TRIO pacesetter in amateur radio

R-1000 "hear there and everywhere"

The R-1000 is an amazing easy-to-operate, high performance, communications receiver covering 200 kHz to 30 MHz in 30 bands. This PLL synthesized receiver features a digital frequency display and analog dial, plus a quartz digital clock and timer.

**R-1000 FEATURES:**
- Covers 200 kHz to 30 MHz continuously.
- 30 bands each 1 MHz wide.
- Five-digit frequency display with 1-kHz resolution and analog dial with precise gear dial mechanism.
- Built-in 12-hour quartz digital clock with timer to turn on radio for scheduled listening or control a recorder through remote terminal.

**R-820 "the amateur band receiver plus"**

With more features than ever before available in a amateur band receiver. This triple-conversion (8.83 MHz, 455 kHz, and 50 kHz IF) receiver, covering all Amateur bands from 160 through 10 metres, as well as several shortwave broadcast bands, features digital as well as analog frequency readouts, notch filter, IF shift, variable bandwidth tuning, sharp IF filters, noise blanker, stepped RF attenuator, 25-kHz calibrator, and many other features, providing more operating conveniences than any other receiver.

**FREQUENCY COVERAGE**
- 40 metres (7.0-7.5 MHz)
- 20 metres (14.0-14.5 MHz)
- 10 metres (28.0-28.5 MHz)
- 10 metres (28.5-29.0 MHz)
- 10 metres (29.0-29.5 MHz)
- 10 metres (29.5-30.0 MHz)
- 19 metres (15.0-15.5 MHz)
- 40 metres (5.9-6.4 MHz)
- 31 metres (9.4-9.9 MHz)
- 25 metres (11.5-12.0 MHz)
- 16 metres (17.7-18.2 MHz)
- 15 metres (15.0-15.5 MHz)
- 10 metres (29.0-29.5 MHz)
- 10 metres (29.5-30.0 MHz)
- 19 metres (15.0-15.5 MHz)
- 40 metres (5.9-6.4 MHz)
- 31 metres (9.4-9.9 MHz)
- 25 metres (11.5-12.0 MHz)
- 16 metres (17.7-18.2 MHz)

**OPTIONAL**
- SP 100 matching external speaker
- HS-5 and HS-4 headphones

**NUMBER 1 R-1000 receiver. £285.20 inc. VAT**
- Matching speaker £26.45 inc. VAT
- Securicor carriage £4.50

**R-820**

**LOWE ELECTRONICS Ltd.
CHESTERFIELD ROAD, MATLOCK, DERBYSHIRE DE4 5LE. TEL. 0629 2817/2430**
THE SHIMIZU SS105S 80-10 metres ssb/cw transceiver

This super new transceiver covers 80-10 metres, gives 10W out and is smaller than anything else we have seen so far. Ideal for transverter driving, the SS105S has FM transmit and receive options as well as excellent performance on SSB/CW for HF band use. The SS105S is supplied in semi kit form so as to keep down the price, but all the RF and mixer boards are ready built and aligned so no test equipment is required. All the cabinet work has been carried out so all you have to do is assemble the IF strip, xtal oscillator, and fit them to the completed chassis. Great idea and it brings back the flavour of home brew with the added advantage that the rig will work when you’ve finished it. For more info, just ask us or come along and see it. It’s a great little rig.

<table>
<thead>
<tr>
<th>Item</th>
<th>Price</th>
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<tr>
<td>SS105S 80-10m solid state SSB/CW/FM transceiver Semi kit form</td>
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<td>SE-NB Noise blanker kit</td>
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<td>SE-FM-RX FM discriminator kit</td>
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<td>SE-PX-M TX FM generator kit</td>
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<td>SE-MK RX marker kit</td>
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<td>0.5 CWF 500 Hz CW filter</td>
<td>£19.50</td>
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<td>Optional band crystals</td>
<td>£3.00</td>
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AR 245 2 metre hand held synthesized 144-146 5/1 watt
AR 240A 2 metre hand held synthesized 144-146 1½ watt
AR 245 £178 inc. VAT. AR 240A £158 inc. VAT. Carriage £1.50.

INFRARED MOBILE MIKE SYSTEM

The Daiwa infrared mike system comprising of a control box, sensor and infrared mike enables you to dispense with the hand mike and cable when operating in your car or shack. By using an infrared beam audio is transmitted from the mike to the sensor and then to the control box which activates the transmitter. To transmit, press the locking switch on the mike and talk. To receive, release the switch and your rig immediately returns to receive. When you have finished your contact return the mike to its slot in the control box and the mike nicad battery is maintained at full charge. For those of you who like fresh air and drive with all the windows open there is a matching wind shield available at an additional 75p. So there we are, the latest in technology to bring safety to your mobile operation, the Daiwa infrared mike.

DAIWA INFRARED MIKE SYSTEM
£45.00 inc. VAT. Carriage £1.50.

FREQUENCY COUNTER Model HFC 55

The HFC 55 is a sensibly priced, easy to use digital frequency meter covering 10kHz-55MHz in a single range. The bright 5 digit display gives a direct reading of frequency when the built-in telescopic aerial is placed near a source of RF. The HFC 55 operates from internal dry batteries and is housed in a strong metal case to withstand regular and continuous use.

HFC 55 Frequency Counter £36.50 inc. VAT. Carriage £1.50.

POWER SUPPLY UNITS

the PP1305 4amp 13.8volts d.c. £18.40 inc. VAT
the PP137 7amp 13.8volts d.c. £32.00 inc. VAT
the PP1310 10amp 13.8volts d.c. £49.50 inc. VAT
Carriage £2.00.
TR-8400

The TR-8400 synthesized 70 cm UHF FM mobile transceiver covers 430-440MHz in 25KHz steps and includes five memories automatic memory and band scan. UP/DOWN manual scan, and two VFOs.

**TR-8400 FEATURES**

- Synthesized coverage of 430-440MHz in 25KHz steps.
- Five memories and memory backup terminal on rear panel.
- Two VFOs.
- Offset switch for ±1.0MHz transmit offset and simplex operation. Fifth memory allows any other offset by memorizing receive and transmit frequencies independently.
- Automatic scan of memories and of 430-440MHz band (in 25KHz steps). Locks on busy channel and resumes when signal disappears. HOLD or mic PTT button cancels scan.
- Up/down manual band scan in 25KHz steps with UP/DOWN microphone supplied with TR-8400.
- Only 53/4 inches wide, 2 inches high, and 75/8 inches deep.
- TONE switch.
- Four-digit frequency display and S/RF bar meter. Other LEDs indicate BUSY ON AIR, and REPEATER operation.
- HI/LOW (10W/1W) RF output power switch.

**TRIO TR-8400 £279 inc. VAT.**
**Securicor carriage £4.50.**

TR-2300

The 2 metre portable

The TR-2300 is a remarkable package which combines all the advantages of a portable station with those of a sophisticated mobile rig. With the TR-2300 you get full 2 metre band coverage from 144-146 MHz in fully synthesized 25KHz channels together with 600 Hz repeater shift (and reverse repeater if required) with automatic 1750 Hz tone burst.

- The dial is directly calibrated in frequency and has switched illumination for ease of use at night and also whilst mobile.
- The transmitter puts out a very clean signal at a power output in excess of one watt, and the receiver is very sensitive, in fact better than many big rigs.
- Using the external power and antenna sockets enables one to use the rig as a fixed station.
- The TR-2300 is amazingly small and its sophisticated case design and modular construction makes for a really rugged rig.
- It comes complete with carrying case, shoulder strap, battery charger and external power cord.

**TRIO TR-2300 £166.75 inc. VAT.**
**Securicor carriage £4.50.**

TR-7800

the only 2 metre FM mobile transceiver

Frequency selection with the TR-7800 2 metre FM mobile transceiver is easier than ever. The rig incorporates new memory developments for repeater shift, priority, and scan.

**TR-7800 FEATURES**

- 15 multifunction memory channels, selected with a rotary switch. M0 to M12 memorize frequency and offset (±800kHz or simplex). M13-14 memorize transmit and receive frequencies independently for nonstandard offset.
- Internal backup for all memories, by installing four AA Nicad batteries (not Trio supplied) in battery holder.
- Priority channel (memory 14) and priority alert.
- Covers 144-146MHz, in 25KHz or 5KHz steps.
- Front-panel keyboard for selecting frequency, transmit offset, programming memories, and controlling scan.
- Automatic scan of entire band (5KHz or 25KHz steps) and memories.
- Manual scan of band and memories, with UP/DOWN microphone (standard).
- Repeatable REVERSE switch.
- Selectable power output 25W (HI/LOW).
- LED S/RF bar meter.
- TONE switch.

**TRIO TR-7800 £288 inc. VAT.**
**Securicor carriage £4.50.**

**LOWE ELECTRONICS Ltd.**
**CHESTERFIELD ROAD; MATLOCK, DERBYSHIRE. TEL. 0629/2817.**
Thanet Electronics
for ICOM
the amateur's professional friends

This month we are showing you:

- IC-451 UHF Base Station
- IC-720A — ICOM's new 9 band HF Transceiver.
- Theta 7000E — An outstanding communications computer.
- IC202S — A pair of magnificent sideband portables.
- IC402

On these, and all our other products:
* we offer a full year's warranty on all parts and labour
* Free delivery for all transceivers, using registered first class post

**IC-451 UHF Base Station**

- £579 inc. V.A.T.

**IC2E** — Probably the smallest made, extra sensitive handy talkie.
**IC251E** — Must be the best value in 2M base stations.
**IC255E** — A great value 25W mobile transceiver.
**IC260E** — The ideal choice for multimode mobile.

* All prices including V.A.T.
* H.P. and Part Exchange welcome.

ICOM are proud to announce the introduction of the 70cm version of their famous 2m base station — the IC-251. Of course, it is engineered to the usual high ICOM standards and includes such features as:-

* 3 memory channels
* Automatic repeater shift on switch-on
* Additional selectable shift for European DX
* Selectable channel steps for FM (supplied with 25KHz — others are diode programmable)
* Full power control on SSB/CW/FM
* Superb receiver performance using MOSFETS
* Multipurpose scanning
* Covers 430-440 MHz
* Xtal controlled Toneburst
* Cool running chopper power supply

Also available from our shop in Herne Bay are:

- MICROWAVE MODULES
- J-BEAM
- RSGB PUBLICATIONS
- WESTERN G-WHIP
- BEARCAT
- ANTENNA SPECIALISTS
- YAESU MUSEN
- VIDEO GENIE COMPUTERS

**IMPORTANT**
We would like you to phone, or write to us so that we can give you as much detailed information as possible on any particular product. Use our 24 hour ansafone when calls are cheap.

SEND FOR TECHNICAL DETAILS

Thanet for ICOM
143 RECALVER RD.,
BELTINGE,
HERNE BAY, KENT.
Tel: 02273/63859
All over the World they haven't been able to get enough! (But things are getting better)

ICOM's new 9-band HF Transceiver — the IC-720A beats the lot!

Some of the Outstanding Features

- 9 Bands Top to Ten including new ones!
- General Coverage Receiver — 100KHz to 30MHz,
- Tuning down to 10Hz steps — YES! 10Hz — yet stable as a rock!
- Built-in Speech Compressor which really gets excellent reports.
- The famous ICOM Band Pass Tuning.
- Memory — it even does all the band changing for you,
- Self cancelling RTT.
- 3 rates of Tuning,
- Two independent VFOs (in band duplex possible),
- 100 W Output.
- Modes AM, SSB, CW and RTTY,

A lot in a small package for £795 incl. VAT (13.6V operation — matching mains PSU £100)
- Solid State 500W linear available shortly.

**Tono Theta 7000E**

A great computer on offer from Thanet

The new TONO THETA 7000E means that every Amateur can enjoy the visual display of CW, RTTY and ASCII in both transmit and receive modes. Just connect the TONO to any TV set via the antenna terminals or to a page printer from the parallel port provided, Bring up your CW speed in receiving or sending by either watching receiver sent or from recorded cassettes. Connection to the transceiver is via the key, phone and mic sockets.

Some features:

- 2 pages 32chr x 16 lines split screen for Rx & E Tx if required
- Automatic transmit/receive switch
- Anti-noise circuit
- Battery backed-up memory
- 7 channels of 64chars
- Send function
- Buffer memory — 53 character type ahead, rub out function
- Simultaneous access of the memory
- LF (line feed) cancel function
- Cursor control function
- Word mode operation
- Automatic CR/LF (72, 60 or 80 chrs per line)
- Echo function
- Word Wrap around function
- Transmit/receive in ASCII mode or RTTY
- CW indentation function
- Mark and break (space and break) system
- Monitor circuit & CW practice function
- Variable CW weights
- Cross pattern checking output terminal
- Log computer output provided
- Test message function

Phone or write for the price list of accessories for this unit.

**What a tremendous pair**

The IC-202S is a very well designed 2m SSB portable. It offers: 3W pep output on USB, LSB and CW.

- Large Battery capacity (HP11 type) or Nicads if you wish
- A special VFO circuit to provide smooth tuning and crystal stability needed for SSB operation on 2m
- Each of the four 200kHz band positions allows operation anywhere in 2m. (Supplied with 144-144.2 and 144.2-144.4)
- Top of the band Oscar xtal available for "cross-pond working"*

- It has a DC socket and SO239 sockets for mobile or base station working,
- Barefoot or as a prime mover
- Mobile mounting brackets, Nicad packs, chargers, cases all available options. You must agree, a very versatile well proved rig.

Their versatility is well worth an enquiry.

SEND FOR TECHNICAL DETAILS
It's Small-but very Sensitive

IC-2E Handy Talky £159 INCL.

CHECK THE FEATURES

FULLY SYNTHESIZED — covering 144-145.995 in 400 5kHz steps.

POWER OUTPUT — 1.5W with the 9V rechargeable battery pack as supplied — but lower or higher output available with the optional 6V or 12V packs.

BNC ANTENNA OUTPUT SOCKET — 50 ohms for connecting to another antenna or use the Rubber Duck supplied.

SEND/BATTERY INDICATOR — Lights during transmit, but when battery power falls below 6V it doesn’t light indicating the need for a recharge.

FREQUENCY SELECTION — by thumbwheel switches, indicating the frequency.

+5kHz SWITCH — adds 5kHz to the indicated frequency.

DUPLEX SIMPLEX SWITCH — gives simplex or plus 600kHz or minus 600kHz Transmit.

HI-LOW SWITCH — reduces power output from 1.5W to 150mW reducing battery drain.

EXTERNAL MICROPHONE JACK — If you do not wish to use the built-in electret condenser mic an optional microphone/speaker with PTT control can be used. Useful for pocket operation.

EXTERNAL SPEAKER JACK — for speaker or earphone.

This little beauty is supplied ready to go complete with nicad battery pack, charger, rubber duck.

IC2E OPTIONS

BATTERY PACKS

ICBP3 9 VOLT PACK (AS FITTED) REPLACEMENT £15.50

ICBP2 (7.2 VOLT) (1 WATT) £22.00

ICBP4 EMPTY CASE (WILL TAKE SIX ‘AA’ SIZE NI-CADS) £5.00

ICBP5 11 VOLT PACK (2.3 WATTS) £30.50

CHARGERS ETC

IC-DC1 9 VOLT REGULATOR PACK £7.50

IC-CP1 CAR CHARGER LEAD WITH CIGAR PLUG £2.75

IC-BC25 CHARGER FOR BP3 AS SUPPLIED £3.70

IC-BC30 DESK CHARGER FOR ALL NI-CAD PACKS FAST FOR IC-BP5 + BP2 (1½ hours) £34.00

It will seduce you in it's own way the ICOM IC 251E

only £479 INCL.

SEND FOR TECHNICAL DETAILS

Thanet for ICOM
IC-255E
An experts mobile choice

25 Watts - 5 Memories - Scanning - 600kHz
AND User Selectable Repeater Shift - Full Coverage in 5kHz or 25kHz Steps.

- Crystal controlled Tone Burst
- Full band coverage - extendable to 148MHz if required
- Four digit LED display
- 25 Watts output or 1W low power
- A superb receiver using grounded gate FET front end
- Scanning over a user programmable range
- Memory scan
- Stop on empty or busy channels
- Tuning in 25kHz or 5kHz steps
- 5 Memories - retained while the power is connected to the rig
- Built-in 600kHz Repeater Shift
- Alternative programmable shift
- Reverse Repeater facilities
- RIT (± 3kHz for those off channel stations)
- Scan control from the microphone (optional mic available)
- Good loud audio
- Optically coupled tuning between control knob and CPU
- Multiway 24 pin socket on back for touchpad, computer, or external control
- Rugged modular PA (Guaranteed of course!)
- Mobile mount which can be padlocked
- Up-down scanning microphone available

CAN YOU RESIST SUCH A TEMPTATION

Enjoy VHF mobile at it's best - IC-260E

The IC-260E offers such extras as full frequency read out, upper and lower sideband, and scanning as well as FM and CW. Thus, it makes an ideal base station, when used with a DC power supply, as well as a mobile. Now supplied with up-down scanning mic.

£339 INCL.

SEND FOR TECHNICAL DETAILS

AGENTS (PHONE FIRST - All evenings and weekends only, except Burnley)
Scotland Jack GM8GEC (031-665-2420) Midlands Tony G8AVH (021-329 2305)
Wales Tony GW3FKO (0874 2772) North West Gordon G3LEQ (Knutsford (0565) 4040)
Burnley (0292 39481)
AMATEUR ELECTRONICS UK
Your number one source
for YAESU MUSEN

FT-107M
Deluxe solid-state HF transceiver
A real thoroughbred from the YAESU stable - a superb receiver section in combination with a rugged, powerful, solid-state PA. 240 watt PEP input, 12 memory option, latest bands.

FT-480R High technology all-mode 2 metre mobile
The most advanced 2 metre mobile available today - USB, LSB, FM, CW full scanning with priority channel, 4 memory channel, dual synthesized VFO system.

FT-707 All solid-state HF mobile transceiver
The definitive HF mobile rig, digital, variable IF bandwidth, 100 watts PEP SSB, AM, CW (pictured here with 12 channel memory VFO).

As factory appointed distributors we offer you - widest choice, largest stocks, quickest deal and fast sure service right through -

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

For full details of these new and exciting models, send today for the latest YAESU CATALOGUE and LEAFLETS. All you need to do to obtain the latest information about these exciting developments from the world's No. 1 manufacturer of amateur radio equipment is to send 3p in stamps and as an added bonus you will get our credit voucher value £3.60 p - a 10 to 1 winning offer.
FL-2100Z High power all band HF linear

Conservatively rated at 1200W PEP input, the new WARC model incorporates all the new bands.

FRG-7700 Synthesized general coverage receiver

The very latest in receiver technology from YAESU. Receives USB, LSB, CW and FM—memory option with 12 channels and automatic band selection.

FT-902DM Competition grade HF transceiver

The YAESU world famous pace-setter with the acknowledged unbeatable reputation. Now with the new WARC bands.

FT-101ZD High performance HF transceiver (not illustrated)

Next to the 902 comes the superb FT-101Z/2D. This fine HF transceiver out-performs many a more expensive rig.

FT-225RD Deluxe 2 metre base station

The tried and proven all-mode 225RD has a very comprehensive specification including memory option, variable power output and DC operation for portable working.

FT-202R 2metre hand-held

Ultra compact lightweight (400g) FM hand-held 1 watt 6 channel, rugged and reliable—many thousands in use.

FT-207R Synthesized 2metre hand-held

400 channels on 144-146 MHz. Memory back-up, 2.5 watt output.

WHERE TO FIND US

FROM SOUTH AND EAST. We are located approximately two miles from Junction 5 of the M6 from which follow signposts to Birmingham. Within ½ mile turn right at Clock Garage and proceed towards city. After one mile look for traffic lights at Fox & Goose immediately over the lights take minor left fork into Alum Rock Road. We are located one mile from this point.

FROM NORTH. Leave M6 at Junction 6 (Spaghetti) and follow left fork down to traffic island beneath motorway complex. Take third turning off to Lichfield. One mile further on follow A4040 to the right and within 100yds 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 leave on A47/East. We are located three miles from this point.

Amateur Electronics UK
508-516 Alum Rock Road, Birmingham 8
Telephone: 021-327 1497 or 021-327 6313
Telex: 337045
Excellent Parking Facilities
### WATER'S & STANTON ELECTRONICS

18/20 MAIN ROAD, HOCKLEY, ESSEX. Tel: (072) 26835

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
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<td>TR80</td>
<td>160m 10m transceiver</td>
<td>£889.75</td>
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<tr>
<td>VFO100</td>
<td>Digital VFO</td>
<td>£945.45</td>
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<tr>
<td>AT230</td>
<td>All band ATU</td>
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<td>SP80</td>
<td>2m multimode mobile</td>
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<td>DS2</td>
<td>80m 32k for TSS600</td>
<td>£39.90</td>
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<td>DXC120</td>
<td>80m power supply controller</td>
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<td>YK8C</td>
<td>500 kHz CW filter</td>
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<td>AT9KN</td>
<td>70cm 10 meter transceiver</td>
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<td>TS2505E</td>
<td>160 10 meter transceiver</td>
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<td>OS</td>
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<td>VFS20</td>
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<td>YG30</td>
<td>Vacuum switch</td>
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<td>D5X20</td>
<td>Conversion kit</td>
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<td>AT100A</td>
<td>10m 50 meter transceiver</td>
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<td>SW20</td>
<td>Monitor scope</td>
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<td>BS</td>
<td>Panoramic display</td>
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<td>R82</td>
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<td>YG45CN</td>
<td>250W CW filter</td>
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<td>TS106A</td>
<td>120m 10 meter transceiver</td>
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<td>SP180</td>
<td>External speaker</td>
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<td>A180</td>
<td>Matching 200W anl. trans #919</td>
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<td>YK8K</td>
<td>50W CW filter</td>
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<td>TS510</td>
<td>2m mobile antenna</td>
<td>£228.10</td>
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<td>TS1305</td>
<td>8 band 20w mobile trans.</td>
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<td>TS1306</td>
<td>20w 10 meter trans.</td>
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<td>TS1307</td>
<td>50w 10 meter trans.</td>
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<tr>
<td>TL1010</td>
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<td>PS10</td>
<td>2m digital readout</td>
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<td>PS9</td>
<td>144-120m 4 digit memory</td>
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<td>PS100</td>
<td>2m/10m digital readout</td>
<td>£189.70</td>
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<td>TL292</td>
<td>160/2m 10w linear band</td>
<td>£985.70</td>
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<td>TA4</td>
<td>2m/10m 10w mobile</td>
<td>£24.75</td>
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<tr>
<td>MC355</td>
<td>First 3k5 impedance</td>
<td>£13.80</td>
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<tr>
<td>LFO4</td>
<td>3900 uHz Ca.</td>
<td>£18.40</td>
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<tr>
<td>RN300</td>
<td>1Kw dummy load</td>
<td>£463.30</td>
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<tr>
<td>TS1301</td>
<td>M/10G 10m 1KW 20w</td>
<td>£83.10</td>
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<tr>
<td>TA5</td>
<td>160m 10w linear band</td>
<td>£985.70</td>
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<tr>
<td>TA610</td>
<td>10m 16 slot ferr.</td>
<td>£24.75</td>
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<tr>
<td>PS101</td>
<td>1Kw 10m 16 slot ferr.</td>
<td>£24.75</td>
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<tr>
<td>PA400</td>
<td>2m 10m 10w power source</td>
<td>£268.00</td>
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<tr>
<td>SB400</td>
<td>164.75 10m 10w</td>
<td>£268.00</td>
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<tr>
<td>PA410</td>
<td>2m/10m 10w power source</td>
<td>£268.00</td>
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<tr>
<td>MB2</td>
<td>100w 10m 16 slot ferr.</td>
<td>£24.75</td>
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<tr>
<td>RA80</td>
<td>10m mobile mount</td>
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<tr>
<td>PS120</td>
<td>120w power control</td>
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<td>TR3401</td>
<td>2M FM yagi 20w mobile</td>
<td>£198.95</td>
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<td>TS1302</td>
<td>Base stand and quck chrgr</td>
<td>£43.70</td>
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<td>BC5</td>
<td>12v quick charger</td>
<td>£17.25</td>
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<td>SC3</td>
<td>Soft carrying case</td>
<td>£11.50</td>
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<td>LH1</td>
<td>Heavy harness</td>
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<td>PB7</td>
<td>Battery battery clamp</td>
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<td>TR2000</td>
<td>70m 20w FM portable</td>
<td>£164.45</td>
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<td>PT1000</td>
<td>Source power generator</td>
<td>£285.45</td>
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<td>YAESU</td>
<td>FT1010-Q 160-10m 10w trans</td>
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<td>FT1012D</td>
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<td>DIG1012</td>
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<td>DCX1210</td>
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<td>FV1012</td>
<td>Remote VFO</td>
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<td>FT103</td>
<td>160 10m band trans.</td>
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<td>FT904</td>
<td>Remote VFO for FT901</td>
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<td>FC100</td>
<td>160 10m 10w fm trans.</td>
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<td>PT1020</td>
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<td>FT1020</td>
<td>15w 70m power source</td>
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<td>FT1033</td>
<td>Transverter</td>
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<td>FT1075</td>
<td>144 10m 10w trans</td>
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<td>5V105/910</td>
<td>20m 10m 10w trans.</td>
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<td>D5X210</td>
<td>10m 10w trans.</td>
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<td>SP107</td>
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<td>SP400</td>
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<td>DMST12</td>
<td>12 channel memory</td>
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<td>CV</td>
<td>CW filter for FT101</td>
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<td>AC</td>
<td>Antenna for FT101</td>
<td>£12.50</td>
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<td>YM34</td>
<td>Desk mic for FT707-FT107</td>
<td>£21.28</td>
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### THE SHORT WAVE MAGAZINE

March, 1981

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- 2m TriBand Antenna
- 2m TriBand Antenna

**THOMAS & VANCOUR**

- 2m TriBand Antenna
- 2m TriBand Antenna

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AMATEUR RADIO CENTRE OF THE SOUTH – WELLS WORTH A VISIT

JBL73 Heavy duty 2.10 (1.00)
JBL99 Max flat plate 3.60 (1.50)

STANDARD VHF/UHF
C900 2m portable scanner receiver 79.00 (n/c)
C1000 2m FM mobile trans 251.00 (n/c)
C1820 70cm FM mobile trans 237.00 (n/c)

G WHIPE ANTENNA RANGE
TriBand Antenna 10/15/20/24m 24.75 (2.00)
LF200 Col for above 6.55 (n/c)
LF160m Coil for above 6.55 (n/c)
LF telescopic resonator whip 3.36 (0.76)
Base mount 1 hole fixg + 3m cable 4.50 (0.50)

AERIAL ROTATORS (completely with control boxes)
CDE AR350 (5 core cable) 47.00 (1.50)
CDE AR430 (5 core cable) 59.00 (1.50)
Channelmaster 9502 (3 core) 42.00 (2.00)
Sky King SK4000 (6 core) 75.00 (2.00)
Jbayem KH400 (6 core) 105.00 (2.00)
CDE alignment bearing 7.75 (0.75)
Channelmaster alignment bearing 11.75 (1.50)

HF ANTENNAS (various manufacturers)
Mini-Prats HO 1-25 15m 2 ele. 96.50 (2.50)
Mini-Prats CA 20-15 m vertical 48.50 (2.00)
Mosley T301 20/15 15m wire dipole 34.50 (1.00)
Mosley "Mini Beam" 20/15 15m wire dipole 150.00 (2.00)
Mosley T32 20/15 15m 2 ele. 26.00 (n/c)
Mosley T33 20/15 15m 3 ele. 34.10 (2.52)
Mosley Mustang 20-15 15m 3 ele. 2k485.75 (4.00)
Hy Gain 32AVQ 20-15 25m vertical 43.00 (2.00)
Hy Gain 14AVQ 40-15 vertical 60.00 (2.00)
Hy Gain 16AVQWB 80-10 vertical 87.00 (2.00)
HF 80/10-10m vertical 200w 48.00 (2.00)
Radial Kit for HF 28.00 (1.50)
Solelax ELX5 80-144deole (7'9 long) 3.50 (0.75)
Jbayem T83HF 3element 2k w 167.90 (4.50)
Jbayem VR3HF vertical 28k w 42.00 (3.50)

DENTROY
ML2500H 6band 160-10m 2k-linear 695.00 (n/c)

CDE alignment bearing 7.75 (0.75)
Channelmaster alignment bearing 11.75 (1.50)

VHF/UHF MONITORS
T1/98 FM Scanner 12V DC/230V AC 79.00 (n/c)
C900 Channel FM monitor 69.00 (n/c)

TRIO TS830S £639.52
TRIO TS130S £491.05
TRIO TR230 £166.00
TRIO TR9000 £345.00
TRIO TR7800 £268.00

A brand new model having all nine bands fitted and providing 200 watts input SSB/CW. Built-in 230v or 12v dc supply, full analogue and digital display. Plus a really comprehensive variable selectivity and notch filtering system. The DXer's dream.

The receiver that revolutionised short wave listening. Full 30 band coverage 200Hz to 3000Hz SSB/CW/BM. Both digital and analogue readouts are provided together with 200w or 12v dc operation facilities. Trio engineering at its best and at a very competitive price.

Base or mobile this solid state HF transceiver covers eight bands SSB/CW with a genuine 100w watts output. No tune up, IF tuning and speech processing are just a few of its features. 12v dc operation with full digital display plus optional PS-3C for 230v ac operation.

VHF/UHF MOBILE AERIALS
AS201 2m 1/4 wave 3.50 (1.25)
AS202 2m 3/8 wave 9.25 (2.00)
AS203 2m 5/8 wave 9.75 (2.00)
AS465 75cm co-linear 8.25 (1.25)
AS467 70cm co-linear 8.95 (0.75)
ASPM1125 2m 1/4 wave 18.50 (0.25)
ASPM1125 2m 5/8 wave 18.00 (0.25)
ASPM1125 2m 3/8 wave 18.75 (0.25)
ASPM1125 2m 1/8 wave 19.00 (0.25)
ASPM1125 2m 2/5 wave 19.00 (0.25)
ASPM1125 2m 3/5 wave 19.25 (0.25)

SAE for full details.

The TR200 still amazes us at its value for money. Portable, mobile or base station it is equally at home in all 3 situations. I want 80 channels complete with m-cad ac charger. An ideal rig for the beginner.

The latest Trio 25w FM transceiver with a host of features that makes mobile operating a real pleasure. Built-in keyoard, digital readout, 14 memories – the list of features is endless. Send a SAE for full details.

Monday – Saturday 9 - 6.30
Waters & Stanton Electronics EARLY CLOSING WED 1.00 p.m.
Warren House, 18/20 Main Road, Hockley, Essex Telephone (0702) 206835
Name: Goods required
Address: Please charge to credit card No

Please rush me the above. Cheque enclosed for £

BARCLAYCARD
MAIL ORDER RETAIL CALLERS
AGENTS: 036PWJ (03844) 77778 3G3WRA (0432) 67884 GW8THL (05642) 53839 GM3GXR (0324) 24428

MAIL ORDER SLIP to: Waters & Stanton Electronics, Warren House, Main Road, Hockley, Essex.
Featured above and to the left is the PCS 3000 2m FM transceiver from Azden. This unique unit has some pretty amazing features and is offered at a special introductory price with full 12 month factory warranty. The detachable head unit enables it to be stowed away in the smallest of spaces when used with the optional remote cable kit. Either 25 watts or 5 watts power output is available with 25 or 12kHz channel spacing. The bright digital display indicates frequency between 144 and 146MHz and a memory bank can be immediately programmed with up to eight popular channels with internal nicad back-up included. The computer controlled touch pad selector on the front panel means easy frequency selection which can also be achieved by the remote up/down frequency control on the microphone. Scanning is just another one of the plus features on this exciting transceiver with the ability to scan either the entire band, part of the band or just memory channels. Repeater shift, tone-burst, etc., are all standard features so send today for full information on the PCS 3000.

For 28MHz enthusiasts there is the PCS 2800. Similar to the PCS 3000 but with standard 10kHz steps, 100kHz repeater shifts, etc. Why not join the gang on 29.60 FM - it goes a long way!

---

**FDK MULTI-700EX**

2m 25W OUTPUT

+ PRIORITY SCANNING

**COMPARE THE PRICE** £199 inc VAT

- Full coverage of the 144-146MHz band with facilities for 12.5kHz steps anywhere in the band.
- Large four digit LED frequency display tuned in 40 x 25kHz steps in each 1MHz range.
- A specially designed five stage helical-resonator assembly together with the latest dual-gate MOSFET front end ensures excellent cross-modulation characteristics.
- Built-in crystal controlled automatic tone-burst with ±600kHz shift for repeater operation and optional +1.5MHz shift for use in conjunction with FDK/MUV-430A UHF transverter.
- Four additional priority channels - two diode matrix programmable in 12.5kHz steps and two crystal controlled for any frequency between 144-146MHz.
- Channel scanning of two chosen channels either synthesizer/matrix or matrix/crystal.
- Continuously variable RF output control from 1-25 watts.
- Advanced PLL technology provides good stability with low spurious output; integral power supply noise filter eliminates vehicle line noise and an automatic protection circuit protects the RF output power module against poor SWR, open or short circuit.

**AMAZING VALUE** £299 inc VAT

- Simple and smooth VFO control gives either 100Hz or 5kHz steps on both FM and SSB modes for optimum convenience.
- The large green fluorescent display tube gives full frequency readout to 100Hz and provides safe and clear readout for both night and day operation.
- Standard features include noise-blanker, RIT control with switch, RF attenuator gain control, automatic crystal controlled tone-burst, high and low power switching and remote up/down frequency control microphone unit.
- Compare its compact size and light weight, its smart appearance and comprehensive front panel controls. Simple and reliable operation is made possible by employing advanced solid-state and logic techniques.
- A dual VFO is employed for the selection of two independent frequencies anywhere in the band. This also enables split frequency operation, particularly useful when used in conjunction with the optional "UHF-EXPANDER" transverter. For normal repeater operation a pre-programmed shift is selected by front panel selector.

LARGEST STOCKS IN THE SOUTH. DELIVERIES ANYWHERE IN UK

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Whether you are just starting, taking an RAE course, just licensed, or an old-timer, SMC has something for you, and at the LOWEST EVER PRICES. Advertised PRICES on this page INCLUDE VAT at 15%, and SECUROCIR SPEEDY delivery.

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We take ACCESS and BARCLAYCARD over the phone, offer HP written quotations, provided upon application (including a FREE FINANCE SCHEME on many regular priced items) and have branches and agents conveniently situated across the country — plus the biggest mail order department right here in Totton.

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
<th>Description</th>
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<tbody>
<tr>
<td>FT101Z</td>
<td>£445</td>
<td>10 180m, SSB, CW, AM, Digital Variable IF bandwidth. (Digital version £510).</td>
</tr>
<tr>
<td>FT107M</td>
<td>£625</td>
<td>180 10m + 2 Aux. SSB, CW, FSK, AM, Memory option, Deluxe all solid state.</td>
</tr>
<tr>
<td>FT780R</td>
<td>£409</td>
<td>100m Synthesized. 100 25 kHz steps on FM, 1 kHz, 100kHz, 10kHz steps on SSB, 10W PEP, £960.</td>
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<tr>
<td>FT225RD</td>
<td>£565</td>
<td>2m, SSB, CW, FM, AM, Digital readout, 25 watts. (Analogue version £120).</td>
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<tr>
<td>FRG 7</td>
<td>£199</td>
<td>0.5 - 30 MHz General Coverage Receiver, 230V ac, 12V dc, + Battery pack. AM/SSB.</td>
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<tr>
<td>FRG 7000</td>
<td>£259</td>
<td>0.25 - 30 MHz General Coverage Receiver, 230V ac, Timer, Digital, AM/SSB.</td>
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<tr>
<td>FRG 7700</td>
<td>£309</td>
<td>0.15 - 30 MHz General Coverage Receiver, AM/SSB/CW/FM (Memory Version £389).</td>
</tr>
</tbody>
</table>

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2 YEAR DISTRIBUTOR WARRANTY

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<td>G3JMK4</td>
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<td>G3ESXP</td>
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<td>G3ECD</td>
<td>0534 26278</td>
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<tr>
<td>S.M.C. (Leeds)</td>
<td>Colin Thomas, G366M</td>
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<tr>
<td></td>
<td>257 Otley Road,</td>
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<td>Leeds 16, Yorkshire.</td>
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<td>Leeds (0322) 762326</td>
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<td>S.M.C. (Jack Tweedy) LTD</td>
<td>Roger Baines, G2YBO</td>
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<tr>
<td></td>
<td>70 Chatsworth Road,</td>
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<td>Chesterfield, Derbyshire.  (0246) 34302</td>
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<td>S.M.C. (Jack Tweedy) LTD</td>
<td>Jack Tweedy, G2ZY</td>
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<td>150 Horncastle Road,</td>
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<td></td>
<td>Woodhall Spa, Lincolnshire.  (0552) 52793</td>
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Tel: Totton (0703) 867333, Telex: 477351 SMCOMM G, Telegram: "Aerial" Southampton
FT107M

- 160-10 metres (including 10, 18, and 24 MHz bands).
- USB-LSB-CW-FSK-AM multi-mode.
- Full band "no tune" power amplifier.
- 240W PEP 75 per cent power output at 3.1 VSWR.
- 12 memory channels with clarifier on memory.*
- Digital Memory Shift gives offset from memory.*
- Up/down scanning control from microphone.*
- Variable IF bandwidth - 16 poles of selectivity.
- Bandwidths: 6kHz, 2.4kHz-200kHz, 2kHz-300kHz.*
- Selectable CW "fixed" widths CW-W and CW-N.*
- Tunable Audio Peak (APP) and Notch filter.
- Diode ring mixer for very high Rx dynamic range.
- Noise blanker - front panel adjustable threshold.
- AGC, slow-fast-off switchable from the front panel.
- Attenuator 0-20dB, plus RF gain on front panel.
- RF speech processor fitted - front panel adjustable.
- Digital frequency displays.
- Meter Reads: Vcc, Ic, ALC, Compression and SWR.
- Choice of built-in or separate power supply units.

* Option £690 inc. & SECURICOR VAT @ 15%

FT707

- 80-10 metres (including 10, 18 and 24 MHz bands).
- USB-LSB-CW-FSK-AM (TX and RX operation).
- 100W PEP 50% power output at 3.1 VSWR.
- Full "band" band no tune output stage.
- Excellent Rx dynamic range, power transistor buffers.
- Rx Schottky diode ring mixer module.
- Local oscillator with ultra-low noise floor.
- Variable IF bandwidth - 16 crystal poles.
- Bandwidths 6kHz, 2.4kHz-300kHz.*
- AGC, slow-fast switchable from the front panel.
- VOX built-in and adjustable from the front panel.
- Semi-break-in with side tone for excellent CW.
- Digital (100Hz) plus analogue frequency displays.
- LED Level meter reads: S, PO and ALC.
- Convenient concentric AGC gain controls.
- Indicators for: calibrator, fix, int/ext VFO.
- Receiver offset tuning (RIT-clarifier) control.
- Advanced noise blanker with local loop AGC.
- 25kHz crystal calibrator feature.
- Internal, ext or external VFO control.

* Option £529 inc. & SECURICOR VAT @ 15%

FT101ZD

- 160-10 metres including new allocations.
- Variable IF bandwidth 2.4kHz down to 200Hz.
- 8 pole filters for razor edge selectivity.
- Selectable CW fixed bandwidth CW-W and CW-N.*
- Semi-break-in with sidetone for excellent CW.
- Digital plus analogue frequency displays.
- 6146B's with 6dB of negative feedback.
- 180W PEP and - 31dB 3rd order intermod.
- RF speech processor fitted - adjustable level.
- VOX built-in and is adjustable from the front panel.
- Wide dynamic range for big signal handling.
- High usable sensitivity, for those weak ones.
- Superb noise blanker - adjustable threshold.
- Attenuator 0-20dB, front panel switch.
- AGC, slow-fast-off, front panel switchable.
- Clarifier (RIT) switchable on TX, RX or both.
- Heater switch for battery conservation.
- Low level transvertor drive output facility.
- Ergonomic design and position of controls.
- Universal power supply 110-230V AC and 12V DC.*

* Option £569 inc. & SECURICOR VAT @ 15%

FT902DM

- 160-10 metres including new allocations.
- Variable IF bandwidth 2.4kHz down to 300Hz.
- Audio Peak and independent notch controls.
- AM, FSK, USB, LSB, CW, FM, (TX and RX).
- Semi-break-in, inbuilt Curtis IC Keyer.
- Digital plus analogue frequency displays.
- 6146B's with negative feedback.
- VOX built-in and adjustable.
- Instant write in memory channel.
- Tune up button (10 sec. of full power).
- Curtis Keyer - lambic, single or straight.
- Switchable AGC and RF attenuator.
- Optional 350 or 600Hz CW, 8kHz, AM filters.
- Clarifier (RIT) switchable on TX, RX or both.
- Audio Peak and tunable notch filter.
- Plug in modular, computer style constructor.
- Fully adjustable RF Speech processor.
- Ergonomically designed with necessary LEDs.
- Incredible range of matching accessories.
- Universal power supply 110-230V AC and 12V DC.*

* Option £799 inc. & SECURICOR VAT @ 15%
Communications Ltd

SMC FOR CHOICE IN

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Available on regular priced YAESU equipment

— contact SMC for details.

FT480R

* 144-146MHz (143.5-148.5 MHz possible).
* USB-LSB-CW-FM (A3, A1, F3).
* Special linear PA module fitted.
* 12V dc (13.8V dc) operation negative earth.
* 30W PIP A3, 30W dc A1 and F3.
* A1 and F3, 10W or 1W output switches.
* Bandpass filter no tune design.
* Outstanding receiver dynamic range.
* Excellent receiver dynamic range.
* SSB and FM operation.
* 3SK59 Mosfet RF, 3SK51 mixer.
* Linear PA module fitted.
* 10W or 1W output switches.
* Bandpass filter no tune design.
* Excellent receiver dynamic range.
* Very bright blue 100Hz digital display.
* Display shows Tx and Rx freq (inc RIT).
* String LED display for “S” and PO.
* Convenient concentric AF and squelch.
* Digital receiver offset tuning.
* Advanced effective noise blanker.
* FM; 100, 251/2, 1kHz steps.
* SSB; 1,000, 100, 10Hz steps.
* Dual digital VFO system.
* Any TX Rx split with A and B VFO's.
* ±60kHz standard repeater split.
* Four easy write-in memory channels.
* Memory kept alive with 12V supply.
* Memory scanning with slot location display.
* Up/down tuning/scanning from mic.
* Priority channel on any memory slot.
* “F set” clears non step component.
* Lock on tuning controls on Tx.
* Satellite mode allows tuning on Tx.
* Scanning for busy or clear channels.
* “Size” (Case): 8.5" D, 2.3" H, 6.9" W.
* “Size” (Projections): 10.1 " D, 3.0 " H, 7.0 " W.
* “Size” (Bracket): 10.1 " D, 3.5 " H, 8.5 " W.
* Weight 5/4lb (2.6kg).
* Generous 2W audio output.
* Indicator for FM modulation level.
* LED’s: “On Air” Clarifier, Hi/Low.
* Matching FP90 Mains PSU available.

£359 inc. & SECURICOR

FT720

FT720 Control Head .................. £120.00 inc.
* Four easy write-in memory channels.
* Rx priority channel (auto check).
* Scanning of band or memory channel.
* Scanning for empty or occupied channels.
* Optically coupled tuning control.
* Easy selection of up/simplx/down.
* String LED’s for “S” and PO.
* Seven status report LEDs.
* Convenient concentric AF and squelch.
* 1/2 W of audio to internal/external speaker.
* 3.5(4.3") D x 6" W x 2(2.2") H.
* MMB3 Bracket for deck option .......... £5.00 inc.
* 720RV 10W, 2M deck .................. £133.00 inc.
* 720RVM 25W, 2M deck ............... £143.00 inc.
* 144-146/14MHz (144-148MHz possible).
* 12 1/2 KHz synthesizer steps.
* ±60KHz repeater offset.
* 0.3V for 20dB quieting.
* Rx 0.5A, Tx 5.5A, RV 8.5A.
* 10.7MHz 8. 455KHz double conversion.
* 0.5µV for 20dB quieting.
* 144-146MHz (144-148MHz possible).
* 12 1/2 KHz synthesizer steps.
* 1.6MHz repeater shift.
* 0.5µV for 20dB quieting.
* Rx 0.5A, Tx 4.5A.
* 16.9MHz + 455KHz double conversion.
* 5.8(6.6") D x 6" W x 2(2.2") D.
* E72S Extension cable 200cms .......... £23.00 inc.
* E72L Extension cable 400cms ........ £28.00 inc.
* E72 Switching box .............. £56.00 inc.
* Permits control head with two decks.
* Single button change of band.
* Auto change of synthesizer steps.
* Auto change of repeater split.

FT720RV 10W 2metre

£253 inc. & SECURICOR

£235 inc. &SECURICOR

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Articles submitted for Editorial consideration must be typed double-spaced with wide margins on one side only of A4 sheets. Photographs should be lightly identified in pencil on the back with details on a separate sheet. All drawings and diagrams should also be shown separately, and tables of values prepared in accordance with our normal setting convention — see any issue. Payment is made for all material used, and it is a condition of acceptance that full copyright passes to the Short Wave Magazine, Ltd., on publication.

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Article Competition

Next month we shall announce the winner of the £75 prize for the best article published in the volume of Short Wave Magazine just completed — Volume 38. Tony Ashton, G3XAP, emerged clear winner last time round with his series on aerials; this year the decision is going to be perhaps closer fought.

With regard to the volume which begins with this issue, we have some excellent articles in the pipeline — but that doesn't stop you from trying to give us a cracking headache when the time comes to decide the winner for Volume 39. We are always very pleased to consider any offerings: they don’t necessarily have to be long, indeed gems usually come in small parcels. We should also add that we make generous payment for all material published!

Returning briefly to G3XAP’s series, following countless requests we are considering publishing it as a booklet. But more of that at a later date.

Year of the Disabled

A letter on this subject from Douglas Byrne, G3KPO, appears in “A Word in Edgeways” elsewhere in this issue. All we can add is that we agree with its message wholeheartedly. In this context (and the preceding one) we would like to publish the best article received from a disabled person on what amateur radio means to him/her. So if you are handicapped, and interested, start getting your ideas together now.

Industrial Action

We apologise to readers, particularly in the North, for late delivery of the February issue. This was due to industrial action in the Post Office in London and Manchester, right at the critical time in the distribution of the Magazine, and therefore a matter over which we had no control.
HERE we are again, and as far as the writer is concerned, sitting in a rather different-looking shack, insofar as there is nothing above the five-watt mark on the operating table, the other gear being laid to one side for the moment. Apart from CW with the old PMII ever-faithful (thinks — wish I could send the stuff as well as the PMII radiates it!) we also have G3ROO’s little QRP 14 MHz CW/SSB ‘Tunbridge’ transceiver to play with. No doubt about it, it’s nice to have room to park a cup or tankard while on the air!

Vale

Many amateurs and SWLs will mourn the passing of C. J. Harris, G3ABG. Many years ago John had the idea which grew into the WAB and HAB programme, and with the help of the Cannock Chase club he got it all going. Eventually of course, it grew beyond the resources of the club members, and various other people took on the various tasks. But, like RAIBC, which owes so much to G3LWY, the WAB programme owes so much to G3ABG; the two groups have much in common, since the idea of WAB in the first place was to produce funds to be split equally between RSGB and RAIBC, though latterly all profits have gone to RAIBC. John gave pleasure to so many: the ‘bookholders’ and informal hunters winking out the squares, whether as SWL or operator, the “DX-peditions” that were thus made available to inactive local squares, and so on. All this producing benefit in that the funds so raised enabled many RAIBC members to be started on the path of amateur radio — as we all know it is at times of illness or inability to get about that our hobby has a particular value. G3ABG will most certainly be missed by many.

The Bands

More or less as one would expect at this time of the year. Those who can recall the dark days of 1975-6, in the context of sunspots, will know just what a different picture it now is. Then one needed a beam and some luck just to get a signal out to the DX, but these days the beam and the luck is required for contriving to actually be heard through the pile-up, and to be able to hear the DX give you his report through the QRM — a vastly different state of affairs! As for being able to go on the bands of a winter evening and find DX — or even a signal for that matter — that was all but out of the question, but common enough during the peaks of this cycle.

Ten Metres

G2HKU (Minster) is still under the eye of the medicine-men, but repairs are well in hand, and of course there has been some extra radio activity — although Ted, one feels, didn’t feel up to great exertions for some of the time. Just one contact was noted on Ten, a QRP CW one with VP2MEA.

Another one with ten-metre offerings was G3OUC in Newbury, who now has an all home-brew solid-state transceiver just off the stocks; the PA transistor is a 570BLY obtained from J. Birckett. It is a very good transistor for this band and power level; and the rig fits nicely in the car for /M operation, which netted VP2MEA, OD5MR, W4PKM, UH8HAS, UA9I0E, ZL3GF, 18GZQ/P, VP2SAC, ZL3ME, CTZ2CH, W9NYW, VE3KYX, A15/P/ SV, G4BHT/P/4X4, and sundry UA, UK, W and K signals. On the debit side there have been problems with breakthrough of CB signals into the front-end; already the level of 27 MHz activity is causing TVI problems and consequent blame on amateurs from the neighbours.

We have two letters from G3NOF (Yeovil) to look at. The first one (which arrived just too late for the February column,) would have announced that Don had been QRT on Ten due to a local TV set problem shown as usual to be the fault of the TV set. In the second letter there were a few QSOs to report. In general the pattern has been the short-path openings around 1000 to JA on occasions, followed by VKs; then the Caribbean around noon, and the Ws between noon and 1900. Despite the QRT, Don managed in the earlier period to work HH2MC, HK3TF, J20A, J23N, JAs, K7DD and K7NN both in Arizona, KB7J1/KH2, P12CR, VE6s, VE7s, W7LTH (Utah), W7WBR (Oregon), W7WR (Idaho), W0YK (Colorado), WH2ABR, 8P6AW, 8P6BN and 8P6OR. In the second period, the band fell away noticeably, and QSOs were made with FGQF0K, K6s, KBOMX (N. Dakota), VP2SAM, VP2SS, VP2EJ, W7ATF, W7WBU, WB7RUN, both in Montana, and 5N0ATW.

G3PKS wrote from St. Mary Cray, where he spent the turkey season. Jack reckoned that Ten had something going for it for quite a few hours on most days. The CW raised WAOCTX, WA3EEE, N7CW, W7ITN, twice, KA8JZJ/M, KORW, VE2WA, UB5ADD, NO9K, WB0YYU, VE3AHA, and WB8SCN; all but the UB5ADD contact were made after 18.00.

G3ZGC/MM reports again, this time from the largest British ship, namely the Burmah Enterprise, GXUM, on the old familiar route. However the gear has been changed, the old FT-75 being rested for the moment in favour of an FT-707, used with a 66-foot wire and dipoles. Richard mentions the departure of the American Lorain-A chains from Top Band; they have now gone over completely to Lorain-C, which operates around 100 kHz. Turning to conditions, it was noted how variable they could be and how localised the skip — conditions to a couple of stations within 100 miles of each other being at times completely different.

Top Band

We were surprised (and highly chuffed) to get a very nice letter from W1BB, thanking us for our support for the Top Band activities on the DX front. It’s always encouraging to be appreciated!

G2HKU, on Sheppey, seems to have had quite a ball, with SSB QSOs to PA0PDA, PA0LOU, PA0ABM, PA0PN, PA2CMH and PA3A0O; not to mention CW to OH0XX, SP9DH, UT5AB, UF6VAZ, UP20M, U6DMDR, F3AT, IU4AMO, UK2GZD, OZ1W, GU3HFN, UP2BAW, E2A0P, HB9CM, OZ310, E191J, GM4KWS, DL0FJ/P, 4X4NJ, N2NT, W8LR, NP4A, UT5BN and, perhaps best of all, UK5DAE who was running just 1 watt to a battery-operated transmitter.

G3PKS says he was mainly restricted to SSB QSOs on this band, but one or two CW ones were thrown in for good measure. Jack says that if there are any new chums, or old ‘uns wishing to brush up their Morse, he is quite willing to be a “chopping block” — he has found some 10 w.p.m. contacts quite enjoyable, and at his own key has been surprised to note how long practice had resulted in some sloppy operating habits! True enough, and the writer always felt that references to “snappy, savvy, operating” were often made by people who could well have looked at their own output!

The FOC marathon is on for the weekend of writing this, and G4BUE (Upper Beeding) has hung up an inverted-V for the event specially, which will be taken down after the action, if only because with it up the garden gets somewhat cluttered!

Contests and Things

Which is where we go straight to 1WY and his invaluable “Contest Calendar”.

For this month we note March 7-8 as the
ARRL Phone contest, then a fairly quiet weekend, leading to March 21-22, when there is: the Bermuda contest, the Commonwealth Phone, and the BARTG RTTY effort. That is just to get your hand in, with the CQ WW WPX coming on March 28-29 for the SSB leg, which is a fine clash with the YL-SSB CW QSO party.

The Bermuda contest rules remain exactly as last year, so it just needs us to remind you that UK and DL stations may work W/K, VE and VP9 stations, but there is no cross band or cross mode working, neither is it allowable for US stations to work Europeans on Forty SSB (this follows from the U.S. bandplanning, one supposes). Logs must be received by May 31, by the Radio Society of Bermuda, P.O. Box 275, Hamilton 5, Bermuda.

The Commonwealth contest this year seems to be under the wing of CARF, and is unlike the informal RSGB Commonwealth CW affair also usually scheduled for March.

On the subject of contests, one of those who doesn’t like them much is G2HKU — he is thinking particularly of the eternal 599 report bunged out by some of these “snappy contest operators” and wonders how, therefore, the contest man justifies himself in his assertion that he tests his equipment and himself by the reports he gets! Well, one could say he’s right, even if the report means nowt — if your signals only seem to land in UB5, the numbers of them will give you the message!

Turning to the G-QRP Club, we rather like the idea of the new members QSL cards — nicely done and with one quarter of a good circuit for a QRP transceiver as the motif. Your batch will be all the same, so you have to work and QSL some other members to get the rest of the circuit.

G3KPO of the Wireless Museum writes to note that Niton Radio now has an amateur among the operators there; G4ANW is newly appointed as manager. Of course we tend to think of coast stations as SSB, or FM VHF, but a little gander down at 500 kHz will indicate where to get some very good Morse practice in!

OH2BAD tells the DX Bulletin that the operation from Market Reef this year (a week from July 6) most well be worth a look. TDXB is a bit puzzled by this but we guess that it boils down to a simple question of a change of keepers.

Still with TDXB, they seem to have little faith in the chances of getting G3JKI/5A QSLs — they have it that the cards won’t be printed until the DXAC pass the effort as a good ‘un. Nonetheless, G3JKI/5A has been reported on the bands again, and saying he would be going fairly often.

On the other hand, we have it from TDXB that the documentation for VK4NJC/3X has at last reached the ARRl and its DXAC; the only snag is that of finding the station and working him! A combination of rather leisurely operating and sick gear isn’t helping, although we understand he now has an Atlas 210 to back up the Yaesu machine, and has found the intermittment that was upsetting the Yaesu transceiver replacement — someone is shipping him an outboard VFO. It is also understood that linear, beam, and rotator are on their way, and should indeed be there by the time this comes to be read.

On a different tack again, the QRP interest is going great guns, and the World QRP Federation now has member clubs in four continents. It is interesting to note how the idea of QRP almost disappeared until 1975, when the G-QRP Club was formed: G3RJV’s guidance has brought it to exceed 1000 members, all of them spreading the word about the delights of QRP. One wonders which is the most attractive — operating with low power, or the mere fact that much of the QRP gear is simple as to be easily home-constructed by a relatively non-technical chap working on the kitchen table. We suspect the latter takes quite a lot of the credit.

Eighty

Most of the reporters to this piece who mention the band are either QRP chaps or CW; not much of the SSB DX activity is reported to us — perhaps because we printed the moans and groans darn near verbatim! And of course between the two bits mentioned at the end of the last section, there is a barrage of chat which, like all conversation, varies between limits of brilliant to brainless, with topics various — bric-a-brac to brass, the obtaining of; and once in a while the subject of amateur radio in one of its multidutinous facets may be noted. A pity there is so much QRM, because it could provide a fascinating study subject for a psychologist!

However, to our business. G3ZPF (Dudley), as has been noted in the last few issues, has transferred his CW from Forty to Eighty, and therefore has some valid things to say. David believes that fundamentally, when one considers the DX aspect, that on Forty, there is more than enough DX to go round once you can overcome the basic problem of reducing noise. This involves nothing more complex than having enough attempts in the front-end of the receiver; and “more than enough to go round” can be then rephrased as “not enough people chasing the stuff”.

On the other hand, looking at Eighty, there seems to be more people chasing less DX, which implies that any station showing is likely to be snapped up by some voracious DX’er; and in the process the pile-up forms, and develops, right to the Heavy Gang who haven’t heard him but call in hope. At which point the DX station makes a rude comment involving a ‘game of soldiers’ and takes himself and his signal elsewhere. Perhaps he’s right, at that! As for the amount of run-of-the-mill stuff reported we agree that it is noticeable, but on the other hand it represents the efforts of the QRP gang, who are getting their fun from the deliberate handicap! One of the more interesting events was to hear a Phone group from Italy and the Spanish group calling PYOCW on sked: after each side had asked the others to QSY, it developed into a right slanging match in Italian and Spanish with, apparently, neither side speaking the other’s lingo, and a consequent lack of understanding and further generation of heat!

One gets the feeling that all his effort on Top Band left G2HKU panting a bit — he offers QRP CW to OK1DKW and 11XHV as his lot!

“CDXN” deadlines for the next three months

April issue — March 5th
May issue — April 2nd
June issue — May 7th

Please be sure to note these dates.

On to G2NJ (Peterborough) who has largely continued the late-night operating, but only because of the awful local electrical noise which now afflicts him during the day. One would have thought that a little bit of D/F with a transistor radio would be enough to locate it fairly accurately down to a house and even to a part of a house: three or four bearings should be enough to pinpoint the offender, and a neighbourly remark to the effect that it might be a serious fire risk as it arcs, should be enough to remove it! Anyway, to return to our last (we do seem to be going off at tangents this month!) G2NJ noted around midnight O28QO and ON6IT, both demonstrating how well an indoor aerial can be made to radiate. SP2LQD was sitting with his one-watt signal right in the middle of a horde of heavies all calling “CQ DX only” — and getting QSO with G2NJ. Another one was G3QDF, when they discussed the activities of the odd ‘night owls’ of the late Forties who used to start operation on the dot of midnight. Then there was one of the regular sessions with GSNX/M who was operating CW while driving, peaking up in a quite surprising manner as he crossed Ilkley Moor.

G3PK/S found the band in fair shape and notes his own reports improving as conditions perk ed up. Jack had a good dabble in the TOPS CW contest in December, with some 130 QSOs, although he found it hard work as there was an LA shindig whose participants just didn’t want to know and an all-but-impenetrable ‘mittel-Europa’ thing also going on.
Reverting to G3ZPF, his CW landed two new countries in EA9IG and VE1ZZ (Sable Is.) plus W3GG, VE1ATJ, A1ZQ, UQ2G1Q, and (the sting is in the tail) TU2IR/PA.

Forty

We seem to have summed up Forty in our comments on Eighty metres! G3PKS reckons it was in "terrific shape" with the skip longer than usual, with only the BC stations making a nuisance of themselves.

G2HKU used SSB to catch FM0FJE, while the dots-and-dashes mode managed to take KV4C1, K4YF, and W2A1W/4.

Harking back to our remarks about patience and sense required for 100 countries on this band, G3ZPF demurs; he reckons that the mere pressing of the button labelled 'attenuator' takes one instantly into the ranks of the faithful! He may have a point there, too. Once in the status of the faithful, all one needs is patience, and stubbornness, and a dash of luck to find the 100 countries on 7 MHz. All we can add is — why the blue blazes doesn't someone tell us about it then?

However, we bleat again, and time presses, so —

14 MHz

As we remarked earlier on, this is the highest frequency available on the operating table at the moment of writing; G3ROO's box covers all the band, while our old PM11 is only calibrated to 14.1 MHz with any degree of accuracy. But CW and SSB at this level are for certain a good way of re-learning the arts of good operating, if only because the creatures known as 'lids' (wonder who invented the name to cover the gormless among us) cannot be competed with, so guile, savvy, and just plain low cunning are required in order to communicate on a two-way basis!

G3PKS made a short visit and raised ZL4KI, and had a 15-minute session on the key; when they signed, G3PKS reckons the mains voltage all across Europe sagged! The mere fact that they all held off until the QSO was done was a pleasant thought enjoyable himself more.

G3NOF now; a few long-path openings to VK/2L/JA were noted in the December period, and in January too, but the short path seemed to have returned to normal, and Ws from noon to 1600 during January. As ever it was all SSB, December showing A4X1Y, A7XD, DF1MS/9K2, FGOFOL/FS7, FK8DH, H18PPP, HKOFOB, HM1SX, HV3SJ, KA7DQQ (Arizona), KL7IB, KP2A, NL7J, S8AP, SV0AW/SV9, VK2NUC/VK9N, VK4NIC/3X, VK9NYG, WP8QG, WB7TYF (Neuad), YC1BMM, YCZSF, YJ3NPS, YK1AO, ZF2AG, J10KM, 6W8AR and 9Y4NP.

The later letter covering January includes A22ZM, A51PN, CN8AW, DF3NZ/ST2, EL2A, FGOFOL/FS7, FK8DH, J1AH, J1FJHI, JK1HAK, KH2G5, W6S, KA7DQQ, KH6WU, PYOZZ, VKs, VK4NIC/3X, W7s, XE2AH, 5H3FW, 8P6CC, and YCY2Y.

Finale

The bottom of the pile this time looks rather like our crystal ball! Perhaps the first item should be that the Danes have now got a Top Band allocation of — wait for it — 1720-1740 kHz and 1830-1850 kHz, CW only; that lower strip will have caused a few raised eyebrows, but older Gs will recall that Top Band once started from around 1715 kHz.

Those who wish for a CE0A, Easter Island, QSO will either have got one during February, or be looking for them about the time this reaches you, W4PRO and W4GSM being the calls and signing/ CE0A; CE0Z, Juan Fernandez Is., activities are rumoured for early April. The Heard Is. expedition by Jim Smith, VK9NS (ex-P29JS) seems to be falling into place at the time of writing, with the pile-up going strong as you come to read this, if we read things a little. Like, we don't know whether they leave for Heard (a fourteen day sail) on February 15, or arrive there on that date.

YIIJY rumours, mentioned of late, don't seem to be jelling into facts, and Y11B0D is notable for its absence from the airwaves, although the odd QSL card is still creeping through the system. Ogasawara Is. will be around throughout March, says TDXB, with JA1JWP/JDI as the call, with intent to clean up the bands of Europe, and on the lower bands.

Another country to go missing soon may well be EP; we have it that EP2TY's licence expires in March and may not be renewed. Characteristically of these countries, there are no licensed Iranian nationals, and so if EP2TY isn't renewed . . . meanwhile, try the DK2OC gathering at noon on 28750 kHz, Saturdays and Mondays.

Finally, readers with long memories will recall W4WFL heading for the Lebanon a couple of years back — Morgan is now back in the States as his position in the Lebanon deteriorated and his applications for a licence went unanswered; but he has faith that he will be G5AYL without too much hassle, and this time he will stay for a time.

That's about the lot for this time, so —

Deadline

Is as usual in the 'box' in the body of the piece, and we would like to be overwhelmed with mail and table entries — we intend putting back the Six-band Country Worked table, and if possible doing something to fill the deserted areas of Top Band. Meantime, be seen ya — and Good DX-ing! The address, of course, for it all is "CDXN", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.
YL, OR RADIO AMATEUR?

THE NUMBER OF FEMALE LICENSED AMATEURS IS INCREASING RAPIDLY, AND THIS ARTICLE LOOKS AT THE SCENE THROUGH THE EYES OF ONE OF THEM

DONNA MANSLEY, G4FID

I HAVE news for the gentleman who wondered how I, being a mere YL, got on plugging the antenna into the correct socket at the back of my FT-101E. Well, dear OM, not only do I seem able to locate the appropriate socket each and every time but I’m also quite capable of soldering the correct plug onto my antenna feeder. Life is full of little surprises, isn’t it? It seems strange doesn’t it, that even though in acquiring my licence, I had to pass the same two exams as yourself, you still aren’t quite sure what I’m all about?

It may interest you to know that from the age of eleven I attended a commercial college where there were no opportunities for me to take scientific subjects and I came to the adventure of amateur radio not even quite sure what an electron was! I think, then, that I managed to absorb the knowledge necessary to pass the RAE in a matter of ten months shows just a little enthusiasm for the subject, don’t you? The Morse took me six weeks and even though I woke each morning convinced that the birds dawn chorus was made in CW, I found it an extremely enjoyable experience.

I must confess that as an operator I prefer the sound of a human voice. After all communication is the name of the game and it is quite often the tone of the voice, and not the words, that imparts the message. How comforting to hear the frustration in your voice when you have used up all your midnight oil and a share of someone else’s and you’re still unable to find the fault. To know that there are times when you too feel like throwing the rig out of the window! However, there is something positively magical about deciphering those dots and dashes efficiently and I can still remember the dizzy excitement I felt when I had just completed my first CW contact. I’d actually understood and been understood and Neil Armstrong’s journey to the Moon had nothing on this! Once I was even complimented on my Morse and I knew that during that particular QSO it had been impeccable. Sadly, since then, I seem unable to find the right combination but it is more than adequate carrot at the end of the stick and I shall keep on trying. Surely that is what amateur radio is all about for all of us, isn’t it?

I spoke of the adventure of amateur radio — and that has got nothing whatsoever to do with the wolf-whistles that comes pirouetting through the ether to land fairly and squarely in the speaker of my electric wireless machine. There are those of you, though you would never admit it, who only answer my CQ call because my voice is an octave higher than yours. No don’t blush, if that’s you, because I don’t mind in the least so long as by the end of the QSO you’ve realized that there’s a little more to me than the fact I wear a skirt. That in our hobby, at least, we have common bond, a united desire to push back our own personal frontiers of amateur radio. We shall never be pioneers (though who knows?) and even if we are lucky enough to live to be very, very old there is no way we shall ever know it all. But like those who reach for the stars and the distant planets, isn’t that what keeps us going? It is exciting amateur radio, isn’t it? Always something new to do, something new to learn. A true adventure.

Of course there are one or two of you who would actually prefer not to talk to me at all, to whom I’m to be avoided at all costs. When faced with my one and only reply to your CQ call and, having pulled yourself together enough to realize this stunned silence can’t go on, you mumble something about “never having worked a YL before . . . don’t know what on earth the XYL will say if she comes in the shack and finds me talking to another woman . . . must go QRT”. Well your XYL has my sympathy, because your inability to share a few minutes of a common hobby with a woman must be reflected in your home life. I’ll bet she has her jobs and you have yours and never the twain shall meet. I can hear you now, railing that I’m a rampart women’s libber but you’d be wrong. This has to do with people, with human beings. What pleases one doesn’t always please another but here in this hobby of ours we meet to share a common interest and the matter whether one has to leave the QSO because his meal is on the table and the other because she has to cook it and put it on the table? By the way, I don’t know if the 7X station who promised “G4FID I don’t copy you” came into the category of “No YL’s please”, but whether he knew it or not he gave me the vital piece of information that I was, indeed, getting out in his direction! What else had there been to copy but my callsign? But no, my instincts tell me that he was one of the majority and that to him I was just another amateur whose callsign was not quite exotic enough.

Now, here’s one problem I’m sure you don’t have. When you have worked a nice piece of DX you know that you’ve worked it because your operating techniques and/or your signal were what you hoped for. I am never absolutely sure that I’ve made it through that massive pile up or out to that weak signal through my skills or because my voice is different: how many times I’ve been told that my voice is worth a few S points in a pile up. If that elusive station has come to me easily then I tend to feel it’s all a bit of a fraud on my part. If I’ve had to work hard for it then I allow myself to feel some of the pleasure that you must feel when you’ve captured the impossible. The answer is of course CW — but must I use CW all the time? There is worse to come because sometimes I’m not even sure that the report given to me is accurate: it can be that I feel the station in question is just being a gentleman, and one doesn’t down a lady. At other times, when the station has gone on at great length about what a pleasure it is and how absolutely delighted he is to be working his first, or one hundred and first YL, and please, please could he have a photograph to commemorate the occasion . . . well, it speaks for itself doesn’t it? Yes, I do exchange photographs, but ‘exchange’ is the operative word — and they are with people I have come to know well and whom I look upon as friends. As you know, there is no greater delight than to put a face to the voice of someone whose ups and downs you have shared in and, often, those of their family as well; a family whose habits, likes and dislikes one often knows as well, if not better, than ones own. So, if you are tempted to ask me for a photograph during our first QSO, please don’t. (As at least one Italian will confirm, a further request via QSL card doesn’t work either!)

By now you will have learnt that my QSO’s don’t always consist of matter strictly relating to amateur radio. Then, neither do yours. I know! I too am a great short wave listener, and isn’t it amazing, within the terms of the licence, the range of subjects we can cover? It is a daily reminder, to me at least, of the privilege it is to hold an amateur licence. How many non-amateurs are able to draw on such a vast range of knowledge and experience? How many times have you just happened to mention something in passing and found your contact knew almost everything there was to know on the subject? Or, and this must happen dozens of times a day, that someone was listening and calls in to offer his expert help and advice. Amateur radio does truly cross all barriers. Each and every one of us has something to offer and how good it is to hear the youngster, still in school, chatting away happily with the old timer, with modern history, amateur radio and anything else, being brought alive for the youngster in a way that schoolbooks could never do. One can’t help but feel that, by the end of the QSO, the old timer is a little richer too; his understanding of the
ways of today's world a little clearer. A thought that, perhaps, things aren't so bad after all.

I'm sure we can all come up with ways that amateur radio has widened our horizons. For my own part I keep a game of Scrabble going over the air: we each have an identical board and a word is usually exchanged either way each day. A small thing you may say, but I can only begin to guess at the number of words it has added to my vocabulary and because one has to be absolutely certain that the latest addition to the board is a proper word, at least two dictionaries are consulted and a full understanding of the word is gained. Well, did you know that zoé was pertaining to, or having animal life? Or that Ἀνάξ is the pilgrimage to Mecca that every Moslem is expected to make at least once? Well, I didn't — before I started playing Scrabble on eighty metres!

During my first eighteen months of operating I made a number of good friends who are blind. It was never a case of, as someone who should have known better commented, "Oh, isn't Donna good talking to us". They are and always were just my kind of people. Believe me, they have given more to me than I could even begin to give them. However, I did get rather frustrated to think that, when we exchanged letters, mine to them had to be read out and so I learnt braille — a fascinating experience and, incidentally, a fairly simple task for a sighted person; and one I know it's unlikely I would have attempted if it had not been for amateur radio.

I've also been able to indulge my love of history, travelling, along with other enthusiasts, roads I'd never dreamt of being possible. One station even went to the trouble of borrowing a copy of Burkes Peerage that we might trace the ancestry of a particular noble family, and he went on to tape the whole complicated entry for me. Then, of course, there are my struggles with the French language... but there, I must get back to my moans and groans before I run out of space: they must not be allowed to escape!

There is one thing, with the odd exception, you are all guilty of. Cast your mind back to the linear you were building, or that speech processor, or maybe even that receiver. Remember how, when you were stuck, you came on the air to discuss and hopefully solve your problem? Or, when you'd finished it, how you delighted in discussing the ins and outs of building it? Then, why did you have to spoil it all by stopping in midstream and, because I was included in the QSO, say something like, "We'll have to stop all this technical talk, Donna will be bored". Does it surprise you so much to know that the practical side of amateur radio appeals to me too? That I can fully appreciate the sense of achievement when something that one has built oneself, nay finally beaten into submission, actually works and works well? Is it such a shock to learn that I too have an insatiable curiosity about the workings of radio equipment? Sometimes I may be able to follow what you have to say quite easily and add my own suggestions and comments. At other times I may need you to explain and enlarge on some particular point — but isn't that the same with you? I think so, and you're not bored are you? Well, I can promise you that Donna is never bored with technical subjects and you need never again even suggest it. A final thought — has it ever occurred to you that with modern miniatures my slim fingers can often never again even suggest it. A final thought — has it ever occurred to you that with modern miniatures my slim fingers can often never again even suggest it. A final thought — has it ever occurred to you that with modern miniatures my slim fingers can often never again even suggest it. A final thought — has it ever occurred to you that with modern miniatures my slim fingers can often never again even suggest it. A final thought — has it ever occurred to you that with modern miniatures my slim fingers can often never again even suggest it. A final thought — has it ever occurred to you that with modern miniatures my slim fingers can often never again even suggest it. A final thought — has it ever occurred to you that with modern miniatures my slim fingers can often never again even suggest it. A final thought — has it ever occurred to you that with modern miniatures my slim fingers can often never again even suggest it. A final thought — has it ever occurred to you that with modern

So, I wonder if these few words have made you any the wiser? Do you see that, as far as amateur radio is concerned, I'm not too much different from you? My niggles, like the perpetrators of my discontent, are more than compensated for by the vast majority of you. I have now been licensed over four years and still the thrill of being part of the amateur fraternity is renewed each time I switch on my rig. I have received encouragement, help and guidance; I have been treated with kindliness and courtesy; I have been welcomed. I can think of nowhere else that I would have found this in such abundance. All this from the vast majority of amateurs, and among them I know I can count you, dear OM, can't I? I salute you gentlemen. I am proud to be one of you but now I must go QRT because there are those who are feeling hungry! See you on the band.

### USING EXTREMELY LOW POWER

**R. W. MICKLEWRIGHT, G3MYM**

This brief article sets out to show what can be achieved with extremely low power and a simple aerial. It outlines the results obtained by Yeovil Amateur Radio Club when using a 38 milliwatt CW transmitter on the 80 metre band on two afternoons in February 1979.

The circuit of the transmitter is shown in Fig. 1. It is a xtal controlled Miller oscillator, keyed in the supply lead; RF output power has 14mW from a DC input of 38mW. The aerial was a sloping half wave dipole with the highest point in the centre at about 35 feet (this is about an eighth of a wavelength high on 80 metres).

![Circuit of 38mW CW Transmitter](image)

The transmitter was in operation from Yeovil ARC's headquarters at Houndstone Camp, 3 miles west of Yeovil in Somerset. G stations had been notified that the transmitter would be on the air, and during the two afternoons (Wednesday February 21st and Sunday February 25th, 1979) 16 QSO's were made. (See Fig. 2). The furthest QSO was to Croydon in Surrey (116 miles), but the signals were also heard at Sevenoaks in Kent at 127 miles.

Since no aerial system is perfect, the actual radiated power would have been less than 14mW, which makes the above results an apt demonstration of the efficiency of short wave communication.
**FIRST** thing to do this time is to comment on the December RAE. R. Middleton (Bury St. Edmunds) is quite down in the dumps because various other candidates from Ipswich and Bury, mainly radio and TV servicemen, thought the questions were catch ones and some ambiguous. J. C. really feels for those poor misguided souls! You see, the whole point of a multiple-choice question is that of the four offered for your consideration, two will be pretty obviously wrong, one will be definitely right, and the other one close enough to make you think a bit. If they saw these as either a 'catch' or 'ambiguous' then they are crying out to the world that they don't know the correct answer! It is unlikely that anything in an RAE paper could be regarded as a catch, and the cry of 'ambiguity' is a statement of "don't know which is right!" — albeit we would expect the answer to one question in a paper to require quite a lot of thought. The trouble is in ourselves, mainly; forgetting basics and flying into the realms of fancy. That's not to say C. & G. are perfect and mistakes can happen.

Still in Bury St. Edmunds, E. W. Robinson endorses our comments about the value of an ATU and an attenuator; Ted has both, and on 7 MHz they are invaluable. Very true. (G3KFE is running an TS-830S through its paces and it is very noticeable how much of the time the "attenuator" button is pressed). To complete the trio from Bury St. Edmunds we have G. A. Davey with a first entry straight into the ATPW. He has a question mark (as do several others) against IAOKM; this station was claiming to represent the "Sovereign Military Order of Malta" and hoping to get it past DXAC for a new country — we doubt whether SMOM qualifies, and indeed there is a faint memory of it being tried unsuccessfully before.

Next we must mention two separate letters from Nev, G3JDK. In the earlier one he is offering much encouragement to SWLs and amateurs to home-brew, and nostalgically recalling the old Millen chokes and National drives, against which he reckons putting a modern bit of gear together is rather like playing with a Lego set! On the other hand, the old National drive was superseded by Eddystone’s 898 which is still reckoned 'tops' in USA. Personally we have gone further in our time, by manufacturing our own slow-motion gearboxes and drives, not to mention winding PA generator and its connection to the receiver; assume the generator can't get the signal without the noise! Next we consider the signal strength at the receiver on, through a 50-ohm loss-less perfect cable, and Ohms Law says only 0.514V appears at the receiver input terminals. So say, you reduce the noise coming out of the speaker by limiting the proportion of the front-end noise which goes through the receiver. So the figures quoted are meaningless unless taken in the context of the IF and/or AF selectivity.

Secondly, the average oscillator, looked at on a spectrum analyser will be seen as sticking up out of a “bush” of noise. Thus, the spectral purity of the oscillator(s) can be important. With a simple receiver, switch on the BFO and hear the increased noise associated with the BFO — “nuff sed” there! Now, you can't measure s/n ratio truly but must talk of s + n/n ratio, because we can't get the signal without the noise! Next we consider the signal generator and its connection to the receiver; assume the generator output impedance is 50 ohms and the receiver likewise. We have 1 µV at the generator output before we connect it to the receiver: this is a p.d., because it’s got nowhere to be an e.m.f. Put the receiver on, through a 50-ohm loss-less perfect cable, and Ohms Law says only 0.5µV appears at the receiver input terminals. So — do we say the receiver is getting 1 µV or 0.5 µV? Either is correct, but we must specify e.m.f. or p.d. As for the 0dB claim for the receiver D, why should that necessarily be a misprint? Why not the front-end of a callsign often tells you some more about his location as, for example, in Russia where once one has the callsign written down, one has him almost pinned down to a village, because there the letter after the number is also part of the front-end. However, we do not take this last into account in HPX, so one UA9 and one UA00 serves. Likewise with the VP2 calls; although the letter after the VP2 tells you which island he's on, only one VP2 will pass. In, say, W6-land, you will find W6A, WA6, WB6, K6, N6, A6 and so on, maybe all in the same street but still all different prefixes.

By Justin Cooper

**Technical**

J. G. Worthing (Shrewsbury) has a pretty conundrum for us. Four receivers, known as A, B, C and D, each quote sensitivity at 28 MHz as: A, 0.5 µV for 10dB s/n; B the same; C, 0.7 µV for 10dB s/n; and D, 0.3 µV for 0dB s/n. A and B are "dual-conversion with no gain controls", C and D are triple-conversion with preselector, and D sports an RF Gain control. Accepted that 0dB might be a printing error in the spec-sheet, which would one choose? None of them, on that sparse information! At the risk of taking up too much space and crowding others out, we'll just have to try and clear this one up. First, consider the receiver alone, all gains on full and 'sharsh' coming out of the speaker. You are listening to (in essence) the front-end noise of the receiver, which is wide-band; hence, if you halve the bandwidth in the IF strip, say, you reduce the noise coming out of the speaker by limiting the proportion of the front-end noise which goes through the receiver. So the figures quoted are meaningless unless taken in the context of the IF and/or AF selectivity.

This is the last listing of 1980. A new Ladder started on January 1, 1981, and entries are now being accepted. The minimum number of prefixes heard before an entry can be made is 200, and in accordance with HPX Rules (see January issue).
turn the generator down until the signal is just in the noise? After all, that is a ratio of unity, and the decibel is only a ratio anyway. That should have got you fairly well down into the mire, so now your scribe must take the dog for a walk and think how to rescue you! Meantime, remember that for most of the time, if not all, the receiver's front-end noise will be swamped by natural and man-made noise appearing at the aerial terminal!

Later... having walked and smoked, J. C. returns to the fray. So far, we have said that the sensitivity of a receiver must be specified in terms of p.d. or e.m.f., and that the bandwidth of the receiver needs to be known as well. So — what criteria can we apply? We can safely say that any of the four receivers will pass the sensitivity requirement on the bench. What about in the shack? Here we are looking for weak signals close by the commercial megawatts into rhombics — clearly if the megawatts overload the receiver the weak signal will be the first thing to disappear! So, we need our receiver to be tolerant of enormous unwanted signals; and the first place where intolerance becomes noticeable is in the mixer(s). So, everything being equal we want as few mixers as possible, and we want that mixer to operate to the best advantage. This means a balanced mixer, with the right proportion of local oscillator injection — very large with respect to signal voltages about sums it up.

Then we come to the matter of gain and selectivity. Clearly, from what has already been said, the place for the selectivity is at the aerial terminals, but that isn't very practical, so it usually ends up just after the first mixer. If the front-end lacks gain, in the interests of avoiding front-end overload, it follows that the gain of the receiver will follow the filter, and that gain will be accompanied by some generation of noise. Thus in a modern receiver one may well find two selective filters, the second one either at the output end of the IF, or even in the audio; and care will be taken to make the audio itself as quiet as possible, which probably will mean roll-off of both high and low frequencies as well as a quiet AF circuit.

Now we come to the crunch bit — Gain. Obviously, to listen to a sub-microvolt signal you must have something of the order of 120dB of gain, depending on whether you are designing for headphones or speaker. It is essential to have enough, it is equally important not to have too much, and above all the distribution of the gain around the receiver sections must be optimised; this last is the key to keeping the stages from overloading, as clearly the best performance occurs when the whole receiver overloads at the same input signal level. That is an ideal — in practice one stage or another will be the first to overload and so limit the rest.

Stability comes in two forms! The first is long-term, and simply means that the dial markings are still somewhere near right after ten years service; we are interested more in short-term stability, which in its turn comes into two categories, namely warm-up and settling from the moment the mains come on, and on the other hand, how well the thing "stays put" after the warm-up, regardless of mains variations, vibration as you thump the operating table with the Morse key, shrink temperature changes and so on. We would express this a bit differently as "coming back on to the other chap at the end of each over of a QSO" — but the point is made.

All this demands a good dial drive with no backlash, and that all the controls of the receiver be in the 'proper' place on the panel, not to mention having the receiver in the 'proper' place on the operating table. Most of us write right-handedly, so the receiver is, in the main, driven with the left hand. The receiver position should be adjusted on the bench so that the hand when operating the tuning control is at its most relaxed — this usually means choking to get the knob. The right height. This last may sound out of place in a receiver spec. — but more receivers than enough are sold as "no good" when they have never given their owners the performance they are capable of simply because he doesn't give 'em a chance! Finally, the receiver needs to be maintained, or at least to have a routine check that all is well: a full table of voltages taken at given settings with a given meter, and a check against this table once a year is probably enough, as long as one can hear the preselector control go through resonance on 28 MHz.

So — enough on receivers and their specifications. Let's get on with the mail.

P. C. D. Barnes (Cardiff) hasn't been any too active over the past four months thanks to an illness which laid him low, and landed him in the bandage-factory before it was diagnosed. However, dietary measures seem to be doing the trick now. The snag, of course, is having the receiver in the garden shed at such a time, especially with winter upon us. Anyway the corner seems to be turned with at least "good, part-worn used" condition of health assured, so that it shouldn't be too long before the urge to get to the bottom of the garden rises again. From us all, the best wishes for a return to full-power operation.

B. Shepherd (Staines) hadn't reported since he commented somewhat tersely that he had joined the ranks of the unemployed. However, it seems he had a tumble from which he is still recovering; luck doesn't seem to be coming Briant's way — or should we say it's added by the time he gets it! Again, good wishes from us all.

R. Baker (North Walsham) continues serenely up the list, and is now beginning to get the QSLs in — he has just seen cards from RKIAPA and UK3R — Box 88 will now drown him in QSLs! We were sad to notice that N. Askew (Coventry) hasn't yet found his old logs, so his present list covers January 1, 1980 to February 17, 1980 with some 706 prefixes heard. That answers somebody else's question — but to be fair, 706 in six weeks wouldn't be quite so easily done if you were new to it. Having the logs but no lists for his earlier activity looks like a long session with paper and pencil coming up — and probably being deferred!
Who or what is PRIAM, enquires D. C. Casson (Earley). If genuine, he would have been in the Democratic People's Republic of Korea, who normally use HM or HL; on the other hand it may have been a "special" prefix for some national occasion.

Now to L. Stockwell (Grays) who has passed Part 1 of the RAE, and hopes to have Part 2 in the bag 'ere long. Meantime, Len wants to modify his KW-201 receiver to cover all the ten-metre band. We wouldn't try — an easier way by far is to build a converter such as the G3HBW, with an IF of, say 1.6-4.0 MHz which is a good range on a GC receiver, but not too helpful on an amateur-bands only job. If your "main" receiver only covers 200 kHz segments, a converter becomes a bit of a chore, and in such a case we would suggest a simple receiver covering just 1.6-4.0 MHz, with no band-switching, and then use a converter for the three HF bands. This approach would keep the KW-201 working, which in itself would be a great help as a comparison standard in defining the qualities of a new receiver by reference to the known ones of the existing receiver.

M. Law (Chesterfield) has another junior op., which has banished him to the cupboard under the stairs; it's really terrible the way the very young are so good at pinching the OM's shack — but at least one can get a night's sleep that way!

On to J. K. Hobson (Ely) who queries SV2JN, not in 1980 Callbook; however it seems the SV2 series was started in 1980, because there are quite a rash of them in the 1981 lists. SV2JN is in Essex.

Now H. M. Graham (Newmarket) who refers to the talk about HKO last time round and mentions his HK0CLP — a YL. Again a search through the 1981 Callbook, and while such a call doesn't appear it becomes fairly evident that the Colombians have a system somewhat like our own, and HK2CLP was probably heard from San Andres.

A. Stevens (Crowthorne) has modified his 9R-59DS a bit; a series trap across the aerial terminals as an anti-image device, an audio filter, and a crystal calibrator; splitting the RF/IF Gain control, using the front-panel headphone jack hole for the new control and taking the phone jack round to the back, thus avoiding drilling holes. Also, a cathode follower to the local oscillator has cured that very annoying tendency to drift every time a control was moved. On a different tack, Allan notes with pleasure that HR1EHA sent his card back to arrive within twelve days; when you take mail time into account, it means the card must have been turned-round virtually same-day.

Signing Off

We hope we've answered your questions; and we make our apologies for the long answer to one query. Letters and lists arrived from D. W. Waddell (Herne Bay); D. J. F. Gordon (Chesham); K. Kyteor (Brandon); A. R. Darby (London SE16); N. Rodgers (Harwood); and M. N. W. Thornton (Romford). Thanks to you all, and see you next time around.

For that the deadline is March 19th: address to your scribe, Justin Cooper, "SWL", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts AL6 9EQ. Just think — by then you'll be getting the garden tools out!
USING AND ABUSING THE 4CX250 FAMILY OF VALVES, PART II

CONCLUDING THE ARTICLE BEGAN IN THE JANUARY ISSUE

JOHN H. NELSON, G4FRX

Power Supplies

It is a curious fact that an amplifier using the 4CX250 family is really very simple to build — there is, relatively speaking, so little to do and, if the design is basically sound and the amplifier well built, no great effort is required to set it up and use it. Most of the real work (and much of the subtlety) comes in the power supply and control system for the amplifier — and in this respect, the author feels that the G4AJW design previously mentioned represents probably the best way to go about the job. In this part of the article it is the author’s intention to discuss the general requirements and some of the problems, and some reference to the article it is the author’s intention to discuss the general requirements and some of the problems, and some reference to the first part will be made. One or two small flaws and alterations will be mentioned, but the author would like to stress that they are entirely his personal opinion and in no way to be taken as criticism of what is much the best published system that he has seen.

The EHT supply, of course, is relatively simple, being in essence a suitable transformer, a rectifier of the appropriate ratings and enough capacitors to ensure at least 30 µF of smoothing at the appropriate working voltage; this will usually imply a bank of electrolytics, and it is important to remember the bleed-cum-equalising resistors across them. Ideally one should aim for about 2 kV on load for the 4CX250B and ‘R’, and about 2.5 kV for the ‘350A and FJ. Any more is asking rather a lot of the ceramic seals in the valve, and anyway is unnecessary. A few amateurs have been heard using 3 kV on 4CX250Bs which, frankly, is silly — the valve insulation is being pushed very hard indeed and the possibility of destructive flashover high; 2 kV will easily give in excess of the legal limit — one wonders why they bother.

If you are one of the few users of the conduction-cooled versions of the ’250 family, be very wary of too much EHT since, particularly at 432 MHz, the beryllium oxide thermal link does not take very kindly to the combination of high EHT and an intense RF field and can start emitting “frying” noises. 1700 volts seems to be enough for this class of valve, although the author has relatively little experience with them and would welcome further comments from users.

A surge-limiting resistor in the EHT output rail is a wise precaution since, as G4AJW points out, in the event of a flashover or fault, the fault current can be several kilo-amps; this is not good for the health of meter movements, protection diodes or the capacitors themselves. About 25 ohms seems a good value, to limit the fault current to 100A or thereabouts, and some excellent 50W wirewound resistors of this value can currently be found.

Finally, even if your usual construction standards, like the author’s, are fairly haphazard, take note of the fact that whatever voltage you have chosen for the anode supply it is likely to be lethal and build the EHT supply accordingly. This means no exposed terminals, no holes or vents for fingers to find their way through, and a general air of common sense.

The screen-grid supply is where most of the common power supply problems have their roots, and in a sense it is the most important part of the supply insofar as deficiencies here lead to the effects that can be somewhat baffling if the causes are not understood. Let us examine what it is required to do:

1. It must be capable of maintaining the correct screen voltage in the presence of either moderate negative DC screen current or normal positive values of current.

2. It must not allow a condition of excessive screen current (positive or negative) to persist, since this causes excessive screen dissipation and, ultimately, valve failure.

The first criterion may easily be satisfied by the use of a bleeder resistor connected directly from the screen to earth, in conjunction with a well-regulated screen supply (i.e. one using VR tubes, Zener diodes or, as in the G4AJW design, hard valves). This resistor should be of such a value as to pass approximately 15 mA. This will allow the power supply to "sink" as well as "supply" negative screen current, and will eliminate most of the common problems caused by the voltage due to this current charging up the screen decoupling capacitor in the valve base, causing the screen-grid voltage to rise and thus turning the valve on harder and harder. But pause for 'pfffffffft' of blowing fuse (and boom of blowing valve as well) if the EHT fails and leaves the screen volts connected — the switching must be arranged so that if the anode voltage disappears for any reason the screen voltage is immediately removed. Otherwise the screen-grid gets delusions of having been promoted to anode and draws heavy currents which will vapourise it in milliseconds. A suitable circuit was given in the earlier article (S.W.M., August 1977), although there are several ways of fulfilling the requirement.

The second case may be dealt with by including an overcurrent relay in the screen voltage supply line (the common line in the case of two valves) and including a small potentiometer across its coil to adjust the pull-in point. This should be adjusted to the value of current corresponding to the maximum rated screen dissipation, which is 12W in the '250 series and 8W in the '350 series: compare these figures with the anode dissipations of the valves and the reason for the screen grid vaporising in milliseconds, as mentioned above, becomes evident! The relay can be used to remove supplies as required, and to light a lamp to warn of the fault.

The G4AJW design is good in this respect, although the EL84 shunt stabilisers are theoretically a little overrun in terms of their maximum anode voltage (specified at 250). Whether this matters is somewhat dubious, especially for supplying voltages of 300 or 350 for a '250 series valve. However, for the '350 series valve, which works at its best with 400 volts on the screen, it seems worth while considering an alternative valve to the EL84 with a higher rated anode voltage; or, as the author has done, modifying the design to use BU208 high-voltage transformers in conjunction with a small TV-style 1 kV spark gap to protect them against the odd short-term flashover. Flashover, incidentally, is rare with good valves and can usually be traced to inadequate loading (i.e. you forgot to connect the antenna) which should have been noticed on the screen current meters in the first place. The BU208 is specified at 1500V, and of course runs very much cooler than the notoriously hot-running EL84! It remains arguable that, valves being the tolerant devices that they are, this modification is unnecessary: but it does save watts otherwise used for heaters, as well as meaning much less heat in the power supply, no deterioration of the device, no overrunning, and a general improvement in peace of mind.

One minor point, applicable not only to the G4AJW design but to several others encountered by the author, is that the 4CX250 screen grid should be earthed on 'receive' and the amplifier not simply cut off by increased negative bias. The reason for this is that the amplifier in this condition tends to generate large amounts of shot noise, manifesting itself as a ticking or swishing noise in the receiver, and also that if the screen supply is not adequately stabilised, the negative screen current usually produced by the amplifier idling at cut-off will charge up the
screen capacitor. The previously mentioned rising-screen-volts runaway condition usually results in the amplifier blowing its fuses (or worse) half-way into the other man's over. So (a) make sure that the screen supply is adequately stabilised in the first place, but (b) add a relay from the screen feed line to the amplifier which connects it to the screen supply on transmit and earth it on receive. The momentary 'floating' of the screen grid as the relay changes over should not cause problems, especially if it can be arranged that the negative bias voltage comes on slightly before the screen relay changes over on 'receive'.

Suitable values for the screen voltage depend on the EHT but, generally speaking, the '350 series perform best with 400V on the screen grid; linearity seems usually best at this level, as well as output power for a given drive level. Since this series is for Class AB1 use only, the screen volts need no further consideration. For the '250 series in Class AB1, somewhere between 300 and 350V is required, and is not particularly critical; curiously enough, the 4CX250B's intermediate performance in Class AB1 does not seem to change with varying screen voltage unless the EHT is below about 1700V. Power output is not particularly dependent on screen voltage either in this valve — which rather undoes the theories of a few people heard running 4CX250Bs with 450 or 500V on the screen grid. This is silly because the chances of exceeding the screen dissipation are vastly increased, and there is no benefit at all to be had; those who think that the power will increase dramatically by increasing the screen volts to this level are fooling themselves. In the interests of screen dissipation, there seems to be some point in going above 300V in Class AB1: and certainly in Class C the screen voltage should preferably not be more than about 250, otherwise screen dissipation can become the limiting factor in drive level and output power. Either way, the stability of the screen voltage is more important than the exact value.

If using VR tubes or Zener diodes as shunt stabilisers, ensure that their ratings are generous enough to cope with the increased dissipation due to negative screen current. Since, as we have seen, a compromise screen voltage for the '250 series might be 300V, two OA2 tubes in series will handle the current from one valve quite adequately and provide the correct voltage with good stability. For two valves, conservative design would suggest four OA2 tubes in series-parallel; this usually raises eyebrows at lectures, but the improvement in regulation is marked if using a circuit, for example, on the lines of the GW3ZTH/GW8EHK power supply published in the March 1973 issue of Short Wave Magazine. Zener diodes are also fine for the job, provided that their ratings are adequate; they have the advantage that fine adjustment of screen voltage may be made easily in a two-valve amplifier for standing-current balance purposes. This may easily be arranged that in the Zener chain a few, say, 6V devices which may be added or bypassed at will. Equality of standing currents in a two-valve amplifier is important from the point of view of load-sharing and hence best performance and longest life — it can easily be achieved by earthing first one screen line and then the other, and then switching to transmit and checking the indicated anode current. Obviously if one valve is drawing slightly more current than its partner its screen voltage should be lowered by a small amount and the test repeated. Both valves should draw 100 mA standing current each, and this is a fairly critical value in terms of linearity; it should not be lower than 90 mA at the outside for Class AB1 working.

Finally, on this topic, do remember when experimenting with the screen supply that the screen grid in the 4CX250 series of valves is a delicate device, and that the product of the screen voltage and current (unless negative) represents the amount of power that the screen is dissipating. Remember the ratings! The grid bias supply should not present any particular problems except that it must be 'stiff' and may with advantage be stabilised. The author's favourite circuit uses a VR tube followed by a shunt-stabilising emitter follower. For the 4CX250 series an OA2 followed by a 2N3773 is used, since, assuming a screen voltage of 330, the valve needs some — 80V for cut-off and hence some — 110V for Class C working (see data sheet); so a — 150V line is ample. The 4CX350 family, for Class AB1 use only, require much less grid bias for cut-off, only some — 30V being required so a — 50V line is plenty: the author uses an 85A2 with a 2N3055 for this service. Again reference to G4AJW's design, which uses the same technique, the users of the 4CX350 family would have to alter some resistor values around the 2N3055 in the bias supply, and delete RLD1 and the C3 voltage setting potentiometer. The 68K feed resistor to the bias failure logic also needs changing to 15K or thereabouts to accommodate the lower bias voltage required for the '350. Actually, the author would also be strongly tempted to change the 2N3055 in the original circuit for a higher-voltage device when using the 4CX250: the 2N3773, for example. The 2N3055 is run a little close to its voltage ratings in this application.

The full negative voltage is of course applied to the control grid on receive, with the correct voltage for the required standing current on transmit (or, in Class C, the appropriate bias setting, which will be somewhere around — 100 to — 110V; this is not critical, and can be adjusted for best output).

Failure of bias voltage is likely to be fairly dramatic and should be guarded against. The G4AJW design does it elegantly, and any simple circuit along the lines of Fig. 1 would suffice. More in the sacred cause of gross over-design than anything else, the current G4FRX2m. amplifier has two detector circuits like this, with their feeds taken from the amplifier's input socket, as well as the shutdown circuit à la G4AJW; failure of the bias to either valve, as well as shutting the amplifier down, illuminates the appropriate lamp to show what has occurred on the front panel, and their placement next to the 'miscellaneous volts' multi-meter switch alerts the operator to cross-check the failure of bias volts on the meter. Being an amateur is fun! Quite what one is supposed to do if the lamps come on half-way through a contest on a hill in the middle of nowhere has not yet been ascertained.

Finally, a brief comment on heater voltage. The 4CX250 series all use either 6V or 26.5V, depending on type, with a few obsolete exceptions. 6.3V is much too much, and valve life is drastically shortened. In fact, due to back-bombardment effects 5.8V (or 24V) is just enough, particularly on 70cm.

Metering of the supply is an important topic — those who wish to accuse the author of over-design may do so, but it is strongly recommended that a grid current meter (one per valve, so that drive balance may be permanently monitored and, as importantly, grid current may be monitored at all times), a screen current meter (again one per valve, so that imbalance of load-sharing or other oddities may be easily seen, as well as inequalities of negative screen current), and an anode current meter (to indicate standing current, drive level and average anode input).
An excessive screen current value for a valve suggest that imminent replacement is likely, since valve life is commonly not a function of cathode emission in this family of valves but of secondary screen emission increasing to the point that the power supply can no longer cope with it, and flashovers and so on start to occur. It is better not to put the anode current meter in series with the positive EHT line, especially if it is a small plastic-cased panel meter in an aluminium front panel, since you may discover the hard way that its insulation is not up to the job; this is particularly true with the small illuminated meters of Japanese origin, where much trouble has been experienced with destructive failure of the insulation. It is probably a good deal less expensive to measure the voltage across a 1 ohm resistor between the centre-tap of the EHT transformer (or the negative side of a bridge rectifier) and earth, and calibrate in terms of current; a high-current diode is required across the meter to stop damage from flashover-induced surge currents, and will do the job adequately provided that there is a surge-limiting resistor in the EHT line as previously mentioned.

A “miscellaneous volts” meter switchable to, say EHT, screen, bias, relay supply and so on is also useful; it is reassuring to be able to check that all pertinent volts are what they should be, and the first sign of trouble will be when one of them is not.

The author quite understands that six meters (for a two-valve amplifier) sounds excessive, but he can only say that it is possible to check everything easily and also, more importantly, drive the amplifier correctly. Any departure from the correct conditions can easily be seen; and further, if the grid current meters are static, both screen currents are flicking around the zero mark and the anode current is varying round about 300 mA (sitting at 200 mA when not speaking), there is a good chance that everything is working normally.

It is no doubt stating the obvious to say that, apart from checking equality of grid drive during testing and also as indicators of correct neutralisation, the grid current meters should not show anything in Class AB1 operation; though in fact it isn’t quite true. At something approaching full drive, the grid current meters may indicate a tiny amount of negative grid current, which is indicative of a small amount of grid secondary emission and nothing to worry about. If drive is increased a little more, the meters will begin to flick positive, and now is the time to stop. There is some degree of controversy about where to stop, but after much testing it seems to be true that, particularly on 432 MHz, about 50µA of positive grid current (which is not quite “grid current” in the usual sense but is a result of thermal phenomena in the valve) is acceptable. But generally speaking there should never be any positive grid current in Class AB1 with this series of valves. Otherwise, how on earth can it be a linear amplifier? The typical horror scenario on the band comes in the remark (heard on 2m recently), “Oh yes, I always run a few milliamps grid current — you don’t get the power out if you don’t”. And, also heard recently, a station running a newly-built linear(?) amplifier and informing his QSO partner that he had “yes, exactly 5 mA grid current per valve — perfectly balanced”. His partner was duly impressed. The signal was extremely rough-sounding, about 35 kHz wide, and this kind of situation is all too common. A two-valve amplifier should not need to be driven to anywhere near its current indicated in linear service for heaven’s sake turn the drive down: if the amplifier is halfway decently built, not only is the output likely to be well in excess of the legal limit but quite disgustedly anti-social. To those of you who insist on doing it, please think about what “Class AB1” means and remember that other people apart from you and your kilowatts may wish to use the band — and your neighbours will also wish to watch television in peace.

Getting it Going

The drive requirements for the amplifier must be considered first of all. Any amplifier using valves of the 4CX250 family in linear service, unless using a passive grid input circuit, needs only sufficient drive to overcome losses in the input circuit, the valveholder and valve insulation, and so on: depending on the valve type, at 144 MHz somewhere between 2 and 4W should be ample and at 432 MHz around 4-7W is required. This is another way of saying that the output from a black box of the TS-700/FT-221/IC-211 family, in the 10-15W class, is much more than necessary, and with this class of equipment the output level may easily be controlled by applying a variable negative-going voltage to the ALC line of the rig. For these particular equipments a value of about 6V seems to suffice for complete reduction of the output to zero, and this voltage can easily be obtained from any convenient low-voltage supply line such as the relay supply, or perhaps the heater line. A 1K potentiometer, with a 100K resistor from the slider to ensure a high source impedance and a diode in series to ensure that positive volts cannot reach the ALC line should suffice, well decoupled at both ends and fed to the socket with screened cable. This forms a good drive level control, and can be on the power supply front panel. With other equipments, some form of attenuator is necessary. Do not be tempted to detune the amplifier grid circuit to cut down drive; this may lead to assorted evils later on, particularly since some exciters will object to the high SWR thus introduced, and the linearity of the amplifier itselfwill also be compromised.

At this point it is worth digressing a little to explain the logic behind the statement at the beginning of this article, that under some conditions the signal from exciter plus amplifier can be cleaner than that from the exciter on its own. The average semiconductor PA stage, admirable though it is in many ways, is certainly not so in terms of intermodulation performance. For instance, the average VHF black box at full power has third-order intermodulation products somewhere between 25 and 30 dB down, with the best figure that the author has yet seen being on his old TS-700 which, carefully set up, produced a figure of —31dB. The Microwave Modules 2m and 70cm transverters measured by the author in recent years have shown anything between —22 and —27 dB: and, after hours of struggling, the author’s current home-brew transverter system, quite hilariously over-designed, tweaked and twiddled, shows third-order intermodulation products at —34 dB (and fifth-order at —39 dB) on 144 MHz at 9 watts output.

Compared with valves, with their better transfer characteristics, these figures are depressingly poor. A pair of 4CX250Bs with 2 kV on the anodes, 365V on screens and 400V...
Many bases, such as the example on the right, are sold as “good for UHF”. They are not! This type, with modification, might be usable at 144 MHz, but certainly not at 432 MHz — its internal capacitance is too high and its screening, etc., inferior. On the left is an early example of the valve family, a 4X150A; note the glass insulation between base and anode structure, as opposed to ceramic in the later types.

p.e.p. output can show third-order intermodulation products at —42 dB with no trouble at all, and the 4CX350 and ’F3 can quite easily manage the —50 dB level at 400W and slightly higher electrode voltages. The author’s last amplifier, for instance, used a pair of 4CX350A valves at 2.4 kV and 390V; at 400W its third-order figure was —49 dB and it held that performance for just under 4100 hours, before being sold, with the same pair of valves. Now of course, had that amplifier been driven by a black box with, say, intermodulation products on average 25 dB down, the above figures would have been quite academic since the system linearity could not have been better than that of the worst unit, i.e. the exciter.

However, the happy fact it that if the output of the exciter is reduced as per the “ALC” method above, its intermodulation performance can improve dramatically. The TS-700 mentioned above (31 dB down at full power) improved to —46 dB at 2.1W, which happened to be the drive required for the amplifier at 400W output; and, since the amplifier’s linearity was still slightly better than that, the overall intermodulation performance for the system at 400W was some 15 dB better than at the TS-700’s barefoot 14W level. This, of course, is a little over-simplified and approximate, since higher-order products have been neglected, and also one cannot blithely add and subtract the figures in this way without making some rather gratuitous assumptions about the precise nature of the distortion. However, the proof of the pudding is simply that at 400W the signal was about 1 kHz narrower overall than at 14W!

Indeed, the author’s favourite test for a newly constructed amplifier driven by a “black box” exciter is to alternate between exciter on its own and exciter-plus-amplifier and see what the signal quality and width is in both cases. Properly engineered, the result should be as above — unhappily, it often isn’t, so we shall resume our setting-up and see how it might be achieved. (Incidentally, some work is currently being done at G4FRX on RF negative-feedback techniques, but no firm conclusions have so far been reached.)

It is assumed that the amplifier has been built to a reasonable standard as far as screening, neutralisation and so on are concerned, and that the appropriate, correctly metered, power supplies are available. A dummy load and power meter should be connected to the output socket. In the case of a two-valve linear, equality of grid drive to the valves should be checked by removing anode and screen supplies and applying enough RF drive to show a reading on the grid-current meters (not more than 2 mA in the case of the 4CX350 series). The balancing arrangements should be adjusted for equality and the grid coupling from the input and the grid tuning re-checked. The input coupling should be set up for a reasonably low SWR, and it is usually found that coupling, tuning and grid balance all interact to some degree. Be prepared to spend some time on this job, since it is important to obtain correct settings.

At the same time, a sensitive RF indicator can be coupled to the anode circuit for a final check on the neutralising: there should be no indication whatsoever of any appearing, and a “final-final” check may be made by setting the grid drive for a few milliamperes indicated grid current, leaving it there and swinging the anode tune and load controls through all their possible positions, whilst closely observing the grid current. There should not be the slightest flicker of the meter needles, and until the amplifier passes this test note that it is not ready for anything further.

Assuming that the anode circuit has previously been checked for resonance with a GDO or similar, the next step is to switch on a receiver covering the amplifier’s intended band and tuned to a quiet frequency; this is useful to listen for the tell-tale “plop” or sundry noises indicative of instability. Next, with everything switched to ‘receive’, reach gingerly for the EHT and ancillary power switches and switch on. Nothing (apart from perhaps S9 adrenalin) should occur; if there are any noises in the receiver, indicated anode or screen currents or, in extremis, loud bangs, stop and investigate. Instability at this stage, in fact, is uncommon, and only once recently has the author come across it, in a behemoth of an amplifier using four 4CX250Bs. (I never did find out why the builder wanted to use four of them, and it never did work very well anyway!)

Next, being sure that no drive is applied and that the grid bias is at its most negative (i.e. cut off) setting, switch to ‘transmit’. Again, nothing should yet be seen on any of the meters and, assuming that all seems well, gradually adjust the bias so that the valves begin to draw current. Go to about ten or twenty milliamperes and stop. Now switch from transmit to receive a few times and note whether the anode current rises smoothly to the same place each time on transmit. If not, something is wrong, possibly the neutralising being grossly out or, more likely, something amiss in the switching. Screen current at this stage may be slightly negative or zero.

When happy, adjust the standing current to the prescribed figure (100 mA per valve, i.e. 200 mA for the two-valve amplifier) and repeat the above test. At this stage, the screen current will probably be one or two milliamperes negative, and possibly slightly unequal in the two-valve case. At no time should the grid meters or the output power meter have shown any reading at all; any output power would suggest something far wrong in the stability department (and would have shown up on the other meters) and any grid current reading would strongly suggest a faulty valve. The next step is to set the anode loading control to maximum (i.e. heaviest loading). Having done that, switch the exciter to produce carrier, increase the drive from zero and look for a small change in screen current. Then resonate the anode tank circuit by tuning for a peak (in the positive direction) in screen current. Next, resonate the grid circuit by tuning for a peak in anode current.

Drive may now be increased until either the desired value of
single-tone screen or anode current is reached, whichever comes first. Plenty of power should be indicated on the power meter now, and the final step is to adjust the loading, anode tuning and drive level to duplicate as nearly as possible the values given in the data sheet for radio-frequency linear operation. It should by possible to arrive at a state where the single-tone anode current (250 mA maximum) and the single-tone screen current occur at the same time, and the power output should be more or less what the data sheet suggests it should be. Remember the importance of loading for a set value of single-tone screen current, as discussed in the earlier section of the article, rather than for epi-topping maximum all-out power! And be careful not to exceed screen dissipation figures, since the single-tone case is the easiest way to do so and, hence, this is not quite correct.

It will now be in order to connect the antenna, and it should be easy to obtain the correct conditions by slight adjustment of anode tuning and loading. Do not adjust grid tuning or drive level. Remember the steps:

1. Resonate anode by tuning for positive peak in screen current.
2. Resonate grid (only if starting from scratch) by tuning for peak in anode current.
3. Increase drive to either single-tone screen or anode current point.
4. Adjust loading so that both occur at the same time.

An SSB signal may now be applied to the amplifier, and we may remind ourselves that the highest drive level possible will be that beyond which any increase would result in indications on the grid current meter; if we are using two valves, it will be salutary to note the power level at which this occurs on the power meter and consider the licence requirements.

It should also be remembered at this point that the peak-to-peak average ratio of anode current as read on the meter varies with the individual voice from about 2:1 to about 3:1. This means that on voice peaks the anode meter should indicate no more than half the value obtained in the single-tone (carrier) condition, which in turn should not exceed 250 mA per valve.

The next stage of the procedure rather depends on what in the way of test gear is available. If you happen to have a spectrum analyser or oscilloscope available, take a look at the signal; presumably if you do have one, you know how to use it, so further comment seems superfluous. Lacking these things, the best method is to check on-air with someone who knows what to listen for, and the important thing here is for both parties to be honest. If your colleague comes back and tells you the signal is 30 kHz wide and needs attention, don't automatically assume that his word is not "true." He might be being overloaded or that the signal does need attention, say so. If you hear stations swallowing up half the band during a contest when there's a pile-up of DLs calling you and your biggest rival is giving a total 80 less than you, and (d) is disgustingly anti-social. If you feel ashamed to say so.

Finally, if someone asks you to do some tests and you're not quite sure of what to look for (perhaps you have been licensed for a short time, or you've never been on SSB in your life before) don't feel ashamed to say so.

Basically, the main body of the signal should not extend more than about 3.5 kHz away from the "sideband" side of the signal, i.e. HF of the signal on 144 and 432 MHz, and less than that (depending on the transmit filter in the exciter) on the "carrier" side, i.e. LF — at worst, say 3-3.5 kHz but hopefully a little less. Also, the signal should fade away gracefully as you tune either side of it: there should not be odd "spitting" noises audible much more than a kHz or so away from the main body of the signal. It is sometimes useful to imagine at what distance away from the signal you could hear a weak DX station without too many problems from the strong signal; naturally it varies with the receiver's performance itself but with a reasonable receiving system you should be able to work a weak station no more than about 3 or 4 kHz away. The commonest fault found is where the main body of the signal may be of the right order of width but low-level "spashing" noises (or, in extreme cases or during contests, high-level ones) are audible 10 kHz or more away from the centre frequency. The usual culprits are: too much drive, incorrect loading, RF feedback, poor valves, too much mic. gain, poor EHT regulation, poor screen current stabilisation, wrong standing current and peak instability due to inaccurate neutralising — in that order.

At risk of tedious repetition, remember that winding the drive up because "it's a contest and the valves will take it anyway", (a) breaches the terms of your licence, (b) contributes nothing to the signal strength at the distant end, since most of the extra power goes into spurious intermodulation products, both in-band and out-of-band, (c) knocks hours off the life of the valves and, knowing Murphy, they'll probably quit halfway through the contest when there's a pile-up of DLs calling you and your biggest rival is giving a total 80 less than you, and (d) is disgustingly anti-social. If you feel ashamed to say so.

Finally in this article, we deal with types and availability of valves and bases in this family. The original designers and makers were Eimac (a division of Varian), an American company represented in this country by EMI-Varian Ltd. of Hayes, Middlesex. A small company run by two amateurs has the franchise for Eimac valves and bases for amateur use, and stock most items in the family. Other manufacturers over the years have produced the 4CX250 series under licence, and many of these are available, as well as Eimac products, on the surplus market. Unfortunately, many of them do not meet the correct specification for the valve type, which is one reason why one particular brand of new 4CX250Bs are available at the moment extremely cheaply! Be warned — they vary very much from valve to valve and, for all sorts of reasons, are likely to be very unreliable in service. Human nature being what it is, one tends to assume that something costing about £30 new which is available for £3, also new, must be a great bargain: but there are good reasons for the low price. Caveat emptor.

Also it should be noted that "surplus" valves of this class are not "surplus" because some professional transmitter engineer somewhere has had a fit of generosity! As we have seen, the limiting factor in valve life is not usually cathode emission but high screen secondary emission, and it is at this stage that the valve has to be thrown out. (Note that there is a valve in the family, the 4CX250BM, which is specially selected for low secondary emission and hence long life; a new Eimac one is well worth having if you come across one.) And quite what "ex-equipment, tested" means is anyone's guess. Valve testers for this type of valve simply do not exist outside the company that made them; all Eimac valves requiring testing have to be sent to the USA and, in nine cases out of ten, this will involve dismantling them. One assumes that "tested" means that the heater continuity may have been tested with an ohmmeter but very little else — perhaps that the valve still has all its pins and an anode structure.

Good valves and bases are an investment which should last the lifetime of the amplifier; and good engineering will give them the best possible chance to do just that.

Conclusion

This article has dealt at some length with the 4CX250 series of valves and work is still being done to find out more. In an age of transistors they are still the logical choice for operation at the legal limit of power output on 144 and 432 MHz (and they make excellent HF amplifiers too). They are extremely durable and long-lasting and also easy to work with. If you use high power, or are thinking of doing so, the author hopes that what has been written has been useful; and remember, the best investment of all, apart from decent valves and bases, is the maker's data sheet!
CLUBS ROUNDUP

By "Club Secretary"

ONCE in a while we hear from a club, saying something along the lines of "we are a small club, and thus we don't have the power to obtain speakers for our meetings." With greatest respect to these writers — what a farrago of utter nonsense! This writer knows many people who on occasion travel quite a distance to give a talk to some group, and one feels that, given a reasonable welcome, they prefer to talk to a small group rather than a large crowd. What makes a talk memorable? — is it not largely a matter of the apparent ease with which the chap up front "gets over" to his audience? Anyone who has ever given a talk which has struck a responsive chord with his audience will agree that if this happens, the task is infinitely easier, which in turn increases the rapport, and the whole thing displays positive feedback and becomes a roaring success. But — the large club with a large room and lots of chairs is daunting to anyone who doesn't like “playing to the crowd" and often under these conditions the feedback becomes negative, particularly if a joke goes flat.

The moral is clear: it doesn’t matter a tinker’s damn if you’ve only got six members, so long as you tell him that in the first place. The chances are pretty fair that if you are a small group, it’s the ‘small’ that’ll cause him to agree, if it’s borderline. But, of course, every Hon. Sec. has to realise that speakers just have to refuse sometimes, simply because it clashes with another commitment, or whatever. But the refusal will rarely be because the group is too small — and a chap vain enough to refuse on that ground won’t be worth listening to, in any case! Here endeth the homily for this month!

Clubs

The pile this time has come out reverse-alphabetical, and that’s the way we’ll go.

So let’s start with our friendly neighbourhood gang at York, in the United Services Club, 61 Micklegate, York. Something for everyone in the course of the year is the aim, and they are there to be visited on any Friday (except the third Friday in each month) at Hq.

By contrast Yeovil foregather on Thursday evenings, at Hut 101, Houndstone Camp, Yeovil; they seem to alternate between talks and informals. Latest details are probably on the way to us, but doubtless the Hon. Sec. will be pleased to bring you up to date, or tell you how to get there — his address is in the Panel.

Because their newsletter doesn’t fall into a regular pattern as compared with our own schedules, we sometimes are short on the gen for Worcester; but we are assured that they are always to be found at the Old Pheasant in New Street on the first Monday in each month.

G8AZT writes to ask for a mention for Wisbech; they have alternate Thursdays at the “Five Bells", Parson Drove, near Wisbech. The Hon. Sec. will be pleased to tell you what’s afoot — see Panel.

Wirral are overdue for an updating exercise too, but they have the first and third Wednesdays at the Sportscentre in Grange Road West, Birkenhead, and we hear through our spies that their numbers are on the increase, which is always the sign of a good club.

March 13 and 27 are the dates for the West Kent crew; on the former date they have the G2FKZ tape-slip talk on Aurora, and for the second date they are collecting the material for a slide show of members’ Shack’s — that should bring some tidiness into the chaos, and be good for a chuckle or two! The venue is the imposing Adult Education Centre, Monson Road, Tunbridge Wells, on the first and third Friday.

Wakefield have their home base at Room 2, Holmfield House, Denby Dale Road, Wakefield. On March 10 G4BLT will be showing Oracle/Ceefax versions of teletext and on 24th there is a visit by the RSGB’s RR, G4DAX.

Verulam seem to have settled in to their new Hq at Charles Morris Memorial Hall, Tyttenhanger Green, Tyttenhanger, near St. Albans. For March, the fourth Tuesday gathering sees the G3PAO Memorial Lecture being given by G3VA — Pat’s subject is one of his pet ones, namely the direct-conversion receiver; they follow up in April with G3XAP on — would you believe? — aerials.

The top floor of Grays Park Hall, Orsett Road, Grays, Essex, is home to Thurrock, and they are to be found there on any Tuesday evening. Full details from the Hon. Sec. — see Panel.

Deadline for “Clubs" for the next three months—

April issue — February 27th
May issue — March 27th
June issue — April 24th
July issue — May 29th

Please be sure to note these dates!

New Way

G8AZT writes to say that Thornbury Adult Education Centre ran a course during the autumn term called “A Guide to Amateur Radio” and based on the RSGB book of the same name. In the current term there is a practical course going on, with the aim of building a direct-conversion receiver — and through the two terms a “club" attitude and atmosphere has been allowed to grow with, it is hoped, a club being formed at the end of term. Anyone interested should contact G8AZT — we’ve put him under Thornbury in the Panel. We reckon others in places where no club exists could try such an approach — it seems a brilliant idea.

The Sutton & Cheam newsletter indicated a certain difficulty in getting their news published in this piece: they achieved this by forgetting to send us an up-date (or, if they did, it never reached us). However, they have now resumed normal service! On March 13, at Sutton College of Liberal Arts, Dick Biddulph will talk about Safety in the Shack — to offer that on Friday 13th is tempting Murphy indeed! On Friday March 27, they go to Banstead Institute for the Annual Construction Contest.

Just, as it were, up the road is Surrey, a club who make their base at T.S. Terra Nova, 34 The Waldrons, South Croydon. March 2 is a surplus equipment sale, and on 16th they have a G3PAO Memorial Lecture being given by G3VA — Pat’s subject is one of his pet ones, namely the direct-conversion receiver; they follow up in April with G3XAP on — would you believe? — aerials.

A new club has been formed in the Sunderland area, to remedy a felt shortage. The new group has extensive premises at the Brewery Yard, Westbourne Road, Sunderland. For the time being they get together every Monday, but it is hoped to extend the coverage in the future. For details — try the address in the Panel.

We are well overdue for an up-date from Stourbridge; but we can say they are based on the Longlands School on the first and third Mondays. The Hon. Sec. can give you the latest position — see Panel.

Stevensage are still based on the old De Havilland works staff canteen, even though its name has progressively changed to British Aerospace Plant B — it’s still in Six Hill Way, and the best way to find it is to contact the Hon. Sec. for directions! The gathering of the clans takes place on the third Thursday of each month.

Over now to Southgate where a new Hon. Sec. has taken over since the AGM. The venue is the Scout Hut, Wilson Street,
Names and Addresses of Club Secretaries reporting in this issue:

ACON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Epsom Road, London W3 8LB. (01-992 3778)
A.R.M.S.: N. A. S. Fitch, G3FPK, 40 Eskdale Gardens, Purley, Surrey CR2 1JQ
ASHFORD (Kent): A. J. Clarke, G3TIS, Yeomans Cottage, The Street, Brook, Ashford, Kent TN25 2SP. (Wye 8288)
BOURNEMOUTH: G. T. Lloyd, G4BGT, 6 Gorleston Road, Parkston, Poole, Dorset.
BRAINTREE: D. A. Holmen, G4JSV, Thaddesse House, East Street, Coggeshall, Colchester, Essex CO6 1SH
BRUMMOSOY: G. Taylor, G4HGF, 6 Marlborough Drive, Stourport-on-Severn, Worcs. DY13 0JH
BURRY: M. Bainbridge, G4BGC, 7 Rutrobury Close, Bury, Lancs. BL8 2TT.
CHELTENHAM: V. McClatchy, G4CWQ, 11 Compton Hill Road, Cheltenham, Gloucestershire.
CHILTERN: B. Catterall, G4WQ, 78 Faversham, Prestwood, Buckingham.
COMBLEY: C. G. Wolsey, G3GKH, 17 St. John's Road, Cowbridge, Powys.
CONGLETON: N. R. Clayton, G8UYT, 2 Moorfields, Leek, Staffs. (Leek 01-330 5521)
CONESTROU: N. R. Clayton, G3GJY, 2 Moorsfoot, Kenton, Harrow.
COVENTRY: J. Beech, G8SEQ, 14 Hollow Crescent, Radford, Coventry CV1 6JT. (Coventry (0203) 598045)
CRAWLEY: D. L. Hill, G4IQM, 6 Reigate Close, Pound Hill, Crawley, West Sussex RH10 7AZ. (Crawley 823641)
DARFORD HEATH P/F: A. Burchmore, G4BGR, 49 School Lane, Horton Kirby, Dartford, Kent DA4 9DQ.
EAST ANTRIM: J. Welch, 20 Bryanstown Brae, Doagh, Ballyclare, Co. Antrim BT39 1QJ. (Ballyclare 40384)
EAST KENT: N. Georgeon, GRPFE, 63 Cobblers Bridge Road, Herne Bay, Kent.
EDWARE: D. I. Liney, G3MNO, 119 Draycot Avenue, Kettering, Northants. NN3 1DA. (01-997 3377)
EXETER: G. Draper, 1 Carynson Close, Heavitree, Exeter EX1 3AJ. (Exeter 3377)
FARHEAD: B. Davey, G4TIG, 31 Somervell Drive, Fareham, Hants. PO16 7QJ
GRAFTON: J. Thomason, GBSYD, 20A Deans Lane, Edgware, Middx. HA8 9NN. (01-959 8785)
GUILDFORD: L. Bright, G4BHQ, 4 Doglay Farm, Shalford, Guildford, Surrey.
HEREFORD: S. Jesson, G4CNY, 181 Kings Acre Road, Hereford. (Hereford 27 3J)
IPSWICH: J. Tourell, G4IFF, 76 Fircroft Road, Ipswich, Suffolk IP1 6PX. (Ipswich 42447)
IRISH T.S.: C. Yeates, EI7AAB, 126 Beech Park, Lucan, Co. Dublin, Eire.

Winchmore Hill Green, N.21, and they have a booking on the second Thursday of each month.

The Eastbourne area is well served by Southdown, on the first Monday in the month at Chashey Home for Disabled Ex-Servicemen, Southchiff, Eastbourne. Their current newsletter has an interesting and comic description of an entry in the Lewes-Newhaven raft race — something a little out of the ordinary.

A new editor takes over the task of getting together the material that is sent in. Probably the best known of the regular contributors is our old friend, The Reading Hq. He has a unique way of bringing out the humour of the situation, and his reports are always welcome.

It is years since we last heard from Salisbury, says our brain, but now the newsletter sees the introduction from us; but this month the newsletter sees the month is finished off by G3CCH on 24th with his talk on micro-games. Besides the Tuesday sessions they have RAE and Morse classes, and are also open on Thursdays.

The Reading Hq is in the clubroom of the “White Horse” at Emmer Green, this being on the B481 Reading-Nettlebed road. Although Tuesdays give them March 3 for G8NBF to talk about video recording techniques, and March 17 they have a talk on propagation by G3LTP; leaving March 31 for a talk on GB3RD, GB3BK and GB3RU by members of the Berkshire Downs Repeater Group.

RAIBC are probably too well known to need much introduction from us; but this month the newsletter sees the membership list divided into supporters, blind/invalid licensed members and blind/invalid SWLs; the two latter categories total.
615 members, but it is of interest how ‘‘patchy’’ the membership is — which suggests that in some areas no-one is getting around to becoming aware of blind and invalid folk who are, or could be, interested in our hobby.

Down in the West, Plymouth write in to mention that various members have gained or upgraded licences; the group are to be found at Tamar Secondary School, Paradise Road, Millbridge, Plymouth, on alternate Mondays. They also warn of the Mobile Rally, on May 24 at Tamar Secondary School, with all the usual attractions.

At Peterborough the officers have been shuffled a bit by the AGM; but the venue continues to be the Scout Hut in Lincoln Road, on the third Friday in each month.

Northern Heights have March 4 when Dr. Mills of Bradford University will be talking about science and society, a committee meeting on 11th, and on March 18 a talk on new developments in hi-fi by G3U5H.

On we go to a curious situation: some corny jokes in the Mexborough newsheet, but no indication of the time, place or day of meetings. However, the file says Friday, Dolcliff Hall, Dolcliff Road, Mexborough. Or you can contact the Hon. Sec. — see Panel for his vital statistics.

Melton Mowbray have a quiz evening on March 20, at the St. John Ambulance Hall, Asfordby, with G3WKM and G3XJW presiding over the ceremony.

On March 5, Melirion have a junk sale, at the Ship Hotel, Dolgeliau; they mention specially a welcome for visitors.

The ‘‘number one hall’’ is ‘‘home’’ to the Medway group, this room being part of St. Luke’s Church Hall in King William Road, Gillingham, booked for every Friday. We understand the programme is being pasted together, so doubtless we’ll have some more details for next time.

Liverpool are at the Conservative Rooms, Church Road, Wavertree, every Tuesday, and the Hon. Sec. — see Panel — can give you the latest programme details.

On the Isle of Wight there is a group based on the “Sloop Inn’’ area, the venue being Unity Hall, Wootton Bridge.

IRTS is the national society for the EIs, and in a copy of their “hand-out” to new enquirers about the hobby we see notes of various local clubs and societies. This hand-out is a fine bit of work and could be the basis for a similar thing for other clubs, so anyone would like a copy of the IRTS one, a letter to your scribe will result in the needful, providing of course an s.a.e. big enough to fold a couple of foolscap sheets is sent as well!

Eastwards now, to Ipswich, who are now to be found on the second and last Wednesdays at the “Rose and Crown” which lies at the junction of Norwich Road (A45) and Bramford Road, on you left as you are leaving Ipswich and heading for the junction with the A12.

Hereford seems to be a booming outfit, and dare well established at County Control, Civil Defence Headquarters, Gaol Street; March 6 should be an interesting evening, with a talk on the 1979/1980 transatlantic meteor-scatter tests, G4ASR being the speaker. March 20 will be an informal.

Guildford reminds us that this is the Year of the Disabled; something we should do something about! They are to be found on the second and fourth Fridays at the Guildford Model Engineers’ Hq in Stoke Park. March 13 sees a talk on fast-scan TV by G8LES, and on 27th comes the junk sale.

Quite a change for Grafton, who have been based on evening schools for as long as the writer can recall; they have moved to a place at the “Five Bells” pub, East End Road, Finchley, where they will be able to foregather on every second and fourth Fridays throughout the year. More details from the Hon. Sec. — see Panel.

It seems that last time round we got the Fareham’s Hon. Sec. ’s call wrong in the Panel — sorry Brian, and we know you weren’t a pirate! For March the dates are 4th, for a talk on power supplies, and 18th when there will be a session on the subject of “typical shackshacks, and what and why they contain what they do” — which is a good starting bid! He doesn’t say where, but we have a guess that when you ask him he’ll say Portchester Community Centre. But check to be sure.

Reverting to the Year of the Disabled theme, Exeter are organising an amateur radio event on August 1, 2 and 3: not a contest, but just call “CQ I YDP” and see what turns up. The date has been chosen to coincide with the opening of the International Meeting of the Devon Sports Association, at St. Loye’s College.

Exeter’s own contribution will be the show stations at St. Loye’s, which will sign G3Y1D and G461YD. More details on this, and on the Exeter club itself, from the Hon. Sec. — see Panel.

Fibre optics is the subject of the talk on March 12 by Ian Macauley at Edgware, with the informal on 26th. Both meetings will of course be at the club Hq at Waiting Community Centre, 145 Orange Hill Road, Burnt Oak, Edgware.

It’s a bit hard to find all the East Kent data in the newsletter. It seems they are based on the Dominican Hall, Canterbury, where they will be on March 5 for a teach-in, which sounds to be a good opportunity to bring along someone who has a latent interest to be stimulated. March 19 sees them having an informal — they call them “pub evenings” — the venue for this being “The Sun” at St. Nicholas-at-Wade. The start time for any of these seems to be 2000.

Over to Gl, and East Antrim who are looking for members. They can be found on the second Tuesday of each month at the Carnall Hall, near Mosley, starting at eight. More details from the Hon. Sec. — see Panel — albeit we think they will have a film show on March 10.

Dumfries and Galloway have a new Hon. Sec. — see Panel — after many years service by GMB8TKA. On Sunday March 15, they have an Open Day and junk sale, the venue being the usual Cargenholm Hotel, where they also are to be found on the first and third Mondays of each month.

On we go to Derby, where March 7 sees the annual dinner/dance at the Derby Room, Albion Restaurant, Albion Street for which tickets are available from the Hon. Sec. Normal meetings at 119 Green Lane (where the club have the top floor), are on March 4 for a bring and buy sale, March 11 for a film show, March 18 for the AGM, and March 25 for a night on the air.

Dartford Heath D/F are on the boom again, and we note they have a hunt on March 8, and of course there are the regular sessions at the Scout House, Broomhill Road, Dartford, Kent, on the first and third Fridays.

G4AVV will be talking about simple logic on March 21 at Crystal Palace, plus a speaker on microprocessors if all goes well.
This one is at Emmanuel Church Hall, Barry Road, SE22. Unfortunately we don't have very much information in the Crawley newsletter to hand about the March goings-on; they have a base at Trinity United Reformed Church Hall, Ifield, where they are on the second Wednesday; in addition they have informals at each others homes — to attend one of these it would be a good thing to contact the Hon. Sec.

Coventry Technical College get together on Monday evenings in the Winfray Annexe. March 2 is specially noted for a 'clean' junk sale.

We mustn't forget the Coventry club where we have the venue — Baden Powell House, Radford, Coventry — and an indication that they alternate lectures and such with informals. However, no dates given so we must refer you to the Hon. Sec. — see Panel.

Down west now, to Cornish where March 5 sees them listening to G3OCB on test gear, at the SWEB Clubroom, Pool, Camborne.

Congleton Library serves as home for the Congleton group; the first Wednesday in every month, with all sorts of attractions being planned by the committee.

The Colchester Institute (wherein resides the club of course!) is in Sheepen Road. On March 5, with the help of G3YWM, they learn how to tackle TVI, and on 19th there is an Open Forum to cover club and RSGB activity.

Pressing on before the space runs out, Chiltern foregather on March 25 in the canteen of John Hawkins Ltd., Victoria Road, High Wycombe. This road is off West Wycombe Road, and we understand there is plenty of parking space in front of the furniture factory.

It is nice to hear that Chesham has an active club again, meeting on Wednesdays. At the time of their letter they were negotiating for a lock-up room, which may have been settled by now. However, check with the treasurer on (02-405) 5625, to avoid the risk of going to the wrong place!

Cheltenham, and no mistake about their place — the Old Bakery, Chester Walk, Clarence Street, at the back of the Public Library. March 5 is a constructors contest, and on 20th they have a natter evening.

Getting started on 23cm. is the subject for March 10 at Bury; and they are to be found there — Mosses Community Centre, Cecil Street — every Tuesday, not to mention RAE and Morse classes.

Bromsgrove have their AGM on March 13, and it seems there will be a session at Parkgate on 17th. Details from the Hon. Sec. — see Panel.

Now at Braintree on 16 March there will be a talk on airfield communications and navigation systems by G4HFR of the CAA. The venue is at Braintree Community Centre, which is next to the bus station. Looking at the map with the newsletter it seems to be as fine a collection of one-way streets going the wrong way as the bus station. So take care not to get lost!

Bournemouth are still using Hq at the Dolphin Hotel in Holdenhurst Road on the first and third Fridays.

BARTG is the "national" that covers all amateur RTTY enthusiasts — details from the Hon. Sec., at the address in the Panel.

Ashford in Kent is a small club with a QTH at the top of Hart Hill, near Charing, Kent. They advise new members to get in touch first, with the Hon. Sec., for directions.

A.R.M.S. covers the /M fraternity, and gives details of mobile rallies, issues awards, and in the newsletter carries articles of interest to the /M operator.

Finally, Acton, Brentford & Chiswick, where the gathering of the clans is at the Town Hall, Chiswick, on March 17, when G3CCD will be demonstrating the Tektronix Type 468 oscilloscope.

Finis

So it is, for another time. Deadline dates are in the 'box', and the address as ever "Club Secretary", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.

HF BANDS FREQUENCY SYNTHESISER

IAN H. MOTH, B.Sc., G8SOH

The design presented here is of an experimental frequency synthesiser suitable for use at HF. It is based on a project of Mr. Jessop's, G8KVG article on synthesisers in the October 1980 issue of Short Wave Magazine. Readers are advised to study Mr. Jessop's article which provides a lucid introduction to the subject.

Theory

The design is built round an NE562 integrated circuit, a device which incorporates most of the components of a phase locked loop system. Extras to be provided are a crystal oscillator and divider to provide the 'reference frequency', and a 'programmable divider' to divide the variable oscillator's output. Fig. 1 shows a block diagram of the system. The reference frequency is derived from a 1 MHz oscillator by division by 10, i.e. 100 kHz; therefore the VCO may be set to N*100 kHz where N is an integer. Since the phase lock loop can be set to 100 kHz intervals, the gaps may be filled in with a VFO having only a 100 kHz range. Table 1 lists a set of suitable frequencies for use with a receiver or transceiver having an IF of 9 MHz and an interpolation mixer VFO which sweeps between 4.0 MHz and 4.1 MHz. Logically, the system could construct any frequency between 100 kHz and 100 MHz but practical reasons, primarily IC4 and IC5's speed of response, limit the VCO's output to less than 20 MHz. Different equipment will require different choices of system frequencies, and this is left to the individual experimenter. This article concentrates on the digital part of the circuitry.

![System Block Diagram](602)

The VCO covers the band of interest in 100 kHz steps, therefore the VFO need only have a 100 kHz range to provide infinitely variable tuning.

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The Short Wave Magazine, March, 1981

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The VCO covers the band of interest in 100 kHz steps, therefore the VFO need only have a 100 kHz range to provide infinitely variable tuning.
Operation

Fig. 2 is the circuit diagram. IC1 is a general purpose IC containing six inverters; two of these are used for a 1 MHz oscillator and one is provided as a buffer. IC2 is a decade counter and divides the input frequency by 10. For reasons which will become clear below it is necessary to divide again by two and this is performed by IC3, a dual flip-flop. IC4 combines the functions of phase detector, filter and VCO, and VCO outputs are available at pins 3 and 4. Note that both pins stay at a +12 volts level.

IC's 5, 6 and 7 are decade counters. Under normal circumstances they would count input pulses from 0 to 999 and then start over again. They are wired however, so that on reaching 999 the 'carry' pulse activates the 'load' command and the counters restart, not from 0 but from the number set up in binary coded decimal on the data input pins 3, 4, 5 and 6 of each chip. The 'load' pulses may be treated as the result of dividing the VCO frequency by N, and this signal is applied to a flip-flop to convert the pulse train to an equal mark-space square wave. It is this square wave which is compared to the reference frequency in the phase comparator to complete the phase lock loop.

Frequency Programming

The number which should be set up on the counter inputs is (999—N) where N is the number it is wished to divide by. Referring for example to Table 1, division by 150 will yield a 15 MHz output; the 9's complement of 150 is 849, and so 1000 0100 1001 would be set up on the counters (1 = High, i.e. 5 volts, and the least significant bit, is on the right). If one were building a full HF general coverage receiver it might be worth designing a module to convert the outputs of a set of thumbwheel switches to yield the correct numbers, but for amateur band use a couple of multi-position switches and diode board would probably be sufficient. See Fig. 3.

It will also be necessary to alter C9 as the bands are changed; C9 sets the VCO free running frequency and this should be adjusted.
to each band centre. Some experimentation may be necessary, but as a first approximation let $C_9 = \frac{300}{f(MHz)}$ pf. It will be necessary to arrange for the switch carrying these capacitors to be close to the IC.

### Full System Design

The injection frequencies (Table 1) will be set by the main equipment's IF, and a number of filter/amplifiers at these frequencies will require to be built. The choice of VFO frequency is more or less arbitrary, but it must be low enough to ensure the chance of achieving good stability and high enough to easily accommodate the required 100 kHz range. In addition it must not leave the VCO with too high a frequency to handle.

Another pitfall is spurii: for example, on 20 metres this system described here may give a spurious response at 14.000 MHz, depending on the attention paid to screening and on the nature of the mixer. Since it is right on the band edge it is not considered serious. It should be noted that a controlled leak of the signal from pin 12 of IC2 would comprise an effective marker generator, providing harmonics at 100 kHz intervals, even up to VHF.

### Construction

The seven ICs may be mounted on Veroboard, ideally DIP breadboard. Layout is important, but not critical: the constructor should take care to minimise the length of links carrying the higher frequencies, these will be from pins 3 and 4 of IC4 (the VCO outputs), and around the buffer amplifier Q1. Miniature screened wire might be used to some advantage here. The TTL requires a 5 volt supply, reasonably well decoupled; the NE562 requires a higher voltage, 18 volts will be sufficient, although it is worth trying to see if your particular '562 will work at 12 volts as this is probable and certainly more convenient.

### Summary

This synthesiser has considerable potential and is very easy to build. It is hoped that many constructors will be encouraged to 'go synthesised' and match the very latest in shop-bought equipment.
Dear Sir — I recently sat the Radio Amateur's Examination and found the multiple-choice style less demanding in examination technique and labour than compiling written answers. One could concentrate fully on the question and suggested short-list of answers without regard to one's own words and grammar, etc.

Part I was fairly straightforward but, to my knowledge of the art, Part II contained many teasers: this is not a complaint — I may have scraped through. However, supposing I've failed what technique and labour than compiling written answers. One could found the multiple-choice style less demanding in examination test, it is doubtful whether a candidate could recall parrot-fashion self-training of examinees? While any exam is in part a memory misunderstandings of the subject.

Surely the only positive answer is evidence of the attempt: that is, the examination question book and completed answer sheet. If these were returned to candidates together with a 'key' of the correct answers and dispel failures, then something should be available to help them search their handbooks for the correct answers and dispel their handbooks for their faculties, or unlucky enough to have failing eyesight or some other handicap. Amateur radio is something all and take part in with the same pleasure — in fact we are all equal with gardens usually only about 36 feet long. How about having some input from experts, or those with first-hand experience, on the problems and solutions of antenna construction suitable for city dwellers. For the flat-dweller this entails problems of earthing, suitable aerials for the top of the building, feeders, etc.; as for the town house amateur, space is the major factor with gardens usually only about 36 feet long. Any articles on these practical problems I think would be of great interest to many readers.

Thanks very much for years of interesting reading.
M. F. Sinnott, ON8KP (ex-MP4TDB)

Dear Sir — There are few hobbies which can be enjoyed by the majority of people, whether they are lucky enough to have all their faculties, or unlucky enough to have failing eyesight or some other handicap. Amateur radio is something all of us can enjoy and take part in with the same pleasure — in fact we are all equal when speaking into a mic., tapping a key, or turning the dial on a communications set.

So, as this is the Year of the Disabled, it would be really wonderful if every one of us — shortwave listener as well as licensed amateur — went out to find a handicapped person and showed them what amateur radio is all about, and the happiness it could bring into their life.

Here is a CQ call to all readers — especially you reading this letter — to go out now, ready to bang on doors and find somebody who may be housebound, an invalid, or perhaps with very bad sight unable to see the goggle-box, and introduce them to a brand new hobby: our very own amateur radio! Why, you might even take along a receiver, string up a temporary aerial and let them listen for a while... over the weekend, for instance?

Douglas Byrne, G3KPO

Address your letters for this column to "A Word in Edgeways", SHORT WAVE MAGAZINE, 34 High Street, Welwyn, Herts. AL6 9EQ.
THE SHORT WAVE MAGAZINE

March, 1981

VHF BANDS

NORMAN FITCH, G3FPK

Awards and Tables

GORDON Emmerson, G8PNH, has been awarded VHF Century Club certificate no. 330 for 2m. operation, from Widdrington in Northumberland. He first came on the air with a Trio TS-700 a.m. and 35 watts amplifier, but these were soon replaced by a TS-700S and home made, QV06-40A, 100 watts amplifier. The aerial is an 8-Over-8 fold array 35ft. a.g.l., the QTH being 2½ miles from the coast and 100ft. a.s.l. Gordon is also on 70cm. with 3 watts from an Icom IC-402, the aerial being a 48-ele. Multibeam at 40ft. Best DX has been to France. He has plans for a tower later on.

Alan Owen, G4HMF, from Ipswich, submitted an interesting list, only three of which were G stations. The first station comprised a Yaesu FT-101 and Europe transverter, now superseded by a Trio TS-770E. Various amplifiers have been used, but the aerial has been the popular 16-ele. Tonna Yagi throughout. Alan says, “The future really lies with 70 and 23cm.”

John Hunter, G3MIV, has won his “200” sticker for his QTH Squares Century Club certificate no. 3. Only one of the 25 contacts was on SSB. Two were via an Aurora, 19 by MS and 4 by Sporadic E. Mike Lee, G3YVF, has achieved sticker no. “175” for his QTHCC certificate no. 7 and now has 182 squares confirmed. Of the 28 cards submitted, 7 were for tropo contacts, the rest for MS QSOs.

For details of the rules for the VHFFCC and QTHCC awards, send an s.a.e. to the address at the end of this feature.

This month sees the new, annual four band table of counties and countries. The points are based on the current administrative counties and regions, plus the Irish Republic countries, the countries being the “DXCC” listing plus GM (Shetlands) and IT9 (Sicily). It has certainly got off to a flying start with G2AXI amassing 115 points in January, something of a record.

Repeater Notes

The VHF Kent repeater near Dover, which used to be G3SKR on channel R4, has now been changed to GB3KS on ch. R1. This change is so that the new relay at Maidstone can operate on R4. Its callsign will be GB3KN. Scottish 2m. FM-ers have a new relay operating from the Isle of Mull on ch. R4, under the call, GB3HI. It is giving good coverage from Fort William, right down the Ayrshire coast.

For the record book, Dick Howel, G3KRH, mentions that, when operating as GM3KRH last May from Sutherland, he made the first QSO with a Faroes station via the Y9YR relay on ch. R1, from mainland Britain. This repeater is located some 800m. a.s.l. and is almost a “local” one for GMs in the Western Isles, Orkneys, Shetlands and northern mainland.

Beacon News

Two more 6m. beacons to add to the list. From Brazil, PY2AA is on A1 on 50.055 MHz running 25 watts to an omnidirectional aerial, 25ft. a.g.l. Reception reports to PY2AA Beacon Project, P.O. Box 22, 01000 Sao Paulo SP, Brazil. From South Africa, ZS6YHF is on 50.005 MHz and reception reports should be sent to ZS5TR, 86 Springside Road, Hillcrest Park, Durban 3652, Republic of South Africa. ZS6YHF also operates on 144.925 MHz.

DX Notes

Any activity from Spain is to be welcomed. From March 15 for two weeks, four German amateurs propose to operate from AA, AZ, ZA and ZZ squares. The actual locators given are such that one could literally step from one square to the next. The four involved are DL7YW, DL7ZL, DC7OH and DD6FW and the gear comprises a Yaesu FT-221R with a muTek board, a 500 watts PA and 10-ele. Yagi. The main aim is to enable fellow German 2m. operators to work Spain via MS. They will be QRV on the 20m. VHF net and the two DL7s will use CW at 500-600 letters-per-minute for MS while the others may operate on SSB.

Roger Thorn, G3CHN, gleaned from a QSO with EA1TA, that the latter has shipped sixteen Cushcraft “Boomer” aerials to EA8KS. Salvador has also ordered a one kilowatt amplifier so is obviously aiming to put the Canary Islands on the E-M-E map. Quite when all this will happen was not clear. Incidentally there is an 80m. Spanish VHF net on Thursday evenings from 2300 GMT on 3,720 kHz, according to G3MIV. Participants include EA1TA, IED, 3ADW and 6FB.

PE1CCN/A has been worked by G8VLQ and was on a gas platform in the Single Operator section with 2,220 pts. The event attracted 31 entries. The 2m. Fixed Contest took place a week later and regular contributor Geoff Brown, G41CD, won the Single Operator section with 2,220 pts. from 183 contacts. Geoff Grayer, G3NAQ, came second — 2,008/270 — and G8EEM third — 1,324/173. In the Multi-Op. part, the winner was G3ZIG/A — 2,66/264 — with G4DEZ runner up — 2,647/259 — and G3NNG in third place — 2,188/324.

Contest News

Results: — The 2m. leg of the Verulam ARC’s Contest was run on Nov. 30 last and the convincing winner was the Cheltenham Club, GSBK/P, who scored 9,996 points. G8ZHP (Lincs.) was 2nd with 6,519 pts. and G8KNU/P (Hereford & Worcs.) 3rd with 5,054 pts. The event attracted 31 entries. The 2m. Fixed Contest took place a week later and regular contributor Geoff Brown, G41CD, won the Single Operator section with 2,220 pts. from 183 contacts. Geoff Grayer, G3NAQ, came second — 2,008/270 — and G8EEM third — 1,324/173. In the Multi-Op. part, the winner was G3ZIG/A — 2,66/264 — with G4DEZ runner up — 2,647/259 — and G3NNG in third place — 2,188/324.

Co-ordinating events: — The final three legs of the BATIC Activity Contest are on March 4, 12 and 20 — see p. 759/Feb. The week end Mar. 7/8 sees the 144/432 MHz event from 1600 to 1600. Single and Multi-Op. sections with a compulsory, consecutive six hour break for the former. Usual report/serial number swapping, plus locator and QTH. Only one callsign and no concurrent, two-band operating. Radial ring scoring, boded up by adjudicators to work out final placings.

Saturday, March 21, from 1900-2300 GMT sees the UHF leg of the AGCW-DL Contest for brass pounders. 432.000-432.150 MHz is the section to use and there are three classes. “A” is less than 3.5w. RF; “B” is less than 25w. and “C” more than 25w. Exchanges to be RS/T, serial no., class and locator; e.g. 579001/B/EL25a. This is a single-op. only affair. Scoring system is:— Class A with Class A, 9 pts., A/B = 7; A/C = 5; B/B = 4; B/C = 3 and C/C = 2 pts. Each locator square worked counts for one multiplier point and each DXCC country contacted is worth 5 pts. The final score is the points times the sum of all the multipliers. Logs by Apr. 30 to Edmund Ramm, DK3UZ, P.O. Box 38, D-2358 Kaltenkirchen, Fed. Rep. of Germany.

The Barking Radio and Electronics Society is running its 144 MHz Contest on Mar. 29 from 1300-1700 GMT. Three sections. 1 for licensed ops. in Essex; 2 for ops. outside of Essex; 3 for all s.w.l.’s One point per contact but club station, G3XBF/P, counts 10 pts. The multiplier is the number of postal counties worked with non-U.K. countries counting as additional counties. Fixed stations only for this one and entries, postmarked not later than 15 days after the event, to:— A. L. Sammons, G8IZN, 80 Lyndhurst Gardens, Barking, Essex, IG11 9XZ. The exchanges to be RS(T), serial no. and postal county, by the way.

The Satellites

AMSAT-UK Secretary Ron Broadbent, G3AJJ, reports that satellite observers have concluded that the rise in base plate
temperature, as revealed by the channel 4 telemetry, is due to a reduction in the tumble rate of Oscar 8. Apparently this effect has been noticed before and there are suggestions that it is seasonal. As a consequence, 0-8 may not be in the scheduled mode.

Launched on Nov. 15, 1974, Oscar 7 is still functioning satisfactorily, far exceeding the anticipated useful life. AMSAT requires telemetry data from both satellites and U.K. readers can send these to G3AAJ at 94 Heron Gate Road, London E12 5EQ. An s.a.e. will bring full details of AMSAT-UK from G3AAJ.

Six and Four Metres

John Baker, G8MHW, (Dyfed) is the only reader to mention 6m. this month. His last crossband 10/6m. QSO was on Jan. 15 with VE1AVX, who also worked G4BWF and G5KX and heard ZB2YHF. The Canadian was last heard by GW4UL/A in Tredegar on the 23rd. John states that the Irish authorities have extended the EI’s 6m. permits for another six months only. He says that some of the Ws want to try double-hop E’s later on this year and he wonders if FY7THF and ZD8TC will be copied this way, too.

G4MHW’s nightly 4m. skeds, with G2AOX seen on again since Harry dismantled a lot of scaffolding. John runs an automatic CW transmission giving “call, QRA etc.” from 1950 to 2045 with odd QSOs in between. G3LLS (Warks) is a newcomer to 4m. and has a QQV06-40A PA stage and a 4-ele. Yagi. John lists January QSOs with G2AXI, QQV06-40A PA stage and a 4-ele. Yagi.

Two Metres

Until the last four days of the month, 2m. conditions in January were unsparing. Nevertheless, as observed from G3FPK, activity was very high with many new calls heard and worked. Some of the rarer-from-the-south counties were worked within a few days of the start of the year. The end-of-the-month spell of excellent tropo., plus the Aurora on Feb. 6, as enabled your scribe to accure 65 counties, only four short of last year’s total.

G4ARI has worked three more counties already this year than in the whole of 1980 and Tim’s list shows a nice assortment of GW, GM, GJ and GU stations at the end of January, plus DJ, F and PE. New welcome to Stephen Fletcher, G4GXL, from Bromsgrove, (Worcs.) who, with wife Jackie, G8RZO, has already this year more than in the whole of 1980. He enters the squares table with 58 counties and G-Plus-twos, with few G4s.

“N” comprised most of the activity with few further north. Most stations seemed to be G3s and G-Plus-twos, with few G4s.

For Tony Collett, G8GXE, (Berks.) nothing much was achieved till the 23rd when G3ZYY (Cnwl.), GW8FWH (S. Glam.) and G4JICD were worked. GUK3KFT and FICOFO (XI) were contacted on the 29th, and DL6BAG (DN); PE0HND (CM) and ON1AIIX (BK) in the afternoon of the 30th. Later that evening, F9FT (CJ) was working following a QSY down from 70cm. Jon Stow, G8LFJ, (Essex) feels deprived at having missed the Dec. 19 Ar. The openings at the end of Jan. produced nothing new, apart from FICOFO on the 25th.

Another new call in the annual table is that of John Brakespear, G8RZP, (Bucks.) who, with wife Jackie, G8RZO, are a well-known “His and Hers” team on 2m. and 70cm. He also got off to a flying start with some of the erstwhile rarer counties. At his second only MS attempt, Len Challis, G8SKG, (Lincs.) worked OE5KE (HI) in 10 mins., and F6GGF in 15 mins. on Jan. 3 at 0542 and 1429 respectively. YU3ULM was copied “26” but Len gave up after 45 mins. He would like to arrange more skeds. and asks if there are any Class A amateurs locally operating on 80m. who could assist on a Sunday. During the lift on Jan. 30, he worked over fifty continents in the evening alone.

Vernon Boldy, G8SVG, (W. Yorks.) is another reader who has started on the MS trail and who completed with OK1KKH (HJ) in the Quadrants, but skeds with EA6FB and YU2RGO did not come off. He enters the squares table with 58 worked. Chris Easton, G8TFI, (London) had some interference problems which kept him off the air during broadcasting hours from Jan. 27. Even so, he has done quite well, particularly in the end-of-the-month lift. Terry Hackwill, G8WRD, (Berks.) is another new entrant in the tables whose station consists of a Yaesu FT-480R, 40 watts amplifier and 9-ele.

Tonna Yagi.

G8VR was working in the U.S.A. during most of January and took the opportunity of operating for a time with KAI1GT (ex-G8KEB) in the January VHF Sweepstakes organized by the ARRL. Ken comments that the VHF scene in the United States is vastly different from that in Europe, with very little activity on SSB and virtually none on CW except for a handful of die-hards. Most activity is on FM and particularly repeaters, the latter being happily free from the troubles which plague such operation in the U.K. There is now virtually no place in the entire U.S. continent which is not within range of one or more repeaters. These are privately owned and maintained, and it is typical to become a member of a repeater group close to the home QTH at an annual fee of around $20. Casual use of other repeaters when “passing through” an area is encouraged however, and foreign
Tony Levy, G4JDEE, (Manchester) it was much weaker. Later on, in a contact with the event was still going on but with signals G3FPK. Ar and neither were any so copied at G4IJE, did not hear any of the beacons via GM4KNQ on SSB in YS square, and number of strong GMs were heard and usual and seemed to work everyone. A high. From the London area, the QTFs amazing affair of Dec. 19, but activity was often happens, just after our deadline, over 1,800kms. are not too frequent. As G4IGO. suggests an E's mode possibility. The time, Spanish Band 2 FM radio and that reader who may opt out of the annual table again, along with EA1QJ and EA I TA, all EA1ED (VD) was worked at 0007 on the F1CRP/P (YI) and F1CBE (XI), while Dec. "Boomer" in mid-Jan. Prior to this, on has now put up a GD3YEO, operating mobile with a Liner path make out they seemed to have an exclusive the 23rd, but they were not strong enough conditions. He heard two or three EAs on January provided some quite remarkable beacons:-DJ2LF (DL) on 432.002 MHz and PA stations in CL, CM, DL, DM and 20 counties up to Jan. 29. Their direct path is virtually non-existent on the band and very poor on 2m. G4JWA, running 10 watts, was a phenomenal signal at 55dB. over S9! On the afternoon of the 31st, both G3PBV and G8ABP in Paignton noticed Doppler effects when beaming east, akin to the phase distortion heard on medium wave broadcasts. John Quarmby, G3XDY, (Suffolk) says that not much happened till the 25th of Jan. when he had a "half QSO" with EI9Q. On the 30th, he worked LX2LA (DJ22f) for a new country and square, then DB1VY and DC8RA, also in DJ. John mentions a couple of useful beacons:-DJ2LF (DL) on 432.002 MHz and ON4UHF on 432.050 MHz which latter had very narrow FS keying making it difficult to copy, even though it was S9-plus.

G8GXE worked some reasonable GDX from Jan. 20 and, on the 30th, some DL, F and PA stations, including PF7F in Co, square, a new one for Tony. G3COJ, G8LFI, (Essex) is now on the band using a Yaesu FT-200 as "prime mover", with a Microwave Modules transverter and 21-ele. Tonna aerial. In the late January lift, he got his signals across to DK and DL squares and also worked G8PWX (ZP) in rare Tynne and Wear. G8RZP is making progress on 70cm. and had already worked 20 counties up to Jan. 29. G8TFI found conditions generally better on this band than on 2m. but restricted operating hours due to the aforementioned interference problems has limited Chip's efforts. On Jan. 27, G8VJR (Lines.); G8EXI and G8WAP/P (CWyd) were worked. The 30th saw G8IDZ (I.O.W.) in the log. The year's first D, F and ON were also contacted. The early morning of the 31st saw very good propagation with several D and PA stations in CL, CM, DL, DM and DN squares, the best being DF3XU (FN31a). G8WRD uses his FT-480R to progress around 2300. There was a second phase too, as Jim Rabbitts, G8LFB, (London) and others discovered, around 0200 on the 7th Colin Rule, G8KWI, was flying over the Irish Sea on the night of the 6th and noticed some of the rare, noclutter clouds which seem to be associated with Auroral events. They were at 280° QTF at about 20° elevation and were noticed at 2100 GMT.

### Seventy Centimetres

Dick Madigan, EI9Q, (Co. Waterford) is the latest newcomer to 70cm. and runs about 100 watts output. He is QRV on Sunday mornings from 1000. Tom Donnellan, EI9BG, in Co. Clare, is also on the band from VM square and gave GJ4ICD his 87th square on 70cm. G8WVH mentions that EI9Q has an 88-ele. Multibeam. Reg can work Dick any time and hopes to have a 48-ele. Multibeam aloft soon. G2AXI took advantage of the end-of January lift to work the majority of his 30 counties and some continents.

**QTH LOCATOR SQUARES TABLE**

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</table>

Starting Date January 1, 1975. No satellite or repeater QSOs.
drive an MM transverter to get on to the band, the aerial being the popular 21-cm. from Tonna. D, F, ON and PA have been worked.

GD2HDZ failed in two attempts to work GJ4ICD, but did make it with F6EAS on Jan. 29 and PA0EZ on the 31st. GJ4ICD told your scribe that the EAs in VD square are QRV on 70cm. and possibly they will be on 23cm. some time, too. There are reports that Syledis transmissions have been causing problems again in certain areas.

Twenty-three Centimetres

"Probably spurred on by the extension of the Annual Table, I gave this band quite a lot of attention." So writes G3PBV, who runs 15 watts of NBFM from a mast head varactor tripler, with a 15-over-15 Yagi. On Jan. 29, Dave worked G8BH and G8SWZ in Wolverhampton; G4KZP (ex-G8GE) and G4BEL in Cambridge; G8HJ (Staffs.); G8IFT nr. Birmingham and G4DSF (Coventry). The next day saw a repeat QSO with G8SWZ who was 59 in Newton Abbott, running just one watt through 60ft. of UR-67 cable! G6FK, (Penn.) was also contacted but G83CLE was inaudible. Bob Short G3GNR, in Okehampton, could not hear G8SWZ and even had difficulty on 70cm. He could copy Dave's NBFM when beaming east instead of southeast. Although G3GNR has worked G8ABP in Paignton over the direct path in flat conditions, they could not do so in the lift. However, the next day they did manage a QSO, by both beaming east, and G3GNR's signal with G3PBV was the best Dave has ever had from Bob. Strange things happening across Dartmoor!

During the big lift, G3XDY concentrated on 23cm. On Jan. 29, John worked about 15 stations to the west and southwest with G8ABP and G3AUS in Devon the best DX. The best conditions were on the 30th when DB1VVY (DJ) was worked but a test with LX2LA was unsuccessful. Next, John gave F9FT (CI) his first G QSO on 23cm. It seems that from Jan. 1, the French amateurs have regained the use of the 1,296 MHz part of the band after years of not being allowed to work more than 100-200 miles, such as mobiles and poorly sited folk, should use 144.30 as at present. Dave suggests that those seeking DX to the north could move a few kHz below "300", and those calling to the south could shift above it, though he admits those beaming east or west might be in a bit of a dilemma.

It seems to your scribe that, when there is little activity, due to time of day or poor conditions, a common calling frequency has merit. However, once activity is good, a calling frequency becomes unnecessary. The band plans are not too easy to recall, especially on 2m. with dedicated QRGs for random MS, SSB calling, CW calling, RTTY, FAX, SS/TV, etc., so any further complications could become self-defeating. For example, the local/DX SSB calling/working suggestions broadcast over G2RS have met with a very mixed response! As observed at G3FPK, when there is a lot of activity, quite a few stations call CQ anywhere but on "300", particularly when wanting to contact controllables. The end-of-Jan. lift provided clear evidence of this.

Operating Notes

Don Bullett, G3EAO, has received a QSL for a contact with G3EAO/A during a contest last year. However, either the sender misread someone else's call or somebody was "borrowing" Don's call. He does not operate on 2m. and has no /A location either.

With the ever-growing number of newcomers to the VHF bands, once more the perennial plea that when you call "CQ", do please say where you are and where you are beaming, especially if your call is too recent to be in the latest Call Book. On the controversial subject of the SSB calling frequency on 2m., G3PBV offers the idea that stations not expecting to work more than 200-300 miles, such as mobiles and poorly sited folk, should use 144.30 as at present. Dave suggests that those seeking DX to the north could move a few kHz below "300", and those calling to the south could shift above it, though he admits those beaming east or west might be in a bit of a dilemma.
SALE... SALE... SALE... SALE... SALE... SALE...


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A FEW EXAMPLE BARGAINS

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Price</th>
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<tr>
<td>TS1955 HF Transceiver (inc. DFC)</td>
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<td>TR2200G Portable (SH)</td>
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<tr>
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<td>Philips FM321 70cm Mobile</td>
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<td>1296/28 Transverter</td>
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<td>9V 1A Mains Transformer</td>
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<td>Vero Keyboard Console</td>
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<td>D.P. Illuminated Sw</td>
<td>75p each</td>
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<tr>
<td>BC54724i coded Thumbwheels</td>
<td>£2.00 each</td>
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<tr>
<td>10000mfd 16V Electrolytic</td>
<td>£1.25</td>
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<td>K100 Scanning Rec.</td>
<td>£170.00</td>
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<td>Alarm (Ultra sonic type)</td>
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<td>TR8300 70cm Mobile (SH)</td>
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<td>MLED50 Red LED</td>
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<td>10W 2M PA Kit</td>
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<td>3 pole mini, toggle Sw</td>
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<td>D.P. Illuminated Sw</td>
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<tr>
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<td>£160.00</td>
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<td>MLED50 Red LED</td>
<td>40p for 5</td>
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All prices include VAT, but add min. 50p post or £4.50 Courier Service.

DON'T DELAY — all items are offered subject to availability and while stocks last only.

Many special bargains for personal shoppers... come if you can... if not phone or write for complete list. Pay by Barclaycard, Trustcard, Visacard, Access, Eurocard, Master Charge, etc. Cash, Cheque, H.P., or the Catronics Credit Charge Card.

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Tel. Louth (0507) 600455 Telex: 56121 WEST G
The TS-830S is a high-performance, very affordable, HF SSB/CW transceiver with every conceivable operating feature built in for 160 through 10 metres (including the three new bands). The TS-830S combines a high dynamic range with variable bandwidth tuning, IF shift, and an IF notch filter, as well as very sharp filters in the 455kHz second IF.

**TS-830S FEATURES**
- 160-10 metre coverage, including 3 New Bands
- 220WPEP input (SSB); 180W DC input (CW)
- Wide Receiver Dynamic Range
- Variable Bandwidth Tuning (VBT)
- IF Shift and IF Notch Filter
- Built-in Digital Readout
- 61468s in the PA, with RF negative feedback
- PLL frequency control system for stability
- RF Speech Processor, Noise Blanker and other desirable operating features
- New compact size — only 333(W) x 333(D) x 133(H) mm

The TS-130S series is an incredibly compact, full-featured, all solid-state HF SSB/CW transceiver for both mobile and fixed operation. It covers 160 to 29.7MHz (including the three new amateur bands!) and is loaded with optimum operating features such as digital display, IF shift, speech processor, narrow/wide filter selection (for both SSB and CW modes), and optional (DFC-230) digital frequency controller.

**TS-130S FEATURES**
- 80-10 metre coverage, including 3 New Bands
- 200W PEP input (SSB), 160W DC input (CW) on 80 and 20m
- 160W PEP input (SSB), 140W DC input (CW) on 12 and 10m
- Built-in Speech Processor
- CW Narrow/Wide filter selection (with optional filter)

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- Wide Dynamic Range
- Many other Convenience Features

**THE '9000 PACKAGE FOR VHF**

<table>
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<th>Component</th>
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<td>TRIO TR-9000</td>
<td>+ BO-9 BASE</td>
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<tr>
<td>+ PS-20 POWER SUPPLY</td>
<td>LIST PRICE SEPARATELY £402.45</td>
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**THE '720 PACKAGE FOR V/UHF**

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<td>YAESU FT-720RV (2M)</td>
<td>+ E-72L EXTENSION CABLE</td>
<td>£305</td>
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<td>+ FP-4 POWER UNIT</td>
<td>ADD £30 FOR FT-720RU (70CM)</td>
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**THE '120 PACKAGE (while stocks last)**

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<td>TRIO TS-120S</td>
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<td>+ MC-35S MICROPHONE</td>
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**THE '7625 PACKAGE (while stocks last)**

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<tr>
<td>TRIO TR-7625 (25W 2M)</td>
<td>+ RM-76 REMOTE UNIT</td>
<td>£279</td>
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**ALL PRICES INCLUDE VAT AT 15%**

SEND FOR LISTS OF OTHER EQUIPMENT AVAILABLE (large SAE please)

ACCESS — VISA ACCEPTED — H.P. (ask for WRITTEN QUOTATIONS)

CREDIT CHARGE — CONTINUOUS CREDIT — SEND FOR DETAILS
**TR8000**

The TR8000 is a compact lightweight 2 mtr. FM USB/LSB/CW Transceiver with an outstanding array of functions. FM1 for 25 KHz steps (for mobile use) FM2 for precise 100 Hz steps (for base station use). Microcomputer control giving many advanced features. Built in Switching memory. New type microphone with UP/DOWN switching. Built in high performance. N. Blanker. Side tone for CW. ALL THIS PLUS MUCH MORE FOR £345.00 inc. VAT.

**TRIO R820 Receiver**

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SM200 Monitoroscope...£197.90

T102 Linear Amplifier...£596.00

PS30 AC power supply for TS 120V...£44.16

MB100 Mobile mounting bracket...£17.25

R1000 Receiver...£298.00

TR2400 Hand Held 2m Transceiver...£198.00

TL120 Linear Amplifier...£129.80

H35 Headphones...£21.95

H54 Headphones...£37.06

MC5000 Microphones...£24.15

MC305 Hand Microphone 5kHz...£15.00

TS 130 HF Transceiver...£404.34

AT 100 Antenna Tuner...£72.89

PS30 Power Supply...£86.10

AT 100 Speaker...£28.46

AT 2200 Antenna Tuner...£106.72

SP200 Speaker...£33.14

SP40 Mobile Speaker Unit...£26.89

**TR2300**

TR2300 2m Synthesised Portable Transceiver. We have lost count of the number of this model we have sold over the last 12 months. Hikers, caravanners, climbers, you can hear them all over the country and reliability which is the essence of TRIO equipment. £165.75

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BY 1/4 5 element yagi...£11.27

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BY 1/2 6 element beam...£31.06

PMR 14 6/14 element Para beam...£44.86

5X2 3 element crossed yagi...£22.77

BY 2/5 7 element crossed yagi...£28.40

10X3/1 10 element crossed yagi...£37.72

Q4/2 4 element Quad...£23.69

Q5/2 5 element Quad...£31.39

Q6/3 6 element Crossed Yagi...£30.12

D9/3 8 element Crossed Yagi...£77.40

UGP 2/5 ground plane...£16.12

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MB/M80 25cm Multibeam...£58.33

TAS N° 3 5 wire whip...£15.26

C35/8 Column...£44.27

C8/12 8x12 Column...£66.00

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Carrage on Antennas £3.00.

**TR7800**

Continuing Trio's policy of presenting the Radio Amateur with the finest equipment available, we were pleased to announce the TR 7800 2m FM Mobile Transceiver. 15 memory channels - Priority channels with simple - 2500 KHz or non-standard operation - "Priority alert" with signal on M14 priority channel. Reversal of scan function. ALL THIS and MORE for £335.50.

**TRIO R1000**

R1000 Receiver...£285.20

The latest general coverage from Trio. Frequency coverage 200 KHz to 30 MHz in 30 bands. Using an advanced PLL system. Full digital readout. Three filters 15 KHz for AM - 5 kHz for AM - 2.7 kHz for CW. Also incorporates a noise blanker. Operation from 100-240V AC or 12V DC.
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Add variable selectivity to existing communications receivers without internal modifications. Gives extremely sharp pass-band edges for truly exceptional filtering performance on all modes but especially for SSB. Its 10 poles fully variable low and high pass filtering gives sharp roll off filter edges even more than normal crystal filters. A separate manually tuned notch filter is also fitted. In "cw" mode all 12 poles of filtering are combined to give exceptional skirt selectivity.

Connects in series with loudspeaker.

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Model PC1 converts any good two metre SSB receiver or transceiver into a superb general coverage communications receiver. Coverage 0 to 30 MHz in thirty synthesised bands of 1 MHz and no receiver modifications are required. Advanced parametric mixer and LS1 frequency synthesiser ensure that the overall performance is limited only by that of the main receiver. Also usable with 28-29 MHz receivers via a conventional 2-metre converter.

Automatic r.f. Speech Processor

Model ASP

Makes your transmitted speech louder and clearer for a given transmitter power. The "Beta-Ray" r.f. speech processors Model ASP adjusts itself to suit your voice level and your microphone. Simply select the degree of r.f clipping in steps of 6 db. Connects in series with microphone.

Model FL2

Advanced parametric mixer and LS1 frequency synthesiser ensure that the overall performance is limited only by that of the main receiver. Also usable with 28-29 MHz receivers via a conventional 2-metre converter.

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Model FL2

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Automatic r.f. Speech Processor

Model ASP

Makes your transmitted speech louder and clearer for a given transmitter power. The "Beta-Ray" r.f. speech processors Model ASP adjusts itself to suit your voice level and your microphone. Simply select the degree of r.f clipping in steps of 6 db. Connects in series with microphone.

Model FL2

Advanced parametric mixer and LS1 frequency synthesiser ensure that the overall performance is limited only by that of the main receiver. Also usable with 28-29 MHz receivers via a conventional 2-metre converter.

Automatic r.f. Speech Processor

Model ASP

Makes your transmitted speech louder and clearer for a given transmitter power. The "Beta-Ray" r.f. speech processors Model ASP adjusts itself to suit your voice level and your microphone. Simply select the degree of r.f clipping in steps of 6 db. Connects in series with microphone.

Model FL2

Advanced parametric mixer and LS1 frequency synthesiser ensure that the overall performance is limited only by that of the main receiver. Also usable with 28-29 MHz receivers via a conventional 2-metre converter.

Automatic r.f. Speech Processor

Model ASP

Makes your transmitted speech louder and clearer for a given transmitter power. The "Beta-Ray" r.f. speech processors Model ASP adjusts itself to suit your voice level and your microphone. Simply select the degree of r.f clipping in steps of 6 db. Connects in series with microphone.

Model FL2

Advanced parametric mixer and LS1 frequency synthesiser ensure that the overall performance is limited only by that of the main receiver. Also usable with 28-29 MHz receivers via a conventional 2-metre converter.

Automatic r.f. Speech Processor

Model ASP

Makes your transmitted speech louder and clearer for a given transmitter power. The "Beta-Ray" r.f. speech processors Model ASP adjusts itself to suit your voice level and your microphone. Simply select the degree of r.f clipping in steps of 6 db. Connects in series with microphone.

Model FL2

Advanced parametric mixer and LS1 frequency synthesiser ensure that the overall performance is limited only by that of the main receiver. Also usable with 28-29 MHz receivers via a conventional 2-metre converter.

Automatic r.f. Speech Processor

Model ASP

Makes your transmitted speech louder and clearer for a given transmitter power. The "Beta-Ray" r.f. speech processors Model ASP adjusts itself to suit your voice level and your microphone. Simply select the degree of r.f clipping in steps of 6 db. Connects in series with microphone.

Model FL2

Advanced parametric mixer and LS1 frequency synthesiser ensure that the overall performance is limited only by that of the main receiver. Also usable with 28-29 MHz receivers via a conventional 2-metre converter.

Automatic r.f. Speech Processor

Model ASP

Makes your transmitted speech louder and clearer for a given transmitter power. The "Beta-Ray" r.f. speech processors Model ASP adjusts itself to suit your voice level and your microphone. Simply select the degree of r.f clipping in steps of 6 db. Connects in series with microphone.

Model FL2

Advanced parametric mixer and LS1 frequency synthesiser ensure that the overall performance is limited only by that of the main receiver. Also usable with 28-29 MHz receivers via a conventional 2-metre converter.

Automatic r.f. Speech Processor

Model ASP

Makes your transmitted speech louder and clearer for a given transmitter power. The "Beta-Ray" r.f. speech processors Model ASP adjusts itself to suit your voice level and your microphone. Simply select the degree of r.f clipping in steps of 6 db. Connects in series with microphone.

Model FL2

Advanced parametric mixer and LS1 frequency synthesiser ensure that the overall performance is limited only by that of the main receiver. Also usable with 28-29 MHz receivers via a conventional 2-metre converter.

Automatic r.f. Speech Processor

Model ASP

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Model FL2

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Automatic r.f. Speech Processor

Model ASP

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MICROWAVE MODULES

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<td>Emoto 502CXX</td>
<td>£138.75</td>
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<tr>
<td>KR 403</td>
<td>£108.00</td>
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<tr>
<td>AR 40</td>
<td>£59.00</td>
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<tr>
<td>KR 950/2A</td>
<td>£60.00</td>
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<td>Rotor Bearing</td>
<td>£12.00</td>
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<tr>
<th>Product</th>
<th>Price</th>
<th>Depositments</th>
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<tr>
<td>Yaesu FT 902DM</td>
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<tr>
<td>Standard C7800</td>
<td>£275</td>
<td>£109</td>
<td>£13.81</td>
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A GOOD START is essential to short wave listening and expert advice is important in achieving this — so here's some — if you've made up your mind to buy a receiver you should be aware it will perform only as well as the antenna it sees. The old adage regarding wire antennas "As long and as high as you can" is still good, but at best is only good for PEAK PERFORMANCE on one or two frequencies, at worse none.

Whichever frequency you tune your receiver to, for PEAK PERFORMANCE on all frequencies you need good matching between your Receiver and Antenna to hear the best from it. If you plan to listen on the high frequency bands up to 30MHz then you know you can't have an antenna for every frequency! Or can you? — Well not quite! BUT we can offer you MUCH IMPROVED PERFORMANCE from your receiver by using an antenna tuning unit, that will electrically change the length of your antenna to match the frequency you select — in other words — A MATCH AT ALL FREQUENCIES.

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<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
<th>Gain (dBi)</th>
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<tbody>
<tr>
<td>ATV3</td>
<td>Vertical 10/15/20</td>
<td>5.0</td>
</tr>
<tr>
<td>ATV5</td>
<td>Vertical 80/10m</td>
<td>5.0</td>
</tr>
<tr>
<td>A14/4/11</td>
<td>7-element 11db Yagi 144MHz</td>
<td>11</td>
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<tr>
<td>2148</td>
<td>Junior Boomer 14 element 15db Yagi 144 MHz</td>
<td>15</td>
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<tr>
<td>A519</td>
<td>19 element &quot;Boomer&quot; 16.5db long Yagi 144 MHz</td>
<td>16.5</td>
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<td>ARX2</td>
<td>Ringo Ranger 6db Vertical 144MHz</td>
<td>6</td>
</tr>
<tr>
<td>AR10</td>
<td>Ringo Ranger Vertical 10 metres</td>
<td>10</td>
</tr>
<tr>
<td>A10/3</td>
<td>3-element Yagi 7.6db 10metres</td>
<td>7.6</td>
</tr>
<tr>
<td>A15/3</td>
<td>3-element Yagi 7.6db 15metres</td>
<td>7.6</td>
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<tr>
<td>A20/3</td>
<td>3-element Yagi 7.6db 20metres</td>
<td>7.6</td>
</tr>
<tr>
<td>A3</td>
<td>3-Band HF Yagi 8db 10/15/20metres</td>
<td>8</td>
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Prices include VAT, *carriage extra. (a) £1.50; (b) £2.50; (c) £3.50

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<tr>
<th>Model</th>
<th>Price</th>
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<tr>
<td>FRG-7</td>
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<tr>
<td>FRG-7000</td>
<td>£239.00</td>
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<tr>
<td>FRG-7700</td>
<td>£239.00</td>
</tr>
<tr>
<td>MEMORY UNIT FOR FRG-7700</td>
<td>£83.95</td>
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<th>Price</th>
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<tbody>
<tr>
<td>AVO Digital Multimeter Model DA211</td>
<td>£51.75</td>
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<tr>
<td>AVO Digital Multimeter Model DA212</td>
<td>£74.75</td>
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<tr>
<td>AVO Digital Multimeter Model DA116</td>
<td>£122.93</td>
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<tr>
<td>AVO Digital Multimeter Model DA117</td>
<td>£165.25</td>
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<tr>
<td>Taylor Analogual Multimeter Model 131</td>
<td>£15.20</td>
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<td>Taylor Analogual Multimeter Model 132</td>
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<th>Agents for G2DYM Antennas. SEM equipment. Rotators and Valves: Most</th>
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<tbody>
<tr>
<td>G3FX</td>
<td>£418.00</td>
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<tr>
<td>100M XASTRO 1028X</td>
<td>£199.00</td>
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<tr>
<td>FRG-7700</td>
<td>£249.00</td>
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<td>FRG-7700</td>
<td>£249.00</td>
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**New Equipment**

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<th>Price</th>
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<td>Cushcraft.</td>
<td>Agents for G2DYM Antennas. SEM equipment. Rotators and Valves: Most</td>
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<tr>
<td>DPW35 Pocket Digital Multimeter</td>
<td>£35.95</td>
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<tr>
<td>PFM30 Pocket Digital Multimeter</td>
<td>£58.42</td>
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<tr>
<td>FT207R</td>
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<td>FC707</td>
<td>£74.75</td>
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<td>FT707</td>
<td>£109.25</td>
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<td>FC902</td>
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<td>FT901ZD</td>
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<td>FP12</td>
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<td>FP301D</td>
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<td>YE7A</td>
<td>£21.27</td>
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<td>YC300U</td>
<td>£110.25</td>
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<td>YC601</td>
<td>£185.75</td>
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<td>YP150</td>
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<td>FP300</td>
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<td>FRG-7000</td>
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<td>FRG-7000</td>
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<td>YPC4</td>
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<td>YG844</td>
<td>£8.62</td>
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<td>YE7A</td>
<td>£198.00</td>
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**Sinclair Equipment**

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
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<tbody>
<tr>
<td>DM235 Digital Multimeter</td>
<td>£58.99</td>
</tr>
<tr>
<td>Carrying Case for DM235</td>
<td>£10.92</td>
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<tr>
<td>Mains Adaptor for DM235</td>
<td>£5.17</td>
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**Triode Equipment**

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<tr>
<th>Model</th>
<th>Price</th>
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<tbody>
<tr>
<td>New Tria R-300 Receiver, in stock, £193.89. All Bands with xtal calibrator.</td>
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<tr>
<td>Ashville Old Hall, Ashville Road, London El 1 4DX Tel. 01-5394986</td>
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**Pdv**

<table>
<thead>
<tr>
<th>Model</th>
<th>Price</th>
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<tbody>
<tr>
<td>TP 5SN, £21.27. Model 700, £68.42, Also in stock Leather Cases for above.</td>
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<thead>
<tr>
<th>Model</th>
<th>Price</th>
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<tr>
<td>TMK METERS: Model TP1OS, £21.27. Model 700, £68.42, Also in stock Leather Cases for above.</td>
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<tr>
<td>Model TP16</td>
<td>£72.16</td>
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<tr>
<td>Model 3020 (Digital)</td>
<td>£115.00</td>
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<th>Price</th>
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<tr>
<td>18.05. Model 500TU-B, £33.23. Model TW20CB, £39.56.</td>
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<tr>
<td>HOFFLEETS</td>
<td>£58.99</td>
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<td>MULLARD SUB -MINIATURE 1000pf 63vw DISCS @ 25p dozen.</td>
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<td>X BAND DETECTOR DIODES CS8B @ 25p.</td>
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<tr>
<td>X BAND TUNING VARACTORS 1 to 2pf or 3 to 4pf @ £1.65.</td>
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<td>X BAND GUNN DIODES with data @ £1.65.</td>
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<tr>
<td>MULLARD 806 TYPE TRIMMERS 4pf, lOpf, 2Cpf, ,6C:if. All @ 15p each.</td>
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<td>MULLARD BFR64 470 X BAND DETECTOR DIODES CS8B @ 25p.</td>
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<tr>
<td>MULLARD UHF MODULE BGY 23 12 volt 420-480 MHz Min. Power Out 7 watt</td>
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<tr>
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