

The SHORT WAVE Magazine

VOL. XXXIX

MARCH 1981

NUMBER 1

 **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.
- Step attenuator to prevent overload.
- Three IF filters for optimum AM, SSB, CW. 12-kHz and 6-kHz (adaptable to 6-kHz and 2.7-kHz) for AM wide and narrow, and 2.7-kHz filter for high-quality SSB (USB and LSB) and CW reception.
- Effective noise blanker.
- Terminal for external tape recorder.
- Tone control.
- Built-in 4-inch speaker.
- Dimmer switch to control intensity of S-meter and other panel lights and digital display.
- Wire antenna terminals for 200 kHz to 2 MHz and 2 MHz to 30 MHz. Coax terminal for 2 MHz to 30 MHz.



OPTIONAL

- SP-100 matching external speaker.
- HS-5 and HS-4 headphones.

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



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 IFs) 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
 Frequency Range:
 160 metres (1.8-2.0 MHz)
 80 metres (3.5-4.0 MHz)

40 metres (7.0-7.5 MHz)
 20 metres (14.0-14.5 MHz)
 15 metres (21.0-21.5 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(WWV)-15.5 MHz)
 49 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)
 Auxiliary band.

VBT/SELECTIVITY CONTROLS

Separate controls on the same shaft provide variable bandwidth tuning as well as selection of four IF filters:
IF SHIFT Varies (shifts) IF passband away from interfering signal.
AF GAIN/RF GAIN Separate controls adjust volume and RF again.

RIT/NOTCH CONTROLS RIT allows receiver to be tuned off frequency, while not affecting transmit frequency, when in transceiver mode. Notch control tunes notch within IF passband for eliminating interference. Notch frequency remains the same, even when IF shift is utilized.

DRS DIAL Satin-smooth VFO tuning dial system provides accurate analog

frequency readout. LSB, USB, and CW frequencies are accurately read from the same pointer.

BAND SWITCHES Select frequency bands from 15 MHz (WWV), 160 through 10 metres, the 49, 31, 25, and 16-metre shortwave broadcast bands, and an auxiliary band.

PRESELECTOR Peaks turned circuits in RF amplifier stage for increased selectivity and sensitivity. RF amplifier coil is dual-tuned.

AGC SWITCH Automatic-gain-control circuit switchable to slow or fast response, or completely off.

RECORD JACK Makes recording off the air simple.

MODE SWITCH Selection of AM, CW, upper or lower sideband or RTTY.

RF-ATTENUATOR SWITCH 10 dB steps of attenuation from 0 to 40 dB to prevent overloading from nearby stations, and for precise signal comparison.

DIGITAL HOLD Locks counter and display while VFO is tuned to another frequency. Helps return to "hold" frequency.

R-820 receiver. . . . £690 inc. VAT
Securicor carriage

LOWE ELECTRONICS Ltd.

CHESTERFIELD ROAD, MATLOCK, DERBYSHIRE DE4 5LE.

TEL. 0629 2817/2430



THE SHIMIZU SS 105S *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.

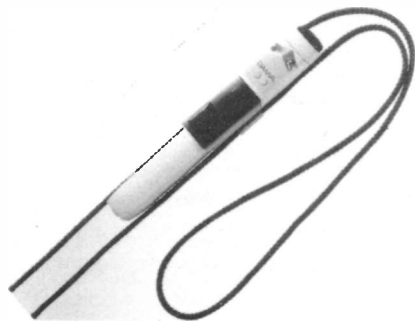
		Net.	VAT	Carr.
SS105S	80-10m solid state SSB/CW/FM transceiver. Semi kit form	225.00	258.75	4.50
SE-NB	Noise blanker kit	6.75	7.76	.50
SE-FMrx	RX FM discriminator kit.	15.00	17.25	1.00
SE-FMtx	TX FM generator kit	11.00	12.65	1.00
SE-MK	RX marker kit	9.60	11.04	.50
0.5 CWf	500 Hz CW filter	19.50	22.43	.50
	Optional band crystals	3.00	3.45	.25

AR 245 *2 metre hand held synthesized 144-146 5/1 watt*

AR 240A *2 metre hand held synthesized 144-146 1½ watt*

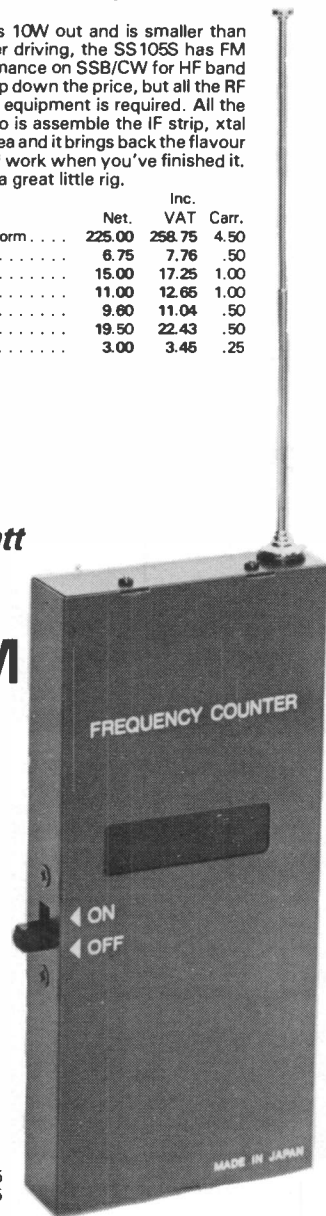
AR 245 £178 inc. VAT. AR240A £158 inc. VAT. Carriage £1.50.

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.



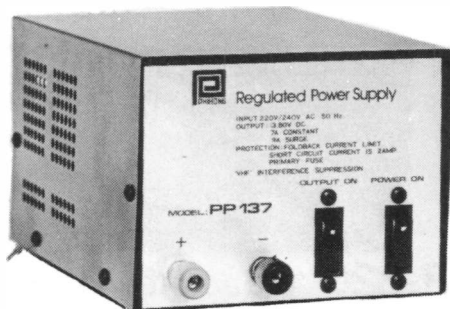
FREQUENCY COUNTER *Model HFC 55*

The HFC 55 is a sensibly priced, easy to use digital frequency meter covering 10 kHz-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.



HEAD OFFICE AND SERVICE CENTRE

Chesterfield Road, Matlock, Derbys. Tel. 0629 2817 or 2430.

Open Tuesday-Friday 9-5.30, Saturday 9-5.00. Closed for lunch 12.30-1.30.

For all that's best in ham radio, contact us at Matlock.

For full catalogues send 48p in stamps with your address. Mark enquiry PW.



TRIO TR8400

pacesetter in amateur radio

70 centimetres is on the move

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 ± 1.6 MHz 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.

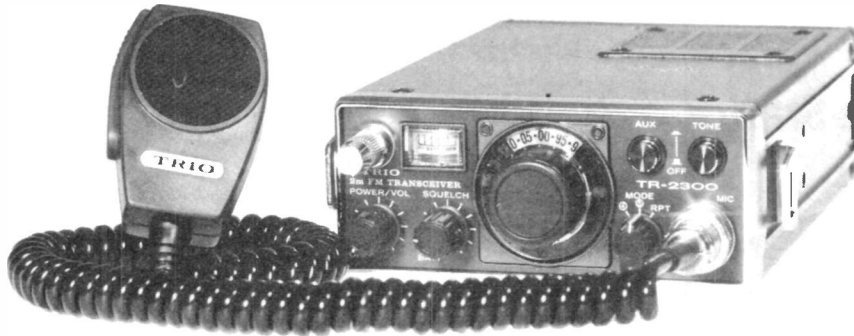
- Up/down manual band scan in 25KHz steps with UP/DOWN microphone supplied with TR-8400.
- Only 5 3/4 inches wide, 2 inches high, and 7 5/8 inches deep.
- TONE switch.



- Four-digit frequency display and S/RF bar meter. Other LEDs indicate BUSY ON AIR, and REPEATER operation.
- HI/LOW (10 W/1 W) RF output power switch.

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

TR2300 *the 2 metre portable*



- The TR2300 is a really remarkable package which combines all the advantages of a portable station with those of a sophisticated mobile rig. With the TR2300 you get full 2 metre band coverage from 144-146 MHz in fully synthesized 25 KHz channels together with 600 KHz 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 TR2300 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.**

TR7800 *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 (± 600 KHz or simplex). M13 M14 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).
- Repeater REVERSE switch.
- Selectable power output 25W (HI)/5 (LOW).



- LED S/RF bar meter.
- TONE switch.

**TRIO TR-7800 £268 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 | * WESTERN | * ANTENNA SPECIALISTS |
| * J-BEAM | * G-WHIP | * YAESU MUSEN |
| * RSGB PUBLICATIONS | * BEARCAT | * 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 RECVLVER 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)**



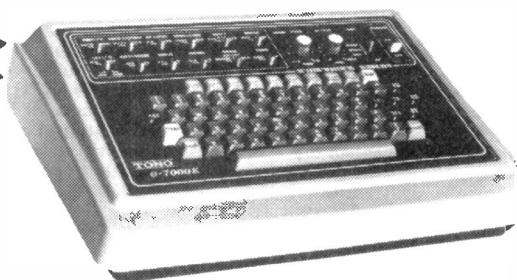
ICOM's new 9-band HF Transceiver – the IC-720A beats the lot!

**IC-720A
£795 incl**

Some 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 RIT.
 - 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 packet for £795 inc. VAT (13.6V operation – matching mains PSU £100)
- Solid State 500W linear available shortly.

**FOR ONLY
£640.00
INCL.**



**Tono Theta 7000E
A great computer
on offer from Thanet**

The new 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 of the Outstanding Features
COMMUNICATIONS COMPUTER THETA 0-7000E

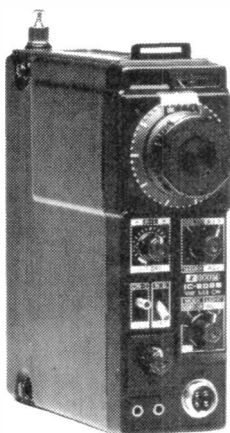
UHF and Composite Video Output * Printer interface * Wide range of transmitting and receiving speeds – 10CW speeds + 8RTTY * Built-in demodulator for high performance for 170, 425 and 820 Hz shift * Crystal controlled modulator for ASFK – Hi or Lo tone * Convenient ASCII key arrangement * Large capacity display memory

– 2 pages 32chr x 16 lines split screen for Rx & Tx if required * Automatic transmit/receive switch * Anti-noise circuit * Battery backed-up memory 7 channels of 64chrs * 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 identification 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 (Ry and QBF).

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

**IC-202S
£169 INCL.**

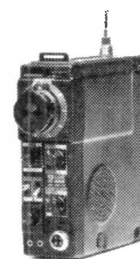


**What a
tremendous
pair**

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 VXO 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 xtals 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.

**IC-402
£242 INCL.**



The 70cm twin of the 202S having very similar features, covering the frequency range of 432-435.2 MHz.

SEND FOR TECHNICAL DETAILS

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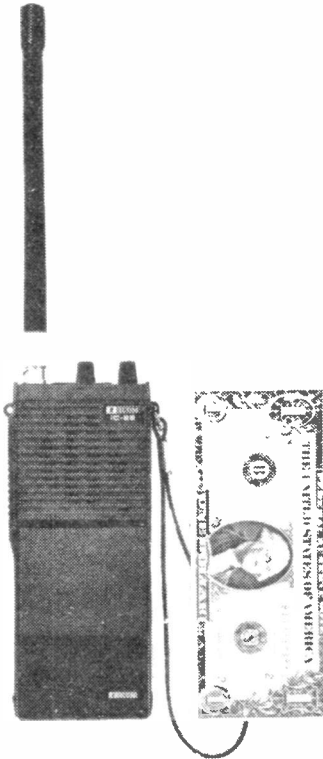
ICOM

TELEX : 965179



It's Small- but very Sensitive

IC-2E Handy Talky £159^{INCL.}



CHECK THE FEATURES

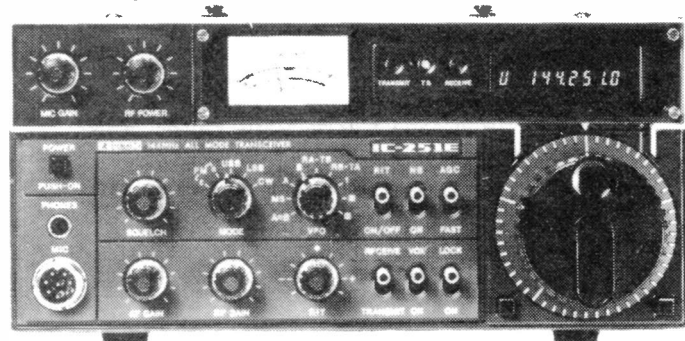
FULLY SYNTHESIZED — covering 144-145.995 in 400 5kHz steps.
 POWER OUTPUT — 1.5W with the 9V rechargeable battery pack as supplied — but lower or higher output available with the optional 6V or 12V packs.
 BNC ANTENNA OUTPUT SOCKET — 50 ohms for connecting to another antenna or use the Rubber Duck supplied.
 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 600 kHz 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			CHARGERS ETC		
ICBP3	9 VOLT PACK (AS FITTED) REPLACEMENT	£15.50	IC-DC1	9 VOLT REGULATOR PACK	£7.50
ICBP2	(7.2 VOLT) (1 WATT)	£22.00	IC-CP1	CAR CHARGER LEAD WITH CIGAR PLUG	£2.75
ICBP4	EMPTY CASE (WILL TAKE SIX 'AA' SIZE NI-CADS)	£5.00	IC-BC25	CHARGER FOR BP3 AS SUPPLIED	£3.70
ICBP5	11 VOLT PACK (2-3 WATTS)	£30.50	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.}

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ICOM

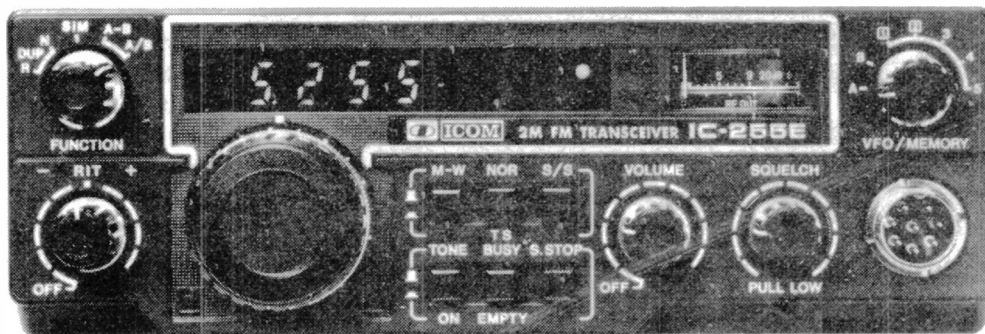


for only
£255
INCL.

IC-255E

An experts mobile choice

NOW WITH
IMPROVED
FRONT-END



**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 (\pm 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	(0282 38481)		



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.

FT-707 In base station format



Here we show the 707 together with the matching FP-707 PSU, FC-707 ATU and FV-707DM VFO memory.



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 36p 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

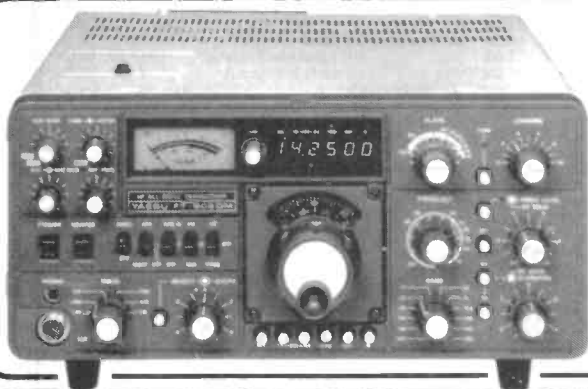


Conservatively rated at 1200W PEP input, the new WARC model incorporates all the new bands.

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/ZD. This fine HF transceiver out-performs many a more expensive rig.

FT-225RD Deluxe 2 metre base station



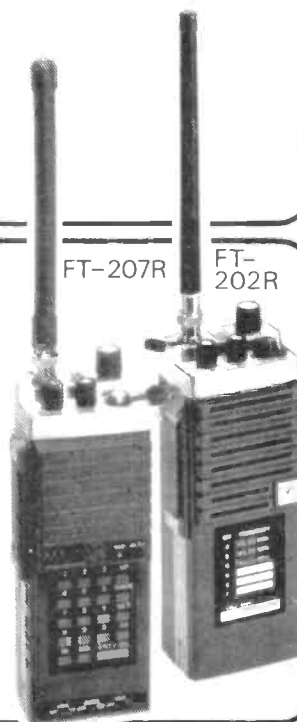
The tried and proven all-mode 225RD has a very comprehensive specification including memory option, variable power output and DC operation for portable working.

FT-202R 2 metre hand-held

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

FT-207R Synthesized 2 metre hand-held

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



AGENTS:
 NORTH WEST—THANET ELECTRONICS LTD. GORDON, G3LEQ, KNUTSFORD (0565) 4040.
 WALES & WEST—ROSS CLARE, GW3NWS, GWENT (0633) 890 146.
 EAST ANGLIA—AMATEUR ELECTRONICS UK—EAST ANGLIA, DR T. THIRST (TIM) G4CTT, NORWICH 06325 866
 NORTH EAST—NORTH EAST AMATEUR RADIO, DARLINGTON 0325 55969
 SOUTH EAST—AMATEUR ELECTRONICS, UK—KENT KEN McINNES, G3FTE, THANET (0843) 291297

As from May 1st.
our new opening hours
are 9.30–5.30 Tues. to
Sat. continuous and
CLOSED all day Monday.

Amateur Electronics UK
508-516 Alum Rock Road·Birmingham 8
Telephone: 021-327 1497 or 021-327 6313
Telex: 337045
Excellent Parking Facilities

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 ¼ mile turn right at Clock Garage and proceed towards city. After one mile look for traffic lights at Fox & Goose and immediately over the lights take minor left fork into Alum Rock Road. We are located one mile from this point.
FROM NORTH. Leave M6 at Junction 6 (Spaghetti) and follow left fork down to traffic island beneath motorway complex. Take third turning off to Lichfield. One mile further on follow A4040 to the right and within 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.

WATERS & STANTON ELECTRONICS

18/20 MAIN ROAD, HOCKLEY, ESSEX. Tel: (0702) 206835

OUR BEST ADVERTISEMENT . . . IS OUR NAME!

MAIL ORDER—Anywhere in UK HEAVY PARCELS—Securicor
OTHER PARCELS—Parcel Post or British Rail
All goods sent are covered free by our own insurance

PRICE LIST—MARCH 1981

	£	£	£	£	£	£	
TRIO							
TS830S	160-10m transceiver	639.52	(4.50)	YM35	Up/down mic for	12.65	(0.75)
VFO 230	Digital VFO	194.45	(4.50)	YM36	500 ohm noise canclg. mic	13.80	(0.75)
AT230	All band ATU	106.72	(1.50)	YM37	500 ohm mic for FT 707/FT107	8.63	(0.75)
SP230	External speaker	33.14	(1.50)	FT707S	160-10m 9 band trans 10w	465.75	(n/c)
DS2	Dc pack for TS830S	39.90	(1.50)	FT707	160-10m 9 band trans 100w	499.00	(n/c)
DRC 230	Digital frequency controller	163.13	(1.50)	FP707	230v AC PSU	109.25	(2.50)
YK 88C	500Hz CW filter	28.75	(1.00)	FC707	160-10m atu	74.75	(1.50)
YK 88CN	270Hz CW filter	28.62	(1.00)	FV707DM	Digital vfo for FT707	178.25	(n/c)
TS520SE	160-10m transceiver	437.00	(4.50)	MR7	Metal rack	14.95	(1.50)
DG5	Digital readout	103.50	(1.50)	MMB2	Mobile mount	21.85	(1.00)
SP520	Speaker	17.25	(1.50)	FRB707	160-10m 1200 watt linear	362.25	(n/c)
VFO520S	External VFO	98.90	(4.50)	FL2100Z	150w dummy load/meter	63.25	(1.75)
YG3395C	CW filter 8 pole	37.95	(0.50)	YP150	8 ohm comm. headphones	10.35	(1.25)
DK520	Conversion kit	10.35	(0.75)	FF501	Low pass filter	19.95	(0.75)
AT200	160-10m antenna tuner	82.80	(1.50)	QTR24D	24 hour quartz clock	24.96	(1.50)
SM220	Station monitor scope	197.80	(4.50)	FP12	230v AC 12 amp DC	78.20	(2.50)
BS8	Panoramic display	48.30	(0.50)	FP4	230v AC 4 amp DC	41.40	(2.50)
BS5	Scan board	48.30	(0.50)	FSP1	0.5-30 MHz comm. receiver	189.00	(n/c)
R820	Amateur band receiver	690.00	(4.50)	FRG7	Battery holder	5.00	(1.00)
YG455C	500Hz CW filter	58.65	(0.50)	BHGR7	0.2-30MHz	P.O.A.	
YG455CN	250Hz CW filter	60.95	(0.50)	FRG7000	Frequency counter	189.75	(n/c)
YG88A	6kHz AM filter	34.50	(0.50)	YC500U		270.25	(n/c)
TS180S	160-10m solid state trans.	679.65	(4.50)	YC500E	1981 version of FRG7000	309.00	(n/c)
VFO180	External VFO	96.60	(1.50)	FRG7700	MEM with frequency memory	380.00	(n/c)
SP180	External speaker unit	36.80	(1.50)	FRG7700	144-146 MHz handheld 2 watt	199.00	(n/c)
AT180	Matching 200W ant. tuner	95.45	(4.50)	FT207R	500Hz CW charger	18.98	(1.50)
YK 88C	500Hz CW filter	28.75	(0.50)	NC2	230v AC charger	39.68	(1.50)
YK 88S	Second SSB filter option	28.75	(0.50)	NC9	230v AC charger	7.48	(0.75)
PS30	AC power sply. for TS180S	85.10	(4.50)	NBP9	Ni-cad battery pack	16.68	(0.75)
TS130S	8 band 200W mobile trans.	491.05	(4.50)	FLC2	Heavy duty case	20.70	(0.75)
TS130V	8 band 20W mobile trans.	404.34	(4.50)	PA2	12v PSU	16.68	(1.00)
DFC230	Digital frequency controller	163.13	(1.50)	FBA1	Ni-cad p'ck charging adaptor	2.59	(0.35)
TS120S	80-10m 200W mobile trans.	432.40	(4.50)	FT225R	144-146 MHz Base station	449.00	(n/c)
TS120V	80-10m 20W mobile trans.	347.30	(4.50)	MEMT225	With digital readout	499.00	(n/c)
TL120	200W pep linear	128.80	(4.50)	DIST 25	Memory option module	92.00	(n/c)
MB100	Mobile mount	17.25	(1.00)	FT480R	Readout for FT225R	57.50	(1.00)
YK 88C	500Hz CW filter	28.75	(0.50)	FT720R	2m 10w SSB/CW/FM trans	369.00	(n/c)
YK 88CN	270Hz CW filter	28.62	(1.00)	S72	2m/4m/70cm control head	149.50	(n/c)
VFO120	External VFO	89.70	(4.50)	E72S	Switching box	55.20	(n/c)
SP120	External speaker unit	25.30	(1.50)	E72L	2m of connecting cable	23.00	(1.00)
SP40	Mobile speaker unit	26.89	(1.50)	720RV	4m of connecting cable	27.20	(1.00)
AT130	100W antenna tuner	72.89	(1.50)	720RVH	10W 2m module	166.75	(n/c)
PS20	AC pwr. sply. for TS120/130V	44.85	(4.50)	720RU	25W 2m module	172.50	(n/c)
PS30	AC pwr. sply. for TS120/130S	85.10	(4.50)	MMB3	10W 70cm module	201.25	(n/c)
MA5	5 band mobile aerial system	74.75	(4.50)	NEW	Mobile mounting bracket	5.00	(1.50)
TL922	160-10m 2KW linear	595.70	(4.50)	FDK VHF/UHF EQUIPMENT	FT1CTT (WARC) 9band HF trs t.b.a.	(n/c)	
MC50	Deluxe desk microphone	24.15	(1.50)	M700EX	FT1012D (WARC) 9bd HF trs t.b.a.	(n/c)	
MC35S	Fist mic 50k impedance	13.80	(1.00)	M750E	2m FM 25w 12.5/25kHz trans	199.00	(n/c)
MC30S	Fist mic 500 ohm impedance	13.80	(1.00)	Expander	2m FM/SSB/CW 144-146 trans	299.00	(n/c)
LF30A	HF lowpass filter	18.40	(1.00)	PS750	70cm transceiver	169.00	(n/c)
RD300	1KW dummy load	48.30	(1.50)	Palm II	230v A.C. 6 amp. psu	69.00	(2.50)
TS770E	2m/70m dual band trans.	730.25	(4.50)	Palm IV	2m FM 6 channel portable	89.00	(n/c)
SP70	External speaker	18.40	(1.00)	TB1	70cm FM 6 channel portable	149.00	(n/c)
TR9000	2m multimode mobile	345.00	(4.50)	Palmsizer	1750Hz tone burst	10.00	(n/c)
B09	Base plinth for TR9000	32.20	(4.50)	Multi 3000	2m FM 40 channel handheld	149.00	(n/c)
TR7800	2m FM syntsd mobile 25W	268.00	(4.50)	TM56B	2m FM/SSB/CW 10w base stn	399.00	(n/c)
RM76	Microprocessor control	60.95	(1.50)	CC2	2m FM monitor	79.00	(n/c)
TR2300	2M FM syntsd portable	166.75	(4.50)	CC2	Speaker/mic for Palmsizer	11.00	(0.50)
VB2300	10W amplifier for TR2300	49.45	(1.50)	SC2	Case for Palm II/IV	5.75	(0.50)
MB2	Mobile mount	17.25	(1.00)	BB2	230v AC battery charger	4.50	(0.50)
RA1	Rubber flex. antenna	6.90	(0.50)	BT2	Case for Palmizer	9.75	(0.50)
PS1200	AC power unit and charger	29.50	(1.50)	Xtals	External battery case	5.00	(0.50)
TR2400	2M FM syntsd handheld	198.95	(4.50)		Ni-cad battery pack	12.00	(0.50)
ST1	Base stand and quick chgr.	43.70	(1.50)		For Palm II and Palm IV	3.00	(0.15)
BC5	12V quick charger	17.25	(1.50)		For TM56B	2.50	(0.15)
SC3	Soft carrying case	11.50	(0.50)				
LH1	Hard leather holster	18.50	(0.50)				
PB24	Spare battery pack	14.26	(1.50)				
TR3200	70cm FM portable	164.45	(4.50)				
PL1	Spare power/charge lead	1.30	(0.15)				
R1000	Gen. Coverage Receiver	285.20	(4.50)				
YAESU							
FT101Z	160-10m 6band trans.	488.75	(n/c)	MICROWAVE MODULES			
FT101ZD	as above with digital	569.25	(n/c)	MMT28/144	10m linear transverter	99.00	(1.75)
DIG101Z	Digital kit	86.25	(n/c)	MMT144/28	2m linear transverter	99.00	(1.75)
DCT101Z	12v Dc adaptor	34.50	(1.00)	MMT432/28-S	70cm linear transverter	149.85	(1.75)
VFO101Z	Remote VFO	126.50	(n/c)	MMT432/144-R	70cm linear transverter	194.00	(1.75)
FT107M	160-10m 9 band trnsrv.	690.00	(n/c)	MMT70/28	4m linear transverter	115.00	(1.75)
FT107	Remote VFO for FT107	92.00	(n/c)	MMT70/144	4m linear transverter	115.00	(1.75)
FC107	160-10m atu	97.75	(1.50)	MMT1296/14423cm	3m linear transverter	184.00	(2.25)
FP107E	230v AC power supply	106.95	(2.50)	MML144/25	2m 25 watt linear amplifier	59.00	(1.75)
FP107	Internal model	97.75	(2.50)	MML144/40	2m 40 watt linear amplifier	77.00	(1.75)
FTV107	Transverter main frame	110.40	(n/c)	MML144/100	2m 100 watt linear amplifier	142.60	(2.75)
FTV107(2)	Transverter	207.00	(n/c)	MML144/100P	2m 100 watt linear amplifier	142.60	(2.75)
144V107V901	Transverter	101.20	(n/c)	MML432/20	70cm watt linear amplifier	77.00	(1.75)
50V107V901	Transverter	69.00	(n/c)	MML432/50	70cm 50 watt linear amplifier	119.00	(2.75)
430V107V901	Transverter	178.25	(n/c)	MML432/100	70cm 100 watt linear amplifier	228.65	(2.75)
SP107P	External speaker	55.20	(2.50)	MM2000	RTTY to TV converter	169.00	(1.75)
SP107	External speaker	27.60	(2.00)	MMC28/144	10m converter	27.90	(0.65)
DMST107	12 channel memory	100.05	(n/c)	MMC50/28	6m converter	27.90	(0.65)
CW	CW filter for FT107	23.00	(0.50)	MMC70/28	4m converter	27.90	(0.65)
AM	AM filter for FT107	23.00	(0.50)	MMC70/28L0	4m converter	29.90	(0.65)
YM34	Desk mic for FT707/FT107	21.28	(1.50)	MMC144/28	2m converter	27.90	(0.65)
				MMC144/28L0	2m converter	29.90	(0.65)
				MMC432/28-S	70cm converter	34.90	(0.65)
				MMC432/144-S	70cm converter	34.90	(0.65)

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JBL73	Heavy duty	2.10	(1.00)	Clipperton-L 6 band 160-10m 2Kw linear	459.00	(n/c)	M161 16 channel FM monitor	59.00	(n/c)		
MBP	Mast base plate	3.60	(1.50)	DTR-1200L 5 band 80-10m 1.2Kw linear	t.b.a.	(n/c)	MF083 Marine/Broadcast scanner	85.00	(n/c)		
STANDARD VHF/UHF				GLA-1000B 5 band 80-10m 1Kw linear	295.00	(n/c)	BEARCAT 220FB 66-512mHz	258.00	(n/c)		
C800	2m portable scan receiver	79.00	(n/c)	DTR-3KA 1.8-30mHz ATU 2Kw	t.b.a.	(n/c)	SX200 26-512mHz	240.00	(n/c)		
C8800	2m FM mobile trans	251.00	(n/c)	MT-3000A 1.8-30mHz ATU 3Kw	275.00	(n/c)	SR9 Tuneable 144-148 or 156-162mHz	46.00	(n/c)		
C7800	70cm FM mobile trans	297.00	(n/c)	AT-1K 1.8-30mHz ATU 1Kw	99.00	(n/c)	AR22 2m FM synthesized handheld	83.00	(n/c)		
G-WHIP MOBILE ANTENNA RANGE				HF200A 80-10m transceiver 100w	399.00	(n/c)	AR22 flexible antenna	3.00	(n/c)		
Tribander Helical 10'15/20 metres	24.75	(2.00)	Spare set of D50A tubes	24.00	(n/c)	VHF/UHF MOBILE AERIALS					
LF40m Coil for above	6.55	(0.50)	All band Doublet 1.8-30mHz	22.50	(2.00)	ASP201 2m 1/4 wave	3.50	(1.25)			
LF80m Coil for above	6.55	(0.50)	100ft. 470 ohm semi-air spaced	12.00	(1.00)	ASP2009 2m 1/4	9.25	(2.00)			
LF160m Coil for above	6.55	(0.50)	ADONIS MICROPHONES				ASP3009 2m 1/4	9.75	(2.00)		
LF telescopic resonator whip	3.35	(0.75)	AM202G Mobile safety mic.	20.95	(n/c)	ASP462 70cm co-linear	8.25	(1.25)			
Base mount 1 hole fixg + 3m cable	4.50	(0.50)	AGM202S Mobile safety mic.	20.95	(n/c)	Magnetic base adaptor	8.50	(0.75)			
AERIAL ROTATORS (complete with control boxes)				AM202H Mobile safety mic.	29.00	(n/c)	ASP677 2m 1/4 wave	14.95	(2.00)		
CDE AR30 (5 core cable)	47.00	(1.50)	AM502G Base station comp. mic.	39.00	(n/c)	ASP667 70cm co-linear	17.95	(1.25)			
CDE AR40 (5 core cable)	59.80	(1.50)	AM802G Base station 3 outputs	59.00	(n/c)	ASPM125 27mHz 1/4 wave	16.50	(2.00)			
Channelmaster 9502 (3 core)	42.00	(2.00)	SEM PRODUCTS				Magnetic base adaptor for above	8.50	(0.75)		
LF80m Coil for above	6.55	(0.50)	2 metre power amplifier 5w/30w	50.00	(1.00)	ASP bootmount adaptor	3.75	(0.50)			
LF160m Coil for above	6.55	(0.50)	2 metre power amplifier 16w/50w	66.70	(1.50)	2VE 2m 1/4 mobile whip	13.00	(2.00)			
LF telescopic resonator whip	3.35	(0.75)	2 metre power amplifier Rf sensing 16w in			RG4M Base for above aerial	3.50	(0.75)			
Base mount 1 hole fixg + 3m cable	4.50	(0.50)	100w out 16w/10w	126.50	(1.50)	GSS Gutter/boot mount	3.15	(0.50)			
AERIAL ROTATORS (complete with control boxes)				2 metre converters 28/30, 4/6, 2/4	23.00	(0.35)	MBS Magnetic mount	7.95	(1.00)		
CDE AR30 (5 core cable)	47.00	(1.50)	2 metre Auto pre-amplifier	21.73	(0.35)	10SE 28mHz whip 1.72m long	11.50	(1.25)			
CDE AR40 (5 core cable)	59.80	(1.50)	70cm Auto pre-amplifier	24.73	(0.35)	15SE 21mHz whip 1.72m long	11.50	(1.25)			
Channelmaster 9502 (3 core)	42.00	(2.00)	2 metre pre-amplifier	14.95	(0.35)	20SE 14mHz whip 1.72m long	13.80	(1.25)			
LF80m Coil for above	6.55	(0.50)	70cm pre-amplifier	17.73	(0.35)	WELZ PROFESSIONAL POWER/SWR METERS					
LF160m Coil for above	6.55	(0.50)	2-40mHz pre-amplifier	18.66	(0.35)	SP200 1.8-160mHz 20w-200w-1Kw	49.95	(n/c)			
LF telescopic resonator whip	3.35	(0.75)	2-40mHz pre-amplifier	11.73	(0.35)	SP300 1.8-500mHz 20w-200w-1Kw	69.95	(n/c)			
Base mount 1 hole fixg + 3m cable	4.50	(0.50)	PA3 2 metre pre-amplifier	8.00	(0.35)	SP400 130-500mHz 5w-20w-150w	49.95	(n/c)			
HF ANTENNAS (various manufacturers)				PA70 70cms pre-amplifier	10.00	(0.35)	SHORT WAVE LISTENER AERIALS				
Mini-Prdts HQ-1 20'15/10m 2 ele.	96.50	(2.50)	Z Match ATU 3 5-30mHz 500watts	47.15	(1.50)	3-30mHz Inverted 'L'	9.95	(1.00)			
Mini-Prdts C4 20'15/10m vertical	48.50	(2.00)	EZITUNE Aerial tuning aid	30.48	(0.75)	3-30mHz Broad band dipole	29.00	(1.00)			
Mosley TD3JR 20'15/10m wire dipole	34.50	(1.50)	IAMBIC Keyer	34.50	(0.75)	Mosley RD5 all-band dipole	40.00	(1.00)			
Mosley "Mini-Beam" 20'15/10m 2 ele. 600w	99.00	(2.00)	2 METRE PORTABLES				AIR BAND PORTABLE MONITORS				
Mosley "Mini-Beam" 20'15/10m 2 ele. 2Kw	129.00	(2.00)	SB2M 2m SSB portable	99.00	(1.50)	Sharp FX213 tuneable	13.50	(0.75)			
Mosley TA32 20'15/10m 2 ele. 600w	89.70	(2.00)	AR245 (previously AR240A) 2m FM 5w	178.00	(1.50)	INGERSOLL MW/FM/Airband monitor	12.95	(0.75)			
Mosley TA33 20'15/10m 3 ele. 600w	133.40	(2.50)	AR245 carrying case	4.10	(0.50)	R517 Professional Air Monitor	49.50	(0.75)			
Mosley TA33 20'15/10m 3 ele. 600w	133.40	(2.50)	AR245 optional helical	4.10	(0.50)						
Mosley Mustang 20'15/10m 3 ele. 2Kw	166.75	(4.00)	AR245 12v DC car adaptor	4.10	(0.50)						
Hy-Gain 12AVQ 20'15/10m vertical	43.00	(2.00)	VHF/UHF MONITORS								
Hy-Gain 14AVQ 40'10m vertical	60.00	(2.00)	TM56B FM Scanner 12v DC/230v AC	79.00	(n/c)						
Hy-Gain 18AVT/W/B 80'10m vertical	87.00	(2.50)	O08 8 channel FM monitor	69.00	(n/c)						
HF5 80'10m vertical 200w	48.00	(2.00)									
Radial Kit for HF5	28.00	(2.00)									
Sagant EL40X 80-40 dipole (79' long)	36.00	(1.50)									
Jaybeam TB3HF 3element 2Kw	167.90	(4.50)									
Jaybeam VR3HF vertical 2Kw	42.50	(3.00)									
DENTRON											
MLA2500B 6 band 160-10m 2Kw linear	695.00	(n/c)									

TRIO TS830S £639.52



A brand new model having all nine bands fitted and providing 200 watts input SSB/CW. Built-in 230V ac supply, 6146B tubes and full digital and analogue display. Plus a really comprehensive variable selectivity and notch filtering system. The DX'er's dream.

TRIO TS130S £491.05



Base or mobile this solid state HF transceiver covers eight bands SSB/CW with a genuine 10C 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 PS3C for 230V ac operation.

TRIO TR230 £166.00



The TR230 still amazes us at its value for money. Portable, mobile or base station it is equally at home in all 3 situations. 1 watt 80 channels complete with ni-cad ac charger. An ideal rig for the beginner.

TRIO R1000 £285.20



The receiver that revolutionised short wave listening. Full 30 band coverage 200kHz to 30MHz SSB/CW/AM. Both digital and analogue readouts are provided together with 230V or 12V dc operation facilities. Trio engineering at its best and at a very competitive price.

TRIO TR9000 £345.00



An all mode 2 metre transceiver that serves the dual role of mobile and base station. Features include digital readout, 12½ or 25kHz steps in FM, five memories band scanning and a lot more! Send for coloured leaflet.

TRIO TR7800 £268.00



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

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PCS 2800 28MHz FM 10W
LIST £189 £169

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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 12½ kHz 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 × 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 +1·6MHz 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.

FDK MULTI-750E

2m (& 70cm) ALL-MODE



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.

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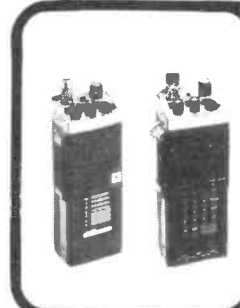
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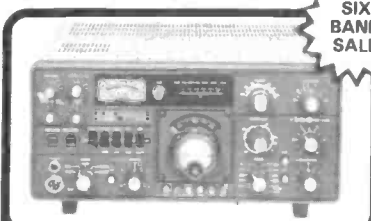
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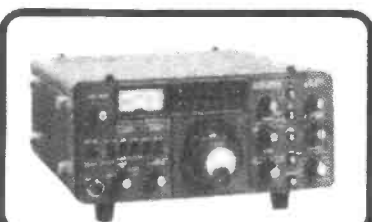
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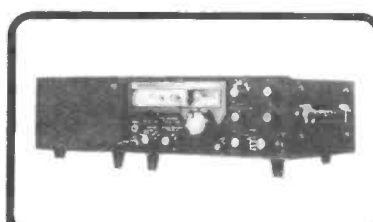
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- ★ Ergonomic design and position of controls.
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FT902DM

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- ★ Audio Peak and independent notch controls.
- ★ AM, FSK, USB, LSB, CW, FM, (TX and RX).
- ★ Semi-break in, inbuilt Curtis IC Keyer.
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- ★ Instant write in memory channel.
- ★ Tune up button (10 sec, of full power).
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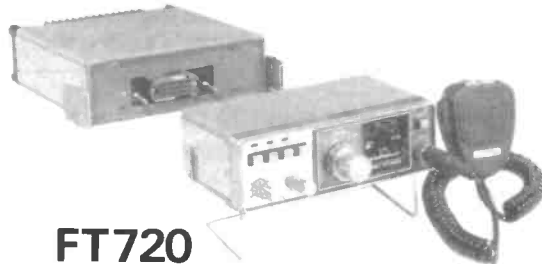
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- ★ USB-LSB-CW-FM (A3, A1, F3).
- ★ Special linear PA module fitted.
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- ★ Generous 2W audio output.
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- ★ Matching FP80 Mains PSU available.

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FT720

FT720 Control Head. £120.00 inc.

- ★ Four easy write-in memory channels
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- ★ Scanning for empty or occupied channels
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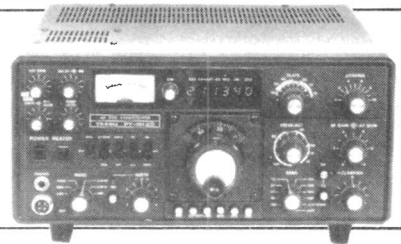
Brenda (G8SXY) and Bernie (G4AOG) invite you to visit the only shop in London where you can see and try ALL the leading makes of Amateur Radio equipment under one roof . . . YAESU, ICOM, TRIO/KENWOOD . . . and, special this month, a really marvellous new receiver from SONY . . . not a name you expect us to be promoting, but then we've always said that the only way to buy a rig is to compare as many alternatives as possible side by side, and then choose the one that's right for you. So, come to the shop where you can do just that . . . and have a cup of Brenda's coffee too!!

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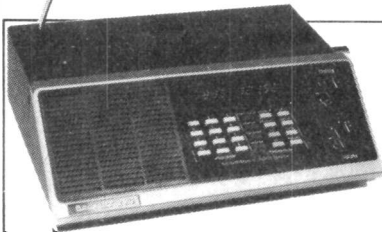
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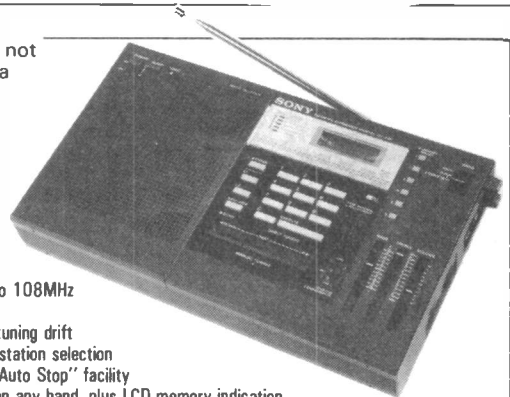


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(GB3SWM)

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The SHORT WAVE Magazine

EDITORIAL

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.

Edwards
G3KFE.

COMMUNICATION and DX NEWS

E. P. Essery, G3KFE

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 courses 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 57OBLV obtained from *J. Birkett*. 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, UA910E, ZL3GF, I8GZQ/P, VP2SAC, ZL3ME, CT2CH, W9NYW, VE3KYX, A15P/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, KB7IJ/KH2, PJ2CR, VE6s, VE7s, W7LTH (Utah), W7WHB (Oregon), W7WKR (Idaho), W0YK (Colorado), WH2ABR, 8P6AW, 8P6BN and 8P6OR. In the second period, the band fell away noticeably, and QSOs were made with FGOFOK, K6s, KB0MX (N. Dakota), VP2SAM, VP2SSS, 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 WA0CTX, PY2VYR, N6YK/VP2, WA3EEE, N7CW, W7ITN, twice, KA8JZR/M, K0RW, VE2WA, UB5ADD, N9OK, WB0VYU, 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 Loran-A chains from Top Band; they have now gone over completely to Loran-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 PA0PCA, PA0LOU, PA0ABM, PA0PN, PA2CMH and PA3A00; not to mention CW to OH0XX, SP9DH, UT5AB, UF6VAZ, UP2OM, UD6DMR, F3AT, I4AMO, UK2GDZ, OZ1W, GU3HFN, UP2BAW, EA2OP, HB9CM, OZ1LO, EI9J, GM4KWS, DL0FJ/P, 4X4NJ, N2NT, W8LRL, 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 W1WY 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-ISSB 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 normal 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) may well be the last; *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 VK4NIC/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 intermittent 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 so 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 multitudinous 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, which involves nothing more complex than having enough attenuator in the front-end of the receiver; and "more than enough to go round" can be then re-phrased 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 PY0CW 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 I1XHV 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 OZ8OQ 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 G3FPC, when they discussed the activities of the old "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 G5NX/M who was operating CW while driving, peaking up in a quite surprising manner as he crossed Ilkley Moor.

G3PKS found the band in fair shape and notes his own reports improving as conditions perked 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 EA9JG and VE1ZZ (Sable Is.) plus W3GG, VE1ATJ, AI2Q, UQ2GIQ, 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 KV4CI, K4YF, and W2AIW/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 PMII 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 too. One other victim of the G3PKS key was JR1YQQ — so Jack must have looked twice.

Covering the past couple of months, G3NOF sums it all up: over the December period he worked CR9CT and J20/A, but found little else of interest barring the West Coast Ws around late afternoon, and the Caribbean and S. Americans appearing around the time when we mere workers are on the way home. For the second period, *i.e.* January, Don didn't make a single QSO simply because he found more of interest on 21 and 28 MHz. One interesting point he does make is that the morning VK/ZL openings seemed to have been rather steep-sided to their peak, resulting in a short but quite good period.

Twenty for G2HKU meant SSB to the usual ZL1VN, ZL3SE, ZL3RS, ZL3FV,

and ZL0ACZ, the last mentioned being W6FEX on holiday.

Our final comment is from G3ZGC/MM. Richard has already commented on the funny conditions noted in the Persian Gulf. Among the QSOs there was a fairly regular one with A4XSV/MM, Ton, aboard the Arab dhow *Sohar* bound from the Gulf of Oman to China, with 4S7VJ/5N9 at 1845z on January 18. The band on that day was also open wide to W and VE, and 5Z4s were heard commenting that they had never known it so good, in among the VK and ZL signals also peaking at that time, from the Indian Ocean. An interesting change was a contact with VK3BUI/AM, John, flying in a Boeing 727 on a flight between Perth and Adelaide.

21 MHz

Seems to have taken over as the place for serious DX hunting, at least for the moment. G4BUE took in the AGCW-DL Winter QRP contest despite not liking rules which tend to force any serious entrant to concentrate largely on one band. The current indications, we hear, are that Chris was not the only one to complain and so altered rules will be in force next time. Be that as it may, the G4BUE rig was fired up mainly on 21 MHz, where conditions were good to the USA, mediocre to Asia and non-existent to VK/ZL. However after 127 QSOs, the first 44 were, all but one, with U.S.A., which was a good start as the support for this contest has not, till this year, been very good in the States. The final tally of 21003 points showed less than 1000 points from the other bands, but on 21 MHz there were all W call areas, several JAs, UA0, and a host of Europeans.

G3PKS hasn't had a lot of time for amateur radio, but he did try 21 MHz three times, to work W6EUP, UK1TAB, and VE1BMN, and to gain the impression that had he had more time he could have enjoyed himself more.

G3NOF now; a few long-path openings to VK/ZL/JA were noted in the December period, and in January too, but the short path seemed to be better, with VKs peaking around 1300, and Ws from noon till 2000, albeit none too well until about 1600 during January. As ever it was all SSB, December showing A4XIY, A7XD, DF1MS/9K2, FGF0L/FS7, FK8DH, HI8PPB, HKOFBF, HM1SX, HV3SJ, KA7DQQ (Arizona), KL7IB, KP2A, NL7J, S8AAP, SV0AW/SV9, VK2NUC/VK9N, VK4NIC/3X, VK9NYG, VP8QG, WB7TYF (Nevada), YC1BMI, YC2BSF, YJ8NPS, YK1AO, ZF2AG, 1A0KM, 6W8AR and 9Y4NP. The later letter covering January includes A22ZM, A51PN, CN8AW, DF3NZ/ST2, EL2AK, FG0FOK, FG0FOL/FS7, FP7BP, J3AH, JJ1FHH, JK1HAK, HL2GS, W6s, KA7DQQ, KH6WU,

PY0ZZ, VKs, VK4NIC/3X, W7s, XE2AH, 5H3FW, 8P6CC, and YC2YY.

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 aright. Like, we don't know whether they leave for Heard (a fourteen day sail) on February 15, or arrive there on that date.

YI1JY rumours, mentioned of late, don't seem to be jelling into facts, and YI1BGD 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/JD1 as the call, with intent to clean up the demands from 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 a 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, raging that I'm a rampant 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 does it really 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 *zoic* was pertaining to, or having animal life? Or that *hajj* 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 achieve easily things that you might find difficult?

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 friendliness 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).

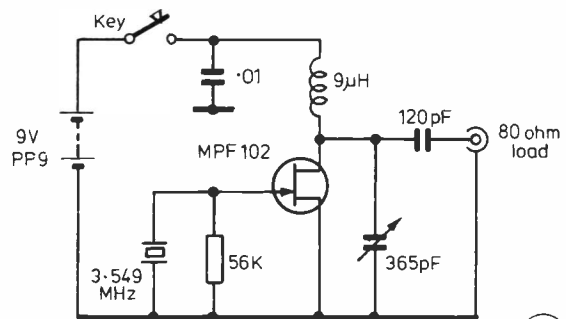
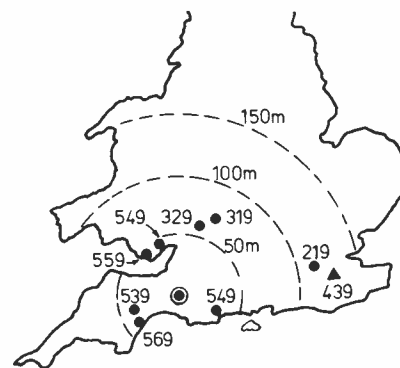


Fig. 1 CIRCUIT OF 38mW CW TRANSMITTER

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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.



Legend.

- TRANSMITTER
 - Station worked and RST given by that station
 - ▲ Signals heard report
- 7 local stations not shown for clarity Typical report given by these stations RST 559

Fig 2 RESULTS OBTAINED WITH 38mW CW TRANSMITTER ON 80 METRE BAND

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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.

• • • SWL • • •

SHORT WAVE LISTENER FEATURE

By Justin Cooper

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 1A0KM; 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 and ATU coil stock with the lathe, and chokes and small coils with a hand-drill and vice. But Nev, like the writer, is professionally employed in the game, and it does take some of the incentive away, although sharpening one's perception of the shortcomings of commercial gear. In his second letter, G3JDK has something to tell of Ted McElroy. Apparently the factory was quite a big outfit, making all sorts of things — even some work for Creed under licence from the UK. The works is understood to be still in operation under Ted junior — so perhaps Mr. Rowland (see January "SWL") could try firing a letter at him for information. Nev reckons father and son both went out of their way to be friendly and helpful.

New Ones

With apologies to Mr. Davey who has already had his mention along with Ted Robinson and Ray Middleton! Our first letter comes from 14-year-old J. M. Short (*Thornbury*) who has the advantage of father and brother both being interested. Their first home-brew 80-metre job was aligned with an assist from G4ETS, and then along came a 9R-59DS, and various home-brew bits for the shack. On the aerial side Jonathan and Co. have a 132-foot end-fed, through an ATU, plus a 21 MHz dipole.

Coming to C. Frankland (*Hull*) we hear a request for us to define 'prefix'. If one takes, say, G3SWM, the callsign proper is 'SWM' and the prefix G3. Thus G2 and G3 and G4 are different prefixes as are GM2, GM3, GM4, and so forth. The point is that

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 UA0 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 W6, WA6, WB6, K6, N6, A6 and so on, maybe all in the same street but still all different prefixes.

P. Eggegan (*Borehamwood*) has a nice collection for the list, but we have deleted Y11PTP (possibly miscopying Y11BGD?) and G4DME/A.

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 μ V for 10dB s/n; B the same; C, 0.7 μ V for 10dB s/n; and D, 0.3 μ V 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.

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 μ V 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 0.5 μ V appears at the receiver input terminals. So — do we say the receiver is getting 1 μ V or 0.5 μ V? 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

ANNUAL HPX LADDER Starting Date, January 1, 1980

SWL	PREFIXES	
R. D. Newall (Bracknell)	493	B. Musselwhite
M. N. W. Thornton		(Warminster) 335
	(Romford) 370	M. Hill (Bedworth) 207

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, every thing 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, shack 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 chocks to get the knob to 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 addled 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 RK1APA and UK3R — Box 88 will now drown him in QSLs!

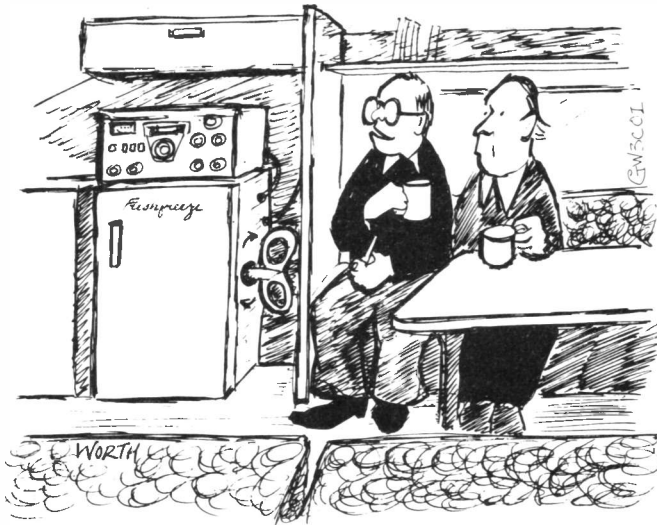
We were sad to notice that *N. Askew (Coventry)* hasn't yet found his old logs, so his present list covers January 1, 1980 to February 17, 1980 with some 706 prefixes heard. That answers somebody else's question — but to be fair, 706 in six weeks wouldn't be quite so easily done if you were new to it. 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!

HPX LADDER (All Time Post War)

SWL	PREFIXES		
PHONE ONLY			
K. Kyezor (Brandon)	2473	A. Twelves (Rhos-on-Sea)	756
B. Hughes (Worcester)	2249	D. J. F. Gordon (Chepstow)	713
S. Foster (Lincoln)	2034	N. Askew (Coventry)	706
E. W. Robinson		F. C. D. Barnes (Cardiff)	683
(Bury St. Edmunds)	1811	J. Worthing (Shrewsbury)	672
M. C. P. Bennett (Datchet)	1571	P. Eggeman (Borehamwood)	637
M. J. Quintin		J. M. Short (Thornbury)	614
(Wotton-u-Edge)	1517	B. L. Henderson (Salisbury)	596
H. A. Londesborough		J. A. Darby (London SE16)	588
(Swanland)	1450	A. Stevens (Crowthorne)	576
H. M. Graham (Moulton)	1325	R. Baker (North Walsham)	575
M. Rodgers (Harwood)	1218	B. Shepherd (Staines)	571
M. Law (Chesterfield)	1201	G. A. Davey	
Mrs. R. Smith (Nuneaton)	1135	(Bury St. Edmunds)	520
P. Ford (Longlevens)	1040	P. J. Boyce (Coventry)	502
M. Shaw (Huddersfield)	1038		
R. Middleton		CW ONLY	
(Bury St. Edmunds)	1000	H. A. Londesborough	
J. F. Hobson (Ely)	921	(Swanland)	1247
J. Doughty (Bloxwich)	915	D. W. Waddell (Herne Bay)	1235
D. C. Casson (Reading)	899	J. Goodrick	
L. Stockwell (Grays)	844	(Bognor Regis)	797
B. A. Payne (Leeds 18)	812	A. Rowland (Mansfield)	524
D. J. S. Williams			
(Wednesbury)	812		

Minimum Score for an entry: 200 for CW, 500 for Phone. Listings include only recent claims and are in accordance with HPX Rules (see p. 702, January 1981 issue). A 'Nil' return is permissible in order to hold a place.

April issue due to appear on Friday, March 27th.



“... I think a cool PA is important ...”

Now the familiar handwriting of Mrs. R. Smith (Nuneaton) appears — a wry comment that there was a total blank in the log between December 13 and January 2. One supposes that about summarises most XYL's view of Christmas — the party politicians who thought up the long Christmas break certainly didn't think of the ladies!

Set yourself a target — J. Goodrick (Bognor Regis) says his is to reach the 1000 mark on CW by the end of 1981, and makes a good start by deleting some odd ones claimed twice — we wish a few more would do that occasionally! Meantime the G8SOH aerial described in December 1980 *Short Wave Magazine* seems to have not only worked but to have excited favourable comment — Ian Moth will be pleased to hear that. However, it now goes into mothballs, along with the converter until we find it again at the new QTH, says John.

Another change of QTH looming up is booked for D. J. S. Williams (Reading) who comes down from university in June, hopefully with a degree, and will be looking for a job. But — degree first!

Coming up for the 1000 mark, J. Doughty (Walsall) recalls thinking how hard it would be to make the 500 — now he reckons it's all time and patience. No, say we, add the extra skill element as you become more used to your receiver, and of course the luck — John was in the act of switching off when A51PN came along for a new country and prefix!

Interesting how views can change as one digs deeper into the hobby; last summer P. J. Boyce (Coventry) thought Ten a dead loss — he's learned differently now and listens mostly there. The point about this is surely not so much the quality of Ten but the need to listen to a band when it is open; sunspot minima sees Ten “closed” as far as ionospheric DX is concerned, but better as an Oscar downlink and with VHF openings to look into.

C. A. Wood (BFPO 31) seems to have got himself deeply into SWL, and now wonders whether there are any groups he needs to join to get an even firmer grip. The answer has to be no, insofar as one can progress a long way, indeed right to the top, without becoming involved with others, just so long as you have some yardstick against which to measure your performance. However, there is a lot to be gained, for those so-minded, in joining a local club and the national society. For the Gs, RSGB is the national society, at the address in the *UK Callbook*; the German group is DARC, to whom reader Wood should doubtless address himself to find out about a local German club. DARC are at Postfach 1155, D-3507, Baunatal 1, West Germany. For the rest — we can try to answer most of the questions in the column, with benefit and interest to all the other SWLs.

Who or what is P8JAM, 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 really is 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. F. 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 Edessa.

Now H. M. Graham (Newmarket) who refers to the talk about HK0 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 (Chepstow); K. Kyezor (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!

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USING AND ABUSING THE 4CX250 FAMILY OF VALVES, PART II

CONCLUDING THE ARTICLE BEGUN 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 this design 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 μ F 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-amperes; 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 'source' when, as it were, "supplying" 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 'phut' 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 vaporise 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 transistors 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 intermodulation 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 little 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 by having 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 350, the valve needs some -80V for cut-off and hence some -110V for Class C working (see data sheet); so a -150V line is

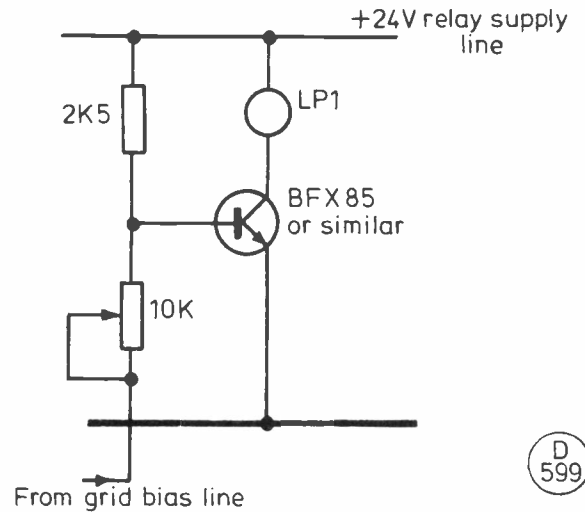


Fig. 1

LP1 may be replaced by a small relay, with contacts wired to shut down supplies as required; set shutdown level with pot.

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, users of the 4CX350 family would have to alter some resistor values around the 2N3055 in the bias supply, and delete RLD1 and the Class C 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 G4FRX 2m. 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 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 grid-current point to produce 400W p.e.p., and if you see grid

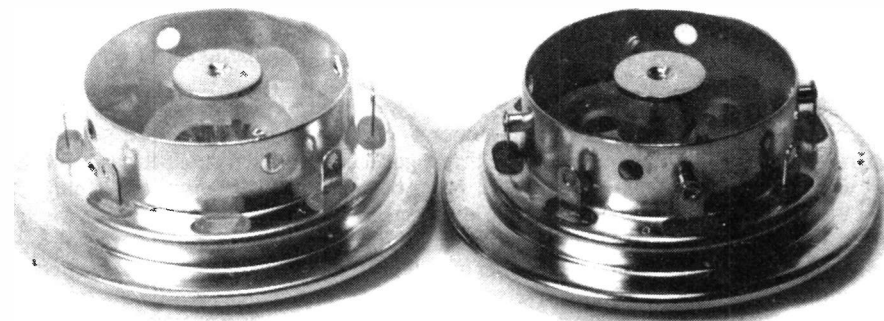
current indicated in linear service for heaven's sake turn the drive down: if the amplifier is halfway decently built, not only is the output likely to be well in excess of the legal limit but quite disgustingly anti-social. To those of you who insist on doing it; please think about what "Class AB1" 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 itself will also be compromised.

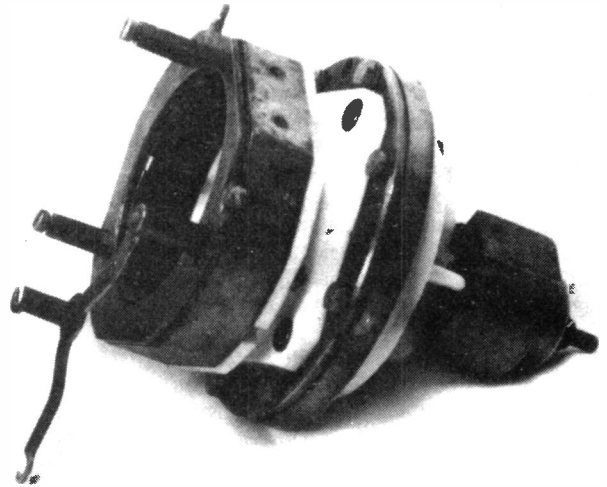
At this point it is worth digressing a little to explain the logic behind the statement at the beginning of this article, that under some conditions the signal from exciter plus amplifier can be cleaner than that from the exciter on its own. The average semiconductor PA stage, admirable though it is 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



The underside of, left, an SK-600A and, right, an SK-610A; note the solid earthing of the cathode pins to the base shell in the latter. Also not in both types the raised screening ring between the grid spigot in the centre of the base and the other valve pin connections — essential for VHF and UHF use. The base insulation is a variant of *p.t.f.e.* in all cases, and users should be beware of bases having inferior material such as nylon or bakelite.

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 'FJ 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 is 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 VSWR, 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 milliamps 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 milliamps 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 will 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 milliamps 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 be 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 ego-tripping 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 if the loading 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 receiver is deficient or he is being bloody-minded; a detached approach to the problem is required. So many stations seem to feel that they have been the subject of some gross personal insult if it is reported to them that their transmission is in some way defective, and often they are the ones who do nothing about it; this seems a pity. And if you are the station doing the testing, be as honest and as careful as you can. If you feel that your receiver may be being overloaded or that the signal does need attention, 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 "spitching" 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 "splashing" 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 hear stations swallowing up half the band during a contest, or, for that matter any other time, tell them so, and keep telling them until they either QRT or do something about it.

Availability

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.

G8RZN 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-slide talk on Aurora, and for the second date they are collecting the material for a slide show of members' shacks — 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 surplus book sale.

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.

Stevenage 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:

- ACTON, BRENTFORD & CHISWICK: W. G. Dyer, G3GEH, 188 Gunnersbury Avenue, London W3 8LB. (01-992 3778)
- A.R.M.S.: N. A. S. Fitch, G3FPK, 40 Eskdale Gardens, Purley, Surrey CR2 1EZ.
- ASHFORD (Kent): J. A. Clarke, G3TIS, Yeomans Cottage, The Street, Brook, Ashford, Kent TN25 5PF. (Wye 812888)
- B.A.R.T.G.: J. Binning, G3AJS, 293 Perry Street, Billericay, Essex.
- BOURNEMOUTH: G. T. Lloyd, G8GTB, 4 Gorleston Road, Parkston, Poole, Dorset.
- BRAINTREE: D. A. Holmes, G3JSV, Thaddeus House, East Street, Coggeshall, Colchester, Essex CO6 1SH.
- BROMSGROVE: G. Taylor, G4HFP, 6 Marlborough Drive, Stourport-on-Severn, Worcs. DY13 0JH.
- BURY: M. Bainbridge, G4GSY, 7 Rotbury Close, Bury, Lancs. BL8 2TT. (061-761 5083)
- CHELTENHAM: G. Cratchley, G4ILI, 47 Golden Miller Road, Prestbury, Cheltenham. (Cheltenham 43891)
- CHESHAM: V. McClure, G8WCO, 51 Chessmount Rise, Chesham, Bucks.
- CHILTERN: B. Catterall, G4IWC, 78 Fairacres, Prestwood, Gt. Missenden, Bucks. (Gt. Missenden 4504)
- COLCHESTER: G. W. Caswell, G4DKI, 112 St. John's Road, Colchester, Essex CO4 4JH. (Colchester 67512)
- CONGLETON: N. R. Clayton, G8UYT, 2 Moorfields, Leek, Staffs. (Leek 385992)
- CORNISH: S. T. S. Evans, G3VGO, Glengormley, Carnon Downs, Truro, Cornwall. (Devoran 864255)
- COVENTRY: J. Beech, G8SEQ, 14 Hollow Crescent, Radford, Coventry CV6 1NT. (Coventry (0203) 598186)
- COVENTRY (Technical College): J. Witt, G8ISJ, Coventry Technical College, Dept. of Engineering, The Butts, Coventry CV1 3GD.
- CRAWLEY: D. L. Hill, G4IQM, 6 Reigate Close, Pound Hill, Crawley, W. Sussex RH10 3TZ. (Crawley 882641)
- CRYSTAL PALACE: G. M. C. Stone, G3FZL, 11 Liphook Crescent, London SE23 3BN. (01-699 6940)
- DARTFORD HEATH D/F: A. Burchmore, G4BWV, 49 School, Lane, Horton Kirby, Dartford, Kent DA4 9DQ.
- DUMFRIES & GALLOWAY: D. H. Stewart, GM4JAP, Drumbuie Cottage, Newmains, Kirkbean, Dumfries.
- EAST ANTRIM: J. Welch, 20 Bryantang Brae, Doagh, Ballyclare, Co. Antrim BT39 0RJ. (Ballyclare 40384)
- EAST KENT: N. Gerolemon, G8PFE, 63 Cobblers Bridge Road, Herne Bay, Kent.
- EDGWARE: D. L. Lisney, G3MNO, 119 Draycott Avenue, Kenton, Harrow HA3 0DA. (01-907 1237)
- EXETER: G. Draper, 1 Carlyon Close, Heavitree, Exeter EX1 3AZ. (Exeter 37170)
- FAREHAM: B. Davey, G4ITG, 31 Somervell Drive, Fareham, Hants. PO16 7QL.
- GRAFTON: J. Thompson, G8SYD, 70A Deans Lane, Edgware, Middx. HA8 9NN. (01-959 8785)
- GUILDFORD: L. Bright, G4BHQ, 4 Dagley Farm, Shalford, Guildford, Surrey. (Guildford 76375)
- HEREFORD: S. Jesson, G4CNY, 181 Kings Acre Road, Hereford. (Hereford 3237)
- IPSWICH: J. Tootill, G4IFF, 76 Fircroft Road, Ipswich, Suffolk IP1 6PX. (Ipswich 44047)
- I.R.T.S.: C. Yeates, EI7AAB, 126 Beech Park, Lucan, Co. Dublin, Eire.
- ISLE OF WIGHT: T. Fallick, G4FYI, "Harmony", Main Road, Chillerton, Newport, I.o.W. (Chillerton 328)
- LIVERPOOL: R. Simmons, G3PNS, 62 Daneville Road, Liverpool L4 9RG.
- MEDWAY: P. J. Poole, G4EYV, 5 River Drive, Strood, Rochester, Kent ME2 3JW. (Medway 76463)
- MEIRION: Mrs. J. Jones, GW8SYX, 25 Fford Dyfrig, Tywyn, Gwynedd. (Tywyn (710) 402)
- MELTON MOWBRAY: R. Winters, G3NVK, 32 Redwood Avenue, Melton Mowbray, Leics. LE13 1TZ. (Melton Mowbray 3369)
- MEXBOROUGH: I. Abel, G3ZHI, 9 Grove Terrace, Maltby, Rotherham, Yorkshire. (0709 814911)
- NORTHERN HEIGHTS: M. Topham, G8NUC, 1200 Great Horton Road, Bradford. (Bradford 73271)
- PETERBOROUGH: D. Wilson, G4KSW, 4 Conway Avenue, Peterborough.
- PLYMOUTH: Mrs. P. L. Day, G4KYY, 46 Beatrice Avenue, Saltash, Cornwall PL12 4NG.
- R.A.I.B.C.: Mrs. F. Woolley, G3LWY, 9 Rannoch Court, Adelaide Road, Surbiton KT6 4TE.
- READING: C. Young, G4CCC, 18 Wincroft Road, Caversham, Reading, Berks. RG4 7HH.
- ST. HELENS: P. Gaskell, G8PQD, 131 Greenfield Road, St. Helens, Lancs. WA10 6SH. (St. Helens 25472)
- SALISBURY: A. Newman, G2FIX, 74 Victoria Road, Wilton, Salisbury, Wilts. SP2 0DY.
- SCUNTHORPE: J. A. Sheardown, G8T1Y, 5 Winteringham Lane, West Halton, Scunthorpe, S. Humberside DN15 9AX.
- SILVERTHORN: C. J. Hoare, G4AJA, 41 Lynton Road, South Chingford, London E4 9EA. (01-529 2282)
- SOUTHDOWN: R. E. Holtham G4EKS, 2 Benbow Avenue, Eastbourne, E. Sussex BN23 6AB. (Eastbourne 31620)
- SOUTHGATE: Mrs. V. Austin, 89 Chaseville Park Road, Winchmore Hill, London N21. (01-360 5832)
- STEVENAGE: E. Godfrey, 94 Common View, Letchworth, Herts. (Letchworth 72184)
- STOURBRIDGE: C. Williamson, G4IEB, 14 Lawn Street, Stourbridge. (Stourbridge 2006)
- SUNDERLAND: D. Holland, 17 Egerton Road, West Harton, South Shields. (South Shields 551045)
- SURREY: R. Howells, G4FFY, 7 Betchworth Close, Sutton, Surrey SM1 4NR. (01-642 9871)
- SUTTON & CHEAM: G. Brind, G4CMU, 26 Grange Meadow, Banstead.
- THORNBURY: K. R. Books, G3XSJ, 72 Nicholls Lane, Winterbourne, Glos.
- THURROCK: A. M. Taylor, G4KJ1, 11 Kathleen Close, Stanford-le-Hope, Essex. (S-I-H 5057)
- VERULAM: G. N. Dale, G3PZF, 16 Palfrey Close, St. Albans.
- WAKEFIELD: R. C. Sterry, G4BLT, 1 Wavell Garth, Sandal Magna, Wakefield. (Wakefield 255515)
- WEST KENT: B. P. Castle, G4DYF, 6 Pinewood Avenue, Sevenoaks, Kent TN14 5AF. (0732 56708)
- WIRRAL: G. O'Keefe-Wilson, G8VPF, 20 South Drive, Upton, Wirral. (051-677 1531)
- WISBECH: D. Dunn, G8RZN, Five Bells, Parson Drove, Wisbech, Cambs.
- WORCESTER: M. Tittensor, G4EKG, 16 Durcott Road, Evesham, Worcs. WR11 6EQ. (0386 41105)
- YEOVIL: D. L. McLean, G3NOF, 9 Cedar Grove, Yeovil, Somerset. (Yeovil (0935) 24956)
- YORK: K. R. Cass, G3WVO, 4 Heworth Village, York.

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 Chaseley Home for Disabled Ex-Servicemen, Southcliff, 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 for a newsletter — and his first issue carries the news of an upping of the sub. That's always the hard bit! Any Friday will find them at Friday Hill House, Simmons Lane, Chingford, London E4, where they have a couple of rooms for themselves, plus all sorts of other facilities the building offers. Lucky **Silverthorn**!

Grange Farm Hobbies Centre, Franklin Crescent, **Scunthorpe** contains the shack in which the gang congregate every Tuesday evening. On March 3, G8VIZ will talk about video cassette recording, while on 10th, someone not named will give a talk on hospital radio. March 17 sees an activity described as 'X-Word' — a new term on us — and 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.

It is years since we last heard from **Salisbury**, says our brain, but the files say differently! Perhaps it's because our most abiding memory of the city is of a Naafi club! The venue is the Activity Centre, Wilton Road, on Tuesdays, and the main interests of the club are many and varied, the accent in summer being outdoors.

Into Lanchashire now, and **St. Helens**. March 4 for them means a talk by G3CSG on Japanese Morse; on the air on 12th, and on 19th they welcome the crime prevention officer of the local police division; Sgt Jeff Mills will talk about the protection of your gear, and back it up with a film and demonstration. Then, on March 26 comes the club forum.

The **Reading** Hq is in the clubroom of the "White Horse" at Emmer Green, this being on the B481 Reading-Nettlebed road. Alternate Tuesdays give them March 3 for G8NGF 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 G3USH.

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, **Meirion** have a junk sale, at the Ship Hotel, Dolgellau; 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 if 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 are 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 shacks, 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



Direct communication again puts amateur radio in the shade! The wedding in January of Diane G8VVV and, on her right, Tony G4GPR, both committee members of Southgate Radio Club. Other club members present were, back row left to right, G3DZW, G3ZVW, G8EWG, G3KTZ, G4IEH and G4DFB; front row, left to right, G4ASR, G4KZD, G3RWL, G4BPR and G3XMV.

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 IYDP" 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 GB2IYD and GB6IYD. 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 Walting 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 GI, and **East Antrim** who are looking for members. They can be found on the second Tuesday of each month at the Carntall Hall, near Mossley, 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 GM8TKA. 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 writer has seen in a year! 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 the author's done some time ago, but written up immediately upon reading Paul 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 $N \times 100$ 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.

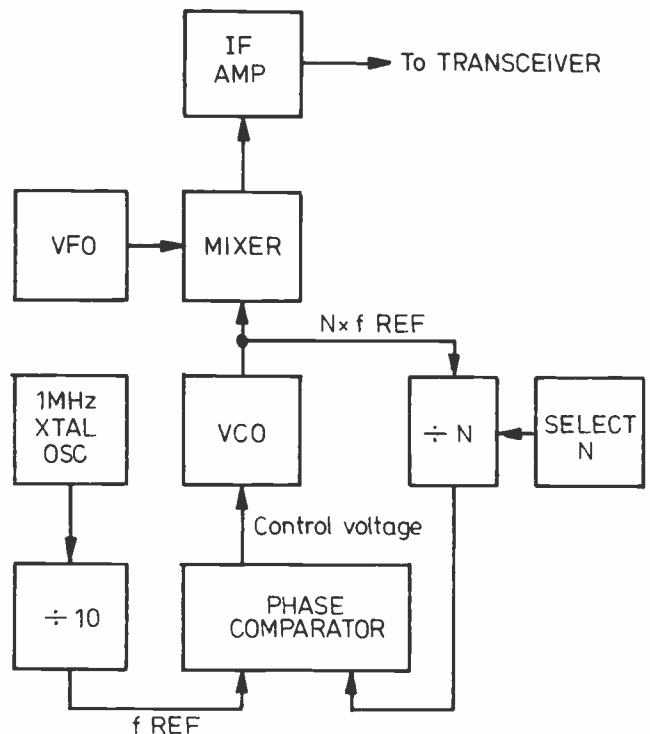


Fig. 1 SYSTEM BLOCK DIAGRAM

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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.

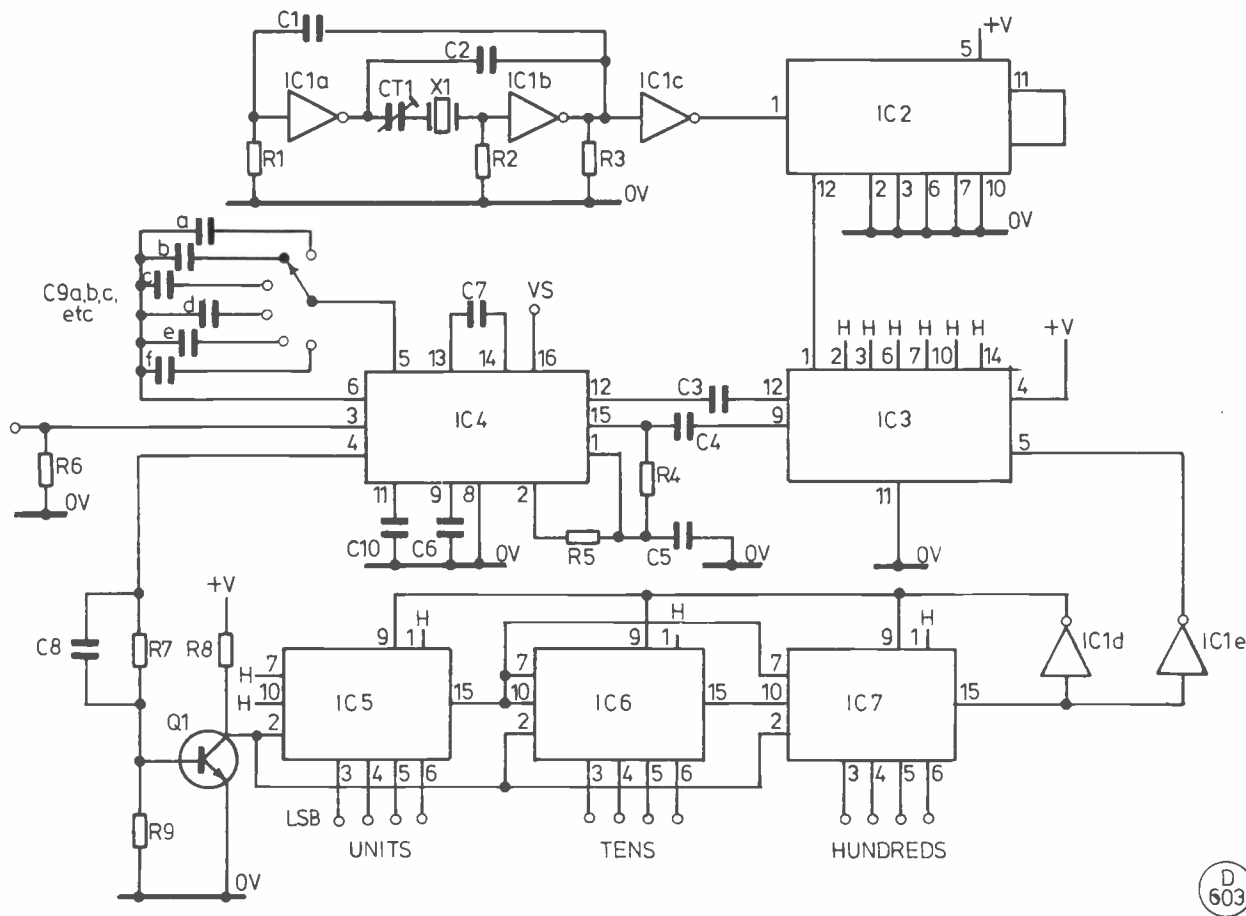


Fig. 2 CIRCUIT DIAGRAM

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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

Table of Values

Fig. 2

- R1, R2 = 2K2
- R3 = 680R
- R4, R5 = 1K
- R6 = 12K
- R7 = 3K9
- R8 = 220R
- R9 = 510R
- C1 = 10nF
- C2 = 100 pF
- C3, C4, C5, C10 = 0.1 μF
- C6, C7, C8 = 1 nF
- C9 = see text
- CT1 = 30 pF trimmer
- X1 = 1 MHz crystal
- Q1 = 2N5134 or similar
- IC1 = 7404 or 7414
- IC2 = 7490
- IC3 = 7473
- IC4 = NE562
- IC5, IC6, IC7 = 74160

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

Primary Frequency	Injection Frequency	VCO Frequency
28 MHz	19 MHz	15 MHz
21 MHz	12 MHz	8 MHz
14 MHz	5 MHz	9 MHz
7 MHz	16 MHz	12 MHz
3.5 MHz	12.5 MHz	8.5 MHz
1.8 MHz	9.8 MHz	5.8 MHz

Table 1. Frequency Plan. The injection frequency differs from the primary frequency by the receiver's IF, and the VCO frequency differs from the injection frequency by the interpolation mixer's VFO (lowest) frequency.

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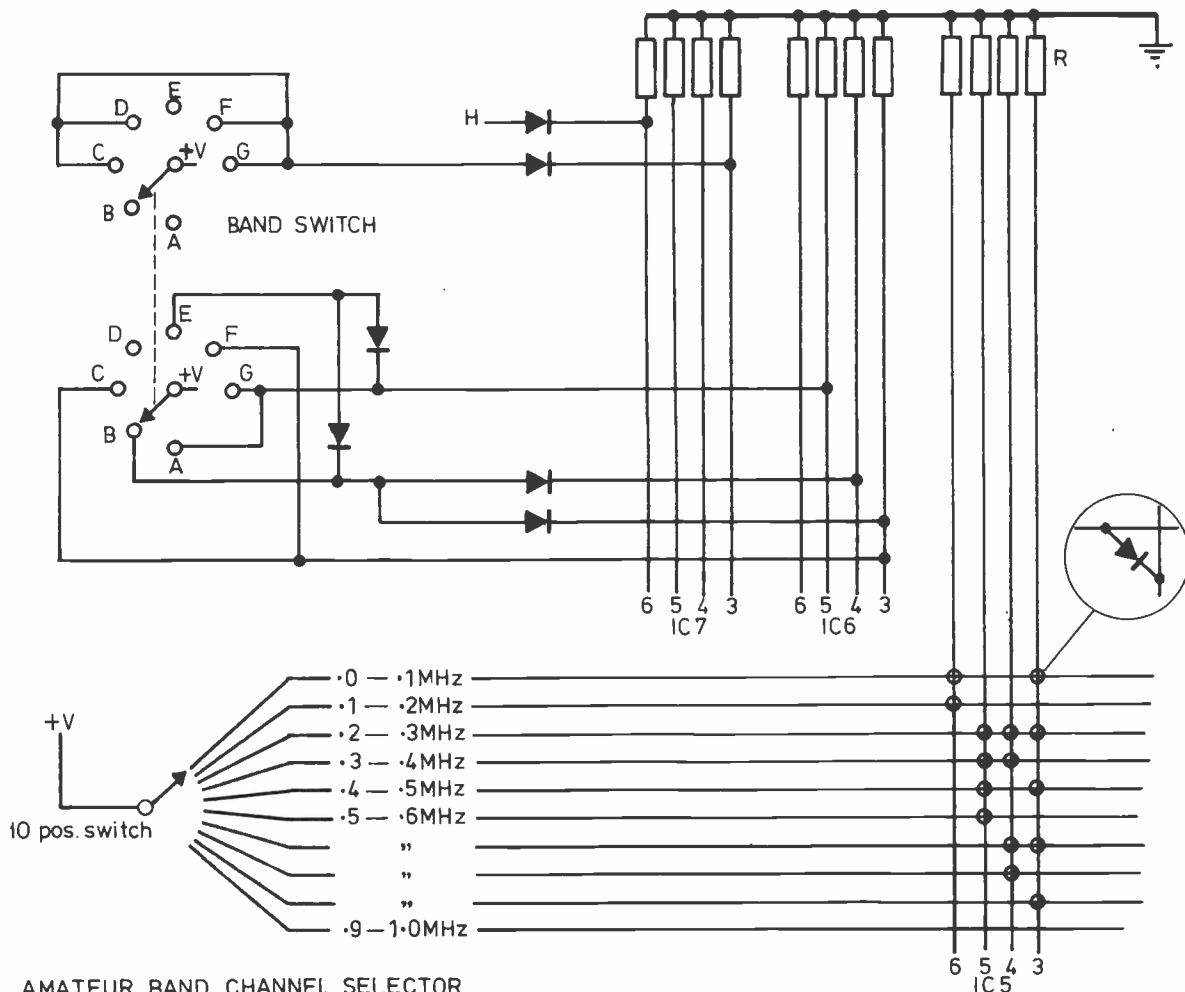


Fig. 3 AMATEUR BAND CHANNEL SELECTOR

All resistors are 1K, all diodes 1N914 or similar; the numbers are calculated from Table 1. On the band switch: A = 28 to 28.9 MHz; B = 29 MHz plus; C = 21 MHz; D = 14 MHz; E = 7 MHz; F = 3.5 MHz, and G = 1.8 MHz.

to each band centre. Some experimentation may be necessary, but as a first approximation let $C9 = \frac{300}{f(\text{MHz})}$ 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 *spuri*: 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.

"Short Wave Magazine" is the only periodical freely available from newsagents throughout the U.K. which is devoted exclusively to the pursuit and interests of Amateur Radio.

“A Word in Edgeways”

Letters to the Editor

The views expressed here are not necessarily those of the Editor, nor should they be taken to represent any particular SHORT WAVE MAGAZINE policy.

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 corrective action can I take to evaluate the right answers in the follow-up exam in May? No candidate could remember with a reliable degree of accuracy the wording of the 95 questions and their 380 suggested answers in order to perform a check after success or failure. If the exam attempt is to be of any value to failures, then something should be available to help them search their handbooks for the correct answers and dispel 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, we would be better informed for any subsequent attempts.

City and Guilds may object on the grounds that this would involve some security risk to their question bank. But is this more important than the great help such action would provide in the self-training of examinees? While any exam is in part a memory test, it is doubtful whether a candidate could recall parrot-fashion sufficient of the suggested 380 answers to gain a pass mark without a good knowledge of the subject itself.

What is the pass mark? Neither question nor answer paper gives this information. Should we not know, or is the mark adjusted according to each paper's difficulty?

T. W. Leary, Halstead

Dear Sir — Can I put in a plea for all those who have vintage valve communications receivers no longer wanted to put them up for sale, even if it does not seem worthwhile. Many provided worldwide contact 20-30 years ago, and still can. Not everyone is in a position to build a complex receiver, or buy an expensive new, or second-hand one. At present I know two boys and an OAP who, in the last twelve months, have set up their own SWL gear for under £25 each. This inexpensive entry into SW radio could well be the only one open to them: one of the receivers, “an old CR-100”, was actually under £8, less some valves and transformer. Restored, it gives readable signals on 0.5 μ V, reasonable mechanical bandwidth, coverage from 60 kHz to 30 MHz with only the range in use displayed, good freedom from

2nd channel with its two RF stages, and high selectivity with its three IF's and crystal. There are too many pre-solid-state receivers of like type to mention; some, of pre-SSB vintage, only need the “maximum AF gain, minimum RF gain” method to be adequate with this mode. They could initiate part of a new generation of SWL's.

F. G. Rayer, G3OGR

Dear Sir — I much appreciate the opportunity to give feedback to *S.W.M.* My gripe is as follows.

We have in the past read some very good articles on antennas; these were written by experts with much experience behind them. The only problem is that much space is given to theory but not enough to practical information. There are many amateurs living in towns and cities where space for antennas is very limited: for example those living in high-rise flats and town houses with very small gardens. Time and again in the antenna articles we read that so-and-so has experimented with the antenna described and had 50 acres of farm land with which to carry them out!

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.

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VHF BANDS

NORMAN FITCH, G3FPK

Awards and Tables

GORDON Emmerson, G8PNN, 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* 7010 and 35 watts amplifier, but these were soon replaced by a TS-700S and home made, QQV06-40A, 100 watts amplifier. The aerial is an 8-Over-8 slot fed 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 *Europa* 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 23cms."

John Hunter, G3IMV, 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, G3VYF, 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 VHFCC 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 counties, 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 GB3KR 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 call sign 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 OY9R 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, ZS6VHF is on 50.005 MHz and reception reports should be sent to ZS5TR, 86 Springside Road, Hillcrest Park, Durban 3652, Republic of South Africa. ZS6VHF 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 *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" aeriels to EA8XS. 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 G3IMV. Participants include EA1TA, 1ED, 3ADW and 6FB.

PE1CCN/A has been worked by G8VLQ and was on a gas platform in BN67h. Bob passes on the information that the station is QRV every other weekend running 10 watts to a 9-ele. beam, perhaps with 40 watts later on. The March dates would be 7/8 and 21/22, then April 4/5, etc. Those seeking a Jersey QSO on 2m. should listen for GJ8YVL/P, every other Thursday, the March dates being the 5th and 19th. Your scribe worked Eddie on Jan. 22 at 1500 and he runs a *Yaesu* FT-480 and 120 watts amplifier to a 4-ele. *Quad*, from the north of the island.

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, G5BK/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, GJ4ICD, 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 — 3,266/264 — with G4DEZ runner up — 2,647/259 — and G3NNG in third place — 2,188/324.

Coming events:— The final three legs of the BATC 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 call sign 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 RST/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, G3AAJ, 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 Herongate Road, London E12 5EQ. An *s.a.e.* will bring full details of AMSAT-UK from G3AAJ.

Six and Four Metres

John Baker, GW3MHW, (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 G4BPY and G5KW and heard ZB2VHF. 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 a further 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.

GW3MHW's nightly 4m. skeds. with G2AOK seem 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 QOV06-40A PA stage and a 4-ele. *Yagi*. John lists January QSOs with G2AXI, G3BA, G3ONP, G3OSS, G3PGN, G3TCT, G3XBY, G3ZRF, G3YZU, G4FKI, G4FRO, G4HMG and G8VR in addition to the "regulars". He has just completed a 4m. Tx and will be QRV shortly from YM24e on SSB. Sounds like a real hefty job and he figures it should last 20 years!

Syd Harden's, G2AXI, activities from Hampshire were chronicled by his wife, Veronica — whose initials were V.H.F. when they met. His 19 counties and 3 countries have helped him to first place in the new table. Tim Raven, G4ARI, (Leics.) has also got off to a good start on the band, as has Dave Thorpe, G4FKI, (Essex). Ken Willis, G8VR, (Kent) is now a regular 4m. band operator and has increased his score to 25 counties, but only 3 countries so far. Even so, he heads the 4m. column in the new table.

Peter Tuffs, G4HEB, is on 4m. from Co. Cleveland and has a 4-ele. *Yagi* aloft. He is looking for contacts. Commenting on the CW Contest on Jan. 18, Angus McKenzie, G3OSS, (London) reckons that conditions were the worst he can recall, but that activity was double that of last year's event. He had 27 QSOs but found band noise rather high, best DX heard being GD4IOM. Stations up to the

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

Two Metres

Until the last four days of the month, 2m. conditions in January were uninspiring. 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 accrue 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. Now welcome to Stephen Fletcher, G4GXL, from Bromsgrove, (Worcs.) whose station comprises an *Icom* IC-251A, *Mirage* B-1016 amplifier/preamp., and 14-ele. *Parabeam* at 27ft. He attempted six MS skeds on SSB in the *Quadrants*, completing four:—OE5XDL (HI); HG1KYY (IH); OZ1DSK (EP) and DK5RQ (GI), all on Jan. 3.

Ken Osborne, G4IGO, (Bristol) reckons to give the annual table a miss this year but promises to continue reporting and chasing squares. Harking back to the Dec. 19 *Ar*, he mentions working PAs and DLs in FM, FO and the "C" and "D" squares, a few Gs, GIs and GMs, F1EFD and F6EQQ (YI) and OE3OBC (II). In the *Quadrants*, Ken worked OK1DIG (HK) and F1JG (CD) and also heard D, EA, F, OE, OK, PA, SM and YU on the random SSB frequency.

For Tony Collett, G8GXE, (Berks.) nothing much was achieved till the 23rd when G3ZYY (Cnwl.), GW8FHW (S. Glam.) and GJ4ICD were worked. GU3KFT and F1COF (XI) were contacted on the 29th, and DL6BAG (DN); PE0HND (CM) and ON1AIX (BK) in the afternoon of the 30th. Later that evening, F9FT (CJ) was worked 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 F1COF 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

TWENTY-THREE CENTIMETRES ALL-TIME TABLE

Station	Counties	Countries	Total
G3JXN	40	9	49
G3DAH	37	9	46
G6NB	28	7	35
G8IFT	28	5	33
G3XDY	24	7	31
G3NHE	24	5	29
GD2HDZ	21	7	28
G8FMK	25	3	28
G3COJ	19	8	27
G4CMV	20	5	25
G4ALN	20	5	25
G3JVL	21	4	25
G3OBD	20	3	23
G8LEF	16	6	22
G8ARM	20	2	22
G8GML	17	4	21
G8GXE	15	5	20
G8EOP	11	5	16
G5DF	12	2	14
G3PBV	9	4	13
G8AOD	11	2	13
G8KAX	11	1	12
G8LHT	7	3	10
G4DKX	7	2	9
G3OHC	8	1	9
G3BW	3	5	8
G8FJG	7	1	8
G8HHI	6	1	7
G8GNZ	4	2	6
G2AXI	5	1	6
G8OPR	3	1	4

Based on current administrative counties.

operating on 80m. who could assist on a Sunday. During the lift on Jan. 30, he worked over fifty continentals 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 KA1GT (ex-G8EKB) 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

amateurs turning up on the frequency can always expect a warm welcome with such questions as, "Do you know my friend Charlie Smith? He lives in Kent." Ken found time to go on the 20m. VHF net where EA3AW told him that he expects to be QRV from the Pyrénées sometime in March with one kilowatt to a pair of 16-ele. aerials.

Arthur Breese, GD2HDZ, reckons that January provided some quite remarkable conditions. He heard two or three EAs on the 23rd, but they were not strong enough to work. He writes:—"As far as I could make out they seemed to have an exclusive path to North Wales and Anglesey although, to my great frustration, GD3YEO, operating *mobile* with a *Liner 2*, was able to work them!"

Reg Woolley, GW8VHI, (W. Glam.) has now put up a 14-ele. *Cushcraft* "Boomer" in mid-Jan. Prior to this, on Dec. 28, he worked EI9BG (VM), FICRP/P (YI) and FICBE (XI), while EA1ED (VD) was worked at 0007 on the 31st for a new square. G2FTS/P on Lundy Island was an unusual contact on Jan. 18. On the 24th, Reg worked EA1ED again, along with EA1QJ and EA1TA, all in VD square. The 27th brought a contact with GU3HFW and F1COF (XI).

Geoff Brown, GJ4ICD, is another reader who may opt out of the annual table this year. He mentions rumours of a *Sporadic E* opening" . . . on Jan. 6/7/8 from France to somewhere . . ." but no further details so far. On Jan. 25th, Yves Drouault, F6EOQ (YI) reckons he worked YZ7BDR (IG42c) at 1709 on CW. At the time, a Danish station was copying Spanish Band 2 FM radio and that suggests an *E's* mode possibility. The above information was passed along by G4IGO.

In the Dec. 19 *Aurora*, Eddi Ramm, DK3UZ, (EN) worked UA3PCK (TO) over a distance of 1,837kms. *Ar* QSOs over 1,800kms. are not too frequent. As often happens, just after our deadline, there was another *Auroral* event, on Feb. 6. Your scribe was alerted to it by G3XDY just after 1800, but it had been in progress some time, it seems. It was nothing like the amazing affair of Dec. 19, but activity was high. From the London area, the QTFs were varying rather randomly between 350° and 20°. The "Swedish Beacon" — SM4IVE (HT68d) — was very loud as usual and seemed to work everyone. A number of strong GMs were heard and worked on CW and mention was made of GM4KNQ on SSB in YS square, and LA6ZW in ET square. Paul Turner, G4IJE, did not hear any of the beacons *via Ar* and neither were any so copied at G3FPK.

Your scribe went QRT around 2100 and the event was still going on but with signals much weaker. Later on, in a contact with Tony Levy, G4JDEE, (Manchester) it was learned that *AR* QSOs were still in

QTH LOCATOR SQUARES TABLE

Station	23 cm.	70 cm.	2 m.	Total
G3POI	—	—	299	299
G3VYF	—	84	202	286
GJ4ICD	1	87	184	272
I4EAT	—	25	238	263
DK3UZ	—	—	257	257
G8HVV	22	83	141	246
G3IMV	—	—	240	240
G4CMV	14	59	157	230
G3XDY	30	80	118	228
G3JXN	39	81	107	227
G3COJ	24	74	112	210
G4ERG	—	16	186	202
EA3LL	—	15	185	200
G3CHN	—	—	196	196
9H1CD	—	13	178	191
G8LEF	22	62	101	185
G3SEK	—	—	182	182
G3BW	5	27	155	175
GJ8KNV	2	54	119	175
G3PBV	12	59	103	174
9H1BT	—	11	163	174
G4BWG	—	37	137	174
G8ATK	5	56	111	172
G3FPK	—	—	168	168
G3KEQ	—	—	166	166
G4IGO	—	—	164	164
G8HHI	2	46	113	161
G4IJE	—	—	161	161
G8GXE	11	55	89	155
G8TFI	—	51	100	151
G8OPR	1	38	111	150
G2AXI	2	54	93	149
G8LGL	—	25	121	146
G4DEZ	—	—	145	145
G4ERX	5	45	92	142
GD2HDZ	12	41	83	136
G8MFJ	—	23	113	136
G4AWU	—	22	113	135
G8IFT	15	34	81	130
G8KGF	—	28	99	127
G8LFJ	—	18	107	125
G8FMK	14	51	57	122
G8KAX	5	41	75	121
G8JJR	—	20	98	118
G8IXG	—	—	115	115
G4HFO	—	46	68	114
G4FBK	—	5	105	110
GJ3RAX	1	27	74	102
G8VR	—	3	94	97
G8CXQ	—	—	96	96
G3FIJ	—	27	68	95
G8KPL	—	7	87	94
G8VLQ	—	27	65	92
G18EWM	—	25	67	92
G6UW	—	1	89	90
G8JAG	—	7	79	86
G4GHA	—	—	86	86
G4JZF	—	—	85	85
G8RMA	—	7	75	82
G8TGM	—	—	76	76
G8WRG	—	—	63	63
G8JGK	—	—	62	62
G8SKG	—	5	53	58
G8TIN	—	3	55	58
G8SVG	—	—	58	58
G4GSA	—	6	51	57
G4GXL	—	—	44	44
G8VJJ	—	2	37	39
G8VJV	—	—	37	37
G8WRD	—	9	14	23

Starting Date January 1, 1975. No satellite or repeater QSOs.

progress around 2300. There was a second phase too, as Jim Rabbits, 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, noctilucent 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. GW8VHI 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 continentals.

On Jan. 7, G3PBV worked a few stations in the Derby and Leicester areas at good strengths from Devon. On the 27th, G8SFI in York was contacted but signals were very weak. On the 29th, Dave worked many Midlands and Lincolnshire stations with G3HHD (N. Yorks.) the best DX. His local Fs were very strong but little was heard from the east. On the 30th, Dave reports some strange effects. He worked G4HFO in St. Austell (Cnwl.) at S9 when both were beaming towards Paris. Their direct path is virtually non-existent on the band and very poor on 2m. GJ4JWA, 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 GDY from Jan. 20 and, on the 30th, some DL, F and PA stations, including F9FT in CJ square, a new one for Tony. Jon Stow, G8LFJ, (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 Tyne 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 Chris's efforts. On Jan. 27, G8VRJ (Lincs.); GD8EXI and GW8AAP/P (Clwyd), 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

drive an *MM* transverter to get on the band, the aerial being the popular 21-ele. 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 G8BHH and G8SWZ in Wolverhampton; G4KPZ (ex-G8GNE) and G4BEL in Cambridge; G8JHJ (Staffs.); G8IFT nr. Birmingham and G4DSF (Coventry). The next day saw a repeat QSO with G8SWZ who was S9 in Newton Abbott, running just one watt through 60ft. of UR-67 cable! G6FK, (Penn.) was also contacted but GB3CLE 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 DB1VY (DJ) was worked but a test with LX2LA was unsuccessful. Next, John gave F9FT (CJ) 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 above 1,255 MHz. This QSO gave John another band square and country. Up to 1900, 3 Germans in DL and DK; 4 ONs in BK and BL, and 2 PAs in CM and CL. He was away over the weekend, but found the band still open to Holland late on the Sunday night, Feb. 1, but by the next day, everything was flat again. At times, beacons GB3s AND, CLE and IOW and PA0QHN were all very strong.

G8GXE worked into London, Surrey, Hants. on the 27th and Essex and Bucks. on the 29th. From 1830 on the 30th Tony worked ON1JE (BL); DB5KS (DL); PA0VTW (CM) for all new countries and squares, then G3AUS and G8ABP. Failures were F9FT, G3GNR and

ANNUAL VHF/UHF TABLE

January to December 1981

Station	FOUR METRES		TWO METRES		70 CENTIMETRES		23 CENTIMETRES		TOTAL Points
	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	
G2AXI	19	3	46	10	30	7	—	—	115
G4ARI	17	2	52	10	—	—	—	—	81
G8TFI	—	—	42	10	19	8	—	—	79
G3FPK	—	—	65	14	—	—	—	—	79
G3PBV	—	—	35	7	26	4	5	1	78
G8GXE	—	—	26	8	25	8	6	4	77
G8RZP	—	—	47	7	20	3	—	—	77
G4DEZ	—	—	53	15	—	—	—	—	68
G8FMK	—	—	23	10	15	3	9	1	61
G8VR	25	3	20	6	—	—	—	—	54
G8SKG	—	—	39	10	2	1	—	—	52
G8TIN	—	—	32	6	6	2	—	—	46
GW3CBY	7	2	22	6	2	2	—	—	41
GD2HDZ	3	1	10	7	12	7	1	2	40
G4FKI	18	2	5	2	3	4	—	—	34
G8WRD	—	—	17	5	7	5	—	—	34
G4GXL	—	—	24	9	—	—	—	—	33
G8FVW	—	—	29	3	—	—	—	—	32
G8RWG	—	—	26	4	—	—	—	—	30
G8VJJ	—	—	21	4	—	—	—	—	25

Three bands only count for points. Non-scoring band figures in italics.

G8FMK. Tony also noted some weird effects:—"These last two failures were very interesting as the attempt with G8FMK at 2100 provided no signals at all when we can normally make it O.K. But while we were beaming at each other, we could both copy G3AUS. An hour before, I heard the PA0 working G3AUS but I couldn't hear him at all, even when beamed to Devon and with the PA0 audible off the back. Also, neither Ray nor I could copy GB3DUN, normally readily audible at both stations."

GD2HDZ got his signals across to PA0EZ on Jan. 31 and GJ4ICD's first QSO was with GJ8KNV and Geoff reports that Phil was working PAs using just one watt in the lift and getting S9-plus-30dB. reports. Ray Cox, G8FMK, (Oxon.) mentioned to your scribe that ice on his aerial completely ruined all directivity. During the 27th he did work G3AUS and G3TQF (Leics.).

From London, G3OSS runs 60 watts PEP output to four 23-ele. *F9FT* aerials at 72ft. The rig comprises a *Sugiyama* F-850 with an *MM* transverter driving two 3CX100A5 valves. Angus is looking for Midlands and northern stations. On Feb. 1 he worked EI9Q and prior to that, stations in Suffolk, Avon, Devon and Staffs.

Finally, an announcement over *GB2RS* suggested that Tuesday evenings from 2000 local be microwave activity night on 1,296.2 MHz.

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 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 *GB2RS* 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 continentals. The end-of-Jan. lift provided clear evidence of this.

Deadlines

That's it or the first of the 1981 reports in the new, bigger format. The deadline for the April issue is March 4 and for the May piece, April 1 — *very early*. Everything to:—"VHF Bands," SHORT WAVE MAGAZINE, 34 High Street, WELWYN, Herts., AL6 9EQ. *73 de G3FPK*.

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40W Kit	£27.00
CSC PB100	£11.00
2M Synthesiser Kit	£35.00
BC143	£1.55 for 5
BCY71	£1.10 for 5
BD131	£2.20 for 5
BD132	£3.00 for 5
BF180	£1.15 for 5
BF224	£1.20 for 5
9.1V Zener	55p for 5
CA3046	£3.80 for 5
CA3130E	£3.90 for 5
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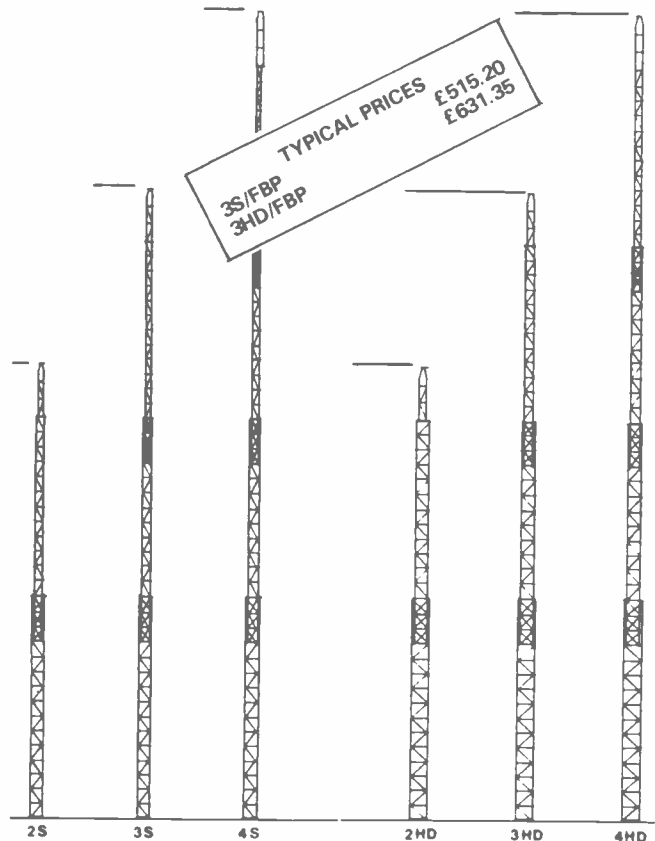
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- ★ Variable Bandwidth Tuning (VBT)
- ★ IF Shift and IF Notch Filter
- ★ Built-in Digital Readout
- ★ 6146Bs in the PA, with RF negative feedback
- ★ PLL frequency control system for stability
- ★ RF Speech Processor; Noise Blanker and other desirable operating features
- ★ New compact size — only 333(W) x 333(D) x 133(H) mm

NEW

TS-130S



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 3.5 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 80-15m
- ★ 160W PEP input (SSB), 140W DC input (CW) on 12 and 10m
- ★ Built-in Speech Processor
- ★ CW Narrow/Wide filter selection (with optional filter)
- ★ SSB Narrow (1.8kHz) selection (with optional filter)
- ★ Automatic Sideband Selection according to Band
- ★ All solid-state; IF Shift; built-in Digital Readout
- ★ Compact package — ideal for /M or /P operation

NEW

YAESU FRG-7700

A HIGH-PERFORMANCE COMMUNICATIONS RECEIVER

The short-wave listener's dream is now a reality in the FRG-7700 — an advanced all-mode communications receiver featuring significant advances in circuit design and operating convenience.



FRG-7700 FEATURES

- ★ Full General Coverage, 0.15 to 29.999MHz
- ★ All Modes, AM, SSB, CW, FM
- ★ Digital Frequency/Time Display
- ★ 12 Memory Channels (option) with backup
- ★ LSI Clock/Timer, for unattended recording
- ★ Wide Dynamic Range
- ★ Many other Convenience Features

THE '9000 PACKAGE FOR VHF

TRIO TR-9000 ONLY
 + BO-9 BASE
 ★ PS-20 POWER SUPPLY **£ 389**
 LIST PRICE SEPARATELY £402.45

THE '720 PACKAGE FOR V/UHF

YAESU FT-720RV (2M) ONLY
 + E-72L EXTENSION CABLE
 + FP-4 POWER UNIT **£ 305**
 ADD £30 FOR FT-720RU (70CM)

THE '120 PACKAGE (while stocks last)

TRIO TS-120S ONLY
 + PS-30 POWER SUPPLY
 + MC-35S MICROPHONE **£ 499**

THE '7625 PACKAGE (while stocks last)

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 + RM-76 REMOTE UNIT **£ 279**

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£258.75

BEARCAT 220 FB
 Specifications:
 Frequency range:

Low Band Mobile.....	66 - 88MHz
Aircraft.....	118 - 136MHz
Amateur Band.....	144 - 148 MHz
Public Service & Marine.....	148 - 174 MHz
UHF Amateur.....	420 - 450 MHz
UHF Band.....	450 - 470MHz
UHF Band.....	470 - 512MHz



TR9000

The TR9000 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 5-channel 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.....	£690.00
SP820 Speaker.....	£37.95
SM220 Monitorscope.....	£197.80
TL922 Linear Amplifier.....	£595.00
PS-20 AC power supply for TS 120V.....	£44.85
MB 100 Mobile mounting bracket.....	£17.25
R1000 Receiver.....	£298.00
TR2300 2m. Portable Transceiver.....	£166.75
TR2400 Hand Held 2m. Transceiver.....	£198.00
TL 120 Linear Amplifier.....	£128.80
HS5 Headphones.....	£21.85
HS4 Headphones.....	£10.35
MC50 Desk Microphones.....	£24.15
MC305 Hand Microphone 50K.....	£13.80
TS 130V HF Transceiver.....	£404.34
TS 1305 HF Transceiver.....	£491.05
AT 130 Antenna Tuner.....	£72.89
PS 30 Power Supply.....	£85.10
SP 100 Speaker.....	£28.45
AT230 Antenna Tuner.....	£106.72
SP230 Speaker.....	£33.14
SP40 Mobile Speaker Unit.....	£26.89



J.R.C. NRD515D

General coverage receiver 100 KHz to 30 MHz fully synthesised. Digital readout PLL synthesiser with rotary type encoder pass band tuning — quotations upon construction. £949.00

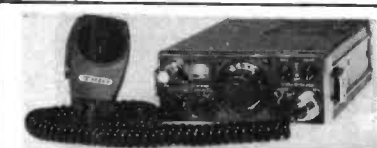
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No parking problems. Turn at the Greyhound Motel on the A580 (East Lancs.) Road. S.A.E. with all enquiries. 25p will bring you latest information and prices, credited to your first purchase over £5. Postage carriage extra.
ALL OUR PRICES INCLUDE VAT



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, campers, climbers, you can hear them all over the country and reliability which is the essence of TRIO equipment. £166.75

JAYBEAM

5Y/2M 5 element yagi.....	£11.27
8Y/2M element yagi.....	£14.49
10Y/2m 10 element.....	£31.05
PBM/14/2m. 14 element Parabeam.....	£44.80
5XY/2m. 5 element crossed yagi.....	£22.77
8XY/2m. 8 element crossed yagi.....	£28.40
10XY/2m. 10 element crossed yagi.....	£37.72
Q4/2m. 4 element Quad.....	£23.69
Q6/2m. element Quad.....	£31.39
D5/2m. 5 over 5 slot fed yagi.....	£20.12
D8/2m. 8 over 8 slot fed yagi.....	£27.40
UGP/2m. ground plane.....	£10.12
MBM48/70cms. Multibeam.....	£28.75
MBM88/70cms. Multibeam.....	£39.33
TAS 1/2" 2m. Whip mobile.....	£15.29
C5/m. Colinear.....	£44.27
C8/70cm. Colinear.....	£50.00
D15/1296 23cm. Antenna.....	£34.04

Carriage on Antennas £3.00.



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THE ULTIMATE IN RECEIVERS

Frequency coverage 160-10m plus SW Broadcast Bands. All modes CW-USB-LSB-RTTY. Digital Readout. Noise Blanker. Fully variable. I.F. Bandwidth, plus Bandpass tuning, plus rejection notch filter. £690.00

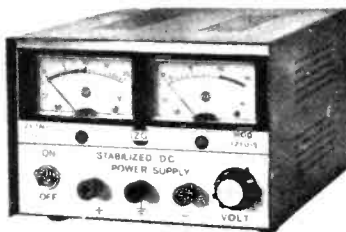
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TR7 Digital Transceiver.....	£1,035.00
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MS7 Speaker.....	£29.90
R7 Digital Receiver.....	£969.00
Filters for TR7.....	£39.10
FA7 Fan for TR7.....	£20.70
MN7 ATU/RF Meter 250 Watts.....	£124.20
MN2700 ATU 2KW.....	£207.00
DL 300 Dummy Load 300Watts.....	£20.70
DL 1000 Dummy Load 1KW.....	£37.95
TV 3300 Low Pass Filter.....	£18.40
AK75. Doublet Antenna 132' top with 470 ohm Feeder.....	£23.00



TR7800

Continuing TRIO's policy of presenting the Radio Amateur with the finest equipment available, we were pleased to announce the NEW TR7800 2m FM Mobile Transceiver. 15 memory channels — Priority channels with simplex ±600 KHz or non-standard operation — "Priority alert" bleeps when signal on M14 priority channel. Frequency coverage 144.00, 145.955 in switchable 5 KHz or 25 KHz steps. Front keyboard for selecting frequencies, programming memories and controlling scan function. **ALL THIS and MORE for £268.50.**



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SOLID STATE STABILISED POWER SUPPLIES
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Model 122 12.6V 2.5A.....	£15.55
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Model 156S 4 - 15V 5 amp Twin Meter.....	£40.00
Model 1210S 4 - 20V 10 amp Twin Meter.....	£85.00
Model 1210/1 10 amp 13V.....	£68.00
Model 1220/1 13.5V 20 amp.....	£90.00
Model 1220/2 13.5V amp.....	£80.00

RECEIVERS AND TRANSCEIVERS
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SR9 Tunable 144 - 146MHz Receiver.....	£46.00
AMR217B Scanner Receiver, AC or DC operation.....	£113.50
R512 Aircraft Band Scanning Receiver.....	£135.00
Regency Digital Flight Scan Synthesised Aircraft Band Receiver.....	£215.00
Philips FM321 70cms FM Transceiver.....	£264.00
Yaesu FRG7 Receiver.....	£199.00
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'Sky ACE' Hand Held Aircraft Band Receiver.....	£49.50
Bearcat 220 Scanning Receiver.....	£258.75
AR22 2m Hand Hold Receiver.....	£83.00



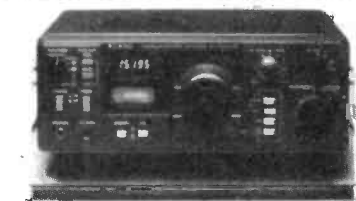
TS830S

HF SSB TRANSCEIVER AROUND £640 inc VAT

carriage by Securicor £4.50.

The new TS830S, the latest from TRIO. A high performance, very affordable HF SSB/CW transceiver with every conceivable operating feature built in for 160 through 10 metres (including the new three bands). The TS830S combines a high dynamic range with variable bandwidth tuning (VBT), IF shift and an IF notch filter, as well as very sharp filters in the 455 KHz second IF. Together with the optional VFO230 (remote digital display VFO) which provides split frequency operation and 5 memories for frequency hold, the amateur has available today's advanced technology linked to the proven reliability and exceptional linearity of a valve PA.

- * VBT variable bandwidth tuning
- * IF notch filter
- * IF Shift
- * Various filter options
- * Built in digital display
- * 6146B final with RF negative feed-back
- * Optional Digital VFO for increased flexibility
- * Innovative PLL system of frequency generation
- * RF speech processor
- * Adjustable noise blanker level
- * Adjustable audio tone
- * RF attenuator
- * RIT/XIT
- * SSB motor circuit
- * Expanded frequency coverage



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 12 KHz for AM — 6 KHz narrow AM and 2.7 KHz SSB. Also incorporates a noise blanker. Operation is from 100-240 V AC or 12 V DC.



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...and the beauty isn't just skin deep!

Multi-mode Audio Filter

Model FL2
Adds 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 of fully variable low and high pass filtering give sharper filter edges even 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.

General Coverage Converter

Model PC1
Makes your transmitted speech louder and clearer for a given transmitter power. The 'Rolls-Royce' of 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.

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 'Rolls-Royce' of 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 ASP



The Answer to the Morse Test. Model D70

The Datong Morse Tutor (Model D70) is your passport to a full licence. Compact, with internal battery and speaker plus personal earphone it provides unlimited random morse for practice. With Model D70 you can practice morse anywhere, anytime, and at your own pace. With the Morse Tutor practice becomes a pleasure because you get results quickly.



Active Receiving Antennas

Models AD270, AD370
Ultra-compact receiving antenna systems giving wideband coverage from 200kHz to over 30MHz at high sensitivity. Models Ad270 and AD370 give similar receive performance to large conventional antenna systems yet are only 3 metres in overall length. The balanced dipole configuration also gives good rejection of local interference.



Model Ad270 (an upgraded version of Model AD170) is for indoor mounting. Model AD370 is waterproofed for outdoor use. Model AD370 & AD270 head units only are also available separately for upgrading earlier AD170 systems.

Model D75 RF Speech Processor

Model D75 uses the same method of r.f. clipping as in Model ASP but features manual adjustment of input level rather than the automatic system used in Model ASP.



Like all our r.f. clippers the unit helps your speech signals stand out from the next under DX conditions. Many users consider the use of our r.f. clippers more effective than a linear.

MODEL FL1 Frequency-agile Audio Filter

As unique now as when we first invented it, model FL1 is still the only audio filter which is able to automatically notch out an interfering heterodyne from SSB speech signals. This ability provides the perfect answer to those who "tune up" on occupied channels. As a cw filter it is surpassed only by our new Model FL2. Independent control of bandwidth and centre frequency gives beautifully smooth adaptability to varying conditions.



INGENIEURBÜRO ULRICH HANSEN

VHF & UHF PREAMPLIFIERS: A new range from Ulrich Hansen of West Germany

Everyone agrees that VHF receivers should have a low noise figure, and converter and receiver makers compete to announce the lowest possible figure. But really the most important thing is not the noise figure of the receiver but that of the receiving system as a whole.

If your coaxial feeder has a loss of 3 db, for example, your overall noise figure is automatically increased by the same factor. This makes the search for the last fraction of a db at the receiver look a bit academic.

Ingenieurbüro Ulrich Hansen in Germany has introduced a range of in-line preamplifiers which allow you to put a very low noise preamplifier right at the antenna. This way feeder loss does not degrade the system noise figure. The improvement on weak signals can be dramatic. All the products in the Hansen range are built to very high standards and no compromises are made which would degrade the achievable noise figure.

The top-of-the-line units use gallium arsenide FET's to give remarkably low over-all noise figures (as low as 0.3 db at 2 m and 0.5 db at 70 cms). In addition most units incorporate relay switching to bypass the preamplifier while transmitting.

Our new short form data sheet on these products is available free on request.

Products not shown in this advertisement

- Model Datest 1 Transistor Tester
- Model Datest 2 Transistor Tester
- R.F. Speech Processor
- Model RFC/M,R.F. Speech Processor PCB Module
- Model MPU, Mains Power Unit.
- Accessory Leads.



Very Low Frequency Converter Model VLF

If your communications receiver gives poor results below 500kHz Model VLF is the answer. It also adds MW and LW coverage to amateur bands-only receivers for news, time checks etc.

- * Connects between antenna and receiver input.
- * Converts signals from 0 to 500kHz to the range 28 to 28.5MHz, with low noise and high sensitivity. (Useable 1MHz with reduced sensitivity).
- * Crystal controlled for high stability.
- * Quality construction in diecast aluminium box (size 112x62x31mm), SO239 connectors, LED indicator, in/out switch.
- * Operates from internal 9 volt battery or external supply (5-15 volts DC).

PRICES: All prices include delivery in U.K. basic prices in £ are shown with VAT-inclusive prices in brackets.

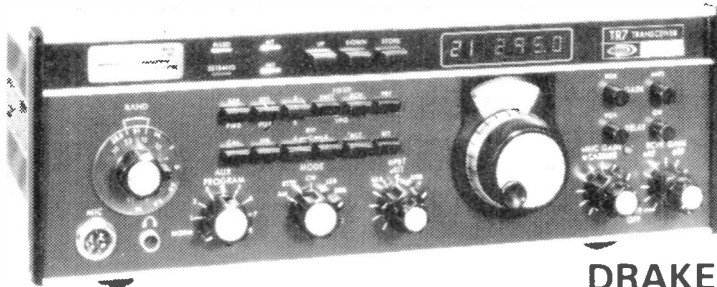
FL1	59.00 (67.85)	AD270	33.00 (37.95)
FL2	78.00 (89.70)	AD370	45.00 (51.75)
PC1	105.00 (120.75)	AD270 + MPU	
ASP	69.00 (79.35)		37.00 (56.3)
VLF	22.00 (25.30)	AD270 + MPU	
D70	43.00 (49.45)		49.00 (56.35)
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RFC/M	23.00 (26.45)		

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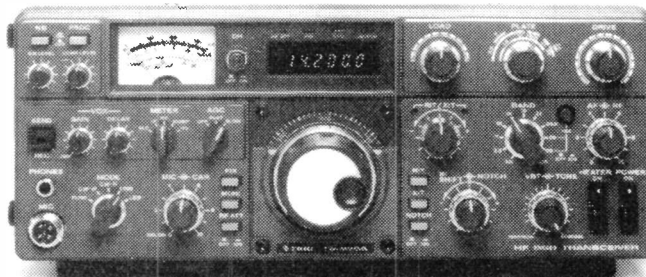
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Swan Cubic 1500Z linear amplifier	POA

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HANSON FS 500H 1.8/60MHz 2Kw	£67.85
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MK 1024	Automatic memory keyer	£135.13
EK 150	Semi/Automatic keyer	£74.75

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DL20	30W DC-150MHz with PL259 connector	£6.33
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Yaesu FRG 7700/S	£309	£120	£15.80
Yaesu FRG 7700S/2M	£315	£120	£16.29
Yaesu FRG 7700M	£389	£189	£16.69
Yaesu FRG 770M/2M	£399	£199	£16.69
Yaesu FRG 7000	£299	£115	£15.30
Yaesu FT 101ZD	£569	£223	£28.81
Yaesu FT 101Z	£488	£190	£24.84
Yaesu FT 225RD	£499	£194	£25.43
Yaesu FL 2100Z	£362	£180	£15.20
Yaesu FT 707	£500	£200	£25.04
Yaesu FT 480R	£359	£175	£15.30
Trio R 1000	£298	£115	£15.20
Standard C8800	£252	£99	£12.71
Standard C7800	£275	£109	£13.81

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Amtech CW 250 - The most outstanding CW filter available	£24.90
Amtech Channelguard - A plug in device to eliminate those unwanted stations	Decoder £15.25 Sender £7.25
Amtech FM7: FM Demodulator for FRG 7	£11.90

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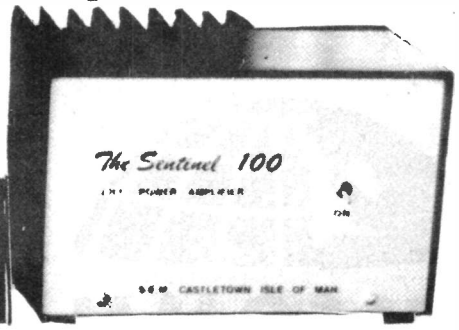
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THE NEW SENTINEL AUTO 2 METRE PRE-AMPLIFIER
In the five years since we first thought of the principle of r.f. switched automatic pre-amplifiers, we have learned a lot about them. The benefit of all this experience has been put into the Sentinel Auto Mk II. These include NEW PROTECTION circuit to give MAXIMUM LEGAL through power rating. Completely new (and unique) third generation DUAL GATE MOSFET pre-amplifier giving 1db N.F. and 20db gain with GAIN CONTROL and OFF switch (straight through when OFF). The r.f. switch has a delay for use on ANY MODE.

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£25.00* 2 metres and 4 metres. 70cm version £28.80*

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Prices shown are for one off, to our amateur spec., closer tolerances are available, please send us details of your requirements.

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Adj. tol. ±50ppm. Temp. tol. ±100ppm 0 to + 70°C.

6.0to 19.999kHz	£28.12	80to 99.999kHz	£10.06
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40to 79.999kHz	£12.40	160to 499.99kHz	£6.19
		500to 799.99kHz	£7.30

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* 1.5to 2.599MHz (fund)	£4.96	* 15to 62.99MHz (30/T)	£4.48
* 2.6to 20.99MHz (fund)	£4.48	* 60to 106MHz (50/T)	£5.16
* 3.4to 3.999MHz (fund)	£6.21	* 105to 125MHz (50/T)	£7.76
* 4.0to 5.999MHz (fund)	£4.93	125to 180MHz (0/T)	£7.50
* 6.0to 20.99MHz (fund)	£4.48	180to 25MHz (0/T)	£12.48

Delivery * Normally 5/6 weeks (express available), all other frequencies 7/8 weeks. Holders: Low frequencies HC 13/U or HC 6/U dependent on frequency. High frequencies are available in HC 6/U, HC 18/U or HC 25/U unless marked † only available in HC 6/U or ‡ only available in HC 18/U and HC 25/U, HC 17/U (replacement for FT 243) and HC 33/U (wire end HC 6/U) available as per HC 6/U above at 30p extra on HC 6/U price. Unless otherwise specified, fundamentals will be supplied to 30p circuit conditions and overtones to series resonance.

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CRYSTAL FREQUENCY RANGE USE (Tx or Rx) and HOLDER	4 MHz-TX-HC6/U	6 MHz-TX-HC25/U	8 MHz-TX-HC6/U	10 MHz-RX-HC6/U	11 MHz-RX-HC6/U	12 MHz-TX-HC25/U	14 MHz-RX-HC25/U	18 MHz-TX-HC25/U	44 MHz-RX-HC6/U	44 MHz-RX-HC25/U	52 MHz-RX-HC25/U
144.4 (433.2)	b	a	b	a	a	b	a	a	a	a	a
144.480	a	a	a	a	a	a	a	a	a	a	a
144.800	a	a	a	a	a	a	a	a	a	a	a
144.850	a	a	a	a	a	a	a	a	a	a	a
145.000/ROT	a	a	a	a	a	a	a	a	a	a	a
145.025/R1T	a	a	a	a	a	a	a	a	a	a	a
145.050/R2T	a	a	a	a	a	a	a	a	a	a	a
145.075/R3T	a	a	a	a	a	a	a	a	a	a	a
145.100/R4T	a	a	a	a	a	a	a	a	a	a	a
145.125/R5T	a	a	a	a	a	a	a	a	a	a	a
145.150/R6T	a	a	a	a	a	a	a	a	a	a	a
145.175/R7T	a	a	a	a	a	a	a	a	a	a	a
145.200/R8T	a	a	a	a	a	a	a	a	a	a	a
145.300/S12	a	a	a	a	a	a	a	a	a	a	a
145.350/S14	a	a	a	a	a	a	a	a	a	a	a
145.400/S16	a	a	a	a	a	a	a	a	a	a	a
145.425/S17	a	a	a	a	a	a	a	a	a	a	a
145.450/S18	a	a	a	a	a	a	a	a	a	a	a
145.475/S19	a	a	a	a	a	a	a	a	a	a	a
145.500/S20	a	a	a	a	a	a	a	a	a	a	a
145.525/S21	a	a	a	a	a	a	a	a	a	a	a
145.550/S22	a	a	a	a	a	a	a	a	a	a	a
145.575/S23	a	a	a	a	a	a	a	a	a	a	a
145.600/ROR	a	a	a	a	a	a	a	a	a	a	a
145.625/R1R	a	a	a	a	a	a	a	a	a	a	a
145.650/R2R	a	a	a	a	a	a	a	a	a	a	a
145.675/R3R	a	a	a	a	a	a	a	a	a	a	a
145.700/R4R	a	a	a	a	a	a	a	a	a	a	a
145.725/R5R	a	a	a	a	a	a	a	a	a	a	a
145.750/R6R	a	a	a	a	a	a	a	a	a	a	a
145.775/R7R	a	a	a	a	a	a	a	a	a	a	a
145.800/R8R	a	a	a	a	a	a	a	a	a	a	a
145.950/S36	a	a	a	a	a	a	a	a	a	a	a

PRICES: (a) £1.95; (b) £2.32; (c) £2.50; (e) £4.48.

AVAILABILITY: (a), (b), (c) stock items, normally available by return (we have over 5000 items in stock). (e) 4/6 weeks normally but it is quite possible we could be able to supply from stock.

N.B. Frequencies as listed above but in alternative holders and/or non stock loads are available as per code (e).

ORDERING. When ordering please quote (1) Channel; (2) Crystal frequency; (3) Holder; (4) Circuit conditions (load in pfl). If you cannot give these, please give make and model of equipment and channel or output frequency required and we will advise if we have details.

4M. CRYSTALS FOR 70.26 MHz - HC6/U

TX 8.7825 MHz and RX 6.7466 MHz or 29.780 MHz £2.32. 10.245 MHz "ALTERNATIVE" IF CRYSTALS £2.32. For use in Pye and other equipment with 10.7 MHz and 455 kHz IF's to get rid of the "birdy" just able 145.0 MHz in HC6/U, HC18/U and HC25/U.

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All at £3.00, 38.6666 MHz (144/28), 42 MHz (70/28), 58 MHz (144/28), 70 MHz (144/4), 71 MHz (144/2), 95 MHz (342/52), 96 MHz (1,296/432/144), 101 MHz (432/28), 101.50 MHz (434/28), 105.6666 MHz (1,296/28) and 116 MHz (144/28).

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10p per word, minimum charge £1.50 payable with order. Add 25 per cent for Bold Face (Heavy Type). Please write clearly, using full punctuation and recognised abbreviations. No responsibility accepted for transcription errors. Box Numbers 40p extra. Replies to Box Number should be addressed to the Short Wave Magazine Ltd., 34 High Street, Welwyn Herts., AL6 9EQ.

READERS

Sale: Amateur radio station including Drake T-4XB, Drake R-4B Rx, 2 kW linear amp., RTTY, Creed printer, etc. with control desk. Please send s.a.e. for complete list. (London) — Box No. 5730, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

For Sale: Complete station: Yaesu twins FR-101S, FL-101, FL-101B, 40-ft. mast, 3-element beam, K.W. E-Zee match, many extras, all still boxed, £600. Must go QRT. — Hensman, G4GQF, QTHR. (Tel: 05436-5418.)

Sell or Exchange: Large quantity of radio control gear: radios, planes and boats, some brand new, sell or swap for amateur radio equipment. W-H-Y? — Ring Harding, 0269-860649.

Selling: Telescopic aerial masts, galvanised tubular steel, fairly good condition, 40-ft., £28; 30-ft., £22. Buyer collects. — Ring Harrison, Wakefield (0924) 277938.

Wanted: FL-101 Tx in damaged or unserviceable condition for rebuild; also B.2 power unit. — Morriss, G4GEN, QTHR. (Tel: 082571-2205.)

Sale: Yaesu FRG-7, £135. 2-metre converter, £14. 2-metre aerial, £14. Multi-Tuner Mk. II, £17. — Ring Shaw, 01-965 6677.

Selling: Trio TR-7625 transceiver, 12 months old, hardly used, £195 or very near offer. — Ring Horrobin, St. Helens 31874.

Selling: Pathfinder portable Rx, SW (1.6 to 30 MHz), VHF/UHF/LW/MW/TV, with 2m/4m/SSB squelch, 6 months old (cost £100), selling for £50. Also Eddystone 730 Rx, £20. — Ring Pearce, Bungay 4270.

Wanted: HRO-500 communications receiver and Datong Morse Tutor. Both items must be in perfect working order, mint condition, and reasonably priced. (Fife). — Box No. 5731, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

Selling: R.A.E. Course (now passed) and my answers, plus books to aid study, £30. Datong Active Antenna, complete, £25. — Spencer, 21 High Street, Swayfield, Grantham, Lincs. NG33 4LL.

Wanted: Mint R. 1155N/L and associated T. 1154, required by radio amateur. Good price paid for right articles. (Surrey). — Box No. 5732, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

For Sale: Racal RA-17, matching SSB selector, Hamgear PM-IIG preselector, Sony-o-Matic 3-speed recorder, all good order, £250 the lot. — Charsley-Thomas, Hillview, Frogham, Fordingbridge, Hants.

Selling: Yaesu FR-400SDX receiver, 160/2m., SSB/CW/AM/FM, 6 filters, rejection tuning, squelch, built-in speaker, excellent performance and condition, £150. — Ring Wilkinson, Hull 492501 6-8 p.m.

Sale: Lafayette HA-350 amateur receiver, £65 or near offer. — Hitchen, 31 Langham Road, Blackburn. (Tel: 0254-50983):

For Sale: Heathkit HW-100 Tx/Rx, some new valves, £100. Solartron CD711S-2 dual-trace 'scope, including trolley, working order, £75. 5XY and AR-33 rotator, £40. Other items, all 'or near offer'. Buyers collect. — Ring Burrows, Rochdale 58229.

Sell or Exchange: FT-221R/D, immaculate, complete with mic., manual and all accessories, in original packing, £300. Or exchange for TR-2300 plus cash difference. — Ring Swift, G8XLP, Chester-le-Street 888364 evenings.

Sale: Yaesu FRG-7 receiver, mint condition, £150. Buyer collects please. — Pearson, 110 Russells Hall Road, Dudley, West Midlands.

For Sale: SRX-30, new Christmas (cost £160), £100. — Ring Guildford 65951 ext. 43, 9 a.m. to 5 p.m.

Wanted: Hammarlund SP-600JX receiver, must be working properly, complete, unmodified and of good appearance. Buyer will pay for transit by B.R.S. Please write (stamp refunded) with details of condition and price. — Barker, 42 Swinhoe Gardens, Wideopen, Newcastle-upon-Tyne NE13 6AF.

Wanted: Private tuition for the R.A.E., Bromley area. — Box No. 5733, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

Sale: 9R-59DE with Codar preselector and Q-Multiplier, plus ancient 2m. converter, £85. — Ring Jones, 0495-791577 evenings.

April issue: due to appear March 27th. Single copies at 75p post paid will be sent by first class mail for orders received by Wednesday, March 25th, as available. — Circulation Dept., Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

For Sale: Yaesu FT-227RB, mint condition, no mods. £175. Trio TR-3200, 70cm., 6 channels fitted, £130. — Ring Devine, 0924-825025.

Wanted: Amateur allergic to co-ax requires someone to make high quality two-foot long cables as listed: 12 lengths terminated UHF/UHF, 12 lengths terminated BNC/BNC, 12 lengths terminated BNC/UHF, 6 lengths terminated BNC/N, 6 lengths terminated UHF/N. Quotation for job required. — Box No. 5734, Short Wave Magazine Ltd., 34 High Street, Welwyn, Herts. AL6 9EQ.

Sell or Exchange: Eddystone 730 receiver, two RF, excellent, £95. Or part-exchange for 640 or 750. Buyer collects. *Wanted:* non-working Eddystones. — Nunn, 7 Hartslock View, Lower Basildon, Reading, Berks.

For Sale: FRG-7, virtually unused, with Joymatch antenna and ATU, £150. — Ring Murray, 01-928 4668 (home), 01-583 4297 (office).

Selling: Eddystone 680X, £105; Eddystone home/communications Rx, 150 kHz to 24.5 MHz. Both superb. Bantam VHF/FM, 4 batteries, £40. Cambridge 'A' band, all cables, £25. ITT UHF/FM mobile Tx/Rx, complete installation, manual, £55. 10-ele Yagi, 450-470 MHz, £10. Electroniques communication Rx, fully wired, needs lining up, with circuit and instructions, £25. Base station, 50-watt 'A' band, £50. — Ring 0223-48650 after 6 p.m.

Wanted: HRO power unit, sound condition. — Carter, G2NJ, 34 West Parade, Peterborough.

For Sale: Telegraph test sets CT-473, CT-490, contain 50 Hz PSU, indicator unit, ideal basis for oscilloscope, £25 each. Marconi CT-394 signal generator, 10-485 MHz, very good condition, £65. Marconi TF-338B 600-ohm attenuator, £10. Meter, 240 degree 3½-in., ideal for rev. counter, £2. Various CRT's. — Ring Cooper, Eversley 734312.

Sale: CT-52 miniature oscilloscope, in strong transit case with carrying strap, £15. Quad II VHF broadcast tuner, £10. Rebuilt 12w. Leak audio amp., £10. — Ring Mash, G8JAO, Malvern (06845) 63270 evenings/weekends.

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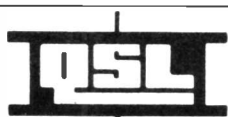
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R4	4.0305	8.0611	12.0916	15.0000	18.1375	45.0000
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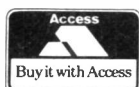
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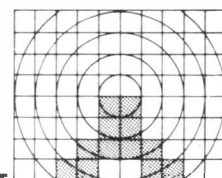
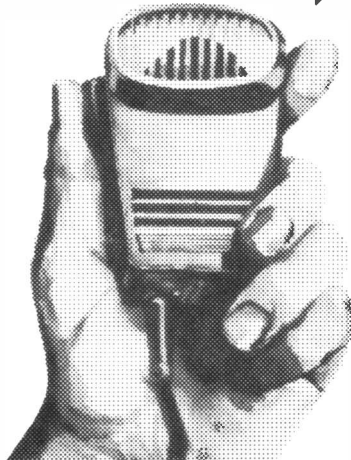
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