Being the best equipment available, what more is there to say?

Except to wish all our customers past, present and future, a Very Happy Christmas and a Lightly Taxed New Year

LOWE ELECTRONICS
**TS820**

The ultimate transceiver . . . TRIO's TS-820. No matter what you have 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 roughest operating conditions, make the TS-820 the leader that it is.

Unprecedented demand plus the painstaking care TRIO lavishes on each TS820 created an initial backlog of orders but happily we can now supply the TS820 from stock. Once you have operated the TS820, you will not be satisfied with anything else.

**Features**

**SPEECH PROCESSOR** An HF circuit provides quick, 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. 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 pass-band 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 performs 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.

**Specifications**

**FREQUENCY RANGE:** 18-30 MHz (160-10 metres)

**MODES:** USB, LSB, CW, FSK

**INPUT POWER:** 200 Watt PEP on SSB

160W DC on CW

100W DC on FSK

**ANTENNA IMPEDANCE:** 50-75 ohms, unbalanced.

**CARRIER SUPPRESSION:** Better than 40dB.

**RECEIVER SENSITIVITY:** Better than -60dB (Harmonics more than -40dB)

**RECEIVER SELECTIVITY:** Better than 9.4uV

**RECEIVER SELECTIVITY:**

- **CW:** 4.4 kHz (-60dB)
- **IF:** 1.8 kHz (-60dB), with optional CW filter installed.

**RADIOFREQUENCY:** 160-15 metres: Better than 60dB. 0.5 kHz (-60dB), 4.4 kHz (-60dB), 1.8 kHz (-60dB), with optional CW filter installed.

**SIDEBAND SUPPRESSION:** Better than 50dB.

**SPURIOUS RADIATION:** Greater than 100W DC on FSK

**SIDEBAND SUPPRESSION:** Better than 50dB.

**IF REJECTION:** Better than 80dB

**RECEIVER SELECTIVITY:** Better than 50dB.

**RECEIVER SENSITIVITY:** Better than 500uV.

**SPEECH PROCESSOR** An HF circuit provides quick, 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. 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 pass-band 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 performs 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.

**Specifications**

**FREQUENCY RANGE:** 18-30 MHz (160-10 metres)

**MODES:** USB, LSB, CW, FSK

**INPUT POWER:** 200 Watt PEP on SSB

160W DC on CW

100W DC on FSK

**ANTENNA IMPEDANCE:** 50-75 ohms, unbalanced.

**CARRIER SUPPRESSION:** Better than 40dB.

**RECEIVER SENSITIVITY:** Better than -60dB (Harmonics more than -40dB)

**RECEIVER SELECTIVITY:** Better than 9.4uV

**RECEIVER SELECTIVITY:**

- **CW:** 4.4 kHz (-60dB)
- **IF:** 1.8 kHz (-60dB), with optional CW filter installed.

**RADIOFREQUENCY:** 160-15 metres: Better than 60dB. 0.5 kHz (-60dB), 4.4 kHz (-60dB), 1.8 kHz (-60dB), with optional CW filter installed.

**SIDEBAND SUPPRESSION:** Better than 50dB.

**SPURIOUS RADIATION:** Greater than 100W DC on FSK

**SIDEBAND SUPPRESSION:** Better than 50dB.

**IF REJECTION:** Better than 80dB

**RECEIVER SELECTIVITY:** Better than 50dB.

**RECEIVER SENSITIVITY:** Better than 500uV.
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 145-000 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 5 kHz to 145-475—but he's getting quicker!

2nd 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 turns 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 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 kHz.

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 600 kHz up which means 145-775 and S23 is 145-575 but it's 400 kHz 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 standpoint 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 forgot 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: 144-146 MHz
- Channel spacing: 25 kHz (current European band plan)
- No. of channels: 80 simplex
- 10 repeater
- 10 reverse repeater
- TX output: 13-15 watts (high power)
- 1-5 watts (low power)
- Repeater access: Automatic, using TRIO 1750 Hz tuning fork oscillator
- RX sensitivity: 0.2 microvolts or better for 12 dB SINAD
- Method of display: LED showing correct channel number i.e. 20=S20, 7=R7 etc.
- Size: Not much bigger than a 2200GX!
- Weight: Not much heavier either.
- Quality: The very best—as anyone.

**DON'T SETTLE FOR ANYTHING LESS THAN THE TR-7500**

TR-7500 £225 inc VAT

Full catalogue available. Send 55p for postage and request "Short Form"
WATERS & STANTON
TELEPHONE HOCKLEY (03 704) 6835 (2 LINES)

QUARTZ—16
£169 inc. VAT!
Fitted 10 Channels

THE Fast Selling 2m. FM Transceiver
NOW... 145-50 Reads "S 20!"
Yes, the latest version now has a calibrated dial giving direct readout in European "S & R" channels.

SOME QUESTIONS ANSWERED
It covers 144-146 MHz, any frequency, not just the 25 kHz spots! It is easy to QSY without having to wind the channel knob all the way round. For example if you fit $20 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 to the local one. A remote vfo is available for complete coverage of 144-146 MHz 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, 107 MHz crystal filters, 495 ceramic filters are all included in the design. The receiver is completely protected against open circuit or high SWR and the modulation is crisp and clear. The standard frequencies fitted are 50, 520, 521, 522, 523, R3, R4, R5, R6 and R7. Included with the Quartz 16 is microphone, power cord, fuses, plug, table stand and English manual.

FDK FREE CREDIT

TM56B AMATEUR VHF MONITOR RECEIVER
320 volts 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 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 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 5/6, 20, 21, 22, 23, R3, R4, R5, R6 and R7, 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

PROVISIONAL PRICE: £639 inc. VAT. Remote Display £10 DELIVERY END OF DECEMBER
MULTI-2700 MkII

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 240v. 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 manufacturers knowledge that a clean signal sells more products! The Optimised 16.9 MHz 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 linear 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 internal adjustment permits the power to be adjusted from approx 1 watt to 6 watts for driving linear or transverters. The Multi-2700 has ± 600 kHz shifts and 16 MHz for 70 cm 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 28 MHz 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 filter section covers 143 to 149 MHz (Tx covers 144-146 MHz + 16 MHz offset). Apart from the two 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.

The bright LED display allows the transceiver to be immediately set to any 2 metre channel. A VFO control ensures the synthesiser can be used equally well on SSB, AM, FM and CW. The versatile VFO control circuit and 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, S.E.M., JAYBEAM, HYGAIN, STOLLE, CDE, MINI-PRODUCTS, SAGANT, BANTEK, ASP, POLAR, MOSLEY, G-WHIPS, SEIWA, KEN, etc. STOP PRESS—NEW JAYBEAM KR400 ROTATORS, SUPPORTS 1/4 TON, COSTS £95 S.A.E.

NEW

EK-I21 DELUXE ECONOMIC ELECTRONIC KEYER

**Built-in paddle.**
**Auto/semi selectable.**
**Ext. 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 read.:—4-6v. 50ma or 4 x 1/4HP cells.**

Price including 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, 198 Collier Row Lane, Romford, Essex.
Tel.: Romford (0708) 68956
G3QQT Bradhurst Electronics, Willowbrook, School Lane, Bunbury, Cheshire. Tel.: (Bunbury) 0829 260708
GM1GRX Eric Simpson. 6 Drossie Road, Falkirk, Stirlingshire. Tel.: 0324 24428

Monday to Saturday 9 a.m.—5.30 p.m. Early closing Wednesday

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, 198 Collier Row Lane, Romford, Essex.
Tel.: Romford (0708) 68956
G3QQT Bradhurst Electronics, Willowbrook, School Lane, Bunbury, Cheshire. Tel.: (Bunbury) 0829 260708
GM1GRX Eric Simpson. 6 Drossie Road, Falkirk, Stirlingshire. Tel.: 0324 24428

Monday to Saturday 9 a.m.—5.30 p.m. Early closing Wednesday
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!

Consider these star features...
- One 10' section weighs only 11 kg.
- 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 13/16'' 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

Alumast

there's no better buy!

Here's why...

Some firms just drive round in their Rolls-Royce!

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

YOUR SINGLE-STOP SOURCE!
Electionics

YAESU AND Western
Names synonymous for SERVICE and VALUE since we first introduced YAESU

THE NEWEST LEADER — FT227R FROM THOUGHT 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...

<table>
<thead>
<tr>
<th>Channels available by front panel control</th>
<th>Yaesu FT-227R</th>
<th>Trio TR7500*</th>
<th>Icom IC240*</th>
<th>Digital II*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full 4 MHz coverage (144-148) without modification</td>
<td>400 (800 over 4 MHz)</td>
<td>YES</td>
<td>Apparently NOT</td>
<td>Apparently NOT</td>
</tr>
<tr>
<td>Frequency steps</td>
<td>YES</td>
<td>5 kHz</td>
<td>25 kHz</td>
<td>25 kHz</td>
</tr>
<tr>
<td>True frequency display</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
</tr>
<tr>
<td>Frequency memory facility</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Repeater shifts</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Tone burst</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Factory-fitted high/low power switch</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NOT YET</td>
</tr>
<tr>
<td>Price (including VAT) from Western</td>
<td>£180</td>
<td>£225</td>
<td>£198</td>
<td>£264</td>
</tr>
<tr>
<td>Price comparison</td>
<td>LOWEST £180 MORE £19 MORE</td>
<td>£45 MORE £49 MORE</td>
<td>£84 MORE</td>
<td></td>
</tr>
</tbody>
</table>

* All details taken from current advertising.
† Tone Burst £11.25 extra.

NOW... YOUR CHOICE IS CLEAR... THE YAESU FT227R SCORES ALL ROUND! LET YAESU DO YOUR TALKING!

NEW 1978 YAESU MODELS, FT-901 and FT-7 HF TRANCEIVERS

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

Agents: LYSKE, GJOCD, NEWTOWNARDS (0247) 612449
ALAN CAMERON, GM3JOG, ALLOA (0259) 218561
ALAN PAXTON, G4BIZ, CHANDLERS FORD, HANTS, (04215) 68015

OPENING HOURS:
LOUTH: Open 9-12, 2-5 p.m. MON.-FRI. Sat. by appointment.
LEICESTER: MAYS Hi-Fi, CHURCHGATE, Tel. 58662. Open MON.-SAT. 9-6 p.m., CLOSED THURS.
THE STEPHENS-JAMES LTD.
47 WARRINGTON ROAD, TELEPHONE LEIGH, LANCs WN7 3EA
(0942) 676790

TR2200GX PRICE £130 (3 ch.).
This is the definitive 2 metre FM portable rig which has won praise from all over the world. Over 6200 operators are carrying them.

TR2300 PRICE £171 inc. VAT. Ex stock.
The newest Fm handy transmitter from the ever expanding TRIO range. Superb performance for the 70 cm. operator with all the advantages of portability and TRIO reliability. 12 channel capability in the range 422-435 MHz with three channels fitted (SUB, 182, 20). Transmitter output switched 2W/400 mW and incorporating the exclusive TRIO 1750 Hz tuning fork access tone generator (does that mean you can ring for credit?) High gain 5/8 wave antenna for enhanced performance on transmit and receive. Supplied complete with all accessories as for the TR2200 GX and including the all important battery charger.
We have just received the first shipment of the VB 3200 10W amplifier for the TR2300. Rather more complex than the VB 2200, the VB3200 including the all important battery charger. Price £95 inc. VAT. Send for details now.

Accessories

COMTEK 2m. Linear Amplifier
Modes: SSB - CW - FM - AM
Input: Up to 15 watts SSB
Up to 5 watts FM
Power output: 101 watts PEP SSB
60 watts FM
Price £140-63 inc. VAT
We carry a stock of products by over thirty of the worlds leading manufacturers. For the call we have a wide range of mobile antennas, test equipment, valves, publications, aluminium tubing, cables, plugs, etc.

We carry a large range of stock which we cannot advertise in the space available. Send 25p in stamps or postal order and we will forward you our latest price list and equipment information available.

Shop Hours: 9.30 till 5.30 Monday to Friday.
9.30 till 5.30 Saturday.
ACCESS and BARCLAYCARD facilities available.

We are always looking for good clean equipment and spot cash will be paid for receivers, transmitters, transceivers, etc. If you have equipment surplus to your requirement we would be pleased to sell this for you on commission. Our secondhand stock changes daily. If you require a specific piece of equipment send us a SAE and we will let you know as soon as we have the model available. All our secondhand equipment is covered by three months guarantee.

PLEASE NOTE ALL OUR PRICES INCLUDE VAT at the current rate.
Carriage, postage is extra.

We can quote for delivery in any part of the world. We are located on the A574. Turn at the GREYHOUND MOTEL on the AS50 (East Lancs. Road) 5 miles from the M62; 6 miles from the M66. Easy access from North, South, East and West. NO PARKING PROBLEMS.
As sole distributors for the STE range of equipment for four years despite rising prices, we have maintained prices stable for over two years. Surely the finest value for money on the market. With the opening of the 28 MHz band the AR10 Receiver module is now one of our fastest selling lines. Demand for these is growing every month.

**PRICE LIST including VAT and postage**

<table>
<thead>
<tr>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>AK20 FM Transceiver</td>
<td>£155.00</td>
</tr>
<tr>
<td>AK20 FM Transceiver Kit</td>
<td>£105.00</td>
</tr>
<tr>
<td>ARAC 102 Receiver</td>
<td>£100.00</td>
</tr>
<tr>
<td>ARAC170 Receiver</td>
<td>£125.00</td>
</tr>
<tr>
<td>ATAL 22B Transmitter</td>
<td>£125.00</td>
</tr>
<tr>
<td>ASAP 154 AC PSU</td>
<td>£37.50</td>
</tr>
<tr>
<td>AR10 Receiver Module</td>
<td>£37.50</td>
</tr>
<tr>
<td>AA1 Audio Amplifier</td>
<td>£40.00</td>
</tr>
<tr>
<td>AD4 FM Discriminator</td>
<td>£50.00</td>
</tr>
<tr>
<td>AT22 Transmitter</td>
<td>£50.00</td>
</tr>
<tr>
<td>AG10 Tone Generator</td>
<td>£45.00</td>
</tr>
<tr>
<td>AR20 C.C. Receiver</td>
<td>£50.00</td>
</tr>
<tr>
<td>AT23 C.C. Transmitter</td>
<td>£50.00</td>
</tr>
<tr>
<td>AS15 Stabilised DC PSU board</td>
<td>£10.00</td>
</tr>
<tr>
<td>ABB Linear Amplifier</td>
<td>£25.00</td>
</tr>
<tr>
<td>AB41 Mobile 40 Watt FM Amplifier</td>
<td>£45.00</td>
</tr>
</tbody>
</table>

**STEPHENS-JAMES LTD.**

47 Warrington Road, Leigh, Lancs. WN7 3EA

Telephone 0942 - 676790
**SMC South Midlands**

**WE WISH YOU ALL A 2-YEAR GUARANTEE 24 HOUR SECURICOR SERVICE**

**TAKE A YAESU FRG7 ADD A SMC COUNTER AND YOU HAVE THE BEST VALUE AROUND TODAY**

The FRG7 is a general coverage solid state receiver with specifications unparalleled in its price range. It uses a Barlow Wadley TriHarmonic, drift cancelling loop for continuous, spin-tuned inclusive coverage of 0.5 to 30 MHz. The receiver is sensitive (0.3μV for 10dB, S+N/N) and stable with A.M., SSB and CW modes catered for. A 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.

**FRG7 FITTED WITH SMC DIGITAL READOUT (to 100Hz) £199, COUNTER ONLY £50 (all + VAT)**

**THE FT227R NEW FROM YAESU IS WITH SMC NOW**

The new FT227R uses a "single knob" tuned digital synthesizer employing a photoelectric sensor for an optical coupled system which eliminates both noisy, unreliable rotary switches, and crystal banks. Full coverage 2 metres in 5 kHz divisions with a ±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 20W, DC input transmitter features Hi/low power outputs, (for 20dB S+N/N) sensitivity into a ±6 kHz (at 6dB) bandwidth whilst maintaining a remarkable immunity to overload and image problems. The 20W, DC input transmitter features Hi/low power outputs, A.F.F, tone burst on repeaters and an out of band inhibition trip, etc.

**FT221R**

**FT101**

**FTIOI EX STOCK IN TOTTON (NEW SERVICE MANUAL £12)**

The FT-101E a complete mains or 12v. DC station contained in a compact 30 lb. package, 260W. I.P.I.P. of SSB (with in-built R.F. speech processor) 180W., CW and 80W. of AM 10 to 160m. (Incl. 10 MHz RX). The sensitive and selective (permeability tuned RF stages and 8 pole crystal filter) receiver offers : threshold adjustable noise blanker, switchable 25 and 100 kHz calibrator, ± 5kHz drift cancelling loop for continuous, spin-tuned reliable operation, whose performance with the semi break in keying, with side tone, and the optional filter clarifier (with separate on/off switch), etc., etc.

**STOP** Think carefully before investing in your new 2m. multi-mode rig.

**LOOK** At the published specifications. Remember some manufacturers claim performance figures their equipment can only just reach, Yaesu write their specifications very conservatively. Look at the features :Internal VOX, CW sidetones, crystal control facility, 600 kHz and 1.6 MHz shifts, auto tone burst, digital readout options, etc. Look at the spurious outputs (or try to find them if the transceiver has a P.L.O. to clear sub harmonics of oscillator chain), Look at the ergonomics, are there more controls than necessary, preselectors or varicaps tuned receiver. Look inside, take off the case (or merely lift the lid) does it look like the bottom of granny's sewing box or is it modular constructed with plug in boards, etc.

**LISTEN** To weak signals, listen to strong signals, listen to your own signal. Is your PA rated to dissipate 7W to the claimed output power.

**TAKE A LOOK — TAKE A LISTEN — GIVE US A CALL**

A YAESU WITH 2 YEAR GUARANTEE

**FOR NEW 23 PAGE STOCK LIST, YAESU CATALOGUE, ETC. (A4) S.A.E. OR 30p STAMPS**

---

**South Midlands Communications Ltd.**

**Head Office, Showrooms**

Cables: Aerial Southampton

Telx: 477501

Tel: Totton (041) 7333 (3 lines)

---

**South Midlands Communications Ltd.**

**OSBORNE ROAD, TOTTON SOUTHAMPTON SOI 4DN**

---

**EVENINGS — AGENTS — ALL QTHR**

**GM8DOX B. of Allan**

**G3ZUL Stourbridge (0384) 5917 Brian Kennedy**

**GM8XY Pontybodkin (035287) 864 Howarth Jones**

**GM8DOX B. of Allan**

**G3ZUL Stourbridge (0384) 5917 Brian Kennedy**

---

**December, 1977**
Communications Ltd

VERY MERRY CHRISTMAS

CHRISTMAS OFFER ALL BELOW POST FREE (POSTABLE ITEMS ONLY)+ VAT RECEIVED BEFORE DECEMBER 25th.

SUPER VALUE SMC MONITORSCOPE
ONLY £69 +8% VAT. (Post free for Christmas).

LEADER WATTMETERS NEW
LPM865 Through line (illustrated). 1-8-54 MHz, 20-200-1000 W FSD £61.50 +8%
LPM880 Absorption. 1-8-500 MHz. 5-20-120W. FSD £64.00 +8%

TRANSISTOR DIP OSCILLATOR
LDM815 1-5-250 MHz on fundamentals c/w earphone and 6 plug-in coils 2 kHz modulation. £130.50 +8%
LIM870 Antenna impedance meter 1-8-150 MHz 0-1 Kohm direct reading c/w load. £130.50 +8%

COAX SLIDE SWITCHES
Up to 1 kW, 1-5 GHz, 0-3 dB less, 1-2-1 VSWR, 50 ohm isolation. 50 ohm distinct "N" phasing. £20.50 +8%
EX-Stock P & P 30p (VAT + 8%) EX STOCK
TWS120 1 in 2 out nickel SO239 ... £5.40
TWS150 1 in 3 out nickel SO239 ... £5.40
TWS220 2 in 4 out nickel SO239 ... £9.35

SWR METER WITH POWER INDICATIONS
SWR52 Twin meter. Up to 160 MHz, calibrated to 3:1 SWR SO239 Connectors. £10.00 +8%

ANTEX (KURANISHI) COAX SWITCHES
1-05-1 VSWR, 0-2 dB loss, 40 dB isolation, 200W, handling all 150 MHz.
KSWI 3 SO239 sockets £7.70 + 8%
KSWIA 2 SO239, 1 PL259 plug. £8.20 + 8%

KLM
2 metre, 55/12VPM, RF sensing with override. "Microscopine" technique, 12v D.C. 10W drive 2" x 6" x 10" (11") (VAT + 12%), free delivery. (Over 15 different models—50m details), LOw PRICE, EX-STOCK.
ARX2 6db Ringo Ranger £21.50 + VAT 12%
CUSHCRAFT colinear (illustrated right)
RINGO RANGER-ARX2 6dB gain over ground plans. Uses 3 x 3/4 in phase and 3/4 stub, ultra low angle radiation, approx. 100 high. (illustrated), LOW PRICE, EX-STOCK.
PA10/160/BL145MHz 160W output £160.00
SMD (JACK TWEEDY) LTD
Roger Balnes, G3YBO
79 Chatsworth Road, Chesterfield, Derby
Tel: Chesterfield (0246) 34982
9-5 Tuesday-Saturday

SMD NORTHERN BRANCH
The Chambers, No. 3, The Parade, North Lane, Headingley, Leeds
Tel: Leeds (0532) 785136
9-6 Tuesday-Saturday, 9-8 Thursday

SMD (JACK TWEEDY LTD)
Jack Tweedy, G3FY
Ham Shack, Grouth Lane, Woodhall Spa, Leeds.
Tel: Woodhall Spa (0526) 52793
9-5 Tuesday-Saturday (+ appoint.)
JUST A PILE OF WINNERS WAITING TO BE BOUGHT FOR CHRISTMAS!

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' PRIZED SERVICE OF THANET WITH OUR WELL QUALIFIED TECHNICAL STAFF AND RANGE OF TEST EQUIPMENT AND YOU NEED HAVE NO WORRIES IN BUYING ICOM FROM THANET

FOR MOBILES:
IC-240 The well tried and highly popular FM synthesised 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.
£185

IC-245E The leader in multi-mode mobiles. Fully synthesised to give full band coverage in 100Hz or 5 kHz 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 patch and can be used, when fitted with extra crystals, to cover 144-145 and 145-8 to 146 MHz. 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!
£162*

IC-215E 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 four 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!

*We have a limited number of IC-215s fitted with 8 Channels at the special price of £149 inc VAT

FOR BASE STATIONS;
IC-211E The leader of them all. Fully synthesised VFO with 7 digit LED readout to the nearest 100 Hz. 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. YORKSHIRE
0226 - 756229

OTHER AGENTS
LONDON—Terry G8BAM (01 556 9366)
NORFOLK—Ted G3FEW (05088 632)
MIDLANDS—Tony G8AVH (021 329 2305)
SCOTLAND—Ian GM8DOX (07868 3223)
WALES—Tony GW3FKO (0222 702962)
NORTH WEST—Gordon G3LEQ (Knutsford (0565) 4040)
BURNLEY—(0282 38431)

FOR ALL MAIL ORDERS AND SALES DURING BUSINESS HOURS
Are you going around in circles trying to choose which synthesised 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 16 kHz?

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 m.p.h. on a busy motorway):—

1. What frequency is 23—145.575 MHz.
2. Can I manage to QSY without looking at the dial for more than about 1 sec.—NO, unless you work out in your head how many 10 kHz steps you need to click the switch round, i.e. 145.575—145.100 = 575 kHz = 57 steps. (You need to memorise the repeater input frequencies of course).
3. Do I have to press the 5 kHz button? Well, as 23 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 excellent rigs to choose from which both have 25 kHz 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 their's is best—so let us list the advantages of the IC-240:

1. Its 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 148 MHz 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 0.1uV pd for 10dB SINAD (which for comparison is better than 0.14uV for 12 dB SINAD)
5. Its cheaper in price but not in quality.

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

Wishing you all a very Happy Christmas and plenty of DX next year!

From Dave, Paul, Phil and Fraser and all the other members of the Thanet team
**YL Electronics Ltd.**  
Established for more than two decades  
01-723 5521  
Closed Thursdays  
GJVL  
400 Edgware Rd., Paddington, W.2  
London's largest stockists of YEASU  
- Antenna Specialists  
- Standard  
- ICOM  
- Bantex  
- 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 FTI21, FTI200, FTI101, FTI100, FTI110, FTI77, FTI300A, FTI77, etc.  
Price £4-00 each inc. VAT.  
Carriage 45p.  
FTI301, FTI221, FTI220, FTI620, £3-00 each inc. VAT.  
Carriage 45p.

## YAESU MUSEN PRICES—FREE DELIVERY WITHIN UK

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FT301</td>
<td>£485-00</td>
<td>T/Rx 1-80, 100W. Mobile</td>
</tr>
<tr>
<td>FT301D</td>
<td>£588-00</td>
<td>Digital Readout 301</td>
</tr>
<tr>
<td>FT3015</td>
<td>£240-00</td>
<td>10W PEP 301</td>
</tr>
<tr>
<td>FY301</td>
<td>£675-00</td>
<td>External VFO</td>
</tr>
<tr>
<td>FP301</td>
<td>£79-00</td>
<td>PSU/Speaker</td>
</tr>
<tr>
<td>FP301D</td>
<td>£125-00</td>
<td>FR301 Digital Transceiver, Ident.</td>
</tr>
<tr>
<td>FT200B</td>
<td>£249-00</td>
<td>T/Rx 3-30</td>
</tr>
<tr>
<td>FP200B</td>
<td>£54-00</td>
<td>AC PSU/Speaker</td>
</tr>
<tr>
<td>FRG7</td>
<td>£145-00</td>
<td>Rx -5-30 Cont.</td>
</tr>
<tr>
<td>FT221R</td>
<td>£339-00</td>
<td>T/Rx 2m, &quot;All Mode.&quot;</td>
</tr>
<tr>
<td>FT227</td>
<td>£167-50</td>
<td>10W, 400 ch. Mobile Digital</td>
</tr>
<tr>
<td>FT232</td>
<td>£139-50</td>
<td>T/Rx 2m, FM 32</td>
</tr>
<tr>
<td>FR101D</td>
<td>£159-00</td>
<td>Digital Readout 10W</td>
</tr>
<tr>
<td>SP101B</td>
<td>£159-50</td>
<td>External speaker</td>
</tr>
<tr>
<td>FL101</td>
<td>£235-00</td>
<td>1 X 18-30 MHz</td>
</tr>
<tr>
<td>FL2100B</td>
<td>£248-00</td>
<td>Linear 1-2 kW</td>
</tr>
<tr>
<td>FT101EE</td>
<td>£408-00</td>
<td>T/Rx 1-80</td>
</tr>
<tr>
<td>FPV101B</td>
<td>£62-75</td>
<td>External VFO</td>
</tr>
<tr>
<td>YC601</td>
<td>£87-00</td>
<td>Dig. Display 101</td>
</tr>
</tbody>
</table>

**MICROWAVE MODULES**

- **MCC70, 4m Converter** £18-00  
- **MCC01L0, 4m, Converter** £22-00  
- **MCC144, 2m Converter, IF out. 2-4 or 28 MHz** £18-00  
- **MCC2101B, 2m Converter, IF out. 28 MHz** £22-00  
- **MCC343/28, 70cm, Converter** £22-00  
- **MCC432/144, 70cm, Converter** £22-00  
- **A.T.V. 435/21, ATV Converter** £22-00  

**FREQUENCY COUNTERS**

- **MMD 050, 50 MHz Counter** £62-00  
- **MMD 050/500, 500 MHz Counter** £79-00  
- **500p Pre-scaler** £25-00  
- **MMV 1296, 23cm, Varactor** £30-00

**A.S.P. — MOBILE AND BASE STATION ANTENNAS**

- **ASPE201, 4W, 2m, Mobile** £3-25  
- **ASPE209, 3 d B 2m, Mobile, NEW MODEL with swivel base** £5-95  
- **ASPE629, 4W, 2m, Mobile 3dB** £7-60  
- **ASPE77, 4 W, 3dB Mobile** £13-50  
- **ASPE399, 4 W, 3dB Mobile** £17-00  
- **ASP, No hole boot mount** £3-70  
- **ASP2, Magnetic mount with cable** £7-95  
- **ASP, Gutter clipless cable** £8-85

**ICOM RANGE**

- **IC215, 2m** £144-00  
- **IC202, 2m, 55B** £152-90  
- **IC22A, 10W, Mobile** £145-00  
- **IC240, 10W, Mobile** £176-00  
- **IC245, 10W, FM/SSB £235-02  
- **IC211E, 10W, PTM/SSB £470-00  

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>FT227</td>
<td>10W, 400 ch. Mobile Digital</td>
</tr>
<tr>
<td>FT232</td>
<td>T/Rx 2m, FM 32</td>
</tr>
<tr>
<td>FR101D</td>
<td>Digital Readout 10W</td>
</tr>
<tr>
<td>SP101B</td>
<td>External speaker</td>
</tr>
<tr>
<td>FL101</td>
<td>1 X 18-30 MHz</td>
</tr>
<tr>
<td>FL2100B</td>
<td>Linear 1-2 kW</td>
</tr>
<tr>
<td>FT101EE</td>
<td>T/Rx 1-80</td>
</tr>
<tr>
<td>FPV101B</td>
<td>External VFO</td>
</tr>
<tr>
<td>YC601</td>
<td>Dig. Display 101</td>
</tr>
</tbody>
</table>

**FRG7 — 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 12.5% VAT

**ACCESS — BARCLAYCARD**

**FREE PARKING AT REAR OF SHOP**
NEW: ACTIVE RECEIVING ANTENNA

A COMPACT INDOOR ACTIVE DIPOLE FOR 60 kHz to 70 MHz

MODEL AD170 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 60 kHz to 70 MHz.
- Ideal for remote mounting (e.g. 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 minimises receiver intermodulation effects.
- Balanced dipole configuration gives choice of polarisation 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 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, i.e. 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 80 mA) 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 (see this advertisement).

NEW: MAINS POWER UNITS MODELS MPU and MPU/1

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/I 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 unstabilised and varies from 15.5 volts off-load to 11 volts at 200 mA (max.) with a 240v. AC supply. The units will also operate Models FL1 and AD170 (but not UC/I) from a 220 volt mains supply.

Normally a 3.5 mm. jack plug is fitted (suitable for AD170). If specified at the time of ordering we can fit plugs suitable for UC/I 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 £33.00, UC/I £105.00, RFC £40.00, RFC/M £21.50.

All prices are subject to VAT at 12½%. Prices include delivery within U.K. Please see previous advertisements or write for more details. More data on any product or 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.
## YAESU MUSEN EXCLUDING VAT

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>FT301 T/Rx</td>
<td>1x30, 100W</td>
<td>£485.00</td>
</tr>
<tr>
<td>FT301D Digital</td>
<td>12V</td>
<td>£585.00</td>
</tr>
<tr>
<td>FT301S 10W PEP</td>
<td>100W</td>
<td>£340.00</td>
</tr>
<tr>
<td>PV301 External VFO</td>
<td></td>
<td>£62.00</td>
</tr>
<tr>
<td>FP101 PSU/Speaker</td>
<td></td>
<td>£79.00</td>
</tr>
<tr>
<td>FP101D FP301 + Clock, Ident.</td>
<td></td>
<td>£125.00</td>
</tr>
<tr>
<td>FT200B T/Rx 3x5-30</td>
<td></td>
<td>£249.00</td>
</tr>
<tr>
<td>FP200B AC PSU/Speaker</td>
<td></td>
<td>£54.00</td>
</tr>
<tr>
<td>FRG7 Rx - 6-30 Cont. AC/DC</td>
<td></td>
<td>£145.00</td>
</tr>
<tr>
<td>FT221R T/Rx 2m, All Mode</td>
<td></td>
<td>£339.00</td>
</tr>
<tr>
<td>FT223 T/Rx 2m, FM 23</td>
<td></td>
<td>£139.50</td>
</tr>
<tr>
<td>FR101DD Digital</td>
<td>readout</td>
<td>£480.00</td>
</tr>
<tr>
<td>SP101B External speaker</td>
<td></td>
<td>£15.50</td>
</tr>
<tr>
<td>FL101 Triax 18-30 MHz</td>
<td></td>
<td>£225.00</td>
</tr>
<tr>
<td>FL2100B Linear</td>
<td>1-2 KW</td>
<td>£240.00</td>
</tr>
<tr>
<td>FT101EE T/Rx</td>
<td>1-30</td>
<td>£240.00</td>
</tr>
<tr>
<td>FC1D/DC</td>
<td></td>
<td>£122.00</td>
</tr>
<tr>
<td>TY101B External VFO</td>
<td></td>
<td>£62.75</td>
</tr>
<tr>
<td>TY801 Monitor scope</td>
<td></td>
<td>£110.00</td>
</tr>
<tr>
<td>YU100 Monitor 2 tone osc.</td>
<td></td>
<td>£118.00</td>
</tr>
<tr>
<td>YP150 Dummy load/wattmeter</td>
<td></td>
<td>£44.00</td>
</tr>
<tr>
<td>FFSDX Low pass filter</td>
<td></td>
<td>£15.25</td>
</tr>
<tr>
<td>OR'24 World time clock</td>
<td></td>
<td>£13.00</td>
</tr>
<tr>
<td>OR'84 Hand mic.</td>
<td></td>
<td>£7.50</td>
</tr>
<tr>
<td>FR1015 Rx 1-30, 12/ 240v</td>
<td></td>
<td>£299.00</td>
</tr>
<tr>
<td>FR101D Deluxe &quot;5&quot;, BC.</td>
<td></td>
<td>£390.00</td>
</tr>
<tr>
<td>FR101DS digital readout</td>
<td></td>
<td>£387.00</td>
</tr>
<tr>
<td>FT2240 T/Rx 2m, FM Auto Scan</td>
<td></td>
<td>£215.00</td>
</tr>
</tbody>
</table>

## ROTATORS INC, CARR. & VAT

- AR30 antenna rotator: £44.00
- AR30 antenna rotator: £31.70
- CD44 antenna rotator: £104.85
- Ham II antenna rotator: £145.00
- CD bearing: £62.21
- Stolle 2010 antenna rotator: £66.50
- Stolle 2030 antenna rotator: £69.05
- Stolle alignment bearing: £61.25

## HY-GAIN ANTENNAS Inc, Carr. & VAT

- 2AVO 10-20m vertical 2kw: £39.90
- 4AVO 15-40m vertical 2kw: £55.60
- 8AVX/1W 10-80m vertical 2kw: £75.90
- TH3 JNR 10-20m, yagi 600W: £108.00
- TH3 MK3 10-20m, yagi 2kw: £165.00
- BN86 balun 2kw: £13.50

## BANTEx

- VHF WHIPS (Carriage 90p) VAT 12½%: £8.75
- 70L, 70 MHz fibreglass: £4.00
- 144, 145 MHz fibreglass: £3.90
- B1 145 MHz FG: £6.35
- BGA 5s 2m, stainless steel: £8.50
- B5 42 MHz: £5.00
- UCL Mid loaded: £6.75
- TLM Trunk lip mount: £5.75
- MB Magnetic base: £8.50
- Unwanted base deduct: £0.50

## ROTORS 7 + 2 metres £162.00 Inc, VAT and delivery

## FDK Multi U-11 £294.00 inc, VAT and delivery

## FDK Quartz-16 £169.00 inc, VAT and delivery

## SMC Monitorscope £69.00 + 8% VAT

## FRG-7 Digital £199.00 + 12½% VAT

Available ex-stock—NOW.

## FREE PHONE

All FDK and Yaesu equipment orders accepted by telephone.

## MISCELLANEOUS

- WD 110 Power, VSWR, Field Strength Meter £9.00 + 8%, VAT
- SWR 50 SWR/PWR/TWIN Meters £1.50 + 8%, VAT
- ODR 123 240 AC - 12v.
- Power Supply 3 amps (5amps Peak) £12.50 + 8%, VAT
- CO-AX Slider Switches £7.50 + 8%, VAT
- TWS 120 1 in 2 out £5.50 + 8%, VAT
- TWS 150 2 in 5 out £11.75 + 8%, VAT
- TWS 220 2 in 4 out £11.75 + 8%, VAT
- Traps Dipoles 50-80 Meters £19.40 + 8%, VAT
- 1 kw PIP 14 yagis £12.30 + 8%, VAT
- YO100 Monitor 2 tone osc. £118.00
- YP150 Dummy load/wattmeter £44.00
- FFSDX Low pass filter £15.25
- OR'24 World time clock £13.00
- OR'84 Hand mic. £7.50
- FR1015 Rx 1-30, 12/ 240v £299.00
- FR101D Deluxe "5", BC. £390.00
- FT2240 Digital readout £387.00
- FT2240 T/Rx 2m, FM Auto Scan £215.00
- FT301 T/Rx 1x30, 100W £485.00
- FT301D Digital | readout £585.00
- FT301S 10W PEP | 100W £340.00
- PV301 External VFO £62.00
- FP101 PSU/Speaker £79.00
- FP101D FP301 + Clock, Ident. £125.00
- FT200B T/Rx 3x5-30 £249.00
- FP200B AC PSU/Speaker £54.00
- FRG7 Rx - 6-30 Cont. AC/DC £145.00
- FT221R T/Rx 2m, All Mode £339.00
- FT223 T/Rx 2m, FM 23 chnl. 12v £139.50
- FR101DD Digital readout £480.00
- SP101B External speaker £15.50
- FL101 Triax 18-30 MHz £225.00
- FL2100B Linear | 1-2 KW £240.00
- FT101EE T/Rx 1-30 £240.00
- FC1D/DC £122.00
- TY101B External VFO £62.75
- TY801 Monitor scope £110.00
- YU100 Monitor 2 tone osc. £118.00
- YP150 Dummy load/wattmeter £44.00
- FFSDX Low pass filter £15.25
- OR'24 World time clock £13.00
- OR'84 Hand mic. £7.50
- FR1015 Rx 1-30, 12/ 240v £299.00
- FR101D Deluxe "5", BC. £390.00
- FT101DS Digital readout £387.00
- FT2240 T/Rx 2m, FM Auto Scan £215.00
- FT301 T/Rx 1x30, 100W £485.00
- FT301D Digital | readout £585.00
- FT301S 10W PEP | 100W £340.00
- PV301 External VFO £62.00
- FP101 PSU/Speaker £79.00
- FP101D FP301 + Clock, Ident. £125.00
- FT200B T/Rx 3x5-30 £249.00
- FP200B AC PSU/Speaker £54.00
- FRG7 Rx - 6-30 Cont. AC/DC £145.00
- FT221R T/Rx 2m, All Mode £339.00

## FOR VISITORS TO LONDON

PLACE YOUR ORDER BY PHONE

WE'LL DELIVER TO YOUR HOTEL OR MEET YOU ON DEPARTURE, AND ACCOMPANY YOU TO THE LANDING OFFICER TO ARRANGE CARRIAGE OF YOUR PURCHASE.

## POWER SUPPLIES SWR BRIDGES, ETC., ETC. ETC.

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

London - Phone before 2 p.m.
and we'll deliver same day.

## LENDARIG SERVICE

Just telephone your card number or send your Cheque with Order

01 - 864 - 1166
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
Open Monday—Friday 9–5, Saturday 9–12.30. Closed for lunch 1–2
YAESU proudly announces a new Synthesized 2 metre FM transceiver FT-227R

The world famous Yaesu state of the arts technique has brought computer theory into VHF communications.

What are the frequency splits for repeaters? Don’t worry! Yaesu has computerised it. In addition to a conventional ±600 kHz split, any transmitter offset frequency is memorised 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 memorised channel instantly.

Why one knob to select a channel out of 800 channels? Yaesu utilises an “OPTICAL COUPLING” system to select each channel in 10 kHz steps and the channel may be offset 5 kHz higher with a touch of a push-button. Thus 800 fully synthesised channels are provided with one-knob and no rotary switches to get oxidised and noisy.

When will the FT-227R be available? October, 1977.

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 output selection, diecast front panel, and famous Yaesu quality throughout!

See your dealer today for an informative catalogue, at a most attractive price.
ADVERTISERS’ INDEX

Page
Aero & General Supplies ... 637
Aerospace and Electronics 630
Amateur Electronics UK ... 594
Amateur Radio Exchange 630
Amcomm Services ... 590
Ian Austin ... 637
B. Bamber Electronics back cover
J. Birkett ... 623
British National Radio & Electronics School ... 626
C. & C. Electronics ... 629
Cambridge Kits ... 637
Catronics Ltd. ... 634
C.B. Electronics ... 628
Colomor Electronics Ltd. ... 638
Commercial Communications 590
Com-Tek ... 631
Crayford Electronics ... 632
Datong Electronics Ltd. ... 628
G3HSC (Rhythm Morse Courses) ... 638
G2DYM Aerials ... 638
G.W.M. Radio Ltd. ... 633
Hamgear Electronics ... 639
D. P. Hobbs Ltd. ... 639
Johns Radio ... 632
K.W. Communications Ltd. 628
Lee Electronics Ltd. ... 588
Lowe Electronics front cover, inside front cover, 577
M.H. Electronics ... 638
Microwave Modules Ltd. ... 622
Mosley Electronics Ltd. ... 629
William Munro Ltd. ... 625
Partridge Electronics Ltd. ... 635
P.M. Electronic Services ... 632
Pulse Technical Communications ... 639
Radio Shack Ltd. ... 591
R.T. & I. Electronics Ltd. ... 633
SEM ... 624
Small Advertisements 634-638
South Midland Communications Ltd. ... 584, 585
Spacemark Ltd. ... 626
S.S.B. Products ... 639
Stephens James ... 582, 583
S.W.M. Publications inside back cover, 636, 637, 639, 640
Technical Associates ... 631
Thanet Electronics ... 586, 587
Varian A.G. ... 629
Reg Ward & Co. Ltd. ... 633
Waters & Stanton Electronics ... 578, 579
Geoff Watts ... 639
Western Electronics (UK) Ltd. ... 580, 581
W. H. Westlake ... 638
Yaesu-Musen Co. Ltd. ... 592
J. Yu ... 627
YOUR KEENEST BUY FOR YAESU MUSEN!

AS DIRECT IMPORTERS WE OFFER YOU...

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 AND SWAN—KEN PERFECT, G3FIK

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 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 left to Lichfield. One mile further on follow A4040 to the right and within 100 yrs. 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 McINNIES, 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 42232.

508-514 ALUM ROCK ROAD BIRMINGHAM 8 021-327 1497

Telex 337045 6313
EDITORIAL

Christmas

It falls to the writer's lot to offer, for the first time, Season's Greetings to all our readers and trade friends, from all of us on the staff of SHORT WAVE MAGAZINE. The past nine months have been a period of consolidation as the change was made from being a freelance contributor to finding oneself in the Editorial chair, and in the next year we hope and expect that there will be a general lifting of the profile now that the present "regime" has become established. One thing is certain: SHORT WAVE MAGAZINE will continue, as it has done for so many years, to be an Independent, commenting when and as it may be necessary, but beholden to no one.

To any and all who may chance to read these lines—may your Christmas be Merry, and in the New Year may we all find Peace and Prosperity.

We return, with some reluctance, to the distasteful business discussed in last month's Editorial. All the "proper channels" referred to in that Editorial—we are reliably informed—have received appropriate inputs and are considering their actions in the light of their various responsibilities, and indeed in some cases may well have initiated actions by the time this comes to be read. This being so, it behoves us all to act responsibly regardless of our opinions on repeaters. No more letters need be written, no more jamming, no more tyre slashing: everything is in hand.

Because of Christmas, the January issue will appear on December 23rd—a week earlier than normal.
COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

THIS comes to be written a couple of days after the end of the Leicester show, at which so many of the callsigns of contributors to this piece were, by meeting, translated into faces to be remembered. However, the writer is possessed of a remarkable memory for names and faces but not for connecting the two, as G2NJ demonstrated forcibly. Nick was laughing like the proverbial drain, the while the ‘KFE brainbox was saying to itself “I know you—but who are you???” for several minutes! G4EAN stopped by for a natter, as did GM3YOR, GM3OLK, G3XTJ, G3NOM and the Yeovil gang, G4BUE of the Channel Contest group and umpteen others—a particular pleasure was to have a few moments chat with G3FKM, John Allaway and G2CVV, Fred Ward. Then, on the one short trip around the Stands, there was G3NMH, and somewhere between, we ran across G4BMO. Indeed a pleasure, in between all the hard grafting before and during the Show.

As to Conditions, the gentle but slow rise seems to be maintained, and Twenty was almost too full to be worth a try on the Sunday evening of the CQ WW Phone contest although it appeared at that time to be getting ready to close when next we looked. The Haiti DXpedition seemed to be doing a roaring trade, as did some others, while W2PV was a bigger signal in terms of genuine S-meter readings than the writer has heard for a very long time. Perhaps the aerial isn’t ready for taking down and overhauling after all!

Top Band

Our first words here were in fact written into last month’s piece, but had to be excited to make everything fit into the ordained space. So here it is now.

We propose to re-introduce the concept of county-chasing for an Award, the counties to be worked on Top Band only. Originally, it will be recalled, there were some 98 points due to our mistake. Ben is pleased to see some of the older callsigns returning to the band; a situation that goes for the writer too.

The world is full of dumb-clucks, as we all know, but they do seem to all latch on to us—Murphy’s Law? G2HKU mentions the Pestilence from Poltava as being audible right up to Medium wave at times. Nevertheless, his SSB is noted as having latched on to DJ0KX, DJ6TK, DJ8WLA, DJ4PI, OH1VP, OF3VV, OH2KA, OH2BO, PA0HIP, PA0PN, EA8CR, YU3TJA, GM3WTA, YU1BCD, HB0HA, HB9H, HB9BLQ, GM3XOQ (Shetland), plus CW to G13PDN, GM3PFQ, GM3TMK and OK1HAS.

Odds & Ends

Old-Timer readers will be interested to hear that ZE3JO, ex-VQ1JO, ex-G2SO is still about; he has a Drake 2B on the receive side, and an HT-32 with about 80 watts of output into the TA33 up aloft. He is still as active as ever on the bands, finding that the majority of his contacts are with Europe, but very few are with G’s; which gives Mal to wonder why there are so few of us about. A good question, only partly explained by TVI, some of the rest to the swing to VHF, and for some odd reason a lack of desire to work the world on the part of many of the newer licensees.

Changing course, we were pleased to see in the Echelshof club Newsletter the plea for more use of Ten—it is opening up more and more of late, and may well be our best DX band for some time. It’s quite a thought to look at the statistics,
which say so many of our current licence-holders have never known what a sunspot peak on Ten can be like in terms of easy DX.

We have a note from G3CED/G3VFA (Broadstairs) which indicates his old buddy and fellow QRP DX-chaser G4EVO is in hospital—Viking Ward, Ramsgate General Hospital. One would hope that by the time this gets to print he will be home again, but a letter to him at his QTH will certainly be appreciated, and passed on if he is by some mischance still in there. If in any doubt, you could give G3CED a ring, either at home or at his Partridge Electronics business as shown in his advertisement, for the latest "state of play."

What a long time it is since last we heard from GM3JZK: he is still up in the Isle of Mull, and our reference to him a little while back provoked him into having a scrounge round for the raw materials for an aerial on Forty and another one on Twenty. More of the results anon, but it is interesting to notice that the builders' apprentices who watched the aerial-erecting tactics said they wouldn't dare try to emulate these simian antics! That in a back-handed way is quite a compliment when one realises that George's call is dated before they were born—and a self-condemnation when one hears of a building apprentice who is scared to go up a tree!

Ex-G2XC (Horndean) has one of the better exit lines on offer this month, and a suitable greeting for any G to boot: from a JA—"The weather in Tokyo is very no good!"

From G3RCA (Wigan) we have the note that the operator of A35AF and ZK2AR in 1976, Kazu, is not QSL'ing, there being a domestic problem to be overcome. It is understood that attempts are being made to see if JA1KSO would be prepared to take over the logs and "dead" QSL's.

G4GMW (Bristol) seems to be having trouble with his trap dipole, which yields an excessively high SWR on all bands save Forty—sounds like a case for dropping it first, checking that all the dimensions are as per book, particularly between traps and ends, and then going through an exercise to adjust the length of the end sections until the VSWR comes down to a civilised sort of level on all bands. Pretty clearly the inner section and the traps are OK, or Forty wouldn't play either.

We have it that WA4TWG has undertaken to clear some 2000 QSL's accumulated at W4SPX, from TT8AC, 5VZDB, and 5VZWT; these in addition to his existing chores for FY7AE, TJ1BF (1972), 4X4NJ, 4X4VB, 4Z4DX.

Eighty

This is very largely the band of the QRP types on CW, the DX SSB types at the top of the band, and just about all the rest of the world in between. However, for this month we are a bit thin on the ground, lacking the usual reports from G4EVO and F9UO which are usually sent in by G3CED, who is also QRT owing to work pressures.

G2HKU used his 3 watts of QRP to work DM2CWB, GM3KPD, and CE1ZGA. On the other hand G4FJU now has more power than before, having acquired a Sphinx, but he still prefers his little 8-watt CW effort which this time went over to UA1ADQ, PAOFVL, and an interesting one with G4FIF of Dover, who had just finished reading the G4FJU saga of last month when the contact was made. One of the many we didn't mention in the preamble as being at the Show was G4DMN (Wirral), who comments that it's always nice to see the face behind the call; he adds that after looking at all the expensive goodies he came away with only a few coaxial plugs; that is parallel to indirect conversion?

Band converter; the question is, what do you call such a set-up—indirect conversion?

Next we have G4EAN (Nottingham) who found his SWR on the 18AVT/WB had shot up to 10:1 on Eighty, and adds, a little crossly "With a 60-foot tower I should use an 18-AVT/WB?" Ian may well have a point, as we seem to recall a time when GW4BELE had one of these verticals and at one stage in the quest for eighty-metre signals took it down in favour of an inverter-vee centred atop a similar-sized tower.

G4GIE (Gt. Moulton) now has his HW-8 operational and has tried it out on various bands. Eighty yielded G4ERJ, G4FPK, G3VTT and OE7GPW during these trials. John is also appearing on Top Band, where he is using an AT5 transmitter at full CW power with the HW-8 as the IF strip for a Top Band converter; the question is, what do you call such a set-up—indirect conversion?

G2NJ (Peterborough) was one of the chaps who came to the Stand for a chat; Nick passed on a B2 receiver to G3RJV, which would appear to be the precise same one that G3KFE passed on to G2NJ some twenty-five years or so ago! On the matter of QSO's, G2NJ is usually to be found around 3570 kHz at noon; this time there has been some minor gear problems, but one chat of interest was with G2CAS when the latter was out on the /P stuff again. This time it was from Blubberhouses, a little village on the A59 between Skipton and Harrogate and north of Otley, where G2CAS/P had some 75 feet of wire out, 15 feet at the near end and down to three feet high at the far end: enough to produce a cracking signal, three more people calling G2CAS when G2NJ signed off.
Forty

This is the band where the hard cases survive and thrive, and those amateurs who drive their receivers as BC sets don't hear a thing!

That delta-loop aerial has been paying off for G3ZSU (Maidstone); Shaun has contrived to load it up on 160, 40, 20 (for which it was designed), 15 and 10! Marvellous gadgets, these new-fangled ATU's! On 7 MHz it was doing well enough to get over the pond to K1VOW.

GM3JZK reckons that maybe it was just instinct, but more or less to get over the pond to K1VOW.

GM3JZK reckons that maybe it was just instinct, but more or less to get over the pond to K1VOW.

Ten Metres

Has really been "showing" on occasion; the only discordant note is from G2BJY (Walsall) who recalls the band right back to the thirties, and reckons it has been rather disappointing; in his argument, he makes the point that if we accept the eleven-year cycle, and that there was a maximum in 1946, then things just "don't add up!!" One feels Geoff is taking the "eleven years" bit rather too literally, in that the cycles so far seen and well documented (namely the past twenty) have varied quite a lot about the mean figure from as low as about eight to a high about fourteen years, figures within which some scientists try to discern lesser patterns. The point of it all is that there isn't any real doubt that the bottom was reached around Spring last year, so at best we are not far up the slope to the peak; thus comparisons with 1946 and 1968-9 are not really valid. In fact Geoff then goes on to demolish his own argument with his DX list; the EU's are assumed, and then we follow with EP5V, ODSAP, PY's, UF6VAZ, UBOU, UK9AAW, UA9CIT, UA9FBN, UA9SCH, UA9WEE, UK7GAA, UL7AAP, VO1AW, ZS1NX, 5R8AL, 4J6AM, 4X4VB, 9H1CB.

Next G3N0F (Yeovil), an old campaigner on the band. He noted several morning openings to VK7ZL, and afternoon session to both North and South America, with some Africans also in the afternoon. He worked A4XGB, K4UTE, K5LM, K5OA, KOGU (Colorado), KORF likewise, VE1ACC, VO2BK, W3RJ, W4FDA, W4ORH, W4QQN, W4WS and ZP5LX.

By the time this comes to be read, G4WBLE (Newport, Gwent) will be a married man, with all that entails. We had a letter from Steve covering just his ten-metre doings, although a verbal report from G34XM was received at the Show as to how the Contest station GW4ENT did in the Contest. Steve's own report covers all-SSB, to A2CZV, FM7WE, VP8LP, PY5ATL, PY5UG, KZ5USN, ZP5CBE, ZP5CD, Z6EJ, KP4APT, KP4CQG, PJ2FR, DM4DA, LU4EFC, HC1BU, HH2MC, CX5BR, ZS1ZF, ZS2AD, ZS5SP, HC1EE, G4DMN(!), CE4KK, K1HUC/KP4, YV4TI and lots of assorted W/K stations. As soon as it was written, we gather, he was rushing away to do the next chore, namely moving to a temporary home in the centre of Newport, to which end he was busily packing away the QSL's and the gear—one wonders just how Steve will pack the tower?

G2ADZ (Cheshington) covers 28 MHz CW, and found only two bad days in October, long spells of DX, and surprises galore. Beacons heard—sometimes all on one day!—were 3B8MS, DLOIGI, N4RD in Florida, GB3SX, 5B4CY, VP9BA, A9CX and EA2OIZ. As for stations worked, G2ADZ says his list is far too long and so he pruned it before sending it in. It mentions ZS's, ZC4, PY/7U's, EA8's, 4J6AM, W's except for W6 and W7, U49's, JH1JEC/MM, VK8HA (complete with the QSL to prove it), ODS5LX, HZIHZ, OA8V who had five watts, VEIAHQ, OATBI, HI8LP, UL7AAP, UL7TA, EP2VW, TU2GA, FG7AM, VS6EJ, HHSTW, ZS3BT and J28AY in Djibouti. On the Gotaway front we noted VU, VO, 9K2 ELOAA, VP2VL, ZP5NW, PZ1AP, KP4 and KS3.

The list from G4DMN, says Richard, needs pruning, but was given in full just to show how good the band had been. We counted about sixty DX calls, and space won't let us take it in full, but suffice it to say it covered all continents and quite a lot of East-West stuff, which is the real measure
of how good the band is.
G3ZSU claims his Gotaway list is the most impressive, including as it does H18, VP2, PY, OY, S8, KV4 and some JA's, as compared with a solitary W worked on SSB and another on the key. However, it did what he set out to prove, which was that the Delta loop would cover all bands!

**Fifteen**

G3ZSU, continuing his tests of a Delta loop used on all bands, tried 21 MHz and managed a brace of W's with good reports.

Long time since we last heard from G3VLX (Petts Wood); since then he has moved from Sidcup to Chislehurst to his present location; in retrospect the first place was a good QTH; a clear take-off, with a clay subsoil and good propagation characteristics. The Chislehurst QTH had trees—for one-fifth acre including the house, there were no less than twelve trees!—but again all on clay and high up with a superb take-off to the West and South. For the past 2½ years G3VLX has been at the present place; again high but on loam, free draining, and the Water table looking to be well below ground level; G3VLX suggests the right answer would be to cover the garden with a sheet of copper, but somehow the XYL doesn't approve of the idea! She prefers to keep him hard at it, rebuilding the place, so his few QSO's are all made from away, either /P or /M. /M has managed JH3VKT on the band, while /P looked at another JA type, VU2AQ, and 5Z4PW. Just one short session from home showed that the place can't be too bad radio-wise, if it can show good DX on Forty.

G2DHV (Sidcup) reckons that September and October conditions were erratic, but he managed to find AP2TN, IT9XUL, VE's, W/K/N's, 4Z4, ZEI, PY, ZS6 and such, the activity being Crystal-controlled on 21134 kHz.

Ex-G2XC (Horndean) reckons that the rise in conditions have at times almost made him feel a wish to be back several months when at least he could listen to one station at a time! The Woodpecker Thing has also made a pretty determined onslaught on the band, sometimes pushing the meter up to the "forty over S9" mark on the scale, so Ted set about trying to work through it. The AGC switch is one of the key controls; if the Thing is louder than the wanted signals, AGC should be turned to "off" or at least to the "fast" setting, and the RF Attenuator or RF Gain used as the volume control enabling SSB to be read between the pulses; as for CW, the use of an audio filter and judicious application of the attenuator can work miracles, to the extent that on both SSB and CW, the Pestilence is less of a problem than domestic appliances, and car ignition QRM from the A3. Heard this month include DU1TOM, FH0FX, HL9VG, HS1WR, P29JS, UK0LAK (Vladivostock), VE6KWy, VE7DFS, VS6AJ, all SSB, plus CW from FP8DG. This makes the 21 MHz total of countries heard up to 202, with 193 on SSB and 146 on CW, all at R5 and all on the indoor aerials. They seem to have been OK on Ten too, as G2XC recalls the situation as being rather like the first QSO's he made on the band, back in September and October 1936.

G4DJY (Blackpool) with his joystick and 100 watts, kept to the CW end; looking at his log we find on 21 MHz, most of the world between Russia-in-Asia, JA's, through to W6's, VP8NO, 5T5ZR and FY7AN.

**Twenty**

Space runs out fast on us; and so, since the band has been doing it's thing up to all expectations, we will only mention a few. G3NOF sums it up by saying that it has been good in the mornings after he has set off for work, the opening not being before 0800 but by 0830 VK, ZL and the Pacific stations have been available; on the other end, Don found the band fading out after dark. The vast majority of G3NOF's contacts were made on 21 MHz, but on 14 MHz he made it to JA6WSB, H18RCD, HH5HR, K7SA, KG6J1B, KV4FZ, VP2MSA, VP9DX, W7ATF, ZL3GS, ZL3WM, 3A6BJ, 4L6M and 8P0A.

G2HKU stuck to the KW—2000, and found himself talking to VK5LC, ZL1VN, ZL3RS, ZL3SE, ZL1BE (who wishes to be remembered to all the older generation of S.W.M. readers, and is nowadays a fruit farmer), ZL1ON and KA2DX.

G3RCA (Wigan) mentions that the reason for his absence last time was simple—no contacts! The beam rotator and stub mast thrust bearings needed to be renewed, not to mention urgent aerial repairs. This month, Tom set out to test everything, with the result that he has a list a couple of pages long. SSB worked FK8AI, FK8CC, FK8CD, KC6BS, VK9NI, VK0KH, VR4CF, ZL1YL/Y, D4CBS and ST5CJ in the morning stints, while afternoons and early evenings gave to FORDO, FB8ZL, YB1CS, 5R8Al, VP8PL, PJ9CG, HH5HR, 3B8DR, FR7BN; in between came P29CC with the elevenses, V85MM likewise, but with the afternoon break.

**Finale**

There it is for this time; a pity it all came in one great lump at the last moment, but it couldn't be helped; and to counterbalance it, there has been the pleasure of meeting and talking to so many of you at the Show. Look in the "box" for the deadline, addressed as ever to CDXN, SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. Meanwhile, have a nice Christmas, with plenty of DX!
THE 1977 LEICESTER A.R.R.A. EXHIBITION, OCTOBER 27th - 29th
THE HAZARD OF HILL-TOP OPERATING — HYPOThERMIA

D. BRADFORD, G3LCK

THE advent of compact commercial—and home-brew—solid-state equipment, especially at VHF and UHF, has meant more and more amateurs taking to the hills to enjoy their radio. For many years, G3LCK has been interested in portable operation on the one hand and fell-walking on the other. Recently, the effects of a rather sinister condition called accidental hypothermia have been realised among the outdoor-pursuits groups; this over and above the expected hazards such as getting lost in mist, falling off high places and so on.

Whatever causes accidents, the suffering to those directly involved, the bother to Mountain Rescue teams, and other people, not to mention the ghoulish outpourings of the Press and Radio, add up to a requirement that one should take every endeavour to avoid such situations.

Some may regard what we are saying as “a bit needless, don’t you think,” or “hell it’s Snowdon not the Eiger!” Before saying this, remember the notice which used to appear on an American radar during the war: “Danger—remember, DEATH IS PERMANENT.” Also recall that the folk who go out on the hills regularly would not dream of making a start without their safety gear check-out, or of ignoring recommended procedures. In addition, they are probably very much fitter than the radio amateur who decides to nip out for the day virtually un-equipped. In addition, they would themselves defend their action by saying they have the rig with them and they can instantly yell for help.

It is a good maxim that you are best able to deal with a problem when you know what the problem is: in this case accidental hypothermia. What is it, and how does it get at you?

Most people know that, when they are healthy, their body temperature sits at around 37°C (98.6°F). If one works hard, slogging it up to that desirable hilltop, the body temperature will rise. The skin are essential; blisters five miles from the nearest road are a darned nuisance. Also, carry a spare pair, and some Elastoplast plasters in a polythene bag. Against this, the body must keep its temperature as close as possible to 37°C. If one gets cold, the body temperature will drop, and this may mean disaster, because the body is not equipped to drop below 37°C, and calls for the bodily biochemistry to release heat energy. This comes from the body core, and especially the liver. This is the rub. You are now, all hot and sticky, at that desirable hilltop site, and you have burned up a lot of vital energy getting there, along with the material from which the energy came.

Out comes the gear, as you sit on the rock and gaze around at all the umpteen counties in sight. Each simplex channel is full of DX, each repeater crawling with signals; “Ye Gods!” you mutter as you reach for the log and the pencil, and settle into a prolonged session of DX-chasing and DX contacts.

Meanwhile, back at the liver, and at the surface of the skin things are happening; those sweat-soaked clothes are being dried out by the wind blowing; but the heat to evaporate each molecule comes from the body skin and is quite considerable. “Cooling down!” signals the bloodstream. “Right-ho” says the system, “Come on liver, let’s have some heat.” However, right now, the liver is a bit short on energy-giving substances, so even though it does its best the body temperature falls a bit. “Hi! What the blazes are you up to?” yells the system, and the liver replies “OK, I’m trying, give me a chance!” while the body temperature goes down a little further.

Systems in general obey the Laws of Thermodynamics and Kinetics; if you cool a chemical reaction it will go slower. At this slower rate less energy will be dissipated to the surroundings per second. If heat is being lost from the system through some other route as well, then things will go slower still. In the end, it will be going so slow that . . .

These light-hearted words are a look at a very serious hazard—after all, jumping around is not part of the operator’s notion of good operating technique, is it?

So, first, go properly equipped. A brief review of suitable garments would include:

**Boots.** Hills and mountains are rocky and boggy places. Broken ankles are not fun, so boots giving good support are essential. These are costly, but so is your life! Most good quality shoe shops sell fell-walking boots by Hawkins and others, or will get them for you. *The Climber and Rambler* magazine has many advertisements for suitable gear. Having got some suitable boots, set about breaking them in, and getting them well waterproofed with dubbin or neatsfoot oil.

**Socks.** Two pairs on are advisable. Wool socks next the skin are essential—blisters five miles from the nearest road are a darned nuisance. Also, carry a spare pair, and some *Elastoplast* plasters in a polythene bag.

**Trousers.** Not, please not, jeans—they get wet, and on drying out they shrink on the wearer, which is not funny in rough country. You can get posh breeches, purpose made and ideal. A good loose old pair of gardening trousers will serve; in cool weather, an old pair of pyjamas underneath, to trap warm air and insulate from the cold. If you get wet the cotton soon dries out.

**Shirts and Jumpers.** These should involve several thin layers rather than one thick one. Those ghastly old woollies the XYL wants to send to the Jumble Sale are ideal; again, trapping warm air is the aim. With several layers, you can “tune” your covering to conditions, better than with one or two thick garments.

**Water and Wind Proofing.** These days there is a vast amount of nylon/PVC gear on the market. It is better to go for quality—and avoid cycle capes unless you like involuntary hang-gliding! Both top and trousers will be needed.
Headgear. A very large amount of heat is lost via the exposed head, so cover it with a bobble hat or a balaclava.

Carrying Gear. Camping shops have a good selection; some frame rucksacks seem to be just asking for a well weatherproofed rig and some nicads to be attached to 'em!

Other Essentials. Map and compass—and find out how to use them before you set off! Almost any small-boat cruising man will tell you how much a compass can be put out by ferrous materials nearby—like the speaker on the rig, for example! Even on a brilliantly sunny day, the visibility can drop to zero in thirty minutes. Walking off an unseen precipice is quite painless until you are retarded by the ground! A good torch, plus spare battery and bulb, together with a whistle are called for. Six toots on a whistle should never be sounded unless you are really in distress—you look a prize twit when the Mountain Rescue team arrive and you lamely explain you were "just trying it out." They get quite cross! Energy-giving foods, chocolate, boiled sweets, flask of tea or coffee—slimming diets are out on the hills. An emergency pack of glucose sweets must be included. And remember, this is for summer activity only. Don't go out in winter without expert companions and full winter equipment. To revert to summer, it is wise to have a survival bag or space blanket with you too.

Procedure
First, decide where you are going! Check with the locals on weather hazards, dodgy routes, and so on. Let someone know you are going, and don't go somewhere else! Estimate your time of return, using Naysmith's Rule which states: three miles per hour, plus thirty minutes for every 1,000 feet climbed, plus an hour for "Tired Tim" effects equals travelling time; add your proposed operating time, and your return trip time to get your return time of arrival; don't forget to let your "someone" know that you have got back! If nasty conditions force you off your intended spot, try to let your "someone" know.

Don't go alone. The symptoms of the dreaded Hypothing are loss of concentration, irrational behaviour, slurred speech, and collapse. If these are observed, the patient must be got into shelter—hence the survival bag—given food, extra clothing, and a hot drink if possible; assistance is required as soon as possible. Note that the old-fashioned use of alcohol and attempts to "rub warmth" into a collapsed person actually increase the risk of a fatality by channelling cold blood into an already over-cool body. The logistics of help are more difficult if you are on your own, and a party of three or four is a useful size. This will enable you to break up operating into shifts, so that those not operating can get an hour's exploring in and get warm and "going" again.

The Return
When the time to return comes, remember you will be in a less sharp-witted condition than when you set out; this can make you careless if you do not make allowance for it, so beware. And, if you hump all the extra safety tackle for a warm sunny day on a prize peak, just thank Heaven for it—if you weren't equipped properly and it had turned nasty, you mightn't be around to hear the prayers of others over your corpse.

(Editor's Note: We agree with everything G3LCK says; we would just add that, while the weather forecasts are almost always right when considered in relation to the areas mentioned, locally things can be quite different; so keep an eye lifting for any signs of trouble in the sky.)

“FM-IZING” THE TR1986 MODULATOR UNIT

OBSOLESCENCE IS SOMETIMES ONLY APPARENT

JACK HUM, G5UM

Among the last valved equipments to be used in RAF airborne applications was that known as the TR1986, which represented just about the ultimate in miniaturisation using hot devices. In due course when it succumbed to the onward march of transistorisation it found its way on to the surplus market in some numbers. Among its various units that found special favour in amateur radio circles was the tiny four-valve modulator unit, which appealed not solely on account of its attractive price of thirty shillings in old money but also because it was capable of giving very good quality AM speech from a unit measuring only 5½ by 3 in old inches!

The TR1986 modulator must have found its way into many hundreds of VHF amateur transmitters during the AM years of the Fifties and the Sixties when its push-pull 6C4 output stage was well able to modulate fully the 10 to 15 watt transmitters of those days. Now there must be many samples of this delightful unit languishing unused in radio rooms as the result of its apparent obsolescence in the predominantly FM conditions of the metre-wave bands of today. One uses the word "apparent" with deliberate intent, for in fact the 1986 modulator may be given a new lease of life in the F3 mode.

At G5UM several erstwhile AM transmitters have been “FM-ized” with the aid of this modulator in what must be one of the simplest methods available, namely, to apply modulation to the screen grid of the crystal oscillator. Pundits will aver that this method produces phase modulation rather than true FM; but there is no doubt that what emerges from the other man's loudspeaker sounds like—and is reported as indistinguishable from—common or garden FM. All that need be done is to interpose the secondary winding of the modulator's driver transformer T2 (Fig. 1) between the CO screen grid and its feed resistor, as shown in Fig. 2—and hey presto, FM!

If this sounds perhaps a little too much like "FM made easy—and on the cheap" one hastens to add that the experimenter should take great care in setting the system...
Push pull 6C4 output stage

EL91 Driver

EF92 Mic amplifier

Mic input

Fig 1

The TR1986 modulator chassis in plan view. To modify it for FM involves removal of transformers T1 and T3, and of the push-pull output valves. The output of the driver EL91 is then used to modulate the screen grid of the CO stage in an existing VHF transmitter.

up, and to obtain on-air reports before he (and his listeners) are satisfied. In particular, various values of screen dropper resistor should be tried (they will vary according to the type of CO valve in use—from which it will be clear that this article is intended for the man with an old valve rig to up-date rather than the contemporary and with-it all solid state user). As a generalisation, it may be stated that the voltage presented to the CO screen grid should be about half that on the anode, so that voltage variations imposed on the SG line by the 1986 modulator will the more effectively vary the operating characteristics of the CO valve.

Modification Programme

A plan view of the TR1986 modulator is shown at Fig. 1. The customary modifications made to it in the AM days were quite basic, and are still relevant to its use in the FM application. They were:

1. Remove the Service-type microphone input socket and replace it with a standard Belling-Lee type coaxial socket;
2. Remove the microphone input transformer T1 if a crystal microphone was to be used (but to retain it if a dynamic microphone happened to be preferred);
3. Solder a 2.2MO resistor between microphone socket and ground if a high impedance crystal microphone was to be used;
4. Rewire the heaters for either 12.6 volts or 6.3 volts: the existing EF92 and EL91 valves have compatible 0.2 amp heaters and may therefore be used in series-chain across 12.6 volts.

The modifications now required to adapt the modulator to the F3 mode are as follows:

1. Remove the push-pull 6C4 output valves (sell them if you can!);
2. Remove the modulation output transformer T3 in Fig. 1 and put it in the spares box: it may come in useful for other applications;
3. Mount a five-way tag-board across the piercings in the chassis disclosed by removal of T3;
4. Looking at the top of the driver transformer, T2, identify an orange and white pair connected to Tags 7 and 8: these disappear into the tiny chassis and re-emerge connected to the grid pins of the 6C4 sockets; connect these two leads to two tags on the newly installed tag-board;
5. Bring out HT, LT and E connections from within the TR1986 modulator chassis to Tags 3, 2 and 1 on the new tag-board: bring out the two connections from the secondary of T2 to the remaining two tags on this five-way board;
6. Make up a lead to furnish the modulator unit with HT, LT and E from the station transmitter (HT not to exceed 250 volts), and connect this lead to Tags 3, 2 and 1 on the new board;
7. Tag 4 on the new board goes to the CO screen-dropper resistor, and thus provides HT to the SG via this dropper and the secondary of T2; Tag 5 on the new tag-board is connected via a screened lead to the SG pin of the CO valve.

And that really is all that there is to it—FM without pain. The constructional information given above is not intended to be hard and fast but to serve primarily as a guideline.

Table of Values

| R1     | crystal oscillator grid resistor, 27k |
| R2     | crystal oscillator bias resistor, 350 ohm |
| R3     | crystal oscillator HT line isolating resistor, 350 ohm, 5w, |
| R4     | CO screen grid dropper resistor, 39k to 47k (see text) |
| C1     | CO cathode by-pass, 1000pF |
| C2     | CO screen by-pass, 1000pF |
| C3     | CO coupling to following multiplier stage, 47pF |
| C4     | CO tuning capacitor (24 MHz) |
| C5     | CO HT line by-pass capacitor, 1000pF |
| L1     | inductor to tune three-times crystal frequency |
| Xtal   | 8 MHz for the 144 MHz band |
| Valve  | E180F, QV04/7 or any tetrode/pentode CO type |
VERTICAL TWO-ELEMENT BEAMS FOR FIFTEEN AND TWENTY METRES
OF PARTICULAR INTEREST TO THE NEWCOMER
F. C. SMITH, GW2DDX

The newcomer to amateur radio, who has just received his licence and wishes to work some DX, but has a slim purse and small garden, faces a problem.

On one hand he could use a ground plane which has the advantage of low angle radiation, but to offset this, the radials can be an infernal nuisance and so can the omni-directional pattern. On the other hand, a full size 14 MHz horizontal beam is quite space-demanding.

The writer has often wondered why he has seen no two-element vertical beams—after all they were very

The omission of any form of audio control will have been detected by the percipient reader. There is no room for one on the TR1986 chassis, but if desired a 2 megohm variable resistor mounted on an external bracket may replace the 2-2 megohm grid-input fixed resistor referred to earlier, but if it is, keep leads short to obviate instability or the inducing of unwanted hum or RF components into the front end of the modulator.

What will also be noticed is the omission of an audio roll-off filter network, commonly regarded as necessary in PM or FM systems. A modicum of top-cut is provided by the retention of the SG by-pass capacitor C2 in Fig. 2, but if more is needed a standard form of RC audio filter may be inserted between the EF92 output and the EL91 input, though the extremely tight packing of the components beneath the 1986 modulator chassis makes this an awkward task for the less dextrous.

In practice, neither audio gain control nor de-emphasis filter has proved to be necessary, and on-air reports tell of "good crisp quality" or even on one memorable occasion "Sounds a lot better than that TS-700 of yours"! But if the output from the operator's larynx is to be in effect the gain control system, then it will be no bad thing for him to ascertain from his partners on the air just how near or far from his microphone he should speak.

Experience has shown both in the 145 and 433 MHz applications of this FM system that a normal conversational voice is all that is required to realize the considerable gain provided by the EF92/EL91 combination and at the same time to avoid "whiskers" on the transmitted signal.

The beam in full size using 300-ohm ribbon for the elements; half-inch or three-quarter-inch bamboo canes, 8 feet long and treated for weather, are used for the top, centre and bottom supports. The bottom cane may be anchored by cord to keep the beam heading. Gain, which has not been measured, should be at least 4 dB.

<table>
<thead>
<tr>
<th>14MHz</th>
<th>213MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 30° 9&quot; 300n</td>
<td>A 20° 7&quot; 300n</td>
</tr>
<tr>
<td>B 31° 5&quot; 300n</td>
<td>B 21° 0&quot; 300n</td>
</tr>
<tr>
<td>C 7° 9&quot; 300n</td>
<td>C 5° 2&quot; 300n</td>
</tr>
<tr>
<td>D 7° 9&quot;</td>
<td>D 5° 2&quot;</td>
</tr>
</tbody>
</table>

Feed 72n Feed 72n

The 7°9 phasing line must be transposed - 180° twist - in centre to give 135° phase condition.
21 MHz
A 20' 10° Director
B 22' 1° Dipole 300 n
C 6' 6" Spacing
Feed 72n Flat twin

Fig. 2. PARASITIC VERTICAL
Of similar construction to the ZL-Special in Fig. 1, 16 s.w.g. wire is used for the director.

popular indeed in the early Band 1 TV channel areas—as they take little real-estate, are easy to rotate and have gain over the vertical dipole of around four dB. It is a fact that earth losses tend to restrict the radiation at the very lowest angles, but this is not too serious when beaming the signal as an appreciable amount of power is radiated at the desired angles, and not much at the wasteful high angles. It cannot be over-stressed that the low-angle radiation is paramount, the more so when one has, as the writer, but ten watts on a crowded 14 MHz band.

The only known method of controlling the angle of the radiation from an aerial is by adjusting the height; at ¼-wavelength high there will be a lobe at twenty degrees (but with a fat lobe at the vertical); but with the beam vertical, the feedpoint height need only be twenty-four feet. Thus one can also work DX with the aerial height considerably lower if one has a vertical. The ability to raise and lower the beam to deal with variations in the ionospheric changes which may occur is of help, so the beams described are pulled up and down the GW2DDX mast by way of a rope and pulley.

Where the mast height is less than forty feet, it is permissible to run three feet each of the driven element and reflector element along the canes without detriment to performance; on a 35-foot mast the aerial will work well with the feed-point at 19 feet with no adjustment needing to be made. If in any doubt one may use a GDO, along the lines set out by E. J. Williams on p.218 of the July 1977 issue.

Results
With the ZL-Special when conditions were good, W, ZS, ZL, ZE, VE, ST2, SX, JA, UA9, VQ9, were all worked, along with the inevitable hosts of Europeans.

For the beam, when conditions were fair, there were ZS, A4X, OD5, 3D6, YB2, 4X4, JA, UH8, UI8, UL7, UK9, UKO, VE and W.

(Editor’s note: It should be noted that the ends of the vertical elements carry very high RF Voltages and so if the garden is to be used by children while you are operating, the aerial should be high enough to keep them safe from shock.)

TRANSATLANTIC TIP
CHARLES WESTRICH, WB3OWM

Finding the battery flat in the MFJ Filter—as did G3FKE in “Communications and DX News” for January—can be very frustrating: Murphy would not have it any other way. As with any battery powered accessory, one can quickly develop the very human habit of turning off the rig, but leaving the accessory “on.” This may be great for the battery industry, but rough on the shack’s economy. So for all us “Forgetful Charleys” this easy and inexpensive solution is offered. Place a miniature LED on the front panel of the MFJ Filter. (Note: this can be done to any battery powered item around the shack). After determining the proper load resistance to get the mini-LED to “just glow,” thus drawing only a few micro-amp (the writer’s draws about 20µA), connect it to the “ON-OFF” switch. The mini-LED can easily be seen from across the room, reminding “Forgetful Charley” to QRT the MFJ as well!

The MFJ Filter with a mini-LED between the two top screws on the front panel.
A C-MOS MORSE KEYER

N. HOULT, G4CIK

In the past many designs for electronic Morse keys have been published, however, they have generally used either discrete transistors or TTL integrated circuits, with a resultant high power consumption. Now that C-MOS integrated circuits are available at a reasonable price, they appear to be the obvious choice for this application; they tolerate widely varying supply voltages and take so little power that it is often possible to power the complete keyer from the line if keys, eliminating the need for batteries or a mains PSU. The keyer to be described may be powered in this way (although more conventional techniques may be used if preferred), and may be used as a normal electronic keyer or as a squeeze keyer. Although designed to be powered from the key socket of an FT-101, modifications are described which would enable it to be used with most other rigs.

C-MOS

Two types of integrated circuit are used in this keyer: NOR gates and D-type flip-flops. A C-MOS NOR gate, with its truth table, is illustrated in Fig. 1. In this application Vdd is grounded and Vss is connected to a supply of about 5v; logic level 0 is -5v, and logic level 1 is 0v. (this inverted mode of operation is used so that negative supplies may be keyed). It will be seen that each input to the circuit is connected to the gates of a P-type MOSFET and an N-type MOSFET; these are "enhancement-mode" devices, i.e. the N-type only conducts if its gate is positive with respect to its source, and vice-versa for the P-type. Thus if either input is at logic 1 (Vdd) at least one of the paralleled N-type FETs is conducting, while the chain of two P-type FETs is not; the output is therefore logic 0. If both inputs are at logic 0, both P-type FETs conduct and both N-type FETs are turned off, giving logic 1 at the output. As in either logic state one set of FETs is conducting while the other is not, the device only draws a very small current (typically less than 0.1µA) except when switching, at which time both sets of FETs are partially conducting.

The D-type flip-flop is rather more complicated, and its circuit will not be described in detail; a truth table is given in Fig. 2—note that this is slightly different to that for TTL D-type flip-flops in that some inputs work in the opposite sense. Further information about logic circuits in general may be found in [1], and about C-MOS in particular in [2].

Keyer Logic

Fig. 3 gives the circuit diagram of the keyer except for the output stage, which will be described separately later as the reader may wish to modify this to suit his own transmitter. Against several key points is shown the logic state when no character is being sent; this is useful for checking purposes. The oscillator is developed from a design in "Technical Topics" [3], while the rest of the logic is based on an earlier TTL design [4].

The operation of the circuit is as follows: IC1a and b form an oscillator, which may be turned on or off by the line X; IC1c and d delay the control voltage to IC1b relative to that to IC1a, eliminating the risk of a spike at the output upsetting the counters IC2 and IC6. IC2a and b form a divide-by-4 circuit, driven by the oscillator IC1, which is used to generate dashes, while IC6a is a divide-by-2 generating dots. IC3b and c, and IC7c gate through dots or dashes as required to the output, and are controlled by the flip-flops IC4a and b, which record character being sent. IC9a and b record whether or not the paddle has been pressed to the dash side, while IC8a and b do the same for the dot side. Information is passed from these bistables to the main memories IC4 via gates IC9c and IC8c in the case of a character immediately following another one (oscillator running continuously) or via IC9d and IC8d in the case of an initial character—in this situation IC5 provides some delay in setting the flip-flop IC4a to allow other parts of the circuit to reset first. The gating provided by IC9s and IC8s is such that if both dash and dot memories (IC9a/b and IC8a/b) are activated, the keyer will next send the opposite character to the one it is currently sending; this enables the keyer to perform as a squeeze keyer when used with a twin paddle. The remainder of the circuit is concerned with controlling the oscillator and gating of the various lines; it is so designed that the paddle position is sensed at the end of the bit space following the current character (the latest possible moment). If the paddle is neither to the dash

<table>
<thead>
<tr>
<th>Clock (CL)</th>
<th>Data (D)</th>
<th>Reset (R)</th>
<th>Set (S)</th>
<th>Q</th>
<th>Q̅</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 → 1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>0 → 1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1 → 0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Q</td>
<td>0</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>X</td>
<td>X</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Fig. 2. Truth table for a D-type flip-flop. X = "don't care" case.
side nor the dot side, the keyer will either stop its oscillator and return to the idling state or output a character space, check the paddle position again, and then either stop or send the next character. This facility is controlled by the switch S2, which on the circuit diagram is shown in the “Character space off” position. Although the keyer is easier to use in this mode, the author finds that better Morse generally results with the auto character spacing turned on!

Power Supply and Output Circuit

The one used in the prototype is illustrated in Fig. 4, and it can be seen that the output of the C-MOS circuit feeds a “Darlington” pair of transistors which effectively short out the key socket of the transmitter when required. Power for the logic circuits is derived from the key socket via a diode (to prevent the keyer from shorting out its own power), and is stabilised by the zener D2. The capacitor C1 stores adequate charge to power the logic during the longest key-down period (a dash at the slowest speed) while R1 is chosen so that C1 recharges completely during the following space i.e. the charging current is at least four times the maximum current drawn by the logic circuits. Provision is made for the connection of an external power supply; in this case the diode D3 protects the circuits against the supply being connected the wrong way round. The push button

![Logic diagram of the Keyer.](image)

Table of Values

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>0.22 µF</td>
</tr>
<tr>
<td>R1</td>
<td>910k, 1W.</td>
</tr>
<tr>
<td>R2</td>
<td>100k, 1W.</td>
</tr>
<tr>
<td>R3, R4</td>
<td>4.7M, 1W.</td>
</tr>
<tr>
<td>R5, R6</td>
<td>1M, 1W.</td>
</tr>
<tr>
<td>RV1</td>
<td>1M linear</td>
</tr>
<tr>
<td>IC1, IC2, IC3, IC5, IC6, IC9</td>
<td>= CD4001</td>
</tr>
<tr>
<td>IC4, IC7</td>
<td>= CD4013</td>
</tr>
<tr>
<td>S1</td>
<td>Keying Paddle</td>
</tr>
<tr>
<td>S2</td>
<td>SPDT switch</td>
</tr>
</tbody>
</table>

Fig. 3. The Logic Section

- Pin 7 of each IC is connected to -ve.
- Pin 14 is grounded.
- Logic states (see text)
Ext power (if used).

From IC7c (Fig. 3)

Fig. 4. Power supply and output circuit.

Table of Values

<table>
<thead>
<tr>
<th>C1</th>
<th>100 μF, 10V, elect.</th>
<th>D2</th>
<th>BZLY88C5%6 or any 5V, 7805</th>
</tr>
</thead>
<tbody>
<tr>
<td>C2</td>
<td>5 nF disc ceramic</td>
<td>RI, R4</td>
<td>22kΩ, 1W (see text)</td>
</tr>
<tr>
<td>R1, R4</td>
<td>22kΩ, 1W (see text)</td>
<td>R2</td>
<td>150kΩ, 1W</td>
</tr>
<tr>
<td>R3</td>
<td>470kΩ, 1W</td>
<td>R5</td>
<td>5.6V, 7805</td>
</tr>
<tr>
<td>D1, D3</td>
<td>BAY38, 1N914, etc.</td>
<td>S1</td>
<td>1 pole, push-to-make</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FB</td>
<td>Ferrite bead</td>
</tr>
</tbody>
</table>

Switch S1 is used to reset the keyer on switching on and at any time when the supply fails; this is necessary because when the keyer is switched on, before its supply line voltage has risen sufficiently for the logic circuits and oscillator to operate correctly, its output goes into the “key down” state, preventing the capacitor C1 from charging further, and so holding itself in this state. The switch turns off Tr1 and Tr2, allowing C1 to charge to its correct voltage; this reset switch is only required if the keyer is to be powered from the transmitter key socket.

The components used in this part of the circuit are not critical, and will depend largely on the voltage and current to be keyed. Those indicated are suitable for an FT-101B, where the open-circuit voltage across the key is about 13V, and the short-circuit current about 6mA. For this particular type of rig it is important that Tr2 is germanium, as the minimum voltage drop across the keyer in the “key down” state is VBE of Tr2 plus VCE(sat) of Tr1, and full power cannot be obtained if this exceeds a few tenths of a volt. Equally, Tr1 should be silicon in all cases, as the leakage current of a germanium transistor can be large enough to turn Tr2 on permanently in hot weather! In the prototype Tr1 was a 2N3964 and Tr2 was a GET890; these were used because they were to hand, and in practice Tr1 could be any high-gain silicon transistor and Tr2 any low or medium power germanium transistor. If using the circuit to key a different transmitter, there are two points to check: firstly, that the combination of Tr1 and Tr2 can pass enough current when driven by the logic ICs, i.e. \( hFE(Tr1) \times hFE(Tr2) \times 10 \mu A \) is less than required current and secondly that R1 is of a suitable value to keep C1 charged; the required value may be calculated from:

\[
R1 = \frac{(V_{OC} - 5.6)}{I_s}
\]

where \( V_{OC} \) is the open-circuit voltage across the key, and \( I_s \) is the current taken by the logic (measured) plus an allowance of a few microamps for leakage in damp conditions. If in doubt, it is always better to over-estimate the current demand than to underestimate it. If using conventional power supplies, R4 can take any value less than \( V_{supply} - 5.6V ) / 1 \) (within the limits of the current D2 can take); a suitable value would be similar to that calculated above for R1 with the same supply voltage.

Modifications to Key Positive Voltages

The circuit as described so far is suitable for keying negative lines, such as in grid-block keying. However,
Fig. 7. General internal appearance of the C-MOS Morse Keyer, discussed in the article by G4CIK.

it may easily be modified to key positive voltages, such as in cathode keying circuits. As far as the logic section is concerned, it is necessary to connect all points shown grounded to a +5v. supply, and ground all points shown connected to -5v. In order to keep the paddle at Ov. it is necessary to invert the dot and dash inputs, and the output will also need inverting; Fig. 5 shows how this may be done with one extra IC. In the keying and power supply section it is merely necessary to replace all PNP transistors by NPN, and reverse all diodes and electrolytics. In the case of cathode keying, where the current is appreciable, it might also be necessary to add an extra transistor to the “Darlington” pair already present to get sufficient current gain. Note that for the key-socket powering technique to work, there must be a voltage present across the key even on receive. While this will almost certainly be the case with grid-block keying, it may not be with other types, and should be checked in any case. It does not matter if the voltage on receive is less than on transmit; as long as it is significantly greater than 5.6v. it will be enough to keep C1 charged.

Construction

Almost any form of construction can be used, as the layout is completely non-critical. The prototype was built on veroboard, as shown in Fig. 6, using the copper tracks only for the -5v. line, ground, and the output circuit; all other connections were made with wire links—this is shown in the photograph of the complete unit. Fig. 7. The power supply to the logic IC’s was decoupled with a small ceramic capacitor at the end of every row of three or four IC’s.

One important point is that the circuit should be completely screened, and its output (and power) leads decoupled to avoid RF pickup: the prototype was built in a diecast box for this reason.

It is best not to decouple the leads to the paddle, if possible, as this could appreciably increase the rise and fall times of the inputs to the logic circuit, giving slightly higher current consumption and the risk of flip-flops mis-triggering; however, if RF pickup on the paddle leads is a problem small decoupling capacitors, possibly with chokes to form an RF filter, should cause no trouble. When the keyer is powered from the key socket the symptoms of RF pickup are that the keyer will latch up in the “key down” position when sending continuously if the transmitter output is turned up, but not otherwise. If this happens during testing, the keyer may be reset with S1 on the output circuit.

Setting-Up

As with most digital circuits, little setting up is required. It is desirable to put a meter in the supply line to the logic circuits and to run the unit from a separate power supply when first testing it. The current taken by the logic circuits should be at most 50µA, and should drop to zero as the circuit assumes its idling condition; if not, check for short-circuits or wrong connections. Then press the paddle to one side and check that the current rises to 30µA or so, varying in time with the output and falling to zero shortly after releasing the paddle. If this is so the keyer may then be connected to
a transmitter or practice oscillator. A point to note with
the FT-101B (and possibly other similar transmitters)
is that the voltage supplied to the keyer via the key
socket is reduced on receive, which will cause the keyer
to work only in the "transmit" mode; this should not
cause any problems in normal use as in the PTT or
manual modes the keyer is always supplied with an
adequate voltage, while in the VOX mode the capacitors
in the keyer will keep it running while the relays in
the transmitter are changing over (if an external power supply
is being used, of course, none of the above problems can
occur).

Fault-finding

While it is difficult to cover every possible problem
with a unit of this complexity, the following notes should
at least enable faults to be traced to a particular area of
the circuit; after that it is a matter of testing each logic
element until the fault is found.

There are two ways of checking the unit; either the
speed is set to minimum and voltages are checked using
a multimeter, or it is set to maximum and an oscillo-
scope is used—note that the 'scope will have to be DC
coupled for this technique. In either case, an external
power supply will have to be used for the tests, due to the
additional load provided by the test equipment which
will be too great for the key -socket supply system.

First check the logic levels shown in Fig. 3; if this
fails to reveal the problem, press the paddle to the dot
side and check that line "X" goes to logic 0 and that the
oscillator IC1 is working. If line "X" does not respond,
check the input circuitry starting at IC8 and working
through to IC6b. If the circuit so far is working, follow
the oscillator signal through the dividers IC2 and IC6a
to the output. Finally, press the paddle to the dash side
and check the operation of IC9, IC5 and IC4a.

Possible Additions

Provisions were made in the original keyer for one
or two extra facilities which have not as yet been used;
these are the use of an external paddle (to give the option
of normal or squeeze keying) and a connection to provide
for input to a memory-point "F" on the circuit diagram
(Fig. 3). Either or both of these may be omitted if
desired; however, if the memory input is removed, pin 13
of IC7 should be connected to the negative rail rather
than left floating.

REFERENCES

[1]-"Learning about Logic" by P. J. Horwood, Radio Communication
June 1976 onwards.

[2]-RCA COS/MOS Data Book.

[3]—Technical Topics," Radio Communication November 1975
page 847.

Chapter 11 page 363—"The WB4VVF Accu-Keyer:"

BOOK REVIEW

ARRL "ELECTRONICS DATA BOOK"

THIS publication is from the American Radio Relay
League, who produce so much that is good and
practical in the way of technical and semi-technical
material in the field of Amateur Radio.

The Data Book treats in depth the data for RF
circuitry, L/C/R networks, broad and narrow band
inter-circuit transformer design, antennae and feeders,
and shows a large selection of "thumb nail" solid-state
circuits. With this goes a great wealth of tabular matter—
such as dB equivalents to voltage, current and power
ratios: RF circuit data; a reactance nomograph; table of
L/C constants, numerous formulae, inductance data for
all types of coils, chokes and toroids; and much similar
information of the sort one needs to look up or check.

The solid-state circuitry includes more than 50
designs involving transistors of numerous types, for AF,
RF and switching applications. A useful chapter deals
with what might be called engineering, construction and
testing, with circuits for several test instruments.

In general, this is the sort of book which will not
only find a place on any experimenter's work-bench but
(like many other ARRL publications) would also
undoubtedly be of great practical value to many professional
electronics engineers and designers working in the field
of radio communication—and, at the price, for these days
it is very good value for money.

It is in large format (11 x 8.5in.,) of 128 pages, well
produced and clearly printed, copiously illustrated in line
and adequately indexed, and the writing is (as with all
ARRL publications) in straightforward language.

ARRL Electronics Data Book, price £3.25 inclusive
of postage, from: Publications Dept., Short Wave
Magazine, Ltd., 34 High Street, Welwyn, Herts., AL6
9EQ.

STOLEN

Two Pye Pocketfones, Serial Nos. C-707001 and
C-707004, have been stolen from the Search & Rescue
Dog Association (South Wales). Any information
regarding their whereabouts should be sent to Hon.
Secretary, Rev. P. Keward, 11 Grosvenor Street,
Cardiff.

I think I can detect a bit of crackling at
your end . . . .
VHF BANDS
NORMAN FITCH, G3FPK

VHFCC Award

MICHAEL Ball, G8L7K, from Long Sutton near Spalding in Lincolnshire, is the recipient of the 289th 2m. VHFCC certificate of this series. He studied for the R.A.E. at the Kings Lynn College of Arts and Technology, passed the exam. and was licensed in August, 1976. Mike's first station comprised a Trio TR-7010 providing 10 watts p.e.p. of SSB to a 10-ele. Yagi. FM operation was with a Hudson base station. In April, 1977 a Trio TS-700G with preamplifier was acquired and the aerial changed for a Parabeam plus 5-ele. Yagi for FM these both at 40ft. a.s.l.

Applicants for membership of the VHF Century Club will find the simple rules mentioned in the October, 1977 “VHF Bands” column.

Beacon News

Readers will recall that part of Project VESNA, which is the study of Sporadic E propagation over the North Atlantic path, was the installation of a beacon FX3VHF (Lannion) operating on 50-1 MHz and beamed towards Central America. Now the E's season is over, FX3VHF is now aimed towards Rhodesia where it has been copied, according to Martin Harrison, G3USF. G4BPY in Walsall is also reported to have heard it via tropo. and meteor pings.

The Scottish Scene

Jack Wilson, GM6XI, has kindly sent some notes concerning activity North of the Border. The recent gales caused considerable damage but Jack reckons the attendant floods improved a few earthing systems. The high standards of operation through the GB3CS repeater are being maintained. The Mid-Lanark 70 cm. repeater on RB10, GB3ML, is operational and the Edinburgh one, GB3ED on RB14, should be by the time this appears.

GM8BJF and GM4DIJ have completed the 23 cm. beacon and obtained site clearance for it at the Edinburgh University Engineering Faculty building in south Edinburgh, but there is no sign of the 70 cm. beacon which the Edinburgh ARS promised to construct some time ago.

On a sad note Jack writes:—"It is with regret that I have to report the death of Syd Rowden, GM6SR, at the ripe old age of 88. He was active on 2m. until the summer of this year when he was admitted to hospital from which there was no return. He was well known on the HF bands from 1925 and well remembered for his pre-war exploits on VHF in the company of the late GM6FN and GM6XI."

Overseas News

Italy.—Fausto Minardi (FE60) has written to say he now has 40 countries worked on 2m. in 192 QTH squares. His tally of British counties stands at 30 but he is baffled by the Scottish regions since the GM QSL's understandably use their postal addresses which still retain the old county names. To clarify matters, the large Geographia Map, “County Map

QTH LOCATOR SQUARES TABLE

<table>
<thead>
<tr>
<th>Station</th>
<th>23 cm. 70 cm.</th>
<th>2 m.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>G8FUH</td>
<td>2</td>
<td>84</td>
<td>207</td>
</tr>
<tr>
<td>G3POI</td>
<td>—</td>
<td>—</td>
<td>204</td>
</tr>
<tr>
<td>I4EAT</td>
<td>—</td>
<td>—</td>
<td>192</td>
</tr>
<tr>
<td>G3CHN</td>
<td>—</td>
<td>—</td>
<td>148</td>
</tr>
<tr>
<td>G3FPK</td>
<td>—</td>
<td>—</td>
<td>140</td>
</tr>
<tr>
<td>GM4CXP</td>
<td>25</td>
<td>122</td>
<td>147</td>
</tr>
<tr>
<td>9H1CD</td>
<td>6</td>
<td>120</td>
<td>126</td>
</tr>
<tr>
<td>G4BWG</td>
<td>25</td>
<td>110</td>
<td>135</td>
</tr>
<tr>
<td>G3XCS</td>
<td>—</td>
<td>21</td>
<td>110</td>
</tr>
<tr>
<td>G3OHC</td>
<td>4</td>
<td>31</td>
<td>98</td>
</tr>
<tr>
<td>G4DEZ</td>
<td>—</td>
<td>—</td>
<td>98</td>
</tr>
<tr>
<td>9H1BT</td>
<td>—</td>
<td>—</td>
<td>94</td>
</tr>
<tr>
<td>G8HVVY</td>
<td>33</td>
<td>93</td>
<td>126</td>
</tr>
<tr>
<td>G4BAH</td>
<td>—</td>
<td>32</td>
<td>92</td>
</tr>
<tr>
<td>G8BK2R</td>
<td>1</td>
<td>17</td>
<td>92</td>
</tr>
<tr>
<td>G4FCD</td>
<td>—</td>
<td>22</td>
<td>88</td>
</tr>
<tr>
<td>G8GML</td>
<td>8</td>
<td>47</td>
<td>87</td>
</tr>
<tr>
<td>G6UW</td>
<td>—</td>
<td>—</td>
<td>85</td>
</tr>
<tr>
<td>9H1C</td>
<td>—</td>
<td>—</td>
<td>83</td>
</tr>
<tr>
<td>G3JXN</td>
<td>26</td>
<td>63</td>
<td>82</td>
</tr>
<tr>
<td>G8HHI</td>
<td>—</td>
<td>24</td>
<td>81</td>
</tr>
<tr>
<td>G4AWU</td>
<td>—</td>
<td>—</td>
<td>80</td>
</tr>
<tr>
<td>G8LEF</td>
<td>4</td>
<td>37</td>
<td>79</td>
</tr>
<tr>
<td>G8JR</td>
<td>—</td>
<td>—</td>
<td>79</td>
</tr>
<tr>
<td>G8IWA</td>
<td>29</td>
<td>77</td>
<td>106</td>
</tr>
<tr>
<td>G8JHX</td>
<td>—</td>
<td>—</td>
<td>74</td>
</tr>
<tr>
<td>G4FBK</td>
<td>—</td>
<td>5</td>
<td>72</td>
</tr>
<tr>
<td>G2AXI</td>
<td>1</td>
<td>43</td>
<td>71</td>
</tr>
<tr>
<td>G4GET</td>
<td>—</td>
<td>—</td>
<td>69</td>
</tr>
<tr>
<td>G3COJ</td>
<td>16</td>
<td>52</td>
<td>68</td>
</tr>
<tr>
<td>G4DKX</td>
<td>5</td>
<td>30</td>
<td>68</td>
</tr>
<tr>
<td>GJ8AAZ</td>
<td>—</td>
<td>22</td>
<td>66</td>
</tr>
<tr>
<td>G8GI2</td>
<td>—</td>
<td>22</td>
<td>63</td>
</tr>
<tr>
<td>G3FIJ</td>
<td>—</td>
<td>27</td>
<td>62</td>
</tr>
<tr>
<td>G8KLN</td>
<td>1</td>
<td>—</td>
<td>62</td>
</tr>
<tr>
<td>G4C1K</td>
<td>—</td>
<td>—</td>
<td>62</td>
</tr>
<tr>
<td>G4GCOQ</td>
<td>—</td>
<td>—</td>
<td>61</td>
</tr>
<tr>
<td>G8KUC</td>
<td>—</td>
<td>7</td>
<td>60</td>
</tr>
<tr>
<td>G8LHT</td>
<td>—</td>
<td>—</td>
<td>60</td>
</tr>
<tr>
<td>G3KPU</td>
<td>—</td>
<td>—</td>
<td>60</td>
</tr>
<tr>
<td>G8KGF</td>
<td>—</td>
<td>—</td>
<td>60</td>
</tr>
<tr>
<td>G8KSP</td>
<td>—</td>
<td>—</td>
<td>60</td>
</tr>
<tr>
<td>G3JYEO</td>
<td>8</td>
<td>59</td>
<td>67</td>
</tr>
<tr>
<td>GD2HDZ</td>
<td>10</td>
<td>32</td>
<td>58</td>
</tr>
<tr>
<td>G8JEF</td>
<td>—</td>
<td>—</td>
<td>58</td>
</tr>
<tr>
<td>G4AEZ</td>
<td>2</td>
<td>22</td>
<td>57</td>
</tr>
<tr>
<td>GW4FJK</td>
<td>—</td>
<td>—</td>
<td>57</td>
</tr>
<tr>
<td>GB8SSS</td>
<td>—</td>
<td>—</td>
<td>54</td>
</tr>
<tr>
<td>G4ERYL</td>
<td>—</td>
<td>—</td>
<td>41</td>
</tr>
<tr>
<td>G8EOP</td>
<td>8</td>
<td>36</td>
<td>38</td>
</tr>
<tr>
<td>G8LLG</td>
<td>1</td>
<td>1</td>
<td>38</td>
</tr>
<tr>
<td>G8JAH</td>
<td>—</td>
<td>—</td>
<td>35</td>
</tr>
<tr>
<td>G8JGK</td>
<td>—</td>
<td>—</td>
<td>34</td>
</tr>
<tr>
<td>G8JA2I</td>
<td>—</td>
<td>—</td>
<td>24</td>
</tr>
<tr>
<td>G8JKA</td>
<td>—</td>
<td>—</td>
<td>21</td>
</tr>
</tbody>
</table>

Starting Date January 1, 1975. No satellite or repeater QSO’s. “Band of the Month” 2m.
British Isles" has been despatched to Fausto.

Spain—Julio Garcia, EA3AIR from Barcelona, mentioned several local stations in EA3 who have 1 kW capability on 2m. These include EA3ADW, EA3WN and EA3XS but they are only interested in tropo and E’s contacts. (See also MS News.)

Czechoslovakia—Franta Strihavka, OK1AIB from Unhost, sent along a picture of the QTH from which he operated /P on October 14/15. It was 1603 metres a.s.l. on Snezka, which means “Snow Mountain,” and very close to the Polish border. He is QRV on 433, 1296 and 2304 MHz as well as on 2m.

Satellite News

No sign of any Russian “OSKAR.” It seems that a Russian amateur had told an AMSAT member that they were having problems and that the first launch might not now take place until 1978. Well, Concorde was only six years late!

Oscar 7’s batteries continue to be rather too hot for comfort. This situation is further exacerbated by some Mode “B” users in particular who insist on firing kilowatts of RF at the satellite. When this happens, and the battery temperature rises sharply, it will switch to Mode “A” eventually, thus denying these anti-social types their use of it. Unfortunately, those who do stick to the 100 watts e.r.p. maximum are also denied its use.

AMSAT has decided to alter the schedule of 0-7 with effect from January 1, 1978. January 1 Mode “B”; January 2 Mode “C” (This is QRP Mode “B” i.e. 10 watts e.r.p. maximum); January 3 mode “A”—and so on. In other words, it will be in Mode “A” only if the day of the year is divisible by three. For example, Sunday, Feb. 26, 1978 is the 57th day of the year, therefore an “A” day. This new schedule could be brought forward.

The band plan will be revised effective Jan. 1, too. On both “A” and “B” downlinks, the lower third will be CW, the middle third mixed modes and the top third SSB only. Please spread the news to users and make a list of those stations whose signals are consistently much louder than the beacon signals on 145-972 and 29-502 MHz. Send your list to G3RWL (c/o THR) who will drop a line to the offenders.

Readers new to satellite communications are invited to write to AMSAT-UK at 60 Willow Road, Enfield, Middx. for a copy of: “Guide to Oscar Operating,” enclosing a 9 x 4 inch s.a.e. This guide is an up-dated version of an article in the Magazine published last March. The 1978 Orbital Predictions Calendar will be distributed in the UK by G3AAJ. Those wishing to reserve a copy should send their request to Ron with a small s.a.e. and when supplies arrive, he will reply and quote the cost. If you are an AMSAT member, please mention your membership number. Ron's QTH is:—94 Herongate Road, London, E12 5EQ.

Contests

Results—The results of the 2m. “Open” of Sept. 3/4 are to hand. In the Portable section, the Hastings Electronics and Radio Club, G6HH, was the winner with 6035 points and GW3OXD, the Albright & Wilson ARS, came second with 5465 points. In the Fixed section, the University of Kent ARS station, G8KUC, was first past the post with 3656 points. In second spot with 2984 points was the G8IJO/G8DRD/G4FDW team. (Tnx GB2RS News Bulletin.)

Coming Event: The last VHF contest of 1977 is the 144 MHz Fixed on Dec. 4, from 0900-1700 GMT.

E-M-E Experiments

The power budget for 2m. Earth-Moon-Earth communication is such that very high e.r.p.'s are used to overcome the average 253 dB path loss. Those limited to 150 watts DC input would need very large aerial gains usually only attainable by large dishes or ambitious stacked arrays. However, large aerial gains can be achieved by simpler wire aerials the main disadvantage of which is that they are fixed in direction.

The AERE (Harwell) ARC have adopted this latter approach by erecting a 50 wavelengths-per-side wire rhombic aimed at a true bearing of 290° and based upon a design by VK3ATN and KOMQS. The aerial is 30 feet high and on Nov. 3, using a souped up FT-221R, they copied K5MWH from Texas at RST 539. Chris Bartram, G4DGU, says his signal actually moved the S-meter! Future experiments will be to try some two-way E-M-E contacts and to install a stacked array for further gain.

Meteor Scatter

The recent Orionids shower was a non-event with no more pings than are experienced randomly. The next major shower is the Quadrantids from Dec. 12 to 15 with the peak on the 14th. The dedicated MS operators have already fixed up their main skeds but there will be plenty of random contacts. To avoid causing unnecessary QRM please keep well clear of 144-200 and 144-100 MHz, the internationally agreed, random SSB and CW MS frequencies. MS is a rather specialised sport—see notes in last month’s column.

EA3AIR and EA3PL combine their MS activity. The local noise level in Barcelona makes MS impossible so they operate from a second QTH in AB48d. The only other MS operators in Spain are EA4AO in Madrid (YA42d) and EA5KF in Valencia (ZZ square) who runs 1 kW to a good aerial system. Keith Naylor, G8UFU (Essex), finally worked CT1WW via sporadic meteor on Sept. 18 exchanging RS 37/26 reports. Thus far, Clive Penna, G3POI (Kent), has not been so lucky with the Portuguese.

In a note to G3CHN, Jaques Guerin, F1JG (CD24g) says he is QRV for MS and has a sked lined up on Dec. 14 with OE5JFL. He will be on in the Quadrantids—Jan. 2-4—and would welcome proposals for skeds with G, GI and GW stations. He is limited to SSB and seems to favour 144-165 MHz or thereabouts. His QTH is simply:—Petit Sonnailler, F-13200, France.

Four Metres

Ray Elliott, G4ERX (Essex), is new QRV on 4m. achieving his first aim of being on all bands from 160m. through 23 cm. on most modes, too. Alan Scott, G4BYP (Merseyside), found the 4m. Fixed contest on October 23 very disappointing and wrote:—“... I could not muster the enthusiasm to continue after only working four stations in the first two hours!”
Angus McKenzie, G3OSS (London), agrees about the poor conditions but nevertheless managed 55 QSO's, the furthest being GU3HFN and G3JYP (Cumbria). G3WCS from Merseyside was a consistently good signal and so was G3PFM (Dorset). Angus heard GD2HDZ but not one GW. He feels activity was good considering the conditions and commented upon the excellent standard of operating and quality of signals.

Two Metres

No doubt that the main excitement was the fine tropo. opening to central Europe on Oct. 14/15. John Heys, G3BDQ (Hastings), really seems to have had the very best of it with no less than nine OK's worked including OK3CD/P (K101d). The others were, OK1AGE/P (HK29b), OK1AY/P (HK26a), OKIKKT/P (HK17f), OK1LDW/BK (HK70g), OK1OA (HK63e), OK1VFJ (HK51b) and OK2KRT (JK41j), all worked between 1840 and 2045 GMT on the 14th. In the period 1335-2005, John seems to have had a private duct to OK1AGE/P who was S6 with his key up and S9-plus-40 dB with key down! Also on CW, and starting at 1803, East Germans DM2CZI (FL66e), DM2BYE (HM53a), DM2BOM/5WN (GK15e), DM3FML/OML (GL79e) and DM3SB (F358d) were worked while SSB yielded DM2CJ (FK91c) and DM4PSN (GK07c). Three Polish stations were also worked on the key:—SP6FUN (IL53c), SP9EU (JK56c) and SP9KAE (JK55c). Two Austrians were contacted on SSB:—OE2CAL/P2 (GH16e) and OE3HHJ/P3 (HH17f) with OE8JFL (G484h) on the key on the evening of the 14th. The DX faded out at 1858 on the Sunday after John had worked on SSB, OE3WBA/P3 in HH25a.

The high pressure system responsible for these conditions was a little too far to the east for most UK stations; however, G3BDQ mentions a QSO with PE1ARC on the 18th in which the Dutchman said he had worked 40 SM's, many OZ's, "... and some OH's" that morning.

Roger Thorn, G3CHN (Devon), found this opening, "... quite unexceptional ..." even though he did work SP9FG (JJ70b), however, the two LX's heard seemed only interested in working OK's. Roger managed SK7CE in a tropo opening on Oct. 26. Back in September, he was lucky enough to contact EI4CM when Paul was in UO and VO squares but missed him in UN.

Mark Deutsch, G3VJG (London), reported that OY1A told him that they had watched British TV up
there all evening on Oct. 15. Dave Johnson, G4DHF (Grimniby) missed the start of the mid-October opening but still reckons it to have been one of the most spectacular tropo events so far experienced. He did work OE3WBA/P3 on the afternoon of the 15th but was disappointed by the poor operating tactics of some north Midlands stations who chatted amongst themselves whilst the OE was in QSO with others. OK1AGE/P was worked on CW and DM2BEN/P (GK05g) answered a "CQ" call. A PAO was heard calling "CQ OY." During the evening of the 15th, many Germans in EF, EJ and EM squares were heard/worked, mostly RST 52/39 but with fairly regular S9 meteor pings every 15-20 seconds. Dave caught the aurora on Sept. 22 but it was very weak. He finds it exceedingly difficult to copy Au signals at 25 w.p.m. and wonders why operators do not QRS a bit.

Bob Nash, G4GEE (Coventry), was in on the Oct. 14/15 fun and worked DR1DIA (EL62h) on SSB and DJ2MG (FJ26d) on CW for a couple of new squares. DD2KN (DL62g) was Bob's first continental YL QSO. G8FUF has increased his squares total to 207, some of the new ones being OK2KWF/P (IJ), DM2DLD (GN) and OK1QI/P (IK) worked on the Oct. 14/15 weekend. Other recent successes were G3OUR/P (WJ), F6CQO (BD), EA1CR (XD) and EA1BL (WD).

A warm welcome to another new correspondent John Morgan, G8NCC (Warks.), currently at college in Cardiff. He runs a Trio TR-2200GX on FM and an Icom IC-202 on SSB. At college, John uses an HB9CV aerial on the balcony railings with which he worked EA1CR on Oct. 14. Mobile and portable operation is also indulged in.

Alistair Simpson, GM8NCM, (Fife), reports exceptionally good conditions on October 15 when twelve new QTH squares were worked. His best DX was OE3WBA/P3 at 1550 km. using the Yaezu FT-221R and 8-over-8 aerial. He was able to access the DB0XJ repeater (FM64b) and found many strong repeaters on R2 through R8.

Ray Bennett, GW8CFQ (Clwyd), had a QSO with HG5AIR (JH47j) around 0400 GMT on Oct. 15 lasting one-and-a-half hours, according to G8JHL. It is rumoured that G8HDS heard a UR2 on CW at 0200 on the 15th and it would be interesting to learn if any “real DX” was heard/worked in the mid-October period.

On Oct. 25, conditions were up to the west and EI5DA (WN28b) in Co. Louth was worked on CW, followed by GI4FMF (WO27h) in Co. Tyrone. The band was again open to Ireland the following evening when GI8K1A and EI5DA were contacted on SSB and on CW, GI4GID in Lisburn, Co. Antrim. The aurora of Oct. 27 produced many GM stations but obviously not the DX worked by more northerly stations. Conditions during the CW contest on Nov. 5 were very poor towards the north, with G83NEE in the noise. Even so, activity seemed reasonable. Bryn Llewellyn, G4DEZ (Oxon.),chalked up 56 contacts in the contest including GM and DL and it seems that leading participants had around 70 QSO’s.

Seventy Centimetres

G3AUS (Devon) wrote to correct the report of his 2m. activity mentioned in last month’s column; seems Bob does not use that band very much. In fact he contacted EA1AM (XD32) at 0820 on Sept. 11 for probably the first G/EA QSO on 70 cm. since confirmed. During the Oct. 14 lift, Frank Howe, G3FIJ (Essex), added new squares DI and EI thanks to FOMD and DJ7FJ/M respectively, the latter also contacted by John Tye, G4BYV (Norfolk). John also worked SM5DWG (IT) as did G3LQR and G4BEL.

Twenty-three Centimetres

Harold Meerza, BRS 34348 (Kent), copied a QSO on SSB between GI3VPK and G3ZIV (ZN16j) in N. Yorks. during the Oct. 26 lift. The previous night, G3ZIV had worked G3AUS in Devon with his home built 114/1296 MHz transverter. Back on Sept. 11, G3ZIV worked into HB9 and G4BYV passes along the news that Simon Freeman, G3LQR (Suffolk), worked OK1KIR/P for perhaps a G/OK “first” on 1296 MHz? Others worked by Simon in the October lift included ON5GF (CK), DC6BUA (FK), DCS6J/P (FK), DC7HM (VM), DF1FQ (DL), DJ3ZU (DL), DK2UO (DL) and DL7YCA (CM). 90 per cent of these contacts were from direct QSO calls on 23 cm. He also had a one-way QSO (crossband?) with SM0DFP (ET). G4BYV also had a good response to his direct QSO calls which brought QSO’s with ON5GF, PA6ZM (DM), DC3QS (DM), DC6MV (DK), DC8BB(EM), DF80QK (DM), DJ5BV (DK), DJ6MB (DK), and DK0SF (FL).

Scientific Studies

While it is very gratifying to work some DX during times of anomalous propagation, it is just as important that such events are properly reported for scientific study and this is why auroral and E’s openings are covered in some detail in this feature. When you hear an aurora, even if you do not work anyone, please record the times, signal strengths, beam headings (QTF) and QTH locators of the stations heard/worked, as well as their calls. Of particular interest is the Doppler shift. For instance, during the event of October 27, it was possible to copy at G3FPK both the direct, tropo signal and the auroral return from G5YV and G4CZP and to note the considerable Doppler shift.

Short Wave Listeners can play a very useful part in these studies and it is suggested that rather than work stations you have already contacted previously, you might like to attempt measurements of the Doppler shift where possible. Obviously, if the reflecting “curtain” is moving towards you, the return frequency will be higher and vice versa. The amateur who coordinates all these data is: - G2FKZ, 61, Merriman Road, London SE3 8SB, so drop Charlie Newton an s.a.e. for a few RSGB report forms.

Deadlines

All your reports and comments and entries for the tables for the January issue by Dec. 1 and for the February feature by Jan. 5 to: - "VHF Bands," SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts., AL6 9EQ. 73 de G3FPK.
COMING back to the Leicester Show for the first time for some years, one of the unexpected pleasures was that so many club secretaries “made their number” at quiet moments—it’s a pleasure to put a name and a face together when a card is taken from the file each month. Great—keep up the good work!

However, after coming back to the shack we now must off-jacket and get stuck into the pile for this month, including the ones we picked up at the Show; straight through the pile this month!

For a start, let us look at B.A.T.C., who have their “centenary” 100th issue of their magazine “CQ-TV.” It seems odd to recall that your scribe was a member in those far-off days when Mike Barlow, G3CVO, was the chap who “made it all happen.” Now, nearly thirty years later, there are several hundred members and a thriving group who themselves mount a stand at the Leicester show and other events. Details from the Hon. Sec.—see Panel for his address.

At Peterborough the group have their next get-together on Friday December 16, for a film-show and Christmas Party. The Hq. (which is where the festivities are being held) is at the Scout Hut, Occupation Road, Peterborough.

At Cheltenham, the amalgamation activity between the Club and the Group seems to be going fairly smoothly; so if you head for the Old Bakery, Chester Walk, behind the Library at about 2000 on the first Thursday in December or January, you’ll be able to meet the gang.

A.R.M.S. covers the interests of the chaps who like their operations to be /M; and of course G3FPK of VHF Bands, does the chore of Hon. Sec. and News-letter-editor rolled into one with his usual efficiency. If you are, or are considering, /M operating then this surely is the one for you.

Oddly enough, in its own way, our next one also has an interest in the mobile operators—UK FM Group (London). At this moment, they are a little worried as to the future of the repeater system on which all their activities are based. They need have no fear on that score; several “anti-repeater group” people came to the Short Wave Magazine Stand and they described the repeater operation—every man-jack among them—as being like Citizens Band, although a question from the Editor led them to say they had never actually heard Citizens Band in the U.S.A. The joke of it all is that every one of them was led into volunteering the information that they had themselves at one time or another been guilty of deliberate infringement of licence conditions, in most cases to the extent that the authorities had shut them down for periods. Now, the writer isn’t exactly pro-repeater, but he does have an overall view, and he did listen to the Editor chatting with these chaps and getting them to volunteer all this. It adds up to us as saying that these fellows feel that they want to be allowed to break the terms of their licence at will, the while they also want to debar others from using the licence in a way that is quite legal—on the argument that this legal way of operating is like another type of radio which they have heard of as going on in a country which they have never been to! That, we submit, is as daft as the guy who operates NBFM in the hopes of getting a DXCC on 14 MHz! Anyway, the “argument” offered indicates a state of mind; maybe a dozen devoted ones have this sort of idea, and most of them will also be members of the National Front or the Communist Party for equally ill-argued reasons; they are a liability to society at large and in previous times would have been detained in Bedlam. To return to our business, contact the Hon. Sec. for the details of group membership, dates and venues.

Declarations for “Clubs” for the next three months—
(For January issue—November 25th)
For February issue—December 30th
For March issue—January 27th
For April issue—February 24th
Please be sure to note these dates!

At Silverthorn they have a stately home as Hq.—Friday Hill House, Simmons Lane, Chingford, where there is a shack, a lecture room, and all sorts of facilities such as one would expect in a building used for community purposes generally. Every Friday at Friday Hill House!

R.A.I.B.C. like BATC were also in evidence at the Leicester show, and no doubt many members, and supporters for that matter, took the time out to make a personal contact at this focal point. If you know of anyone who could be interested in radio, as SWL or transmitter, you should point them at the Hon. Sec.—see Panel. And, we could add, it wouldn’t be a bad idea for you active and fit types to join as representatives or supporters too.

Derby have their place at 119 Green Lane, Derby, each Wednesday; on 7th there is a Junk Sale, while on December 14 they have a Constructor’s contest. The Christmas Party is on December 21, and on 28th they will look back at the last twelve-months of the club and its members.

The report from Clifton indicates that they are still going strong; they are to be found every Friday at eight, at the Hq. address of 225 New Cross Road, London SE14. We were a little amused by the sad tale of their D/F event in which one team failed to find the start, let alone the finish—but all credit to them for admitting it! They sound a pleasant lot to be with.

R.A.F. A.R.S. announce their “members contest” in a letter from Locking—the details will be found in CDXN, but it is for us to comment that this is a very active outfit, and anyone who has R.A.F. associations past or present could do worse than join; details from the Hon. Sec.

It’s the first Monday in the month for Southdown, at their Hq., Chaseley Home, South Cliff, Eastbourne; the
routine only changes at Bank Holidays when, if they crash, the booking is put back a week. December 5 is to be the AGM, and in addition they have a visit to MV Sonlac at Newhaven Harbour down for 0900 on December 11. More details from the Hon. Sec. at the address in the Panel.

The upstairs room at the Constitutional Centre, Warwick Road, Redhill is the venue for the formal Reigate meetings, and the date December 20 for a Constructional Contest and demonstration of the club project. However, earlier in the month, namely on 6th, there is the Natter session at the Marquis of Granby.

Now to the Medway group and here we have the very best of reasons for not being able to give a firm date. This is because, they hope, it will be possible to call an Extraordinary General Meeting to discuss a new home for the club which they will own for themselves and not just hire for each meeting. Good forthem—and we suggest you get in touch with the Hon. Sec. at the address in the Panel. However, we can say that the programme says naturally enough, a Christmas Party! On the other hand, December 30 sees the club still closed. As if all this were not enough, a Christmas Party!

From Medway to Milton Keynes from whom we have a note of a change of Hon. Sec.—see Panel for details. They will be at Lovat Hall, Silver Street, Newport Pagnell, the kick-off being at 2000; December 12 is a talk with the intriguing title of “ETC—Where are We?” which will be given by Mr. D. Robinson.

Acton, Brentford & Chiswick are at Chiswick Trades and Social Club, 66 High Road, Chiswick, London W4, on Tuesday December 20, when G3IGM will demonstrate his new two-metre SSB Transmitter and its Linear.

The Dolphin Hotel, Bournemouth, is the home of Wessex (Bournemouth) group on December 2 and 16: the first is a series of short lectures on various topics relevant to R.A.E., such as interference and licence conditions, and the latter date is down for a talk on D/F both Top Band and two-metre variety. We also notice a Skittles evening with the South Dorset chaps, at the Prince of Wales, Puddletown, for details of which G3YWG is the contact. Bournemouth’s Hon. Sec. is at the address given in the Panel.

December 14 is the date for Crawley, with the AGM also “in the pipeline” for January 25. The former is down for a Members Evening. The venue, as ever, is Trinity United Reformed Church Hall, Ifield.

A little further to the north and left a bit brings you to South Manchester, where they are “regulars” every Friday evening at Sale Moor Community Centre, Norris Road, Sale. December 2 is for a talk by G8MQW called “Simple Introduction to Microprocessors,” which is a good lead-in to the Club Quiz on December 9.

G4AOK takes over on December 16, to talk about the Demodulation of FM Signals, and on 23rd there is, naturally enough, a Christmas Party! On the other hand, December 30 sees the club still closed. As if all this were not enough, the informals on Monday evenings in the club shack at Greaia, Shady Lane, Baguley, continue weekly.

Names and Addresses of Club Secretaries reporting in this issue:

ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GHE. 188 Gunnersbury Avenue, Acton, London W3 8LJ. (01-922 3779)
A.R.M.S.: N. A. S. Fitch, G3FPK, 40 Eskdale Gardens, Purley, Surrey CR2 1EZ.
B.A.T.C.: M. Cox, G3HUA, 13 Dane Close, Broughton, Brigg, South Humberides.
BRISTOL CITY (RSGB): B. L. Goddard, G4FRG, 2 Greenfield Park, Portishead BS20 8NQ. (Bristol 484740)
CHELTENHAM: G. D. Lively, G3KI1, 26 Priors Road, Cheltenham (34785), Glos.
CHICHESTER: T. M. Allen, G4ETU, 2 Grange Cottages, Colworth. (Chichester 88069.)
CLIFTON: R. A. Hinton, 42 Cliffville Road, Welling, Kent.
CORNISH: H. F. Adcock, 2 Bowsland Close, Castle Road, Ludgvan, Penzance TR20 8HD. (Corkle/the 562.)
CRAWLEY: G. C. Reid, G3OUX, 11 Coombe Close, Langley Green, Crawley RH11 7TP, West Sussex.
CRYSTAL PALACE: G. M. C. Stone, 1 Liphook Crescent, London SE23 3BN. (01-699 6990.)
DERBY: Mrs. J. Shardlow, G4EYM, 19 Portreath Drive, Darley Abbey, Derby DE3 2BJ.
ECHFELD: R. E. Hewes, G3TDR, 24 Brightside Avenue, Laleham, Staines, Middx.
EDGWARE: P. D. Ling, G4BZJ, 42 Greencourt Avenue, Edgware, Middx. (01-952 2945.)
FARNBOROUGH: C. J. Beeley, G4EFA, 152 West Heath Road, Farnborough (49478), Hants. GU14 8PL.
GLENROTHES: A. Long, GM4BRM, 31 Church Street, Glenrothes, Fife.
GUILDFORD: L. Bright, G4BHQ, 4 Dagley Farm, Shalford, Guildford, Surrey.
HEREFORD: S. Jesson, G4CNJ, 181 Kings Acre Road, Hereford.
INVERNESS (Technical College): W. Lee, 36 Old Mill Road, Inverness (37254) IV2 3AR.
MAIDENHEAD: M. Adams, G3JLQ, 76 Blind Lane, Bourne End, SL8 5LA.
MEDWAY: P. J. Poole, G4EYV, 5 River Drive, Strood, Rochester, Kent ME2 3JW.
MELTON MOWBRAY: R. Winters, G3INVK, 32 Redwood Avenue, Melton Mowbray (3369), Leics. LE13 1TZ.
MILTON KEYNES: F. Walters, 2 Queen Street, Stony Stratford, Milton Keynes, Bucks.
NORFOLK: P. W. Forster, G3JWQ, 12 Thor Road, Thorpe St. Andrew, Norwich NR7 0JS.
PERTH: R. Grant, G4DOJQ, 31 Stormont, Scone, Perth PH2 6SD.
PETERBOROUGH: L. C. Critchley, G3EEL, 36 Waterloo Road, Peterborough, Cambs.
R.A.I.B.C.: H. Boutle, G2CLP, 14 Queens Drive, Bedford MK41 9BQ.
REIGATE: F. H. Mundy, G3XSZ, 2 Conifer Close, Reigate (43130), Surrey.
SILVERTHORN: C. J. Hoare, G4AJA, 41 Lynton Road, South Cipford, London E4 9EA. (01-529 2282.)
SOUTH DOWNS: B. Chuter, G8CVV, 15 Coopers Hill, Willingdon, Eastbourne, East Sussex BN20 9JG.
SOUTH MANCHESTER: W. L. Seddon, G3JWV, 12 Barwell Road, Sale, Cheshire M33 5FF. (061-973 3355.)
STOURBRIDGE: A. Dewsbury, G4CLX, 10 Rectory Road, Oldwindford, Stourbridge (3530), West Midlands.
SURREY: S. A. Morley, G3FWR, 22 Old Farleigh Road, Selsdon, South Croydon CR2 8PB. (01-657 3258.)
SUTTON & CHEAM: J. Korndorffer, G2DMR, 19 Park Road, Sutton, Surrey.
TORBAY: M. Yates, G3UIQ, Top Flat, 23 Waverley Road, Newton Abbot (3025), Devon.
VERULAM: B. Pickford, G4DUS, “Netherwood,” 130 The Drive, Rickmansworth (77616), Herts.
WESSEX (Bournemouth): G. D. Cole, G4EMN, 6 St. Anthony’s Road, Bournemouth BH2 6PD. (0202-20027.)
WINKWORTH: A. W. A. Crofts, G3DLF, 3 Barnmouth Road, Walsayee. (051-638 2515.)
WOLVERHAMPTON: J. Cook, G8EDG, 75 Windmill Lane, Castlecroft, Wolverhampton WV3 8HN.
The West Country is represented next, by way of Torbay who have Hq. at Bath Lane, rear of 94 Belgrave Road, in Torquay. For December it is the Christmas Party on 10th, this year being held at the Community Centre, Kingsteignton Road, Newton Abbot. On a different tack, members who seek a QSO with EP-land could do worse than note that member G3SXW is now operating from Tehran as EP2IA, looking for home contacts around 14030 kHz.

At York we know they are to be found every Friday except the third one of each month at the United Services Club, 61 Micklegate, York. In recent weeks they have had a first run in the Jamboree-on-the-Air, and an excellent Annual Dinner, not to mention having battered the local Education Authority into offering an R.A.E. class—which was over subscribed in the event! Such a response must have been very gratifying, as there is nothing harder than making a local government set-up move from a pre-decided position, short of putting a bomb in its pants!

Verulam have their place at the Market Hall, St. Peter's Street, St. Albans on the fourth Thursdays in each month, the subject for December being not known to the writer at this moment—but either a visit (or a note to the Hon. Sec.—see Panel)—will certainly be worthwhile. The second Thursday of each month is the informal evening, this one being held in the R.A.F.A. Hq. in Victoria Street, St. Albans.

Monday December 19 is the date for Britsol RSGB group, their venue being Queens Building, University Walk, Clifton, Bristol. On this occasion they have a diet of Potted Lectures, three or four of around 20 minutes each given by speakers to be announced on the night. 1900 is the start time for this mystery tour.

The Wolverhampton Hq. address is at Neachells Cottage, Stockwell End, Tettenhall, Wolverhampton, on Monday evenings December 5, 12, and 19; December 26 and January 2 will be skipped. The first date mentioned will be down for G3VPE, the Regional Representative for Region 3, to come along and explain all about the inner workings of RSGB; the second date is a Natter session, and on the 19th they will venture forth from the clubroom to a local alehouse for Seasonal potations.

Edgware have the second and fourth Thursdays of each month at the Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware. A Junk Sale occupies December 8, but for this month the other December date is passed as it would fall rather near to Christmas.

New Ones

To our amazement, both in Scotland—which country normally keeps its club news very dark. Right to the North first, to Inverness Technical College, which in fact has been running for some few months. The Chairman writes on their behalf, the Hon. Sec. having recently had to resign his commitment for personal reasons. The group is mainly for the students, of course, but they positively welcome all radio amateurs who can attend. The meetings are on alternate Wednesday evenings in Room C30—the Electronics Lab—Inverness Technical College, Longman Road, Inverness. One wonders what has happened to the “old” Inverness club which we haven't heard of for years—two clubs in the same area would indicate a startling level of activity.

Our second one is also in Scotland, and also is based on a Technical College. This one is Perth, where the work of GM4DQJ has been clearly recognised at the inaugural meeting when they shotgunned him into the Hon. Sec's. chair, with all the work it entails. They have every Tuesday evening between 1900 and 2130—and they also would like to welcome some visitors.

Returning to the established groups, we have a letter from Norfolk the first for a very long time; we well recall the fine Newsletter they used to put out as being one of the best of the bunch. They have now moved to Crome Community Centre, Telegraph Lane East, Norwich, every Wednesday evening, speakers being called upon for alternate dates. In addition they have been, and will go on, putting their talents in front of the public at special-event shows, and of course we must not forget the Annual Dinner on December 16 at Horning Ferry.

The Sutton & Cheam lads appeared at our Leicester Exhibition stand, and berated us for the date we picked for MCC—a fair comment, but of course we did announce the date along with the results of the previous MCC.
just because so many groups didn’t like a November date! Luckily, we’ve broad shoulders and it was all in good spirit. The group have two places to meet, namely Rays Social Club, London Road, North Cheam, and Sutton College of Liberal Arts, Cheam Road, Sutton. For December it will be the first-mentioned, on December 14, for the Christmas meeting. There will be a committee meeting however, at the other place—just to keep the seats warm!—on December 7.

At Maidenhead the Hq. is at the Red Cross Hall, The Crescent, Maidenhead, on the first Thursday and the third Tuesday of each month; the formal for December will be December 1 for a constructional competition.

It looks to be the first and third Wednesday for Surrey, at their Hq. in TS Terra Nova, the local sea cadets Hq. For December we understand that the main meeting will be a combination of a Christmas Party and a call for help!

At Wirral your scribe was saddened to note that the Newsletter editor had found it necessary to ask some members to be quiet while a speaker is on his feet—not for the lack of courtesy as such, but for the fact that the main offenders are younger members. However, you can always pay a visit to the Sports Centre, Grange Road West, Birkenhead, on the first or third Wednesday of each month, to find out for yourself whether the Newsletter editor was in earnest, or just “having a stir” in his final, 72nd Newsletter!

Hereford have a prize group of workers—they set out to raise some £300 for a club transceiver, then decided that they wanted a Trio TS-520, which meant they had to go after another £100 if they were to buy new. So—they are back in the fund-raising business! The group Hq. is at the County Control, Civil Defence Hq., Gaol Street, Hereford, where they may be found on the first and third Fridays in each month.

At least someone reads this column—we questioned the origin of the Stourbridge informal meeting-place’s name, and got the reply that they don’t know either! The main meeting is at Longlands School, Brook Street, Stourbridge, as are the new Construction/CW sessions, while the informals are in the Shrubbery Cottage pub, Heath Lane, Stourbridge. The latter is on December 6, the day after the Constructional/CW session on 5th; the “main” one will be December 19 for the Grand Surplus Sale.

For Melton Mowbray December 16 will be firstly a Junk Sale and then, more importantly, the presentation of the G3FDF Memorial Trophy to bring back memories of a long-serving and loyal club member. The venue, as always, is the St. John Ambulance Hall in Melton Mowbray.

It’s the first Tuesday and the third Thursday for the Chichester crowd, the Hq. being the Lancastrian Boys School. How to Home-Brew will be the topic on December 6, with G2DZT passing it all on, and of course on December 15 it will be near enough to Christmas to throw a party! On a different tack, that famous old call of G2NM has been used on the air again, having been re-issued to the club, with the full permission of the family of the late G2NM.

Up to GM again, to hear that GM4BRM; “Drew adds that the group still foregather at the Club Rooms, Provosts Land, Douglas Road, Leslie, every Wednesday evening. In addition they have an “Open Night” as in past years at the Laurel Bank Hotel, Markinch, set for November 23—what a pity we didn’t hear of this last a little earlier!

A change of shape and of print-size signals that the Echelford Newsletter has a new editor; he says on the front page that the venue is The Hall, St. Martin’s Court, Kingston Crescent, Ashford, Middx., on the second Monday and the last Thursday of every month.

WAMRAC is the Methodist Church group, and accepts as associate members those of other denominations. They most certainly have recovered well from the loss of their founder, under the wise control of G3AGX. For details of the group, write to him at the address in the Panel. It is nice to see that at their recent Conference, the collection at the Sunday service was some £7.50 which was passed on to RAIBC—a practical gesture indeed.

After just a short time out of office, we hear that once again the Newsletter of Crystal Palace (and the Hon. Sec. chore too!) reverts to G3FZL, who did the job for so many years before. On Saturday December 17 they have a Film Show and Christmas Party, while the new informal session for December is on December 6 chez G3IIR.

Just so the lads can listen to it, G8CQM will be playing his tapes of CB activity in the States for Guildford on December 9, while on 23rd there is a Natter Nite. The Hq. is at . . . but now we read that the lads have been asked to remove their magazines, etc., from Guildford and District M.E.S. (Model Engineering Society?) which is as near as we can get, so we must refer you to the Hon. Sec.—see Panel.

Farnborough have a place at the Railway Enthusiast’s Club off Hawley Lane, on the second and fourth Wednesdays of each month, and also have a quarterly Newsletter with a quite magnificent picture of aerials with a formation of aircraft apparently flying between the elements.

At Cornish they have the Christmas Social Evening on December 1; but we are not sure whether the meeting will be at the old venue or not, so for this information we suggest you contact the Hon. Sec.—see Panel.

Our final stop is with the Royal Navy group; they have a very fine Newsletter with plenty of both the technical and the personal touch—well worth a sub for this alone! Details from the Hon. Sec.—see Panel.

Finale

Which is where we do a bit of reminding—the deadline dates are in a “box” in the body of the piece, which means that by now you will have the January news all sent off. This year we will try to have both an abbreviated “Clubs” as well as the MCC report which, the feedback says, must be a bit more detailed than in the past few years—O.K., point taken! The address is as ever, Club Secretary, SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ. Meanwhile, may we take this chance to offer our best wishes for Christmas and the New Year.
A THERMOSTATICALLY CONTROLLED OVEN FOR THE VFO

N. H. SEDGWICK, G8WV

We had an amateur-radio problem which dogged us for many years and which must surely have been experienced by many other amateurs. The "shack" is indeed a shack which lives down the garden and is not an economical proposition to keep heated all the time during winter. Thus, the frequency determining components of the VFO were subjected to a very considerable change of ambient temperature on every occasion that we decided to spend some time in the shack and put on heating in cold weather so that the VFO frequency drifted for a couple of hours or so.

Now there exists a great wealth of literature which deals with making oscillators stable, and the number of VFO's that we built over the years must have run to twenty or more. But they all drifted in much the same degree, and slowly it dawned upon us that the speciality which gives the claimed excellence for all of these various circuits is isolation of capacity changes in the amplifier part of the oscillator from the LC circuit which fixes the frequency. The isolation is achieved either by swamping inter-electrode capacities, etc., with a much higher capacity across that part of the tuned circuit presented to the amplifier (as in the Clapp), or by reducing the coupling capacity into the amplifier to a very low value which appears in series with any stray or inter-electrode capacities, etc., presented to the amplifier (as in the Franklin), and is useless in stabilising frequency if the drift is caused by direct temperature change of the LC circuit components as occurs when the ambient temperature in which they are placed changes.

Once the idea had been grasped that all these trick circuits assume room temperature to be steady it was clear that the only cure for frequency drift as experienced was to make the assumption true by putting the tuned circuit into a temperature controlled oven, and whilst this changed the tempo, it started a long period of frustrating experiment, for nowhere could any practical information on such matters be found.

Before embarking on making an oven an attempt was made to write down a technical specification by posing and answering questions which seemed pertinent to the requirement. These worked out rather like this:-

Q. 1: What components shall I put into the oven?
A. 1: As few as possible because once boxed, they will be difficult of access, and every time the box is opened it will take hours to settle down to steady temperature again. It depends on the type of oscillator to be used too.

Q. 2: All right, what type of oscillator?
A. 2: If a Colpitts/Clapp is used the quite large capacitor in shunt with inter-electrode and stray capacity will have to go in the oven as it is across the tuned circuit. Its power factor will get worse as it gets hotter. It will probably get brittle and ooze wax or other goo in the heat. Better to use a Franklin because the very low capacity couplings can be home-made by soldering washers onto screws and making them up like the old-fashioned neutralising capacitors, so that they are adjustable and use air dielectric. Really depends on how much heat.

Q. 3: Yes indeed, how much heat?
A. 3: Ideally somewhat above maximum ambient temperature likely to be encountered. In fact it will have to be whatever is fixed by the thermostat available.

Q. 4: What thermostat?
A. 4: Ah, better get one out of a crystal oven. That is the same sort of requirement and should be somewhere around optimum.

Q. 5: What sort of heating/cooling cycle should one aim at?
A. 5: If the thermostat only switches off for a very short time it means the loss of heat in the oven is high. Wrap the oven up in fibre-glass lagging so that it holds its heat. If the thermostat only switches on for a very short period the heating power is too great and should be reduced. It is a fair bet that the optimum situation exists if thermostat on and off periods are of the same duration when room temperature is at an average. A small lamp on the front panel of the VFO is needed to indicate by glowing when the oven is heating. Commercial oven controlled devices in telecommunications seem to change over between heating and cooling every two or three minutes, so adjust oven insulation and heating power to give this sort of performance in an ambient temperature of say 20°C.

Q. 6: How do we calculate the heating power required to satisfy A. 5, size of element, applied voltage, etc.?
A. 6: We do not! We suck it and see and hope our guesses are intelligent. It is going to be a long job, so arrange the element in a way that enables it to be changed easily. We don't want the voltage very high because that would make the element wire thin and fragile to get enough resistance to limit the current. Let us start with 24 volts, which is nice and handy for available transformers. If we aim at a maximum of 2 amps that is 48 watts, and if we need more than that the thing will probably catch fire! Incidentally, that enables us to fix the wire size of the element to around 30 s.w.g. of nickel-chrome, which will not glow red hot at that current, but will enable a reasonable length to be used to make two elements for fixing on facing sides of the oven box.

Q. 7: Will an element on each side be enough or do we need them on top, bottom, and back as well?
A. 7: Don't know, but it's a very long and complicated job to fit them to every flat surface of the oven box. Let's start with the two sides and see how it works out.

Q. 8: What is this oven box?
A. 8: A metal box containing the thermostat, variable condenser, inductance, and coupling capacitor assembly for the Franklin oscillator. A larger metal box giving 3/4 inch or so clearance around
the inner box and the elements mounted on the insides of the side plates of the outer box, i.e. in the cavity between the two boxes. The whole assembly wrapped in 3-inch fibre-glass lagging. Size of the inner box determined by the components in it, but probably about three inches cubed.

At this stage the junk box was broached and an old 100 kHz crystal in an oven taken to pieces to provide the thermostat. This was quite large and the bi-metal part was in the form of a disc about one inch diameter. When heated it became convex very suddenly with a loud "plop" and the contact made. It was found to operate at 80°C, which seemed high, but it was obviously quite a precision job.

The VFO was built with this at its heart. Readings taken with a laboratory Centigrade thermometer (purchased quite cheaply at a local chemist's shop) pushed through a hole in the box showed no variation at all in temperature, once the device had settled. Only when the oscillator was set working did the snag show up. Every time the big thermostat operated, the mechanical shock caused the oscillator to jump in frequency. There was no way round it but to discard this mechanical hammer which called itself a thermostat and seek deeper in the bowels of the junk box for something gentler. This came to light in the form of a plug-in oven for HC6U crystals of the type currently advertised in a number of periodicals. The thermostat was a tiny strip contact of unpretentious appearance, and one needed a small hack-saw and some careful cutting to detach it from the oven, which was then completely wrecked. In the VFO it also held the oven to 80°C, but seemed light for the current it was switching. That trouble was eliminated by switching about 20mA DC to a relay with the thermostat contact and using one contact of the relay to apply AC volts to the elements and another contact of the relay to switch power to the "OVEN HEATING" indicator lamp on the front panel.

The junk box also provided the assembly for the heating elements. Some old components mountings consisting of strips of ½-inch wide bakelite fitted with turret lugs at ¼-inch intervals were cleaned and cut into four lengths each 3½ inches long. They were fixed along the top and bottom edges of the vertical sides of outer box in the cavity between the boxes, and the nickel-chrome wire stranded up and down between opposite lugs to form a grill. Only the start and finish of the wire were soldered to the lugs, and the two elements so constructed were connected electrically in series.

The inevitable snag showed up as soon as power was applied. The neat and tight wire grills immediately went slack as the wire expanded with the heat, contact occurred with the metal of the box and the wire fused. This big expansion of the wire was quite unexpected but is clearly a feature of nickel-chrome. The insides of the box were then lined with asbestos sheet cut from oven mats with a Stanley knife, and the turret lug strips mounted on top of the asbestos, so clamping it flat whilst it serves to protect the wire from contacting the metal sides. Which brought us to Q. 9.

Q. 9: Where should the thermostat be mounted in the oven, relative to the components?

A. 9: It seemed sensible to place it right in the middle of the oven in the air, and it was dangled thus on its connecting wires.

That answer was the worst guess of all and the thermostat was hopeless in that position, because the components were of necessity screwed down to metal surfaces which conducted the heat to them at quite a different rate from the conduction of heat to the thermostat by the air. After weeks of trial and error it was found that the best arrangement was to fix all components and the thermostat in the middle of them to one flat metal surface, and to group them as close together as possible.

The break-through now seemed to have occurred and the oscillator had become enormously stable by previous standards, which then introduced the problem of how to measure its stability. The VFO frequency range was 5 to 5.5 MHz and, in the absence of a digital frequency meter, another HC6U crystal oven was produced from the junk box and put into action with a 5.210 MHz crystal in position in an oscillator. We assumed this would have a much higher order of stability than the VFO, and that if one brought the VFO to zero beat with the crystal oscillator, any drift in frequency that followed could be blamed onto the VFO. By this time we were quite happy that the VFO was entirely adequate for its purpose in the transmitting rig, but it was nice to have a measurement of stability even if it was a bit approximate. In fact the measured frequency stability was disappointing when compared with advertised performances of similar commercial devices.

A law of diminishing returns operates in all development work. As one gets nearer to perfection further improvements become more and more time-consuming and expensive and provide less and less in the way of advantages. So with this one! We were looking for an improvement of a couple of parts in 10³ or so, and the oven was wrecked and built again twice before the trouble was located. It was very simple; the ½-inch brass spindle of the tuning condenser extended out of the oven into the dial mechanism and changes of room temperature were conducted down that spindle direct to the tuning condenser. The cure was to cut the brass spindle short inside the oven and extend it externally by a piece of ½-inch bakelite rod having much poorer thermal conductivity than the brass.

In practice the two-element arrangement was quite satisfactory for heating the oven, but the 48 watts of the original 'guesstimate' was rather high and we found 30 watts nearer the optimum, applying the criteria of A. 5. Nickel-chrome 30 s.w.g. is roughly 12 ohms to the yard, so the total wire used in the two elements was 57 inches.

The secret of the Franklin oscillator is to adjust the coupling capacities to be as small as is consistent with maintaining oscillation over the tuning range. The output of the oscillator is therefore small and a buffer amplifier is necessary. We did try using a twin gang condenser in the oven with one section tuning the Franklin and the other tuning the output of the buffer amplifier, but this spoilt the frequency stability of the Franklin because load variations on the output were coupled into the Franklin tuned circuit by stray capacity between the two condenser sections. The final version of the VFO therefore has a separate output tuning control and an RF voltage meter for peak indication.
Since heating elements were only located against the two vertical sides it is not necessary to use a double box for the oven. A single die-cast box with two partitions fitted to provide enclosed compartments for the heating elements would serve admirably. One word of warning however; since the boxes are moulded, they taper slightly, so that a tuning condenser screwed to a side will have its spindle not quite perpendicular to the top and bottom of the box. It is therefore better to mount the components on one of the partitions enclosing an element, as this can be set when fitted to bring the condenser spindle out perpendicular to the front panel.

RECENT CELEBRATIONS AND PRESENTATIONS

At a recent meeting of the Farnborough Radio Society, Mike Hearsey, G8ATK, (left) presented Ken Alford, G2DX, with a copy of the “Blackwater Valley Award, No. 44” endorsed “In recognition of devotion to the amateur radio movement.”

The Jack Hum, G5UM, half-century! Above, to celebrate his 50th year as a licensed radio amateur Jack held a dinner-party for a group of old friends whom he and his wife, Grace, had known for the last 25 years. Left to right, rear: G3BJC, G8VN, G6FI, Mrs. G3GGK, G3AAZ, G5UM, G3GGK, G3DXI and G2BLA; front, left to right are Stella (Mrs. G3BJC), Jessie (Mrs. G3AAZ), Gladys (Mrs. G8VN), Grace (Mrs. G5UM), Eve (Mrs. G6FI), Joyce (Mrs. G3DXI) and Sheila (Mrs. G2BLA). When sending us this picture, G5UM recalled that he and the late Editor of SHORT WAVE MAGAZINE, G6FO, were licensed at almost exactly the same moment in 1927 and together did much to open up the then-neglected 160m. band. Below, Jack and Grace with the Certificate presented to him by fellow radio amateurs to mark his 50th anniversary. The Award reads: “The supreme award to Jack Hum, G5UM, for his unique 50 years of service and dedication to the true spirit of amateur radio.”

January issue will appear on Friday, December 23rd.
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 432 MHz linear transverter, MMT432/144, which now includes a 1-6 MHz repeater shift, MMT432/144R.

**NEW PRODUCT** A new version of our standard 28 MHz to 432 MHz 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.

### DIGITAL PRODUCTS

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Description</th>
<th>Features</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMD050</td>
<td>Six digit 50 MHz frequency counter. Frequency range: 0-45-50 MHz.</td>
<td>Six digit 50 MHz frequency counter.</td>
<td>£62 + VAT. (£66-96 inc. VAT).</td>
</tr>
<tr>
<td>MMD050/500</td>
<td>Six digit 500 MHz frequency counter.</td>
<td>Combination of MMD050 and MMD500P.</td>
<td>£79 + VAT. (£85-92 inc. VAT).</td>
</tr>
<tr>
<td>MM500P</td>
<td>Divide by 10 prescaler to give 500 MHz capability. When used with MMD050 or similar counter.</td>
<td>Fully TTL compatible.</td>
<td>£25 + VAT. (£27 inc. VAT).</td>
</tr>
</tbody>
</table>

### POWER SUPPLY

<table>
<thead>
<tr>
<th>Description</th>
<th>Features</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>MMP12/3</td>
<td>Compact matching 12-5 volt 3 amp. PSU for our transverter range.</td>
<td>£50 + VAT. (£56-25 inc. VAT).</td>
</tr>
</tbody>
</table>

**INCIDENTALLY, ALL OF OUR PRODUCTS ARE FULLY GUARANTEED FOR 12 MONTHS**
SPECIAL 10X CRYSTAL. 100 kHz Plus
50 ASSORTED BC 107-8-9 TRANSISTORS. Untested at 57p
COMPRESSION TRIMMERS. 1Opf, 30pf, 5Opf, 1000pf. All at 6p each
CAMPION R.F. CHOKES 22u H at 5p each
SOLDER -IN FEED THRO's. 6'8pf, 300pf, 1000pf at 20p doz.
J. BIRKETT

2.5 GHz DUAL TRANSISTORS NPN. Untested 4 pair for 57p
PISTON TRIMMERS. 0 co 20pf at 22p
MINIATURE AIR SPACED TRIMMERS. Spf at 75p, 1Opf at 75p, 5Opf at 55p, 10Opf at 55p
12 BANDED ASSORTED FET's for FM IC's like TBA 120S. Untested with data at 6 for 60p
FT 243 CRYSTALS. 8040, 8100 kHz at 75p each.
NATIONAL BC 212K TRANSISTORS. 10 for 50p
200 + 200 + 100uf 300v.w. ELECTROLYTICS at 250.10 for LI.80
PHOTO TRANSISTORS NPN at 15p, PHOTO DARLINGTONS
COMMUNICATION SERIES OF 1.C.'s.
BCX 37 I Amp 40 Volt 80 MHz TRANSISTOR at 10p
BCX 36
ELECTROLYTICS. Screw Terminal Type. 680uf 160v.w. at 40p ;
3300uf 63v.w. at 55p ; 4700uf 100v.w. at 61 ; 15,000uf 40v.w. at 61 ;
33,000uf 16v.w. at 75p ; 47,000uf 10v.w. at 75p. Tag ended types
500uf 70v.w. at 30p ; 500uf 100v.w. at 30p ; 1000uf 100v.w. at 30p ;
3000uf 25v.w. at 50p ; 4700uf 25v.w. at 50p ; 500uf 30v.w. at 60p.
Wired ended types 220uf 63v.w. at 20p ; 330uf 40v.w. at 30p ; 470uf
6v.w. at 5p ; 47uf 16v.w. at 10p ; 680uf 20v.w. at 30p ; 3300uf 16v.w.
at 25p.
MINIATURE AIR SPACED TRIMMERS. 5p, 1Opf, 5Opf at 15p each
BUTTERFLY PRESET, VARIABLE CAPACITORS. 25 x 25p at
30p ; 38 x 38p at 60p ; 38 x 38pf Wide Spaced at 65p. All Spindles
easily extended.
UNIJUNCTIONS. TIS 4J type at 20p ; MEUZ1 at 22p ; MU4894 at
22p; 2N 4871 at 25p ; GE4105289 at 22p ; D1311 at 25p ; 2N 6028
Amp at 30p.
PISTON TRIMMERS. 0 to 20pf at 22p ; 8 to 28pf at 33p
2-5 GHz DUAL TRANSISTORS NPN, Untested 4 pair for 57p

SILICON BRIDGE RECTIFIERS. 100 PIV I Amp at 20p ; 400 PIV
1 Amp at 300
ELECTRET MICROPHONE INSERT with PET Pre-Amp at £1.85
I.C. DIL SOCKETS. 8 Pin, 14 Pin, 16 Pin, 18 Pin. All at 15p each
MULLARD C281 1uf 35v.w. CAPACITORS at 20p doz.
500yd. REEL OF PWC CABLE. 25 strand 004 at £3.
TEN TURN POTENTIOMETERS. 100 ohm, 200 ohm, 250 ohm,
1K, 2K, 2.5K, 5K, 10K, 20K, 100K. 1p spindle all at £1.50 each
NXT 14 TRANSISTOR equivalent to OC71, 1op for £6 for 50p
5 M3 OHM CERAMIC FILTERS at 27p each, 4 for £1
500 uf 220VAC SUPPRESSION UNITS at 10p each
MINIATURE BUT 300v.w. ELECTROLYTICS at 10 for 37p
RCF 24045 RNP 90 Volt 100 MHz TRANSISTORS at 15p each
2N 706 TRANSISTORS. Unmarked. Good, 12 for 50p
POLYSTYRENE CAPACITORS. Assorted at 57p
SOLDER -IN FEED THRO's. 6'8pf, 300pf, 1000pf at 20p doz.
COMMUNICATION SERIES OF 1.C.'s.
BCX 37 I Amp 40 Volt 80 MHz TRANSISTOR at 10p
BCX 36
ELECTROLYTICS. Screw Terminal Type. 680uf 160v.w. at 40p ;
3300uf 63v.w. at 55p ; 4700uf 100v.w. at 61 ; 15,000uf 40v.w. at 61 ;
33,000uf 16v.w. at 75p ; 47,000uf 10v.w. at 75p. Tag ended types
500uf 70v.w. at 30p ; 500uf 100v.w. at 30p ; 1000uf 100v.w. at 30p ;
3000uf 25v.w. at 50p ; 4700uf 25v.w. at 50p ; 500uf 30v.w. at 60p.
Wired ended types 220uf 63v.w. at 20p ; 330uf 40v.w. at 30p ; 470uf
6v.w. at 5p ; 47uf 16v.w. at 10p ; 680uf 20v.w. at 30p ; 3300uf 16v.w.
at 25p.
MINIATURE AIR SPACED TRIMMERS. 5p, 1Opf, 5Opf at 15p each
BUTTERFLY PRESET, VARIABLE CAPACITORS. 25 x 25p at
30p ; 38 x 38p at 60p ; 38 x 38pf Wide Spaced at 65p. All Spindles
easily extended.
UNIJUNCTIONS. TIS 4J type at 20p ; MEUZ1 at 22p ; MU4894 at
22p; 2N 4871 at 25p ; GE4105289 at 22p ; D1311 at 25p ; 2N 6028
Amp at 30p.
PISTON TRIMMERS. 0 to 20pf at 22p ; 8 to 28pf at 33p
2-5 GHz DUAL TRANSISTORS NPN, Untested 4 pair for 57p
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 48 watts out. The circuit is suitable for all transmission modes with a sophisticated bias stabilisation circuit for correct full power operation rather than the simple diode arrangement normally used.

The receive pre-amplifier has the same performance as our standard 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, 4½” deep. Sockets are SO239.

Price £53.00 + VAT = £69.62.

Also available without the receive pre-amplifier at £44.00 + VAT = £51.44.

NEW! THE ONLY ONE AVAILABLE

SENTINEL TOP BAND CONVERTER

Top Band (Marine Band) to 20 metre converter. If you miss being able to listen on 160 metres this provides the answer. 1-8 MHz-2-5 MHz in 14-14.5 MHz out. Price £18.00 + VAT = £20.25. IN STOCK.

2 METRE CONVERTERS

Sentinel D.G. Mosfet converters. These provide a performance that cannot be beaten. N.F. 2dB, Gain 30dB. Supply 12v. (9-15) 15mA. Size is 2¾” x 1½” x 3½”. IFs : 28-30 MHz, 4-6 MHz, 2-4 MHz. These are also in stock for Marine Band to 28-30 MHz and Satellite Band to 20-22 MHz. 4 metres to 28-28.5 MHz Price : £18.00 + VAT = £20.25. IN STOCK.

SENTINEL X 2 METRE CONVERTER

Containing a mains power unit and RF gain control. Specification as above. Size : 5” x 2” front panel by 5” deep. Price : £22.00 + VAT = £24.75. IN STOCK.

SENTINEL 2 METRE CONVERTER KIT IF 28-30 MHz

Performance as above converters. Complete unit with box, connectors, etc. Price : £11.50 + VAT = £12.94. We will get them going if you have trouble for £2.50, so you can't go wrong. IN STOCK.

70cms. CONVERTERS

The most economical method of listening on 70cms. is our 70cm. 3db. to 2 metre FET converter. N.F. 3dB., Gain 30dB. Price : £18.00 + VAT = £20.25. Size : 2¾” x 1½” x 3½”. IN STOCK.

SENTINEL 70

70cms. to 28-30 MHz, N.F. 3dB., gain 30dB. Size 2¾” x 1½” x 4”. Price : £20.00 + VAT = £22.50. IN STOCK.

PRE-AMPLIFIERS

We have now sold thousands of these pre-amplifiers and many who have a V.H.F. unit come back for an H.F. unit or vice versa. Many of you report to us on the improvement in performance obtained and we have had no reports of anyone not finding an increase in sensitivity, I think that we can safely say that they are the most cost effective units you can buy.

THE SENTINEL AUTOMATIC 2 METRE PRE-AMPLIFIER


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. IN STOCK.

SENTINEL H.F. PRE-AMPLIFIER. These are wideband pre-amplifiers from 1-40 MHz. N.F. 1dB, gain 15dB. Input and output impedances 50/75 ohms. Size : 2¾” x 1½” x 3”. Price : £7.00 + VAT = £7.70. 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 coax. 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 81” x 4” x 71”. SO239 and screw terminals for coax fed or wire aerials. Balanced or unbalanced. Price : £36. IN STOCK.

SENTINEL 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 200W Drive for 200W input.
* Spurious output—80dB !
* Size only 9” x 48” 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.

SENTINEL EUROPA SS

All solid state Europa

* Receive converter 2dB N.F., 30dB gain.
* Transmit converter 200W input for 10W output, capable of operating into o/c and s/c loads.
* Front panel meter reads P.A. collector current.
* Contains rectifier and smoothing circuits for operation off 12V, a.c. of d.c. Price : £80.00 + VAT = £90.00.

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 send or phone 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.

Here are a few tips about dealing with our Manx company. 1. Telephone calls to the Island cost the same as anywhere else in Britain and are usually by S.T.D.; 2. Post to the Island costs the same and takes no longer than anywhere else in Britain; 3. Post from the Island is all “first class,” most of our products are sent “letter post” and arrive the next day; 4. We use a P.O. Box so that we can collect the mail early in the morning each day, to process and dispatch orders on the same day. The postman doesn't deliver here until afternoon, which would put a day's delay on some orders.

Finally, if you have managed to read so far you certainly deserve our wish of a very Merry Christmas and a successful New Year.
CQ301

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 15 MHz 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 28 MHz).

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.

CQ301 2kW Linear Amplifier—10 to 160M with built-in power supply and 2 EIMAC3-500Z 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.

SECONDHAND EQUIPMENT FT301D/FP301 £625 VAT incl.

NEC EQUIPMENT IS AVAILABLE FROM

THANET NORTHERN 64 High Street, Wombwell, Yorks. Tel. (0226) 756229.
CAMBRIAN COMMUNICATIONS 2 Joseph Parry Close, Llandough, Penarth.
(Tony Blackmore) S. Glamorgan, CF6 1PL. Tel. (0222) 702982.

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

TELEPHONE 0349 852351

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

TELEX 75265

ACCESS — BARCLAYCARD — HIRE PURCHASE — INSURANCE
**We'll put you on the air.**

Learn how to become a radio-amateur in contact with the whole world. We give skilled preparation for the G.P.O. licence.

---

**British National Radio & Electronic School**

P.O. Box 156, Jersey, Channel Islands.

NAME
ADDRESS

---

**NEW SAMSON ETM-3C C-MOS KEYER**

- 1 μA battery drain—Why switch off?
- Self-completing dots/dashes/spaces.
- Can be used either as normal electronic keyer or as an iambic mode squeeze keyer.
- 8-50 wpm.
- Constant 3:1 dash-dot ratio.
- 6 C-MOS ICs and 4 transistors.
- Plug-in PCB.
- Long battery life—typically 1 μA drain when idling—Built-in battery holder for 4 x 1.5v. batteries (but will work over 3-10v. range).
- PCB has both a reed relay (250v., 0.5 amp., 25w. max.) and a switching transistor (300v., 30 mA max.)—either keying method can be used.
- Has the well-known fully-adjustable Samson precision twin keying lever assembly.
- Operate/Tune button.
- Side-tone oscillator.
- Grey case 4" × 2" × 6". ETM-3C, £63.88.

**ETM-4C MEMORY KEYER:** As ETM-3C but with 4 memories (2 combinable).

**JUNKER PRECISION HAND KEY**

A superbly engineered straight key used for many years by professionals afloat and ashore. With this key you can't help but send good morse.

- Free-standing—no screwing down.
- Front and back contacts—fully-adjustable gaps/tension.
- Key-click filter.
- Hinged grey cover, £38.64.

**BAUER KEYING PADDLE**


88 mH TOROIDS

For CW, RTTY, SSTV and other filters, 90p each.

---

**COMMERCIAL COMMUNICATIONS**

**Antenna Specialists Antennas and Mounting Options**

<table>
<thead>
<tr>
<th>Antenna Type</th>
<th>Frequency Range</th>
<th>dB Gain</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASP 201</td>
<td>108-512 MHz</td>
<td></td>
<td>£2.50</td>
</tr>
<tr>
<td>ASP 629</td>
<td>130-174 MHz 3 dB gain</td>
<td></td>
<td>£6.61</td>
</tr>
<tr>
<td>ASP 677</td>
<td>130-174 MHz 3 dB gain</td>
<td></td>
<td>£11.95</td>
</tr>
<tr>
<td>ASP 667</td>
<td>420-440 MHz 3 dB gain</td>
<td></td>
<td>£14.95</td>
</tr>
<tr>
<td>ASP 655</td>
<td>130-174 MHz 3 dB gain, base station antenna</td>
<td></td>
<td>£19.95</td>
</tr>
<tr>
<td>ASP 659 UK</td>
<td>420-440 MHz 5 dB gain, base station antenna</td>
<td></td>
<td>£19.95</td>
</tr>
<tr>
<td>ASP 629 Magnetic Mount with cable, fits 629, 677, 667</td>
<td></td>
<td></td>
<td>£7.69</td>
</tr>
<tr>
<td>K220 Magnetic Mount with cable, fits 201, 462</td>
<td></td>
<td></td>
<td>£7.19</td>
</tr>
<tr>
<td>K220A</td>
<td></td>
<td></td>
<td>£7.10</td>
</tr>
<tr>
<td>ASP 332</td>
<td></td>
<td></td>
<td>£7.10</td>
</tr>
<tr>
<td>ASP 667 Colinear 420-440 MHz 5 dB gain, base station antenna</td>
<td></td>
<td></td>
<td>£11.95</td>
</tr>
<tr>
<td>ASP 659</td>
<td></td>
<td></td>
<td>£19.95</td>
</tr>
<tr>
<td>ASP 629</td>
<td></td>
<td></td>
<td>£7.69</td>
</tr>
<tr>
<td>ASP 677</td>
<td></td>
<td></td>
<td>£7.19</td>
</tr>
<tr>
<td>ASP 667</td>
<td></td>
<td></td>
<td>£7.10</td>
</tr>
<tr>
<td>K126 Stock Spring, fits 629 only</td>
<td></td>
<td></td>
<td>£4.95</td>
</tr>
<tr>
<td>UR 67</td>
<td>Coaxial Cable, ATTN 0-68 dB/100 MHz, 2-5 dB/1000 MHz</td>
<td></td>
<td>£28.00</td>
</tr>
<tr>
<td>UR 76</td>
<td>Coaxial Cable, ATTN 1-6 dB/100 MHz, 5-2 dB/1000 MHz</td>
<td></td>
<td>£35.00</td>
</tr>
<tr>
<td>UR 67</td>
<td></td>
<td></td>
<td>£4.00</td>
</tr>
<tr>
<td>UR 76</td>
<td></td>
<td></td>
<td>£5.00</td>
</tr>
<tr>
<td>PTT</td>
<td>Microphone, with clip</td>
<td></td>
<td>£2.50</td>
</tr>
<tr>
<td>3 Ω</td>
<td>Speaker in black/silver case</td>
<td></td>
<td>£4.95</td>
</tr>
</tbody>
</table>

Add 12¾% VAT plus 50p P & P each item

**Run your mobile rig at home with our**

- 13-8v. D.C. stabilised PSU, 3amps. £35.00
- 13-8v. D.C. stabilised PSU, 6amps. £38.00
- Add 12¾% VAT plus £2 P & P
- Wall Brackets 12" stand off (P & P £1) £4.00
- 18" stand off (P & P £1) £5.00
- Chimney Bracket 12" (P & P £5) £4.00
- 18" (P & P £5) £5.00
- Lashing Kit for above (state length) (P & P £5) £1.00
- Raw Bolts ⅜" (P & P £0.50) £1.00
- Guying Rings, 3 or 4 way (P & P £0.50) £3.00
- Guy Wire (per metre) (P & P £0.50) £3.00
- Guy Tensioners (claw strainers) (P & P £0.50) £5.00
- Guying Stakes (P & P £1) £1.00
- 9' x 1½" Mast (P & P £3) £3.50
- 10" x 2½" Mast (P & P £2) £3.50

Terms: Cash with order, callers by appointment

---

**SPACEMARK LTD.**

THORNFIELD HOUSE, DELAMER ROAD
ALTRINCHAM, CHESHIRE

(Tel: 061-928 8458)

**BROCHURE WITHOUT OBLIGATION TO:**

SWE 12
EVERY PICTURE TELLS A STORY!

You are looking at an actual un-retouched 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 brings 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

NEW... Exclusively for the ICOM IC240
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 25 kHz 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 144-000–147.975 MHz in 25 kHz steps and manually select a desired channel.
- Automatic safeguard on out of band transmission.
- Automatic ±600 kHz shift of transmit frequency when repeater mode is selected.
- Large six digit display shows frequency to 5 kHz.
- 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. by 1.1”h. by 5.5”d.
- Available NOW.
- Low, affordable price.

£69.00 Plus VAT

Contact: THANET ELECTRONICS, HERNE BAY — FOR FURTHER DETAILS
J. YU, 21 LANGLEY AVENUE, SURBITON, SURREY KT6 6QN
Profession with Performance

Decca KW Dummy Load is air convection cooled and has been designed as a purely resistive 50 ohm load up to 30 MHz. Power capability up to 1000 watts.

Decca-KW Balun Mk. II. The Decca-KW Balun is broadband—3 to 30 MHz, 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.

Note: The well-known KW LOW PASS FILTER passing 3—30 MHz is available from stock.

OTHER KW FAVOURITES

- Trap (for original and Dipoles: KW Antenna Switch, Splitters for Vehicles: CDR Rotators: Sharpe Microwaves: are normally stocked for after manufacturer of equipment or ‘phone for catalogue or ‘phone for catalogue.

C.B. ELECTRONICS

UNIT 3, 771 ORMSKIRK ROAD, PEMBERTON, WIGAN, WN5 8AT
Telephone: Wigan (0942) 216567

WITHOUT DOUBT THE BEST IN THE NORTH-WEST

The 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 and 10 yards further turn right by telephone kiosk. Premises are slightly to your left. Plenty of parking space. Mileage from motorway ½ mile.

From Wigan follow the A577 Skelmersdale to traffic lights at Fleet Street, Pemberton (Ye Olde White Swan on your left). Turn right then 10 yards right again. By telephone kiosk. Mileage from Wigan 2½ miles.

YAESU:

- FT101E £602.62
- FT101EE £659.00
- FRG7 £162.00
- FRG7 Dig £223.00
- FR101D £438.00
- F.D.K.
  - Quartz 16 £169.00
  - Multi 11 £219.00
  - Multi 12 £249.00
  - Multi 300 £489.00
  - TM48 £295.00
- UNIDEN 2030 £162.00
- NR56 receiver £54.00

Low Monitor receiver complete with 11 xtal.: £67.50

MAIN DISTRIBUTORS OF S.C.S. EQUIPMENTS

- 2M10 80L 80W. 144 MHz amplifier. Solid state
- HF3 100L 100W. 3—30 MHz amplifier. Solid state.
- DX555P VHF counter with HF Generator.
- PA144N Low noise 144 MHz pre-amplifier.

SASE for prices and details.

WANTED: RECEIVERS & TRANSCEIVERS HF or VHF

PART EXCHANGES WELCOME

S.A.E. ALL ENQUIRIES

H.P. AND CREDIT TERMS
“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
- TA-33 Jr. High Power model incl. Balun
- TA-33 Jr. 3 elements, 10, 15 and 20 metres
- TA32 Jr. 2 elements, 10, 15 and 20 metres
- TA31 Jr. Rotary dipole, 10, 15 and 20 metres
- ELAN 3 elements, 10 and 15 metres
- TA32 Jr. 3 elements, 10, 15 and 20 metres
- TA31 Jr. Rotary dipole, 10, 15 and 20 metres
- TR-2 Trap Dipole 40 and 80 metres
- TCD-2 Trap Dipole 40 and 80 metres compressed
- V-3 Jr. Trap Vertical 10, 15 and 20 metres
- ELAN 3 elements, 10 and 15 metres
- TR-2 Trap Dipole 40 and 80 metres
- TCD-2 Trap Dipole 40 and 80 metres compressed
- V-3 Jr. Trap Vertical 10, 15 and 20 metres
- ELAN 3 elements, 10 and 15 metres
- TR-2 Trap Dipole 40 and 80 metres
- TCD-2 Trap Dipole 40 and 80 metres compressed
- V-3 Jr. Trap Vertical 10, 15 and 20 metres
- ELAN 3 elements, 10 and 15 metres

SWL ANTENNAS
- SWL-7 Dipole 11, 13, 16, 19, 25, 31 and 49 metres
- RD-5 Dipole 10, 15, 20, 40 and 80 metres
- Orbit Vertical 11, 13, 16, 19, 25, 31 and 49 metres

Prices correct at time of going to press.

MOSLEY ELECTRONICS LIMITED
196 Norwich Road, New Costessey, Norwich, NR5 0EX, ENGLAND

MOSLEY ELECTRONICS LIMITED
Administrative Address only

All antennas available ex works (carriage and VAT extra)

C&C electronics
10 WEST PARK, LONDON SE9 4RQ

THE MADE TO ORDER CRYSTAL SPECIALISTS
OFF CRYSTAL PRICES

Fundamentals:
- Group 1. 0.030 to 0.099 MHz 100ppm Price £14.25
- Group 2. 0.100 to 0.369 MHz 100ppm Price £9.75
- Group 4. 0.731 to 1.499 MHz 100ppm Price £9.75
- Group 5. 1.500 to 1.999 MHz 30ppm Price £6.45
- Group 6. 2.000 to 3.999 MHz 30ppm Price £6.00
- Group 7. 4.000 to 6.999 MHz 30ppm Price £5.85
- Group 8. 7.000 to 9.999 MHz 30ppm Price £5.25

3rd Overtones
- Group 9. 12.000 to 56.999 MHz 30ppm Price £2.85

5th Overtones
- Group 10. 55.000 to 104.999 MHz 30ppm Price £3.95
- Group 11. 105.000 to 199.999 MHz 30ppm Price £2.75

5th, 7th and 9th Overtones
- Group 12. 120.000 to 130.000 MHz 30ppm Price £1.00

Unless otherwise requested fundamentals will be supplied with 30pf load capacity and overtones for series resonance operation. HOLDERS: Groups 1 to 4, 12 & 13 - 6 to 8 weeks.

LOW FREQUENCY STANDARDS (8% VAT) 100 kHz in HC13/U Price £12.00

For fast, competitive service, contact: Bob Bowles, Eimac Division, Varian AG, P. O. Box, 6300 Zug, Switzerland. Tel. 042 / 31 66 55
Telex 78 789 or 78 841
Sales offices in:

Eimac stock popular tube types, duty free, at Zürich Airport.
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

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 inc. VAT.

Available from us with special 2m converter and accessories, all for just an extra £17.

WINTER TRANSMITTING

FT-227R, a new era in 2m transceivers, with 400 fully synthesised channels, 5kc spacing, memory button for recall of previous channel, ±600kc for Repeater or any other offset 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

BARCLAYCARD VISA

Credit sales by telephone

Securicor delivery

2 NORTHFIELD ROAD, EALING, LONDON, W13 9SY  Tel. 01-579 5311

AEROSPACE & ELECTRONICS LTD.

44 WATSON AVENUE, DUNLAOGHAIRE, CO. DUBLIN, IRELAND

DR22
FULLY SYNTHESISED GENERAL COVERAGE RECEIVER

SPECIFICATIONS

FREQUENCY COVERAGE
50 kHz to 29.7 MHz continuous.

5 kHz steps, digital readout, ±5 kHz fine tune.

AM, USB, LSB, CW.

1μV typical.

70dB.

4 kHz-3dB, 10 kHz-60dB and 8 kHz-3dB, 14 kHz-60dB.

(Wx Dx H) 17.5 x 14.5 x 5.1 in. Shpg. weight 19 lb.

PRICE £695.00 + VAT

ENQUIRIES: AEROSPACE & ELECTRONICS LTD., 44 WATSON AVENUE, DUNLAOGHAIRE, CO. DUBLIN, IRELAND. S.A.E. PLEASE
RX BAND PASS FILTER + 9 integrated circuits | 1 watt O/P stage | headphone socket | 8 switched positions of filter | high pass—2.5 kHz-2.00 kHz, 1-5 kHz—200 Hz, 110 Hz—800 Hz. 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 any supply from 9v. to 15v. £26.00 + VAT (12½%) + 50p P. & P.

PRINTED CIRCUIT MODULE including rotary switch. £15.00 + VAT (12½%) + 25p P. & P. (Type B.P.11).

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 any supply from 9v. to 15v. will also peak up CW signals. £26.00 + 50p P. & P.

PRINTED CIRCUIT MODULE. Including all pots and switch. Assembled and tested, £15.00 + VAT (12½%) + 25p P. & P. (Type P.N.I.)

THE TECH ASSOCIATES PRE-SELECTOR. Peaks all signals, amateur bands + broadcast bands tunable from 1.6 MHz to 31 MHz three switched bands R.F. gain control to prevent strong station overload 50Ω-259Ω/F and O/P sockets three 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 £26.00 + 12½% VAT + 75p P. & P.

TYPE 2 for S.W.L. without ant. relay £23.00 + 12½% VAT + 75p P. & P.

AUDIO COMPRESSOR suitable or SSB/AM/FM pure compression, no clipping! 24 to 26dBs of compression, with less than 1% distortion 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 mods involved these compressors have been tested alongside commercial rf clipper, the only difference at the receiving end was superior audio quality. £24.00 + VAT (12½%) + 50p P. & P.

PRINTED CIRCUIT MODULE. Supply your own case and knobs. Assembled and tested. Type A.C.I. £14.00 + 12½% VAT + 25p P. & P.

COM-TEK (MIDS.) LTD.
Reg. Office—
506 ALUM ROCK ROAD
BIRMINGHAM
B8 3HX
Tel.: 021-326 6343. Telex: 339938

A MERRY XMAS from . . . . .
a happy new year WITH . . . . .

2ML — 144 MHz Amplifier for the serious 2 metre operator.

UK Agent:— Stephens-James Ltd. Export enquiries welcome
THE SHORT WAVE MAGAZINE

P.M. ELECTRONIC SERVICES

VAT—Prices exclude VAT which should be added at the higher rate (15%) for items marked (H) and at the lower rate (8%) for items marked (L). Overseas orders in Sterling. B.B.C. and Channel Islands.

2M TX & RX CRYSTAL AVAILABILITY & PRICE CHART

CRYSTAL FREQUENCY RANGE AND USE (Tx or Rx or both) and HOLDER

<table>
<thead>
<tr>
<th>OUTPUT FREQUENCY</th>
<th>CRYSTAL FREQUENCY RANGE AND USE (Tx or Rx or both) and HOLDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>144-030</td>
<td>45.000 MHz ± 10 ppm (bare sub)</td>
</tr>
<tr>
<td>144-480</td>
<td>45.000 MHz ± 10 ppm (bare sub)</td>
</tr>
<tr>
<td>145-060</td>
<td>45.000 MHz ± 10 ppm (bare sub)</td>
</tr>
<tr>
<td>145-080</td>
<td>45.000 MHz ± 10 ppm (bare sub)</td>
</tr>
</tbody>
</table>

PRICES: (a) £2.36 (b) and (c) £3.90 + 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 possible we could be able to supply from stock.

N.B. Frequencies as listed above 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 (pF) or equipment. It is not essential to give the exact frequency, though it would be of assistance to quote if known.

JAPANESE AND AMERICAN EQUIPMENTS

With the ever increasing popularity of Japanese equipments we have now extended our range of stock crystals. We can now supply for YAESU (FT2F, FT2J, FT2A, FT224), most of the IC700 range and the TRIO-KEN MD -108 Double Balanced Mixer.

We can also supply stock crystals for the HEAT KIT HW201 + HW17A YAESU FT211 CRYSTALS NOW IN STOCK. All at £2.95 + VAT (H).

All popular channels—for repeater use advise requisite frequency as earlier models have different channel slits to later FT211R. We can also supply the crystal to give NORMAL “tune to 30 MHz” (at FT224 70 cm) we can supply the 1 MHz shift xtal for direct use with a MICROWAVE MODULES MMT3214 which we can supply for £13.00 + VAT (H). SPECIAL OFFER! If ordered with transverter 70 cm crystal FREE!

JOHNS RADIO

424 BRADFORD ROAD, BATLEY, YORKS.

Telephone 0924-478159

Communication Receivers: Racal R.A. 117 & 117F. Frequency Range 1-30 MHz in 10 Bands 1 MHz wide. Effective Scale Length 145ft. 6in. corresponds to 100 kcs. Power 100-125 or 200-250 AC. Internal Scan Crystal Filter in 10 Bands. Transmit Power 50-100 watts. Price £42.95 del.

N. B. NEW ADDRESS

2, ALEXANDER DRIVE, HESWALL, Wirral, Merseyside, L61 6XT

Tel.: 051-342 4443 (4.30-7p.m.)

Cables: CRYSTAL BIRKENHEAD Telex 627371

CRAYFORD ELECTRONICS

GAYN

VHF/UHF

AERIALS FOR MOBILE USE

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS-5</td>
<td>144 MHz ±48 h/p gain with 4m. cable (4 dB gain)</td>
<td>£9.10</td>
</tr>
<tr>
<td>AS-12</td>
<td>432 MHz ±48 h/p gain with 4m. cable (4 dB gain)</td>
<td>£6.50</td>
</tr>
<tr>
<td>CPW58</td>
<td>432 MHz ±48 h/p gain with 4m. cable (4 dB gain)</td>
<td>£7.10</td>
</tr>
<tr>
<td>M6-6</td>
<td>432 MHz ±48 h/p gain with 4m. cable (4 dB gain)</td>
<td>£8.00</td>
</tr>
</tbody>
</table>

The above represents a small sample of our range—an SAE will bring more details or answer your queries.

ACCESS, BARCLAYCARD ACCEPTED CARRIAGE & VAT INCLUDED 6 LOVELACE ROAD, WEST KINGSDOWN, SEVENOAKS KENT TN15 6DJ

Cables: JOHNS BIRKENHEAD Telex 627371

ANTEC

AERIALS FOR MOBILE USE

<table>
<thead>
<tr>
<th>MODEL</th>
<th>DESCRIPTION</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AS-5</td>
<td>144 MHz ±48 h/p gain with 4m. cable (4 dB gain)</td>
<td>£9.10</td>
</tr>
<tr>
<td>AS-12</td>
<td>432 MHz ±48 h/p gain with 4m. cable (4 dB gain)</td>
<td>£6.50</td>
</tr>
<tr>
<td>CPW58</td>
<td>432 MHz ±48 h/p gain with 4m. cable (4 dB gain)</td>
<td>£7.10</td>
</tr>
<tr>
<td>M6-6</td>
<td>432 MHz ±48 h/p gain with 4m. cable (4 dB gain)</td>
<td>£8.00</td>
</tr>
</tbody>
</table>

The above represents a small sample of our range—an SAE will bring more details or answer your queries.
R. T. & I. ELECTRONICS LTD.

where equipment is fully overhauled

TRIO QR666 Receiver........... £120.00 (£3.00)
TRIO IBO B.S. Receiver........... £90.00 (£3.00)
EDDYSTONE EC10 MK1 Receiver... £90.00 (£4.00)
HAMMARLUND HG170A Receiver... £180.00 (£4.00)
KWO. B.S. Receiver.............. £130.00 (£4.00)
C.MA. AM/AM Receiver.......... £110.00 (£4.00)
HAMMARLUND SP600JX........... £120.00 (£4.00)
EDDYSTONE 940.................. £190.00 (£4.00)
EDDYSTONE E800X Receiver..... £170.00 (£4.00)
NATIONAL NC190 Receiver.... £180.00 (£4.00)
HALLICRAFTERS SX100........... £145.00 (£4.00)
HAMMARLUND H181.............. £130.00 (£4.00)
EDDYSTONE 940.................. £100.00 (£4.00)
MEASUREMENTS FRDX 400 Receiver... £160.00 (£4.00)
HEATHKIT SB303 Receiver...... £200.00 (£4.00)
YAESU MUSEN FT-221-I Transceiver .......... £300.00 (£4.00)

We are MAIN DISTRIBUTORS for AVO, MEGGER, TAYLOR and SULLIVAN INSTRUMENTS.

All types of VOLTMETERS and MICROVERS, normally in stock also accessories and spares.

We also repair all types of instruments.

Trade and Educational enquiries invited

S. G. BROWN'S HEADPHONES. Type "F" 120 ohm, 1200 ohm, £13.95 (£1.00); Rubber Earpads for same, £4.39 per pr. (40p).

EDDYSTONE EQUIPMENT. Please enquire.

S. G. BROWN'S HEADPHONES. Type "F" 120 ohm, 1200 ohm, £13.95 (£1.00); Rubber Earpads for same, £4.39 per pr. (40p).

EDDYSTONE EQUIPMENT. Please enquire.

YAESU MUSEN FRG-7 Receiver in stock

YAESU MUSEN FT-221-I Transceiver

In present conditions we regret that all prices are subject to alteration without notice.

NOTE: 12½% VAT must be added to all prices, new and secondhand, except Test Equipment which is 8% inc. carr. and packing.

Carriage for England, Scotland and Wales shown in brackets.


R. T. & I. ELECTRONICS LTD.

Ashville Old Hall, Ashville Road, London E11 4DX

NEAREST STATION: LEYTONSTONE (Central Line)

HOURS -9.30 a.m.-5.30 p.m. MON.-FRI.

CLOSED SATURDAYS
AMATEUR RADIO BULK BUYING GROUP

JAYBEAM VHF AERIALS

We generally have the full range of "Jaybeam" aerials in stock as follows:

FOR 12m. BAND:
- C5/2M: collinear £28.12
- SY/2: 5 ele. Yagi £6.98
- SY/2: 10 ele. Yagi £19.35
- PMH4/2: 14 ele. parab. £28.35
- 5XY/2: 5 ele. cross £14.52
- 8XY/2: 8 ele. cross £18.12
- 10XY/2: 10 ele. cross £23.96
- Q4/2: 14 ele. Quad £14.85
- G6/2: 16 ele. Quad £19.80
- DS/2: 5 over Yagi £12.38
- DS/2: 8 over Yagi £16.80
- XD/2: crossed dipoles £8.94
- UGP/2: Unipole £8.94
- HM/2: Halo and Mast £3.54
- TAS: Wave whip £11.82

FOR 70cms. BAND:
- DS/70: 8 over Yagi £14.06
- PMH1B/70: 18 ele. parab. £16.88
- MBM4/70: 40 ele. multi. £19.68
- MBM8/70: 80 ele. multi £26.32
- 12XY/70: 12 ele. cross £27.00

PHASING HARNESS:
- PHM/2C: 2m. circular £4.62
- PMH2/2: 2m. stacking £8.18
- PHM2/70: 70 cm. stacking £5.34
- MT75/50: Transformer £2.48
- MASTS/ROTATORS etc.: £5.34
- SPM: 16ft. portable mast £9.45
- PHE: 4ft. extension £1.58
- SVMK: Vertical mount £3.48
- AR40 Rotator... £48.09
- 22p/yd.

Add CARRIAGE as follows:
- Harness, Halos and UGP 75p.
- Rotators and all other aerials to UK Mainland only £1.50, Isle of Wight £2, N. Ireland, £3.50, elsewhere at cost. These prices include VAT.

MICROWAVE MODULES

Products

Large stocks of Converters and Transverters available — full details in our price list.

NEW DATA CATALOGUE (4th edition)

Send 35p + Large 15p SAE.

Catronics

RTTY TERMINAL

The Eurocat ST5B RTTY Terminal Unit is now available from stock. A few of the features are:

★ Tuning indicator arrangement using LED’s to aid receiver tuning.
★ Built-in AFSK oscillator for use with AM, FM, or SSB transmitter.
★ Front panel controls for 170Hz/425Hz shift, Normal/Reverse shift, Normal/Reverse AFSK, Receive/Transmit.
★ Ready assembled, Tested and GUARANTEED for 12 months. Metal Cabinet 11½ x 3½ x 8".
★ Available exclusively from Catronics Ltd. Price only £70.00 + VAT (£87.75) + carr. (£1.25).
★ Receive only version (without AFSK oscillator) also available £60.00 + VAT (£70.50) + carr. (£1.25).

Cheques and P.O.’s should be crossed and made payable to

COMMUNICATIONS HOUSE (Dept. 712)
20 WALLINGTON SQUARE, WALLINGTON, SURREY, SM6 8RG
Telephone: 01-669 6700

("SITUATIONS" AND "TRADE")

15p per word, minimum charge £1.20. No series discount. All charges payable with order. Insertions of radio interest only accepted. Add 25% for Bold Face (Heavy Type). Box Numbers 35p extra. No responsibility accepted for transcription errors. Replies to Box Numbers should be addressed to the Short Wave Magazine, Ltd., 34 High Street, Welwyn, Herts., AL6 9EQ.

TRADE

QSL cards: Send s.a.e. for sample by return of post. Quick service.—D. Hogan, 14 Sunnymead Avenue, Mitcham, Surrey.

Give your Amateur neighbours a Happy Christmas—give them a clean signal. If you use a big amplifier, give it a Christmas bonus with a new Eimac 4CX250B or 4CX350A. Come to that give yourself a Christmas treat and build that big linear you’ve always wanted; and give it clean, smooth power with a '250B, '250R or '350A from Cambrian Electronics, P.O. Box 10, Stanmore, Middx. Got problems? Contact G4FRX on 01-602 5855 for any technical assistance.—Cambrian Electronics—Eimac stockists.

Wanted: Communications receivers. Top prices paid.—Recording Centre, 81 Victoria Road, Swindon. (Tel: Swindon 34755.)

Walkie-Talkies: Standard 148A, special deal £100 + VAT. 11-channel mobile transceiver, unrepeatable at £165 tax paid. LED display Clock-Radio, £18.95 + VAT. British LED clock, £9.50 + VAT.—Ring 01-592 7800.

January issue: Due to appear December 23rd. Single copies at 50p post free will be sent for first class mail orders received by Wednesday, December 21st, as available.—Circulation Dept., Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

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.

Take cover for your Amateur Radio equipment: consult with confidence for all your insurance requirements. Established 22 years in the Insurance industry.—Ted Endersby, G4DTA, QTHR.

Radio Amateur Examination City & Guilds. Pass this important Examination and obtain your G8 Licence with an RRC Home-Study Course. For details of this and other Courses (GCE, professional examinations etc.) write or phone: The Rapid Results College, Dept. JV/1, Tuition House, London SW19 4DS. Careers Advisory Service, 01-947 7272 or ring 01-946 1102 for prospectus only (24-hour answering service).

Wanted: Receivers. We pay top prices. Instant cash, no fuss. Fridays and Saturdays only—Lambert’s, Rosemary Lane, Lancaster.

QSL cards: Sample pack and price list forwarded on receipt of 20p stamp.—Derwent Press, 69 Langstone Drive, Exmouth, Devon.

READERS’ ADVERTISEMENTS

8p per word, minimum charge £1.20, payable with order. Add 25% for Bold Face (Heavy Type). Please write clearly, using full punctuation and recognised abbreviations. No responsibility accepted for transcription errors. Box Numbers 35p extra. Replies to Box Numbers should be addressed to the Short Wave Magazine, Ltd., 34 High Street, Welwyn, Herts., AL6 9EQ.

READERS

Selling: KW-204 with mic., as new, £190. KW-202, as new, £200. Both “or near offer.”—Ring Holland, G3GHS, 01-399 6293.
For sale: Eddystone EC-10 Mk. II with mains PSU, recent overhaul, £110 or near offer. Digiscan Rx, 8 marine channels, £110 or near offer. UHF Rx/Tx, fitted 8 marine channels, £200 or near offer. Brand new Optiscan 10 cords, select your own frequency, £200 or near offer. Murphy portable UHF Rx/Tx, 3 channels, battery and charger, £125 or near offer.—Barczok, 6 Gloucester Road, Teignmouth, Devon. (Tel: Teignmouth 6845 day, 6772 evenings.)

For sale: Drake TR-3 with home-built PSU/Speaker, very good condition, £235. Redifon R.50M 8-band Rx, rack mount style, £45. Marconi TF-995A/5 signal generator, AM/FM, 1-5-220 MHz, very good condition, £295. Marconi TR-1374/1 precision crystal calibrator, with 10/2 MHz and 1500/100/25 kHz markers, Tx/Rx testing via internal mix/amp/phones, £45. Thorn Bendix 70cm converters, for 28-30 MHz or 144-146 MHz IF, £6-50 each. 5in. tapes. 85p; empty 5in. reels, 15p; large Goodmans bass reflex speaker, 12in./20w., £12. Schaub Lorenz music unit, AM/FM broadcast Rx and 126-track tape player, 40 hrs. continuous music, fabulous machine (s.a.e. full details), £55. EMI 19in. studio colour monitor, needs some parts, modern (1973) solid-state instrument, £120. Petrol generator, 7.5 kW, 240/ 50 Hz, new condition, £335. Two-metre converter, with internal mains PSU, IF 28-30 MHz, £13:50.—Sandall, G3LGK, Ambercroft, Higham, Derbys.


Selling: Sphinx SSB transceiver, 70 watts p.e.p., £63 or near offer. Wanted: Any VHF or UHF gear; also No. 62 Set. Exchange for above with cash adjustment?—Ring Ward, Bedworth (0203) 312313.

Sale: Eddystone EC-10 Mk. II with mains converter, mint; Codar PR-40 preselector. £120 the pair.—Taylor, 7 Hillcrest Road, Yevol, Somerset.

Selling: Lafayette KT-320 Rx, £17. BC-221M, £15.—Whitemore, G3XGQ, 13 Godley Road, Salisbury.


Wanted: £400 available for best HF transceiver/matched-separates offered. Mini-beam and rotator also required.—Taylor, G3RDT, QTHR.

For Sale: FR-50B Rx, 80-10m. and 160m., mint condition, with manual, £75. Wanted: YO-100 monitoroscope.—Ring Newport, Maidenhead 25764.

Sale: Yaesu FRG-7 Mk. II, FT-101E and FDK Quartz-16. All brand new and unopened, boxed still factory sealed, full guarantee available. FRG-7, £145; FT-101E, £420; FDK Quartz-16, £150. Each plus £2.50 insured carriage, or can deliver reasonable distance.—Ring Batham, G3LNC, 0582-65114.

Wanted: B.2, complete and in first glass condition. Details and price please.—Coleman, 55 Dafforne Road, London SW17 8TY. (Tel: 01-672 7592.)

Sale: U.S. Army phones, complete with low-to-high impedance adaptor, brand new, boxed £7:50 plus postage. HRO G/C coils, new, LF to 7-3 MHz, s.a.e. for list. Stephens-James Multi-Tuner Mk. I, brand new and boxed, £14 plus postage (Lancs.).—Box No. 5613, Short Wave Magazine Ltd., 31 High Street, Welwyn, Herts. AL6 9EQ.
CALL BOOKS

INTERNATIONAL:
RADIO AMATEUR CALL BOOKS (1977) "DX Listings" O/S "U.S. Listings" £10.20
U.K. Call Book, 1977 Edn. (RSGB) £2.40

MAPS

"SHORT WAVE MAGAZINE"
DX ZONE MAP (GREAT CIRCLE)
In colour. New 8th Edition. £2.00

AMATEUR RADIO MAP OF WORLD
Mercator Projection — Much DX Information — in colour. Second Edition £1.05

RADIO AMATEUR MAP OF THE U.S.A. AND NORTH AMERICA
State boundaries and prefixes, size 24" by 30", paper 90p

RADIO AMATEUR'S WORLD ATLAS
In booklet form, Mercator projection, for desk use. Gives Zones and Prefixes (New Edition). £1.80

LOG BOOKS

Standard Log (New Glossy Cover) £1.30
Receiving Station Log £1.35
Minilog (New style) 98p
(The above prices include postage and packing).

Available from

SHORT WAVE MAGAZINE
Publications Dept., 34 High Street, Welwyn, Herts. AL6 9EQ-Tel. Welwyn (043871) 5206/7
(Counter Service, 9.30-5.15, Mon. to Fr.)

(152 pages)

HAM RADIO
A BEGINNER'S GUIDE
by R. H. Warrin

Written by a well-known author, this book deals with transmitting and receiving equipment; its installation and maintenance; the operation of amateur stations; call signs; amateur transmitting licences; Morse Code transmission described in detail.

Excellent reading for those wishing to gain a sound knowledge of Amateur Radio without the need to become too technically expert.

152 pages £3.33 inc. post

Publications Dept.
Short Wave Magazine Ltd., 34 High Street,
Welwyn, Herts. AL6 9EQ. Tel: Welwyn (043871) 5206/7

Offering: Eddystone EC-10, mains battery, as new. Offers? Or part exchange for TR-300 or FRG-7.—Zanre, 104 Camden Castle Park, Cardenden, Fife KY3 0PD.

Wanted: C.D.E. AR-30 rotator, in good condition with control unit.—Jones, 86 Cornwall Road, Ruislip (364391), Middx.

For sale: Eddystone EC-10 Mk. II, £80. Two-metre converter, IF 28-30 MHz, £15.—Ring Burgess, Watford 20119.

For sale: Trio TR-2200GX with nicads, charger and helical, and xtals for S20, S21, S22, R3, R6 and R7, £120. QQVO6/40A valve, new, £3.—Ring Drake, Dewsbury 469387.

Selling: Trio JR-500S amateur bands Rx, 80-10m., with speaker, good condition, £50. Buyer collects.—Edwards, GW8CNG, 17 Gwladys Street, Penydarren, Merthyr Tydfil, S. Wales.

Wanted: AC/PSU and manual for HRO receiver.—Ring Harris, Ammanford (0269) 3858.


Selling: Motorola mobile T/R's, 70-88 MHz, with power-packs, 6/12v., 30 watts RF, some valves and xtals required, less control boxes, 6 available, £40 or £7 each. Prefer buyer collects.—Barnes, 14 Laurel Drive, St. Helens (53018), Lancs.

Sale: Trio JR-500S Rx, 80-10m., very good condition, £45. Heathkit DX-40U Tx, AM/CW, 80-10m., with spare 6146, £20.—Ring Manuel, Orpington 21297.


January issue: Due to appear December 23rd. Single copies at 50p post free will be sent by first class mail for orders received by Wednesday December 21st, as available.

—Circulation Dept., Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

Sale: Airmec CT-212 signal generator, 85 kHz-30 MHz, £10. Hudson VHF amplifier, £6. VCR-139A cathode ray tube, £5. AC-mains stabilised PSU, will drive many ex-govt. equipments, £2. Carriage extra. s.a.e. with enquiries please.—Hayward, Sunnyfields, Lighthouse Road, St. Margarets Bay, Dover, Kent.

Sale: Collins R.390A/URR receiver, 0-5-30 MHz digital, £275. Creed 444 ASR, £70. Creed 7B/N3, 240v. AC, with Burgess silence cover, £25. Creed 7P/N3 keyboard perforator, £10. 71C tape readers, £5. Terminal unit Type FSR-1, with CRM-1 tuning indicator and BARTG PSU, all plugs etc., ready to plug teleprinter straight in, £25. CRM tuning indicator, new, £10. Other RTTY gear, s.a.e. for list.—Bonner, 6 Broadway Road, Bristol BS7 8ES. (Tel. 0272-4636.)

Sell and exchange: Sentinel 2m. converter, IF 4-6 MHz, few hours use only, £12. Or will exchange for MMC144/28.—Livesley, G8JAI, QTHIR.

Sale: Drake TR-3, with VFO, speaker, AC and DC PSU's, all mobile accessories, mic., £265.—Ring Belger, G3JLB, 0474-4694.

HAMS \& RSGB - the choice of communications professionals.

Sale: Hammarlund HQ-170A Rx, amateur bands 16/0 10m., double-superhet 160/80m., triple conversion other bands, AM/SSB/CW, excellent condition, offers over £70. Heathkit SB-620 Scanner, IF 455 MHz to suit HQ-170A, factory assembled, £25. Buyer collects.—Ring Greenwell, Newdigate (0306-77) 236 evenings (Surrey).

Wanted: KW-2000B and AR88LF, both in good working condition. Details and price please.—Minter, G5RM, 50 Palace Grove, Bromley, Kent.

For sale: Codar AT5 Tx with mains PSU, T.28 Rx, unused. £45 or near offer for The Lot. Postage extra.—Littlewood, G3FPJ, QTHR.


Wanted: Previous editions of ARRL “Amateur Radio Handbook.” Details and price please (Tyne & Wear).—Box No. 5614, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.


Selling: Hallicrafters “All Wave” receiver, AM/BFO, 240v., £24. Wanted: Trio R-300, or FRG-7.—Silver, 16 Warneford Gardens, Exmouth, Devon.

Selling: Trio 9R-59D Rx, with crystal calibrator, voltage stabiliser and owners’ manual, £45.—Ring Lawrence, Kettering 710892 anytime.

For sale: Inoue IC-215, with case, nicads, charger, helical, fitted SO, S19, S20, S21, S22, S23, S24, R7 duplex/input, as new, £165. Trio 9R-59DE, perfect, £65.

Wanted: Atlas 210X plus console; walkie-talkies.—Ring Moxcrop, G4EMG, 01-534 3460.


For sale: Racal RA-117E; Racal RA-17 Mk. II; HRO plus coils; 45ft. mast; Marconi aircraft Tx; T.4188 Tx; 2-metre transverter; A.S. whip; G-Whip; Advance signal generator; coaxial relays; Eddystone 898 drive; Meters; Components, spares, etc. Enquiries and callers welcome.—Ring Ketley, G4EA, West Drayton 43694 after 6 p.m.

**USED IC’s YET?**

FREE DX from tiring whistles and CW interference with a Tunable Audio Notch Filter, speaker amplifier, only £7.90

DIAL UP the DX with a Crystal Calibrator. Switched 1 MHz, 100, 25 kHz markers to VHF. Get SPOT-ON for only £13.80

EXPLORE V.L.F. Roam historic 10-150 kHz with a VLF Receiver. Be a latter-day pioneer for only £9.70

AUDIO OKAY? Check it all, TX, RX, Hi-Fi, etc., with an LF Signal Generator. 10-200 kHz sine, square wave for only £9.80

ACCURATE TIME always with a 60 kHz Time Receiver. Ferrite rod, audio and logic outputs, only £13.70

**SSTV**

**NEW**

ROBOT “400.” Solid state slow to fast and fast to slow scan converter with digital random access memory. S.A.E. for details £66.00

256 line conversion kit for “70” series monitors £12.50

Daylight Viewing Hood for “70” series monitors £9.80

15 foot camera cable for “90” series cameras £12.50

Grey scale test tape (Cassette) £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**

**AERO & GENERAL SUPPLIES (DEPT. S.D.)**

Nanaimo House, 32 Rufford A

NG9 3JH

Tel.: 397588

**S.W.M. “DX ZONE MAP”**

**NEW 8th EDITION ! !**

In four colours, on durable paper for wall mounting, 33½ in. wide by 24½ in. deep. Giving essential DX information—bearing and distance of all parts of the world relative to the U.K., the Zone areas into which the world is divided for Amateur Radio purposes, with major prefixes listed separately. Distance scale in miles and kilometres. Time scale in GMT. Marking of Lat./Long. close enough for accurate plotting. Hundreds of place names, mainly the unusual ones, and most of the rare islands.

Prefixes corrected to August 1977

Price £2.00

including postage and special packing in postal tube to avoid damage in transit.

Publications Dept.

Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EG. Tel. Welwyn (043871) 5206/7
LOADS OF CABLES . . . 

| UR43 | 50 ohm standard at | ... | 10p per m., post 2½p m. |
| UR76 | 50 ohm stranded conductor, now in stock again at | ... | 1½p per m., post 2½p m. |
| UR77 | 75 ohm standard at | ... | 1½p per m., post 2½p m. |
| UR95 | 50 ohm miniature nylon coax at | ... | 6p per m., post 3½p m. |

100 metres single equipment, approx. 7 different colours at £1, post 32p.

WANTED 

TEST AND COMMUNICATION EQUIPMENT single items or quantities also RF plugs, sockets and connectors

Call, write or phone 01-743 0999

COLOMOR ELECTRONICS LTD. 179 GOLDHAWK ROAD LONDON W12

G2DYM ANTI-T.V.I. AERIALS

INDIVIDUALLY DESIGNED BY EX-B.B.C. TRANSMITTER AND AERIAL ENGINEER. ALL CUSTOM BUILT FOR THE TRANSMITTER OR S.W.L. GSRV's, G2DYM's, WIDEBAND S.W.L. TYPES, DESIGN AND ADVISORY SERVICE. Details—7" x 10" 12½p S.A.E. — 3 rp stamps.

LAMBDA ANTENNA STUD FARM, WHITEBALL, WELLINGTON, SOMERSET

MORSE CODE RECEIVING AND SENDING

Receiving:

CASSETTE A For Amateur Radio examination preparation. Speed slowly increasing from 1-12 w.p.m.

CASSETTE B For Professional examination preparation. Computer produced morse from 12-24 w.p.m. including P.P.I. etc. (overseas surface mail LI extra).

3 core mains, PVC 5 amp. at 40p per m., post 40p. 

100 metre stranded equipment wires, 5m. x 40p per m., post 40p.

SRB miniature soldering irons, 130 watts.

UR95, 50 ohm miniature nylon coax at 100 metres, 20 colours at £1, post 40p.

Using scientifically prepared 3-speed records you automatically fit most black boxes PTT, curly lead, also OK for Pye, Cambridge etc.

3 core mains, PVC 5 amp. at 40p per m., post 40p. 

100 metre stranded equipment wires, 5m. x 20 colours at £1, post 40p.

SENDING:

Cassette A

SRB miniature soldering irons, 130 watts.

3 core mains, PVC 5 amp. at 40p per m., post 40p. 

100 metre stranded equipment wires, 5m. x 40p per m., post 40p.

Morse Key and Buzzer Unit for sending practice and own Tape Preparation.

100 metre stranded equipment wires, approx. 7 different colours at £1, post 32p.

For Professional examination preparation. Computer produced morse from 12-24 w.p.m.

Prices include VAT, postage, etc.

S.A.E. for full lists of other cables etc.

WANTED 

TEST AND COMMUNICATION EQUIPMENT single items or quantities also RF plugs, sockets and connectors

Call, write or phone 01-743 0999

COLOMOR ELECTRONICS LTD. 179 GOLDHAWK ROAD LONDON W12

G2DYM ANTI-T.V.I. AERIALS

INDIVIDUALLY DESIGNED BY EX-B.B.C. TRANSMITTER AND AERIAL ENGINEER. ALL CUSTOM BUILT FOR THE TRANSMITTER OR S.W.L. GSRV's, G2DYM's, WIDEBAND S.W.L. TYPES, DESIGN AND ADVISORY SERVICE. Details—7" x 10" 12½p S.A.E. — 3 rp stamps.

LAMBDA ANTENNA STUD FARM, WHITEBALL, WELLINGTON, SOMERSET

RTTY sale: Complete station, going overseas. Creed 54RP and 7B with 2F reader, T/U and control unit, with handbook, paper and tape, £75.—Daynes, G5YD, QTHR. (Tel: Shanklin 3750, Isle of Wight.)

Sale: Complete RTTY receiving system: Creed 7B printer with base, silence cover and terminal unit, in excellent working order (pleased to demonstrate), £35. Steel scaffold pole, new, £7. Crystal mic., 50p HT transformers 450-0-450v. and 250-250v., £9.50 each.—Prater, G4AEI, QTHR. (Tel: Reading 851 123 ext. 7614, working hours.)

Sale: Liner-2 and PSU, mint condition, £110. Callers after 6.30 p.m.—Cousens, 198 Chester Road, Stretely, Sutton Coldfield, Warks.


Exchange: Straight swap: FT-DX500, 560w. input, 160-10m. inclusive for KW-2000 with AC/DC PSU's, or similar (e.g. FT-100 etc.).—Wilson, G3GDI, QTHR. (Tel: Derby 22929.)

Offering: 30ft. tower in 10ft. sections, climbing steps, internal tube mount, AR-22 rotor, TA-33JR. 3-‐ele. beam. Offers?—Ring Foster, Ingrebourne 73366.

Sale: BC-221 with charts, PSU and spare valves. One each only QVQ0/20A and QVQ0/40A; six QVQ0/10's; pair of boxed 807's. Transform, 500-‐0-‐500v.; chokes; capacitors.—Ring Bristol 36994.

Selling: Trio JR-310 Rx, with 10AZ filter, calibrator, handbook, good condition, £75 or near offer. Heathkit Garex 2m. converter, IF 28-‐30 MHz, £5. Sentinel gear: HW-7 with audio filter and handbook, good condition, £35 or near offer. Eddystone 898 dial, used but unmarked, £8.—Ring Johnston, 0247-878851 evenings.

For sale: Hiamtower, 30ft., with base grillage, internal tube mount, cap fitting, £60. Memomatic rotator, £10. Garex 2m. converter, IF 28-‐30 MHz, £5. Sentinel gear: 2m. converter, IF 4-‐6 MHz, £10; 2m. pre-‐amp. (needs attention), £2; 70cm. pre-‐amp., £10; 70cm. converter, IF 144-‐146 MHz, £10. 70cm. Multibeam, £8.—Richardson, 9 Derwent Road, Aylesbury (81881), Bucks.

Sale: Eddystone 840C receiver with spare valves, good clean condition, £40.—Henderson, 75 Wilkins Road, Cowley, Oxford. (Tel: Oxford 777278.)

Wanted: Air Cadets require Collins TCS-12, or similar Tx or Tx/Rx suitable for use on 3-‐7.5 MHz band continuous.—Ring Scrivens, Armitage 491098 evenings.

Sale: Trio 9R59DS, general coverage 10-‐160m., SSB, BFO, immaculate condition, £48.—Ring Ledger, Chestfield 3250.

Sale: Sony multi-mode multi-‐band, with three VFO's, excellent condition, £175. Yaesu model 224 two-‐metre mobile, spot channel and eleven channels fitted, used once, £160. Heathkit transceiver, 100 mW, CW, with power supply, as new, £20.—Ring Parsons, Blackmoor 823434 after 6 p.m.
**G4DSG**

**D. P. HOBBS LTD.**

**THE COMPONENT SPECIALISTS**

- **QH70 28/144 Scorpion Transverter** .......................................................... £109.00
- **Cobra 2M/70 CMS FM Transverter with mic. Audio** ..................................... £89.00
- **2 metre Solid State Linear Amp** ................................................................. £55.00
- **28/144 Solid State Transverter** ................................................................. £60.00
- **432/28 Converter** ........................................................................................ £15.00
- **432/38 Converter** ........................................................................................ £27.00
- **Microwave Modules 2 metre Converters 2-4, 4-6, 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 1296-23 CMS Converter any IF** .......................................................... £18.13
- **MMA 144 2 metre Pre-Amp** ......................................................................... £14.63
- **MPT 432/28 MHz Transverter** ..................................................................... £109.13
- **MT 432/144 MHz Transverter** .................................................................... £149.63
- **MPT 144/28 MHz Transverter** .................................................................... £139.50
- **MMV 1296, 23 CMS Varactor Tripler** ......................................................... £33.75
- **NR56 VFI 2 metre Monitor Receiver** .............................................................. £54.00
- **FDK Multi U11, 23 channel 70 CMS Transceiver fitted 5 receiver and 4 simplex channels. Auto-scan on 433.5, 433.2, 433.4 and 433.45 MHz** .......................................................... £249.00
- **50 k. ohm Push-to-Talk Microphones** .......................................................... £3.75
- **Microwave Modules Counters 50 MHz** ...................................................... £86.96
- **50 MHz Counter with built-in 500 MHz Pre-Scaler** ....................................... £85.32
- **500 MHz Pre-scaler** .................................................................................. £27.00
- **BanTEX 2 metre Mobile Aerials** .................................................................. £12.14
- **BanTEX Magnetic Pivots** .......................................................................... £10.40
- **Yaesu** PRCY General coverage Communication Receiver **£163.12**
- **Qmso 432 + 434 MHz dual-band Converter 28-30 MHz** ................................ £31.50

Jaybeam Aerials All in Stock

Part exchange welcome.

**HAMGEAR**

Start the Winter season right with a good signal to noise ratio on your receiver, give those weak stations the best chance of being heard. The P.M.I.DX 76 Super preselector covering 1.5 to 32 MHz in five overlapping ranges. Has a built-in A.T.U. to make the most of those small antennas. Has regeneration over the range 18 to 32 MHz to give just that extra “edge” where most receivers start to fall off. Has a low noise and high gain of 30 dBs, and when used correctly will improve most receivers. A “Listen Thru” switch is also incorporated, enabling instant check to be made with or without the unit in circuit. Send two 9p stamps for further details of this and our Oscaramp for down link Oscar.

**G3EKX S.S.B. PRODUCTS G3EKX**

- **SONY CRF160, 13 W/B. Receiver. As new** .................................................... £150.00
- **EDDYSTONE BC10-Mk 2. Mint. As new** ....................................................... £150.00
- **TRIO 9R5DS. In original box. Excellent** .................................................... £75.00
- **Ex-R.A.F. RI 1155N + Metered pack + Speaker** ......................................... £60.00
- **5K-SET RXK, with Power Unit, 240v, AC** .................................................. £30.00
- **PYE-RANGER, High Band, V.H.F., 12v** ..................................................... £28.00
- **S.W.R. METER CT 216, 240v. Automatic, 2 to 30 MHz. Superb Unit. Will work as Sig. Generator. Absolute Bargain (only four).** ................................................... £25.00
- **CRYSTALS (15,000 in stock) all new. All types. Quick Service from Stock.** SEND S.A.E. State alternatives. (100 kHz, £3.50 each with base).

**PRICES INCLUSIVE. Please ADD Carriage and safe packing costs**

**TOWN QUAY, TRURO**

**CORNWALL**

Telephone 0872-865275

**SIMPLE, LOW-COST WIRE ANTENNAS**

by William I. Orr, W6SAI

This excellent and thoroughly recommended handbook, is the publication on the practical approach to building aerials. After starting with aerial fundamentals there are discussions and descriptions of ground-plane, end-fed, DX dipole, vertical and wire beam antennas, plus coverage on a universal HF antenna system and working DX with an “invisible aerial”: the SWR meter and coaxial cable also have chapters to themselves.

The whole book is presented in an authoritative, immensely clear, readable and enjoyable manner with the emphasis on the practical throughout—to the extent that even the chap who can hardly strip a piece of co-ax need not feel at all left out! Just as practical for the SWL, too!

192 pages

£3.33 inc. post

Order from:

Publications Dept.

**SHORT WAVE MAGAZINE LTD.**

34 High Street, Welwyn, Herts. AL6 9EG.

**WANTED NOW**

AMATEUR COMMUNICATIONS

EQUIPMENT IN SUPERB CONDITION — ALSO TEST EQUIPMENT FOR RF AND COMMERCIAL MOBILE RIT

Pulse Technical Communications

167 LONDON ROAD, BURGESS HILL, SUSSEX RH15 8LH
a selection of specially recommended titles . . . . .

* SIMPLE, LOW-COST WIRE ANTENNAS, by W. Orr W6SAI  ...... £3.33
* A GUIDE TO AMATEUR RADIO, 16th Edition (RSGB)  ...... £1.35
* HAM RADIO, A BEGINNERS' GUIDE  ...... £3.33
* SUN, EARTH and RADIO  ...... £2.30
* WORLD RADIO TV HANDBOOK 1977  ...... £5.67
* RADIO AMATEUR OPERATORS HANDBOOK (Data)  ...... 90p
* WORKING WITH THE OSCILLOSCOPE  ...... £1.90
* AMATEUR RADIO TECHNIQUES, 5th Edition (RSGB)  ...... £3.47
* TOWERS' INTERNATIONAL TRANSISTOR SELECTOR (New Revised Edition)  ...... £5.15
* VHF/UHF MANUAL, 3rd Edition (RSGB)  ...... £6.70
* VHF HANDBOOK, by W. I. Orr W6SAI (New Edition)  ...... £3.95
* RADIO VALVE AND SEMICONDUCTOR DATA, 10th Edition  ...... £2.40
* RADIO COMMUNICATION HANDBOOK, VOL. I (New 5th Ed.) RSGB  ...... £9.30
* RADIO COMMUNICATION HANDBOOK, VOL. II (New 5th Ed.) RSGB  ...... £8.05

(all prices include post/packing)

Available from SHORT WAVE MAGAZINE
Publications Dept.,
34 HIGH STREET, WELWYN, HERTS., AL6 9EQ
Telephone : Welwyn 5206/7

BETTER SHORT WAVE RECEPTION
by William I. Orr W6SAI and Stuart D. Cowan W2LX
New 4th Edition
In the latest edition of this excellent work for all those who own (or intend to own) a radio receiver, these two well-known and respected writers have produced chapters covering: the radio spectrum and what you can actually hear world-wide; the tuning of a shortwave receiver; the business of buying a receiver, both new and secondhand; a description of the SW Rx in non-technical terms, together with receiver adjustment and alignment; DX-ing above 30 MHz; a description of the VHF receiver; building and adjusting efficient aerials; reception techniques. Thoroughly readable and "digestible," this book is without doubt a very valuable addition to the bookshelf of any SWL.
160 pages  £3.32 inc. post
Order from:
Publications Dept.,
SHORT WAVE MAGAZINE LTD.,
34 High Street, Welwyn, Herts., AL6 9EQ

BUTTERWORTH TITLES NOW IN STOCK...
The Practical Aerial Handbook, 2nd Edition
by Gordon J. King
232 pages (Hard Cover)  £6.20 inc. post
Foundations of Wireless and Electronics, 9th Edition
by M. G. Scroggie
521 pages (Soft Cover)  £4.50 inc post
Radio and Electronic Laboratory Handbook, 8th Edition
by M. G. Scroggie
614 pages (Hard Cover)  £8.75 inc. post
Available from Publication Dept.
SHORT WAVE MAGAZINE LTD.,
34 High Street, Welwyn Herts., AL6 9EQ

Beginner's Guide to Radio
New 8th Edition !!
232 pages  £3.05 inc. post

Beginner's Guide to Electronics
Latest 3rd Edition
240 pages  £2.60 inc. post
Publications Dept.,
SHORT WAVE MAGAZINE LTD.,
34 High Street, Welwyn Herts., AL6 9EQ
Technical Books and Manuals

(ENGLISH AND AMERICAN)

AERIAL INFORMATION

Practical Aerial Handbook, 2nd Edition (King) ... £6.20
Aerial Handbook ... £1.10
Beam Antenna Handbook ... O/S
Cylindrical Quad Antennas, 2nd Edition ... O/S
Simple Low Cost Wire Antennas, by E. M. Noll ... £3.33
73 Vertical Beam and Triangle Antennas (E. M. Noll) ... £3.75
73 Dipole and Long-Wire Antennas (E. M. Noll) ... £3.75
Antenna Handbook (ARRL) 13th Edition ... £3.43

BOOKS FOR THE BEGINNER

"Short Wave Magazine" R.A.E. Questions and Answers, 1972-1976 ... £2.15
Solid State Short Wave Receivers for Beginners (R. A. Penfold) ... £1.10
Electronics Self-Taught ... £2.20
Beginners Guide to Radio (New 6th Edition) ... £3.05
Beginners Guide to Electronics ... £2.60
Course In Radio Fundamentals, ARRL ... £2.18
Guide to Amateur Radio (16th Edition) (RSGB) ... £1.35
Ham Radio (A Beginners Guide) by R. H. Warring ... £3.33
Learning the RT code (ARRL) ... 75p
Morse Code for the Radio Amateur (RSGB) ... £5.67
Radio Amateur Operators Handbook ... £1.15
Radio Data Reference Book RSGB ... £2.30
Simple Short Wave Receivers (Data) ... £1.05
Understanding Amateur Radio (ARRL) ... £2.28

GENERAL

Amateur Television, new 2nd Edition (BATC) ... £2.30
50 (FET) Field Effect Transistor Projects, by F. G. Rayer ... £1.40
Amateur Radio Awards (RSGB) ... £2.10
How to Build Advanced Short Wave Receivers (Penfold) ... £1.35
50 CMOS IC Projects (R.A. Penfold) ... £1.15
50 Projects Using IC CAS130 (R.A. Penfold) ... £1.15
Better Short Wave Reception, New 4th Edition (Penfold) ... £3.32
FM & Repeaters for the Radio Amateur (ARRL) ... £3.05
Easybinder (to hold 12 copies of "Short Wave Magazine" together) ... £2.35
Radio Engineers Pocket Book (Newnes) ... O/S
Test Equipment for the Radio Amateur (RSGB) ... O/P
World’s SW, MW, LW, FM and TV Broadcasting Stations Listing ... O/S

HANDBOOKS AND MANUALS

Radio Communication Handbook, Vol. II (5th Edition), RSGB ... £8.05

SURPLUS CONVERSION HANDBOOK ... £3.65
TELEPRINT HANDBOOK (RSGB) ... £3.65
Radio and Electronic Laboratory Handbook, 8th Edition (Scroggie) ... £8.75
Amateur Radio DX Handbook ... £3.33
New RTTY Handbook ... £3.00
Radio Amateur Operators Handbook ... £9.00
Slow Scan Television Handbook ... £3.35
Television Interference Manual (G3JGO) ... O/S
Specialized Communications Techniques for the Amateur (ARRL) ... £2.60
Advanced Communications Systems ... £10.05
Working with the Oscilloscope ... £1.90
Radio Amateur Handbook 1977 (ARRL) ... O/S
Radio Amateur Handbook 1977 (ARRL) hard cover ... O/S

USEFUL REFERENCE BOOKS

Solid State Design for the Radio Amateur (ARRL) new title ... £5.35
Foundations of Wireless and Electronics, 9th Edition (Scroggie) ... £4.50
Amateur Radio Techniques, 5th Edition (RSGB) ... £3.47
Engineers Pocket Book, 6th Edition ... £2.03
U.K. Call Book 1977 (RSGB) ... £2.40
Hints and Kinks (ARRL) ... £1.88
Radio Data Reference Book RSGB ... £2.60
Single Sideband for the Radio Amateur (ARRL) ... £3.30
Sun, Earth and Radio ... £2.30
NBFM Manual (RSGB) ... £1.35
Electronics Data Book (ARRL) ... £3.25

VALVE AND TRANSISTOR MANUALS

Field-effect Transistors (Mullard) ... O/S
Transistor Audio & Radio Circuits—2nd Ed. (Mullard) ... £3.05
Towers' International Transistor Selector, (New Revised Edition) ... £5.15
Wireless Engineer's Laboratory Handbook, (New Revised Edition) ... £3.35
Service Valve and Semiconductor Equivalents ... 55p
Radio Valve and Semiconductor Data (10th Ed.) ... £2.06
Popular Valve/Transistor Substitution Guide ... £2.15

VHF PUBLICATIONS

VHF Handbook, Wm. 1 Orr (New Ed.) ... £3.95
VHF Manual (ARRL) ... £3.20
VHF/UHF Manual (RSGB), New 3rd Ed. ... £6.70

THE ABOVE PRICES INCLUDE POSTAGE AND PACKING

Many of these titles are American in origin (terms C.W.O.)

Available from

SHORT WAVE MAGAZINE
Publications Dept.
34 High Street, Welwyn, Herts. AL6 9EQ - Welwyn (043871) 5206/7

(Counter Service. 9.30-5.00, Mon. to Fri.)

(GIRO A/C. No. 547 8151)
ALL BELOW — ADD 8% VAT

B. BAMBER ELECTRONICS
DEPT S, 5 STATION ROAD, LITTLEPORT, CAMBS., CB6 1QE
Tel.: Ely (0353) 860185 (Tuesday - Saturday)
CALLERS WELCOME BY APPOINTMENT ONLY

A MERRY CHRISTMAS TO ALL OUR CUSTOMERS
PLUS A CHRISTMAS PRESENT FROM US
THE FORM OF A 10%, PER ORDER ON ALL ORDERS RECEIVED FROM 1ST TO 31ST DECEMBER.
FOR OUR IN STORE ACTUAL AND ADS ONLY
THIS OFFER IS FOR ONE MONTH ONLY!

ALL BELOW — ADD 8% VAT

MAINS TESTER SCREWDRIVERS. £1.60. (To 500v.)
SOLDER SUCKERS (Plunger type). £1.50.
DIAGONAL SIDE CUTTERS. £1.90.
SMALL SIDE CUTTERS L2. Standard, £3-70. (Copper alloy.) £1.60.
MIDGET OPEN END SPANNER SETS. (2.4. £6-40. (10-6. £6-72. £8-89.)
MINIATURE SETS. £3-50 set of 6.
TAP AND DIE SETS (18 piece) contain
SMALL SIDE CUTTERS U2.
ALL BELOW - ADD 8% VAT (Made by Multicore) Solders Aluminium to
STEEL, BRASS, COPPER, BRASS, BRASS, BRASS.
(Toshiba manufacture).

ALL BELOW — ADD 12½% VAT

BARGAIN PACK OF LOW VOLTAGE ELECTRICAL COMPONENTS.
Up to 50v., working. £1.00 each.

ALL BELOW — ADD 8% VAT

WELLER TCP2 and PUDJ PSU. Temperature controlled soldering iron, with matching Power Supply Unit, containing sponge and spring stand, £30.00.
BAY3I Signal Diodes, £1.25. (Not used for transfer, Batteries required. Requires 24v. DC at 50mA. Contains transistorised circuit for constant current limiting, £3-75.
RED LEDS (Min. type), £5 70p.
VIDICON SCAN COILS (Transistor type, but no data) complete with vidicon base, £6-50 each.

TRANSISTORS
T03 TRANSISTOR INSULATOR SETS, 10 sets for 50p.
85X20 transistors (VHF OSC/MULTI), 3 for 50p.
BC108 (metal can), 4 for 50p.
PBC108 (plastic BC108), 5 for 50p.
PAN AUDIO TYPE TOS TRANSISTORS, 12 for 25p.
BF512, 4 for 50p.
BF512 (UHF AMP/MIXER). 3 for 50p.
2N3819 Fix. 3 for 60p.
CB148 PNP SILICON, 4 for 50p.
CB158 PNP SILICON, 4 for 50p.
BAY31 Signal Diodes, 10 for 35p.
BYX7 30x25 Stud Rectifiers, 300v. at 25A, 4 for 60p.
BA121 Varicap Diodes, 4 for 50p.
IN914 DIODES, 10 for 25p.
741CG RCA OP AMPS, 4 for 50p.

VALVES
QQV02/20A (ex equipment), £3-00.
QQV03/10 (ex equipment), 75p or 2 for £1-20.
DE2-22 (ex equipment), 2 for £1-00.
6BH4 (ex equipment), 3 for 50p.
All the above valves are untested, except for
heaters, and no guarantee of percentage of emission is given. Sorry, no returns.

WELLER TCP2 and PUDJ PSU. Temperature controlled soldering iron, with matching Power Supply Unit, containing sponge and spring stand, £30.00.

ELECTROLYTICS
MULLARD 85A2 85v. STABILISER VALVES (BRAND NEW), 85p each or
6BW6 VALVES (BRAND NEW), 85p each or
28v. DC at 50mA.

WELLER TCP2 and PUDJ PSU. Temperature controlled soldering iron, with matching Power Supply Unit, containing sponge and spring stand, £30.00.

VIDICON SCAN COILS (Transistor type, but no data) complete with vidicon base, £6-50 each.

TV LINE CONNECTORS (back-to-back type), 4 for 50p.
3 PIN DIN SOCKETS, 15 each.
3 PIN DIN PLUGS, 15 each.

ELECTROLYTICS
ELECTROLYTICS, 50µF 450v., 2 for 50p.
ELECTROLYTICS, 100µF 275v., 2 for 50p.
ELECTROLYTICS, 330µF 82v., 2 for 50p.
ELECTROLYTICS, 1,000µF 30v., 3 for 60p.
ELECTROLYTICS, 5,000µF 35v., 50p each.
ELECTROLYTICS, 5,000µF 50v., 50p each.
In ELECTROLYTICS, 6,000 µF at 25v., high grade, screw terminals, with mounting clip, 50p each.

WELLER TCP2 and PUDJ PSU. Temperature controlled soldering iron, with matching Power Supply Unit, containing sponge and spring stand, £30.00.