This is a practical and readable manual for the amateur who not only wants to "roll his own" solid-state gear, but design it as well. For the less adventurous there are many complete designs illustrating the principles described.

Contents are as follows: Semiconductors and the amateur; Basics of transmitter design; More transmitter topics; Power amplifiers and matching networks; Receiver design basics; Advanced receiver concepts; Test equipment and accessories; Modulation methods; Field operation, portable gear and integrated stations; Appendix; Bibliography.

256 pages

£5.85 inc p&p



# PUBLICATIONS OBTAINABLE FROM RSGB

**RSGB members can obtain a 10 per cent discount on the prices listed below (excluding Ham Radio Magazine and Ham Radio Horizons). To obtain the discount, deduct 10 per cent, calculated to the nearest penny, from the total value of the order (using the latest price list) and enclose a remittance for the balance. Also enclose an address label from a recent Radio Communication wrapper as proof of membership.**

## RSGB PUBLICATIONS

### Technical books

|                                                     |       |
|-----------------------------------------------------|-------|
| Amateur Radio Awards                                | £2.15 |
| Amateur Radio Techniques (5th edn)                  | £3.55 |
| Guide to Amateur Radio (16th edn)                   | £1.38 |
| Morse Code for Radio Amateurs                       | 54p   |
| NBFM Manual                                         | £1.38 |
| OSCAR-Amateur Radio Satellites                      | £4.20 |
| RSGB Amateur Radio Call Book 1978                   | £2.21 |
| RAE Questions and Answers                           | £2.00 |
| Radio Amateurs' Examination Manual (7th edn)        | £1.60 |
| Radio Amateurs' Examination Revision Notes          | 86p   |
| Radio Communication Handbook 5th edn, Vol 1         | £9.36 |
| Radio Communication Handbook 5th edn, Vol 2         | £8.12 |
| Radio Data Reference Book (4th edn)                 | £3.65 |
| Service Valve and Semiconductor Equivalents         | 48p   |
| Teleprinter Handbook                                | £8.89 |
| Test Equipment for the Radio Amateur (Out of print) |       |
| TVI Manual (Out of print)                           |       |
| VHF/UHF Manual                                      | £6.82 |
| World at their Fingertips (Paperback)               | £1.63 |
| World at their Fingertips (De-luxe)                 | £2.76 |

### Log books

|                       |       |
|-----------------------|-------|
| Standard Log          | £1.34 |
| Receiving Station Log | £1.46 |
| Mobile Mini-Log       | £1.03 |
| De-luxe Log           | £3.00 |

### Maps, charts and lists

|                                            |       |
|--------------------------------------------|-------|
| Countries List/HF Awards List              | 25p   |
| Great Circle DX map (in tube)              | £1.29 |
| Oscar map (in tube)                        | 43p   |
| QTH Locator map (Western Europe) (in tube) | £1.15 |
| QTH Locator map (Western Europe) (on card) | 57p   |
| RSGB Amateur Radio Prefixes (World) map    | 66p   |
| UHF repeater planning map                  | 40p   |
| UK Beacon List                             | 19p   |
| UK Repeater List                           | 19p   |
| IARU Region 1 Beacon List                  | 19p   |

### Members' sundries

|                                                |       |
|------------------------------------------------|-------|
| Call sign lapel badge (5 weeks' delivery)      | £1.31 |
| Lapel badge (RSGB or RAEN emblem, pin fitting) | 51p   |
| Tie (Maroon or Blue)                           | £1.96 |
| Radio Communication Eastbinder                 | £3.00 |
| Car window sticker (RAEN) (self-adhesive)      | 31p   |
| Members' headed notepaper (50 sheets) quarto   | 85p   |
| Members' headed notepaper (50 sheets) octavo   | 60p   |
| Radio Communication back issues (as available) | 84p   |
| RSGB contest log sheets (100)                  | 77p   |
| RSGB teshirt (large, medium or small)          | £2.25 |

Prices include postage, packing, and VAT where applicable. For air mail despatch, please ask for price before ordering. Goods are obtainable, less p & p, at RSGB headquarters between 9.30am and 5pm, Monday to Friday.

**POSTAL TERMS:** Cash with order. Stamps and book tokens cannot be accepted. Cheques and postal orders should be crossed and made payable to "Radio Society of Great Britain". Giro A/C No 533 5256.

All overseas orders: add £1 to cover insurance if required. Please write your name and address clearly on the order.

### ORDER FROM:

## OTHER PUBLICATIONS

### American Radio Relay League

|                                                          |       |
|----------------------------------------------------------|-------|
| Antenna Book (13th edn)                                  | £3.59 |
| Course in Radio Fundamentals                             | £2.60 |
| FM and Repeaters for the Radio Amateur (Out of stock)    |       |
| Solid state Design for the Radio Amateur                 | £5.85 |
| Hints and Kinks                                          | £2.27 |
| Radio Amateurs' Handbook 1977 (Paperback) (Out of print) |       |
| Radio Amateurs' Handbook 1977 (Hardback) (Out of print)  |       |
| Ham Radio Operating Guide                                | £3.90 |
| Single Sideband for the Radio Amateur                    | £3.39 |
| Getting to know Oscar from the ground up                 | £2.75 |
| Specialized Communication Techniques (Out of stock)      |       |
| Understanding Amateur Radio                              | £3.39 |
| VHF Manual                                               | £3.62 |
| Electronic Data Book                                     | £3.56 |

### Radio Amateur Callbook Inc

|                                                      |  |
|------------------------------------------------------|--|
| American Callbook (USA listings) 1977 (Out of stock) |  |
| American Callbook (DX listings) 1977 (Out of stock)  |  |
| World Atlas (Amateur radio prefixes) (Out of stock)  |  |

### Radio Publications Inc

|                                               |       |
|-----------------------------------------------|-------|
| Beam Antenna Handbook                         | £3.90 |
| Better Short Wave Reception (3rd edn)         | £3.42 |
| Cubical Quad Antennas                         | £2.77 |
| Simple, Low-cost Wire Antennas (Out of stock) |       |

### Miscellaneous

|                                           |       |
|-------------------------------------------|-------|
| Amateur Television                        | £2.20 |
| Complete Handbook of Slow-scan TV         | £5.83 |
| International VHF FM Guide (Out of stock) |       |
| RTTY the Easy Way                         | £1.02 |
| Radio Amateur Operators Handbook          | £1.11 |
| Radio Valve & Semiconductor Data          | £3.00 |

## MORSE INSTRUCTION AIDS

|                                                                       |        |
|-----------------------------------------------------------------------|--------|
| G3HSC Rhythm Method of Morse Tuition—                                 |        |
| Complete Course (two 3-speed lp records and one ep record plus books) | £5.60† |
| Beginner's Course (one 3-speed lp record and one ep record plus book) | £4.12† |
| Beginner's lp (0-15 wpm) plus book                                    | £3.44† |
| Advanced lp (9-42 wpm) plus book                                      | £3.44† |
| Three-speed simulated PO test 7in ds ep record                        | £1.15† |
| † Overseas orders: add £1.12.                                         |        |

## MAGAZINE SUBSCRIPTIONS

|                                                                                   |        |
|-----------------------------------------------------------------------------------|--------|
| QST (including ARRL membership) (Per annum)                                       | £10.50 |
| Subscriptions for QST should be sent to RSGB, 35 Doughty Street, London WC1N 2AE. |        |

|                                                                                                                                                                      |        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Ham Radio Magazine (Per annum) (inc air delivery)                                                                                                                    | £15.00 |
| Ham Radio Horizons                                                                                                                                                   | £6.50  |
| Subscriptions and changes of address for Ham Radio Magazine and Ham Radio Horizons should be sent to: Ham Radio Magazine (UK), PO Box 63, Harrow, Middlesex HA3 6HS. |        |

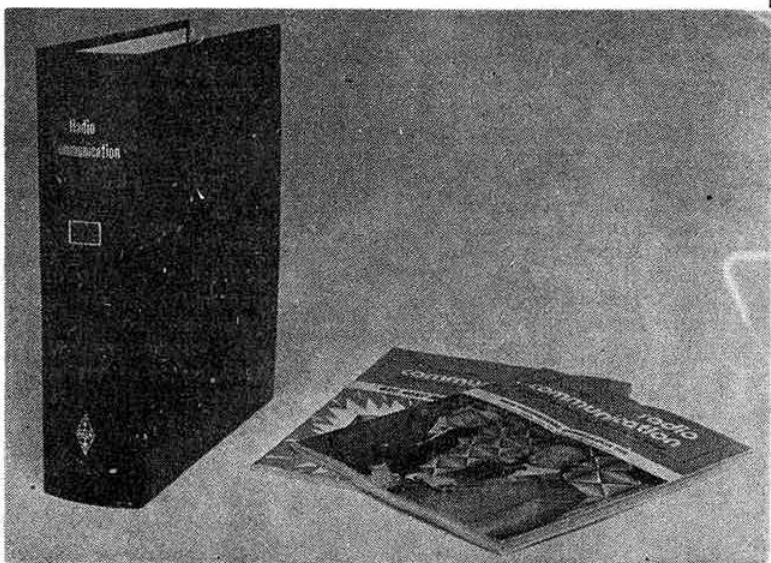
**RSGB Publications (Sales), 35 Doughty Street, London WC1N 2AE**

## Easibinders for "Radio Communication"

Have you a pile of well-fingered back issues of *Radio Communication* which you turn over each time you refer to a particular issue? No wonder they become frayed!

Why not protect them from these ravages in an Easibinder specially made to hold them by Easibind Ltd?

One of these maroon cloth-bound sturdy binders will hold a complete volume (12 issues) firmly and safely, and yet still enable individual issues to be extracted and replaced, if necessary, without damage. The binder is conveniently made so that even when full it may be opened flat and any page read with ease. The spine carries the title and RSGB symbol in gold blocking.



Despatched in stout corrugated cartons, Easibinders can be obtained from RSGB, 35 Doughty Street, London WC1N 2AE; price £3.00 including postage.

## RSGB PUBLICATIONS ORDER FORM

|                                                |                 |                                                                                                                                                             |
|------------------------------------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RSGB MEMBER <input type="checkbox"/>           | TICK BOX IF YES | Please use this form when ordering                                                                                                                          |
| CALL-SIGN or ORS/BRSA <input type="checkbox"/> |                 | NAME <input type="checkbox"/>                                                                                                                               |
| ADDRESS                                        |                 | Full details of conditions of sale can be found on the RSGB price list. Please check the latest price list when ordering as incorrect pricing causes delay. |
|                                                |                 |                                                                                                                                                             |
|                                                |                 |                                                                                                                                                             |

Post your order to.....

RSGB PUBLICATIONS (SALES),  
35 DOUGHTY STREET,  
LONDON WC1N 2AE

Telephone.....  
01-837 8688

| QUANTITY<br>REQUIRED | ITEM CODE | ITEM DESCRIPTION | PRICE<br>EACH | TOTAL FOR<br>QTY. ORDERED | OFFICE<br>USE ONLY |
|----------------------|-----------|------------------|---------------|---------------------------|--------------------|
|                      |           |                  |               |                           |                    |
|                      |           |                  |               |                           |                    |
|                      |           |                  |               |                           |                    |
|                      |           |                  |               |                           |                    |
|                      |           |                  |               |                           |                    |
|                      |           |                  |               |                           |                    |

I enclose cheque, giro cheque, postal orders to the value of £

# B. BAMBER ELECTRONICS

DEPT RC, 5 STATION RD, LITTLEPORT, CAMBS, CB6 1QE  
TEL: ELY (0353) 860185 (TUESDAY-SATURDAY)

**A Merry Christmas  
To All Our Customers**  
Plus a Xmas Present from us  
in the form of a  
**10% discount on all orders received  
from 1st to 31st December**  
For items in our current ads and  
lists only  
**This offer is for 1 month only!**

## ALL BELOW—ADD 8% VAT

**MAINS TESTER SCREWDRIVERS** 100 to 500V  
Standard size 50p. Large 70p.

**RADIO PLIERS** 5 1/2" £1.60, 6 1/2" £1.80.

**DIAGONAL SIDE CUTTERS** 6 1/2" £1.90.

**SMALL SIDE CUTTERS** LJ2 Standard £3.70. LJ7 (with  
wire holding device) £4.10.

**MIDGET OPEN END SPANNER SETS** 0 + 1,  
2 + 3, 3 + 5, 4 + 6, 6 + 8 BA sizes £2.85 set of 5,  
4 + 4.5, 5 + 5.5, 4 + 6, 6 + 7, 8 + 9, 10 + 11 mm sizes  
£3.50 set of 6.

**MINIATURE FILE SETS**, Set of 6 £1.90. Set of 10 £3.25  
(Round, flat, etc.)

**TAP AND DIE SETS** (18 piece) contain 1 each of 0, 2, 4,  
6, 8, BA sizes in Dies, Plug Taps, Taper Taps +  
American type tap wrench, T type tap wrench, Die  
Holder. £11.60.

**TUNED COILS**, 2 section coils, around 1MHz, with a  
black smart tuning knob, which moves an internal  
core to vary the inductance, many uses, easily rewound,  
3 for 50p.

**FULL RANGE OF BERNARDS/BABANI ELECTRONICS BOOKS IN STOCK, S.A.E. FOR LIST**

**NEW FOR THE VHF CONSTRUCTOR.** A range of  
tuned circuits on formers with slugs and screening  
cans. Frequencies quoted are approximate, and  
range can be greatly extended by using varying capacitors  
in parallel.

Type S (1/2" square, dummy type)

Type SA 20 to 30MHz (when 33pf fitted in parallel)

Type SD 135 to 175MHz (with link winding)

Type M (Min. 1/2" square types)

Type MA 19 to 28 MHz (when 33pf fitted in parallel)

Type MB 22 to 32MHz (when 33pf fitted in parallel)

Type MC 25 to 35MHz (when 33pf fitted in parallel)

Type MD 38 to 50 MHz (when 33pf fitted in parallel)

Type ME 45 to 60MHz (when 33pf fitted in parallel)

Type MF 100 to 200MHz (without slug) when 0 to 30pf  
variable fitted in parallel)

All the above coils available in packs of five only  
(same type) at 50p per pack of 5.

## A NEW RANGE OF QUALITY BOXES & INSTRUMENT CASES.

Aluminium Boxes with lids.

AB10 5 1/2" x 4" x 1 1/2" 60p

AB13 6" x 4" x 2 80p

AB14 7" x 5" x 2 1/2" £1.00

AB15 8" x 6" x 3 £1.30

AB16 10" x 7" x 3 £1.50

AB17 10" x 4 1/2" x 3 £1.30

AB25 6" x 4" x 3 £1.00

Vinyl Coated Instrument Cases.

Blue Tops and White lower sections. Very smart  
finish.

WB1 5" x 2 1/2" x 2 1/2" 60p

WB2 6" x 4 1/2" x 2 1/2" £1.10

WB3 8" x 5" x 2 £1.60

WB4 9" x 5 1/2" x 2 1/2" £1.80

WB5 11" x 6 1/2" x 3 £2.00

WB6 11" x 7 1/2" x 3 £2.25

WB7 12" x 6 1/2" x 5 £2.60

WB35 8" x 5 1/2" x 3 £2.00

**VIDICON SCAN COILS** (Transistor type, but no data)  
complete with vidicon base £8.50 each. Brand new.

## ALL BELOW—ADD 8% VAT

**PLASTIC PROJECT BOXES** with screw on lids (in  
Black ABS) with brass inserts.

Type NB1 approx. 3 1/2" x 2 1/2" x 1 1/2" 40p each.

Type NB2 approx. 3 1/2" x 2 1/2" x 1 1/2" 50p each.

Type NB3 approx. 4 1/2" x 3 1/2" x 1 1/2" 60p each.

**QUARTZ-XTAL CONTROLLED CLOCKS**, 9 to  
12V DC at approx. 3mA required. Dial size approx.  
2", depth of unit approx. 2". Not in cases, unit only,  
smart modern appearance, black face with white  
lettering, 12 hr, with second hand, and red hour and  
minute hands (Cost over £40 to produce) £10.00 each  
while stocks last, tested before despatch.

**OSMOR REED RELAY COILS** (for reed relays up to  
1 1/2" dia, not supplied) 12V, 500ohm coil, 2 for 50p.

**PERSPEX TUNER PANELS** (for FM Band 3 tuners)  
marked 88-108 MHz and Channels 0-70, clear number  
rest blacked out, smart modern appearance, size  
approx. 8 1/2" x 1 1/2", 2 for 35p.

**MIXED COMPONENT PACKS**, containing resistors,  
capacitors, switches, pots, etc. All new, and hundreds  
of items, £2.00 per pack, while stocks last.

**PROGRAMMERS** (Magnetic devices) contain 9 micro-  
switches (suitable for mains operation) with 9 rotating  
cams, all individually adjustable, ideal for switching  
disco lights, displays, etc., or industrial machine  
programming. (Need slow motion motor to drive cams,  
not supplied.) Sorry, sold out.

## PLUGS & SOCKETS

**BNC PLUGS** (ex-equip) 5 for £1.50.

**N-TYPE PLUGS** 50ohm 60p each, 3 for £1.50.

Greenpar (GE30015) Chassis Lead Terminations  
(These are the units which bolt on to the chassis,  
the lead is secured by screw cap, and the inner of  
the coax passes through the chassis). 30p each, 4  
for £1.00.

**PL259 Plugs** (PTFE) Brand new, packed with reducers,  
65p each.

**SO239 Sockets** (PTFE) Brand new, (4 hole fixing type)  
50p each.

## VALVES

**QVQ03/20A** (ex equipment) £3.00.

**QVQ03/10** (ex equipment) 75p or 2 for £1.20.

**DET-22** (ex equipment) 2 for £1.00.

**6BH6** (ex equipment) 2 for 50p.

All the above valves are untested, except for heaters  
and no guarantee of percentage of emission is given.  
Sorry, no returns.

**MULLARD 85A2 85V STABILISER VALVES** (brand  
new) 70p each or 2 for £1.20.

**6BW6 VALVES (BRAND NEW)**, 85p each or 2 for  
£1.50.

## SEMICONDUCTORS

**PNP Audio Type TOS Transistors**, 12 for 25p.

**BFY51 Transistors**, 4 for 60p

**BYX 38/300 Stud Rectifiers**, 300V at 2:5A, 4 for 60p.

**BCY72 Transistors**, 4 for 50p.

**BSX20**, (VHF osc/mult.) 3 for 50p.

**BC108** (metal can) 4 for 50p.

**PBC 108** (plastic BC 108) 5 for 50p.

**BF152** (UHF amp/mixer) 3 for 50p.

**2N3819 Fet**, 3 for 60p.

**BC148 NPN SILICON** 4 for 50p.

**BC158 PNP SILICON** 4 for 50p.

**BAY31 Signal Diodes** 10 for 35p.

**BA121 Varicap Diodes**, 4 for 50p.

**741CG RCA OP-AMPS** 4 for £1.00.

**DIECAST BOXES**. We still stock these, but owing  
to frequent price rises from our suppliers, and costly  
postal charges, it has been found impossible to publish  
up-to-date prices on these items. Please ring or write  
(with SAE), for latest mail-order prices.

**AEI CS108/R MICROWAVE DIODES**: up to X-Band,  
max. noise figure 8.5dB at 9.375GHz. 80p each.

**BARGAIN PACK OF LOW VOLTAGE ELECTRO-  
LYTIC CAPACITORS**. Up to 50V working.  
Seatronic manufacture. Approx. 100 £1.50 per pack  
(+12 1/2% VAT).

**TERMS OF BUSINESS: CASH WITH ORDER, MINIMUM  
ORDER OF £2.00.**

**ALL PRICES NOW INCLUDE POST & PACKING (UK ONLY)**  
**EXPORT ENQUIRIES WELCOME**

**CALLERS WELCOME by APPOINTMENT ONLY**

Please enclose stamped addressed envelope with ALL Enquiries

**PLEASE ADD VAT AS SHOWN**

## ALL BELOW—ADD 8% VAT

**RED LEDs** (Min. type) 5 for 70p.

**NEW PCBs FOR PYLEX TV-CAMERA**.

**STABILISER PANEL** (AT26352) £3.00.

**VIDEO PCB** (AG58314) £5.00.

**BOX OF P. C. BOARDS**, mixed PCBs, containing  
Transistors, I. C.s, Resistors, Capacitors, etc. Good  
breakdown value. Our selection £3.00 per box.

**SLIDER SWITCHES**, 2 pole make and break, (or  
can be used as 1 pole change-over by linking the  
two centre pins) 4 for 50p.

**SMITHS CLOCK MOTORS**, 200-250V 50Hz 2 watts,  
1 Rev. every 2 mins., 3 hole fixing, 1/2" spindle, £1.00  
each.

**SLOW MOTION MOTORS**, 120V 50Hz 1RPM, Size  
approx. 2" dia., 1 1/2" deep, with 1/2" spindle, 60p each or 2  
for £1.00.

**COMPUTER GRADE ELECTROLYTICS**, Screw ter-  
minals, 20,000mfd at 45V (ex-equipment) 2 for £1.00.

**SUB-MINIATURE ROTARY SWITCHES**, 4 x 5 way  
make contacts, Size approx. 1 1/2" dia., 1" deep, 1/2" spindle,  
50p each.

**UR41 ATTENUATION CABLE**, Nominal 72ohm,  
overall dia. approx. 1/2", Att. per 100ft: 100MHz 218dB,  
200MHz 316dB, 600MHz 449dB, 3000MHz 625dB. Ideal  
for Rx or Low power Tx fixed attenuators. Supplied  
with attenuation graph. 4 metres for £1.00.

**ALU-SOL ALUMINIUM SOLDER** (made by multicore)  
Solders Aluminium to itself or Copper, Brass, Steel,  
Nickel or Tinplate, 16SWG with multicore flux, with  
instructions, approx. 1m coil 40p Pack.

Large reel £2.75.

**SOLDER SUCKERS** (Plunger Type)

Standard Model £5.00.

Skirted Model £5.50.

Space Nozzles 60p each.

**MULTICORE SOLDER**

Size C15A18 Savbit, 18SWG 50p.

1Kg. (1-1lb) 60/40, 20SWG on Plastic Reel, £3.00.

**WELLER TCP2 and PU2D PSU**. Temperature con-  
trolled soldering iron, with matching Power Supply  
Unit, containing sponge and spring stand. £30.00.

**SPIRALUX Tools** for the Electronic enthusiast... SAE  
for list.

**HEAVY DUTY RELAYS**, 24V DC operated (will work  
on 18V) 3 heavy duty make contacts (around 10A  
rating + 4 change over contacts + 1 break contact.  
New, complete with mounting bracket (ideal for switch-  
ing HT on Linears). Many uses for this high quality  
unit. £1.50 each.

## ALL BELOW—ADD 12 1/2% VAT

**VARICAP TUNERS** Mullard Type ELC1043/05 Brand New,  
£4.40.

**TV plugs** (metal type) 4 for 50p.

**TV line connectors** (back-to-back skt) 4 for 50p.

**3 pin Din plugs**, 4 for 50p.

**Din 3 pin Line Sockets**, 15p each.

**Din Sockets** 5 pin, 270 deg. 4 for 50p.

**Din Speaker Scts**, 2 pin, 4 for 30p.

**RESISTOR PACKS**, approx 300 pieces, 1/2 to 2 watt  
types mixed values, our selection £1.00pk

## ELECTROLYTIC CAPACITORS

**Dubillier Electrolytics**, 50uF, 450V, 2 for 50p.

**Dubillier Electrolytics**, 100uF, 275V, 2 for 50p.

**Plessey Electrolytics**, 470uF, 63V, 3 for 50p.

**TCC Electrolytics**, 1000uF, 30V, 3 for 60p.

**Dubillier Electrolytics**, 5000mfd at 35V, 50p each.

**Dubillier Electrolytics**, 5000uF at 50V, 60p each.

**ITT Electrolytics**, 6800mfd at 25V, high grade: screw  
terminals, with mounting clips. 50p each.

**A LARGE RANGE OF CAPACITORS AVAILABLE  
AT BARGAIN PRICES, SAE FOR LIST.**

# A. J. H. ELECTRONICS

Proprietor: A. J. HIBBERD

(G8AQN)

Tel: RUGBY daytime 76473, evening 71068

Terms of Business Cash with order, Mail order only, or Callers by appointment.

S.A.E. with enquiries

Handling Charge 40p

Minimum order £1.00.

Official orders accepted on a strict monthly basis.

Prices now include VAT

FULL MONEY-BACK GUARANTEE ON ALL ITEMS

## NOW AVAILABLE

### "KENT" MODULES

These are fully assembled and working modules for the constructor the first available will be a 10-7MHz FM IF amplifier and a matching AUDIO AMPLIFIER with squelch, both units offer superb performance with modern "state of the art" circuitry, prices and delivery to be announced next month. S.A.E. for technical data.

**ITT AM7STARPHONE P.C. BOARDS** removed from new & unused units: audio & squelch £6.00/AM IF 1st IF 10.7MHz, 2nd IF 455KHz with 2nd mixer & crystal, filter  $\pm 3\frac{1}{2}$  KHz £9.00/AM modulator P. C. B. £6.00/3 ch. osc TX & Rx with channel switch & knob "high band" £2.00. Mod. Xformer £2.00.

**P. C. BOARDS for M5 UHF STARPHONE:** single channel TX & Rx osc board £2.00.

**TANTALUM BEAD CAPACITORS** 1mf/20v, 6-8mf/16v, 15mf/16v, 15mf/35v, 22mf/16v, 47mf/6v, 150mf/6v, all 10p each.

**DISC CERAMIC CAPACITORS** 50v 22pf-2,200pf in E12 series 3p each.

**CARBON FILM RESISTORS**  $\frac{1}{2}$ ,  $\frac{1}{4}$ , &  $\frac{1}{8}$  watt 22 ohm-1 megohm in E12 series, minimum quantity of 10 per value supplied-price  $\frac{1}{2}$  &  $\frac{1}{4}$  watt 13p per 10,  $\frac{1}{8}$  watt 16p per 10.

**ELECTROLYTIC CAPACITORS:** 6-4mf/25v, 33/16v, 47/16v, 47/25v, 47/35v, 80/16v, 100/10v, 100/25v, 100/40v, 150/16v, 220/25v, 250/16v, 330/25v, 470/25v, all 5p each. (20 & 5p each) 1000/10v 10p, 1000/40v, 15p, all wire ended, 4700mf 40v can type 35p, 3300mf 25v, wire ended 20p.

**ERIE 1000pf 500v disc ceramics** 10 for 15p.

**SG BROWN MIC INSERTS** same as used in PYE mics, but 300 ohm imp. OK for liner two etc. £1.00 each (new only).

**B40 RECEIVERS,** good condition, £45.00. 0-64-30-5MHz, 5 bands, xtal, calibrator etc. Buyer to collect by arrangement.

**B41 RECEIVERS,** 15KHz-700KHz. £35.00.

**STEREO CAR CASSETTE PLAYER AUDIO AMPS** contains two NEC  $\mu$ PC1001H2 audio ICs plus 30 capacitors, 30 resistors, 4 transistors, on PC board,  $4\frac{1}{2} \times 1\frac{1}{2}$  approx. 3 $\frac{1}{2}$  watts RMS per channel @ 12VDC supply. These have been removed from new units by the manufacturer and are not faulty in any way. Price £2.00 each or two for £3.50, you could not buy the capacitors for this price! With circuit.

**CAR RADIO PCBs.** Famous British manufacturers rejects due to P.C. track defects "sold for components" but can be used for a number of projects inc. top band DF set. The IF and audio stages are complete, the mixer stage is wired but was originally designed for a permeability tuner, new and unused, only £1.00 inc. circuit. Circuit only—8p stamp + S.A.E.

**FM RADIO FRONT END TUNER UNITS** 88-108MHz with 10-7MHz I.F. output & fitted with A.M. gang, capacitor, FET RF amp, npn mixer, separate osc. AFC & AGC inputs, geared tuning band new with circuit requires 9-12V DC. BARGAIN ONLY £3.30 each.

**ITEMS FOR FREQUENCY COUNTER FEATURED IN MARCH 1976 R.C.:**

**DECADE COUNTER PCB.** Made to suit our miniature ITT Nixie tubes (ITT553S) suitable for use with 18 way 0-1" pitch edge connector if required, ready drilled and tinned to suit SN7490, 7475 and 74141 75p each set of five £3.40. 2" pitch edge connector to suit above PCB. 60p.

**MINIATURE NIXIE TUBES** ITT-553S to suit the above decade boards left and right decimal points,  $\frac{1}{2}$ " characters, envelope size only 7/8" x 7/16" new and unused with data sheet 60p each, five for £2.50, ten for £4.50.

**HC6/U CATHODEON Crystal Ovens** MCO-2M 45p.

10,000mfd 16V electrolytic 35p.

10mfd 350V 10p.

SN7400 17p.

SN7473 22p.

SN7475 60p.

SN7490 60p.

SN74121 38p.

SN74141 80p.

$\mu$ A7805 5V regulator TO3 case £1.50.

**PYE CAMBRIDGE 10-7MHz IF AMPS.** new £3.00.

**PYE F27 Tx PATANK UNITS** "P" band can be altered to 2 MTrs new 75p.

**PCB** for breaking down contains 11 Plessey 5V reed relays 2 pole make/break, 11 BC107 transistors, 6 ICs 74 series, 11 diodes & resistors ex-new equipment bargain £3.00.

**MIXED BAG OF CAPACITORS** polyester type 250/400v. PC mounting sold by weight but a bag contains approx 400, values 0.1-1mfd. 95% good. 1 lb bag 80p + 70p post.

**TRIMMER CAPACITORS:** CERAMIC 10mm dia. 6mm high, 2-8pf, 3-10pf, 4-20pf & 10-40pf, all 8p each. 7mm dia. 3-9pf, & 7-35pf 8p each. **TUBULAR CERAMIC** solder in type 1-6pf, 8p each 70p for ten.

**MULLARD TUBULAR BOLT-IN TYPE** 0-8-6-8pf, 13p each.

**CERAMIC MINIATURE COMPRESSION TYPE** 8 x 13mm P.C. mount 10-40pf 6p each.

**CERAMIC COMPRESSION** 10-250pf 10p each. (for 70MHz Tx Feb. R.C.)

**PLASTIC SEMI-AIRSPACED** 7mm dia. 1-10pf, 1-15pf PC mount 8p each. 10mm dia. 2-25pf, 6p each ten for 50p, 2-32pf 8p each, all 3 pin PC mount.

**OXLEY AIR SPACED**  $\frac{1}{2}$ " sq. base 1-10pf, 1-15pf, 18p each ten for £1.40. 2-30pf 20p each.

**TETTER TRIMMERS** Jackson C16 Cat. No 5640 2-10pf,  $\frac{1}{2}$ " sq. base, temp. coef. less than +100ppm/°C 40p each ten for £3.50, also 8mm dia. PC mount Cat No 5750 price & info, as 5640.

**ERIE TEFLOM TRIMMERS** "530 series" .25-1-5pf, 600v.  $\frac{1}{2}$ " dia. x 7/16" long solder in type P.T.F.E. insulation 10p each.

**JACKSON BUTTERFLY TRIMMERS** 17 + 17pf 0-050" air gap Cat. No. C713 screwdriver adjustment 50p each, few with  $\frac{1}{2}$ " spindle 65p each.

**PLASTIC SEMI-AIRSPACED TRIMMERS** 10-60pf as used in PYE WESTMINSTER PA units 15p each.

**VIDEO CAMERA SCAN & FOCUS COIL ASS.** transistor type to suit std. 1" vidicon tube, inc. centring magnets & tube clamp, no info. new unused £8.00 each two for £11.00.

**PLUGS/SOCKETS** 50 ohm BNC right angle adaptors 60p. 50 ohm BNC single hole sockets cable entry type 50p each. SO239 sockets, P.T.F.E. ins 50p.

**PL259 PLUGS,** slightly tarnished, 30p.

**SPECIAL OFFER:** 50 ohm "N" plugs for UR43 co-ax 35p. 75 ohm BNC plugs 30p. 75 ohm BNC single hole sockets 30p. each.

**10-7MHz CRYSTAL FILTERS:** STC 445/LQU/929  $\pm 15$ KHz @ 3db imp. 910 ohm (for PYE Pocketfone PFI) £3.00.

TOYOCOM 10M-5B-1  $\pm 5$ KHz @ 6db imp. 3k ohm £3.50.

STC 445/LQU/901A  $\pm 15$ KHz @ 3db imp. 2k ohm £2.50.

STC 445/LQU/909B  $\pm 7.5$ KHz @ 3db imp. 910 ohm as used in PYE/FM Westminsters EX-EQUIP. £2.50.

TT 024CC  $\pm 6$ KHz @ 3db imp. 910 ohm £4.00.

ITT 024DC  $\pm 3.75$ KHz @ 3db imp. 910 ohm £6.00.

ITT 024DE/923L  $\pm 3.5$ KHz @ 3db imp. 820 ohm £6.00.

ITT 044DA  $\pm 3.75$ KHz @ 3db imp. 3-3k ohm £5.00.

TOYOCOM TI4FO2-M  $\pm 3.75$ KHz @ 3db imp. 910 ohm £6.00.

**1-4MHz LSB, SSB, FILTER** made by Cathodeon for PYE SSB125T Radiotelephone £4.00.

all above filters are new & unused except for 445/LQU/909B which is EX-EQUIP.

**ERNEST TURNER EDGEWISE METERS** small precision type 100 microamp FSD, marked 0-100 display area 9/16" x 1 $\frac{1}{2}$ ", make nice "S" meter new boxed £2.50.

**JAPANESE TUNING METERS** 1" sq. marked "mono/stereo" special offer 45p each.

**SEMICONDUCTORS** HEWLETT PACKARD HP5082-3080 pin diodes 50p each 4 for £1.75.

**VARICAP DIODES** BB105 in matched sets of 4, 90p per set. BA111 15p each.

**VHF POWER TRANSISTOR** SRF1117 (Motorola) capstan type, 13v, 300 mW input gave 2 $\frac{1}{2}$  watts output on 145MHz FM. (2 $\frac{1}{2}$  watts max output) special offer 65p each any quantity.

**BF160 VHF/UHF RF amp.** 20p each.

**BF166 VHF RF amp.** 15p each (replacement for W15AM Westminster front end.)

**BFY90 VHF RF amp.** 90p each.

**ST2110 RF amp** FT950MHz OK VHF Tx driver 15p each. CA3089E 16 pin DIL, FM IF amp. "S" meter, AGC, AFC. outputs OK for IF amp for 2 MTr Rx. with data sheet £2.00.

**TBA641/A12 AUDIO AMP IC.** gives 2 watts into 4 ohms with 9 volt supply, with data sheet £1.25.

**741 OP AMPS** 8 pin DIL. 35p each.

**NE555 TIMERS** OK for tone burst etc. 8 pin DIL. 45p.

**FND507**  $\frac{1}{2}$ " single digit LED numeric displays common anode with right hand decimal point, only £1.25 each, data supplied.

**INTEGRATOR UNITS** for PYE PF1 Pocketfone receivers new 75p each.

**SWITCHES** MINIATURE ROTARY SWITCHES 1" dia. 3 pole 11 way make before break new 50p, 3 pole 3 way + (off position) & earthing ring) break before make, 20p each.

**SUB MINIATURE** 2 pole 10 way (remove the stop & it makes 2p 12 way) 5/32" spindle 80p each.

**SLIDE SWITCHES** 2p CO std size three for 17p.

**REVOCO**  $\frac{1}{2}$ " wave mobile aerials for 145MHz £7.50 + 60p post. High band 155-174MHz, same price.

**MIXED FERRITE CORES** 5/32" and  $\frac{1}{2}$ " dia. coarse and fine threads bag of 100 50p.

**FERRITE RINGS**  $\frac{1}{2}$ " dia. 10p,  $\frac{1}{2}$ " dia. 15p, 2" dia. 25p. (no gen.)  $\frac{1}{2}$ " dia. with 6 turns wire 3p,  $\frac{1}{2}$ " dia. with 5 turns wire 5p.

**FERRITE BEADS** similar to FX1115 4 for 10p.

**10-7MHz IFTs,** single tuned translator type 1" sq. 10p.

**455-470KHz IFTs,** single tuned translator type  $\frac{1}{2}$ " sq. 10p

**ELECTRONIC TUNING DIALS** £3.50.

**CRYSTAL HOLDERS** HC6/U usable P.C. or chassis mount, HC25/U, HC25/U P.C. mount FT243, chassis mount all 11p each.

**COILS** 5mm dia. 10mm sq. base for P.C. mounting complete with core as used in PYE radiotelephones 5p each.

**COILS IN CANS,**  $\frac{1}{2}$ " sq. x  $\frac{1}{2}$ " high, 5p each; 10 for 40p.

**I.C. SOCKETS** 8 pin 10p, 14 pin 15p, 16 pin 16p each. (low profile)

**REED RELAYS** 14 pin DIL made by ASTRALUX type 121A-3, 5 volt coil 500 ohms TTL compatible, with normally open contacts, new 45p each ten for £3.50.

**3 GANG TUNING CAPACITOR** 365pf per section direct drive 75p each.

**SOLDER-IN INSULATORS** approx  $\frac{1}{2}$ " dia 100 for 50p.

59 WAVERLEY ROAD, THE KENT, RUGBY, WARWICKSHIRE