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AND THE AEA PK-88 PACKET TERMINAL

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MARCH 1990
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YAESU'S DUAL BANDER GOES PLACES OTHER MOBILES DON'T.

FT-4700RH control head
(1 15/16" x 5 7/8" x 1")

Introducing Yaesu's FT-4700RH dual-band mobile. Choose Yaesu's FT-4700RH, and you open the door to a lot of tight spaces.

While other dual banders just won't fit in today's small cars, the FT-4700RH utilizes a versatile "remote head" design. So you can mount the "brains" on your dash, visor, or door, and hide the "muscle" under your seat. Optional YSK4700 required for remote operation.

High-performance package. Packing a solid 50-watt punch on 2 meters (40 watts on 70cm), the FT-4700RH includes Dual-Band Watch for simultaneous monitoring of both bands, with independent squelch settings on the main and secondary bands. When you transmit, opposite band monitoring goes on in a full-duplex mode.

You can adjust the relative volume of the two receive channels with the balance control, too. And with Yaesu's bright LCD display, transceiver status is clearly visible in sunlight or shade.

Convenience on the road. Human engineering, long a Yaesu speciality, is an important aspect of the FT-4700RH design. The ten-button front panel keypad includes a "do-re-mi" audible command verification, and all important controls are backlit for night operation.

Frequency range 144-146MHz on 2m and 430-440MHz on 70cm. Nine memory channels on each band. High/low power selection (low power five watts). One-touch reverse repeater shift button. Optional CTCSS module. And 16-key DTMF microphone.

Optional accessories. FTS-8 CTCSS unit. MH-15D8 DTMF microphone with 10-telephone number memory. SP-3 or SP-4 External Speakers. And YH-1 Headset/Boom Mic or MF-1A3B Flex-arm Boom Mic, both with SB-10 PTT Switch Unit. YSK4700 Remote Kit.

Discover Yaesu's FT-4700RH today. And see what "high performance" really means. For dual-band mobile operation Yaesu's FT-4700RH really fits!
Call us today for details of your nearest authorised Yaesu dealer.

South Midlands Communications Ltd,
S M House, School Close, Chandlers Ford Industrial Estate, Eastleigh, Hampshire, SO5 3BY. Telephone (0703) 255111, Fax (0703) 263507, Telex 477351 SMCOMMG.

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ICOM

Count on us!

IC-R7000, 25-2000 MHz

Commercial quality scanning receiver

With 99 programmable memories the IC-R7000 covers aircraft, Marine, FM Broadcast, Amateur Radio, television and weather satellite bands. For simplified operation and quick tuning the IC-R7000 features direct keyboard entry. Precise frequencies can be selected by pushing the digit keys in sequence of the frequency or by turning the main tuning knob. FM wide/FM narrow/AM upper and lower SSB modes with six tuning speeds: 0.1, 1.0, 5, 10, 12.5, 25KHz.

The IC-R7000 has 99 memories available to store your favourite frequencies including the operating mode. Memory channels can be called up by pressing the memory switch then rotating the memory channel knob, or by direct keyboard entry. A sophisiticated scanning system provides instant access to the most used frequencies. By depressing the Auto-M switch, the IC-R7000 automatically memorises frequencies that are in use whilst it is in the scan mode, this allows you to recall frequencies that were in use. The scanning speed is adjustable and the scanning system includes the memory selected frequency ranges or priority channels. All functions including the memory channel readout are clearly shown on a dual-colour fluorescent display. Other features include dial-lock, noise blanker, attentuator, display dimmer and S-meter and optional RC-12 infra-red remote controller, voice synthesizer and HP 1 headphones.

Icom (UK) Ltd.
Dept. PW, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 363859. 24 Hour.

Helpline: Telephone us free-of-charge on 0800 521145. Mon-Fri 09.00-13.00 and 14.00-17.30. This service is strictly for obtaining information about or ordering equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.
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ICOM

Count on us!

IC-765 HF ALL BAND TRANSCEIVER

We enjoy listening. It's part of what we do well. So when ICOM heard you talking, our engineers designed a transceiver specially for you – the serious DX enthusiast with worldwide contacts in mind. The result is the new super advanced IC-765, an HF all band transceiver built to expand your HF world.

The IC-765 is equipped with ICOM's exclusive DDS (Direct Digital Synthesizer) System, a fully automatic antenna tuner, an electronic keyer with iambic operation and a full break in function.

Fully Automatic High Speed Antenna Tuner
A built in CPU automatically memorises the pre-set position of each band without pre-set controls. tuner speed is ultra fast since tuning starts from a preset position. If the tuner cannot tune from the previous preset position, the re-try function changes the preset position and memorises the best position.

10Hz Digit Display
The large fluorescent display shows 7 digits for the operating frequency, the 10Hz digit is displayed.

Band Stacking Register
Each band memorises the last used frequency, mode and IF filter condition (narrow or wide).

Complete System for CW Operators
The IC-765 has many advanced functions for CW operators such as CW pitch control, a built-in electric keyer, a keying speed control and high speed full break-in capability.

New PLL Circuit
The advanced ICOM DDS System ensured high speed PLL lock-up times, clear signal emissions, and high C/N characteristics. A high speed PLL provides very fast CW full break-in performances.

Convenient Miscellaneaous Functions

- 105dB dynamic range
- 10dB preamp and 10, 20 30 dB attenuator
- 99 memory channels
- Split memory on channels 90-99
- Built-in FL32A and FL52A CW narrow filters
- Programmed scan and memory scan
- IF, shift and Notch filter
- Fast/Slow/OFF Selectable AGC
- RF type speech compressor
- Noise blanker
- DATA switch for advanced data communications

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MULTIMETERS from Cirkit

THEY'RE D-MM GOOD VALUE!!

TM115

TM135

TM175

Cirkit's new range of Digital Multimeters offer a quite unbeatable combination of features and value:

- Ranges include; frequency, capacitance and temperature
- Housed in strong ABS cases
- Overload protection on all ranges
- Full one year warranty
- 3½ digit, auto zero, auto polarity LCD, plus low batt indication
- 200 hour battery life
- All meters supplied with test leads, battery and manual

TM5315B

TM5365

TM5375

TM5315B

- **Remarkable value**
- **18 ranges**
- **10A dc current**

dc Volts: 200mV-1kV
ac Volts: 200V, 750V
dc current: 200uA-10A
Resistance: 200Ω-20MΩ
Continuity and diode test
Basic dc accuracy, ±0.8%
Size: 128×72×33mm

1+	5+	10+
£17.38	**£16.95**	**£16.52**

56-05315 **ex VAT**

TM5375

- **Frequency measurement to 20MHz**
- **ac/dc current to 10A**
- **24 ranges**

dc volts: 200mV-1kV
ac volts: 200mV-750V
dc current: 200uA-10A
ac current: 200uA-10A
Resistance: 200Ω-20MΩ
Frequency: 2kHz-20MHz
Continuity, diode and HFE test
Basic dc accuracy ±0.5%

1+	5+	10+
£31.96	**£31.16**	**£30.39**

56-05375 **ex VAT**

TM5365

- **30 ranges**
- **Frequency and capacitance measurement**
- **Compact size**

dc volts: 200mV-1kV
ac volts: 200mV-750V
dc current: 200uA-10A
ac current: 200uA-10A
Resistance: 200Ω-2000MΩ
Frequency: 2kHz-200kHz
Capacitance: 2nF-20uF
Logic, continuity, diode and HFE test

1+	5+	10+
£32.96	**£32.13**	**£31.33**

56-05365 **ex VAT**

TM115

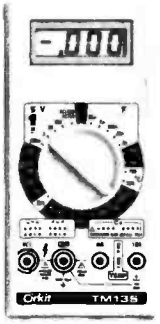
- **0.5% accuracy**
- **Transistor HFE test**
- **26 ranges**

dc volts: 200mV-1kV
ac volts: 200mV-750V
dc current: 200uA-10A
Resistance: 200Ω-2000MΩ
Continuity, diode and HFE test
Basic dc accuracy ±0.5%

1+	5+	10+
£29.28	**£28.49**	**£27.77**

56-00115 **ex VAT**

TM135



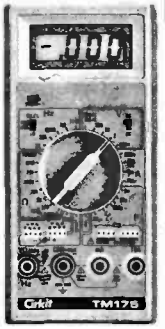
- **Temperature measurement**
- **Capacitance measurement**
- **40 ranges**

dc volts: 200mV-1kV
ac volts: 200mV-750V
dc current: 200uA-10A
ac current: 200uA-10A
Resistance: 200Ω-2000MΩ
Temperature: 200°, 750°C
Capacitance: 2nF-20uF
Diode, HFE and continuity test.

1+	5+	10+
£39.96	**£38.96**	**£37.98**

56-00135 **ex VAT**

TM175



- **Frequency measurement to 10MHz**
- **Capacitance measurement from 1pF to 20uF**
- **39 ranges**

dc volts: 200mV-1kV
ac volts: 200mV-750V
dc current: 200uA-10A
ac current: 200mA-10A
Resistance: 200Ω-2000MΩ
Capacitance: 2nF-20uF
Frequency: 2kHz-10MHz
Continuity, diode, HFE, logic and LED test.

1+	5+	10+
£49.99	**£48.75**	**£47.52**

56-00175 **ex VAT**

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☐ × **TM5375** at £37.65 (£31.96 + £4.79 VAT + £0.90 p&p)
☐ × **TM5365** at £38.80 (£32.96 + £4.94 VAT + £0.90 p&p)
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- ★ CW NARROW (500Hz) STANDARD
- ★ LARGE CLEAR LCD DISPLAY
- ★ SIMPLE OPERATION (see pic below)

The FT-747GX is a compact SSB/CW/Am and (optionally) FM transceiver providing 100 watts of PEP output on all hf amateur bands, and general coverage reception continuously from 100kHz to 30MHz. A front panel mounted loudspeaker and clear, unobstructed display and control layout make this set a real joy to use. Convenient features include operator selectable coarse and fine tuning steps optimized for each mode, dual (A/B) vfos, along with twenty memory channels which store mode and skip-scan status for auto resume scanning of selectable memories. Eighteen of the memories can also store independent transmit and receive frequencies for easy recall of split-frequency operations. Wideband (6kHz) AM and narrowband (500Hz) CW IF filters are included as standard, along with a clarifier, switchable 20dB receiver attenuator and noise blanker. User programming for more advanced control by an external computer is possible through the CAT (Computer Aided Transceiver) System. The transmitter power amplifier is enclosed in its own diecast aluminum heat-sink chamber inside the transceiver, with forced-air cooling by an internal fan allowing full power FM and packet, RTTY, SSTV and AMTOR operation when used with a heavy duty power supply.

All major controls are grouped together for convenience and ease of operation.

WARNING: If you buy FT747GX not designed for the U.K. market, these may not be fitted with AM/CW filters which you may not be able to obtain.

IMPROVED PERFORMANCE AT NO EXTRA COST!

Yaesu's **FT757GXII** is a HF compact transceiver which offers full featured performance just about anywhere, on holiday, on the road or in the shack. Remarkably similar to the **FT757GX** the **FT757GXII** has a number of improvements which enhance the pleasure and ease of operation with no detriment to the electrical performance. The improvements include memory storage of operation mode, slow/fast tuning selection, automatic step change according to mode, IF Notch filter, 10 memories and VFO to VFO scan.

Other standard features include RX coverage from 500kHz to 30MHz, TX from 160m to 10m (WARC bands included), 100W RF output, SSB (LSB+USB), CW, AM & FM, iambic electronic keyer and AF speech processor.

A whole host of options are available to increase the operating pleasure.

So no matter where you are why not try **Yaesu's FT757GXII** full featured transceiver.

OPTIONAL ACCESSORIES

FP75HD Heavy Duty P.S.U.	£239.00	FAS-1-4R Remote Antenna Sw	£80.00
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FL7000 500W solid state linear amplifier £1600.00

- ★ All mode SSB (USB+LSB) CW, AM and FM
- ★ All Band Tx (General Coverage RX)
- ★ 100% Duty cycle (100W, CW, FM 25W AM)
- ★ Pushbutton mode selection
- ★ Switchable VFO steps (All modes)
- ★ New Notch Filter
- ★ Dual VFOs and 10 memories (Freq & Mode)
- ★ Computer compatibility (with optional interface)

NOW EVEN BETTER the FT757GX MK2

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— 0% INTEREST SUBJECT TO STATUS

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IMPROVED
FT767GX

Yaesu have upgraded this popular HF and VF/UHF base station transceiver. The improved version is now available with enhanced synthesiser performance and VFO tuning rate. Read Chris Lorek's review in "Ham Radio Today".

★ ALL MODE LSB/USB, CW, FSK, AM & FM
★ ALL BAND Transmit, General Coverage Receive
★ Optional VHF/UHF units (6M, 2M & 70cms)*
★ 100% DUTY CYCLE (Key down CW for 30 mins)
★ Built in AUTOMATIC ATU (one memory on each band)
★ Computer & Packet radio compatibility

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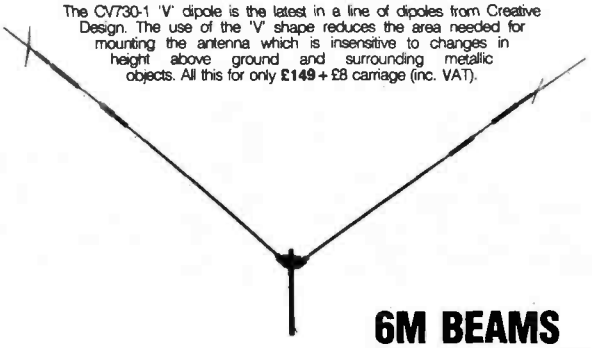
SP767 External Speaker £69.95
FIF232C Computer Interface £75.00

For existing owners of the FT767GX who purchased their sets through Yaesu's official UK distribution network, Yaesu are offering an upgraded local unit for a nominal charge. Please contact us for details.

CREATE CREATE CREATE CREATE CREATE

The CREATE company has, for the past twenty years, been the leading manufacturer of amateur and commercial antennas (mainly HF) in Japan.

Now available to customers in the UK through South Midlands Communications, the appointed distributor, are the popular CREATE HF beams to cover the 10/15/20 metre bands, HF baluns up to 10KW PEP and the exciting 10/15/20/40V dipole which has elements of only 19ft and is designed in such a way that it can be mounted in particularly awkward places. SMC also stock what must be one of the largest amateur antennas available, the 40 metre full sized beam, as well as 6 and 7 element and six metre yagis and professional quality log, periodic antennas for 50-1300 and 105-1300MHz. CREATE also manufacture rotators to exacting levels of precision and these have virtually no back lash, quiet gears, variable speed and large torque. All are now available from SMC stock. Please contact us NOW for full details.

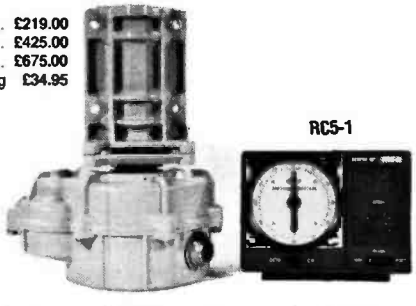


The CV730-1 'V' dipole is the latest in a line of dipoles from Creative Design. The use of the 'V' shape reduces the area needed for mounting the antenna which is insensitive to changes in height above ground and surrounding metallic objects. All this for only **£149** + £8 carriage (inc. VAT).

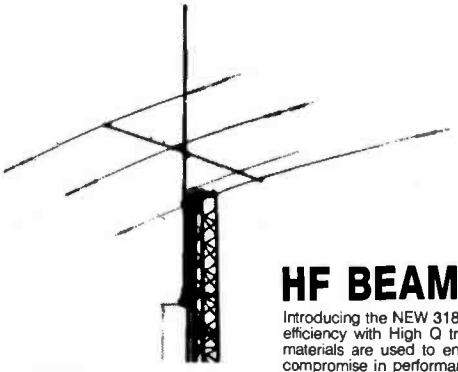
ROTATORS

The **RC5 Series** of rotators from **Creative Design** are built to meet the exacting standards required by both professional and amateur users. A range of models is available designed to cater for medium to large sized antennas. All the rotators are manufactured with high quality components allowing continued and reliable operation.

RC5-1 ..... **£219.00**
RC5A-3 ..... **£425.00**
RC5B-3 ..... **£675.00**
CK46 Rotary bearing **£34.95**



RC5-1



6M BEAMS

New from Creative Design are a range of 6m beams, the CL6DX 6 element, CL6DXX 7 element and CL6DXZ 8 element.

All these antennas are the result of long and continued research to achieve the best possible performance whilst remaining both cost effective and extremely robust.

CL6DX 6 ele 13dB* **£115.00**
CL6DXX 7 ele 14.3dB* **£168.99**
CL6DXZ 8 ele 14.5dB* **£225.00**
*Manufacturers figures.

HF BEAMS

Introducing the NEW 318 series of DX Tribanders from Create which offer outstanding efficiency with High Q traps especially designed for 14, 21, & 28MHz. High grade materials are used to ensure long life, maximum reliability and light weight with no compromise in performance.

All beams supplied complete with balun

CD318JR 4 ele 10-15-20M 750W PEP Gain 7:7:5:8dB F/B 18dB — Only **£299** P&P £5.90
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CD3188 5 ele 10-15-20M 2KW PEP Gain 7:5:9:95dB F/B 20:18:20dB — Only **£449** P&P £7.90
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AD385 Matching network 40/80M for CV48 remote switchable — Only **£49** P&P £2.85
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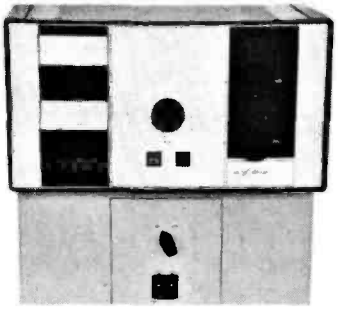

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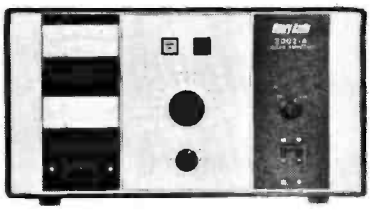

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25–40W Drive. Typical.
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25–40W Drive.
1 x 3CX800A7 W/O Coax Relay.
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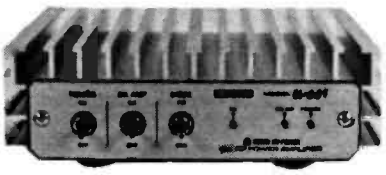

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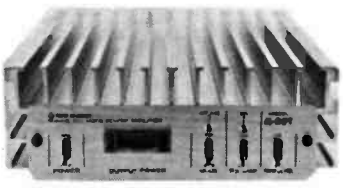

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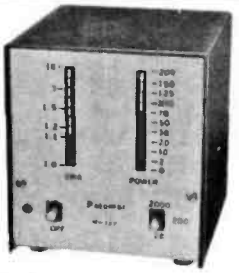

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An RF sensing circuit bypasses the preamplifier during transmit. The bypass handles 350 watts.

PALOMAR
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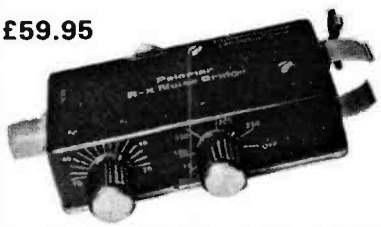

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The Palomar R-X Noise Bridge tells you if your antenna is resonant or not and, if it is not, whether it is too long or too short. It gives resistance and reactance readings on dipoles, inverted Vees, quads, beams, multiband trap dipoles and verticals from 1 to 100 MHz.

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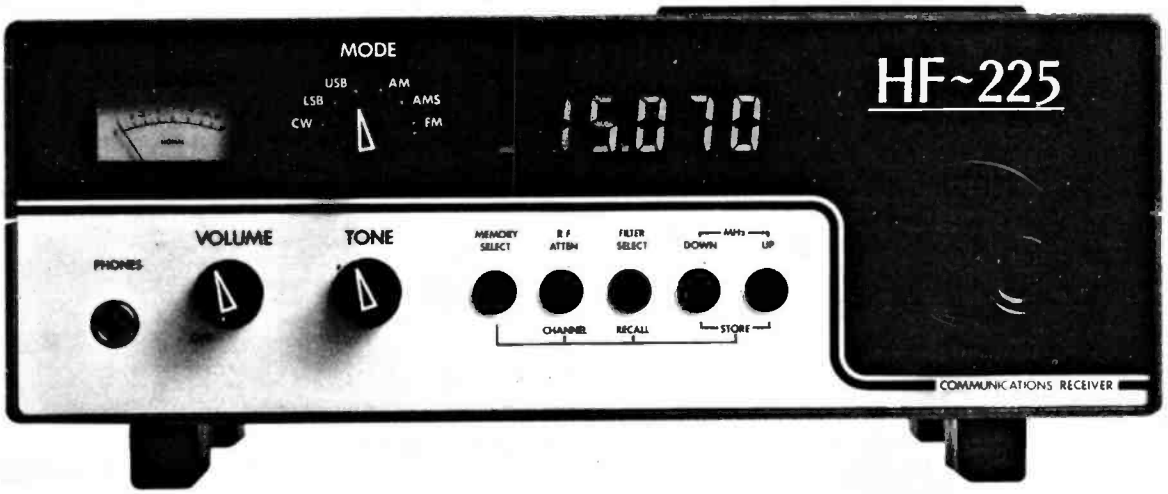

The New HF-225 Receiver

I am delighted that the HF-225 has been a raging success world wide, and I will just quote a letter received from one of our American customers:—

"I received my Lowe HF-225 about a week ago. Since then I have enjoyed many pleasant hours listening to it. As a past owner of receivers such as the Sony ICF2010 and Grundig Satellit 650 and 500, I must say that none compare to your Lowe HF-225. Without question, for hour after hour listening, nothing compares. I especially like the Genie key pad. Why more receivers do not incorporate such intelligent rergonomics is beyond me. I also thought both the instruction manual and the short wave book were well written, with the shortwave guide particularly enjoyable."

The letter comes from Chris Williams in Massachusets, but is typical of many letters we are receiving from all over the world about the HF-225.

Technically, the HF-225 distinguishes itself by having a low phase noise synthesiser, which gives a reciprocal mixing performance not far off that of "professional" receivers costing up to ten times the price, and that's not just advertising talk, it is really true. The synthesiser actually tunes in steps of 8Hz, which betters most other receivers and gives a smooth "VFO" feel when tuning. As one user has already commented "If you tuned the HF-225 with your eyes closed, you would believe you had a £5,000 receiver on the table".

The HF-225 has a range of low cost options which extend its appeal; such as a keypad for direct frequency entry, which simply plugs into a rear panel jack; an active whip aerial; a rechargeable battery pack for portable use; and an attractive carrying case which protects the receiver whilst allowing full operational use. The new D-225 detector option is really something special, because it gives true synchronous AM detection for dragging sensible programme quality out of a signal being affected by selective fading distortion. The same option also gives narrow band (communications) FM demodulation.

Every listener these days appreciates a receiver which offers facilities for memorising favourite or regularly used frequencies, and the HF-225 offers 30 memory channels for this purpose. Using the memories has been made particularly versatile, because the operator can review the contents of the memories whilst still listening to the frequency he is using, or alternatively in the "Channel" mode, can tune through the memory channels using the main tuning knob, listening to each frequency as it appears on the display. Just like having a bank of single channel receivers under your control. Terrific for checking HF airband channels for activity.

Unlike most HF receivers on the market, the HF-225 comes complete with all filters fitted for every mode:— 2.2kHz, 4kHz, 7kHz, and 10kHz. There is also a 200Hz audio filter for CW, and if the D-225 detector is fitted, a 12kHz filter for FM. The correct filter for each mode is automatically selected by the receiver mode switch, but further selection can be made by the user from the front panel and the receiver remembers which filter was last used. True versatility and all built in at no extra cost. When selecting filters in use, the filter bandwidth is shown on the main display.

The display itself is a high contrast liquid crystal type, and shows frequency, filter bandwidth, detector lock (when D-225 is fitted), and whether the receiver is in memory mode. Automatic placing of the decimal point takes place as the receiver is tuned, so there can be no ambiguity in reading.

At the end of the day, what does the HF-225 offer you as a user? I can do no better than quote what was said by Rainer Lichte about the earlier HF-125:—"The HF-125 is a serious piece of equipment; don't be deceived by the unassuming front panel and the lack of spectacular features. The HF-125 will outperform most competitors. If you like an honest approach to receiver design, this is it. British understatement at its best".

The HF-225 is even better.

HF-225 £395 John Wilson

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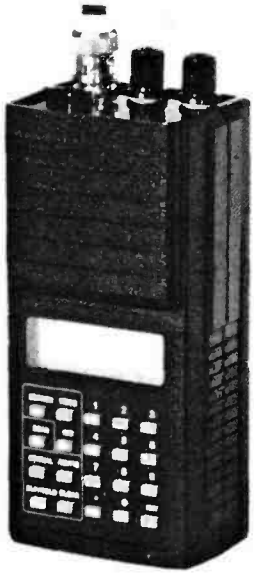

AR-800E
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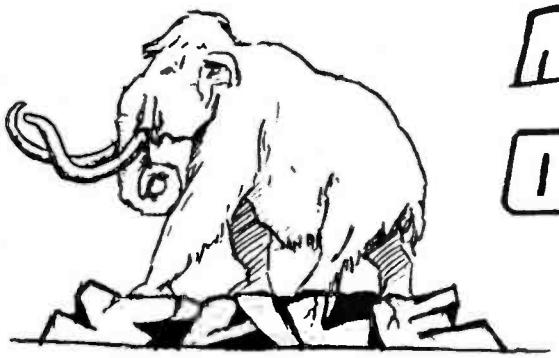

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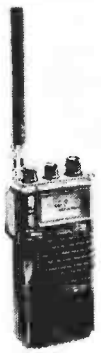

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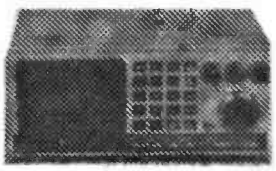

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CA287C 7/8 wave 5.2dB 200W 1.89 Metres double co-phase	£ 22.50
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MONOBAND BASE ANTENNAS	
ABC21 5/8 wave Ground Plane 144MHz 3.4dB 200W 1.4 metres	£ 24.50
ABC22A 2 x 5/8 wave 144MHz 6.5dB 2.87 metres	£ 36.00
ABC23 3 x 5/8 wave 144MHz 7.8dB 200W 4.5 metres	£ 59.50
ABC71 5/8 wave Ground Plane 432MHz 3.4dB .54 metres	£ 21.56
ABC72 2 x 5/8 wave GP. 432MHz 200W 5.8dB 1.07 metres	£ 34.85
CA712EF 432MHz Twelve x Half wave 9.5dB 3.10 metres HF & 50MHz	£ 55.00
CHA-5 Vertical with Loaded Radials for 80/40/20/15/10m 200W SSB 5.29 metres. Features trifilier wound toriodal core	£219.95
52HB4 4 El.HB9CV Beam 10.4dB for 50MHz 400W SSB 3.2m	£ 67.90
CBL30 HF 1.7-30MHz Balun 1:1 1kW	£ 20.85
CRZ/DISCONE & HANDHELD ANTENNAS	
CRZ12DB A unique wide band Active antenna 500Hz to 1500MHz 1.24 metres with controller	£ 96.30
CH72S Designed for dual-band 144/432MHz handhelds 0/3.2dB BNC	£ 11.85
CH2S Flexi Half wave BNC. (self resonant)	£ 11.95
CA2BN BNC Telescopic quarter wave	£ 10.95
ROD2 BNC 5/8 wave base loaded Telescopic (up to 8dB better than a helical)	£ 12.95
ACCESSORIES	
CDS120 Power/SWR Meter 1.8/200MHz 15/60/200W PL259. Reads Peak & Average Power. Low Insertion Loss	£ 85.00
CDS270D Power/SWR Meter 140/525MHz 15/60/200W Peak & Averaging. Low Ins. Loss	£ 88.95
CM200 Miniature SWR/Power meter 140/150MHz 15/50 Watt	£ 32.45
CM400 Mini SWR/Power meter 430/450MHz 15/60W	£ 32.45
CF50MR 1 kilowatt Lo-pass filter 30MHz cut-off	£ 29.95
MOUNT & BASE ASSEMBLIES	
CA58M SO239 Socket with RG58 lead terminated PL259	£ 6.90
MS58 Strong Magnetic Mount SO239 RG58 lead with PL259	£ 19.95
CRD 58M Boot/Trunk Mount high quality with RG58 lead & PL259	£ 14.80
RS2 Stainless steel Gutter Mount	£ 10.85

STANDARD

Standard have done it again! You all know how popular the C500 is, well now here is their latest dual bander — the **C528** (not to be confused with the Japanese only version, the C520), The European version has all the facilities that you want in a base station, let alone a hand held!!

- ★ Direct 13.8V in for 5 Watts out.
- ★ VHF 2.5W, UHF 2W with CNB151 NiCad pack.
- ★ Dual displays
- ★ Power save function.
- ★ Multiple memories.
- ★ Priority channel.
- ★ Tone squelch (option).
- ★ Programmeable offsets.
- ★ Coded paging function.
- ★ Various scanning modes.
- ★ Programmeable step sizes.
- ★ 144-146 VHF, 430-440 UHF, 800-975 Rx only.
- ★ Separate Vol. & Squ. controls for each band.

★★★★ HAND HELD ★★★★

★★★REPEATER FUNCTION ★★★

All this in a package just 55mm wide x 157mm high x 31mm deep (2.5in x 7in. x 1.5in for us technical people).

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STANDARD

C500

Ask anyone who has one, his opinion of the well proven C500, and he will tell you that it can't be beaten. Thousands of users around the world are of the same opinion!

We have now made it affordable by reducing the price *still further* to *£335*, so what are you waiting for?

THIS IS, OF COURSE, THE *EUROPEAN VERSION WITH FACTORY FITTED TONEBURST* — PLUS MANY OTHER INCREDIBLE FEATURES NOT PREVIOUSLY AVAILABLE IN A HANDHELD.

- ★ Frequency coverage 144–146 & 430-440MHz with Full Duplex available
- ★ Extended receive capability:- 130–169.995 & 410–470MHz
- ★ 2.5 to 5 Watts output (depending on battery pack)
- ★ High or Low switchable RF output
- ★ Step sizes:- 5/10/12.5/25/50kHz (user programmeable)
- ★ Keyboard programmeable repeater offset (0–39.9MHz)
- ★ Reverse repeater mode
- ★ Priority Channels available on both bands
- ★ Each band has 10 memories for frequency and repeater offset
- ★ Dual synthesised VFO's
- ★ User programmeable CALL button (instant QSY to your favourite channel — either band)
- ★ Numerous scanning modes (Pause or Busy — memories — band etc.)
- ★ Auto Power Off — with Alarm (4mA current drain on standby)
- ★ Battery Save on receive — 9 user programmeable Rx/Off ratios
- ★ Vacant Channel Search — for easier QSYing
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- ★ Can be powered directly from a car's cigar lighter (5W output)
- ★ Keypad or Rotary Knob frequency selection
- ★ Dimensions:- 173mm H x 60mm W x 34mm D

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		P.O.A.	NEW
FT1000	All mode HF Transceiver		
FT767	HF Transceiver	1599.00	(—)
FEX767(2)	2m Module (767)	179.00	(3.00)
FEX767(70)	70cm Module (767)	225.00	(3.00)
FEX767(6)	6m Module (767)	179.00	(3.00)
SP767	Speaker	89.95	(2.50)
FT747GX	Budget HF Transceiver	669.00	(—)
FT757GX	MkII HF Transceiver	989.00	(—)
FP700	20A P.S.U.	219.00	(4.00)
FC700	Manual ATU	149.00	(3.00)
FP757HD	Heavy Duty 2m P.S.U.	268.75	(4.00)
FAS14R	Remote Aerial Switch	80.00	(3.00)
FT4700	New 2m/70cm Dual Band FM Mobile	875.00	(7.00)
FT290	MkII Super 290 2m Multimode 2.5W	429.00	(—)
FT690	MkII 6m M/Mode 2.5W	399.00	(2.00)
YHA15	2m Helical	7.50	(2.00)
YHA44D	70cm ¼ wave	12.50	(2.00)
YM43	Speaker Mike	23.00	(2.00)
MMB15	Mobile Bracket	14.55	(2.00)
FT411	New 2m H/H Keyboard	225.00	(3.00)
FT811	New 70cm H/H Keyboard	239.00	(3.00)
FT470	New 2m/70cm Dual Band H/H	389.00	(3.00)
FT23R	2m Mini H/H	209.00	(3.00)
FT73R	70cm Mini H/H	229.00	(3.00)
FNB9	Nicad Battery Pack (23/73)	34.50	(2.00)
FNB10	Nicad Battery Pack (23/73)	34.50	(2.00)
FNB11	Nicad Battery Pack (23/73)	67.85	(2.00)
NC18C	Charger (23/73)	17.71	(2.00)
SMC26	Charger (23/73) 13A Plug	17.71	(2.00)
NC28	Charger (23/73)	17.71	(2.00)
NC29	Base Charger (23/73)	69.00	(3.00)
PA6	Car Adapt Charger (23/73)	24.15	(2.00)
MH12A2B	Speaker Mic	31.05	(2.00)
MH18A2B	Speaker Mic Miniature (23/73/727)	31.05	(2.00)
FNB3	Spare Battery Pack (FT209)	41.00	(2.00)
FNB4	Spare Battery Pack (FT709)	46.00	(2.00)
FNB5	Empty Cell Case (FT727)	10.00	(2.00)
FRG9600M	60-950MHz Scanning RX	609.00	(—)
PA4C	Power Supply for 9600	29.00	(2.00)
MM810	Mobile Bracket	10.00	(2.00)
NC9C	Charger	11.50	(2.00)
PA3	Car Adaptor/Charger	21.85	(2.00)
YM24A	Speaker Mike	31.05	(2.00)
FRG8800	HF Receiver	649.00	(—)
FRV8800	Converter 118-175 for above	100.00	(2.50)
FRT7700	RX ATU	69.00	(2.50)
MH1B8	Hand 600 8pin mic	21.00	(2.00)
MD1B8	Desk 600 8pin mic	79.00	(2.00)
MF1A3B	Boom mobile mic	25.00	(2.00)
YH77	Lightweight phones	19.99	(2.00)
YH55	Padded phones	19.99	(2.00)
YH1	L/weight Mobile H/set-Boom mic	26.75	(2.00)
SB1	PTT Switch Box 208/708	22.00	(2.00)
SB2	PTT Switch Box 290/790	22.00	(2.00)
SB10	PTT Switch Box 270/2700	22.00	(2.00)
FT736 NEW	2/70cm 25W Base Stn.	1,359.00	(—)
FT2311R	23cm FM Transceiver	475.00	(—)
FT211RH	2m 45W FM Mobile	309.00	(—)
FT212RH	New 2m 45W FM Mobile	349.00	(—)
FL2025	25W Linear	115.00	(3.00)
FL6020	6m 10W Linear	109.00	(3.00)
QTR24D	World Clock	39.00	(3.00)

ICOM

IC505	50MHz multi-mode portable	499.00	(—)
IC290D	2m 25W M/Mode	542.00	(—)
IC228E	2m 25W FM Mobile	365.00	(—)
IC2SE	2m Handheld	275.00	(—)
IC2GE	FM H/Held NEW	265.00	(3.00)
IC275E	New 2m 25W Base Stn IC75E	1069.00	(—)
IC4GE	70cm H/Held NEW	299.00	(3.00)
IC4SE	70cm H/Held NEW	310.00	(—)
IC32E NEW	2m/70cm Dual Band H/Held	399.00	(3.00)
IC490	70cm 10W M/Mode	617.00	(—)
IC3210	2m/70cm FM Dual Band Mobile	499.00	(4.00)
IC2400E NEW	2m/70cm Mobile	635.00	(—)
IC12E	23cm H/H	428.00	(3.00)
ICR71	Gen Cov RX	825.00	(—)
IC7000	VHF/UHF Scanner	957.00	(—)
IC765 NEW	HF Transceiver	2499.00	(—)
IC751A	HF Trenseiver	1465.00	(—)
IC735	New HF Transceiver	949.00	(—)
IC725	HF Base Transceiver	979.00	(—)
AT100	100W ATU (751/745)	365.00	(3.50)
AT150	150W ATA (735)	315.00	(3.50)
PS55	Ext PSU (735)	185.00	(3.00)
AH7000	25-1300MHz Discone	82.00	(3.00)
SP3	Ext Speaker	61.00	(2.50)
CK70	DC Cable (R70/R71)	7.00	(2.00)
EX257	FM Board (R70/R71)	41.00	(2.00)
GC5	World Clock	43.00	(2.50)
AC2	Waterproof Bag all Icom H/H	14.38	(2.00)
BC35	Desk Charger	70.15	(2.50)
BP3	Battery Pack 8.4V (2/4E/02/04E)	29.90	(2.00)
BP4	Empty Battery Case (2/4E/02/04E)	9.20	(2.00)
BP5	Battery Pack 10.8V	60.95	(2.50)
CP1	12V Charge Lead BP3/7/8	8.90	(2.00)
DC1	DC/DC converter operate from 12V	17.25	(2.00)
HM46	NEW Mini speaker mic	24.15	(2.00)
HM9	Speaker/Mic	21.85	(2.50)
HS51	Headset inc PTT/Vox unit	41.25	(2.00)
LC24	Micro + BP22/23	7.50	(2.00)
LC41	IC32 + BP3	9.20	(2.00)
LC42	IC32 + BP5	9.20	(2.00)
SM8	1.3kμ/600μ 8P Base Mic	82.00	(2.50)
SM10	Comp/Graphic Mike	116.20	(3.00)

KENWOOD

		P.O.A.	
TS950S	NEW Transceiver		(—)
TS940S	9 Band TX General Cov RX	1995.00	(—)
AT940	Auto/ATU	244.88	(3.00)
SP940	Ext Speaker	97.55	(3.00)
TS140	HF 9 Band Gen. Cov. TX/RX	882.00	(—)
TS680S	HF/6m TX Gen. Cov. RX	985.00	(—)
TS440	9 Band TX General Cov RX	1138.81	(—)
AT440	Auto/ATU	144.82	(3.00)
PS50	H/Duty PSU	222.49	(3.00)
AT230	All Band ATU/Power Meter	208.87	(3.00)
SP230	External Speaker Unit	66.49	(3.00)
PS430	Matching Power Supply	173.78	(3.50)
SP430	Matching Speaker	40.81	(3.00)
SM220	Station Monitor	343.82	(3.50)
BS8	Band Scope Unit (830/940)	77.00	(2.50)
TL922	10/160 2kW Linear	1495.00	(7.00)
TH25	NEW 2m H/Held	238.00	(3.00)
TH45	NEW 70cm H/Held	268.00	(3.00)
TH75	NEW 2m/70cm H/Held	P.O.A.	(—)
TH205	2m H/H	215.26	(3.00)
TH215	2m H/H Keyboard	252.13	(3.00)
TR751	2m 25W M/M Mobile	599.00	(—)
TS790	VHF/UHF Transceiver	1495.00	(—)
R2000	Gen Coverage HF/RX	599.00	(—)
VC10	118-174MHz Converter (R2000)	161.94	(2.50)
R5000	General Coverage HF/RX	675.00	(—)
VC20	118-174MHz Converter (R5000)	187.21	(2.50)
TM701	NEW 2m/70cm FM Mobile	469.00	(5.00)
TM721	2m/70cm FM Mobile	675.00	(5.00)
TM231E	NEW 2m FM Mobile 50/10/5W	269.00	(5.00)
TM431E	NEW 70cm FM Mobile 35/10/5W	316.00	(5.00)
SMC30	Speaker/Mic TH21/4/2600	28.31	(2.00)
MC50	4P Desk Mic	48.08	(3.00)
MC60A	8P Desk Mic	88.22	(3.00)
MC80	Electric Desk Mic	53.96	(3.00)
MC85	Desk Mic Audio Level Comp	99.00	(3.00)
MC43	8P Fist Mic	22.22	(2.00)
MC35	4P Fist Mic	21.72	(2.00)
MC55	Mobile Mc (6p.o. 8p)	52.87	(3.00)
LF30	HF Low Pass Filter	32.26	(2.50)
HS6	Lightweight H/phones	24.36	(2.50)
HS5	Deluxe H/phones	37.54	(2.50)
RZI	500Hz-950MHz AM/FM Scanner	465.00	(6.00)

C W Keyers

HI-MOUND			
HK702	Straight key (adjustable tension)	42.49	(2.00)
HK703	Straight key (adjustable tension)	38.45	(2.00)
HK704	Straight key (adjustable tension)	26.35	(2.00)
HK705	Straight key (adjustable tension)	22.49	(2.00)
HK706	Straight key (adjustable tension)	21.80	(2.00)
HK707	Straight key (adjustable tension)	20.15	(2.00)
HK802	Straight key (Deluxe-Brass)	109.00	(3.50)
HK803	Straight key (Brass)	104.50	(3.50)
MK703	Squeeze key	34.50	(2.00)
MK704	Squeeze key	30.00	(2.00)
MK705	Squeeze key	32.78	(2.00)
MK706	Squeeze key	30.48	(2.00)
STARMASTER			
Dewsbury	Electronic Keyer Unit (No Paddle)	54.70	(3.00)
Dewsbury	Electronic Memory Keyer (No Paddle)	95.00	(3.00)

Rotators

G250	Light Duty	78.00	(4.00)
AR200XL	Light Duty	38.50	(4.00)
G400	Medium Duty	139.00	(4.00)
G400HC	Medium Duty (Round Face)	169.00	(5.00)
G600RC	Medium/Heavy Duty	219.00	(5.00)
G200RC	Heavy Duty	445.00	(5.00)
G500	Elevating Rotator	149.00	(5.00)
GR5400	Azimuth/Elevating	279.00	(5.00)

SWR/PWR Meters

HANSEN			
W720S	130/440MHz 20/200W	52.75	(2.50)
JD110	1.5-150MHz	16.50	(2.00)
YMIX	3.5-150MHz	31.50	(3.00)
Yaesu Y560	1.6-60MHz	93.15	(3.00)
Yaesu YS500	140-525MHz	61.65	(3.00)
Hanson FS500H	1.5-30MHz	53.40	(3.00)

Miscellaneous

SMCS 2U	2 Way SO239 Switch	18.95	(2.50)
SMCS 2N	2 way 'n' Skts Switch	23.50	(2.50)
Kenpro KP21N	2 way Switch 'n' Socket Deluxe	27.00	(2.50)
T30	30W Dummy Load	10.29	(2.50)
T100	100W Dummy load	45.00	(3.00)
T200	200W Dummy load	65.00	(3.00)
WAI	Wavemeter 120-450MHz	24.95	(2.00)
PK232	Packet/RTTY Terminal	299.95	(3.00)
Datong D70	Morse Tutor	63.40	(3.00)
Datong FL2	Audio Filter	100.91	(3.00)
Datong FL3	Audio Filter/Autonotch	146.51	(3.00)
Datong ASP	Processor 4pin	93.15	(3.00)
Datong ASP	Processor 8pin	93.15	(3.00)
Datong AD370	Active Antenna	77.62	(3.00)
Datong PCI	General Coverage Converter	154.60	(3.00)

Antennas

D130	26-1300MHz Discone	75.00	(3.00)
Jaybeam	TB3 MkIII 3e HF Tribander	348.45	(8.00)
Hygain	TH3JNR 3e HF Tribander	299.00	(8.00)
Creative	CD318 JR 4e HF Tribander	299.00	(8.00)
Creative	CD318 JR 4e HF Tribander	349.00	(8.00)
CA2X4KC	2/70cm Mobile	39.95	(3.00)
WX1	2m/70cm Base Fibre Glass	54.99	(4.00)
CA2X4Max	2m/70cm Base Fibre Glass	99.95	(4.00)

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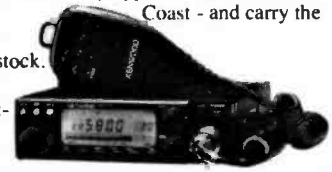

TS 950SD New Digit HF Transceiver	£3199
TM 231E 2 Mtr mob	£289
TM 431E 70cm mob	£318
TM 701E 2/70cm mob	£469
TR 751E 2m multi-mode mobile	£599
TS 711E 2 Mtr multi-mode *(s/soiled)*	£799
TS 440S HF	£1138
TS 940S HF	£1995

We always carry a large selection of used eqpt. ring for details

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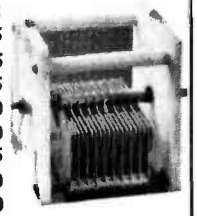
TM 1000 1 KW ALL BAND ATU

Using our unique high power wideband roller coaster this ATU gives effortless matching of all long wire, G5RV, vertical and coax fed antennas. *(Add £5.75 carriage for all models)*

Standard Model TM1000	£168
Balun Model TM1000B	£199
Standard TM1000 Kit Form	£138

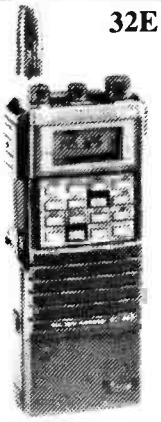
BUILD YOUR OWN AMPLIFIER OR ATU WITH OUR RANGE OF HIGH POWER COMPONENTS



Roller Coaster 30 μH	£29.95
Var. cap 150 pF (4Kv) (For mag. loops)	£16.95
Var. cap 250 pF (10Kv)	£19.95
Var. cap 250 + 250 pF (10Kv)	£28.00
Var. cap 750 pF (4Kv)	£28.00
Turns Counter (For Roller)	£15.95
Empty ATU Case	£26.00
2Kw Balun Assembly	£28.00

TALK ICOM

As ICOM main South Coast dealers we are always pleased to discuss prices, part exchanges and finance.....Give Paul Martin, our ICOM specialist, a call now!



IC - 2SE	Call
IC - 32E 2/70 H/held	Call
IC - 3210E 2/70 Mobile	Call
IC - R7000 Receiver.	Call
IC - R71E Receiver.	Call
IC - 725 HF TCVR.	Call
IC - 735 HF TCVR	Call
IC - 751A HF TCVR	Call
IC - 761 HF TCVR	Call
IC - 765 HF TCVR	Call
IC - 228H 2m/45w.	Call
IC - 448E 70/25w.	Call

TALK SCANNERS

We probably carry the largest stocks of scanners in the UK. Our NEW BUMPER CATALOGUE features all the latest models. Here is a small selection:-

NEW FAIRMATE HP100E
THE ULTIMATE HANDHELD

* Freq: 15 - 600 MHz
  830 - 1300 MHz
* 1,000 Channels of mem.
* Keypad or rotary control
* AM/Narrow FM/Wide FM
* Search steps from 5KHz to 995KHz.

EVERY SET SUPPLIED WITH:-
Full set high PWR nicads
2 antennas, carrying case,
earphone, DC cable, belt clip
shoulder strap.*(charger extra...£7.76)*

£299

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SUITABLE FOR SCANNERS & TRANSCEIVERS
* 25 - 2100 MHz
* **Full RF switching for transceiver use**
* Low noise GaAs Fet
* Variable Gain
* Band pass filters

Boost reception on your scanner, handheld transceiver, communications receiver with this superb new unit high quality japanese workmanship

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OTHER POPULAR MODELS:-

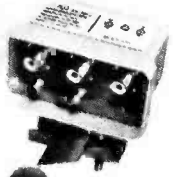
Black Jaguar Mk111	£199
Jupiter 11 mobile	£375
Jupitar 11 H/held	£299
Bearcat 200 XLT H/held	£299

SCANNER ANTENNAS

Nevada Discone (50 - 700 MHz)	£24
WB1300 Discone (25 - 1300 MHz)	£59.95
PA15 Colinear (200 - 960 MHz)	£49.95

TALK ACCESSORIES

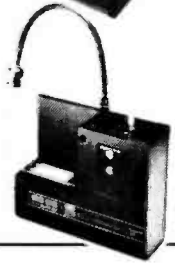
REMOTE MAST HEAD SWITCH
NEVADA CAS - A2 £49.95
Freq:- DC - 1.3 Ghz
Connectors:- 'N' Type
Power:- 150/300 Watts



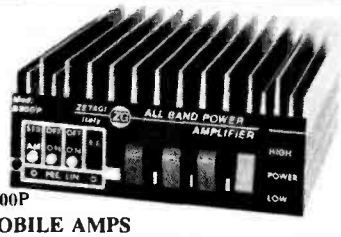
SADELTA XL30 Mic
A new electret base mic, that will give your Kenwood, Yaesu, Icom, or other leading brand of Transceiver extra 'punch' and 'clarity'. The micmay be powered from the Transceiver direct or with an internal PP3 battery.
Introductory Offer £39.95

SADELTA CM 40 Mic
As the XL 30 above, but with Vol/Tone controls
Introductory Offer £49.95

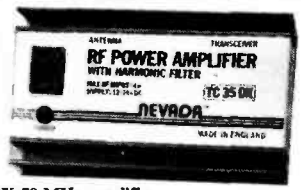
NEW DOCKING BOOSTER
Boost the output of your 2mtr handheld to 25 watts suitable for use at Home or in the car.
Model BS25
For ICOM, CTE, Kenpro
Model BS23
For some Yaesu models
Both Models £59.95



TALK AMPLIFIERS



B300P



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B150 180w (26 - 30 Mhz)	£54.95
B300P 300w (6 - 30 Mhz+pre amp)	£147.52
B550P 500w (6 - 30 Mhz)	£237.00
B303 200w (6 - 30 Mhz)	£114.67
TC50 15w (50 - 52 Mhz)	£29.95
HL 66V 60w (50 - 52 Mhz) S/hand	£95
BRL31 28w (26 - 30 Mhz)	£19.95
B250 250w (6 - 30 Mhz) 24 volt	£115
737 80w (26 - 30 Mhz)	£35.41
735 35w (26 - 30 Mhz)	£18.54
B110 110w (142 - 170 Mhz)	£145

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B132 240w (6 - 30 Mhz)	**£129**
BV131 250w (26 - 30 Mhz)	£115
B507 300w (6 - 30 Mhz)	**£278**
HL1K/6 500w (50 -52 Mhz)	£695

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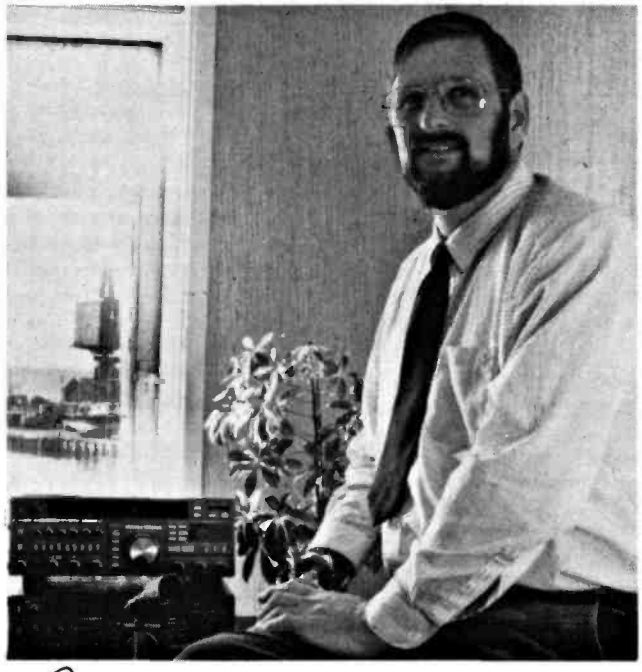
Keylines



Rob Mannion G3XFD

PW celebrates its 1000th issue with the publication of the July magazine and I would be most interested to hear from any of our veteran readers who have either taken *PW* from the early days, or from anyone who has memories from before the war. Our sister publication *Short Wave Magazine* has already put us in touch with some of our readers who have enjoyed the radio hobby with the help of both papers and I would especially like to hear your stories of those pre-war projects and how you built them.

Perhaps, out there somewhere, somebody has a receiver that they actually built themselves from a *PW* design - which is still in their possession and is still in working order!

It's much more likely that we shall hear about a receiver that was built by Grandad, now in the proud ownership of a grandson who knows the history of the equipment. If you are one such lucky owner, write to *PW* and tell us about it, as your family heirloom also forms an important aspect of *PW's* heritage.

During the Second World War *PW* carried on publishing - despite the paper shortages and other restrictions. The magazine played an important role providing technical reading, information and necessary training for the many thousands of new radio and radar technicians who were needed during the hostilities.

Not surprisingly there's little mention of radar in specific terms until much later on in the wartime issues - for obvious reasons! However, radio enthusiasts were recruited in great numbers to work on radar and other important defence electronic systems. Were you one of them? Did you read *PW* in the war and did you find yourself reading the magazine in an unusual setting? I feel sure that there are many interesting stories to be told by readers who 'did their bit' by working in the various aspects of radio communications and I hope to be able to share some of them with you in the July issue.

Thinking back to the Second World War made me think about the dangerous world of espionage - spies and spying to most of us! - and it doesn't seem to be so long ago to me when radio amateurs operating on 'Field Day' events and working mobile equipment were often thought to be spies!

It might seem rather funny to people nowadays to hear about groups of amateurs (suspiciously transmitting Morse signals from remote fields during the night) being confused with the practice of espionage -but it happened! There are many stories told about surprised club-station operators suddenly finding themselves surrounded by the local constabulary, who often took some convincing that the strange people they'd been tipped off about were doing it all for fun! The effect was even more devastating to the radio operators when you bear in mind that the heavy tread of the approaching size fourteen boots was usually masked by the roar of the petrol-driven generator!

The problems for the mobile operator were often less funny. It wasn't much fun to be stopped by the police while they investigated the (often very strange looking) antennas and home-brewed equipment to be found on amateur radio-equipped cars in the late 50s and 60s. Mind you -my Morris Minor wasn't nicknamed the 'porcupine' for nothing ! My home-brew h.f. gear and the ancient (even then!) much modified ex-p.m.r. RAYNET 144MHz equipment and associated omni-directional HORIZONTALLY polarised antenna attracted a lot of attention from the police. Most police officers were polite enough, although they occasionally demanded to see my amateur radio licence.

On the rare occasions I was carrying the then very large foolscap document with me - they were none the wiser for reading it! However, my encounters with the police were amicable enough and I can claim at least two converts to the hobby through such encounters! But it was often an unpleasant experience to be flagged down and not something to be recommended!

Nowadays an enormous number of vehicles on British roads seem to be fitted with radio telephones of either the cellular selective ringing type or the older p.m.r. 'base station' system. The growth of 'in-car communications' has laid to rest any possibility of a radio amateur attracting much attention when mobile operating, but that very growth has drawn the attention of many road users and safety organisations to the dangers of using hand-held microphones while driving on our congested roads at high speed.

On motorways I am often overtaken by motorists exceeding 70 m.p.h. while they are obviously chatting on the 'phone at the same time! Driving home from London via the M3 recently another driver overtook me as he was using a car 'phone and was so engrossed in the conversation he didn't notice a police patrol car directly behind! I don't know of course whether he got away with a warning or now faces prosecution, but it was a stark reminder to me to stay safe!

As I've got to be careful anyway because of the loss of my right hand, I operated mobile with a headset/boom microphone combination for many years. There are many commercially made lightweight microphone and headset designs available and I hope that many more operators will wear them and save their pockets - bearing in mind the well publicised police intention to clamp down on this dangerous habit - and possibly also save their lives by using a bit of common sense!

To finish off this month's Keylines I've got a sad little postscript for you regarding the Heathkit HW7 c.w. transceiver mentioned last month. I built this rig myself and used it for many years before passing it on to a friend. On reading January's Keylines, he contacted me to say that the transceiver is now resting at the bottom of the Caribbean Ocean and can perhaps claim to be the first HW7 to be under water! (perhaps worth a special callsign? Reception reports please with two IRCs for a QSL card!) Apparentely the rig was loaned to a radio amateur working on a remote missionary station on one of the islands It duly arrived and he had a few QSOs before a hurricane struck the island carrying the operator's shack complete with HW7, etc., into the sea. The loss of the transceiver was nothing compared to the damage on the island but I wish he'd been able to have a few more QSOs with it. Oh well, perhaps we'll send him a replacement - suitably waterproofed!

Receiving You...

Dear Sir

I am writing this letter to inform you that I shall not be renewing my membership with the RSGB this year as I think that the £4.50 increase to the basic subscription for home corporate members is totally unjustified. This increase amounts to almost a 22% rise in the annual subscription. I know that the Society has not increased its membership rates in the last 20 months, but in the last 20 months the membership should have increased and should be higher now than ever before.

With the membership increasing every year and advertising rates in Radcom increasing in line with inflation, I can see no justification for such an increase. The Society should be looking for ways to increase its membership and not depleting it as they will do by raising the membership fees.

The Society should ask itself if it is so good, why are there so many radio amateurs and s.w.l. who are not members of the RSGB? My income, like many others, has not increased by 22% in the past 20 months - and please don't go on about the price of equipment, etc! I don't smoke or drink and my family and I have not had a holiday in years. In fact, our last holiday was 11 years ago and my car can only be described as a 'banger'! So that I can get on h.f. I am having to sell other things that I own so I can buy a second-hand rig. There are many other amateurs like me who are on a low income.

The RSGB is no longer in the range of my pocket. I also have no wish to help fund a novice licence when we already have the RAE which is not that difficult to pass if the student puts their mind to it. So, like many other good amateurs, I will not be renewing my membership this year.

I know that I have no chance of getting this letter published in *Radcom*, as *Radcom* will not publish anything that is critical of the RSGB. It's a well known fact that the Society does not like criticism and this is why I am writing to you in the hope that you may publish my letter.

M. G. Butler GW0MNP
Bridgend, Mid-Glamorgan

The RSGB replies

David Evans G3OUF, Secretary and Chief Executive of the RSGB, replies to Mr Butler's letter.

"In replying to Mr Butler's letter I have to say that I believe the RSGB's new annual fee of £25 offers exceptional value for money . For £25 the RSGB defends and enhances the interests of all UK radio amateurs both nationally and internationally. A host of other benefits and services are available including : a monthly magazine, a free QSL bureau, planning permission and EMC advice, Intruder Watch, the Observation Service, discount book service, reciprocal licensing information, technical advice, slow Morse instruction, attractively priced equipment insurance, rallies, exhibitions and conventions, beacons and repeaters, RAYNET, special event callsigns, propagation information, RSGB low interest rate credit card, GB2RS news, contests and awards, etc.

"In defending and enhancing the conditions under which UK radio amateurs operate, the RSGB has one of the finest records of any national society in the world. For example, the RSGB has led the World on packet radio licensing and was the first national society in Europe to negotiate permission for all of its amateurs to use the 50MHz band. Many other countries have since followed.

"Add to all of the above services the cost of the democratic process such as Council and committee meetings, the publication of an annual report and accounts, the annual meeting and elections for the Council and you will appreciate the costs in running a national organisation. However, like most national societies and countries in the world, membership and the numbers of licensed amateurs is either roughly static or drifting down at present.

"Mr. Butler urges the Society to recruit more members as a means of helping to keep fees down, but does not support the concept of a Novice Licence. Such a licence is seen by a large proportion of members surveyed, and the RSGB Council, as the prime way of bringing more people into amateur radio.

"The problem which sometimes does not seem to be appreciated is that if the number of licensed amateurs world-wide falls, then sooner or later the argument to decrease the size of amateur bands becomes irresistible to Governments, especially at a time when there are enormous commercial and other pressures on the radio spectrum. Indeed, at the major ITU (International Telecommunication Union) Conference to be held in 1992, many of the amateur bands could well be under threat. The Society will be involved in using the resources of all its members to defend the status quo and if possible enhance it at the 1992 WARC (World Administrative Radio Conference). Extra funds are also needed for other work which will be needed to defend the position of the UK radio amateur against any European legislation which, as 1992 approaches, threatens the hobby.

"The above case was put to all members when the fee increases, due from 1 March 1990, were announced in the January edition of *Radio Communication*. Naturally we are sorry that Mr. Butler has decided not to support the work of the Society. We are also sorry to note that Mr. Butler felt that his reasonable letter would not be published, since in the same issue that the RSGB fee increase was announced, there is a letter from a member griping about the QSL Bureau.

"To all those who are not members of the RSGB, I urge them to consider membership. There is safety in numbers and the Society has a fine record in defending the interests of UK radio amateurs. When you join any organisation it is not only for what you get out of the organisation, but also for what you can put back into it. The latter is the knowledge that you are funding the work which is necessary to maintain the basis of the hobby itself - defending the amateur bands without which there would be no amateur radio - 1992 is just around the corner."

David Evans RSGB

G3XFD comments

"Those of you who read my 'Keylines' editorial in January PW, will realise I cannot support Mr. Butler's objection to the Novice Licence proposal. Amateur radio needs new blood and the novice approach is an excellent idea. I've often worked American Novice Licence holders on c.w. on the h.f. bands and have been very impressed with the quality of the Morse and the standard of operating. I've often been very surprised at the age of the person on the key! One of the best c.w. 'fists' I've heard in many years came from a ten year-old girl in Wisconsin! However, I must state here and now that I regard that the RSGB has made a fundamental mistake by aiming the recruitment drive at the wrong age group. To be successful you have to encourage the young people at around the age of six or seven. Many children are happily using very complex computers at school by the age of seven! With guidance, a large number of youngsters can (and have!) built working radio receivers. I consider that if the approach is left to the 'teens' - it will often be far too late in the day as the young people will usually be engrossed in computers, other interests and exams. Think early, for our young people have far more to offer to themselves and us than we can possibly imagine!"

Receiving You...

Send your letters to the Editorial Offices in Poole, the address is on our contents page. Writer of the Star Letter each month will receive a voucher worth £10 to spend on items from our PCB or Book Services, or on *PW* back numbers, binders, reprints or computer program cassettes. And there's a £5 voucher for every other letter published.
Letters must be original, and not duplicated to any other magazines. We reserve the right to edit or shorten any letter. Brief letters may be filed via our Prestel Mailbox number 202671191. The views expressed in letters are not necessarily those of *Practical Wireless*.

Dear Sir,

Following your 'Keylines' editorial in the February issue regarding valve circuits, I am hastening to write saying how much I would appreciate some valve circuits in *PW*.

I have been interested in amateur radio since the '30s and am therefore, a valve man and find solid state work difficult. It's not only because of the small size of everything but because if it does not work first time it is difficult, if not impossible to 'get into it to check current drain etc. With valve circuits all you have to do is unsolder a wire. I hope you'll be able to arrange something for the likes of me.

H. H. Smith G3ARU
London E12

Keep looking Mr. Smith, we have one or two ideas 'up our sleeves' so to speak. Ed.

★★★★★STAR LETTER★★★★★

Dear Sir,

How about a write up on the large size rigs that are to be found on the second-hand market such as the Yaesu FT-102 (why so cheap?) and the FT-1 (why so dear?), etc. Some people don't want small 'pocket' h.f. rigs.

Brian Grimes G0LGZ
Ventnor, Isle of Wight.

An interesting idea Brian. What other older equipment would any of you like to see reviewed in PW *? Write and let us know. Ed.*

Dear Sir,

I must write and congratulate you on the wonderful new format for *PW*. Excellent paper, clean and clear printing, well set-out and with new and attractive titles. Many thanks for the new style magazine - may it long continue.

George A. Ross G4IGI
Romford, Essex

Dear Sir,

I just had to put pen to paper after purchasing the new *PW* magazine. Having read the old style and finding it excellent, the new style is a thousand per cent better.

With the paper being whiter, it makes the reading easier on the eyes, and stands out much more. And as for the increase in price, it pays for the excellent quality for which you have supplied us with, especially the superb colour pictures throughout the magazine.

An excellent improvement by your staff. Keep up the good work!

Paul Hawkyard, Newcastle

We are very pleased at the response from readers via the mail and telephone answering machine to the new-look PW. Obviously we are striving to keep costs down and provide you with a good magazine and are always pleased to receive your comments and ideas. Keep writing, we're receiving you! Ed.

Dear Sir,

I would like to add a little history to the highly informative article entitled 'The Father of Amateur Radio' by G3OXC in your January issue.

In the Admiralty Handbook of Wireless before 1939, the unit of capacitance was the 'Jar'. I cannot remember the electrical definition of the Jar or its relationship to the Farad. Perhaps an old timer amongst your readers could help ?

G. R. B Wilson G3APV
Seascale, Cumbria.

According to the PW *office copy of the* Admiralty Handbook of Wireless Telegraphy (1938 edition) *1 microfarad = 900 Jars. The book also states that the term was obsolete even in 1938. I've no doubt readers will remind us of other units and terms we've forgotten about. Ed.*

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Newsdesk '90

Large Display Multimeter

The M4650 is a large, high resolution 4 1/2 digit liquid crystal display multimeter. It has the added advantage of data hold memory in addition to its other useful features.

The meter offers f.s.d. measurements of voltage up to 750V a.c., 1000V d.c., direct and alternating current up to 20A, resistance from 200Ω to 20MΩ, l.e.d./audible continuity testing, transistor h_{FE}, capacitance from 2000pF to 20μF and frequencies up to 200kHz.

A c.m.o.s. dual-slope a.d.c. is utilised for the auto-zero, polarity selection and over-range indication functions and the display has a range of annunciators including a low-battery indication and shows the units selected.

Crotech Instruments Ltd.,
2 Stephenson Road,
St Ives,
Huntingdon,
Cambs PE17 4WJ.
Tel: (0480) 301818.

The 8th Annual Practical Wireless 144MHz QRP Contest will take place on Sunday 17 June 1990 0900-1700UTC

Transmitter output power will be limited to three watts as usual. Full rules will be published in due course in Practical Wireless. Contest adjudicator:

Neill P. Taylor G4HLX.

The BATC Convention

The British Amateur Television Club (BATC) has moved its annual convention to a new venue this year. The new location is Harlaxton Manor, near Grantham Lincolnshire. The Manor is ideally situated being only 2 miles from the A1. The committee spent a long time researching various sites, having received complaints about the lack of car parking space, the price of refreshments and the cramped exhibition areas. The new venue has none of these problems, with ample car parking space, and has good quality catering arrangements. The convention will be using a number of the large rooms of the Manor, which will allow more space for traders and the demonstration areas. As well as the exhibition, attended by many traders, there will be a full lecture programme covering several aspects of amateur television.

The Manor stands in many acres of beautiful grounds which will occupy the XYL whilst you browse the trade stands, or attend the lectures and demonstrations. There are several local attractions which will make a visit to the area worthwhile for all the family. Belvoir castle (8km), reknown for the jousting tournaments held there during the summer months is open to the public. Grantham town (5km), perhaps better known as Mrs Thatcher's birth place, has more historical connections as it is also the birthplace of Sir Isaac Newton.

The BATC looks forward to welcoming you to its convention, and hopes that readers will join them there.

DX Association of Great Britain

Due to ill health E.A. Rickett has had to resign as secretary of the association. He will of course remain a member of the DX Association. This is to take effect from 1 February 1990. Would those who wish to contact the society please address all mail to

Adrian Donaldson (DXAGB)
49 Arkaig Drive,
Crossford,
DUMFERMLINE, Fife KY12 8YW

Special Event Stations

The Radio Club of Thanet will be activating three GB50 special event stations during the current year from Ramsgate to commemorate World War II events which took place 50 years ago.

In May, GB50DNK will be on the air from a Ramsgate Council building overlooking the harbour and will be commemorating the evacuation from Dunkirk and the fact that over 82 000 troops were landed at Ramsgate Harbour mainly from small boats, pleasure craft and Ramsgate lifeboat.

Also in May GB50SUN will be situated on board the *Sundowner* a 58ft long motor yacht which was one of the small boats taking part in the evacuation and rescued 130 men in one trip. The owner and captain of the vessel at the time was Commander Charles Herbert Lightoller the senior surviving officer of the *Titanic* disaster in 1912. The *Sundowner* has had a chequered career and carried out clandestine operations in 1939 for the government. It is hoped to operate GB50SUN/MM when the vessel makes a nostalgic trip back to Dunkirk at the end of May with Dunkirk verterans and other dignitaries, but space is limited and this may not occur.

In July GB50MAN will be active from RAF Manston, one of the front line aerodromes of World War II and will be commemorating 50 years since the Battle of Britain.

It is hoped to activate all three stations daily during the respective months with the morning and early afternoon operation on the 40m band with later operation on 20 and 10m. The frequency to be used on 10m will be 28.845MHz commencing 1400UTC. Operation on 144MHz will take place as and when operators are available mainly at the weekends. The QSL operation will be organised by G3OPL who will acknowledge all cards received and direct applications will also receive an information sheet application to the respective operation returned with the QSL card. A s.a.e. with sufficient return postage please.

The Club is particularly interested to hear from Dunkirk vererans and anyone who flew from Mansyon during 1940 with the possibility of greetings messages being passed beween them and the Mayor of Ramsgate and/or a Royal representative during the Sundowner operation, for the latter.

Further information can be obtained from Buster G3OPL. Tel: (0843) 597916, QTHR.

Stations who work all three GB50 calls are entitled to apply for the 'Seaweed Award' issued by the club. The cost of the award is £1 within the UK and 4 IRCs or 3 US dollars elsewhere.

The Awards Manager to whom all applications should be sent is ***Butch G0CBY, QTHR.***

Newsdesk '90

WX Satellite Decoding Module

Previously, the display of polar-orbiting and geostationary weather satellites has meant interface units coupled to framestores or computer systems, sometimes putting this fascinating aspect of radio reception beyond most people's means.

Now, the APT-1 module enables you to display these satellite pictures on any FAX system. It simply converts the APT transmission format into the FAX format but that isn't all.

The module incorporates a VOGAD i.c. to give a.g.c. for the APT signal, completely eliminating the black and white level controls, which are such a tiresome feature of framestores, and allowing the module to be driven from any convenient source of audio without adjustment. To let you change the display for special effects, brightness and contrast controls are provided but these are pre-set for a standard display during calibration.

The clock frequency of the APT transmission is recovered in the APT-1 module and drives a divider chain to produce a synchronising signal. Thus eliminates the picture distortions due to Doppler effect and variations in tape speed on recorded transmissions. This signal can be reset by an external strobe pluse for picture phasing.

For users of our RX-8 multi-mode receive system, the module comes complete with everything to connect it into the existing RX-8 system and to control the functions and also a new software upgrade giving extra controls and facilities to make the best use of the module. Power to the module is supplied by the computer and no external supply is needed.

To receive the satellite transmissions, you will need a special v.h.f. satellite receiver as standard communication or broadcast receivers are not suitable. These satellite receivers are available quite cheaply from Maplin, Cirkit, etc. For Meteosat reception, a 1.69GHz converter is also required.

The price of the APT-1 module, assembled, tested and calibrated, is £59 including p&p and VAT. For RX-8 users, it comes complete with all connections and software upgrade for a very special price of £39 if purchased at the same time as RX-8.

Technical Software.
Fron,
Upper Llandwrog,
Caernarfon,
Gwynedd LL54 7RF.
Tel: (0286) 881886.

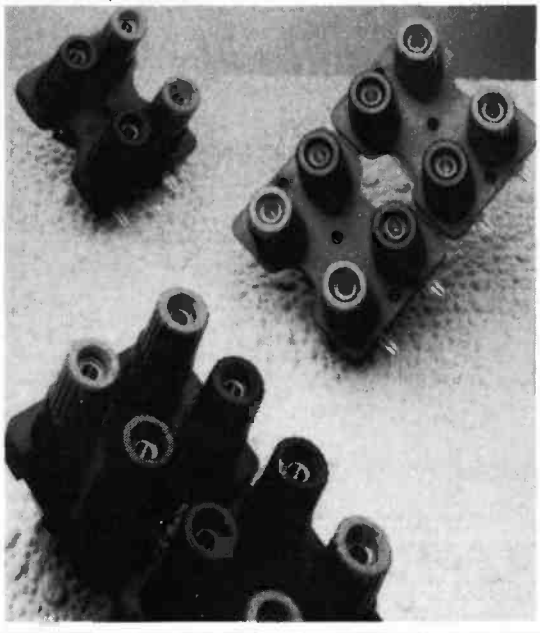
Binding Posts

A new range of p.c.b. mounted binding posts with 4mm sockets has been introduced by Watts International Components Ltd.

Available with four or eight terminals, they have been designed for use in professional audio and hi-fi applications, and with test equipment where a non-fixed attachment or probe is required.

There is a choice of cap colours for easy identification in loom wiring use, and the posts accept a standard 4mm banana plug.

Watts International Ltd.,
No. 4 Phillips Business Centre,
Terminus Road,
Chichester,
West Sussex PO19 2UL.
Tel: (0243) 533479.



Wide-band Pre-amp

The JIM M100 low-noise wide-band GaAsf.e.t. pre-amplifier covers the frequency range 24-2150MHz. To ensure best possible performance, three switchable band-pass filters are included. With full built-in r.f. switching, this pre-amplifier is suitable for both receive and transmit applications. The BNC connectors mean that it can be simply connected to the operators favourite transceivers, scanning receivers, hand-held, etc., and the existing antenna put on top of the unit.

The M100 will also be of interest to the technician where it may be used in line with oscilloscopes, spectrum analysers and similar test equipment. The cost £79.95.

Nevada,
189 London Road,
North End,
Portsmouth,
Hants PO2 9AE.
Tel: (0705) 662145.

Catalogues

The Vintage Wireless Company have sent us their December 1989 Antique Wireless Newsheet. This 28-page loose folded item contains news, views, editorial and readers pages including a test of the K.B. Kitten two valver of 1932. There are also lists of classic BBC radio programmes and their availability on cassette. Obtainable for the sum of £5.00 for twelve issues.

Also from The Vintage Wireless Company is their 48 page component catalogue detailing such things as: accumulators, capacitors, chokes, coils, headphones and hardware, metal rectifiers, wires and cables, but the item that caught my eye was on the back page. This was a selection of material covering the period 1922 to 1934 including *Nellie the Nudist Queen.* by Stuart Ross and Joe Sargent. The above and their lists of valves, information sheets and books from ***The Vintage Wireless Company Limited, Tudor House, Crossham Street,***

Newsdesk '90

Mangotsfield, Bristol BS17 3EN. or Tel: (0272) 575442.

Available from Attersbury Associates (Public Relations Services) Limited, on behalf of Hamlin LCD, is a brochure detailing Hamlin's manufacuring capability with Supertwist l.c.d. displays. The publication contains concise technical specifications for design and applications of these displays. Iso-contrast plots are available for each of the four fluids that are used in the displays. Copies free of charge from ***Atterbury Associates on 01-859 6617 ask for Karen Mascarenhas, or David Griffiths of Hamlin on (0379)644411.***

Miniature Push Button Switches

The Mekanisk Elektrisk Compagni of Denmark have sent us details of their new surface or conventional p.c.b. mount switches. These have been designed to give maximum key travel and tactile feedback, in applicaions using a flexible foil overlay. The patented construction gives 1mm movement with an operating force of 150gram.

Sealing is to IP65 and the expected life is 5 million operations. The 10.1mm square 6.4mm high is suitable for SM or TH mounting using automatic pick up and place equipment. Interested?

MEC A/S
PO Box 26,
Industiparken 23
DK-2750
Ballerup,
Denmark.

Competition Results

Thanks to all those readers who sent in their entries for the *PW* Wordsearch Competition in the November and December issues. We were caught out with the number of entries received - after about three days we ran out of places to store them! Looking through the various grids, only two words seem to have caused any problems. The first was 'SHACK' which was on the right-hand side with part of the word on each piece of the competition. The other was 'YAGI' which was on the second piece of the competition on the left. It doesn't matter whether you marked one or all of the 'am' and 'fm' words, any of them count.

Anyway, the winner (the first correct grid out of the pile on the floor!) is:

Peter Rice G6AYU in Peterborough.

He wins the Standard C528 kindly donated by Lee Electronics in London W2.

The first runner-up is **George Mills** in Doncaster

He wins the Uniden 2830 kindly donated by Raycom of Oldbury.

The second runner-up is **S.P. Tomsett** of Hoddesdon.

They win the colour television.

The 100 other runners-up are:

Mr K Clayden, Isle of Wight; Kevin Roche, Beech; Mr M.D. Harfield, Brighton; M. Sundara Vadivel, India; Donald Macdonald, Isle of Lewis; Thomas Fusco, Co. Down; P.R. Hughes, Little Sutton; A.S. Clelland, FRG; R.H. Harbord G4YDY, Norwich; Mr J.R. Cottrell G1OKY, Wirral; Ken Thompson, USA; L.A. Stringer G4GZG, Ongar; J.E. Smith G1SRJ, Humbleton; C. Womack, Pontefract; Mr H.A. Williams G4WNA, Redcar; John Cottrell, Birmingham; Jean Dobersecq, France; Eric Dew, Bristol; Michael Grieg GM0MMN, Fife; H.W. Genschorek, Canada; N.J. Vames, Wincanton; Mr B.I. Richardson, Isle of Wight; Mr A.J. Humphreys, Basingstoke; J Savage, Exeter; John Portney, London; Mr R Fuller G6YQU, Nuneaton; Folke Johansson SM4HJ, Sweden; K. E Miller, Tyne & Wear; F. J Gibbons G3TBU, Kidderminster; Susan Redfern, Manchester; Mr R Parker G4ZBO, Kendal; B.T. Howat, Southport; Flight Lieutenant P.A. Bradbeer, BFPO 42; Alistair R Hill, Easlesham; R. Johnstone, Fort William; Larry W. Maddox, USA; Mark Fasham, Ramsgate; N. Porter, Surbiton; Mr Lim Chin Siang, Singapore; Mr J Sable, Braintree; Mrs Pauline Coburn, Wrexham; Charles Grech, Malta; Mr P Haylor, Birmingham; Mr F.G. McGall, Co. Antrim; Denis Oakley, Warley; Gary Davis, Tamworth; Zhao Jiulong, China; Alan Benfield, Witney; Mr R Baldock, Birmingham; Shaun C Barker G7ENH, Stanton; E. Simmons, Doncaster; Mr H.D. Green, Truro; Bernard Gay, Kings Norton; S Hattick, Morpeth; P.J. Doyle, Woodford; Mr A.C. Miles G6RJS, Ilford; John Lund OZ9WW, Denmark; Mrs Lindy Jasper, Bognor Regis; Mr Michael Day, Guernsey; C.W.M. Anderson ZR6AFU, South Africa; Mr R Moat, Dover; G Jarvie, Co. Londonderry; Mr W.B. Booth G7FCN, Bracknell; Bob Stone, Plymouth; Mr L Wheeliker G0EZK, Doncaster; James Bodle, Stranraer; Colin Seymour, Tyne & Wear; Nick Mavrantis, Greece; Mick Behan, Co. Wicklow; Mr G.A.E. Johnson, London; Howard Seddon, Lancashire; D.W. Payne G3KCR, Crowborough; Mrs M Stanley, Leeds; G.P. Truckel, Bristol; V. Cundall G3FAU, Stevenage; Mr L Ullman, Canvey Island; Mr C. E. Blumfield, Shrewsbury; L.W. Thomas, Saltfleetby; Rolin Francis, Belgium; Mr M Hadley, Birmingham; Mr N.J. Cleaver, BFPO 58; R.W. Moore, Isle of Man; A.G. Martin GJ3GCC, Jersey; Mr A.W Johns, Saltash; D.A. McAtee, Gloucester; Ury Moskowitz, Israel; Mr M Gregory, Locks Heath; G Renggli G0GID, Bournemouth; C.R. Rogers, Peterborough; G. T Bilbie G0BGW, Mansfield; Hamish Dally, Shetland; J.C. Kralingen, Holland; Mr R Craib, Aberdeen; Alec M Jones GM8HGD, Aberdeen; John Kirby, Chalgrove; Steve Curtis, Australia; Ken Ritzema G0MLP, Barnard Castle; Reynir H. Stefansson, Iceland; J.M. Garner G3KEC, West Looe; Mr F.C. George, Orpington.

Congratulations to all the winners, your prizes will be on their way very soon.

The January Crossword winners have been picked from the hat. The first prize of a £20 PW voucher has gone to Carolyn Gilbody in Belfast, the second prize of a six month PW subscription goes to Mrs E Meinwaring on the Isle of Wight and the 3rd prize of £10 in PW vouchers goes to John Williams from Stourbridge.

The February Spot the Difference results will be announced in the April 1990 issue.

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Competition Corner *Wordsearch*

S	D	Q	B	O	C	L	I	L	C	F	A	O	P	Y	J	J	B	V	F	D	G	W	E	D
S	E	Q	L	U	B	I	Y	A	U	R	W	I	X	N	R	S	K	A	T	T	S	Z	O	G
O	M	G	S	R	E	R	P	A	O	Y	S	Y	N	V	Y	F	T	F	A	S	Z	Z	K	C
F	P	P	M	T	E	A	T	T	R	H	P	R	P	T	O	S	S	I	A	Y	B	Z	S	I
H	B	S	J	T	C	I	Y	B	X	X	E	A	O	K	E	R	H	P	U	A	S	I	H	F
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F	J	O	O	O	A	Y	A	R	Q	N	P	G	N	Z	K	X	G	Z	G	Q	S	J	R	R
K	F	K	O	A	S	Y	L	C	A	T	S	W	T	M	D	E	A	U	B	Y	K	T	Z	S
B	R	L	I	R	C	W	O	I	S	B	C	H	C	L	F	P	E	V	C	L	P	F	V	I
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D	G	P	I	C	E	D	O	C	R	L	L	G	U	K	X	T	Q	M	B	J	M	U	S	Q
X	O	I	C	L	B	B	L	R	V	U	O	X	E	A	V	H	T	C	D	A	D	M	S	F
W	X	B	T	B	S	Z	G	E	A	K	Z	C	N	O	X	E	J	S	X	M	J	S	A	I

PRIZES...

First prize will be awarded to the first correct entry drawn from a 'hat' on Monday 19 March 1990 and the winner can choose either a one year PW subscription or £20 in vouchers for the book service.

The **two runners-up** drawn from the same 'hat' can choose from either a six month PW subscription or £10 in book vouchers.

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Twenty different 'radio' words have been hidden in the letter grid. They have been printed across (forwards or backwards), up and down or diagonally, but they are always in a straight line without odd letters in between. You can use the letters in the grids more than once for different words, and they're not all used. Once you have found all twenty words, mark them on the grid and send in your answers.

Send your entry to PW Publishing Ltd., March 1990 Wordsearch Competition, Enefco House, The Quay, Poole, Dorset BH15 1PP. Closing Date last post received Friday 16 March 1990. The Editor's decision on the winner is final, no correspondence will be entered into.

Name ..... **Address** .....

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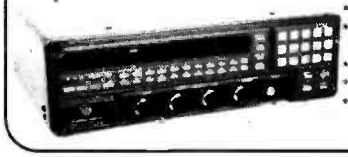

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The problem with omni-directional wide-band antennas is their lack of gain.
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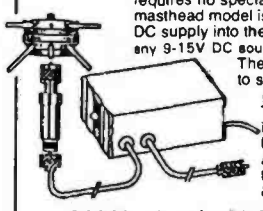
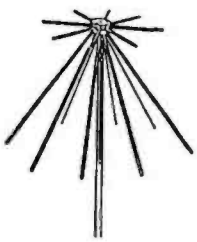
The basic specification of the products is similar: coverage 20MHz-1GHz, at 1GHz: minimum gain 13dB, noise factor 5.5dB. Choose from a mast-head version (PA3) or a standard die-cast box style (PA3I). Best results are normally obtained from the masthead model which gives a boost to weak signals which would otherwise have been lost in the feeder cable. Also feeder cable noise is not amplified which is the case if the amplifier is mounted at the base of the feeder. On the other hand, the die-cast box version requires no special installation and is readily taken out of circuit. The masthead model is supplied with a special power unit which feeds the DC supply into the antenna feeder. No psu is provided for the PA3I as any 9-15V DC source is suitable (current requirement about 25mA).



The PA3I finds application in instrument work, e.g. input to spectrum analysers, boosting the output from signal generators to give a low-power TX.
The standard version of the PA3I has BNC sockets and is designated "PA3I/B"; available to special order N-type sockets ("PA3I/N") or SO239 ("PA3I/S").
A special feature of the PA3 series is a high-pass filter to attenuate frequencies below 20MHz; high-power HF & MF broadcast stations can be very troublesome!

PA3 Masthead, with PSU		PA31/B	BNC	**£35.50**
PL259	**£49.95**	PA31/N	N-type	**£38.95**
N-type	**£53.95**	PA31/S	S0239	**£35.50**

REVCONE



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The Icom IC-901E Dual Band VHF/UHF Mobile Transceiver

Mobile operating today comes with the choice of many transceivers with multiple options. Rob Mannion G3XFD spent the Christmas holidays looking at a recent release from the Icom stable. G1TEX then put the rig through its paces in the PW test lab.

When it comes to modern equipment, especially the 'all-singing, all-dancing' type found nowadays, I have great difficulty in understanding the masses of instructions and the fiddly controls. In fact, anyone at *PW* will inform you that I am certainly not 'computer friendly'. Sadly they're right - I just do not seem to relate well to any form of computer or microprocessor controlled system. This extends, unfortunately for me, to hand-held transceivers and other equipment that uses multi-purpose control switches. I can get into a terrible muddle before I get used to a particular system. However, the unusual IC-901E seems to have made friends with me in no uncertain way and I enjoyed operating it.

Driving out into the Dorset countryside to the high viewpoints near Blandford Forum I was able to listen and work many stations on 144MHz. The transceiver drew very favourable comments for audio quality on transmit and I found that, despite the very small size of the supplied speaker, the received audio reproduction was good and there was plenty of it to overcome the high noise levels in my work-weary Ford Escort estate. Despite being in an excellent location for v.h.f. and u.h.f., I did not hear much on the 430MHz band except packet radio bursts. Mind you, I have since found out from other local amateurs that this band is somewhat under-utilised in and around this area.

My biggest problem in using rigs such as the IC-901E is the physical size of the control switches. My extra-large hand and fingers seem to spread over controls, and without even realising it I can operate the wrong switch and cause problems and confusion for myself and the people I'm working. Despite the very small size of the rig - it's only fractionally bigger than the average car radio cassette-player - the transceiver really does pack a punch and (much to my surprise bearing in mind my difficulties with small-size modern equipment) I found it very easy to work on the air and made few mistakes. The switches were very positive, although they only required a light touch. The tuning control (the tuning is in 25kHz steps) felt rather odd at first (it felt as if the action were following my movements after a slight delay) but I got used to it very quickly indeed and found it very pleasant to use.

There's no doubt in my mind that the most attractive option for most radio amateurs will be the complex facilities offered by the well designed remote control head. The detachable front panel was very clean and clearly laid out with a push-button either side of the front panel to release it. The eight function buttons on the right hand side of the box, although small didn't cause me any difficulty. Considering them in turn:

PWR is the on off button and successive presses change this state, as the front panel is operable remotely this button does not carry the full power of the machine.

V/M this toggles the v.f.o. control between one of the twelve memories available for each band, or for direct control using the main rotary control knob.

MHz pressing this causes each rotational click of the main control to increment in 1MHz steps instead of the pre-selected step. This allows rapid and easy frequency shifts on the 430-440MHz band.

CALL, this is a further memory which holds a calling channel on either band to control the transmitter.

H/L controls the r.f. power output of the transmitter stages switching the 144MHz output to either 5 or 50W and displaying an 'L' in the appropriate window. On the u.h.f. band the powers are 5 and 35W, and again there is an 'L' when in low power mode.

M/S changes the Main and Sub channels windows over. The main channel is the one on which transmissions take place and occupies the upper portion of the window. Physically, the characters of the main channel display are also larger, making them stand out distinctly.

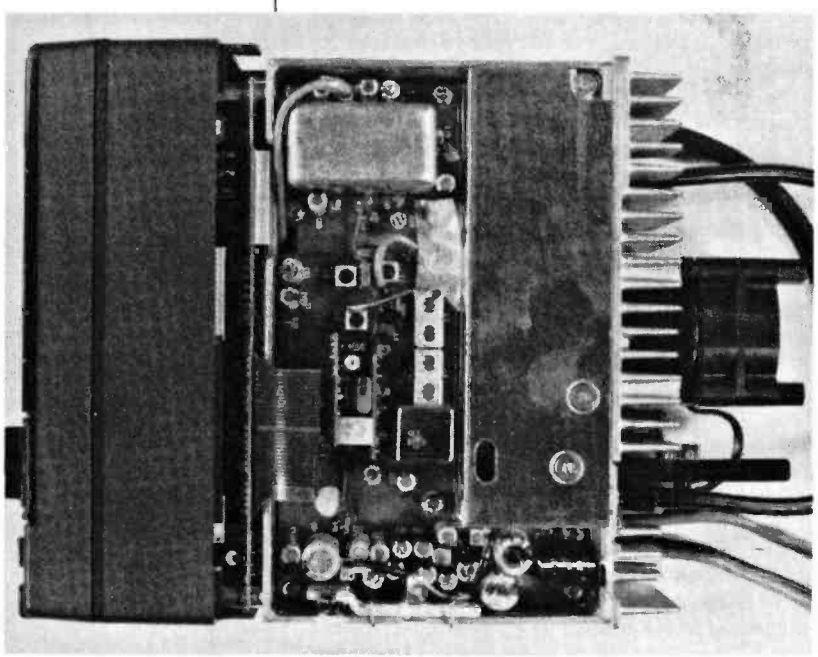
SET allows the rotary control switch to be used to change the various parameters such as frequency, step rate, volume, squelch, on the basic IC-901, repeater shift etc. Repeated presses cause the various functions to be displayed in the window and the use of the rotary

control to change any of these that have several possible values. For instance if the SET button is pressed until the word dUP appears, (this is a representation of the limitations of all seven segment displays) rotating the main control knob then causes the display to cycle through the three transmitter offset possibilities. These, of course, are above, below or on the same frequency as that used for reception. This offset itself may be preset to other than the normal value of 600kHz on v.h.f. The offset has only three choices available. When setting the sub-audible tone frequency there are 37 of them to cycle through. These range from 67 to 250Hz and the chosen frequency comes into use when the 'T' for tone squelch is enabled.

The final button to be described is the one that has the effect of allowing changes to be made to the 'SUB' band channel instead of the Main band channel.

Under that main display are seven smaller switches marked BAND, MODE T/T.SQL, TS CHECK, MW and S.MUTE. These are used less often than the buttons described previously. With the bare IC-901E, only the last four have any real meaning. TS changes the frequency step, CHECK allows listen on input when in repeater mode. The one marked MW is Memory Write and used to transfer data to one of the memories of which there are 12 for each band. Finally S.MUTE mutes the SUB band audio. As either band may be MAIN or SUB this applies only to the frequency shown in the lower half of the windows. On setting the volume and squelch for both MAIN and SUB these apply to which ever is which.

The illuminated liquid crystal display is excellent and the option of the removable control panel - it detaches from the main unit very easily - is an innovation that I personally have not seen for a long while. Some years ago remote operating facilities were popular and necessary (due to the large size of the equipment and the power supplies which had to be hidden away in the boot) with early car radio receivers and v.h.f. radio-telephone equipment. Re-introduced in this way, the option brings many advantages to the modern mobile operator. Space is at a premium nowadays in cars. Gone are the days of large under-dash parcel shelves, door pocket and transmission tunnels and therefore the majority of the chances of finding a suitable place to mount your rig. Most modern vehicles seem to be fitted with oddly-shaped moulded compartments and the streamlined interiors leave the mobile operator with a real struggle to find a suitable location for the transceiver. When you have long legs and considerable bulk to go with it - the option to place the rig away from the possibility of knee and shin collisions is welcome.



While on air I found that the displayed control settings were very useful, especially the squelch and volume controls. I don't know about you but I've often left the squelch turned up too far and lost a QSO as a result. These display reminders are useful and must be an aid to safety, as there is no need to grope for the controls.

As the transceiver is fully capable of working on both 144 and 430MHz at the same time (the rig has a separate antenna input for the u.h.f.band) the receiver section of the rig on whatever band not being used for transmitting, is active. This does take some getting used to if both bands are active! In my case I was using 144MHz to transmit and receive on and had no antenna connected to the 430MHz socket. Not being used to full duplex facilities in an amateur radio transceiver, I was somewhat surprised that the speaker continued to emit receiver noise when I was transmitting and using one band. However, I soon got used to the effect and was only sorry that it was not possible for me to have a cross-band QSO with someone on 430MHz.

The facility to listen and monitor one band while working on another also proved to be a useful and interesting addition. The receiver seems to be very sensitive and I was able to hear (and work) several stations that would have normally been out of range of my usual transceiver operating into the cheap and cheerful mag-base quarter-wave 144MHz whip. During one evening of listening, I heard the Torbay repeater although I could not access it well enough to work anyone. The Swindon repeater usually gets into Dorset very well - especially on the high ground. I heard it for the first time at my home QTH using this equipment - while the car was parked right up next to the house and screened by a wall and two thick hedges.

With the optional extra of a very long control lead (20m! Part No. OPC189) - fibre-optics come into play here - caravanners can take the rig control panel into their living quarters and happily operate from there. This removes the bother of having to take the equipment out of the car every time you park up for the night. It's things like this that make the rig a multi-use piece of equipment for the operator who wants more than either a mobile or base station rig.

Reading the handbook was a revelation in itself. I was completely taken aback with the various possibilities of the equipment. If you do buy all the optional extras you can end up with a medium wave receiver, a 28MHz f.m. transceiver, a v.h.f. stereo car receiver and a rig capable of working over to 1000MHz.

Technical Details

The IC-901E is a combination of two transceivers in a common case. They each have their own antenna connections and r.f. stages, along with individual audio stages and speakers thus allowing independent reception of signals. This is not new, of course, as dual band rigs have been available for some time. What makes this stand out is the fact that it can become the centre of a complete system which may include not only the f.m. unit as supplied, but also add-on units to make the system into an almost fantastic array of other things. All the variations for the receiver can be seen in Table 1 which has been taken from the handbook.

Two of the additional band units allow monitoring or transmitting on secondary frequencies within each of the two main bands and could benefit from a little more explanation.

Specifications

The measured values are enclosed in brackets.

General

Frequency Range	144.000MHz to 146.000MHz in 5, 10, 12.5, 20 or 25kHz steps; 430.000MHz to 440.000MHz in 5, 10, 12.5, 20 or 25kHz steps
Mode of operation	f.m. on both bands with standard IC-901E (s.s.b. and c.w. on v.h.f. available as optional extras)
Power requirements	13.8V +/- 15% at up to 13A (see below)
Usable temperature range	-10°C to +60°C
Overall dimension	when front panel fitted to rig 150 (wide) x 50 (high) x 191mm (deep) projections not included
Weight	1.6kg

Receiver

Max audio outputs	1.4A(1.3A)
Squelched outputs	850mA

The receiver uses a double conversion technique VHF - 17.2MHz + 455kHz; UHF - 30.875MHz + 455kHz

Sensitivity	less that 0.18µV for 12dB SINAD (0.17µV) on both bands. The test rig was fully quieted with 1.2µV.

With a deviation of more that 7.8kHz the audio became rather rough in tone. I assume this rig would easily deal with 12.5kHz channel spacing. One anomaly of this independent receiving capability was found in testing. When the u.h.f. received frequency is exactly 3 times the v.h.f. transmission, then a fully quieted but rough-toned signal is heard on u.h.f causing howlround. It was measured at an input of 1.2mV of v.h.f. energy into the u.h.f. input. Retuning the v.h.f. transmission 15kHz or more caused this problem to disappear. Retuning the u.h.f. frequency 50kHz had the same effect. No noticeable effect of u.h.f. energy on the v.h.f. reception was measureable.

IF rejection	>70dB on a fully quieted signal
Audio output power	2.4W at 10% into 8Ω, (maximum 3.5W into 8Ω)

Transmitter

Maximum deviation of frequency	5kHz (4.7kHz)

RF output and current requirements of the rig

BAND	HIGH	LOW
144-146MHz	50W/13A (10A)	5W/5A (3.5A)
430-440MHz	35W/1A (7A)	5W/5A (3A)

Spurious emissions	Less than 60dB on maximum r.f. output
Number of memory channels	12 channels plus one calling frequency per band.

	MW Band	VHF Band				UHF Band	
Frequency Coverage	520-1630kHz	76-108MHz	108-137MHz	137-200MHz	200-236MHz	300-500MHz	800-950MHz
Mode	a.m.	f.m.	a.m.	f.m.	f.m.	f.m.	f.m.
Tuning step (TS-A)	10kHz	100kHz	25kHz	25kHz	25kHz	25kHz	12.5kHz
Tuning step (TS-B)	1kHz	10kHz	12.5kHz	12.5kHz	12.5kHz	12.5kHz	25kHz

Table 1

UX-R91E - this receiver unit has all the functions of a normal car radio and more, as it covers medium wave from 520kHz to 1630kHz with selectable step rates of either 10 or 1kHz. The v.h.f. broadcast band of 76-108MHz is also fully covered in 10/1kHz steps. This covers the frequencies used by some East European countries as well as our own domestic coverage of both national and local stations. The frequency of reception and also the stereo balance may be set from the IC-901E. Scanning rate in this band is 100kHz or 10kHz. From 108 to 137MHz, the air band is also covered using the a.m. mode of reception. From here the reception mode changes back to f.m. and continues up to 236MHz which encloses both the amateur and v.h.f. marine frequencies, not to mention the various small bands set aside for such things as radio microphones. The rest of the official v.h.f. band is missed out and reception, using f.m., begins again at 300MHz and ranges up to 950MHz with a gap between 500 and 800MHz. This unit has the coverage of a scanner and could possibly replace one, especially as the frequency and mode are, controlled from the front panel of the IC-901E.

UX-S92A/E is an s.s.b. or c.w. unit which extends the v.h.f band allowing multi-mode working on 144MHz and f.m. on u.h.f. The v.h.f. antenna is coupled through this unit and then to the antenna proper. A connection is available for the Morse key on the back panel of this unit. Two further interfaces are available to enable the main body of the IC-901 to be mounted remotely in the boot of the car, leaving only the control unit, microphone and front panel in the passenger area of the vehicle. When this method of mounting is employed, the supplied interconnecting cable is no longer used, but is replaced with a fibre-optic link. This would give an excellent immunity to extraneous signals that could impinge upon a normal multi-way cable over this length. The booklet gives several suggestions for positioning the control unit remotely within this area of the car, including on the vanity mirror.

Also mentioned in the booklet are several other options, such as tone squelch for use in a selcall facility, which has an answer-back detect feature. This gives an indication that the other station is both operational and has received the call. As a further addition a d.m.t.f. (dual tone multi frequency) unit allows the use of the code squelch and pager functions. This paging function is not the same as the national system of paging, but is a beep tone to alert you to a call which has the sub-audio tone present. This may be turned off by the user. By using this facility one person may call either a group or a single person on a common channel, without others being aware of the traffic going on at the time. **PW**

Summary

I found the IC-901 an unusual and excellent little transceiver, ideal for cross-band and duplex working. The rig is full of potential for the caravanning, camping, boating or motorcycling radio amateur. It really is versatile and I think the term 'mobile' does not do it justice.

The IC-901E is available from **Icom (UK) Ltd., Sea Street, Herne Bay, Kent CT6 8LD. Tel: (0227) 363859**. The basic transceiver costs £799.00, the UX-R91E costs £TBA and the UX-S92E costs £379.00. We would like to thank Icom for the loan of the review model.

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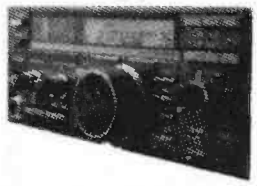

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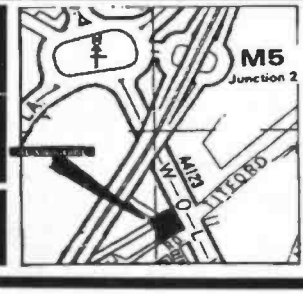

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Cable supplied **RA519**
Type **Discone 8+8**
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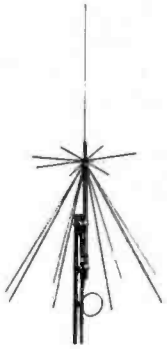
Weight **1 Kg**



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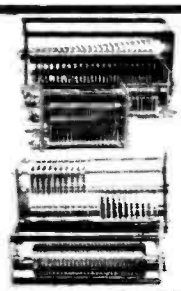

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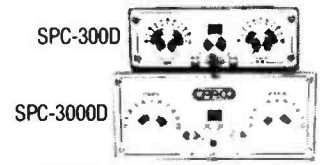

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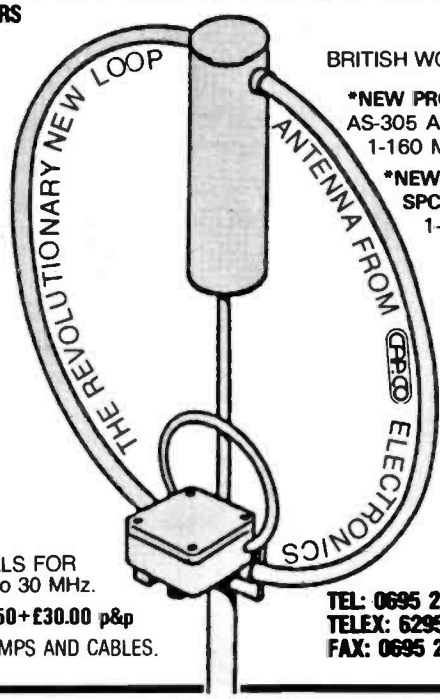

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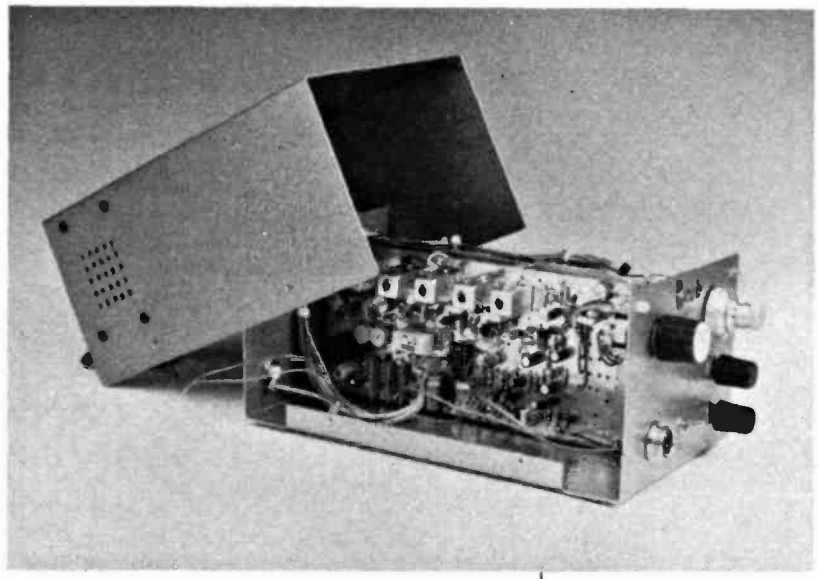
The PW Badger Cub

Construction

The *PW* Cub is a crystal controlled 144MHz f.m. transmitter which operates from a 12V supply and gives about 2W of r.f. output. It was originally designed to complement the *PW* Badger 144MHz receiver featured in the October 1988 *PW*. because of this, a 'netting' facility has been incorporated in the circuit of the Cub to enable easy tuning of the receiver. Also on the board is an antenna change over relay which can also be used to supply both power and antenna connections for the Badger.



Starting in this issue Mike Rowe G8JVE describes this addition to the PW Badger, turning it into an ideal low-cost rig for 144MHz f.m.

Block Diagram

Shown in Fig. 1.1 is the overall block diagram of the *PW* Cub. Use this in conjunction with the circuit diagram Fig. 1.2 and the following description. The crystal oscillator TR1 is a standard Colpitts oscillator running at just over 12MHz on standard fundamental frequencies. Trimming to exact frequency is achieved by adjustment of a series capacitor for each channel crystal. The output of this oscillator is phase modulated by the output of TR8, which follows a microphone amplifier and may also contain an audio tone burst for repeater access. The phase modulated signal is fed to a tuned buffer amplifier TR2, which is a BF244 f.e.t.

The following stages are frequency multipliers with TR3 being a tripler stage and TR4 and 5 are both doubler stages to the final frequency of 144MHz. The first two multiplier stages are f.e.t.s, to give less loading and so better *Q* of the tuned circuits. The second doubler, TR4 has a capacitive tap to reduce loading and to match the input impedance of the final bipolar doubler TR5. Capacitors C25 and 26 serve to both tune the doubler stage and match into the driver stage TR6, a BSX20 type transistor. This stage is fitted with a small heaksink as it dissipates some heat. Capacitors C28 and 29 tune this stage and match into the final p.a. transistor TR7, which is fitted with a substantial heatsink. This transistor is an r.f. power type MRF237 in a TO5 can.

The r.f. energy is tuned and filtered through a network comprising L7 through to C38 where it is applied to one set of contacts on relay RL1 and ultimately to the antenna. The other pair of contacts on RL1 are used to provide 12V power to either the Badger on receive, or the Cub on transmit. On receive, if the Net switch is pressed, then only the Cub's oscillator and multiplier stages are energised which the Badger may then be tuned into. As the microphone is not 'live' at the time of pressing the netting switch, no 'howl-round' shriek should occur even if the audio is turned to a high setting.

The audio stages are straight forward amplifiers with the microphone gain control (R17) feeding into TR10. Thus providing sufficient gain to give limiting action with diodes D2 and D3. Roll-off of the audio high frequencies is provided by C44 across the deviation control R23. Transistor TR9 provides post clipping gain to drive the phase modulator transistor and the network comprising of R28, 29. Capacitor C49 provides further low pass filtering. Overall maximum deviation is set by R23. In the prototype, over 5kHz of deviation was obtainable.

The tone burst amplifier uses a 4093 type c.m.o.s. NAND Schmitt trigger, with the first gate and associated components controlling the length of the toneburst. Refer now to the waveform and timing diagram, Fig. 1.3, along with the circuit.

On applying 12V to the circuitry, pin 2 of IC1a follows the charging curve of C54 via R32. At around half supply rail, the gate changes state and the output on pin 3 goes low once more. Gate IC1b has, during this period of a high level on pin 8, been oscillating with a frequency controlled by C55 and R33, and is set at 1750Hz later. These gated oscillations are allowed to reach R36 when the switch S2, connected to pin 13, is as shown. If Pin 13 is taken to the negative line, then this gate is inhibited and no tone oscillations are produced. Integrated circuit IC1d is, at present, not used and so both inputs are tied to negative.

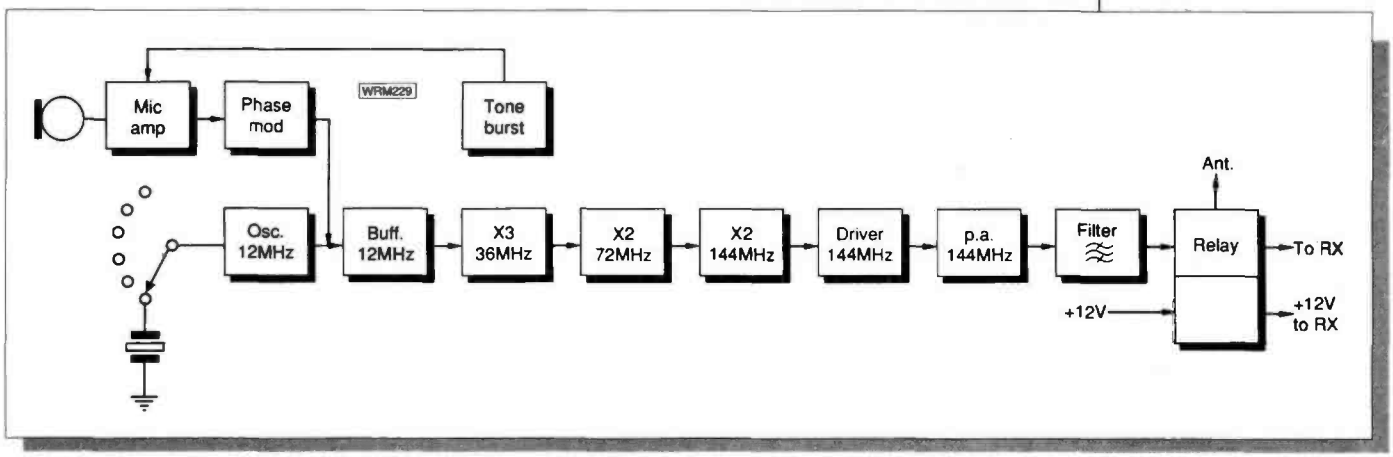


Fig 1.1: The overall block diagram of the *PW* Badger Cub.

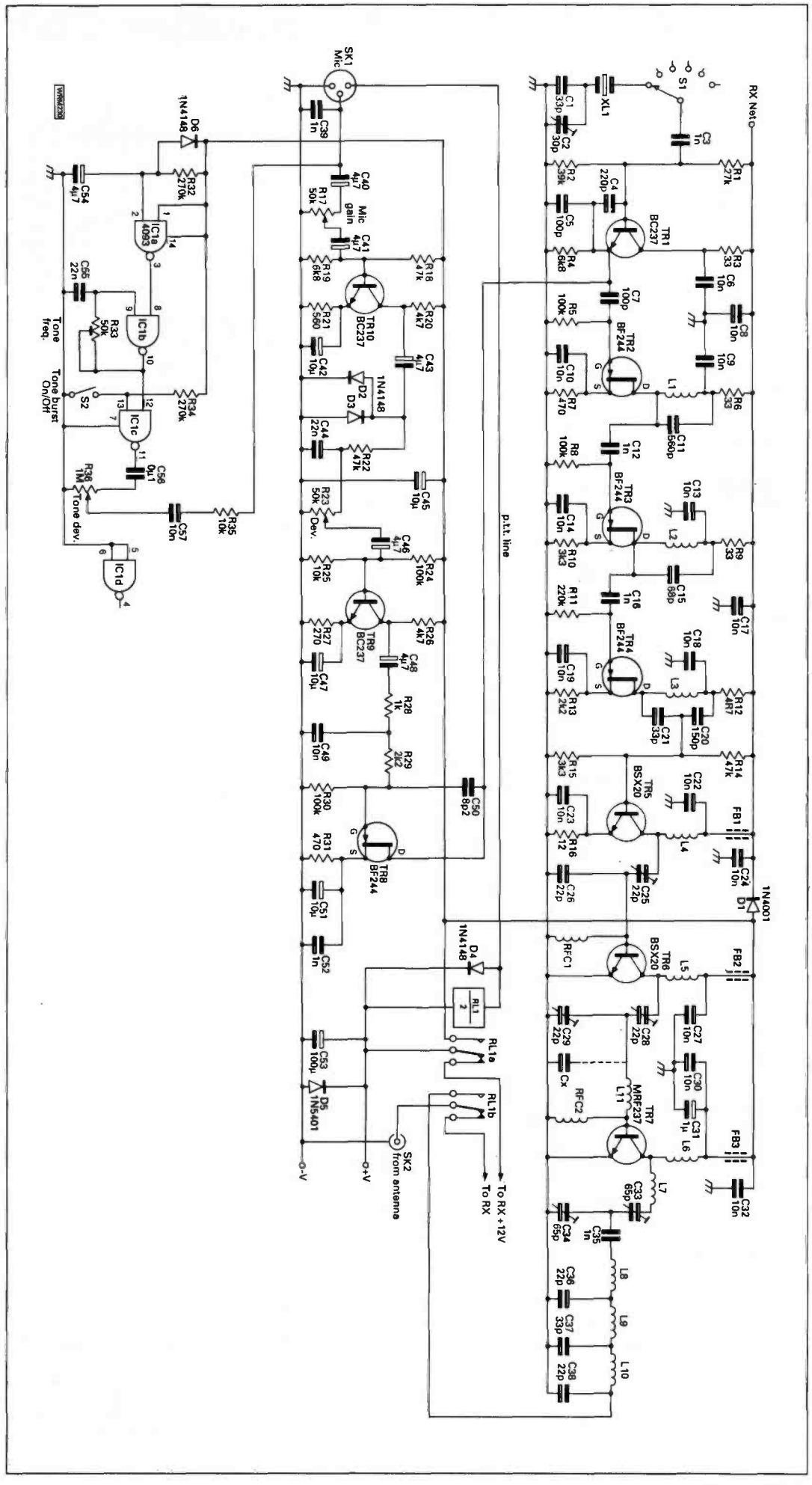


Fig. 1.2: The full circuit diagram of the PW Cub.Showing the three separate areas of the design. The top portion is the r.f. strip above the modulator stage, with the tone burst circuit based on IC1 below

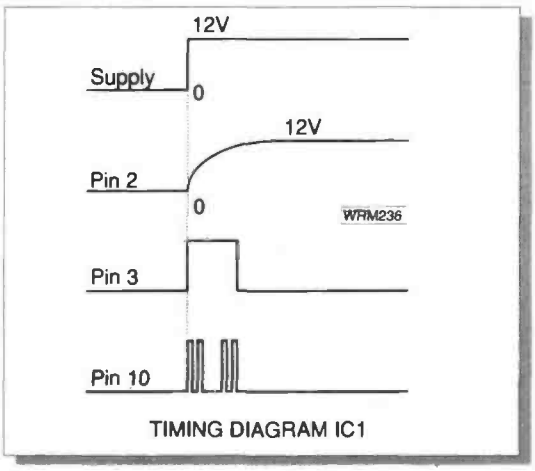
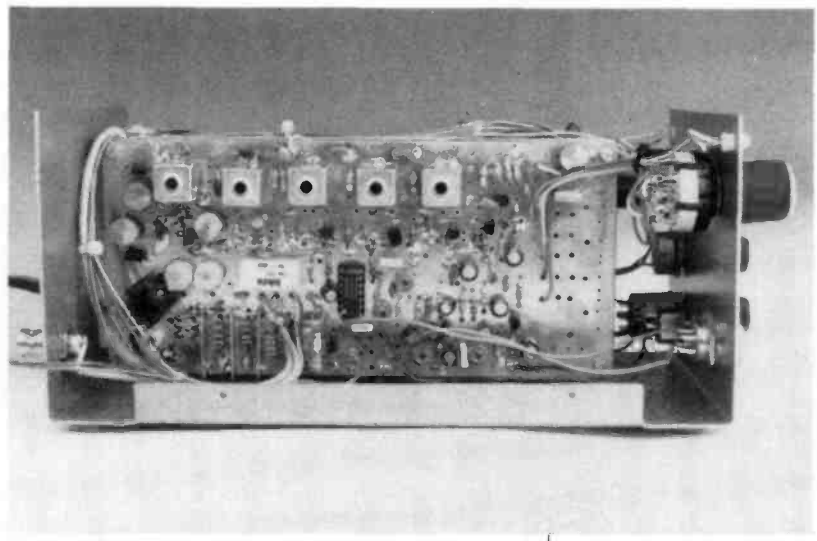


Fig. 1.3 . Waveforms to be found on some of the pins on IC1.



The *PW* Cub shown mounted in the Badger box. It may be seen that only one crystal has been fitted, although there is space for six. The screens are visible low down towards the left hand side of the board, separating the r.f. coils.

Shopping List

Resistors
0.25W 5% Carbon film

4.7Ω	1	R12
12Ω	1	R16
33Ω	3	R3,6,9
270Ω	1	R27
470Ω	2	R7,31
560Ω	1	R21
1.0kΩ	1	R28
2.2kΩ	2	R13,29
3.3kΩ	2	R10,15
4.7kΩ	2	R20,26
6.8kΩ	2	R4,19
10kΩ	2	R25,35
27kΩ	1	R1
39kΩ	1	R2
47kΩ	3	R14,18,22
100kΩ	4	R5,8,24,30
220kΩ	1	R11
270kΩ	2	R32,34

Variable 5mm Cermet p.c.b. mounting

50kΩ	3	R17,23,33
1MΩ	1	R36

Capacitors
Miniature Ceramic plate

8.2pF	1	C50
22pF	3	C26,36,38
33pF	3	C1,21,37
68pF	1	C15
100pF	2	C5,7
150pF	1	C20
220pF	1	C4
560pF	1	C11
1nF	6	C3,12,16,35,39,52
10nF	17	C6,8-10,13,14,17-19,22-24,27,30,32,49,57

Miniature Polyester

22nF	2	C44,55
0.1μF	1	C56

Min Electrolytic 16V radial leads

1μF	1	C31
4.7μF	6	C40,41,43,46,48,54
10μF	4	C42,45,47,51

Min Electrolytic 25V axial leads

100μF	1	C53

Trimmers film

2-22pF	3	C25,28,29
5-65pF	2	C33,34

Trimmer ceramic

5-30pF	1-6	C2 and similar for additional channels

Coil data
Coil types are of the Toko S18 type available from Bonex

Coil	Core	Colour
L1	Ferrite	White
L2	Ferrite	Violet
L3	Ferrite	Yellow
L4	None	Orange
L5	None	Yellow
L6	None	Blue

Other coil details

L7	3turns 24s.w.g. 5mm i.d.
L8	4turns 24s.w.g. 3mm i.d.
L9	4turns 24s.w.g. 3mm i.d.
L10	4turns 24s.w.g. 3mm i.d
L11	1turn 24s.w.g. 3mm i.d.

RFC1, 22 turns 26s.w.g. on FX1115 ferrite bead
FB Thread an FX1115 ferrite bead on a 22s.w.g. wire link

Semiconductors
Transistors

BC237	3	Tr1,9,10
BF244	4	TR2-4,8
BSX20	2	TR5,6
MRF237	1	TR7

Integrated Circuits

4093	1	IC1

Diodes

1N4001	1	D1
1N4148	4	D2-4,6
1N5401	1	D5

Miscellaneous
Crystal 12MHz range, S18 single screening cans; Relay Bonex Part No. 610067; s.p.s.t. Min toggle switch; Push to make switch; Heatsink for TR7; Ferrite beads FX1115 5 off; Veropins; 1-pole 6-way rotary switch; Min coaxial cable; Multi strand hook-up wire; Mounting pillars; p.c.b.

All components for the prototype were obtained from either Bonex or Maplin with the exception of the crystals which are avaliable from Golledge Electronics at £5.50 per channel or £30 inclusive of VAT and P&P, for a set of 6 channels of your choice. Ask for the *PW* Cub crystals and the channels or frequencies required.

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Have Trio communication receiver 9R-59DE and operating manual, would exchange for photographic equipment. S Barnes Tel: Brookwood Surrey 3678

Have 2 weeks holiday for two in my home in Greece.Would exchange for commercial Marine distress/safety frequencies watch receiver h.f. or v.h.f. Write for details to: Kromidakis Mikali, Skines Kydonias, Xania Kriti, Greece.

Have Sharp MZ80K computer with Epson Mx80F/T printer plus much software. Would exchange for a Packet TNC or 144MHz f.m. transceiver. M. Costello 3 Northern Avenue, Henlow Beds, or Tel: 0462 815533

Have NAD Electrostatic headphones with separate power unit, plus Maxcom 4E legal f.m. CB. Would exchange for a realistic DX100 receiver. Tel: Cranwell 61130

Have R206 receiver and or cash adjustment. Would exchange for FRT-7700 a.t.u., FRV-7700 v.h.f. converter and matching speaker. Keith Heselton, 3 Upavon Court, Penhill, Swindon, Wilts SN25HD

Have many types of valves. Would exchange for complete copy of *Wireless World Radio Valve Data 7th edition*. Also looking for comprehensive CV to civilian valve conversion book. R. Southall. Tel: Lincoln 20520.

Have f1300 lap-top computer MOD200 3 x 24K RAM, DS3.5in disk drive, lots of programs and disks, DMP105 fast printer and six ribbons, eight manuals, newsletters, bar-code wand, RS232 tester. A total working system. Only six months old, all boxed as new. Would exchange for v.h.f./u.h.f. hand-held or very good 430MHz hand-held plus cash adjustment, or 430MHz mobile with power, no cash. Tel: (0473) 85203.

Have Philips 4307 7in reel-to-reel tape recorder or Eddystone 640RX. Would exchange for Eddystone EA12 or 888A amateur only receiver. R.E. Kay G3NSW, 7 Lea Drive, Blackley, Manchester M9 2AL. Tel: 061-759 7084.

Have FDK Multi-700AX 144MHz 25W transceiver in good working order. Would exchange for base type scanner. A. Hopkins, 104 Everill Gate Lane, Broomhill, Wombwell, Barnsley, South Yorkshire S73 0YJ.

Have a Handie v.h.f. 144MHz American model covering 140 to 170MHz, battery pack and speaker mic. Would exchange for a video camera. Paul Daly. Tel: 01-961 6627.

Have Trio 144MHz f.m. hand-held transceiver. Would exchange for Drake RV-7 remote v.f.o. for use with Drake TR7 transceiver. Also have KW E-ZEE match and KW SWR meter for consideration. Stan G3XON. Tel: Guildford 36953.

Have Trio h.f. transceiver. Would exchange for 144MHz multi-mode or dual band mobile, w.h.y? Dave. Leave a message on GB7AAA for G1BGF.

Have Collins R361, 432MHz receiver, BC1000 (WS31), Commodore Pet computer, components from post WWII era, including tens of valves, coils on ceramic formers, HF transformers. Would exchange for any of TX12, a.t.u. matching TX12, B47, R216, Pye Westminster. P. Werba G7FXO. Tel: (0929) 4235805 evenings.

Have Data General DG-1 portable personal computer with full size l.c.d. screen, two 720K disk drives, internal NiCad pack, mains p.s.u., NiCad cgarger adn carrying case. Complete with MSDOS 3.21, IBM BASIC and various software. Would exchange for Yaesu FRG-9600 or similar v.h.f./u.h.f. receiver or a modern colour video camera/camcorder. Also have Genicom 3400 wide carriage line printer with serial interface and Digisolve CC2123 V21/23 Hayes-compatible Modem. Would exhcnage for FRG-7 or similar general coverage h.f. receiver. Mike Gathergood G4KFK, 24 New Road, Datchet, Slough, Berks SL3 9JB. Tel: (0753) 40520.

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KENWOOD

Every once in a while, something comes along which marks a true turning point in amateur radio equipment. Such was the case when Trio-Kenwood introduced the TS-120 series; the first of the small solid state HF transceivers to appear.

Following the trends of the last few years towards more "sophisticated" equipment (really meaning more and more complicated), we have seen Kenwood engineering directed more towards better performance, particularly in HF transceivers; performance which has become a standard of excellence for others to try and match.

The culmination of Kenwood design thinking is a new transceiver which I think is another turning point in HF equipment. This is the TS-140S, and I can tell you that reading the enthusiastic comments coming from happy owners, I can confidently say that the TS-140S is the "HF transceiver of the year."

The TS-140S continues the successful "1" series, which began with the TS-120S, developed into the TS-130S and has now reached what I consider to be that new direction in amateur radio equipment. In the TS-140S, Kenwood designers have given the user a receiver section with real performance which matches today's expectations, and remember that Kenwood have consistently set the standards for many years.

It is almost impossible for any manufacturer to give every potential customer everything that the customer wants, but there is little doubt that many people have been asking for "simplicity". However, it is also possible to carry the "simplicity" concept too far, resulting in a transceiver which is certainly low priced but lacks facilities which many users see as essential. I happen to believe that Kenwood have achieved the right balance in the TS-140S.

In my opinion, the TS-140S in combining performance with simplicity at an attractive cost is giving real satisfaction to the radio amateur who wants to enjoy his hobby of communicating, rather than counting the buttons on the front panel.

73.
John Wilson
G3PCY/5N2AAC

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It is fashionable in some quarters to sneer at the microprocessor, but Kenwood write the software in their processors with the aim of giving the user complete control over a wide range of facilities and not confusing the issue. In this respect, the TS-790E adds a new dimension to VHF operating, with its dual (triple) band monitoring, cross band operation, full duplex facilities, and a wide range of features to make life easy for the operator.

John Wilson
G3PCY/5N2AAC

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AX 700E

AT LAST – a scanner from Standard! For longer than I care to remember people have been asking why Standard do not make a scanner – well now they do. I now have 'English speaking' leaflets available which an s.a.e. will bring you post haste. You can see from the photograph that the AX 700E has maintained Standard's reputation for innovation. The strange looking liquid crystal display not only shows the frequency, mode and so on, it is also a panadaptor! For those of you who are new to scanning I had better explain what that is. The vertical line on the left hand side of the display is to show signal strength and the horizontal line along the bottom is the frequency range. This range can be set to 100, 250 or 1000kHz. The frequency displayed at the top is the frequency at the centre of the line. In other words, if the displayed frequency is 145.50MHz and the width of the display is set to 1000kHz, then the left hand side would be 145.00MHz and the right hand side would be 146.00MHz. Now comes the magic. Every time a signal comes up within that frequency range (i.e. 145-146MHz), it will show up as a spike on the display. The height will show the signal strength and the position will indicate the frequency. By simply turning the tuning knob a cursor can be slid along to line up with the new signal and its exact frequency will be displayed at the top of the screen! To receive the new signal, just press a button and that signal becomes the one that is heard and the display will shift to place it in the middle of the screen. The width of the spikes is governed by the setting of the step size (10, 12.5, 20 or 25kHz) so you can see that it is possible to monitor the activity on up to 100 channels simultaneously. If, for instance, you are looking for a specific signal but you only know the band that it is in and not the spot frequency, just set up the appropriate band edges and then sit back and watch the display. Any signals that then appear can be instantly spotted and tuned to in seconds. That's what a panadaptor can do for you!

As for the rest of the scanner, it covers 50 to 904.995MHz with AM and FM (wide & narrow), it is powered by 13.8V dc and it measures just 180mm W × 180mm D × 75mm H. There is a lot more to it but I can't decipher Japanese, but we should have some English leaflets by the time that you read this ad. and maybe even some radios, so come into the shop and see for yourself. You can even play with our new active antenna which should be ideal for use with this set.

Norman G4THJ

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C5200

This new generation dual band mobile transceiver is virtually two radios in one box. 70cms and 2m each have their own displays showing frequency, S-meter and so on. Both bands can be heard simultaneously through the built-in speaker or through one or two external speakers. Each band has its own Volume and Squelch controls and there is also an Automatic Mute control that can mute the audio from one band while the other is being received.

Full duplex is available (Tx/Rx either frequency) and the Rx frequency can be tuned while transmitting (45 Watts available on each band).

Each band has 4 different scan modes and 10 memories. Five step sizes are available and different ones can be set for each band, for instance 12.5kHz for 2m and 25kHz for 70cms.

The supplied microphone gives remote control of some of these functions and Tone Squelch and AQS units are available as optional extras.

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NORMAN G4THJ

A Collinear for 144MHz

Construction

Build your own Collinear Antenna for 144MHz. G4WUP shows you how in this short article

Collinear antennas offer advantages over the normal quarter or half wave antenna, but good all round coverage and increased gain over the smaller antennas are tempered by an increase in cost. With this in mind, I decided to develop a simple collinear that was also cheap to construct.

Loading coils and ground planes always seem to cause problems for the home constructor. To minimise these problems this antenna is based on the 'J pole' which requires only one loading coil and no earth plane. The overall construction is shown in Fig. 1. The antenna is made up of three main parts, each of which is made from aluminium tubing. The lower and upper pieces are a sliding fit into the main stem tube. These pieces are constructed from 1/4in tube with a sidewall thickness of 20s.w.g., whilst the main stem is made from 3/8in tube also with a sidewall thickness of 20s.w.g. These are obtainable in 4m lengths from aluminium suppliers.

Construction

Starting with the loading coil, the assembly is constructed on a 75mm long piece of Type 66 nylon rod with a diameter of 16mm (Fig. 1 shows the cutting and drilling dimensions). If making your own pieces, then a 7mm drill normally gives a clearance hole suitable for the 1/4in required for the top section, and a 10mm drill should prove adequate for the other hole. The recommended self tapping screws will penetrate both walls of the tubing. Using a file, flatten an area which will give better clamping to the coil when the time comes to make connections.

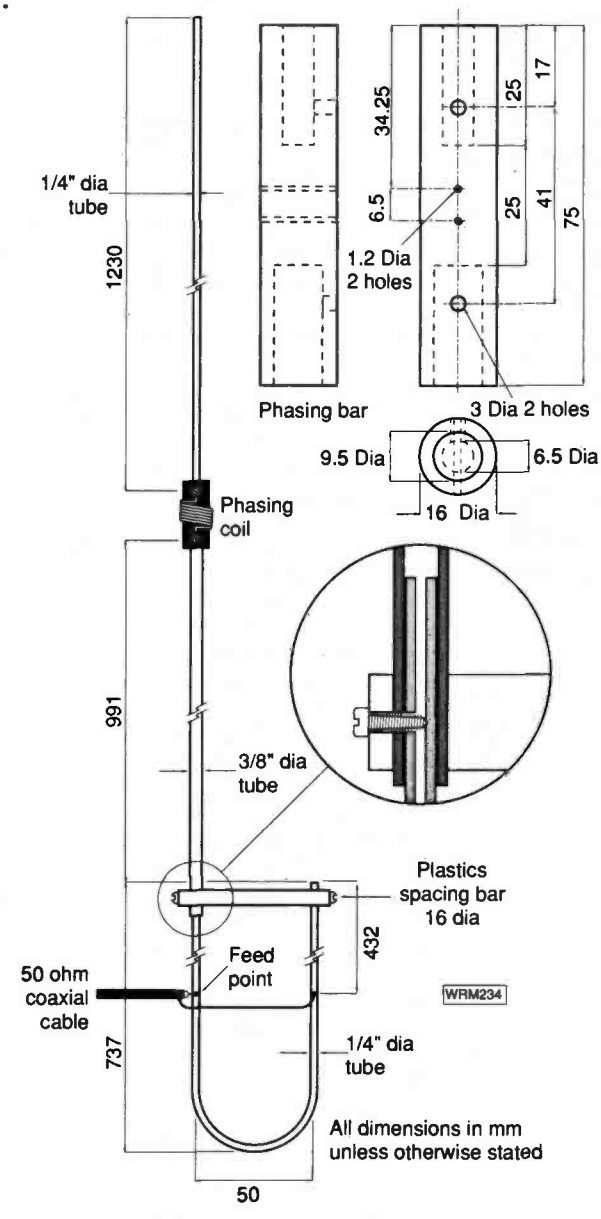
The coil itself is formed by winding 6 close spaced turns of 1mm enamel covered copper wire on the rod, leaving sufficiently long tails to make the connections later on. When completed the wire 'tails' should be pushed through the 1.2mm cross holes. Then, scrape off the enamelling where the connections are to be made.

Cut the top element to the correct length as this requires no other work, but the main stem should be cut some 16-20mm longer as shown in the enlarged view diagram. A 1.7m length piece of the 1/4in tube is used to form the feed section of the antenna. If available, a hard former of 45mm diameter will allow the bend to be made with more accuracy and ease. A point 780mm from one end of this piece, is to become the centre point of the curve. Finally cut the short leg to the correct length of 737mm as shown in Fig. 1. This gives two legs of uneven length, the longer one will be inside the main stem giving more strength at the spacing bar support point. The shape is correct when this piece lays flat afterwards. Assemble the three pieces together using Fig. 1 as a guide, and check the continuity between the feed point and the top section of the antenna. Any reading greater than about 0.1Ω should be corrected. The loading coil must now be made weather-proof by several coats of a good marine polyurethane varnish.

Setting-up

Support the antenna as high up as possible and in the open, make temporary connections of the coaxial cable with crocodile clips and check the v.s.w.r. using a frequency of 145.300MHz. It should possible to achieve a v.s.w.r. reading of 1.1:1 or lower at this frequency. **PW**

Fig.1.



The nylon parts shown in the diagram will be made available from *PW* at a cost of £10.95 inclusive of VAT, post and packing. Ask for the PW March '90 Collinear Spacers. Please allow 28 days for delivery.

Shopping List

1m 3/8in (with 20s.w.g. sidewall) tubing
1.23m 1/4in (with 20s.w.g. sidewall) tubing
1.7m 1/4in (with 20s.w.g. sidewall) tubing
160mm of 15mm diameter Type 66 Nylon rod
750mm of 1mm (20s.w.g.) enamelled copper wire
2 off No. 4 by 12mm panhead self tapping screws
2 off No. 6 by 12mm panhead self tapping screws
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(with a bit of theory thrown in)

How do we know when the antenna and network are resonant and presenting the correct value of resistance to the transmitter? Directional wattmeters or reflectometers are an answer, Ray Fautley G3ASG explains.

Let's start with a couple of questions.

(i) Why are directional wattmeters so-called?

(ii) What are they used for?

Directional wattmeters are so-called because, when connected between a source of power and a load, they are able to differentiate between power flowing in one direction - from source to load - which is the direction it is supposed to go; and power flowing in the opposite direction - reflected from load to source - which is the direction it is not supposed to go. In other words, directional wattmeters can indicate power flowing in different directions. They are also called 'reflectometers' as they are able to indicate reflected power, another term for the power flowing the 'wrong way' from load to source. They can be used:

(i) To measure power into a resistive load (in watts) (ii) To measure standing wave ratio (s.w.r.) existing on an antenna feeder (iii) To indicate when the power reflected back to a source (such as a transmitter) has been reduced to a minimum. If they can be used to measure power into a resistive load, then they can also be used to measure power into an antenna, provided that the antenna and feeder together may be represented by a particular value of pure resistance.

To illustrate this, look at Fig. 23.1. Assume that the transmitter requires a load of 50Ω and that the directional wattmeter has been calibrated to measure power correctly when connected to a resistive load of 50Ω. If these assumptions are correct, the only measurement we need to make is that of the voltage appearing across the 50Ω resistor (after the transmitter has been switched on!) to determine the power dissipated in the resistor. From $P = E^2/R$

If the measured voltage across the resistor is, say 50V r.m.s., the power in the resistor will be:

$$P = \frac{50^2}{50} = \frac{50 \times 50}{50} = 50W$$

So, all we really need is an r.f. voltmeter! Well, that's all right as long as the load is a pure resistance of 50Ω. What happens if it isn't? Well, the wattmeter will still only read the voltage across the load and if the load is complex with a reactive component, the reading on the wattmeter scale will be very far from indicating the true power in the resistive part.

Remember only resistance dissipates power and the voltage measured by the meter would be that appearing across the whole complex load, not just the voltage appearing across the resistive part. So, what's inside one of these reflectometers? The main components are shown in Fig. 23. 1. A brief description of operation in matched and un-matched conditions follows.

Matched Condition

When the output terminals are connected across a pure resistance, say 50Ω: (i) The r.f. voltage across C2 will be in phase with the line voltage at point X (ii) The r.f. current through T1 primary will be in phase with the line voltage. (iii) The r.f. voltage developed across R1 will be in phase or exactly 180° out of phase with the r.f. voltage across C2. depending on which way round T1 secondary is wired.

It should be connected so that the R1 voltage is 180° out of phase with C2 voltage, thus is the two r.f. voltages are made to be equal, the resultant reading on the r.f. voltmeter will be zero. That is, no reflected power.

Un-matched Condition

When the output terminals are connected to a complex impedance such as would appear if a random length of wire and an earth were to be connected to the output terminals. (i) The r.f. voltage across C2 would still be in phase with the line voltage at point X (ii) The r.f. current through T1 primary would not be in phase with the line voltage (iii) The r.f. voltage across R1 would change, both in phase and amplitude (iv) As the two voltages applied to the r.f. voltmeter, one from C2 and the other from R1, are neither exactly equal in amplitude nor exactly opposite in phase; the r.f. voltmeter will read, indicating a mis-match.

To enable the directional wattmeter to read forward power when connected to a pure 50Ω load, the connection to T1 secondary must be reversed by a switch, thus enabling the two voltages from C2

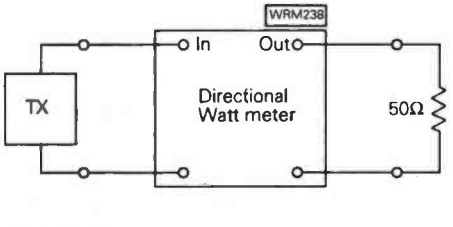

Fig. 23.1

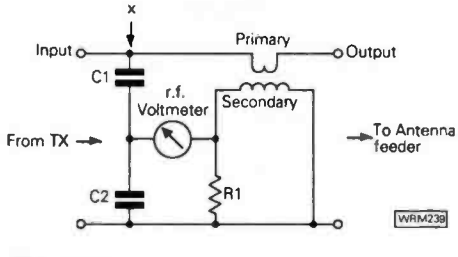

Fig. 23.2

and R1 to add together instead of subtracting. This forward reading on the meter can be calibrated in terms of power dissipated in 50Ω. So, what is the use of the directional wattmeter to the amateur trying to match his antenna to his transmitter? Since the meter is able to indicate reverse power, i.e. power reflected from the load back towards the transmitter;if there is any such reflected power one thing he does know is that he has not got a match! So given this as a starting point, where does he go from there? In fact, this is the most usual case, for unless the antenna itself has been designed and constructed to present an impedance which is purely resistive and equal numerically to the characteristic impedance of the feeder to which it's connected, (with the directional wattmeter also intended to be used at the same value of resistance) there will be some indication of the reflected power, that is a mis-match.

So, what can we do about this mis-match which will certainly appear as soon as we attempt to operate on a band for which the antenna was not designed? Let's assume that a simple random length wire is required to be used on as many h.f. amateur bands as possible. The only way to operate with the maximum efficiency possible over several bands is to ensure that at whatever the required frequency, the antenna presents a resistive 50Ω to the transmitter. This can be achieved, but not for nothing! The price is to use an antenna tuning unit (a.t.u.). This device is an impedance matching network covering the frequency range required, usually all h.f. bands except for 1.8MHz. Top band (1.8MHz or 160m) is often treated separately as it requires a very large inductor when matching a short length antenna. Another reason is that the low power level permitted on this band allows the use of smaller components with lower voltages and current ratings than are required for use on the other bands.

We dealt with impedance matching in Parts 20 to 22 of the series, so we have already got some clues for tackling the problem. In those articles, the way ahead could be ascertained if we knew what the actual impedance of the antenna was at the frequency we wanted to operate. Indeed, determining this antenna impedance either as a series or a parallel network is quite a difficult task, even if an impedance measuring bridge is available. The average amateur is not likely to have access to such a bridge, so what can he do? The answer is to design an a.t.u. which is capable of operation over as wide a range of frequencies and impedances as possible. Where do we start? What do we define as:

(i) a wide range of frequencies?

(ii) a wide range of impedances?

The range of frequencies is determined by the amateur bands to be convered, say 3.5 to 29.7MHz (80 to 10m bands). The range of impedances to be covered is much more difficult to assess. A realistic approach is to use variable components which have low minimum reactances and high maximum reactances. This is to enable the reactive part of the antenna impedance to be tuned out, and as this reactance may be either inductive or capacitive, variable inductors and capacitors having low minimum values and high maximum values are necessary.

A further problem is that as the resistive component of the antenna impedance may be higher or lower than that required by the transmitter (which is commonly 50Ω) and our a.t.u. must be capable of converting upwards or downwards. From the previous parts about impedance matching, it can be seen that the way the matching components are connected determines whether a step-up or step-down or resistance results. The theoretical problem of designing such an a.t.u. is very much greater than the practical problem of actually using it to resonate and match antenna systems to provide a 50Ω resistive load for the transmitter. It is the directional wattmeter which is the important piece of equipment, for all that is necessary is to vary the a.t.u. controls until the reflected power indicated is zero, whilst the forward power is maximum.

All the complicated impedance matching is then done for you without having to determine first the actual reactance and resistance of the antenna system for each different amateur band. To cover as many practical cases as possible, one of the requirements therefore is for the matching components to be connected in different ways to enable both upward and downward matching to be achieved. Possible ways of doing this will appear at some later date, as the design and operation of a.t.u.s is quite another story!

PW

A directional wattmeter is an important piece of equipment in the shack. Most of the work is done for you while you watch the dial as you adjust the a.t.u. controls.

Radio Diary

February 24: The Rainham Radio Rally will be held in the Parkwood Community Centre, Deanwood Drive, Rainham, Gillingham, Kent. Doors are open from 10.15am to 4pm (10am for disabled visitors). The usual traders will be there along with a Bring & Buy stall and refreshments. Talk-in GB4RRR on S22 and SU22. **Bob G0LKE. Tel: (0634) 362154**.

March 3: The Tyneside Amateur Radio Society Rally will be held at the North-Eastern Exhibition Centre at Gosforth Park Race Course (1 mile North of Newcastle upon Tyne). The usual trade stands, Morse tests and Bring & Buy, refreshments will all be there. There's ample free parking. Talk-in on S22 and SU8. **Terry G6VEG. Tel: 091-264 8196**.

***March 9-10**: There will be an amateur radio show at Picketts Lock Centre, Picketts Lock Lane, Edmonton, London N9. Details from: **London Amateur Radio Show, 126 Mount Pleasant Lane, Brickett Wood, Herts AL2 3XD**.

***March 18**: The Norbreck Amateur Radio, Electronics and Computing Exhibition organised by the Northern Amateur Radio Societies Association (NARSA) at the Norbreck Castle Exhibition Centre, Blackpool. **Peter Denton G6CGF. Tel: 051-630 5790**.

March 18: The Wythall Radio CLub will be holding their 5th annual radio rally at Wythall Park, Silver Street, Wythall, Worcestershire. That's on the A435 near junction 3 on the M42,

Continues over...

Radio Diary

south-west of Birmingham. Rally opens at 11am. There will be three halls plus a marquee, the usual trade stands, flea market, a large Bring & Buy, bar and snacks with talk-in on S22. Admission 50p. **Chris Pettitt G0EYO. Tel: 021-430 7267**.

March 18: The Tiverton Radio Clubs Mid Devon Rally will be held at the Pannier Market, Tiverton. There's ample free parking, food and drink available, club-room open all day. Talk-in on S22 with doors opening at 10am. **G4TSW, Mid Devon Rally, PO Box 3, Tiverton, Devon EX16 6RS**.

March 25: Dover (YMCA) ARC are holding their QRP Convention and table fair at Dover YMCA ARC, Dover. Doors open from 10.30am to 4.30pm. **G0BPS. Tel: (0303) 276171**.

March 25: The Cunninghame & District Amateur Radio Club will be holding their rally at the Magnum Centre, Irvine.

March 25: The Pontefract & DARS 11th Components Fair will take place in the Carleton Comunity Centre, Pontefract from 11am to 4.30pm. There will the usual stands, a bookstall, Bring & Buy and a licensed bar. Talk-in on S22. Admission free. **B. Atkinson. Tel: (0977) 704067**.

April 8: The 4th Launceston Radio Rally will be held in Launceston College. There will be the usual traders, Bring & Buy, hot snacks and a bar available. Doors open 10am with Talk-in on S22. **Maggie. Tel: (040921) 219**.

April 8: The Cambridgeshire Repeater Group Amateur Radio Rally will be held at the Philips Radio Communications - Catering Centre, St Andrews Road, Chesterton, Cambridge. Doors open 10.30am, auction items accepted from 9.30am. **G.M. Gardner G0HEM. Tel: (0799) 23689**.

April 8: The Swansea ARS are holding their 9th Amateur Radio Trade Rally in the Swansea Leisure Centre. This is situated on the A4067 Swansea-Mumbles coast road. There will be trade stands, catering facilities, a licensed bar, bookstand, Bring & Buy, etc. **Roger Williams GW4HSH. Tel: 0792 404422**.

April 15: The Centre of England Amateur Radio Rally will be held at the Motorcycle Museum, Bickenhill, near the NEC Birmingham. It's being held in three large exhibition halls and free ample parking. **Frank Martin G4UMF. Tel: (0952) 598173**.

***April 21-22**: The RSGB are holding their Convention and Exhibition at the NEC, Birmingham.

April 22: The Marske rally will be held in the Marske Leisure Centre, Marske by the sea. Doors open 10am. **Mr Phoenix G7CBR, 1 Conway Road, Redcar, Cleveland. Tel: (0642) 48005**.

April 29: The Bury Radio Society will be holding its annual Hamfeast at the Castle Leisure Centre, Bolton Street, Bury. Doors open at 11am (disabled at 10.30am). Talk-in on S22 and SU8. Catering facilities and a licensed bar are available as well as the giant Bring & Buy. **C. Marcroft G4JAG, Mosses Community Centre, Cecil Street, Bury**.

***May 13**: The VHF Convention will take place at Sandown Park Racecourse, Esher, Surrey.

***May 13**: The Yeovil Amateur Radio Club will be holding its 6th QRP Convention in the Preston Centre, Monks Dale, Yeovil. **D.J. Bailey G1MNM, 7 Thatcham Close, Yeovil, Somerset BA21 3BS**.

***May 20**: The 33rd Northern Mobile Rally will be held at the Great Yorkshire Show Ground, Harrogate. **Mike G0MKK. Tel: (0423) 564353/507653**.

May 20: The 7th National Amateur Radio Car Boot Sale will be held at the new venue of Stockwood Park, Luton. This is easier to get to (not far from junction 10 on the M1). Private sellers £7 in advance or £9 on the day, traders £20. **Clive G4ENB. Tel: Luton 27907**.

May 20: The Cambridge & District ARC are holding their 5th Annual Rally & Radio Car Boot Sale at Coleridge Community Centre, Radegund Road, Cambridge. Doors open at 10.30pm. **Brian G4TRO. Tel: (0223) 353664**.

May 27: The 14th Annual East Suffolk Wireless Revival will be held at the Civil Service Sportsground, Straight Road, Bucklesham, Ipswich. There will be a Bring & Buy, Car Boot Sale, a transceiver clinic, 50MHz demo station, all the usual traders and lots more including a children's play area. **Paul Whiting G4YQC. Tel: (0473) 642595**.

May 28: The 1990 Bircotes Radio Rally will be held near Bawtry, Doncaster. Doors open at 11am (10.30am for the disabled). Talk-in on S22. Details and or boking forms from: **Pat Smith, 23 Florence Avenue, Balby, Doncaster. Tel: (0302) 857526**.

***June 10**: The Royal Naval Amateur Radio Society Annual Mobile Rally will be held in the Sports Field, HMS Mercury, near Petersfield, Hants from 1000-1700.

***June 24**: The Annual Longleat Mobile Rally will be, as usual, held at Longleat near Warminster, Wilts. **Shaun O'Sullivan G8VPG. Tel: (0225) 873098**.

July 1: The York Radio Rally will be in the Tattersall Building, York Race Course, The Knavesmire, York. Doors open at 11am with an entrance fee of 50p (children admitted free). There is ample free parking. On show will be amateur radio, electronics and computing, arts and crafts, there's a grand Bring & Buy, Morse tests, lectures on various aspects of amateur radio, a raffle and talk-in on S22. A licensed bar and cafe will be available for refreshments. The Knavesmire is well signposted and there will additional RAC signs round the main approaches to York. **Frank Webb G3ZKS. Tel: (0904) 625798**.

July 1: Newport ARS are holding their 3rd Grand Surplus Equipment and Junk Sale at the Brynglas Community Education Centre, Brynglas Road, Newport. The Sale is open from 10.30am to 4pm (10am for the disabled). **Kevin GW7BSC. Tel: (0633) 262488**.

Lancastrian Rally. PW and the organisers of this event offer sincere apologies for any inconvenience caused by the premature advertising of the rally, which is planned for January 1991.

* *Practical Wireless* & *Short Wave Magazine* in attendance.

If you are organising a rally and would like it mentioned in *Practical Wireless*, then drop us a line, preferably as soon as you have fixed the date but no later than six weeks in advance (marking your envelope Rally Calendar) and we'll do the rest. Please make sure that you include all the essential details such as the venue, starting time, special features and a contact for further information.

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TS950SD	NEW Top of the range HF Transceiver complete with Digital Processing Unit, Auto ATU and filters.	3199.00	(–)
TS950S	NEW Top of the range HF Transceiver complete with Auto ATU but without other options	2499.00	(–)
TS940S	HF Transceiver with general coverage receiver	1995.00	(–)
AT940	Automatic ATU 160M–10M Ham bands. Fits inside TS940S	544.68	(5.00)
SP940	External speaker unit with switched filters	87.55	(5.00)
TS440S	HF Band Transceiver with general coverage receiver	1136.81	(–)
AT440	Internal automatic ATU for TS440S 80–10M Ham bands	144.82	(4.00)
PS50	Heavy Duty PSU for TS440S	222.48	(12.00)
TS140S	HF Transceiver 160–10M Ham bands with general coverage receiver	862.00	(–)
TS680S	HF Transceiver 160–10M plus 6M Ham bands with general coverage receiver	985.00	(–)
PS430	Mains PSU for TS140S or TS680S	173.78	(12.00)
SP430	Matching speaker for TS140S/680S	40.81	(5.00)
MB430	Mobile mounting bracket for TS140S/680S	15.80	(3.00)
AT230	All band ATU and power meter. General purpose ATU	208.87	(12.00)
TL922	160–10M 2KW HF linear. 3–500Z valves included	1495.00	(–)
LF30A	HF Low pass filter 1kW rating	32.26	(3.00)
YK88C	500 Hz CW filter for TS440S/TS530/TS830/R5000	49.08	(2.00)
YK88CN	270Hz CW filter for TS440S/TS530/TS830/R5000	54.64	(2.00)
YK88S	2.4kHz SSB filter for TS440S	47.40	(2.00)
YK88SN	1.8kHz SSB filter for TS440S/TS530S/R5000	46.74	(2.00)
MC50	Deluxe Dual impedence Desk microphone. 4 pin plug	48.08	(4.00)
MC60A	Deluxe Desk microphone with built-in pre amp	88.22	(4.00)
MC43S	Up/Down hand microphone for 8 pin rigs	22.22	(2.00)
HSMX2	Mobile microphone with control box	39.80	(4.00)
TS780E	NEW Dual Band all mode transceiver 2M/70cms with 1296MHz option	1495.00	(–)
TR751E	2M multimode mobile/fixed transceiver	599.00	(–)
TM231E	NEW Compact 2M mobile transceiver. 50/10/5W	289.00	(5.00)
TM431E	NEW Compact 70cm mobile transceiver. 35/10/5W	318.00	(5.00)
TM701E	NEW Compact 2M/70cm mobile transceiver. 25W	469.00	(5.00)
TH25E	2M FM compact handheld transceiver	238.00	(5.00)
TH45E	70cm FM compact handheld transceiver	269.00	(5.00)
TH-75E	NEW 2M/70cm handheld transceiver with dual watch display	399.00	(5.00)
HMC2	Headset/mic with VOX/PTT	34.25	(3.00)
SMC31	External speaker microphone	28.79	(2.00)
SMC32	Miniature speaker microphone with earphone socket	23.95	(2.00)
TH205E	2M handheld transceiver with LCD display	199.00	(5.00)
TH215E	2M handheld transceiver with keypad entry	228.00	(5.00)
TH405E	70cm handheld transceiver with LCD display	245.00	(5.00)
TH415E	70cm handheld transceiver with keypad entry	268.00	(5.00)
HS5	Deluxe headphones for all KENWOOD equipment	37.54	(4.00)
HS6	Ultra light deluxe headphones	24.36	(3.00)

Icom

			P&P
IC-781	All mode general coverage transceiver. 99 memories 150W. Includes internal ATU, PSU and CRT display.	4500.00	(–)
IC-765	All mode general coverage transceiver. 99 memories. 100W. Includes internal ATU and PSU	2499.00	(–)
IC-736	SSB, CW, FM, AM, RTTY general coverage transceiver. 32 memories, 100W	979.00	(–)
IC-726	Compact HF transceiver 160–10M with 6M Ham bands, plus general coverage receiver	989.00	(–)
IC-725	Compact HF transceiver 160–10M Ham bands with general coverage receiver. 26 memories, 100W	759.00	(–)
IC-575	Multimode 6M/10M Base station 10W.	1042.00	(–)
IC-575H	Multimode 6M/10M Base station 100W	1195.00	(–)
IC-2SE	FM Multifunction 2M handheld transceiver	275.00	(5.00)
IC-2SET	FM Multifunction 2M handheld transceiver. Keypad entry – DTMF	295.00	(5.00)
IC-2GE	FM 2M handportable 3/7W	265.00	(5.00)
IC-290D	2M Multimode mobile. 25W	550.80	(–)
IC-275E	2M Multimode Base station including PSU. 25W	1069.00	(–)
IC-275H	2M Multimode Base station excluding PSU. 100W	1039.86	(–)
IC-4SE	70cm FM Multifunction handheld transceiver	310.00	(5.00)
IC-4SET	70cm FM Multifunction handheld transceiver. Keypad entry – DTMF	P.O.A.	(5.00)
IC-480E	70cm Multimode mobile transceiver. 10W. (One Only Left)	559.00	(12.00)
IC-475E	70cm Multimode Base station including PSU. 25W	1185.00	(–)
IC-32E	2M/70cm FM handportable. 3/5W	399.00	(5.00)
IC-3210E	2M/70cm FM mobile transceiver. 25W	469.00	(12.00)
IC-24ET	2M/70cm FM handportable transceiver with Dual Watch Display – DTMF – Full Duplex	395.00	(5.00)

CW/RTTY Equipment

			P&P
BY1	Bencher Morse Key (Black)	67.45	(3.00)
BY2	Bencher Morse Key (Silver)	77.00	(3.00)
HK708	Straight Morse Key	21.85	(3.00)
HK702	Deluxe version of above on Marble Base	43.40	(3.00)
HK706	Straight Morse Key	23.25	(3.00)
HK705	Straight Morse Key	24.00	(3.00)
HK707	Straight Morse Key	22.25	(3.00)
MK704	Squeeze paddle	20.25	(3.00)
MK705	Squeeze paddle on Marble Base	32.20	(3.00)
Star Master Keyer. Electronic Keyer.		54.70	(4.00)
Star Memory Keyer. Electronic Keyer with Memories.		95.00	(4.00)
Datong	070 Morse Tutor	63.48	(3.00)
PK-232	All mode Terminal Unit. Packet, Amtor, RTTY, CW, ASCII, FAX, and NAVTEX. Works with any computer equipped with an RS232 interface (now with Mailbox)	319.95	(5.00)
AMT-2	All mode terminal unit. Amtor, RTTY, CW, ASCII. Works with Commodore 64, BBC-B etc	199.00	(4.00)
******Software to suit different computers available for the PK232 and AMT-2******			

Yaesu

			P&P
FT-1000	NEW Top of the range HF transceiver 160–10M Ham Bands with general coverage receiver. Modes CW, USB, LSB, AM, FM, RTTY and Packet. Fitted Auto ATU. 200W output	2995.00	(–)
FT-747GX	HF transceiver 160–10M Ham bands with general coverage receiver. 100W	659.00	(–)
FP700	Power supply for FT747/FT757. 20 amp	219.00	(12.00)
FP757HD	Heavy Duty Power supply (100pc duty cycle)	258.75	(12.00)
FT767GX	HF Transceiver 160–10M Ham bands with general coverage receiver	1598.00	(–)
50/767	6M module for FT767	179.00	(5.00)
144/767	2M module for FT767	179.00	(5.00)
430/767	70cm module for FT767	225.00	(5.00)
******ONE ONLY LEFT FT726/6M module******		249.00	(5.00)
FT411	2M FM handheld transceiver. Keypad entry. (Radio only)	225.00	(5.00)
FT811	70cm FM handheld transceiver. Keypad entry. (Radio only)	239.00	(5.00)
FT470	2M/70cm FM handheld transceiver with Dual watch display (Radio only)	389.00	(5.00)
FT290RMKII	2M Multimode transceiver, portable/mobile/fixed. 2.5W output	429.00	(12.00)
FT690RMKII	6M Multimode transceiver, portable/mobile/fixed. 2.5W output	429.00	(12.00)
FT736R	2M/70cm Multimode Base station	1359.00	(–)
FEX736/50	6M module for FT736R	239.00	(5.00)
FEX736/1.2	1.2GHz module for FT736R	425.00	(5.00)

Standard

			P&P
C150	2M handheld transceiver. Keypad entry. Extendable frequency range on Rx.	230.00	(5.00)
C500	2M/70cm handheld transceiver	359.00	(5.00)
C528	NEW 2M/70cm handheld transceiver with Dual Watch Display, up to 5W output, Tone squelch option.	379.00	(5.00)

Receivers

			P&P
Lowe HF225	NEW 30kHz–30MHz. AM/SSB/CW General coverage receiver	395.00	(12.00)
D225	Narrow Band FM and Synchronous AM detector for HF225	39.50	(2.00)
K225	Genie Pad. Keypad for direct frequency entry on the HF225	39.50	(2.00)
NRD525	Top of the range General coverage receiver 0.09–34MHz	1095.00	(–)
CMK165	Optional VHF/UHF converter for NRD525. 34–60, 114–174, 423–456MHz	391.35	(5.00)
R5000	HF General coverage receiver	875.00	(–)
VC20	Optional VHF converter for R5000 108–174MHz	167.21	(5.00)
R2000	HF general coverage receiver	595.00	(–)
VC10	Optional VHF converter for R2000 118–174MHz	161.94	(5.00)
RZ1	Wide Band scanning receiver 500kHz–950MHz	465.00	(5.00)
AR2002	VHF/UHF scanning receiver 25–550MHz, 800–1300MHz	487.30	(5.00)
AR800E	VHF/UHF Handheld scanning receiver. 75–105, 118–174, 406–495, 830–950MHz. AM/FM selectable.	169.00	(5.00)
AR900UK	VHF/UHF handheld scanning receiver. AM/FM selectable 100 memories. 108–136, 137–174, 220–280, 300–380, 406–470, 830–950MHz	199.00	(5.00)
LC800	Leatherette Case for AR800	2.95	(0.75)
LC900	Leatherette Case for AR900	3.55	(0.75)
WIN108	VHF Airband receiver. 108–136MHz	175.00	(5.00)
R535	Airband receiver. Covers VHF and UHF airband	249.00	(5.00)
R537S	VHF Airband handheld receiver, tunable 118–136MHz	69.55	(3.00)
FRG8800	HF general coverage receiver 0.15–30MHz. All modes	648.00	(–)
FRG9800	VHF/UHF scanning receiver 60–850MHz. All modes	509.00	(–)
FRV8800	VHF converter for FRG8800 118–175MHz	100.00	(5.00)
AX700E	VHF/UHF scanner 52–904MHz with built in Panoramic display	575.00	(–)
Jupiter II	VHF/UHF handheld scanner 25–550 & 800–1300MHz. AM/FM selectable	299.00	(5.00)
Icom IC-R1	NEW All band handheld scanning receiver. 150kHz–1300MHz. 100 memories. AM/FM selectable	399.00	(5.00)
IC-R100	NEW All band receiver. 500kHz–1800MHz. 121 memory channels. AM/FM selectable	489.00	(12.00)
IC-R72	NEW HF general coverage receiver. 100kHz–30MHz. 99 memory channels	599.00	(12.00)
IC-R71E	HF General coverage receiver. 0.1–30MHz. All mode, (FM optional). 32 memories	855.00	(–)
IC-R9000	HF/VHF/UHF scanning receiver. 100kHz–2000MHz. Has built in Spectrum Scope and 1000 memories	3995.00	(–)
IC-R7000	VHF/UHF Scanning receiver. 25–1000MHz & 1025–2000MHz. 99 memories	989.00	(–)
PRO-2005	VHF/UHF Scanning receiver. 400 memories. 25–520 & 760–1300MHz. AM/FM selectable	338.95	(5.00)
PRO-2022	VHF/UHF Scanning receiver. 200 memories. 68–88, 108–136(AM), 136.005–174, 380–512 & 60–960MHz.	239.95	(5.00)
PRO-2024	VHF/UHF Scanning receiver. 60 memories. 68–88, 118–136(AM), 138–174 & 380–512	179.95	(5.00)
PRO-57	VHF/UHF Scanning receiver. 10 memories. 68–88, 138–174 & 380–512MHz	119.95	(5.00)
PRO-34	VHF/UHF Handheld scanning receiver. 200 memories. 68–88, 108–136(AM), 138.005–174, 380–512 & 806–960MHz	249.95	(5.00)
20-006	Telescopic whip aerial with BNC connector. Extends portable scanner range. Nine sections centre loaded 25–1300MHz	6.99	(1.00)
270-1560	DC adapter. Power your portable scanner through your vehicles lighter socket. Reduces 12VDC to 3/4.5/6/9VDC at 300mA	11.99	(3.00)
AM/VHF	Aircraft Pocket Radio	14.95	(–)

Aerials & Accessories

			P&P
Revcone	Discone antenna. 50–550MHz coverage. Ideal for use with scanner	33.75	(5.00)
Royal 1300	Wide Band Discone antenna. 25–1300MHz	59.95	(5.00)
AH7000	Wide Band Discone antenna. 25–1300MHz, complete with 15M of Low loss coax	82.50	(5.00)
20-006	Telescopic whip aerial with BNC connector. Extends portable scanner range. Nine sections centre loaded 25–1300MHz	6.99	(1.00)
H89CV	2M 2 element beam. Ideal for lofts!	3.95	(4.00)
H89CV	70cm 2 element beam	3.95	(3.00)
H89CV	6M 2 element beam	12.95	(5.00)
Slim Jim	2M antenna	6.95	(4.00)
Halo	2M SSB antenna	5.95	(4.00)
G5RV	Full size 102' long. Covers 80–10M	10.95	(4.00)
G5RV	Half size 51' long. Covers 40–10M	14.95	(4.00)
Trap Dipole	80–10M Trap dipole kit. Length 110'	19.95	(4.00)
Trap Dipole	160–80M Trap dipole kit. Length 230'	27.95	(5.00)
Baluns	1:1 Ratio. 500W	12.95	(2.50)
Baluns	4:1 Ratio. 500W	12.95	(2.50)
Traps	40M traps – 7.1MHz. 500W	9.50	(3.00)
Traps	80M traps – 3.7MHz. 500W	9.50	(3.00)
Copper wire	50M reels of copper wire	7.95	(3.00)
******Full range of Jaybeam and Tonna Aerials******			
78F	2M ¼ wave mobile antenna	24.50	(3.00)
2E	2M ¼ wave mobile antenna	14.95	(3.00)
727VM	2M/70cm mobile antenna	25.95	(3.00)
727VME	2M/70cm High gain mobile antenna	40.95	(3.00)
320E	2M ½ wave antenna. PL259 fitting	3.50	(2.00)
SAGMS	Mag mount. Large limpet mag mount with rubber skirt	20.50	(3.00)
HSTM8	Boot mount for any of the above aerials	15.45	(3.00)
SSB2	Hatch back mount for any of the above aerials	22.35	(3.00)
2106	Heavy duty Hatch Back mount for above aerials	27.27	(3.00)
GSS	Gutter mount	6.95	(1.50)
RG4M	4M lead with SO239 socket and PL259 to go with gutter mount	6.95	(1.50)
D24N	2M/70cm Duplexer	28.95	(3.00)
GF151	2M ON-GLASS ¼ wave mobile antenna	27.99	(4.00)
GF411	70cms ON-GLASS 3dB antenna	28.99	(4.00)
******Full range of G-Whip Aerials******			
Active	Antenna. Covers 0-40MHz. Comes complete with power supply and bracket	45.00	(5.00)
Global	SWL Antenna Tuner. Covers all bands from 100kHz–30MHz	69.00	(5.00)
CT1010	200W Fan cooled dummy load	69.00	(3.00)
Rex	2M Flexible ¼ wave antenna, BNC connector	11.00	(1.50)
DL80	20W continuous dummy load	11.00	(1.50)
FRT7700	SWL antenna tuner	59.00	(3.00)

Books & Maps

		P&P
Confidential Frequency List 1989 edition	7.95	(1.00)
The complete guide to VHF/UHF frequencies 25–2000MHz. 1989 ed	5.95	(1.00)
HF Oceanic Airband Communications	3.95	(0.75)
NEW VHF/UHF Airband frequency guide	5.95	(1.00)
World Radio and TV Handbook	17.95	(1.50)
Better Short Wave reception	5.30	(1.00)
HF Antennas for all Locations	7.25	(1.50)
Radio Amateurs Examination Manual	5.85	(1.50)
Morse Code for the Radio Amateur	3.25	(0.75)
Radio Communication Handbook. Vols. 1 & 2	13.85	(2.50)
Practical Wire Antennas (NEW for 1989)	8.25	(1.50)
How to Pass the RAE	3.80	(1.50)
Logbook	3.50	(1.00)
VHF/UHF Manual	10.98	(2.00)
Amateur Radio Operating Manual	6.85	(1.50)

Power Supplies & Linears

		P&P
DRAE 24 amp power supply	151.35	(12.00)
DRAE 12 amp power supply	104.71	(5.00)
DRAE 6 amp power supply	78.72	(5.00)
BNOS 12/20E 20 amp power supply	178.25	(12.00)
BNOS 12/10E 10 amp power supply	132.25	(5.00)
BNOS 12/5E 5 amp power supply	74.75	(5.00)
Daiwa PS30XM Heavy Duty power supply. 24 amps. Variable volt	128.50	(12.00)
BNOS LP144-3-50 2M 50 watt linear with preamp. 3W input	138.00	(5.00)
BNOS LP144-10-50 2M 50W linear with preamp. 10W input	138.00	(5.00)
BNOS LPM144-3-100 2M 100W linear with preamp. 3W input	235.00	(5.00)
BNOS LPM144-10-100 2M 100W linear with preamp. 10W input	205.00	(5.00)
BNOS LPM144-3-180 2M 180W linear with preamp. 3W input	355.00	(5.00)
BNOS LPM144-10-180 2M 180W linear with preamp. 10W input	355.00	(5.00)
BNOS LPM144-25-180 2M 180W linear with preamp. 25W input	305.00	(5.00)
BNOS LP50-3-50 6M 50W linear with preamp. 3W input	138.00	(5.00)
BNOS LP50-10-50 6M 50W linear with preamp. 10W input	138.00	(5.00)
BNOS LPM50-10-100 6M 100W linear with preamp. 10W input	235.00	(5.00)
BNOS LPM432-10-50 70cm 50W linear with preamp. 10W input	205.00	(5.00)

Satellite Receiving Equipment

		P&P
Cambridge TV Satellite receiving system. Stereo, 48 channel Remote control. (NEW Square Type Dish)	259.95	(12.00)
Slowscan 2 Weather satellite decoder and frame store. Also decodes FAX and Slow Scan Television pictures. With Colour generator.	715.00	(12.00)
Meteosat Receiver	270.25	(12.00)
Meteosat Preamp	92.00	(3.00)
Meteosat Dish, stand, and feedhorn	199.00	(12.00)
Computer Interface and Software for decoding Weather Satellite pictures, using the Commodore AMIGA A1000	289.00	(12.00)
WX237 Seven Channel Weather Satellite Receiver. VHF	275.00	(5.00)
2XY/137/C Crossed Two element aerial for Weather Satellite Receiving	43.12	(12.00)

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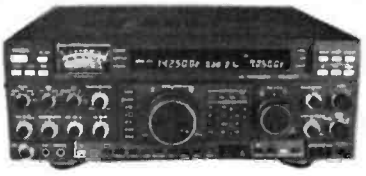
Telephone

58 High Street, Newport Pagnell, Bucks. MK16 8AQ. 0908 610625

NEW — NEW — NEW KENWOOD TS950S/SD

Available NOW this superb all band, all mode HF transceiver has too many features to mention, so send for details or come in and try one!
TS950SD = **£3199.00**
TS950S = **£2499.00**

NEW — NEW — NEW Yaesu FT-1000



Available NOW this NEW Top of the range all band, all mode HF Transceiver from Yaesu. Again too many functions to list, so please send for leaflet!
FT-1000 = **£2995.00**

Icom IC-725

Compact HF transceiver with General coverage receiver. 26 memories, 100 watts output. All band, all mode, (FM optional).
£759.00 FM unit = **£40.00**

NEW — NEW — NEW Standard C528

Available NOW the superb NEW C528 Dual Band handheld from Standard. This unit has dual watch facility and extended receive coverage 800 – 975MHz.

£379.00 P & P = £5.00

NEW — NEW — NEW Icom IC-24ET

Available NOW this super compact and lightweight Dual Band handheld has a host of features including Dual watch facility, Full duplex capability, 5W output to name but a few!

£385.00 P&P = **£5.00**

Kenwood TH-75E

This high quality Dual band handheld is excellent value for money. Not only does it have Dual watch facility and Full duplex capability, but it comes complete with nicad, charger and aerial.

Only **£398.00** P&P = **FREE**

ON-GLASS ANTENNAS

We have in stock the GF151 ½ wave VHF mobile aerial and the GF411 3dB gain UHF colinear. Both of these aerials perform exceptionally well and have a frequency coverage as follows: GF151 138–175MHz and the GF411 430–470MHz.
GF151 = **£27.99**
GF411 = **£28.99**
P&P **£4.00**

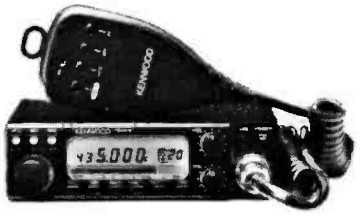
Kenwood TM231E

Compact 2M FM mobile transceiver. 50/10/5W.
Only **£289.00** P&P = **£5.00**

Kenwood TM431E

Compact 70cm FM mobile transceiver. 35/10/5W output.
Only **£318.00** P&P = **£5.00**

Kenwood TM701E



Compact 2M/70cm FM mobile transceiver. 25W on both bands. Full Duplex capability.
Only **£469.00** P&P = **£5.00**

Base/Mobile Scanners

NEW Icom IC-R100 HF/VHF/UHF scanner **£499.00**
PRO-2005 VHF/UHF scanner **£339.95**
Icom IC-R7000 All mode VHF/UHF scanner **£989.00**
Icom IC-R9000 All mode HF/VHF/UHF scanner **£3995.00**

NEW — NEW — NEW — NEW — NEW

AR-1000 Handheld Scanner

Basic Specification:—

Frequency Ranges: 15-600MHz and 805-1300MHz.
Frequency Selection: By direct keypad entry or by Tuning knob on top panel.
Memory Channels: 1000 arranged conveniently in Ten banks of 100, with direct keyboard access to any memory.
Search Bands: Ten Bands which come pre-loaded with the ten most important UK bands of interest. Note these frequencies are pre-loaded in the factory and any search band can be easily re-programmed by the user.
Reception Modes: AM, FM (narrow) and FM (wide) which gives access for the first time to FM broadcast and TV sound in a handheld scanner.
Frequency Steps: User programmable from 5 to 995kHz, in any multiple of 5kHz or 12.5kHz.
Scan Speed: 20 channels per second.
Search Speed: 40 channels per second.
Power Source: 4.8v rechargeable Nicad.

Please note that the battery pack is four separate 600mAH AA size cells which are provided, but the user can easily remove them and replace them by four standard AA pencils. Also and most importantly, the AR-1000 can be powered from any external DC supply of 13.8V nominal, which not only powers the receiver but also charges the Nicad batteries.

All the performance and features which we wanted from AOR are here in a stylish handheld package, measuring only 70 x 35 x 170mm and weighing a mere 300g (excluding batteries).

The AR-1000 comes complete with the following accessories:—

Set of 600mAH Nicad batteries
240V mains charger
DC power cord with cigar lighter plug
Soft carrying case
Belt clip
Carrying strap
Earpiece
High performance DA900 flexible gain antenna

AND NOW THE BIT YOU HAVE ALL BEEN WAITING FOR!!!!!

Price: £249.00 **P&P £4.00**

AUTHORISED AGENTS FOR KENWOOD, ICOM, YAESU & STANDARD. FULL SERVICE FACILITIES AVAILABLE

SPEND UP TO £1,200 INSTANTLY WITH A PHOTO ACOUSTICS LTD, CREDIT CHARGE CARD — APPLY FOR DETAILS
PART EXCHANGE WELCOME, ASK FOR KERRY G6IZF OR ANDY G4YOW
RETAIL SHOWROOM OPEN MONDAY–FRIDAY 9.30–5.30, Saturday 9.30–4.30

Goods normally despatched with 24 hours. Please allow 7 banking days for cheque clearance. Prices correct at time of going to press — E&OE

PHOTO ACOUSTICS

Ten SpOt

The Autumn DX season of 1989 produced examples of just about every type of propagation on the 28MHz band, John Petters G3YPZ gives us a few details

As expected normal F2 contacts from the UK to Asia, Australia and the Pacific have been commonplace, with QRP achieving quite remarkable distances.

At G3YPZ, a limit of 10 watts s.s.b. brought daily QSOs with Stateside, JA, USSR, etc., but some interesting ones were HI8, A61, ZP5, CX2, V31, FH8, CO2, VU2, etc., all worked with a 5λ/8 groundplane at 6m from the flat Fenlands of North Cambridgeshire. ZL4OD was also netted from the mobile installation on November 6.

Whilst on the subject of ZL, it is worth checking the band for long path openings during our evening times - a freak c.w. QSO with ZL2GG occured on November 8 at 2246 - he was the only signal on the band - so even if you think that the band is dead - it may not be.

The current mobile antenna used is the converted DV27 ex-CB whip. This is an efficient and cost-effective antenna. It is a shortened and helically loaded 1λ/4 wave with an adjustable screw in section at the top.

With the section fully out, the antenna tunes with 1:1 v.s.w.r. on 29.60MHz and with the top section adjusted for the lowest v.s.w.r. it will tune anywhere in the band.

Aurora

A number of auroral events have taken place over the past few months. One notable example being on Friday November 17. The tell-tale signs were all there - DX stations developing a very rapid flutter and Stateside disappearing in favour of fairly uneven signal from the Southern Hemisphere, then no DX at all and the characterisitc rough distorted Scandinavian and 'G' stations.

The opening lasted at least until 2230 when activity seemed to die out. Contacts with G3LAZ Luton, Beds; G4SKX Stockton; G0DBE (5 watts) Liverpool and GM4WKA Elgin were made from Cambridgeshire. An ususual QSO took place between G3YPZ, G3LAZ and UA3IGP who reported auroral flutter on both 'G' signals. This was at 1815 - long after normal F layer propagation had died out to the USSR.

Please let me know about your auroral experiences!

During the exceptionally good tropo openings on 144MHz during late November, there was little evidence of anything of a similar nature on 28MHz. A strange Sporadic-E opening did, however, occur on November 27 when the band - well open to the USA - suddenly produced extremely short skip European, followed by even shorter skip inter 'G' and then again Southern Europe.

At 1730 on 29.060MHz I worked DL9EBO on 2-way a.m., with S9 signals. A few minutes later K2UTC was worked on s.s.b. By 1850 Stateside had gone and DH2VM was worked with S9 signals that soon faded away into the noise - typical Sporadic-E. At the same time a few Caribbean and South American stations were copyable.

At 1950 on 29.600MHz f.m. G4TRU called into a local contact, again with S9 plus signals from Exeter, Devon, well over 320km away. Andy was running 50 watts with 1λ/2 horizontally polarised dipole, G0LGF (Norwich) and G4NEY/M (Cambridge) and G3YPZ were running verticals - polarisation is not critical with Sporadic-E or F layer propagation due to the signal path being twisted and turned.

Within 10 minutes G4TRU started to fade out and HB9CBG in Zurich was worked for over 20 minutes. The evening finished with an s.s.b. QSO with I2RR at 2039 who was 20dB over S9. Incidentally, many of the European beacons were audible throughout the evening.

Were other *PW* readers active on the band on November? Let me know what you heard or worked.

Fancy VK6 on FM?

Graham Rogers VK6RO at Perth, Western Australia is around and looking for Europe most mornings on 29.600 or 29.510MHz QRM permitting. I first worked Graham back in the last cycle when his signal could be heard reliably most days. I was delighted to renew the acquaintance again on October 26. Contact was established at 1250UTC and completed at 1309 during which time VK6RO was varying from S2 to S9 plus.

A power reduction from 100 watts down to 1 watt was tried at Graham's end with 1 watt just detectable and 10 watts workable. Graham managed to read my 4 watts from the Icom 1050. Graham's set-up consists of a TS-440S into a 3-element Yagi.

Since the last cycle, VK6RO has worked the folowing prefixes - all on 29MHz f.m.

A4, A9, BV, BY, CT, DL, DU, EA, EA6, EA8, F, FK, FR, FT8Z, G, GD, GI, GJ, GM, GW, HA, HB, HL, I, JA, JD1, W, KH2, KH6, KH0, KL7, LA, LX, LZ, OD, OE, OH, ON, OZ, P2, PA, S7, SM ,SP, SV, TA, TL, UA, UI8, UL, UO, V8, VK9X, VK9Y, VQ9, VS6, VU, YO, YU, ZC4, ZL, ZS, ZS2, 3B8, 3B9, 4S, 4X, 5B, 8Q, 9J (a.m.-f.m.), 9M2, 9V.

An impressive list and Graham must be congratulated for this outstanding achievement. Many amateurs would be delighted to work so many rare ones on s.s.b. let alone f.m.

If you are searching for long haul DX on f.m. be prepared to be patient, because the mode suffers very badly from phase distortion. At times the carrier can be fully quieting but the modulation unreadable. Surprisingly, a.m. suffers much less from this problem.

Talking of a.m., those who still have their old DX100, DX40, LG300, KW Vanguard rigs of yesteryear could find a whole new (or more accurately old) mode of operation. Look above 29.000MHz when the band is open to the States and delight in how amateur radio used to sound. Those that have multi-modes can join in the fun also, as well as the many that have old CB rigs from the illicit days - but be sure you get the right documentation from the DTI.

PW

Your comments and observations to:
G3YPZ, Rose Cottage,
Hannath Road,
Tydd Gote,
Wisbech,
Cambs PE13 5NA.

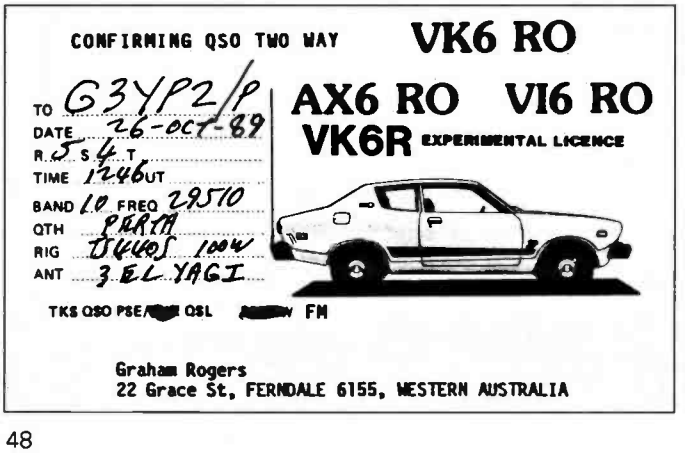


Fig. 1 Graham VK6RO's QSL card.

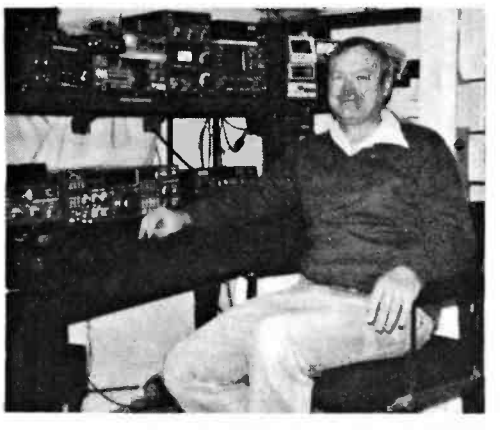


Fig. 2 Graham VK6RO

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Features front-panel socket for transistor and capacitor tests.
Low battery indicator, diode check function and continuity sounder.
Measures to 1000 VDC, 750 VAC, 10 amps AC/DC current, 20 megohms resistance.
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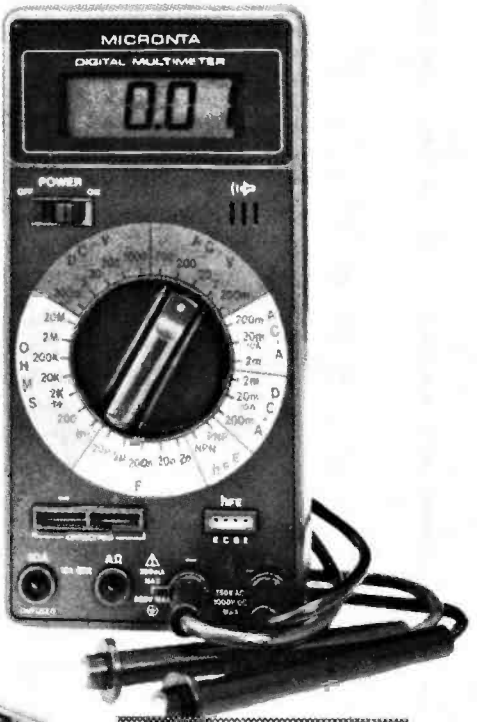

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Measures to 400 volts AC/DC and resistance in K-ohms up to 2 megohms.
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Tel: 0327 60178

"Thanks for the nice signal report, OM.
The station here is home-brew."

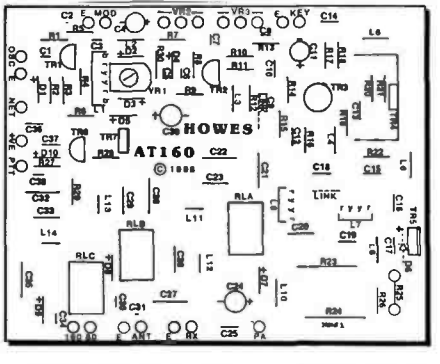
It's a great feeling to be able to say you built the equipment yourself, not to mention the enjoyment you gain from doing the construction. You can feel sorry for the guy, who spent over three grand on his new set, and isn't enjoying his radio as much as you are. Sure his set seems to have knobs for everything, but somewhere along the black box production line, they took the fun out. How many extra QSOs do you get with 1000 memories, and fifty less than essential functions?

May we suggest a rig that offers the challenge and pleasures of low power communication, combined with the fun of building it yourself?

SINGLE BAND CW TRANSMITTERS

These little rigs are simple to build, but offer a nice sounding CW note that you can be proud of. Key shaping and output filtering are provided, as is one crystal to get you on the air. RF output power is adjustable with an onboard control. Provision is made for connecting a VFO (HOWES CVF range) for full band coverage, and you can also add a DcRx Direct Conversion receiver for transceive operation if you wish.

CTX80	(80M 5W)	Kit: £13.80	Assembled PCB: £19.90
CTX40	(40M 3W)	Kit: £13.80	Assembled PCB: £19.90
MTX20	(20M 10W)	Kit: £22.90	Assembled PCB: £29.90
CVF VFO	(80, 40 or 20M)	Kit: £10.40	Assembled PCB: £16.90
50pF	Tuning capacitor to suit VFOs:		£1.50



Parts Location overlay on AT160 PCB

DUAL BAND AM/DSB/CW TRANSMITTER

The *HOWES AT160* transmitter is great for the 160M club net, local nattering on AM, and long distance working on CW. 10W PEP output is available on both 80 and 160M bands. Front panel controls are provided for output power and carrier level. Excellent modulation quality is provided by a low level balanced modulator, class A driver stages, and plenty of RF negative feedback. Full key shaping is provided. The transmitter is broadband with no tuned circuits to align. Harmonics are -40dB or better with relay switched output filters. One crystal (80M) is provided, as is PTT switching (including antenna relay).

Matching microphone amplifier and dual band VFO kits are available.

AT160	(Dual Band TX)	Kit: £34.90	Assembled PCB: £53.90
VF160	(Dual Band VFO)	Kit: £19.90	Assembled PCB: £34.20
MA4	(Mic Amp for TX)	Kit: £ 5.60	Assembled PCB: £ 9.90

DcRx DIRECT CONVERSION COMMUNICATIONS RECEIVERS

These receivers make a great introduction to amateur radio for the novice, besides being widely used by experienced QRP (low power) operators as part of a transceiver. Modes are SSB and CW, with up to 1W of audio output for 'speaker or 'phones. These are straightforward, single band receivers, and give amazingly good results. A "hardware" package to suit (case, dial, tuning caps, knobs, sockets etc) is available. There are versions for 20/30M, 40M and 80M amateur bands.

DcRx		Kit: £15.60	Assembled PCB: £21.50
DcRx	Hardware:		£15.50

DXR10 10, 12 & 15M COMMUNICATIONS RECEIVER

This three band receiver gives SSB and CW reception on the three highest frequency shortwave amateur bands. These are commonly known as "DX" bands, and you can hear stations from all over the World. You don't need a big antenna for these frequencies, and this set will give great results with a simple wire dipole (details in the kit instructions). Performance is excellent.

DXR10		Kit: £24.90	Assembled PCB: £36.90
DXR10	Hardware:		£14.00

ACCESSORY KITS

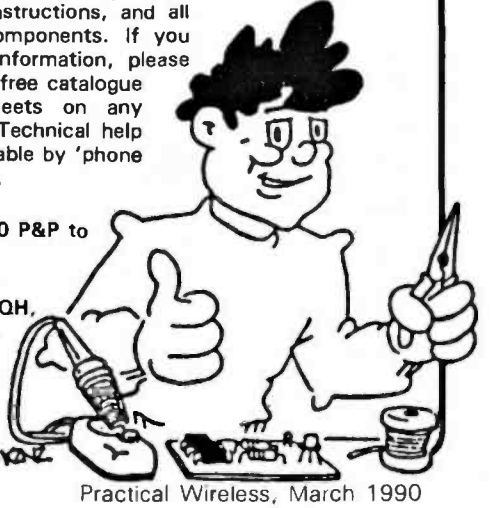
We have lots of add-on goodies to tempt you with. Could you fancy extra filters, or perhaps a digital frequency display? Need a good quality ATU?

CTU30	All HF Bands ATU 30W	Kit: £27.90	Assembled PCB: £33.90
CM2	Quality Mic with VOGAD	Kit: £11.90	Assembled PCB: £15.90
CSL4	SSB & CW Dual B/W Filter	Kit: £9.90	Assembled PCB: £15.90
DCS2	"S meter" for receiver	Kit: £7.90	Assembled PCB: £11.90
DFD5	Digital Counter/Display	Kit: £39.90	Assembled PCB: £59.90
SWB30	SWR/Power Indicator	Kit: £12.50	Assembled PCB: £17.30

All **HOWES** kits come with a good quality Printed Circuit Board, full clear instructions, and all board mounted components. If you would like more information, please send an SAE for a free catalogue or information sheets on any specific products. Technical help and Sales are available by 'phone during office hours.

PLEASE ADD £1.00 P&P to your order total.

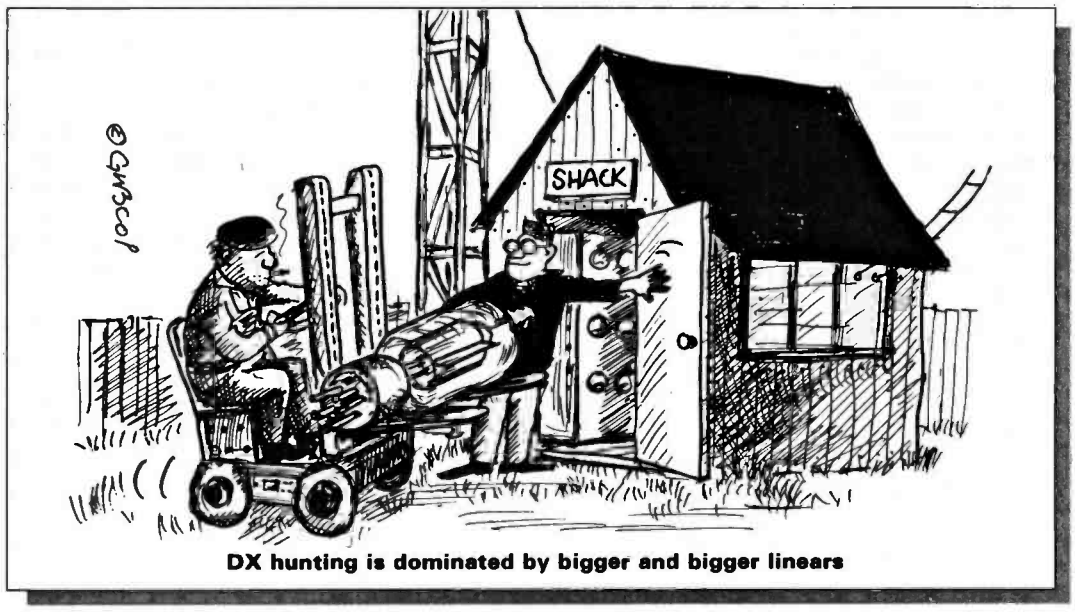
73 from Dave G4KQH, Technical Manager.



No Linear - No HF DX!

Feature

It seems to be a generally held belief (amongst the general public as well as amongst many amateurs) that amateur radio is an expensive hobby and that high power is the only way of getting through. Peter Barville G3XJS would like to dispel these myths once and for all.



DX hunting is dominated by bigger and bigger linears

It is not possible these days to work DX on the h.f. bands unless you are using high power. The pile-ups are too big and only the 'big boys' will get through. Therefore, the h.f. bands are only for those with a fat cheque book and it is a waste of time going on the bands with 100W and a dipole, let alone trying just 2 or 3W from a home-brew rig.

This is certainly a view I hear expressed quite frequently and I wonder if this is your view of h.f. operating? Tuning around the bands, particularly when there is some rare DX about, it is very easy to take one listen to the melee of stations and decide that this aspect of the hobby is not for you.

I became interested in h.f. DXing around 1979, during the last sun spot peak, and at the time was running a commercial transceiver, a 400W linear and a 3-element tri-bander. Over a period of 3 or 4 years I had a lot of fun, using s.s.b. and c.w. to work about 300 DXCC countries. However, in 1983 I sold the rig and antenna because I had become despondent with the h.f. DX scene - it was becoming increasingly dominated by bigger and bigger linears, each attempting to 'outgun' the opposition. I decided that this was not much fun and hardly my idea of amateur radio.

Opposite Directions

I chose to move in the opposite direction and try some low power operation. With my old (but excellent) Drake receiver I listened around 3.560MHz - the 80m QRP c.w. frequency - and was amazed to discover that I could hear stations from around the UK who were running flea power and yet conducting solid QSOs. Some were using power levels of one watt or less, yet I was hearing them with little or no difficulty - **I was hooked**. In a lot of cases, but certainly not all, the equipment being used was home-brew and, of course, it's true to say that QRP equipment lends itself very readily to home construction. For me, this was an added attraction as I have always enjoyed building equipment - even if some of the end results have not always been quite what I would have hoped for - hi!

In contrast to what I had left behind on the h.f. bands, it seemed to me that I had 're-discovered' amateur radio.

I built a couple of 3.5MHz band QRP rigs and spent a year or two working (and meeting) fellow enthusiasts. In the process I discovered just how popular the QRP movement is in the UK and across the world.

After a while, I began to realise that the number of countries I had worked with QRP on 3.5MHz was slowly increasing - GW, GM, ON, PA0, F, etc., and entirely by accident here I was chasing DX again! On the face of it, I was now doing it the hard way though, because my 3.5MHz band antenna was only a low trap dipole and I was using a maximum of 3W output. Yet, to my amazement, my QRP c.w. started to give me contacts into Asia, USA and Africa as well as across Europe. Because these results were so unexpected, the additional challenge of making the DX QSOs with such low power and relatively simple and cheap rigs, gave me tremendous satisfaction and enjoyment. Working DX with a commercial transceiver and linear was never as much fun as this!

I set myself a 'target' of 50 confirmed countries on 3.5MHz QRP c.w., but wondered whether it would prove possible. The last two or three proved hard work (they always do) but eventually that elusive 50th QSL arrived!

Build a Rig

By this time, I was keen to build myself a rig for the h.f. bands - not to get into the rat race of h.f. DXing again, but to try some low power around the bands and hopefully have some enjoyable QSOs. I chose to build the G3OGQ multi-band transceiver (*RadCom* 1983 and 1985) which is a fairly time consuming project, but one which has proved very successful for me. Although it is capable of running about 50W of c.w. and s.s.b., it was my hope that QRP c.w. operation with it on the h.f. bands would prove as rewarding as had my earlier 3.5MHz activity. To replace the 3-element Yagi that I had

sold, I put up a 2-element tri-bander - a DX32 at about 10m - which I thought ought to provide some reasonable contacts.

Now I could venture onto the h.f. bands with my massive 3W signal, I wondered what would be in store for me. I was, of course, very pleased when stations around Europe came back to me with good reports. Any surprise I felt with some of those reports, was far outweighed by the surprises and amazement expressed by stations I worked when they discovered my power level! Sure enough, I was making plenty of QSOs and soon discovered that it was possible to work some of the more exotic countries.

It wasn't long (surprise, surprise) before I began to enter one or two DX pile-ups. Of course, it was a bit 'tongue in cheek' as first - after all, how could I expect to compete with the competition, many of whom would undoubtedly be running anything up to a kilowatt. However, I soon discovered that I very often made the QSO despite the pile-up and realised that a respectable DXCC score could well be possible using QRP.

Even then, I don't think I expected my efforts to be as successful as they have subsequently proved to be. At the moment, the DXCC score stands at 213, with over 200 confirmed. In fact, at times I think it harder to obtain the QSL card from stations than it is to work them!

Therefore, these results surely indicate that the statements in my opening paragraph cannot be correct - it is certainly not necessary to use expensive high power h.f. equipment in order to work DX. It can be very easy to work even some very rare DX on c.w. with a comparatively modest station. I will agree that not everybody is able to put up an h.f. beam, but most will run considerably more power than me, and that will balance things out somewhat. I also agree that to work h.f. DX on s.s.b. will normally demand more than a 3W station, although I know there are plenty of QRP s.s.b. operators who enjoy their fair share of success. As a rule, however, your chances of working the DX will be much enhanced if you try that 'outdated' mode - c.w. In fact, it seems to have just about everything going for it, not only is it such an effective mode for working DX, but the rig can be fairly simple, home-built (if that's your cup of tea), and cheap.

An Asset

If you would like to fill your log with some juicy DX callsigns, there is one invaluable asset you can employ that is infinitely cheaper than a linear (and is probably more effective), and even cheaper than a c.w. rig. In fact, it is completely free!

That asset is simply the ability to listen. I believe that many operators miss out on DX more as a result of their apparent inability (or reluctance) to listen carefully, than any short-comings in the efficiency of their stations. The successful DXer spends more time listening than he does transmitting. He will winkle out the rare stations when they first appear on the band and make his QSO before the 'pack' descends, but if a pile-up has already developed then he will listen carefully to the DX station's operating procedures. He will ascertain when to call, and whether to call 'co-channel', or to call slightly off frequency - 'split frequency working'. This is the secret of success - particularly when trying to work c.w. DX. The received strength of your signal is of less importance than where and when you call, and this explains why QRP operators can and do enjoy so much success.

Of course, as with a lot of things in life, practice makes perfect. If c.w. is a mode you're not too proficient in, then a c.w. pile-up will be a little daunting at first. But don't despair because, apart from anything else, you will only need to exchange reports (usually 599) and won't have to worry about name, QTH, etc. Again, time spent listening (to other peoples QSOs) will help you become accustomed to the usual procedures and abbreviations.

Get used to making normal 'rag-chew' QSOs before entering the fray of a pile-up, because they tend to be handled at a comparatively high speed and you will need a basically sound c.w. ability in order to understand what is going on. Your first task of course, when coming across a pile-up, is to find and identify the DX station. You may well find stations calling across a spread of up to 5kHz (sometimes even more), and the DX will normally be at, or just below, the bottom edge of the mass of calling stations. Listen for the signal that is giving a callsign followed by a report (599 is normally abbreviated to 5nn) and then perhaps a 'QRZ'

It's often harder to obtain the QSL than to work them!

followed by another callsign and report. He may not announce his own callsign very often, and when he does he may add details of the QSL route before going on to take more calls.

Different DX stations adopt slightly different operating procedures, but they all fall into roughly the same pattern. For example, if I am calling in a pile-up, I will know I am being worked when I hear the DX send:"G3XJS 59". In the interests of brevity, he may well not send a "K" or "BK" at the end of his transmission. In reply, I would send something like: "QSL 599 599 G3XJS TU". The abbreviation "TU" means thank you. I could perhaps send: "TU 599 599 73 de G3XJS" instead. His acknowledgement may simply consist of : "TU", or perhaps "QSL QRZ" and that will complete the QSO. The others who have been waiting will start to call. Unless there is a query, perhaps over your callsign, it will be all over in a trice!

Before Calling

Before even calling the DX though, you will need to know exactly where to call. If you are lucky, and have been doing some diligent listening, you may have found him calling CQ, in which case you will need to call him on (or very close to) his own frequency. If however, there are already a number of stations calling, then you should listen carefully, find the stations he is working and establish whether they are on his frequency or slightly to one side. Normally, stations tend to spread out by moving h.f. of the DX, perhaps only 500Hz or so to start with, but increasing to a few kHz if the size of the pile-up increases. The DX will probably give some indication of his tuning intentions by sending: "UP" or "UP2" at the conclusion of a QSO. In this case, UP2 is not a prefix, but means 'I am listening 2kHz up from my transmit frequency'. So be guided by the DX, but find for yourself the stations as he works them, and call around their frequency - but ONLY when the previous QSO finishes! You will not be very popular if you call while he is still trying to complete a QSO, or is looking for calls from another part of the world (e.g. "USA only"). When you do transmit, send only your own callsign once or twice, do not sent the DX callsign as part of your transmission - it is obvious who you are calling!

Bear in mind that the DX will be using a narrow c.w. filter and if you can put your transmission in the centre of its passband, then the chances are very high that he will work YOU if the other stations are calling in the wrong place. The worst place to call if the DX is working 'split' is right on his frequency. Not only will you not get through, but you will be causing a great deal of QRM to others who may then miss a QSO themselves if you have prevented them from hearing the DX giving them their report. Such operating leads to 'self-appointed policemen' telling you to "UP" - hi.

Clearly, life is easier if you are using a transceiver with a remote v.f.o., but it is by no means essential. A great deal can be achieved just by careful use of an r.i.t., or x.i.t., control. Indeed, I have yet to get round to building myself a separate v.f.o.

You may decide that c.w. pile-ups are not for you, but don't give up too quickly. They take a little getting used to, and can be very productive (even for a modest station) in the search for DX. I have frequently been amazed when I have worked some very rare and sought after stations against a great deal of high power competition in large pile-ups. DX can be found and worked without joining a pile-up of course, but these days it is unusual for a rare country or station not to attract a lot of attention very quickly. Whether you go in for pile-ups or not, there is a great deal of satisfaction and fun to be had from making contacts with low power and I know that some of my QRP colleagues work DX with power levels of one watt or less.

Even is you're not too worried about working some of the rarer DX and you simply wish to have some enjoyable QSOs around the world, give it a try. Particularly now the h.f. band conditions are approaching their optimum, you don't need to spend a fortune to work the VKs and ZLs, etc. Remember, provided you are prepared to use the key, you won't need a linear - all you need is a pair of ears! **PW**

Practically Yours

Feature

In this issue Glen Ross G8MWR begins a series describing practical test equipment. This month we start with a function generator

To judge from the correspondence received it seems that there is good demand for constructional information and details on test equipment. Over the next few issues it is intended to provide constructional details for a wide range of such equipment such as simple signal generators, capacity bridges, power meters and so on.

Function Generator

Let us begin with the details for a wide range test oscillator. In the form described, the unit covers a range of 20 to 20000Hz, but this range could easily be extended to cover 0.001Hz to 1MHz. Over the design range the unit will provide simultaneous sine, square and triangular (or ramp) waveforms. An added bonus is that the duty cycle is variable over large range, so providing a means of producing narrow pulse outputs. This is achieved by using the square wave output and suitably adjusting the duty cycle. The waveforms produced are extremely clean and the third harmonic distortion (t.h.d.) on the sine wave output can be lower than 0.5%.

Circuit Description

The full circuit diagram is shown in Fig. 1 where it may be seen that a dedicated chip type 8083b takes care of the generator functions. The frequency range is covered by the combination of C2 and R2. To extend the range of the basic circuit C2 could be replaced by a series of switched inverse values of C2, (larger capacity lower frequency). Resistor R2 is mounted on the front panel and should ideally be equipped with a good quality epicyclic reduction drive to enable more accurate frequency setting. Alternatively a 10-turn potentiometer and turns counter could be used, as these may now be obtained at reasonable cost.

Wave Shaping

The duty cycle of the oscillator is controlled by R6 and this should also be front panel mounted. Only if the output is displayed on an oscilloscope will the full value of this control be appreciated. It is possible, by choosing a suitable waveform and adjusting this control, to generate practically any waveshape that

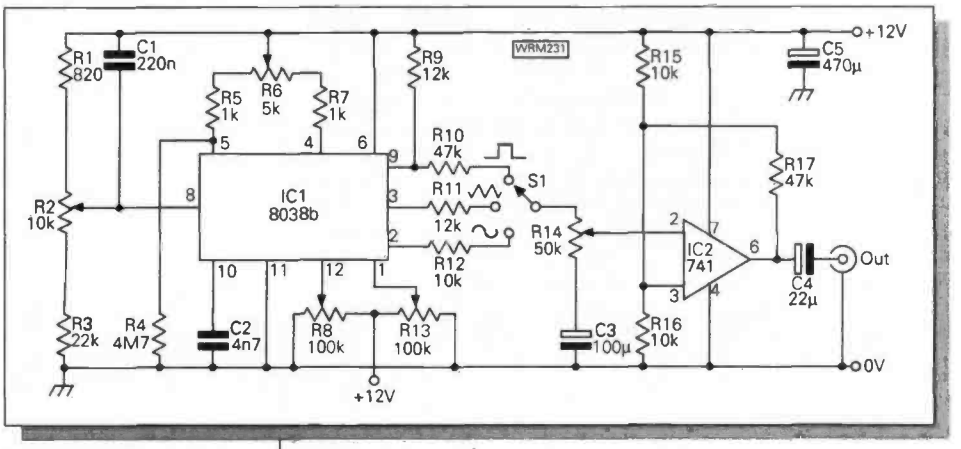


Fig. 1

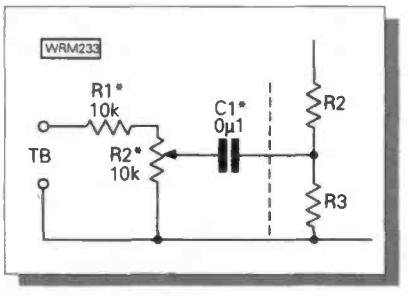


Fig. 2

you could reasonably require. The preset resistors R8 and R13, which are p.c.b. mounted, are used to minimise distortion on the sinusoidal output. If available a wave analyser should be used to set their optimum points, but more than adequate results may be obtained by observing the sinewave output on an oscilloscope while adjusting them. To do this simply, with the duty cycle set to 50%, adjust R8 and R13 for the most symmetrical output that can be obtained. Should an oscilloscope not be available, then dispensing with both of these presets all together may be the best idea. If this is the case then a fixed resistor of 82kΩ should be connected from pin 12 of IC1 to negative, and pin 1 should be left unconnected. Under these conditions the t.h.d. on the sinewave output will be around 2% or less, but still adequate for most purposes.

Outputs

The three outputs available at pins 2, 3 and 9 of IC1 have differing levels. The three combinations R9/10, R11 and R12 in conjunction with the input impedance of the buffer stage IC2 serve to give a similar output level for all three waveforms. Switch S1 selects the required waveform and the panel mounted R14 controls the output level available from pin 6 of IC2. This has been added to buffer the output of IC1 and ensure a constant output level into differing load impedances.

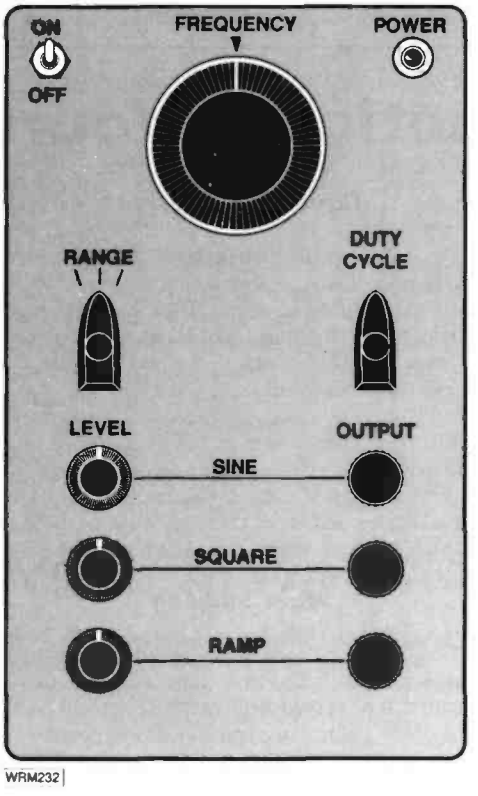


Fig. 3 Suggested layout for the front panel.

Multi-outputs

An alternative method is to make all three waveforms available simultaneously. If this is desired then S1 is dispensed with and each output is taken via its own level control to a buffer amplifier similar in all details to that of IC2 and the surrounding components. Adding this last option is highly recommended, considering the small cost of incorporating it. The unit has very modest power drain and will run on a power supply of between 10 and 30V, and a p.s.u. made up from components rescued from and old cassette recorder or radio would be adequate to power it.

Construction

There is nothing at all fussy about the construction of the unit which may be built on Veroboard. Should you intend extending the range covered towards the upper limits of 1MHz then a p.c.b. would be preferable and IC2 would require changing to a faster type. A die-cast metal box could be used to contain the project and Fig. 3 shows a suggested layout for the front panel. Since the unit was originally build I had a requirement for a swept signal output to assist with the filter alignment. It was that this was easily achieved using the circuit of Fig. 2. The timebase output of an oscilloscope is connected to the terminals marked TB, allowing R2*, which should be panel mounted, to control the frequency swing available. In use this system works best with timebase speeds of between 2 and 20ms per centimetre. **PW**

Component Shopping List

Resistors

0.125W 5% carbon film

820Ω	1	R1
1kΩ	2	R5,7
10kΩ	3	R12,15,16
22kΩ	1	R3
12kΩ	2	R9,11
47kΩ	2	R10,17
4.7MΩ	1	R4

Minitaure preset

100kΩ	2	R8,13

Rotary panel mounted

5kΩ	1	R6
10kΩ	1	R2
50kΩ	1	R14

Capacitors

Disc ceramic

4.7nF	1	C2
220nF	1	C1

Electrolytic 35V working

22µF	1	C4
100µF	1	C3
470µF	1	C5

Semiconductors

Integrated circuits

741	1	IC2
8038b	1	IC1

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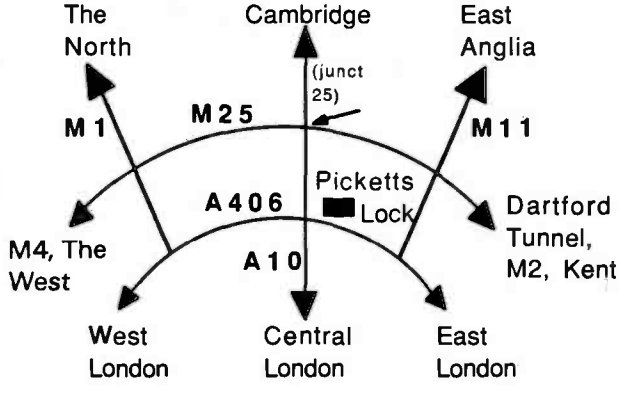

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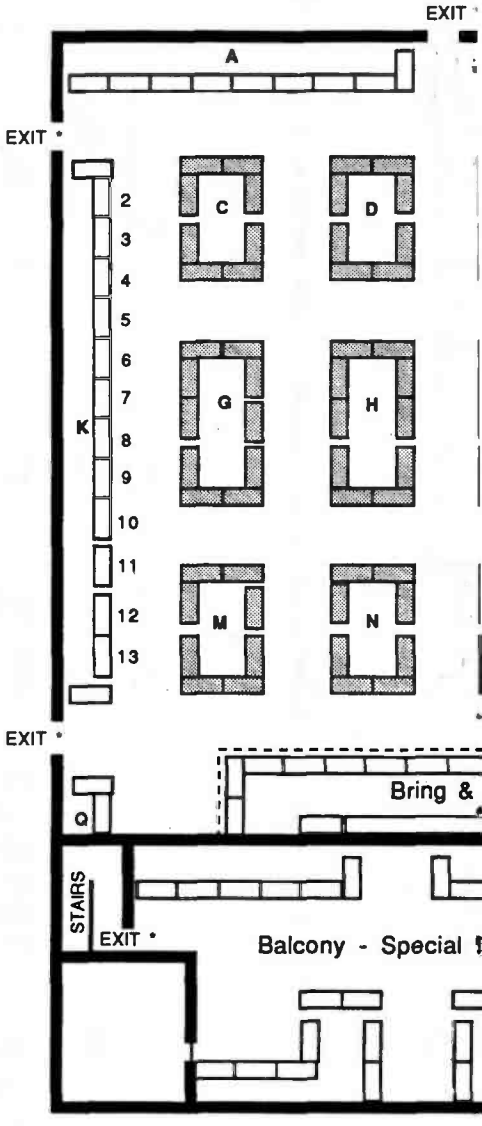

It has been several years since London hosted a full size radio show but happily that is about to change with the arrival of the London Amateur Radio Show at Picketts Lock. As you can see from the floorplan and list of exhibitors, most of your favourite dealers will be there and there are rumours of some exciting new radios being announced at this show.

The venue, in the Lea Valley Leisure Park, should make an ideal day out for all the family and while you're at the show we hope that you will stop by our stands (RA & RB) and tell us how you like the new look PW.

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io Show-Hall Layouts

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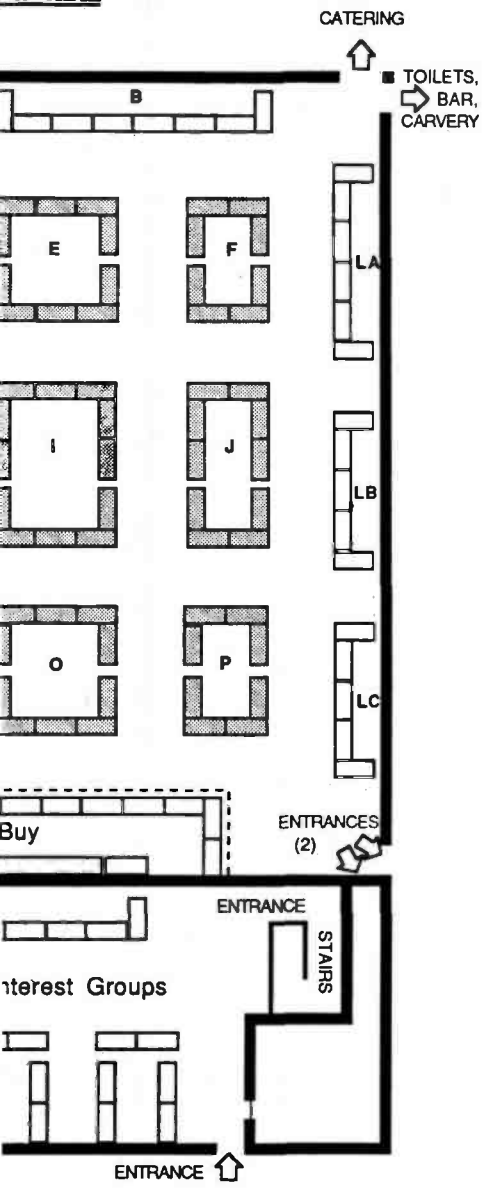
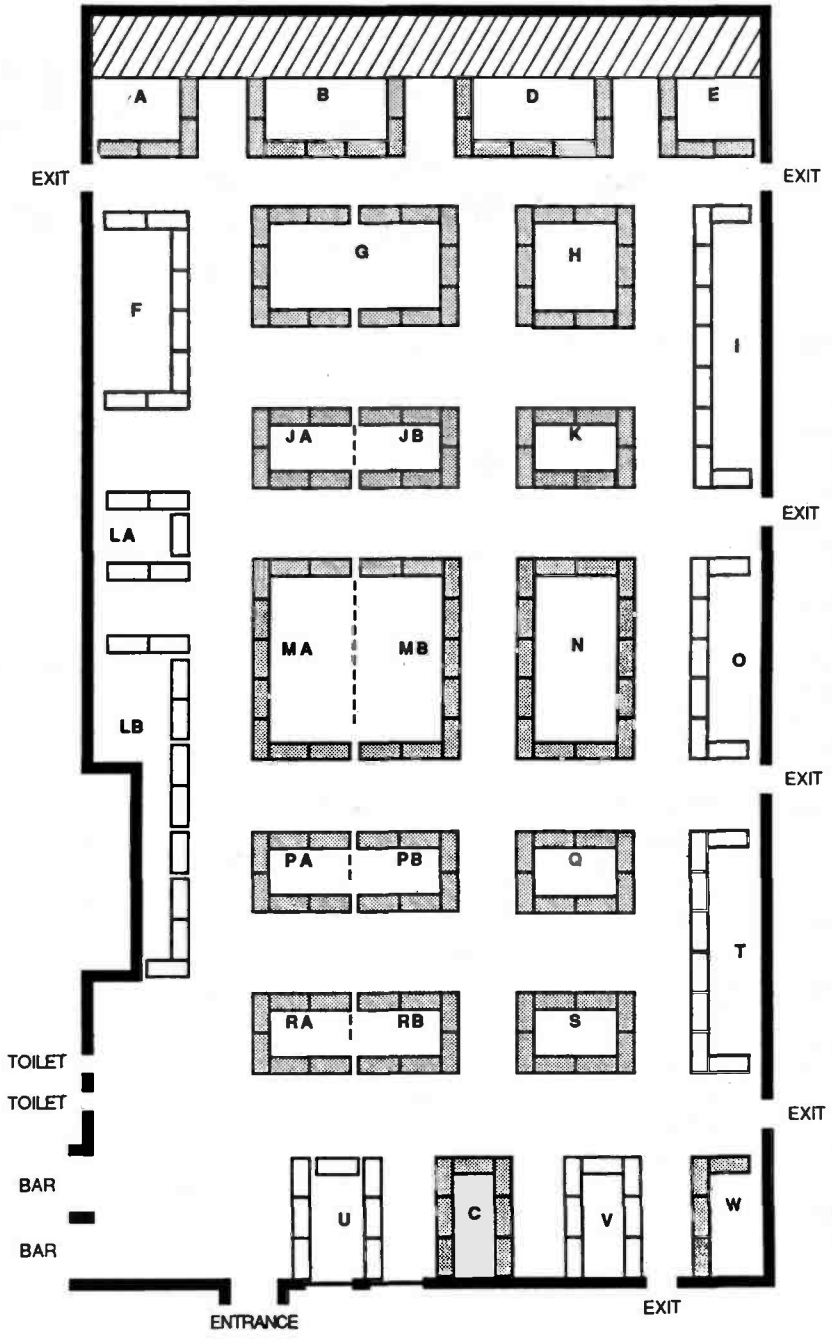


SOUTH HALL



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Index to Company names and Stand Locations for the

LONDON
AMATEUR RADIO SHOW

COMPANY NAME	LOCATED
A.J.P.	North — Balcony
A.R.E. Ltd.	South — MA & MB
A1 Electronics	North — G
Air Training Corps	North — Balcony
Amdat	South — W
Amsat — UK	North — Balcony
Andrews Computer Service	South — A
Arrow Electronics Ltd.	North — H
B.A.R.T.G.	North — Balcony
B.N.O.S. Electronics Ltd.	North — LA
Badger Boards	South — LA
Birkett J.	North — M
Bonex Ltd.	South — D
Capco Electronics Ltd.	South — PA
Cheshunt & District A.R.C.	South — LA
Commonside Hardware Serv	North — K
Compelec	South — LB
Dataphone Electronics	North — C
Dee Comm	North — F
Dewsbury Electronics	South — S
Display Electronics	South — G
Dressler Communications Ltd.	South — F
ECS Services	South — JA
Radio Bygones Magazine	North — Balcony
G4ZPY Paddle Keys	South — L
Garex (Startop Comms Ltd.)	North — J
Giacomelli	North — O
GQRP Club	North — F
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Kent R.A.	North — M
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Lee Electronics (Communique)	North — LB
Loutronics	North — E
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Receiver Sensitivity Signal and Noise

Feature

If it were possible to increase the amplification of a weak signal in total isolation we would have no problems. Unfortunately, as Gordon J. King IEng, AMIERE G4VFV points out, life isn't that simple.

If we could amplify just the wanted signal, then we would be able to read even the weakest of signals merely by adding more r.f. gain to the front-end of our receivers! Unfortunately, when we add gain, not only do we increase the background noise of the signal itself but we also tend to introduce extra noise resulting from the process of the amplification.

Let's look at the sort of signal we might wish to amplify. In Fig. 1a you can see a signal comprising a number of discrete frequency components (e.g. a modulated signal), rising from a relatively low noise floor. The signal to noise ratio (S/N) can be regarded as the amplitude difference between the noise floor and the signal peak. This 'distance' along the amplitude axis is commonly expressed as a dB ratio. In Fig. 1b you can see the same signal, but this time relative to a higher noise floor and hence with a smaller S/N.

In many cases the readability of a signal is determined by the S/N. Thus, while signal (a) may represent R5, the higher noise floor of the signal (b) may impair the readability to R3 or R4 at best. What, then, can we do to make a signal such as (b) more readable? There are two primary things: one, of course, is to reduce the noise floor and the other to increase the signal amplitude.

All right, we may say, let's increase the r.f. gain by bringing in a pre-amplifier since this will increase the signal amplitude. Yes, certainly the amplitude will be lifted, but so also might the noise floor by the same amount. In that case the S/N will be unchanged - readability would not have improved despite the signal meter indicating S9 plus! We shall be seeing that there are times when a dedicated low-noise pre-amp can improve the S/N; but there are other times when the S/N might be further worsened by a pre-amp. We have undoubtedly encountered these effects when using the antenna pre-amp combined with some v.h.f. linears, where switching in the pre-amp dramatically steps up the S-reading yet does little to enhance the readability of a weak signal.

If we want to increase the signal amplitude, then one of the best bets is to improve the antenna at the operating frequency or by using a beam array directed for maximum signal response consistent with the best discrimination against QRM.

Noise Power Bandwidth

It is possible to reduce the noise floor at the expense of signal bandwidth and in this respect a couple of interesting diagrams are given in Fig. 2. At (a) a very high noise floor is shown which almost buries the wanted signal, yielding a very poor signal to noise ratio. The same signal is also present at (b), but this time it is passed through a narrow band-pass filter. Now, because the noise power falls as the bandwidth of a given signal spectrum is decreased, so the noise floor falls and the wanted signal, within the reduced operating bandwidth, rises above the noise and a very much enhanced S/N occurs, as shown.

From the first principles, the improvement in S/N corresponds to the ratio of the full bandwidth to the reduced bandwidth. By way of an elementary illustration, let's suppose that the full bandwidth is 5kHz and the filter bandwidth 100Hz (both to the -3dB or half-power points), then the ratio is 50:1. Hence the improvement in S/N is 50 times, or 17dB (power). This can certainly make the difference between a non-readable signal and a perfectly readable one!

Such a small bandwidth, of course, is only realisable with Morse code or data signals. Speech calls for significantly wider bandwidths; but, although the very narrow Morse-type of filtering cannot be used for s.s.b. signals, somewhat wider band-pass filters can be desirable, though the S/N improvement is less than with c.w. signals. With f.m. signals, of course, the requirement is for even wider bandwidths; but even with this mode it seems possible to reduce the channel width to something less than 25kHz, anyway. We shall possibly be hearing more about this at a later date.

What About Sensitivity?

Now having set the stage so to speak, let's see what is meant about sensitivity. The basic expression for sensitivity is merely the antenna signal level required for a stated S/N. Instead of an antenna, a modulated signal generator is correctly coupled to the receiver and the receiver tuned to the signal produced by the generator. It is usual to set the modulation somewhat below the maximum appropriate to the particular mode under test. The modulation level should be stated in the spec.

Of course, a meter is required at the output of the receiver, instead of the speaker or 'phones, to set a 0dB datum at the modulation level and volume control setting used. An audio millivoltmeter is highly suitable, and this is connected across a suitable value resistor which is replacing the speaker

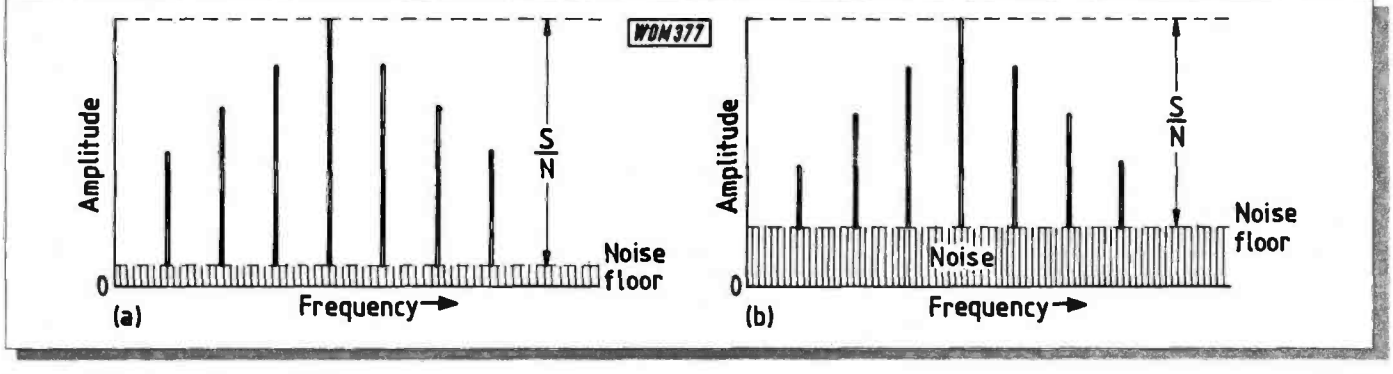

Fig. 1: A signal spectrum rising from a relatively low noise floor (a) and a similar signal rising from a higher noise floor (b), showing the signal-to-noise ratios (S/N)

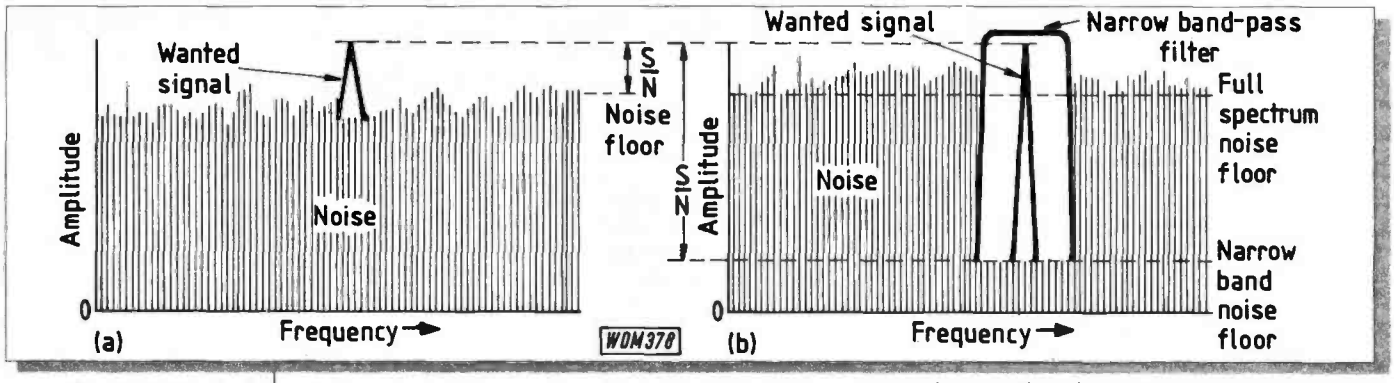

Fig. 2: A wanted signal almost buried by noise over a relatively wide spectrum (a) resulting in a very poor S/N. Part (b) shows how the S/N can be greatly improved by passing the signal through a narrow band-pass filter

at the output of the receiver. To achieve the 0dB datum, the r.f. output from the signal generator is set fairly high to start with. After setting 0dB on the meter by adjusting its sensitivity and/or receiver's volume control, the modulation is switched off and the meter's sensitivity stepped up allowing the meter to read noise only down to about -10dB or so, as required.

Sensitivity at any appropriate S/N can be determined by adjusting the r.f. level and making sure that the 0dB reference is correct at each r.f. input. The diagram in Fig. 3 shows that we are not really measuring the true S/N because when the 0dB datum is set, especially at low r.f. inputs, the meter must be reading the noise as well as the signal. The ratio is thus S+N/N. It would not be valid to make a sensitivity measurement by switching off the r.f. completely because, then, the receiver's a.g.c. system might increase the r.f. and i.f. gain at zero signal level. The effects of the a.g.c. should, in any case, be considered. It is sometimes best to switch it off if possible. Ratios of S+N/N of 10dB sensitivity are often given in the specifications.

The RF Level

The way that the signal is coupled from the signal generator to the receiver can yield a conflict between measured performance figures and specifications. It is, of course, very important always to ensure that the generator is terminated accurately to match the antenna input impedance of the receiver. In addition, the performance data should state whether the signal level corresponds to potential difference (p.d.) across the matched input or e.m.f. (electromotive force) from the generator direct. As p.d. corresponds to half e.m.f., the difference between e.m.f. (e.g. open circuit voltage from generator) and p.d. is shown in Fig. 4. Probably most reviewers of amateur radio equipment indicate sensitivity in terms of p.d., but unless the load coupling is accurately matched there will be errors. Many signal generators have their attenuators related to e.m.f., so if the generator indicates, say, 2μV (e.m.f.) for the required S/N, the sensitivity in terms of p.d. will be 1μV. The frequency spectrum over which the measurement is made will influence the results. Some engineers use 'weighting' circuits or low pass filtering so that the S/N performance relates more to the subjective (how we judge it by our ears) effect.

Signal Noise & Distortion (SINAD)

Rather than actually switching off the modulation to measure the noise content at the given r.f. input, an alternative method uses a distortion factor meter to 'notch out' the modulated audio signal at the output of the receiver, so that the meter then indicates the ratio between the signal plus noise plus distortion to the noise plus distortion (S+N+D/N+D), which is often called the SINAD ratio. Dedicated meters are available for this sort of measurement, combining the readout proper, bandpass filtering and weighting and an automatically nulling notch filter. This tunes accurately onto the modulated tone and thus puts a 'notch' at that audio frequency, so that at the output (e.g. input to the readout) there remains the noise and harmonics (e.g. distortion), which are then read on an r.m.s. basis as a dB value below the datum value originally established by the instrument. The scheme is shown in Fig. 5.

It is possible, of course, to employ an ordinary audio distortion factor meter which some engineers, including me, regard as more convenient. The sensitivity is commonly referred to as a SINAD ratio of 12dB, which corresponds to a distortion factor meter reading of 25 per cent. The generator, of course, must produce modulation suitable for the mode under test, however, for s.s.b. it is feasible to apply an unmodulated carrier and adjust the receiver's tuning for a suitable (1kHz) beat note. This, then, represents the modulation which can be notched out in the usual way to achieve the SINAD ration.

A similar thing can be done for c.w. measurements. However, where the S/N of very narrow band c.w. is being attempted, account should be taken of the noise power which is being removed by the notch filter. Notch filters for SINAD tests are very narrow, but so also are some c.w. filters! To avoid noise-power error, therefore, it may be desirable to quote mere S/N (not SINAD) for c.w. sensitivity measurements. With f.m. the generator should provide a deviation some two-thirds of the full deviation of the system (for example, around ±3.3kHz for narrow band f.m. (n.b.f.m.).

The output of the receiver under test should be properly loaded (with a suitable resistor to match the speaker's impedance) and the volume control kept fairly low to avoid overload distortion. An output of about 50mW is a good level. This corresponds to 632mV across 8Ω or 447mV across 4Ω. It sometimes helps to monitor the modulation on a pair of phones or the receiver's speaker if this can be switched off when the actual measurement is made. The receiver must always be very accurately tuned to the generator signal.

Noise Signal

Noise signal is born of the random movement of electrons in electronic circuits. It is the bane of all electronic engineers - not to mention radio amateurs! Over the years many things have been done and techniques evolved to try to minimise its effect; but it is still with us! From our 'phones or speakers it manifests as a hiss like the sound of car tyres on a wet road. When made up of components

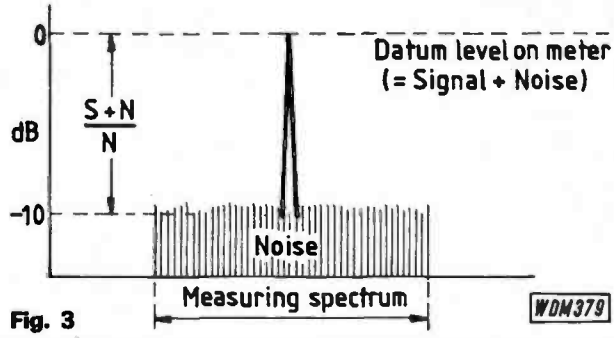

Fig. 3

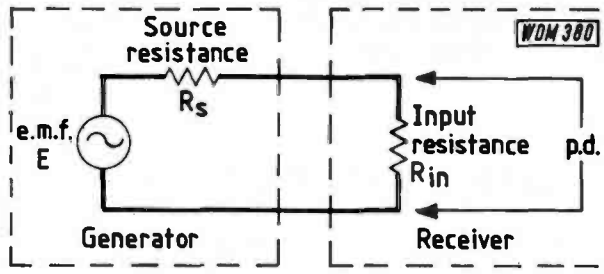

Fig. 4

covering a wide frequency spectrum it is called white noise, by analogy with white light which contains all the colours of the rainbow. Owing to the filters and response characteristics of our receivers the noise we hear is more 'pink' than white. It is weighted noise. Even so, over the air we often hear it referred to as 'white noise'.

Noise Power

Power in the noise signal is equal to the product kTB where k is Boltzmann's constant (1.38 x 10^{-23} joules/K),T is temperature kelvin (K) and B is bandwidth in hertz,K is referred to absolute zero (-273.16 degrees C), so at an ambient of 17°C, T calculates to a shade over 290K, which is the noise temperature 'standard'.

As an example, the noise power in a resistor at 17°C works out close to 4 x 10^{-21}W per unit bandwidth (e.g. per Hz). Thus at 10Hz bandwidth it would be 4 x 10^{-20}W, at 20Hz 8 x 10^{-20}W, at 40Hz 1.6 x 10^{-19}W and so forth. In other words, the noise power increases by 3dB (it doubles) each time the bandwidth is doubled and decreases by 3dB (it halves) each time the bandwidth is halved. This, of course, directly relates to the noise power bandwidth discussed earlier.

Equivalent Noise Voltage

It is interesting to consider what sort of noise voltage noise power produces across a given resistor value over a stated bandwidth. Let's suppose that the noise power is acting in, say, a 50Ω load resistor over a bandwidth of 2000Hz (2kHz) at an ambient temperature of 17°C. Then, to work out the equivalent noise voltage we can use the simple expression of voltage equals the square-root of the product of the power is watts and the resistance in ohms.

We thus derive (kTBR)0.5, where kTB is the noise power part and R the resistance. It should be noted that the noise power is that occurring in a matched load of the same value as R and is independent of the value of R. Substituting the figures, the noise voltage across the matched load resolves to 2 x 10^{-8} or 0.02μV. With R at 1kΩ and B at 5kHz, the noise voltage is around 0.14μV. The open-circuit e.m.f., of course, is double these values, given by (4kTBR)0.5, which is regarded as an r.m.s. voltage in series with the conductor resistance R. The noise voltage, of course, is amplified along with the antenna signal, and the effective S/N is further impaired by the noise contribution of the r.f. amplifier itself.

Noise Factor & Noise Figure

Noise factor is the input S/N to the output S/N, both direct ratios, while noise figure is the dB difference between the two when themselves expressed as dB ratios. For example, a 5:1 noise factor is 7dB noise figure (e.g. 10log5 = 7).

If an amplifier produced zero noise (not possible!) the noise at the output would be the direct contribution of the input noise (e.g. from the antenna and load). In practice the output noise is bound to be greater. The noise figure is a measure of the 'noisiness' of the amplifier.

As an example, an output S/N of, say, 2dB resulting from an input S/N of 9dB would indicate a noise figure of 7dB, this stemming essentially from the nature of the transistor and r.f. amplifier design.

Clearly, then, for the most effective operational S/N we need a receiver with a low noise figure, along with a reasonably strong antenna signal. However, at h.f., especially on the l.f. bands, a low noise figure is of very minimal consequence owing to the noises arriving from the antenna system itself! These tend virtually completely to mask the receiver noise. Just consider, for instance, the 3.5MHz band after dark and not only QRM, QRN, atmospheric noises in general, but also the multiplicity of intermodulation products stemming from many strong signals, which not only produce a dramatic rise in overall noise level but also diminish the effective dynamic range! The noise level on this band can be greater than 40dB (10 000 times) more powerful than the noise generated by the receiver.

Noise Above 28MHz

The noise figure plays a more important role at frequencies above about 28MHz, where the antenna noise is essentially cosmic and hence more sanitary. At v.h.f. and above, therefore, we should strive for receivers with the lowest possible noise figures. Modern 144 and 430MHz band rigs are, in fact, designed with a low noise figure in mind. This is aided by the use of low-noise r.f. amplifier transistors, and the design focusing on low noise performance rather than maximum possible gain.

It is not particularly easy to improve on the noise figure achieved by the manufacturer of a v.h.f. or u.h.f. rig without, perhaps, a minor redesign of the r.f. amplifier stage, for it is the first stage of a rig which is generally more important from the aspect of S/N ratio improvement than subsequent stages. Sometimes a change of r.f. transistor can help and/or careful realignment of the front-end for the lowest noise figure (e.g. best S/N). After purchasing some years ago a Yaesu FT-480R 144MHz rig, I was able to attain a very worthwhile improvement in noise figure merely by 'optimising' the drain current of the 3SK59Y r.f. transistor and realigning!

If one has a 'deaf' 144MHz band rig, there's always the temptation to hook in an external antenna pre-amplifier. Working 144MHz band s.s.b. on a not-very-strong signal without the pre-amp, one can be fooled into concluding that the pre-amp is a

Fig. 3: When measuring sensitivity a 0dB datum is first established by the signal. The modulation is then switched off and the noise alone read as a -dB value. however, because when the datum is established the meter is reading both the signal and the noise, the ratio is really S+N/N (signal plus noise over noise). The test spectrum will also determine the amount of noise indicated (see Fig. 2)

Fig. 4: Showing the difference between e.m.f. (the open circuit generator voltage, V) and the p.d. (potential difference) across the matched coupling to the receiver. When the generator source resistance exactly matches the receiver's antenna input impedance, the p.d. is half the e.m.f. Because the antenna impedance of the receiver can affect the voltage, some engineers prefer to indicate antenna input voltage in terms of e.m.f. rather than p.d. - see text.

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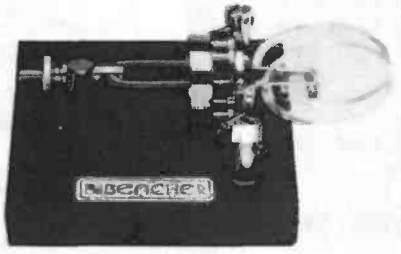

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worthwhile device by the way the S-meter reading shoots up when it is switched in! Any pre-amp will give higher S-meter readings and make s.s.b. signals louder; but is the S/N improved? Try tuning an R3/R4 s.s.b. signal without the pre-amp, and then switch in the pre-amp. After resetting the volume control to get the audio level the same as before, determine whether the signal is now R4/R5. If it isn't, then there's not much point in having the pre-amp in circuit. In fact, it could be doing more harm than good merely by amplifying all the signals - weak and strong ones - and hence dramatically reducing the overload margin of the receiver, and possibly inciting spurious responses and intermodulation products in the r.f. amplifier and mixer stages! In other words, the dynamic range of the receiver could be impaired by as much as the gain of the pre-amp. The craft, then, is not particularly for high gain, but for the best noise figure!

Improving the Overall Noise Figure

Nevertheless, a well designed pre-amp, such as those produced by the small, specialised British firms can certainly enhance the S/N performance of a v.h.f. front-end if the rig itself isn't endowed with a particularly exciting noise figure. As already mentioned, it is the first r.f. amplifier which is the critical one from the noise performance aspect. Total noise of a system takes account of the input circuits, r.f. amplifier, mixer,etc., according to the expression:

$$N_f1 + \frac{N_f2 - 1}{G_1} + \frac{N_f3 - 1}{G_1 \times G_2} + \ldots$$

where N_f1, N_f2, N_f3, etc., are the noise factors of the first, second, third, etc., stages and G1, G2, etc are the direct ratio power gains of the first, second, etc., stages. Let's suppose that our 144MHz band rig has a noise figure of 4dB (2.5 noise factor) and we hook in a pre-amp with 2dB noise figure (1.58 noise factor) and 14dB gain (25:1 power ratio), then by using the first part of the foregoing expression we obtain:

$$1.58 + \frac{2.5 - 1}{25} = 1.64 \text{ noise factor}$$

or 2.15dB noise figure

Thus, by using this low noise pre-amp we have achieved a 1.85dB improvement in noise figure over the rig without a pre-amp. Quite a worthwhile improvement which would undoubtedly be noticeable on a weak s.s.b. signal, possible making an R3/R4 signal into an R5 one!

We can do even better than this by putting the pre-amp at the top end of the feeder, near the antenna. If, for example, the feeder at 144MHz has a loss of 3dB, the signal at the input of the pre-amp will be twice the power, thereby improving the S/N by 3dB. However, the total noise figure will worsen since in effect 3dB will be knocked off the pre-amp gain, leading to a total noise figure of 2.3dB, which is still very good.

If the feeder is fairly long and hence lossy, it certainly pays to site the pre-amp close to the antenna; but with an ordinary antenna system the pre-amp at the rig end of the feeder will do a good job if its noise figure is less than that of the rig. A relay, r.f. or 'hard-switched' operated, by-passes the pre-amp in the transmit mode.

In summary then, the noise factor of an ideal receiver can be defined as the number of times by which the signal power from the antenna must exceed kTB to provide unity S/N! In terms of practical performance, a receiver with 10dB S+N/N with an input of 1μV to 3μV is very good. At v.h.f. and above, higher sensitivities are being achieved; but at h.f. the 'usable sensitivity' is invariably established by atmospherics and other noises below 12MHz, as already noted.

Because of the reduced noise-power bandwidth required for reading Morse code, receiver sensitivity is commonly higher in this mode. In fact, with a narrow-band c.w. filter a S/N advantage up to 20dB becomes possible in with with respect to s.s.b. This means that a signal just bordering on R5 c.w. would need to be raised by more that three S-points to provide similar readability on s.s.b. Or, put another way, a c.w. transmitter with 100 times less power would provide a similar readability. Hence the popularity of c.w. QRP.

Dynamic Range

The noise floor is also caused to rise by spurii and intermodulation effects generated in-band by the large-signal limitations of all receivers. Viewed from the large-signal side of the dynamic range sandwich, the 'usable dynamic range' can be regarded as that dB range over which the multiplicity of signals can increase such that the intermodulation products (essentially third and odd-order) do not result in a significant rise in noise floor. In other words, a receiver with a good dynamic range performance is not only adequately sensitive for the band in use, but also one whose spurii and intermodualation products are well tamed.

We have seen, therefore, that receiver sensitivity is certainly not the 'be all and end all' of receiver performance. A more important consideration, in fact, can be how well a receiver can handle strong signals. **PW**

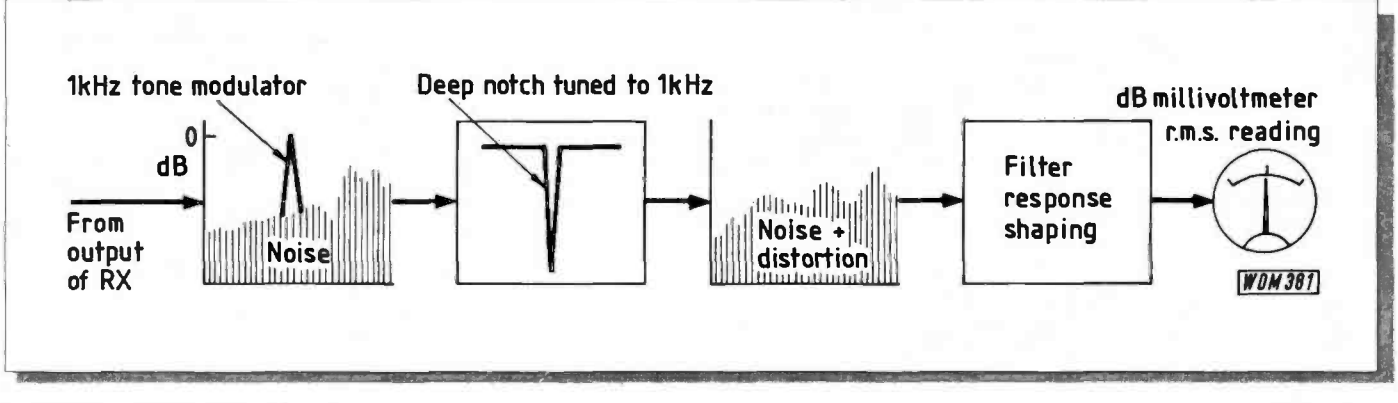


Fig. 5: Showing the signals and instrumentation for a SINAD sensitivity test. The receiver r.f. input is adjusted for a SINAD ratio of 12dB (corresponding to a distortion factor meter reading of 25%), making sure that the 0dB datum is correctly set for each r.f. level change. The SINAD sensitivity is given by the signal generator, usually expressed as μV (p.d.)

Feature

Keyed-in Morse

This Morse training program, written by G1TEX, takes advantage of the availability and convenience of a portable computer to provide random Morse characters on the move or at unusual times

Although I have held my Class 'B' licence since early 1986, it is only recently that I have made any determined efforts to learn Morse. The days that separated the Morse classes, run by Phil G0KKL, meant that any advances in ability made during the sessions were eroded by not listening to Morse inbetween times. I had tried commercial tapes, but these proved unsuitable in my case. The sounds of chairs scraping and intestinal activity of the person generating the Morse were distracting on one tape and I found myself listening less and less. Finally Phil said "You have a computer, why don't you write a program to train yourself"? The listing reproduced here is the result of being unable to answer that question.

Starting Point

I have several computers, but the one I chose for the program is a Tandy Model 100. This small portable computer has 32KBytes of memory, runs from batteries and has various utility programs built into it. Not only that, but it also has a good, if not fast, version of BASIC. I had an Olivetti M10 version of this computer previously and the program will run on that, also I believe NEC make a copy of this machine although I do not know the model number of their machine.

Basically, the program will turn characters, saved previously in a text file, or a pseudo-random series of characters into the equivalent Morse tones. Either numbers or letters or mixed letters and numbers may be produced, with the possibility of limiting the characters to those that cause problems.

When typing the listing in, each BASIC line should have no spaces between the words, except where they have a textual meaning. So there should be no attempt to make the listing on your machine look tidy. The spaces within the program line will only slow the maximum speed down, which might eventually make the Morse less useful.

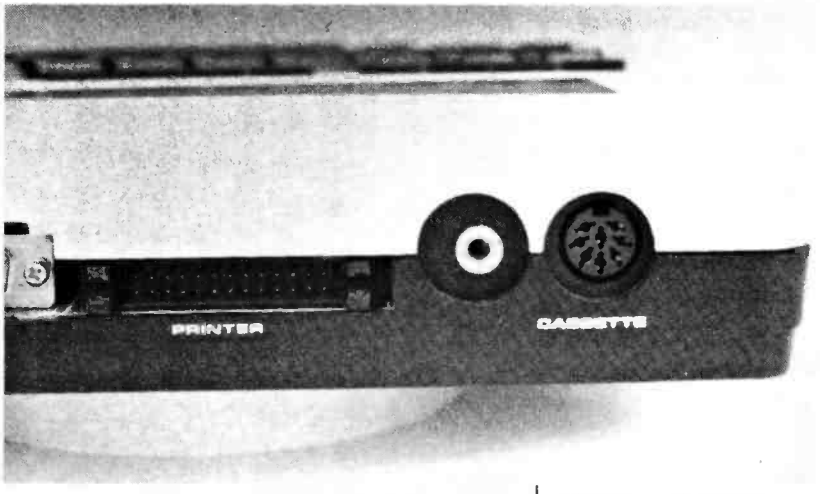
Definitions

Only lines 1 and 2 produce Morse sounds, all the others are there for support and organisation. Sound is produced by the BASIC command SOUND tone, duration. Where tone is an inverse number, i.e. high number-low note, and duration is in fiftieths of a

```
0 GOTO 1000
1 SOUND TN,DI:FOR Y=0 TO WC :NEXT
    :RETURN
2 SOUND TN,DA:FOR Y=0 TO WC
    :NEXT:RETURN
3 PRINT C$; :FOR Y=1 TO WW :NEXT:RE-
    TURN
4 FOR X=1 TO LEN(MC$):IF MID$(MC$,X,1)
    "." THEN GOSUB 1 :NEXT:RETURN
    ELSE GOSUB 2 :NEXT:RETURN
5 X=(INSTR(MA$,C$)-1)/2+1 :MC$=MC$(X)
    :GOSUB 4:GOSUB 3 :IF INKEY$=
    CHR$(27) THEN GOTO 10 ELSE RE-
    TURN
6 FOR X=1 TO 2 * WW:NEXT:PRINT " "; :RE-
    TURN
10 CLOSE:CLS:PRINT " Produce MORSE
    tones from ? ":PRINT "[P]re-recorded mess-
    age" :PRINT "[K]eyboard text input"
    :PRINT "[R]andom characters" :PRINT
    "[C]hange parameters" :PRINT "[ESC] to
    quit"
11 IN$=INKEY$:IF IN$="" THEN GOTO 11
12 IF IN$="P" OR IN$="p" THEN GOSUB 200
    :GOSUB 100:GOTO 10
13 IF IN$="K"OR IN$="k"THEN GOSUB 300
    :GOSUB 100:GOTO 10
14 IF IN$="R"OR IN$="r"THEN GOSUB 400
    :GOSUB 100:GOTO 10
15 IF IN$="C"OR IN$="c"THEN GOSUB 500
    :GOTO 10"
16 IF IN$=CHR$(27)THEN CLS:END ELSE
    GOTO 10
100 IF LEN(MS$)> 0 THEN MC$="-.-."
    :GOSUB 4 :GOSUB 6:CLS:FOR N=1 TO
    LEN(MS$) :C$=MID$(MS$,N,1):IF C$=" "
    THEN GOSUB 6:NEXT ELSE GOSUB 5
    :NEXT
120 RETURN
200 CLS:FILES:PRINT "Please use only a file
    name":INPUT"with '.DO' in it";FL$
    :OPEN FL$ FOR INPUT AS 1:CLS
210 IF NOT EOF(1)THEN INPUT#1,MS$
    :GOSUB 100:GOTO 210
220 GOTO 10
300 CLS:INPUT"Please input your text up to 4
    lines>";MS$ :CLS: GOSUB 100 :GOTO 10
400 CLS:PRINT "[L]etters":PRINT "[N]umbers"
    :PRINT :PRINT "[ESC] TO RETURN"
401 IN$=INKEY$:IF IN$=""THEN GOTO 401
402 IF IN$="L"OR IN$="l"THEN GOTO 410
403 IF IN$="N"OR IN$="n"THEN GOTO 420
404 IF IN$=CHR$(27)THEN RETURN
405 GOTO 400
410 CLS:PRINT "Enter the characters to be prac-
    ticed or press [ENTER] key for the al-
    phabet.." :INPUT RN$:IF RN$="" THEN
    RN$="ABCDEFGHIJKLMNOPQRSTUV
    WXYZ":GOTO 450 ELSE GOTO 450
420 RN$="0123456789"
450 RL=LEN(RN$):CLS:PRINT "Please wait
    generating the characters":FOR X=1 TO
    VAL(RIGHT$(TIME$,2)) :RN=RND(X)
    :NEXT:MS$=""
451 FOR GP=1 TO 30:FOR CH=1 TO 5
    :RN=RND(9)*RL+1
    :MS$=MS$+MID$(RN$,RN,1)
    :NEXT:MS$=MS$+" ":NEXT
```

```
452 CLS:PRINT "[ESC] to quit":PRINT "    any
    other key to continue"
455 IN$=INKEY$:IF IN$="" THEN GOTO 455
456 IF IN$=CHR$(27) THEN GOTO 10 ELSE
    RETURN
500 UP=0:CLS:PRINT "Change which parameter
    ?" :PRINT "[T]one of character" :PRINT
    "[S]peed of character":PRINT "[W]ait peri-
    ods" :PRINT "[ESC] to quit"
501 IN$=INKEY$:IF IN$=""THEN GOTO 501
    ELSE IF IN$=CHR$(27)THEN RETURN
502 IF IN$="T"OR IN$="t"THEN GOTO 520
503 IF IN$="S"OR IN$="s"THEN GOTO 530
504 IF IN$="W"OR IN$="w"THEN GOTO 540
505 GOTO 500
520 UP=0:CLS:PRINT "press":PRINT "[1] to go
    higher":PRINT "[0] to go lower":PRINT
    "[ESC] to return"
521 IN$=INKEY$:IF IN$=""THEN GOTO 521
    ELSE IF IN$=CHR$(27)THEN RETURN
522 IF IN$="1"THEN UP=-0.1*TN ELSE IF
    IN$="0"THEN UP=0.1*TN
523 MS$="k":TN=TN+UP:GOSUB 100 :GOTO
    500
530 CLS:PRINT "Press":PRINT "[1] for faster"
    :PRINT "[0] for slower":PRINT "[ESC] to
    return"
531 IN$=INKEY$:IF IN$=""THEN GOTO 531
    ELSE IF IN$=CHR$(27)THEN RETURN
532 IF IN$="1"THEN DI=DI-1:DA=3*DI
    :GOTO 590
533 IF IN$="0"THEN DI=DI+1:DA=3*DI
    :WC=2.5*DA:GOTO 590
534 GOTO 530
540 CLS:PRINT "Press":PRINT "[1] for shorter
    pauses" :PRINT "[0] for longer pause"
    :PRINT "[ESC] to return"
541 IN$=INKEY$:IF IN$=""THEN GOTO 541
    ELSE IF IN$=CHR$(27)THEN RETURN
542 IF IN$="1"THEN WW=WW*.75:GOTO 590
543 IF IN$="0"THEN WW=WW*1.5:GOTO 590
544 GOTO 540
590 TN=TN+UP:MS$="kkkkk":GOSUB 100
    :GOTO 500
1000 CLEAR 5000:DI=3:DA=3*DI: WC=
    2.5*DA :WW=4*WC:TN=2000
1010 DIM MC$(36):FOR X=1 TO 36 :READ
    MC$(X) :NEXT
1020 MA$="aAbBcCdDeEfFgGhHiIjJkKlLmM
    nNoOpPqQrRsStTuUvVwWxXyYzZ1122
    3344556677889900"
1025 GOTO 10

1030 DATA ".-", "-...", "-.-.", "-.."
1031 DATA ".", "..-.", "--.", "...."
1032 DATA "..", ".---", "-.-", ".-.."
1033 DATA "--", "-.", "---", ".--."
1034 DATA "--.-", ".-.", "...", "-"
1035 DATA "..-", "...-", ".--", "-..-"
1036 DATA "-.--", "--.."
1037 DATA ".----","..---","...--","....-"
1038 DATA ".....", "-....","--...","---.."
1039 DATA "----.", "-----"
```



The 'spare' plastic panel used for the audio output socket.

second the variable DI holds the length of a dot, and DA the length of a dash. Their relationship is set in line 1000 at 1:3. Variables WC and WW hold inter-character, and inter-word pause values. The Morse characters themselves are held in an string array MC$(), and lines 1030 to 1039 hold representations of A-Z and 0-9. Please note again that lines 420 and 1020 have no spaces. Similarly in line 410 beginning THEN RN$="A...YZ". The string RN$ holds the characters from which the random Morse will be produced in lines 450-456.

Menu Choices

The main menu is presented in line 10, with lines 11-16 selecting and calling the various subroutines. Pressing the [ESCape] key whilst Morse is being produced will result in the program returning to this menu within a few seconds. Pressing [ESCape] at this menu causes the program to terminate. Once you are sure that the program works, and a copy has been saved to tape or disk, line 16 may be amended to ....THEN MENU ELSE GOTO 10, instead of its present form.

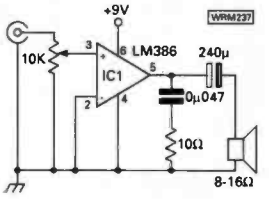
Parameters

Lines 500-590 provide a means, within the program, of changing various parameters. These being the length of the dots and dashes, the pauses between characters and words, and the tone of the Morse produced. Generally choosing '1' causes a speeding up or raising of pitch, and choosing '0' the opposite. The rate of change of these parameters may be varied by altering the step factors used to vary the value of each variable. Remember strange things occur if the dot length reaches zero, or the pitch becomes a negative number.

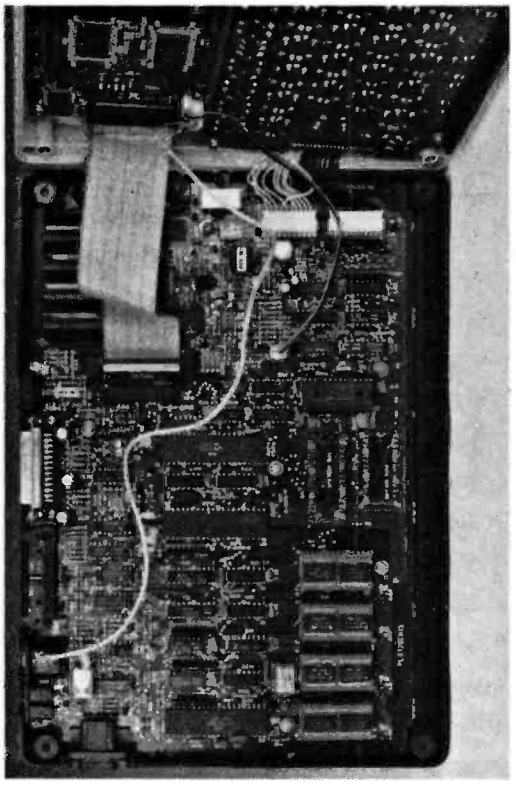
Pre-recorded Text

The only area not covered is the use of prewritten text, which may be created with the inbuilt text editor. These files which the system uses the '.DO' extension to signify a textual document, are read in, at up to 240 characters and spaces at a time. Each character read in will be sounded as Morse, followed by putting it on screen just before sounding the next. This use of prewritten text allows a more natural style of word sizes, rather than the unnatural 5 character groups created in a pseudo random manner

Experiments with an amplifier showed that a better tone was produced if an audio amplifier as below was used. If this also has a tone control, then very smooth sounding Morse may be produced which sounds more like the real thing.



View inside the case showing the miniature coaxial cable connecting the buzzer output to the 3.5mm jack socket on the back panel.



in line 451. The latter half of line 450 is an attempt to create a differing series of characters each time the program is run. (Other computers may use the RANDOMIZE command to achieve this).

Minus points

The Morse characters become more staccato and less ideal as the dot time is shortened and is too mechanical to be the only training used. It should augment the periods of listening to Morse created by hand, either in a club or by listening to the radio. Finally the volume of the Tandy is not in the earsplitting range, so a method of making more sound was sought. Sound is produced using a ceramic sounder behind the badge on the upper right hand side of the front panel. An audio frequency signal is sent to this sounder to produce the 'tinny' tone. On my model there was an unused plastic panel onto which a 3.5mm jack socket could be fixed, to allow the inbuilt sounder to be bypassed and an amplifier to be used

This has not made learning Morse any easier, in fact I have spent less time learning, but I now have no excuse for not being able to practice. Five minutes listening may be achieved at any time of the day or, much to my long suffering XYL's disgust, the night.

Dah-Di-Dah. **PW**

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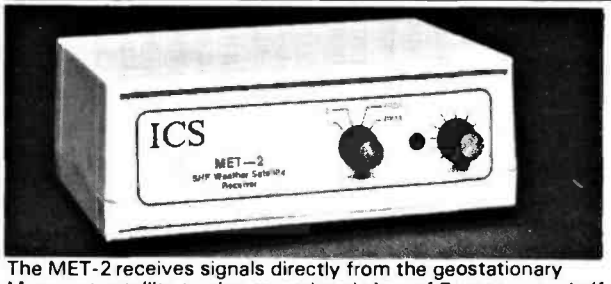

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Construction

PW Irwell Part 3

In this final part of the PW Irwell, The Reverend George Dobbs G3RJV describes how to case the project and interconnect the modules to complete the QRP transmitter.

The prototype Irwell was built into a Minffordd Engineering Equipment Case Type J9 because the J9 case is both attractive and easy to drill. I drill the holes for controls slightly undersized and then enlarge them with a hand reamer to the correct size. The placement of the boards and controls is shown in Fig. 3.1. Mark and drill the holes for the various sockets and l.e.d.s then using standoffs, mount the boards in their respective positions. The case allows plenty of room for the boards, with the v.f.o. in its own box, placed in the centre. The signal leads must be wired with screened leads, and these are shown as the bold lines in Fig. 3.1. Ideally miniature 50Ω coaxial cable should be used. The commonest small coaxial cable available is type RG174, but often it is stiff and difficult to use for small interboard connections. In practice small screened cable, sold as microphone cable, may be used for the interconnections without too many problems.

Front and Back

The front panel on the prototype was finished off with a false front made of thin white card, with legends produced using dry rub-down lettering. This card is protected by a layer of sticky-backed transparent plastic of the type used for covering books. The main connections into the Irwell are all on the back panel and consist of: 12V in, key, antenna and receiver. I have used phono sockets for all these terminations because they are cheap and standard in my shack, but any type of connector may be used. If phono sockets are used throughout it is essential to clearly mark and remember which socket is carrying the 12V input.

It is easy to overlook interconnections between the various boards, so work in a logical order. I would suggest beginning with the 12V input from the back of the case. Add all the power leads

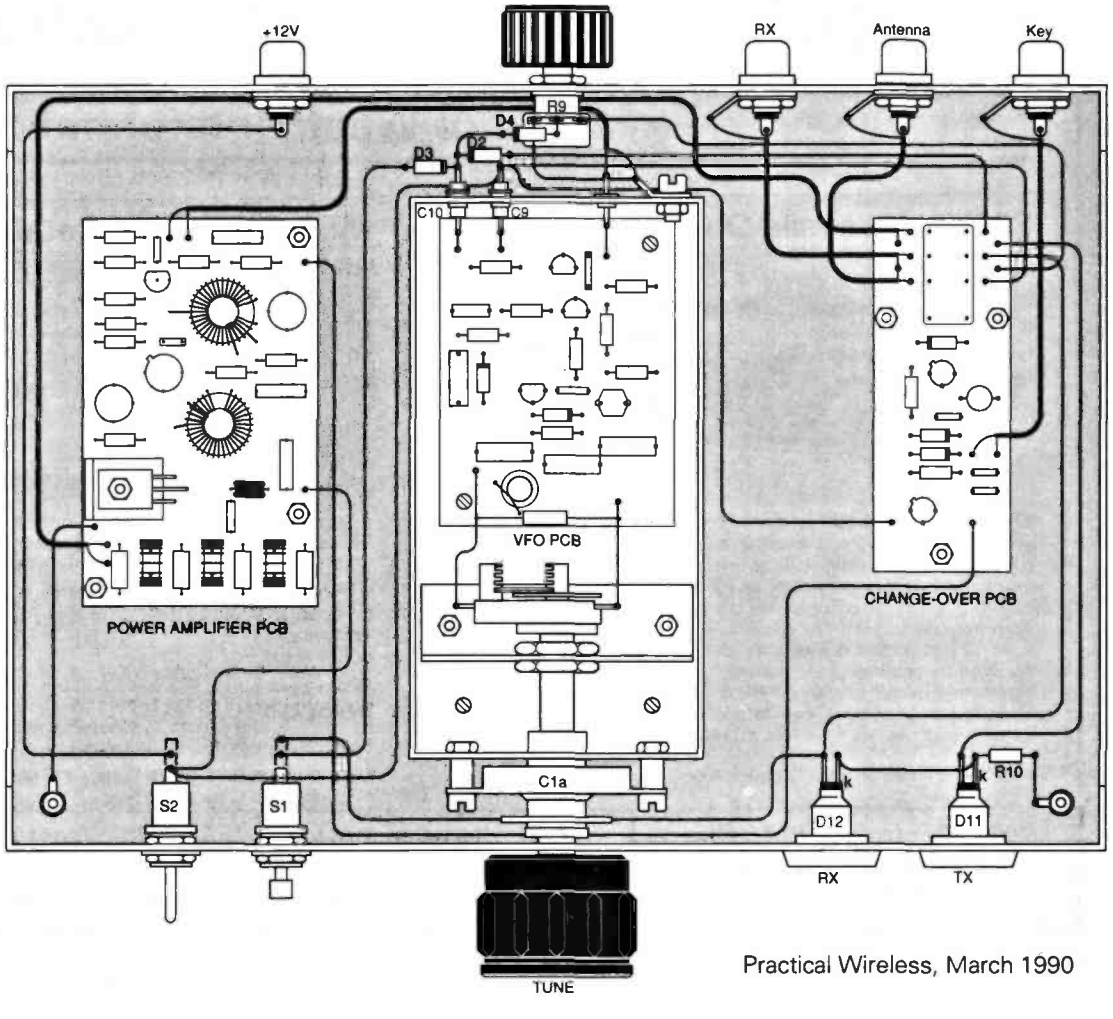
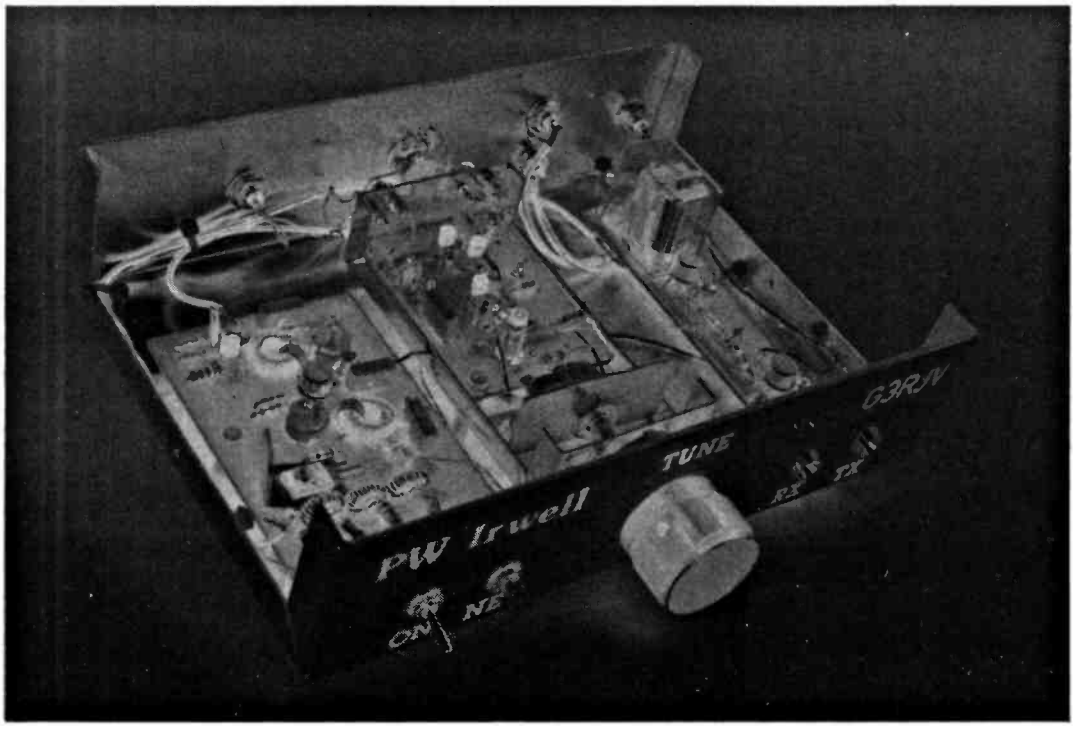


Fig. 3.1: Finished layout of the transmitter showing p.c.b. interconnections.



The Irwell in its finally assembled form.

beginning with the 12V via S2, then adding +12, +TX and +RX interconnections leads. The v.f.o. cut-off control, R9, is mounted on the back panel of the outer case behind the the v.f.o.box. The signal connections starting from the v.f.o. may then be added.

Putting It To Use

The Irwell requires a nominal 12V stablised supply at a load of around 1A. One of the cheaper p.s.u.s available from radio shops should easily supply enough power. Bear in mind though, that a poorly regulated supply could result in a poor transmitter tone so please try to make sure that the smoothing is adequate.

The Irwell is actually very simple to use. The receiver is connected to the receiver socket SK3 which, on receive or with the unit switched off, connects to the antenna. When the key is pressed, relay RLA connects the antenna to the ouput of the p.a. board.

The transmitter does not have a built in sidetone monitor, as I prefer merely to back off the receiver gain control and listen to the actual signal. Most receiver front-ends will cope with the few watts of r.f. passing close to the input, but being cautious I have added a little more receiver protection. The diodes D13 and 14 shown in Fig. 2.3 of *PW* Feb. '90, show how a pair of diodes may be mounted back-to-back across the receiver socket to limit the amount of r.f. voltage that can enter the receiver.

Hints & Tips

Operating QRP is good fun, ask any of the several thousand members of the G-QRP Club and they will confirm this.

There are, though, a few simple rules which help to reduce possible frustration. Avoid just simply going on the band and calling "CQ". Listen for and call other stations after carefully netting onto their frequency. Using the tail-ending technique is a good method of QRP working, that is calling one of the stations at the end of an existing QSO. Wait for the final exchange and call the required station by using a 'two by two', that is his callsign twice then your own twice. Call just a little slower than the previous QSO speed. Avoid giving your power level until after a report has been given, this can be worth up to 2 extra S-points! Try listening on or near 7.030MHz for other QRP stations. Above all, expect to make QSOs and you will. Have fun! **PW**

Errors & Up-Dates March 1990

PW Review. Ten-Tec Omni V Transceiver, February 1990.

An extra V crept into the headline of the review. The transceiver is of course, for the h.f. bands. We apologise for increasing the versatility of this excellent transceiver.

Errors & Up-Dates, February 1990.

Readers wishing to build the *PW* 49'er In-Car Short Wave converter which appeared in the January issue (the p.c.b., layout, reference WR267, was reprinted in the February issue for the benefit of those readers wishing to make their own boards) can now obtain the ready-made board from the *PW* p.c.b. service @ £6 inclusive of P&P.

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WR247	ZENER DIODE TESTER	AUG 88	3.56
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WR240	.. ..	..	9.10
WR239	.. ..	..	
WR238	"OTTER" 50MHz RECEIVER	JAN 88	7.10
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WR231	.. ..	..	9.20
WR230	.. ..	..	
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WR227	.. ..	..	9.70
WR226	.. ..	..	
WR298	"ITCHEN" LCR BRIDGE	APRL 87	3.40
WR225	"WOODSTOCK" SW CONVERTER	MAR 87	4.10
WR219	MASTHEAD PRE-AMP PSU	FEB 87	2.50
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WR215	SIMPLE 50MHz CONVERTER	SEP 86	3.60
WR213	MOD FRG-7 (CARRIER Osc)	JUN 86	2.70
WR210	"ARUN" PARAMETRIC FILTER	MAY 86	8.10
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WR209	SIMPLE AUDIO OSCILATOR	MAR 86	4.30
WR208	RF SPEECH PROCESSOR	MAR 86	4.10
WR207	CRYSTAL CALIBRATOR	JAN 86	2.10
WR206	RTTY/MORSE MODEM (Plug-in)	JAN 86	2.80
WR205	RTTY/MORSE MODEM	JAN 86	5.40
WR204	WQ MEDIUM WAVE LOOP	NOV 85	3.00
WR203	SIMPLE CAPACITANCE METER	OCT 85	2.80
WR199	"MEON" 50MHz TRANSVERTER	OCT 85	6.70
WR202	ECONOMY UHF PRE-SCALER	SEP 85	3.70
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WR177	DART (p.a.)	NOV 83	3.00
WR176	DART (v.f.o.)	NOV 83	3.00
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WR196	"TEME" 7/14MHz WRP (TX)	NOV 84	3.70
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WR166	"SEVERN" (RECEIVER/AUDIO)	JUN 83	6.50
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WR144	IAMBIC KEYER	MAR 82	6.50
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Radio Personality

Feature

Ron and Joan Ham - a well matched pair.

This month we offer a double value personality page as we profile the very well known and respected husband and wife team of Ron and Joan Ham. It's not often that such teams go together and it can be honestly claimed that Ron and Joan are unique and only come as a pair and to profile them separately wouldn't work!

Ron Ham has had a very long career in radio which started with the construction of a 1-valve radio when he was 10 years old. Ron quickly caught the radio bug and was soon to be found working on Saturdays in a cycle and wireless shop. At 14 he left school and worked in the radio retail trade from 1945 and was much involved with the increasingly popular television service - busily installing receivers for customers. It was while watching a Philips TV receiver he'd installed that he saw Sporadic-E long-distance reception of TV signals for the first time and it was that incident that triggered his life long interest in the study of propagation.

From 1950 to 1953 he worked for the South Eastern Electricity Board and married Joan, who he had met in 1948, during 1953. Since then the two of them have been inseparable and work together on virtually every project undertaken, although Ron freely admits that he can't cook!

During 1953 Ron was busy installing TV sets at the time of the mad rush to see the Coronation via the fascinating new service and during this time gained a great deal of practical engineering experience working with low-band v.h.f. television.

At Home

Since 1954 the couple have lived in the heart of the West Sussex countryside in the picturesque downland village of Storrington where Ron became a half-partner in a long established radio and electrical retail business - which is, he's glad to report, still thriving - until he took early retirement so as to concentrate on his writing and many other activities.

Living as they do in the beautiful West Sussex countryside, it comes as no surprise to find that both Ron and Joan are very keen gardeners. Along with their very large garden they have three greenhouses to look after and guests can always look forward to a good selection of home-grown vegetables at mealtimes. They are of course, also keen members of the active local horticultural Society.

Their cottage - 'Faraday'- is tucked almost under the slopes of the South Downs and it is hard to imagine that the outside world has ever intervened in the tranquil life of Storrington. However, as Ron delights in telling the visitor, the last war did come to Storrington and if it had come any closer they might have lost their home before they had even found it, because of a badly damaged German aircraft that had crashed almost opposite the house. This aircraft had been successfully attacked after it had raided Portsmouth and had not been able to gain enough height to fly over the South Downs. It crashed, narrowly missing what is now 'Faraday', in the field opposite the house. All the crew were killed and Ron recalls the story as it was told to him by a villager who was at the scene at the time and had witnessed the souvenir hunters amongst the wreckage.

Ron's own interest in aircraft, flying and radio led him to be an instructor for the Air Training Corps for many years. He encouraged many young people to take up radio as a hobby through this disciplined form of training and it was through his connection with the ATC that Ron and Joan first became involved in rifle-shooting. Although they are the last people to boast about their skills - they are both excellent shots and have enjoyed target match shooting for many years and are both qualified RAF marksmen.

Amateur equipment of the 1950s - one of the many exhibits at Chalk Pits Museum.

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Performance.

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features and options that other manufacturers still have on their drawing boards: Like **200 watts RF power output; Built-in TCXO*** for superior frequency stability; **Independent filter selection; Dual receive with balance control** and **two tuning knobs** for simultaneous reception in tough pile-up situations. Using **BPF-1*** allows cross-band dual receive.

And the FT-1000 options such as **digital voice-recording system (DVS-2)*** for storing and playback "CQ Contest" messages. On RX the DVS-2 has a 16-second running memory for playing back garbled calls. There's also a **CW spot control,** so you can align your frequency to that of an incoming signal without having to transmit; Plus **direct keyboard frequency entry; Front panel RX antenna selector; Built-in cascaded filters;**

Dual-mode noise blanker. And the receiver front-end uses a **four JFET up-conversion mixer,** for high dynamic range.

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*These items and some filters are optional

Propagation Interest

Propagation and astronomy has always been a great interest, especially the problems of Sporadic-E and tropospheric 'openings' and the resultant interference to television reception In 1968 Ron designed and built a solar radio-telescope which worked almost daily until 1984 when it was honourably retired after many thousands of hours of observations. The building of an instrument of this type by a radio engineer who was not involved in professional astronomy attracted a lot of attention and Ron soon found himself appearing on the Tomorrow's World programme with James Burke, BBC *South Today* with Andrew Harvey and a science film entitled *All For Love* made by Yorkshire TV.

Between 1970-73 this enthusiastic and dedicated observer designed, built and ran an instrument for the radio observation of meteors as the entered the earth's atmosphere. The instrument ran for 15 hours a day and it gathered an enormous amount of information and statistics on radio signals reflected from the ionised trails left by the many meteors that burn up in the atmosphere every day. Several other models of Ron's instrument were built by other observers after they witnessed the original working at Storrington but Ron still has Mk 1, although it has now been retired. Between 1970 and 1975 Ron took part in over 50 of the BBC World Service *World Radio Club* programmes and its successor *Waveguide*. During this period he also presented a programme on BBC Radio Brighton dealing with amateur radio activity.

Many of Ron's broadcasts on radio and TV were associated with the late Frank Hennig, who for so many years contributed to the national radio network and the BBC World Service programmes. It was the sudden death of Frank Hennig, at 53, that made Ron decide that he should retire - if that is the right word - from business to concentrate on everything else.

Broadcasting work and mutual interests have also brought Ron into contact with another specialist, Patrick Moore. Ron and Patrick have worked and co-operated together closely for many years. Patrick contributes on a regular basis to the propagation pages in the 'Backscatter' section in *PW*. Despite being an extremely busy man himself, the famous astronomer finds time to assist Ron Ham in his own specialist field from his own home in nearby Selsey.

Despite being an incredibly busy man, Ron finds time to be involved in the British Astronomical Association and has written for many technical journals including *PW* and our sister publication *Short Wave Magazine*. Since 1979 he has been immersed in the running of the vintage wireless collection at Chalk Pits Museum nearby in Amberley. This section of the museum is based on Ron's own collection and now is an ever-growing part of the proceedings. As Honorary Curator of the Museum - a title which is misleading as it cannot do justice to the amount of work involved! - Ron has appeared on TV and radio many times showing special guests around the unique displays of vintage German military radio equipment and the many other special exhibits, while Joan (amongst her many other activities at the huge 36 acre museum site) is the specialist librarian in charge of the historic wireless library.

A little history and a lot of personal attention for Alexandra and Charlotte Mannion at Chalk Pits.

Team Work

Both Ron and Joan insist that they are not individuals but are part of a team! The couple complement each other in an extraordinary way and this can be illustrated by the fact that when Ron gives a talk on any one of a multitude of subjects, Joan operates the projector during the slide-show. When Joan gives a talk it's Ron's turn to be the projectionist!

Joan has made her own mark in West Sussex as a local historian, journalist, publisher and bookbinder! Along with her work as a freelance journalist for *PW*, *Short Wave Magazine*, etc., she writes for local papers and also researches, publishes and binds her specialist books with help from Ron.

Joan Ham's interests are also very wide and she is active in many local activities including the Horticultural Society of which she was Chairman and Secretary for many years. Along with the interests in science, physics and local history which she shares with her husband, Joan has a particular interest in Genealogy and has discovered much about the family name and history. This interest led her to become a member of the West Sussex Archives Society which provides her with another outlet for her skills and also helps her with the research for the various book projects which are planned or under way.

Publishing Skills

As an author Joan has produced some interesting titles which are still proving to be popular. The first book was published in 1979 and featured Storrington in Pictures. Following the success of that book *Storrington In Living Memory* appeared in 1982 to be followed closely by *Storrington in Georgian and Victorian Times* and *The History of Storrington and District Horticultural Society* in 1987.

Another particular speciality that Joan has up her sleeve, is the restoration of ancient books and manuscripts which can entail many hundreds of hours of painstaking work. Her published book titles on local history have proved so popular that the couple are kept very busy in their bookbinding factory which has to double as a dining table at mealtimes!

No personality profile can ever do justice to this amazing couple. They really do come as a matched pair and as many past visitors (over 80 000 last year!) to the museum - which is set in old chalk-pit workings only a stone's throw from the mainline Amberley railway station - can verify , Ron and Joan Ham are very special pair of personalities! **PW**

Packet Update 9

Feature

Roger Cooke G3LDI reports on the ever growing popularity of packet and the implications of satellite-packet radio.

The launch of the new series of Microsats is due in early January. It was to have been early November but there has been a delay due to a technical problem with a previous launch. It will make a nice New Year present for us. Six are being launched, three of which will be of interest to the packet operator, Pacsat, Lusat and UoSat D from the University of Surrey team. The amateurs involved with these projects have put in an enormous amount of work, in design, construction and organisation of the satellites and are to be congratulated for their efforts. Most of the AMSAT and TAPR teams were involved in the Microsat project, whilst the University of Surrey team were responsible for the UoSAT D and E satellites.

Pacsat and Lusat are digital store and forward satellites. They will allow open access to a packet radio bulletin board to any amateur who has the correct equipment. They will use AX25, HDLC, NRZI as produced by any standard TNC. However, because these are operated from orbit, they will use mode JD. Mode JD, as defined by the Japanese, is 'Manchestered' FSK on the uplink and BPSK on the downlink. The hardware requirements are described in the Satellite column by Pat Gowen G3IOR. UoSat D will be carrying a packet radio experiment that will be operating a polling protocol with the satellite the master on top of AX25. This protocol will run in your computer and you will use a TNC running AX25 with a special modem. This satellite will operate 9600 baud FSK. The modem needed is K9NG compatible. These are available from TAPR and James Miller G3RUH.

The Pacsats will be used as flying BBS's in the usual way, using the satellites as a transmit device or a stored data device, enabling the 'human' to use it as he would a terrestrial BBS. It will also have real-time and stored telemetry files. However, the most interesting and innovative possibility is the introduction of a Broadcast Protocol. This will enable the reception of bulletins by a large number of terrestrial stations simultaneously. Assuming a 20K file on board the Pacsat BBS being read by 200 people. How long would that take? We only have a ten minute window every orbit, so the satellite will be tied up for a long time! However, with a broadcast protocol, all 200 stations would receive that file at one time. Another advantage of a broadcast protocol is that it does not require a transmitter at the receiving site. Also, the transmit and receive frequencies are on different bands. Pacsat will be the only transmitter on the downlink, thus removing the possibility of collisions, data-loss and QRM. This system, if it is successful, will be an ideal way of transferring large files around the globe. At present, all h.f. sysops have a 10K limit on bulletins, agreed at the last h.f. sysops meeting on the air.

Bandplans - Again!

Two concerned comments on the bandplans for h.f. packet as they stand at the moment. The first comes from John TG9VT:

According to the h.f. bandplan for IARU region 1 (Africa, Europe, The Middle East, Mongolia and the USSR) the following sub-bands are recommended for packet radio.

3.590 - 3.600MHz
14.089 - 14.100MHz
21.100 - 21.150MHz
28.120 - 28.150MHz
29.200 - 29.300MHz

If this is true, it is feared we could end up with 9kHz of 14MHz allocation for RTTY - just enough for a few mailboxes and goodbye to rag-chewing or DX on 14MHz. Packet has been intruding on 14.095 mark and below and there is a net on 21.095.2MHz and at times the ARRL bulletin cannot be heard due to packet. Another comment comes from Tom OD5NG, who is also concerned. Tom operates an AMTOR link, also operates packet and his comments are given verbatim.

"We do badly need a better bandplan, but not one arbitrary arrived at by a small selection of users.

"It must be an internationally agreed one by all parties, in the meantime RTTY baudot has only 20kHz of the band and even this is often blocked with commercial traffic then below that we have AMTOR with even less (10kHz) followed by by c.w. with 70kHz.

"One adverse effect I have noticed is that packet is coming lower and lower into the baudot and even into AMTORs small segment and consequently that the RTTY DX stations particularly are also having to move lower into the very small segment used by AMTOR.

"I do feel rather strongly about the encroachment of packet into the baudot segment and personally feel that until some agreement is reached, packet should remain in the slot just above the RTTY section.

"Packet is not the only growing mode short of space as AMTOR is very much in a similar position and my own personal opinion is that baudot, AMTOR and packet should all have a reasonable amount of space. With baudot/AMTOR/packet having 20kHz each. I also do think that c.w. could be moved down by say 20kHz to make space for packet and that AMTOR occupy the next 20kHz and baudot the next 20kHz.

"I stress that this is a personal opinion and I know there will be many in disagreement as well as in agreement, but time is running out and things are getting out of hand. We must sort ourselves out in an orderly manner.

"What do you think?

"73 de Tom OD5NG

"To comment, please use command: SB QST@ EU $

"Or directly to OD5NG: SP AMTOR @ SK7CS (with "OD5NG" as subject)."

This all serves to re-enforce my views, stated in previous articles, that we do need separate segments for different modes. However, the success of the Microsat missions, more of which are planned for the future, may relieve the h.f. congestion, once a network of suitably equipped stations are available.

International Packet

Jim Stone 4X1RU sent me a file earlier last month with his comments on the International scene as he sees it. Since he sent it, we have re-established forwarding with Moscow, in the form of Leo EK3ZO. Leo is at the Moscow State University and we have managed to pass traffic both ways. Leo Labutin UA3CR has some problems at the moment but he hopes to be back on in the near future. Here are Jims' very interesting comments:

The view from Israel, by: Jim Stone, 4X1RU dated 12 July 1989.

"Packet radio has expanded so much during this last year alone that as I write this the information contained here is rapidly becoming obsolete. The number of stations now using this mode has grown to the point where most BBS stations are simply over loaded due to the explosion of information which they are now handling. And if you think the v.h.f. networks are jammed, you should just see once what is happening on the h.f. international forwarding network.

"International forwarding is performed on v.h.f. as well as h.f. networks and it is obviously preferred to do forwarding, where ever possible on the v.h.f. bands and above. However, there are locations which are simply not accessible by any means other than h.f. These h.f. networks are being used, and sometimes misused, to provide the basic services of bulk store and forwarding between continents, between countries on the same continent and sometimes between stations in the same country where there is still no backbone v.h.f. network or the topography is prohibitive.The main purpose of the h.f. forwarding network is to handle long haul traffic.

"Most of this traffic is between countries where distances range up to approximately 5000km, but more typically up to 3000km. This traffic includes both bulletins and personal mail. There are a number of forwarding groups who pass traffic to one another on various frequencies primarily in the 80m, 20m and 15m bands.

"My forwarding partners for both bulletins and mail are:

SV1IW, I1HUH, LA6HX, EA4DYX and 5B4TX.

"My forwarding partners for mail only are:

GB7LDI, PA0SCH, HB9AC, HB9GL, F6ABJ and DK1QG.

"Russia is a special matter since at various time I was forwarding to RA3APR, RS3A and EK3AZO, all in Moscow. At the present time, there is no one left with a license to operate packet radio other than possibly RA6APR in Armenia. With this group and their extensions into other forwarding groups on either h.f. or v.h.f., mail and bulletins reach every BBS within a few days.

"In addition, there is now a v.h.f. link to Cyprus, 5B4TX. Costis now receives all bulletins that I receive and he is able to feed other stations that would otherwise not be able to receive bulletins and mail, such as EA3RCN in Spain and CT1DIA in Portugal. This link has reduced a lot of unnecessary QRM on the h.f. bands.

"The inter-hemispherical links are probably the most interesting and the most difficult to run. There are only two links running between the Western and Eastern hemispheres. One of them is run from the west coast of the United States to Hawaii and then on to Australia. The second link is running between Washington DC, on the east coast to my station in Israel and now there is an additional station in England, GB7LDI, who is also a partner in this link. This came about since the United States has third party agreements for amateurs with only Australia and Israel. Therefore, there has been no other choice but to route all Far East traffic through Australia and Europe, Middle East and Africa via Israel, and now also England. This may all now be changing since I understand that the FCC has rewritten the amateur rules and regulations permitting third party amateur only traffic and should become effective on 1 September.

"The station near Washington DC is N4QQ-1 and is located at the QTH of Art, KB4ZJ, who has dedicated his station solely for the purpose for passing trans-Atlantic traffic. His station sits permanently, 24 hours a day, on 15 meters. On the HF side of the link, his station is passive and waits until either GB7LDI or 4X1RU call him. On the VHF side of his link he sends all his traffic to either N4QQ or W3IWI for further forwarding. These are essentially the only stations that he forwards to. N4QQ-1 is set up to work with BBS's ONLY to prevent other stations from blocking the primary forwarding link.

"N4QQ-1 handles all traffic for the Americas. We have been receiving traffic from Canada, Mexico, Venezuela, Argentina, Chile and Brazil. There is even a station in Tahiti (FO5) which sends traffic to France by first going straight to N4QQ to catch the trans-Atlantic link. And he gets answers. The amount of traffic varies but usually runs from 30 to 70 messages, total, going in both directions. In addition, all AMSAT bulletins over this link and, MBLBBS, RLIBBS, REBBS and RTTYDX bulletins are received.

"The distance between Washington and Israel is 9400 km. The probability of us ever having good working conditions is slight and therefore we use the fastest possible parameters so that packets can be accepted and acknowledged before QSB and severe multi-path can distort the signals. The critical parameters we use are:

PACLENGTH = 32
RESPONCE = 0
DWAIT = 0
FRACK = 1
MAXFRAME = 1
AX25 = OFF (Level 1)
RETRIES = 15

"There seems to be some misconception that when two BBS's are passing traffic on HF that another packet QSO can be tolerated simultaneously. This just results in a severe slow down of channel through-put and leads to 'everybody going nowheres, fast'.

"We are continually plagued by other packet stations calling CQ on top of us, RTTY stations calling CQ or just sending RY's, CW stations calling CQ and numerous other clever individuals sending strings of 'dits', trying, and often succeeding, to dump the link. But with all this we are able to clear all traffic both ways every 24 hours 5 days out of 7. Half the problems are associated with QRM and the other half due to the lack of propagation.

"HF band conditions has been truly fantastic this Sun-Spot Cycle, but it won't continue forever. In a few years we will have to abandon 15m for 20m and the QRM there is horrendous. Hopefully, the PACSATs will be operational and the truly long haul circuits can be handled by satellite.

"I guess the most frustrating experience that has occurred is the failure to use packet radio to handle third party traffic during the earthquake in Armenia. Several months before this disaster struck, I had been in regular contact with Leo UA3CR on packet. He had been using my BBS as his 'HOME' BBS for several months and we had worked together spending many interesting hours getting our link to work good. Leo had then gone to the States and managed to acquire an IBM-PC some kind and MBL software. Within a few weeks he had the first Russian BBS operating under his son's, Evengi's, callsign, RA3APR. We were handling traffic several times a week between Moscow and Washington but there was not much traffic.Then the earthquake in Armenia struck. For several days I did not hear from Leo and then when we finally got together he told me that Evengi went to Yerevan to set up some kind of packet station with the call sign RA6APR. Leo was desperate for equipment. He was in contact with many amateurs in Europe and the United States to enlist their help. Many stations all over the world were ready and willing to assist. And help was sent. But then the problems became apparent. They turned out to be political and bureaucratic in nature and not technical. Equipment that arrived was held up in customs. Those individuals who came physically to help set up the amateur communications links were turned away. And the worst of all, even though within a few days after the earthquake, we had a good operational link on packet between Yerevan, Moscow, Israel and Washington, the United States and Russia never came to an temporary agreement on third party traffic.

"During the several months that followed I could tell from Leo's comments, which I was surprised to see aired, that he was terribly frustrated in his efforts to get things moving in Moscow. We all did the most we could but there are some things that remain beyond our influence.

"The primary justification for amateur radio is to give assistance during emergency situations. The international packet network is the ideal mode for handling traffic during such emergencies and this network is operational. It's daily use by countless stations all over the world proves that it is a dependable mode of operation for error free transmission of messages literally to any place in the world."

HF Forwarding

The h.f. mail has increased just lately, most of it personal mail, with one American in London writing about three or four letters per day to his family, all of whom seem to be licensed. Nice way to keep in touch with home! As I am writing this, the personal mail in the last two days has topped 90. This is not including all the normal bulletins that are shipped over from N4QQ from ARRL, AMSAT and the like. So, as you see, h.f. packet does work! Manos SV1IW, has just automated his station with computer control in such a way that he can be polled on one frequency and automatically QSY to any one of nine others to find a clear one for forwarding. He is working on antenna rotor control as well. Humans are definitely becoming redundant!

Odds and Ends

Please keep packet away from the beacon frequencies. There have been several complaints about QRM on 14.100MHz.

Please exclude packet from contests! A personal view, but wonder what you think?

That's about it for another month, comments please to G3LDI @ GB7LDI, QTHR or Tel: (0508) 70278.

73 and happy packeting. **PW**

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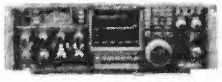

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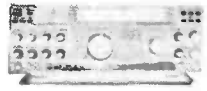

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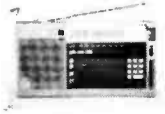

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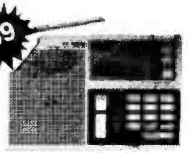

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TS790	2m & 70cms	1495.00
PS31	Matching psu	186.00
SP31	External speaker	63.00
TR751E	2m multimode mobile	599.00
TR851E	70cm multi-mode	599.00
VS1	Voice module	32.25
TM231E	2m FM 50w	289.00
TM431E	70cms FM mobile 35w	318.00
TM531E	23cms FM mobile	385.00
SP40	Mobile Speaker	21.00
SP50	Mobile Speaker	20.40
TM731E	2m/70cms mobile 50W	665.00
TM701E	2m/70cms FM 25W	469.00
TH75E	2m/70cms FM handy	398.00
TH25E	2m FM handheld	238.00
TH45E	70cms FM handheld	269.50
BC2	Charger	11.85
BT2	Dry case	11.86
SC8	Soft case	11.86
SC11	PB21H case	10.45
AD1	Screwed phono/BNC	3.95
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TH215E	2m handheld	228.00
TH405E	70cm handheld	245.00
TH415E	70cm handheld	268.00
SMC31	Speaker/mic	29.70
SMC32	Miniature speaker	23.95
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FRV8800	Conv. 118-175MHz	100.00
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IC765	HF transceiver	2499.00
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IC726	Compact HF tcvr.	989.00
IC735	HF transceiver	979.00
IC725	HF transceiver	759.00

ICOM RECEIVERS

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R7000	Rx. 25 MHz-2 GHz	989.00

ICOM VHF

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IC2SE	2m handportable	275.00
IC2SET	2M handy	
IC2E	2m FM handy 1.5w/BP3	235.00
ICO2E	+ keypad 3w/BP3	249.00
IC228E	2m FM mobile 25w	365.00
IC228H	2m FM mobile 45w	385.00
IC290D	2m multimode mobile	559.00
IC275E	2m multimode base AC	1069.00
IC4SE	70cms FM handy	310.00
IC4SET	70cms FM handy DTMP	310.00
IC4GE	70cms FM handy	299.00
IC448E	70cms FM mobile 25W	429.00
IC490E	70cms all mode mobile	625.00
IC32E	FM 2m/70cms 3/5W	399.00
IC24ET	FM 2m/70cms	385.00
IC3210	FM 2m/70cms 25W	499.00
IC2500E	FM 2m/70cms	635.00

ICOM SUNDRIES

ICPS15	Ext. 20 amp psu	165.00
ICPS45	Ext. psu 8 Amp	129.00
ICPS55	Ext. psu 20 Amp	192.00
EX310	Voice synthesizer	47.00
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SP3	External speaker	64.00
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AIR7	108-174 MHz + BC	227.00
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20809	2m 9 element beam	33.00
20818	2m 9 el. crossed	63.00

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CP4	4 band vert. complete	149.00
MM3	Min 3 element	359.00
TB3MK3	10-20 3 element 2kW	345.00
TB2MK3	10-20 2 element 2kW	234.00
TB1MK3	10-20 1 element 2kW	117.00
VR3	10-20 vertical 1kW	81.00

SEM

ZMATCH	160-10m 100W	145.00
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AIR-7	108-174 MHz AM/FM	227.00
PR0SO	150KHz to 225 MHz	299.00
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PS9	Mains adaptor for R537S	8.95
R535	VHF/UHF Air	249.00
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MTV6000	Base 25-1300MHz	379.00
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LC800	Soft case for AR800	3.50
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Best Buy!
The Jupiter scanners are now recognised as the best on the market. Ironically recent competitive models have underlined this fact!

Sensitivity.
The Jupiter is more sensitive than the competition. Our own tests and an independent review have shown this to be the case even at VHF. And when it comes to UHF, the Jupiter wins hands down.

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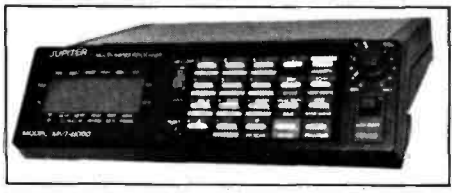
How often have you had batteries go down on you? With the Jupiter you can reduce this problem. It has a built in battery saver that will dramatically reduce battery drain.

Channel Steps.
It's nice to be able to change channel steps. Most scanners have this essential feature. But with the Jupiter when you change steps the frequency is corrected to the nearest channel multiple. Some models don't offer this which means that you will end up with some horrific muddles on the display and lots of missed stations.

25-1300 MHz* Mini-mobile/base JUPITER 6000 inc. P.S.U.

£345



Memories.
The Jupiter has struck a realistic balance in the number of memories and banks. 100 memories is more than enough for most mortals. And conveniently they are all empty when you get the receiver! What is more, you can empty all memories in one go or just empty them one at a time. Check the competition on this!

Pre-programmed Bands.
The Jupiter is the only scanner that has pre-programmed bands with proper upper and lower limits retained in its memory. Just two buttons to press and the receiver will scan between the band limits. Again, no other model offers this simplicity.

Last frequency retained.
Whatever frequency you last listened to is remembered by the Jupiter and it will be there again when you switch back on. Imagine the frustration with some models that insist on re-setting the frequency every time you switch off.

User friendly.
If you have ever owned a scanner that does odd things or performs functions in a most complex way, then you will know how tempting it is to throw it across the room! The Jupiter never invites such harsh treatment. It does everything in a most sensible and easy to understand manner. The fact that it is extremely sensitive is also rather comforting. Of course we can supply almost any scanner from stock. The choice is yours. But we have this old fashioned idea that our customers should be happy with their purchase. With Jupiter we have no such worries!

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R537S	VHF Air Exc	45.00	AOR900	Handheld VHF/UHF Exc	159.00
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PRO-32	Handheld VHF/UHF Exc	139.00	Datong	PC1 Rx converter Mint	89.00
PRO-32	Handheld VHF/UHF Good	129.00	DJ100E	2m Handheld Mint	179.00
PRO-34	Handheld VHF/UHF Exc	199.00	DJ500E	2m/70cm Handheld Mint	319.00
BC200XL	Handheld VHF/UHF Exc	159.00	DR510E	2m/70cm Mobile Mint	469.00
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REVIEW

The AEA PK-88 Packet Radio TNC

It has been said by many people that Packet Radio, offering 100% error-free world-wide digital communication, is today's most rapidly growing mode in amateur radio. Amateur satellites carrying store-and-forward packet radio message facilities orbit the earth, linking to the network of mailbox stations that automatically forward messages throughout day and night. Chris Lorek B Sc (Hons) AMIEE G4HCL reviews one of the popular 'starter' TNCs.

Many beginners to packet radio are overwhelmed by the complicated all-mode terminal units on the market, offering l.e.d.s galore together with manuals stretching to over 100 pages long. It must be said that the PK-88 is similar in many respects, however the multiple l.e.d.s are there only as indicators to tell you what is happening. The long manual goes into detail about the many facilities available, rather than needing you to fully understand every line. As such, once connected to your computer and radio, you can be on the air within minutes. Most of the standard commands have sensible 'default' values already programmed in for you, so there is no need to worry about things such as what to set the Paclen to, and whether you need the AX25L2V2 'On' or 'Off' before you start!

The PK-88 will basically give the average amateur every facility needed to get going on packet, to link to other amateurs or 'Bulletin Board' stations and, if required, to automatically receive messages from other amateurs and even to act as an automatic 'digipeater' when the radio and TNC are left switched on but the station is unattended.

The PK-88 provides all the decoding, encoding and transmitter control routines needed to send and receive packet radio. You will need a 144MHz f.m. transceiver capable of operation on 144.650 and/or 144.675MHz to link it to. This does not necessarily need to be a sophisticated all-mode affair, many amateurs use a low-cost ex-professional radio crystalled onto 144.650MHz for this. Other frequencies are used to a much lesser extent on packet, such as 430MHz and h.f., but you will normally find the 145MHz band to have the greatest activity. The PK-88 comes fitted with internal headers for v.h.f./u.h.f., spare headers are also provided in case you wish to use the unit on h.f. While you're in the shack, you'll need to connect a simple terminal or a computer operating in 'terminal mode' with a suitable program to allow you to see what is happening and to have QSOs.

The unit is quite small, measuring 35 (H) x 150 (W) x 190mm (D), and operates from a 13.8V power supply requiring a supply current of 550mA.

Computer Connections

The usual RS232 port connection is provided on the rear of the PK-88 to interface with your terminal or computer, as well as this a pair of headers are provided to give a t.t.l. level interface to some computers that do not have an RS232 connector fitted, the Commodore 64 for example. This interface requirement is worthwhile noting if you are considering purchasing a computer 'just for packet', make sure it can communicate through a serial port to the outside world! Unless you are using a dedicated terminal, you will also need some form of terminal program for the computer of your choice. Again make sure something suitable is available unless you have one of the popular computers such as a BBC or a PC clone for which an abundance of software is available. A straightforward pin-for-pin connecting lead is used between the TNC and your computer, if the thought of making one puts you off then several TNC suppliers and computer shops stock ready-made leads. Screened multi-way cable is advised to prevent any r.f. problems.

Radio Interfacing

An 8-pin connector on the PK-88 links to your radio, this needs to be connected to the transceiver p.t.t., transmit audio, receive audio, and ground connections, an optional squelch line may also be connected if available at the radio end, to prevent the TNC transmitting when a carrier is present. The PK-88 may incidentally, be internally linked to allow either positive or negative polarity p.t.t. keying, many Japanese sets and early UK transceivers employ negative keying, whilst later UK sets such as the Europa and Olympic use positive keying.

Powering Up

When first switched on, the PK-88 upon command goes through an 'Auto-Baud' routine, where it sends data to your terminal or computer at 300, 1200, 2400, 4800 and 9600 baud rates. Until the baud rate matches that set at your terminal, meaningless data appears on your screen, however when you have typed a few '*' characters the PK-88 matches your terminal baud rate, digital word length and parity automatically, what could be simpler? The default values are 1200 baud, 7 bits and even parity, but these may be altered at will. An internal lithium back-up battery is used to store these and other pre-set command functions when power to the TNC is removed.

After the PK-88 has recognised your terminal parameters, the following message appears on the screen;

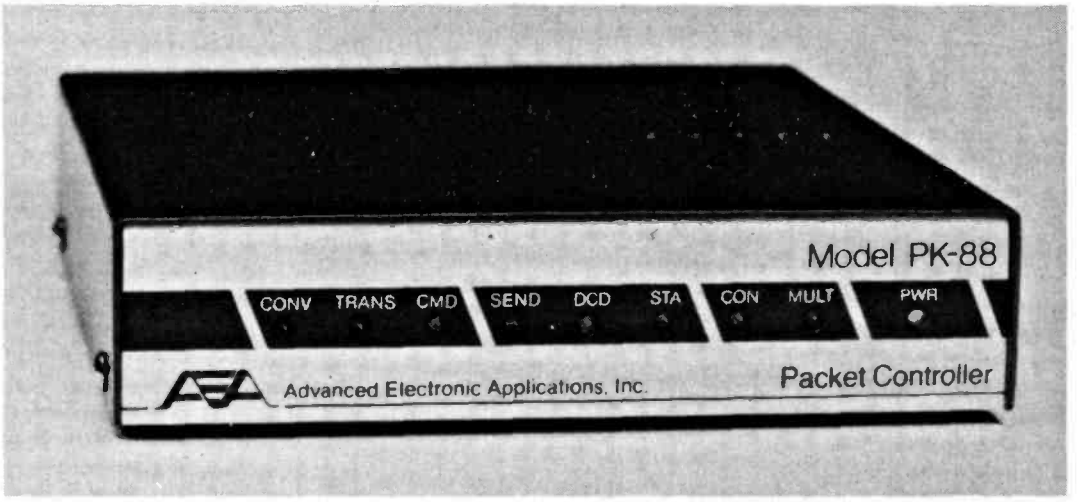
AEA PK-88 Packet Controller
AX.25 Level 2 Version 2.0
Copyright (C) 1986, 1987, 1988 by
Advanced Electronic Applications, Inc.
Release 29.APR.88
Checksum $D9
cmd:

The final 'cmd:' prompt indicates the unit is in 'Command' mode, i.e. awaiting any instructions, with the front 'CMD' l.e.d. being lit to indicate the unit's state.

Commands

The numerous commands which you may enter are common to those used by most other TNCs, the descriptions of all of these are beyond the scope of this review, indeed over 70 pages of the instruction manual are devoted purely to them! However the most commonly used are the simple commands such as 'Monitor' ON/OFF which allows you to monitor other traffic on the channel, 'MHeard' which gives a listing of the last 16 callsigns heard, and 'Connect' to attempt a 'Connection' to another named packet station. Other commands such as 'MYcall' to set your callsign, 'DIGIpeat' ON/OFF, 'DAYTime' to set the internal clock, 'CText' to set the automatic text sent to another station on connection and so on are used to a lesser extent, with the vast majority of other commands either being set once only or just left at their default values.

The front panel l.e.d. indicators show whether the TNC is in 'Command', 'Converse' or 'Transparent' mode, as an indication of the current control status. Further LEDs show the 'STA' which indicates if



any of your packets are awaiting acknowledgement, 'SEND' showing p.t.t. status, 'DCD' indicating data is present on air, 'Connected' and 'Multiple Connect' modes, and Power On.

Maildrop

A useful feature of the PK-88 is an internal 'Maildrop' programmed internally to the TNC EPROM software. This allows stations to connect to your station in your absence provided your radio and TNC are left on, and to leave you a message to read upon your return. It uses a sub-set of the standard national bulletin board station commands such as 'Send', 'Read', 'Bye' and so on, to ensure familiarity. This also means that, with prior arrangement with your local BBS operator, your PK-88 has the facility to automatically receive auto-forwarded messages addressed to you from distant stations through the national BBS network.

The PK-88's internal message memory capacity is 8000 bytes, i.e. a few A4 size pages of text. In compliance with the UK licence regulations 3rd party messages are not allowed by the maildrop software, this means all stored messages are either from you or to you.

Technicalities

The TNC uses the AMD7910 demodulator i.c. to ensure a reasonable rate of detection under noisy conditions, it has an input sensitivity of 5mV r.m.s. with a dynamic signal input range of 5mV to 770mV r.m.s.. An external modem may be connected if required, for 9600 baud usage on 23cm or store-and-forward packet satellites for example, HDLC rates of 45 to 19,200 baud are available from the TNC. A Z80 processor with a 32K battery backed RAM is used for operation, with 32K ROM.

The unit is compatible with TCP/IP protocol, and a software 'Host' mode may also be used to allow dedicated programmers to write support software to communicate using shorter commands, hence speeding things up by communicating directly with the computer.

Note that although many of the user commands are TNC-2 compatible, the PK-88 is not a TNC-2 clone, hence it will not operate with TheNet EPROMS for individuals or groups wishing to set up this type of network node.

On Air

After connecting the TNC up and setting the data rate accordingly on the Auto-baud routine, I commenced entering the preliminaries such as 'MYCALL G4HCL' and so on. It's often amusing to see the odd 'NOCALL' (the TNC default callsign) floating around on air, with their owner wondering why they're not having any luck until some kind amateur connects and tells them! Within two minutes of powering up I had 'connected' to my local BBS, and commenced listing the latest news and gossip message titles available for me to read.

After a period of successful operation from home, due to the TNC's compact dimensions I decided to become adventurous and take the unit out mobile, as a passenger in my car commuting between Cambridgeshire and Hampshire. My Z88 computer served as a terminal, a converted synthesised PMR rig purchased for £15 as the radio. On my journeys more than one amateur was astounded to see my periodic beacon 'Mobile CQ' message, with several QSOs resulting. It also certainly makes a change to be able to download the weekly RSGB news whilst travelling along, storing rally details and contest dates in computer memory rather than relying on frantic jottings on scraps of paper!

Throughout the review period the TNC operated perfectly when used with an Amstrad PCW9512, a BBC, and a Z88 lap-top, all operating in 'Dumb Terminal' mode to ensure I was testing the TNC itself rather than how clever any add-on computer software was. Further computer refinements are of course available, such as specialised programs for split screen operation, file downloading and uploading and the like. AEA for example have the PK-88 'Pakratt' program available for both PC Clones and the Commodore 64, this uses Host mode and offers more features than a simple terminal emulator. **PW**

Conclusions

The PK-88 appears to be an excellent starter TNC at a budget price of £129.95 inc. VAT plus £5 P&P, yet still has facilities such as Host mode and external modem expansion capability to provide for many future interests. The internal 'maildrop' is very useful to enable other stations to leave you messages in your absence, to be read locally on your return without the need for both amateurs to connect in to a remote BBS station.

My thanks go to ICS Electronics Ltd., Unit V, Rudford Industrial Estate, Ford, Arundel, West Sussex BN18 0BD for the loan of the review sample.

ICOM

THE NEW IC-2SE, SIMPLE OR MULTI-FUNCTION 144 MHz FM TRANSCEIVER

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The IC-2SE measures only 49(W) x 103.5(H) x 33(D)* mm with the BP-82 Battery Pack. Hold the IC-2SE in your hand to truly appreciate its miniature size. Weighing just 270g† with the BP-82, the IC-2SE will easily fit anywhere – on belts in shirt pockets, handbags, etc. *1.9(W) x 4(H) x 1.3(D) in. † 9.5 oz.

Simple design for operating convenience.

Even with its tremendous versatility and a wide variety of functions, the IC-2SE is easy to use. All functions are performed by a total of just six switches and three controls. The IC2SE includes both simple and multi-function modes. The result is two transceivers in one: both an easy-operation and multi-function transceiver. Simple mode ensures totally error-free operations. Multi-function mode allows you a variety of function settings depending on your operating requirements.

Other advanced features:

Reduced size doesn't have to mean reduced quality. The IC-2SE proves this with a wide variety of advanced functions.

- Tuning control on the top panel for quick QSYing.
- Monitor function that allows checking of the input frequency of a repeater.
- Function display that clearly shows all information required for operations.
- Splash resistant design and durable aluminum die-cast rear panel for dependable outdoor operations.

Options

• **BA-11, Bottom Cap.** Protective cap for terminals on the bose of the IC-2SE.

• **Battery packs and case.**

BP-81	7.2V, 110mAh
BP-82	7.2V, 300mAh
BP-83	7.2V, 600mAh
BP-84	7.2V, 1000mAh
BP-85	12V, 340mAh
BP-86	Case for six R6 (AA) size batteries

• **BC-72E, AC Battery Charger.**
Desk top chorger for the BP-81 - BP-85.

• **CP-12, Cigarette lighter cable with noise filter.** Allows you to use the IC-2SE through a 12V cigorette lighter socket. Also chorges the BP-81 - BP-85.

• **FA-140BB, 144MHz flexible antenna.**
Flexible antenna for 144MHz band operotion. Some type supplied with the IC-2SE.

•**HM-46, Speaker/Microphone.**
Combination speoker ond microphone equipped with on eorphone jock. Clips to your shirt or lopel.

•**HS-51, Headset.** Headset with VOX function thot ollows you hands-free operotion.

• **Carrying Cases.**

Carrying Case	Battery Packs, Battery Case
LC-53	BP-81
LC-55	BP-81, BP-83 or BP-86
LC-56	BP-84 or BP-85

• **MB-30, Mounting Bracket.**
Mounts the IC-2SE in a vehicle or on o woll.

• **OPC-235, Mini DC Power Cable.**
For use with a 13.8 V DC power supply

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Utilizing a specially designed ultra-small highly efficient power module, the IC-2SE delivers a full 5 W* of output power. Bring those distant repeaters into range.
* At 13.8V DC

48 Memory Channels.
The IC-2SE has 48 fully-programmable memory channels and one call channel. Each memory and call channel stores an operating frequency and other information required for repeater operations.

Convenient Repeater Functions.
The IC-2SE is equipped with programmable offset frequencies for accessing repeaters. All memory channels and a call channel store repeater information for your convenience. The IC-2SE includes a newly designed 1750 Hz tone call transmit function. A 1750 Hz tone call transmits when the PTT switch is pushed twice quickly.

Power Saver for longer operating time.
The power saver ensures lower current flow during standby conditions. Operating times are much longer than with older, more conventional transceivers.

Built-in Clock with timer functions.
The IC-2SE is equipped with an advanced 24-hour system clock with timer function. The transceiver automatically turns on when real time matches a pre-programmed time. This is perfect for scheduling QSO's. Auto power-off timers and other settings can be made in clock mode.

Convenient Scan Functions.
The IC-2SE is equipped with VFO and memory scan.
- **VFO Scan.** VFO Scan repeatedly scans all VFO frequencies. In addition, unnecessary frequencies can be skipped.
- **Memory Scan.** Memory scan repeatedly scans memory channels.

Auto Power Off Timer Function.
If you ever forget to turn the IC-2SE off, don't worry. It will turn itself off. Power-off time can be selected or deactivated using multi-function mode. Preserve battery pack power for the times when you need it most.

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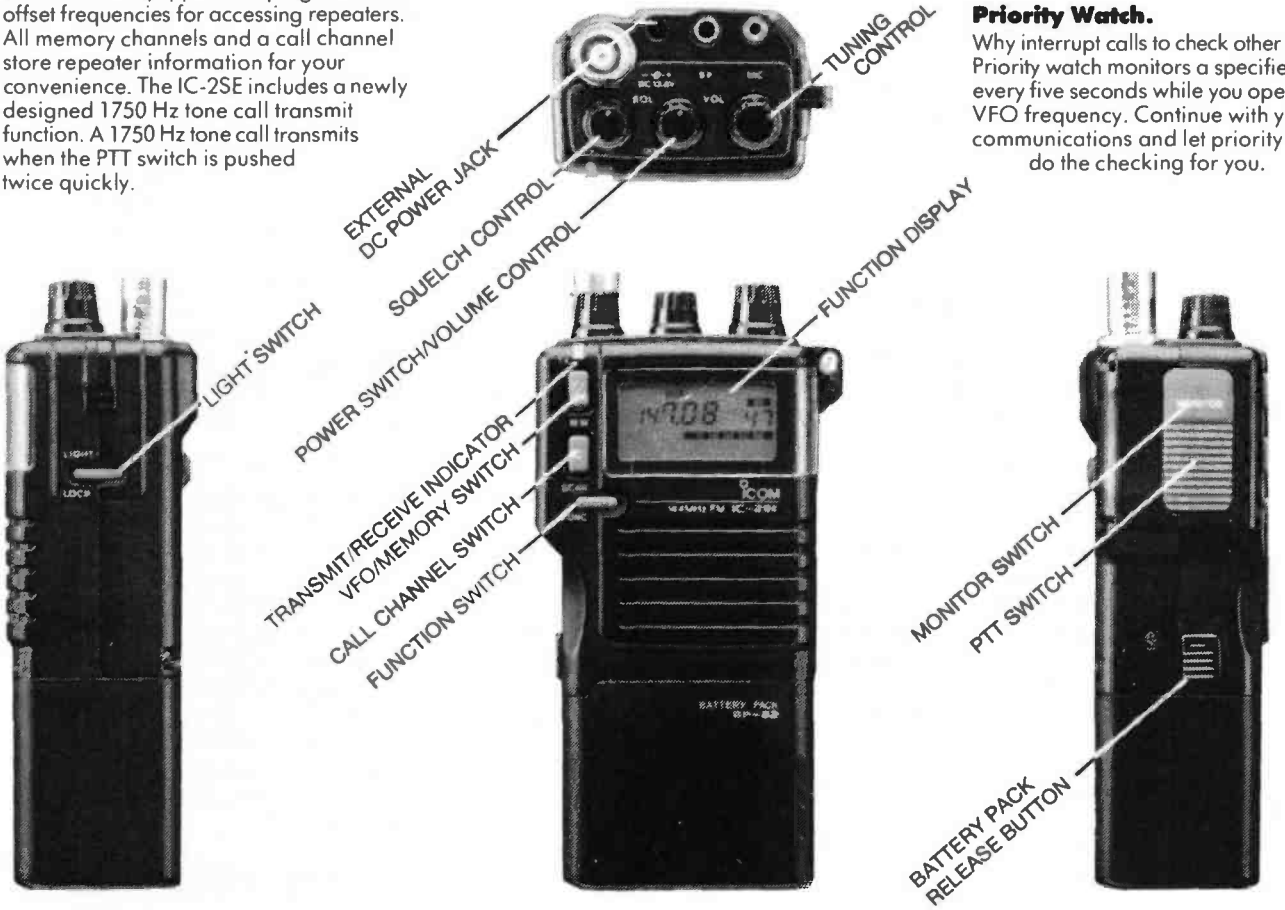

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Feature

G'day
News from Down Under

Greg Baker finishes his latest report on the latest developments in Australian amateur radio

A new, shorter regulations booklet, DOC71, has now been published though another, DOC72 *Amateur Service - Operating Procedures* is only now entering the printing phase before being released. Because of this, the regulations examinations are still being conducted on the old collectors item regulations book which was last modified in December 1978. This has caused confusion among candidates in this transition period and will continue until several months have elapsed from the release of DOC72 to allow the information in that booklet to filter through to all examiners and candidates.

The main changes to regulation, apart from deleting obsolete requirements, are the introduction of WARC '79 emission designations and a major change to novice licences.

Novice Licences

The Australian novice licence from its introduction has restricted holders to transmit at limited power on three segments of the h.f. bands. There were two problems with this. One was that Australia's v.h.f.-and-above-limited licence holders could not communicate on air with h.f. only novices. The other was the problem of reciprocal licensing arrangements with Japan. With increasing tourism between VK and JA, anomalies became apparent, in that JA telephony only operators were able to receive v.h.f. privileges in Australia and Australia's novices, who are better grounded in radio theory, could not.

To solve these problems DoTC has permitted novices 10 watts f.m. voice on the 146-148MHz segment of the 2m band. Novices and most other amateurs are pleased with the change, though some die-hards in VK7 are reported to have moved their net into the 144-146MHz segment to avoid novice contacts.

Callsigns

Because of a DoTC computer limitation and the difficulties involved in a manual system, VK9 calls are now issued randomly rather than as previously with the fourth character signifying location. Thus VK9L calls will not now necessarily come from Lord Howe Island.

The fourth character of VK callsigns are currently A to G inclusive, S and W for full calls; L, M, N, P and V for novices; J and K for combined limited and novice calls and, though UK amateurs would be surprised to hear them, R for repeaters and T, U, V, X, Y and Z for limited calls. DoTC is not keen to issue I, O or Q but H will no doubt appear in due course.

Loss of the 576MHz Band

The 576-585MHz (50cm) band, uniquely though temporarily, allocated to Australian amateurs until needed be broadcast services, has now been largely withdrawn. Operational ATV repeaters which use the 587-585MHz segment will be permitted to continue until these frequencies are needed in the coverage area for Band IV u.h.f. television. The pressure has come from the installation of large numbers of u.h.f. translator stations in Band IV and V, to give television coverage to hundreds of country towns across Australia. The WIA is looking to an ATV segment around 614-620 or 902-928MHz. Though the DoTC Spectrum Planning Section is examining the proposal, success is not likely.

Ionospheric Prediction Service

Australia's propagation forecasts come from the Ionospheric Prediction Service (IPS) now renamed IPS Radio and Space Services. The IPS is based around the joint US-Australian solar observatory at Learmonth on North West Cape in Western Australia. This facility uses both a radio telescope and an optical telescope to constantly monitor the sun when it is above the horizon. Reports are compiled using this information and information for IPS's other solar observatory at Culgoora near Narrabri in New South Wales.

The IPS has become very active in recent times.

In the past, their main output as far as the amateur service was concerned, was the standard GRAFEX charts of predicted propagation conditions from east and west coasts to a dozen or so target areas. These charts show for all h.f. bands, and across the twenty-four hour period, the sorts of propagation conditions to be expected. These continue in *Amateur Radio Action* magazine but have died in the WIA's *Amateur Radio* which now only runs a brief ionospheric summary.

In addition, though, IPS now offers more services to amateurs and to the general community. First is a

series of IPS user training courses. Each course costs $A75 (£4) per person for an all-day session of 3 two-hour lecture and demonstration sessions. The first session covers the scientific principles involved in ionospheric prediction, the second covers propagation and prediction formats and the third examines solar activity and the effects of short term solar disturbances. Participants receive an IPS User Training Manual. The courses are held on rotation in state capital cities and large country towns. Those wanting the course either at different times or other places can get their own presentation at $A500 (£225) per day plus the lecturer's travelling expenses and $A25 (£11) per participant for manuals.

Second is the availability for a cost of $A16 (£7) per year predictions for a user nominated eighteen circuits. Predictions are posted twelve times per year to subscribers.

Third is the IPS Frequency Prediction Calculator. This laminated sliding card calculator shows upper and lower frequency limits plus recommended frequency for paths of up to 1000 kilometres in the Australian region any time of day for any month, season or year. The cost is $A14.50 (£6.50) per year which includes the laminated card body plus a new slide posted at three monthly intervals to subscribers. It is ideal for mobile operators wanting to choose the most appropriate frequency for their h.f. communications.

The fourth is the Sydney IPS Solar and Geophysical Report recorded telephone message service, which gives a rundown on solar disturbance warnings, solar activity, the geomagnetic field and provides predictions of flux number and indices.

The fifth is SAPS - the Stand Alone Prediction System computer program and data files. It is suitable for predictions across any circuit in the world and outputs a myriad of ionospheric prediction information to 40MHz. User information files of such data as antennas available and their characteristics and operating schedules can be included for SAPS to use in its predictions and recommendations. As a bonus, the system calculates beam heading and distance. The system is on seven 360KB 5.25in IBM XT or AT compatible floppy disks and includes an historical data set from 1938 to the present and with predictions to 1990. Data updates, latest predictions and other useful solar information are provided in the Solar Geophysical Summary sent monthly to all SAPS purchasers. Users input this data to their existing database. Cost for SAPS is $A250 (£110). Advanced SAPS, ASAPS, will soon be available to SAPS users for an additional $A100 (£45) and will provide more advanced features.

Finally, the sixth IPS service is a propagation report five times a day Mondays to Saturdays from Radio Australia. First daily report is at 0425UTC.

Other News

My horror story of the decade comes from VK5. As part of South Australia's Jubilee 150 year celebration, a group of amateurs took VI5JSA aeronautical mobile in a Cessna 172. That sounds normal enough, but the antenna arrangements have alarmed all pilots who have come across the details. The antenna was an 11m length of wire, wait for it, weighed at the trailing end with a house brick! All the arrangement needed was a brief period of negative G-forces for the brick to smash through the fuel tanks, control surfaces or whatever. I shudder to think of it.

Australia's volunteers for the International Travel Host Exchange Scheme now exceed an astounding score. Any G amateurs interested in contacting these VK amateurs with a view to meetings and accommodation in Australia can contact the ITHE via the WIA at PO Box 300 Caulfield South, Victoria 3162, Australia, or the federal co-ordinator Ash VK3CIT at PO Box 539, Werribee, Victoria 3030, Australia.

Amateur Radio magazine has published a very useful list of current prices for a vast range of second-hand equipment in Australia. Covering about 250 transceivers, linear amplifiers, microphones, receivers, antennas and rotators, the list could be useful for any G amateur wanting to pick up gear on holiday here. I've sent a copy to a Hampshire *PW* reader interested in just that. For 4 IRCs, I'm happy to send the list to other interested *PW* readers as well. The compiler Jim Linton VK3PC at 4 Ansett Crescent, Forest Hill, Victoria 3131, Australia will no doubt do the same.

I reported some while ago that Australian Telecom was proposing to close the precise time and frequency station VNG. The station closed on 1 October 1987 leaving users to find alternative time and frequency standards. A VNG Users Consortium was formers in December 1987 to consider re-introduction of VNG services. It was estimated that $A40 000 (£18 000) was needed yearly to maintain services plus another $A10 000 (£4500) to relocate the VNG transmitters.

The $A10 000 was raised from 55 users and sympathisers and the transmitters moved to Llandilo near Sydney. Test transmissions began on 4.5MHz late in 1988 but have now moved to 5MHz.

The Australian Government has announced that subject to normal rules and regulations, broadcast licences will in future be allocated to the highest bidder. The idea is to ensure windfall profits from the use of frequency spectrum accrue to the government rather than to private interests. While I support the idea in principle, I hope it's not the thin end of the wedge as far as services like the amateur service are concerned. Imagine how much spectrum amateurs could afford if money was the sole criterion for frequency allocations!

And so I don't finish two columns in a row on a low note, there's a little gem from Chris VK3SR and published in *Amateur Radio Action*.

In the 1920s the Melbourne Cup results were sent by telegram to Perth. Because this took at least an hour, Perth bookmakers took bets up to half an hour after the race was run. Some enterprising amateurs used the opportunity to send the results to fellow amateurs in the form of a code based on radio terms. For three years they raked in a tidy profit until short wave broadcasters relaying 3LO from Melbourne put an end to it!

VK amateurs or s.w.l.s with the news of interest to *PW* readers can send it to me at PO Box 93, Braidwood, NSW 2622, Australia.

PW readers who write and would like a reply PLEASE send a couple of IRCs for return postage. **PW**

Back-Scatter

HF Bands

Reports to
Paul Essery GW3KFE
287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1RA

I started writing this piece in the run-up to the Christmas break, with the thought that there will be little activity on the bands, if only because mouths (and fists!) will be employed in rather more fundamental activities such as eating and drinking! To all those who sent Season's Greetings, my sincere thanks.

And, of course, I have a problem, in that the first issue in the new format omitted to indicate the deadline dates, so there was reduced input of data from which to construct this offering. So, please note they are: March 12, April 9 and May 14.

Conditions

Not bad, at that!, of course, there are ups and downs, but that is part of the fascination of it all. Of course, the events of the past few weeks in Eastern Europe have tended to over-ride mere considerations of DX, and make me wonder if we shall see significant changes like these reflected upon our amateur radio scene.

Goings-on

First, I hear that Conway Reef 3O and Banaba (Ocean) Is T33 will be added to the DXCC list on March 1. Cards may be offered after that date.

Talking of 3D, if you happen to have stumbled across 3D2XR, that was Mats SM7PKK on Rotuma. That takes the current DXCC countries total to 323 possible.

A new collection of prefixes to be noted; ES1- ES0 are the new ones for Estonia, from 1 January 1990. Also of course, by now most people will be aware of the LYs; but one believes there has also been a YL prefix from some station upon an island - does anyone know any details?

Laos is being well and truly knocked off the 'Most Wanted' lists in many a shack; firstly there was the XW8KPL activity, and then came XW8DX/XW8CW, located some 8km near enough for some visiting, and enabling the lads to knock Laos off their own totals! Operation by the HA lads was slated to continue at least to December 27, which rather wipes out the rumours of a Spratly visit. On the other hand rumour has it that a German station may visit Spratly for a period during March.

The Bouvet show should have come and gone by the time you read this; at the time of writing they were known to be en route but had not yet surfaced on 3Y. Just what is happening to the American Bouvet expedition on the other hand, seems clouded at the moment of writing, although I believe it is still intended to visit Bouvet, and it may surface after this comes to you.

However, one you should be able to catch after you've read this column is ST0; the news here is that PA3CXC has his permissions to operate as 6U0CW and and 6U0DX; the dates noted are either later February/early March, or late March/early April, the latter being rather more likely.

Reports

The quiet geomagnetic conditions noted at times during the month have been the spur for some useful low-band openings, although just when things seemed quite nice on 80m radio-wise, the rains and the winds made it difficult in other directions - a shack-full of water or a fallen antenna do tend to inhibit one's activity a trifle!

Pirates

Somebody in UK seems to have it in for the OYs.... Once again from the SW of England, this time using OY1B. If some kind soul would - with *appropriate gestures of course!* - find the person concerned and fit him with a suppressor, relations between G and OY would be improved. Come to think of it, amputation of the head is usually successful in such cases!

Another maggoty-headed individual is the one who persists in using the callsign G3WYD - if he says he is 'Don' from Bristol, then you hooked a Bristol Slim; the real one answers to Pat and is in Bishops Stortford.

Contests

February 17-18 is the weekend of the ARRL DX CW Contest, and March 3-4 the SSB leg. There are several rule changes, so entrants should study December 1989 *QST* for the gory details. Note that this one has a separate section for single-operator all band QRP, defined as less than five watts output.

February 23-25 is the weekend to trawl Top Band for the DX stations brought out by the CQ WW 160m SSB contest.

Top Band

This is a good 'un if only you have the room for a dipole firing E-W, or the courage for a high vertical and plenty of wire down below in the form of ground radials. Ideally of course, the high vertical - or a phased pair - and a nice string of Beverage covering the desired compass directions and a quiet electrical environment

It was nice to hear again from **G4AKY** who notes that he is no longer with MoD but has moved to DTI. When he used to report in regularly on Top Band Dave was around the 100 countries worked, but now he assures us he almost meets the 4X4NJ definition of a 'mature Top Band DX-er' namely 160 or more countries worked! One wonders what old W1BB thinks of that idea; Stew is much missed among the real Top Band addicts.

G2HKU (Minster) is another long-time Top Band operator, and Ted notes that he has used his s.s.b. for ON7BW, plus c.w. over to LX/OF3CB, LX7A, OH0MM, CT1AOZ, 4N9N, DF2RG, 4U0ITU, OY9JD and OK3TPV.

As for **G3BDQ** (Hastings) this winter has seen a marked reduction in Top Band activity, in favour of 50MHz. In addition, John has eschewed the early-morning stuff, and the late-night activity, but his occasional evening managed c.w. QSOs with RL7PAJ, UA9KAA, CT1UP, CT1NK, YO3APJ, VE1ZZ, W1ZE, WB3AAI and 4X6DK.

Finally to **G0HGA** (Stevenage) who has tried the band using a 20m wire and some 10m to act as a counterpoise. At the time of Angie's letter this had yielded contacts with G4TNI, G2AGC and G3JUT, although the latter dipped down in very heavy QSB immediately after they had completed the essence of a QSO.

The 3.5MHz Band

This again is a band where many people are inhibited from activity by the length of a half-wave dipole, and the fact that even if they have one, it won't cover all the band at reasonable s.w.r. The best compromise is probably to put up what you can, end-feed it against earth, and do as much as you possibly can to the earth. You won't have a band-flattener of a signal but you will be surprised at the improvement the work on earth and ATU can make.

G0HGA uses the same antenna for 3.5MHz as Top Band; on this band it made c.w. QSOs out to G3MCK, G8NT, G3USX, G3GIH, G3JUT, DL6UQ, DF1NY, DL6MAA, Y42AB, YU1KT, SP2LNW, LY3BS. LX7A and DL/PY2MIK.

Now I open the report of **ON7PQ** (Kortrijk) who offers as his 3.5MHz takings, c.w. of course, 8P9HT, P31AA, JF9DX, PY0GD, VK6HD, 7X4AM, FS/JA7RHJ, UW9OQ/ RW9H, ZD8VJ, 6W6JX, K0ZZ (S. Dakota) and ZB0MM.

The 7MHz Band

What a difference it makes to even the best receiver to have a decent switched attenuator for receiving available on this band.

G4XOJ (Billingham) comes in here, and notes that he worked c.w. with G4ITL, GW3PYD, GW4ZAG, GM3GKU, NN2U, VK3MRC, JW5NM, W4FDA, W2HT, NU1W, WA8M, SM6JWR, K6DC, UA3WEJ, UZ4PZG and G4AWI. The antenna for this activity was a grounded loop.

G0JBA (Sittingbourne) notes that at the time of his letter he had strong SE winds, and GW was getting it rather more strongly. The antennas survived at Sittingbourne, and indeed here save for a minor failure which took me less than five minutes to repair. Of late, activity has been in the main 144MHz s.s.b. - shame on you!! - but nonetheless some operating and a lot of listening have been applied. On 7MHz the word is of lots of G, GI, GM, GW and western European stations but nothing of any significant interest.

Now to ON7PQ. Pat is a dab hand on this band, and his crop includes TU4DT, XF4T, JT1BJ, JW8XM, VK6HO, PY0GD, SU1RR, XT2KG, V31TP, EL2CX, XX9OO, K9EL/VS6, TL8CM, ZB2/F2JD, JA0SI heard one morning at 0703 on the long path, 9M2ZZ, HL1IE, XW8CW and VK2KM.

Next letter from G0HGA who notes that she has K1VV, K1BU, KY1H, W3NX, K3SUI, WA2YSJ, NM2E, KQ3F, N4HB, KU3X with five watts, KJ3Q, N2RR, KZ1J, K0FW/2, KA4IFF (YL op), N4RU, W4BPC, KF2I/MM, VE2BOH, VE1AUU, VE1OK, J79DX, 8P9HT/K4BAI, HK1AMW, UZ9JXD, UA9MJA, CT3MAW, EA8AB, T77C, 4U1ITU, ZD8VJ, HB0PTB and a host of smaller fry.

Turning to G3BDQ, John managed s.s.b. with UF6VR, UI8LAD, UM8MCW, 5T5CK, plus c.w. to JA1KQX, JA6CNL, JA0SI, JA0QNT, CT3MAW, VK2KM, VK3MR, KK4UJ, K1BU, RD8X/UZ3QWX, UJ8JKK, 4X4YM, T77C, ZV7SY, UA0YO and KC6XO (Palau).

G2HKU went c.w. all the way, and his offering on this band includes OY7ML, UD6DKW, KY1H, UL7LEB, CT3M, N2MM and WZ4Z.

Finally for this band to **G3NOF** (Yeovil) who mentions his contacts on s.s.b. with PP2MAC and ZD8VJ.

WARC Bands

Paucity of reports here again; G2HKU has c.w. to GW3SB and CT3FT, while G3NOF comments that he heard little on 18MHz, but did make contact with TU2QQ.

The 28MHz Band

At times this band has been positively jumping. G3NOF notes 'opening time' was about 0800, and closing around 1900 with occasional extensions to 2030Z. Conditions haven't been quite on a par with previous months, but short path openings, 0900 for HL and JA, followed at 1000-1230Z by Asia and VK were noted. North Americans then took over until closing time, but little was heard of Africa or South America. Contacts using s.s.b. were rung up with A92FB, BY1PK, CT3FT, EL2CX, EL2FO, FS5R, HC2G, JAs, KH0AC, N1EDM/AM, TG0FRACAP (a conference station), TI1W, N9AG/J6L, OX3LX, TA3F, UW0MF in Zone 19, VK8NLV, VO2AA, VO2AC, WP4Q, XT2KG, XW8DX, XW8KPV, 3X1SG and 8P9EM.

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EABC80	1.25	EZ80	1.50	QQV02-6	19.50	6B7	3.25
EB91	1.50	EZ81	1.50	QQV03-10	5.00	6B8	3.25
EBF80	1.50	GY501	3.00	QQV03-10 Mul	15.00	6BA6	1.50
EBF89	1.50	GZ32	4.00	QQV03-20A	25.00	6BA7	5.00
EC91	8.00	GZ33	4.75	QQV06-40A	27.50	6BE6	1.50
ECC33	4.50	GZ34 Mul/GE	7.50	QQV06-40A Mul	39.50	6BH6	2.50
ECC35	4.00	GZ37	4.75	QV03-12	6.80	6BJ6	2.25
ECC81	1.75	KT61	7.50	R18	3.00	6BN8	2.00
ECC82	1.75	KT66	15.00	R19	9.24	6BQ7A	3.50
ECC83 Siemens	2.25	KT77 Gold Lion	12.00	SP41	6.00	6BR7	8.00
ECC85	3.80	KT88	16.00	SP61	4.00	6BR8A	3.50
ECC88	3.80	N78	15.00	U19	13.75	6BS7	8.00
ECC91	8.93	OA2	3.25	U25	2.50	6BW6	8.00
ECF80	1.50	OB2	4.35	U26	2.50	6BW7	1.50
ECH35	3.00	OC3	2.50	U37	9.00	6BZ6	2.75
ECH42	3.50	OD3	2.50	UABC80	1.25	6C4	1.25
ECH81	3.00	PC86	2.50	UBF89	1.50	6C8	3.50
ECL80	1.50	PC88	2.50	UCH42	4.00	6CB6A	2.50
ECL82	1.88	PC92	1.75	UCH81	2.50	6CD6GA	5.00
ECL83	3.00	PC97	1.75	UCL82	1.75	6CL6	3.75
ECL86	1.75	PC900	1.75	UCL83	2.75	6CG7 GE	5.25
EF37A	5.00	PCF80	2.00	UF89	2.00	6CH6	13.00
EF39	2.75	PCF82	1.50	UL41	10.00	6CW4	6.00
EF41	3.50	PCF86	2.50	UL84	1.75	6D6	3.50
EF42	4.98	PCF801	2.50	UY41	4.00	6DQ6 GE	12.00
EF50	2.50	PCF802	2.50	UY85	2.25	6DQ6B	4.75
EF54	5.00	PCF805	1.70	VR105/30	2.50	6EA8	3.00
EF55	3.50	PCF808	1.70	VR150/30	2.50	6EH5	1.85
EF80	1.70	PCH200	3.00	Z759	25.00	6F6	3.00
EF86	5.00	PCL82	2.00	Z803U	25.00	6GK6	3.50
EF91	2.95	PCL83	3.00	2D21	3.25	6H6	3.00
EF92	8.37	PCL84	2.00	3B28	15.00	6HS6	3.77
EF183	2.00	PCL85	2.50	4CX250B	91.00	6J5	4.50
EF184	2.00	PCL86	2.50	5R4GY	5.50	6J6	2.00
EH90	1.75	PCL805	2.80	5U4G	4.50	6J7	4.75
EL32	2.50	PD500	6.00	5V4G	2.50	6JB6A GE	8.50
EL33	7.80	PFL200	2.60	5Y3GT	3.50	6JE6C	8.50
EL34 Mullard	10.00	PL36	2.50	5Z3	4.00	6JS6C GE	11.25
EL34 Siemens	4.50	PL81	1.75	5Z4GT	2.50	6K8GT	2.75
EL36	2.50	PL82	1.50	6/30L2	1.75	6K7	3.00
ELL80	25.00	PL83	2.50	6AB7	3.00	6K8	3.00
EL81	5.25	PL84	2.00	6AH6	5.00	6KD6 GE	11.95
EL84	2.25	PL504	2.50	6AK5	5.99	6L6G	7.50
EL86	2.75	PL508	5.50	6AL5	1.50	6L6GCSYL	9.00
EL91	7.39	PL509	8.00	6AM6	5.02	6L6GC Siemens	4.50
EL95	2.00	PL519	6.00	6AN5	4.75	6L6GC GE	9.50
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Back-Scatter

The next stop is to G0JBA who offers HH7PV, JE8NZE, JH1LBR, JH8QBY, RA9ST, VE3BRO, W8LXK, and, on f.m., VE6VVS.

G0HGA used 30 watts c.w. and a half-wave vertical, which netted a fifty-minute natter with N1FNN, N4AR, NE3P and K2SWZ.

Just a single foray on the band for G2HKU yielded a c.w. QSO with W6DU.

G3BDQ was one of those who worked XT6KG (The Yasme crew, Lloyd and Iris Colvin), plus HI8FHD, UV9FM, VK6HQ, ZD7CW. All were on s.s.b.

Turning to the all-c.w. offering of ON7PQ, Pat mentions XF4T, VS6BG, PY1DFF/PY0F, D44BC, CM0A, SU1RR, KH0AM, KH2D, TU4B, J6DX, ZP0YD, 8P9HT, OX3XR, TL8CM, VP5P, XT2KG, CE0FFD (Easter Island) and 3D2ML.

The 21MHz Band

For many people this is the favourite; ON7PQ went the bundle on it, to the tune of 3C0GD, XF4T, W8NJR/J6L, KH0/JF2SKV, KH0AM, J79DX, KC6MX, 3D2ML, VP5P, V73AT, C6A/KR8V, TL8CM, XW8CW, YI1BGD and XT2KG.

On the other hand, G3BDQ seems to have confined himself to knocking off EC8ASD and 8P9EM.

As for G0HGA Angie uses the 28MHz vertical and managed KD2HE.

G0JBA offers a new prefix for him by way of ZM2BRS (a special from ZL), plus EC4CVA, VK2AMD, VK2AND, VK2KGY, VK2PEJ and VK3VAJ.

Opening on the long path at 0800Z, to HL/JA/VK/ZL, the band changes round to short path around 0900, G3NOF heard little from the Pacific area, but S. America was noted around 1000 and Africans around 1800-1900Z. As for the Yanks, they were about from around 1100Z until the band closed. Don booked in CO2RX, CP8HD, HL1CG, HL3UW, IQ1A, J88BS, JAs, JT1BV, JT1KAI, KG4DD, NP4WR, OH9SCL (Santa Claus Land!), OY9A, RA0AD/JT, UA2FEK, UA9WO/RW9J, UH8AAQ, UL7GY, UM8QAF, UW0LT (Zone 19), V29OA, V31BB, VE7DGI, VK2XG, VP2VE, VQ9IF, XT2PS, XW8DX, XW8KPV, YI1BGD, ZB2IZ, ZC4NC, ZL3RK, 9K2DB and 9N1RN.

The 14MHz Band

G2HKU mentions that he used c.w. and managed VK3VJ, NL7G, WB6HGJ, 4S7NR who was running 4W to a crystal-controlled rig, N8ABL, KP4L and HK3RQ.

G3NOF notes that he hasn't been too active on this band but he lists his contacts, on s.s.b., with KL7XD, TA5C, UL7GWB, UW1ZC/UA1O, XX9JG, XT2KG, XV2A, XW8DX, XW8KPV, 5H1TW, 9J1RL and 9Q5XX.

"Never really liked this band", says G0JBA, but he did manage to force himself to work EA7GOJ, and W1TTT.

Angela at G0HGA had a play in the CQ WW with 20W, and hooked lots of USA, W1-2-3-4-8-9-0 plus VE7ZZZ and CT3SM.

Just the one for G3BDQ, namely FY5YE, worked on the key.

ON7PQ keyed with 3C0GD, D44BC, JW9XG, KC6XO, SM0OIG/YN, PA0GAM/ST2, NY6M/NH4, XX9AF, XT2KG, TL8CM and C6A/KR8V.

Now we go to Billingham and G4XDJ again; VE6RGT, JY6ZZ, VE3OCP, UV9CBM, W5REA, SM6LJU, SM6MCW, G3KQN and SM6FFG all appear on his list.

Finale

Make a note on your calendar to listen out for GB4SMC, and give us a call; 1500Z April 14 to 1500Z April 15. We'll be looking out for old friends.

Apropos that Nunavut bit last time around, G3NOF notes that VE8CB is already in the area, at Cambridge Bay. Doubtless VE8CB is keeping it quiet, since if Nunavut does become a new one, he'll get no peace thereafter!

Unfortunately, I have to finish this month with some sad news. Frank Anzaloni W1WY passed away on December 30 at the grand old age of 87. He he will be very sorely missed by amateur all over the world, not least me, for his *Contest Calendar* which he has produced over the last 30 years.

For the very latest in what's happening on the h.f. bands, call Wireless Line on (0898) 654632.
See page 68 for full details

Back-Scatter

VHF Up

Reports to
David Butler G4ASR
Yew Tree Cottage
Lower Maescoed, Herefordshire HR2 0HP

Solar Data for December 1989

For the last few days of November, continuing through to December 3, there was an increase in solar activity, with, on November 26 and 27, a number of flares and ionospheric disturbances. On December 1, at 1340UTC, a sequence of proton events started, continuing through to December 3. During the afternoon and evening of December 1, there was an aurora but it was not very spectacular. As to be expected, the geomagnetic A index was very unsettled during this period, with a sub-storm level of 30 units being reached on the 1st. Solar activity considerably lessened during the period between December 4 and 10, with an unexpected decline in solar flux levels every day. These levels continued to fall for the next few days, reaching a minimum of 166 flux units on December 14. The geomagnetic levels generally remained quiet until December 16 when Boulder recorded the A index at 15. The radio quality indices remained below normal all of the period, although there was a good 50MHz opening to North America on December 11. From December 15, the solar activity steadily increased, reaching 285 flux units on December 27, the highest level since last September. During the period between December 22 and 30, there were a large number of flares and by consequence, solar alert and magnetic alert were in force for most of this period. This activity caused a number of reasonable auroras to take place on the 144MHz band.

The 50MHz Band

As to be expected, activity waned a little during December, although those fanatics with time to monitor the band 24 hours a day still managed to work the real DX. The latest forecast for sunspot maximum is that it will take place in March 1990. Operators of the 50MHz band should now book their annual leave for the months of February and March. Don't say you haven't been warned!

First up this month is a report from Scotland giving details of activity during November. **Ian Wilson GM1XOG** (SCD) runs an FT-690R, 10 watts and an HB9CV antenna at 20m above ground. Nothing was heard on the band until November 5 when contacts were made with SV1DH, SV1EN and ZC4MK. Conditions to North America were good on November 10, contacts being made with HC5K, a number of stations in the W1 call area, K8MMM and VE3KKL. P43AS, on Aruba, was worked, 59 bothways, on November 12 and many UK stations were worked on the following day via aurora. On November 16, another opening to the States gave s.s.b. contacts with stations in the W1, W2, W3 and W8 call areas. An aurora, between 1430 to 1830UTC on November 17, gave Ian over 30 QSOs with stations in G, GI, GW, PA and OH. Contacts were then made, in the few days, with HC1BI on the 18th, FY5AU, HH7PV, HIBW, KP4A, PJ9EE, 8P6JW and stations in W1 and W3 on the 19th, and HC2FG, V47SIX, and 16 stations in W1, W2, W3 and VE3 call areas on November 20. F2 conditions remained excellent for the remainder of the month. Between November 20/26, Ian worked 56 stations in W1, W2, W3, W4, VE1, VE2, VE3 and VO call areas. Excellent results with 10W and an HB9CV.

Another station running with an identical system is **Paul Feldhahn G7CFK** (MCH). During the last week of November, 33 s.s.b. contacts were made with stations located in call areas W1, W2, W3, W4, W8, W9, W0, VE1, VE2, VE3 and VO. On November 23, HC5K (FI07) was worked at 1230UTC. Gotaways during the month included YV4DDK on the 19th and 8P6JW on November 21. The South American beacon FY7THF was heard putting in a good signal around 1038UTC on the same day. Paul continued working the DX during December. In the period between December 7/14, the US was worked every day. More interesting contacts included EA8/G0KPW (IL18) and PZ1AP on December 13, and HH7PV (FK28) on the following day. Other DX stations heard but not worked were TU2MA on the 2nd, OA8ABT on the 3rd and the Ascension Island beacon ZD8VHF at 1058UTC on December 6.

John Hilton GM1ZVJ (LTH) has been on the band since June 1988 and has yet to work into England. John runs 2.5W from an FT-690R transciever into a 1/4 wave whip antenna. I trust John operates with the set on its side so that the antenna is horizontal! During an Auroral-Es opening on December 2, at 0109UTC, contact was made with OH1ZAA (KP01) for a new country.

Moving down country to South Wales, **Paul Baker GW6VZW** (GWT) reports on the DX heard and worked during the latter part of 1989. A new continent, country and square was obtained by working HC5K at 1223UTC on November 21. AF1T (FN43) was worked the next day, giving Paul another new square. On November 26, Richard EL2B was heard but not worked, however VO1QF (GN26) was worked later in the day. A number of other stations in North America were heard, including VY2ZZ (FN86) on Prince Edward Island. This latter station incidentally, confusing some of the inexperienced operators into thinking he was in the Yukon Territories (VY1) and not in the Maritime Provinces

Back-Scatter

(VE1). A change of propagation mode, Sporadic-E, on November 27, allowed Paul to work CT1WW at 1015UTC and SM7AED at 1715UTC. K3ZO (FM18) was worked via F2 on November 30. December started off with a number of DX countries being heard. On the 2nd, V29OA (FK97) on Antigua, popped out of the noise at 1230UTC. Frustratingly, TU2OJ, in the Ivory Coast, was heard on December 6, but the QSO floundered because the station was only speaking French. Other stations to be heard included PZ1AP, at 1215UTC, on December 9, and HH7PV and 8P6JW, around mid-day on December 13. Earlier in the day, on the 13th, a Sporadic-E opening to Scandinavia, allowed Paul to make contact with SM7FJE (JO65). A good opening to the States, on December 16, produced QSOs with KA1PE, W1RJA (FN31), W1GCI (FN42), WA1OUB (FN43) and VE1JH (FN66). More stations, mainly in W1 and W2, were worked in the run up to Christmas. Among the s.s.b. contacts were K1GPJ (FN44), KA1MVB (FN54), WA2TEO (FN31), K2QIE (FN12) and VE1AOE (FN85).

Bill Biltcliffe G6NB (OFE) reports that due to a local telephone breakthrough problem, the maximum power used has been 10 watts into a 3-element Yagi at 10m. He finds it hard going competing with the new 'generation' of long Yagis and well sited stations. However, it's all good fun when the band is open. November 30 was particularly good when QSOs were made with KP4D, KP4EKG, HH7PV, VP2VI plus the usual run of VE and W stations. Short Sporadic-E openings gave contacts with CT1WW on November 27, OH3MM on December 7 and with SM6AEK, SM6PU, SM7AED on December 21. During December, many stations were worked in call areas VE1, VE2, VE3, W1, W2, W3, W4, W5, W8, W9 and W0.

Dave Grey G8YYB (LDN) has seemed to have heard, if not worked, everything that was on the band during December. Contacts in the log included many stations in VE1, VE3, VO, W1, W2, W3, W4, W8 and W9. Notable DX stations and openings included W8VYF (EM79) on December 8, and K8EFS (EN72), K8WKZ (EN72), W8IDU (EN89), KD9IV (EN53), K9HMB (EN52), W9JUV (EN62) and AG9S (EN61), between 1745 to 1910UTC, on December 12. A Sporadic-E opening, between 1630 to 1700UTC, on December 21, gave QSOs with SM6PU, SM6AEK, SM7AED and OH3EX. Dave also made s.s.b. contacts, on December 23, with KG4SM (FK29), and, via crossband, OK3CM (JN88). Christmas Eve gave Dave a solitary contact with HC5K. Choice DX stations heard but not worked were D44BC (HK76) on the 16th, OA8ABT (FI21) on the 23rd, and HC2FG (FI07) on the 24th.

We now seem to be in a mid-winter lull, so writes **John Heys G3BDQ** (JO00). He reports that openings, on the south coast, are fewer and of quite short duration. John notes that the band may be open to North America for as short a time as 5 minutes. In a 35 minute opening, on November 30, contacts were made with stations in VE1, W3 and W4. It was very much the same the next day, with stations being worked in the same call areas in a 20 minute opening. OA8ABT was heard very weakly, at 1250UTC on December 3, with a number of Canadian stations being worked between 1339 to 1350UTC. Some nice South American DX in the shape of FY5AU (GJ34) and HC5K (FI07) was worked on December 4. Later in the day, at 1318UTC, whilst beaming to the south-west, VE1ZZ was worked, presumably via back scatter. John was another operator to hear the French speaking TU2OJ on December 6. At the time he was working an SV station. Between 1349 to 1610UTC, a number of stations in W1, W8 and W9 were worked. Although openings were brief, the band was open nearly every day from December 9 through to December 20. Pick of the dx during this period included PZ1AP at 1200UTC on December 9 and D44BC heard at 1150UTC on the next day. 9Y4VU was heard at 1220UTC on December 15, followed 10 minutes later by a contact with KP2A. John has now worked 37 countries but claims to have missed a number of the easy ones such as ZC4.

One of the lucky UK operators to work all continents on 50MHz is **Jim Smith G1DWQ** (DOR). On November 1, at 0911UTC, he worked VK4ALM (QG56), managing to crack a large pile-up. On the same day, at 1239UTC, the first W station of the season was worked. Having got into the swing of working DX, Jim continued the trend by working, on November 2, 16 stations in call areas W1, W2, W3 and W4. The completion of WAC was accomplished on November 5, by a contact with ZC4MK at 1022UTC, after waiting nearly 2 hours in a mega pile-up. Just to make sure that Asia was really in the bag, Jim worked VS6WV (Hong Kong) at 1159UTC, whilst beaming Stateside. Guantanamo Bay was worked on November 11, when KG4SM was contacted at 1248UTC. A good American opening on the 15th, put another 25 W/VE calls in the log book. An aurora, 2 days later, had Jim rattling the key, best DX in this event being FC1EAN (JN06) 55A 53A. It was back to the F2 DX on November 19, with PJ9EE, 8P6JW and many stations in W1, W2, W3 and W8, being worked from 1200UTC. A similar opening, on November 26, boosted the squares totals dramatically when numerous US stations were worked. It was a pleasure to break the monotony of the US openings by working, on November 30, at 0930UTC, C56/OH2FQ and later in the day from 1153UTC, HH7PV, KP2A and KP4EKG. New call areas, K9VGE (EN52) and WB0V (EN35) were contacted, between 1600 to 1700UTC on December 6. W5 was also heard but not worked. Jim mentions that by the middle of December he had notched up 132 Stateside contacts, 171 squares and 43 countries.

144MHz QRB Table
Distance in kilometres

Station	Tropo	Aurora	Meteors	Sporadic-E
G0CUZ	2943	1758	1996	2943
G0DAZ	1251	876	2026	2249
G0EVT	3080	1640	1808	3080
G0FYD	1315	1624	——	2019
G0ISW	1059	566	——	2057
G0LBK	3060	1755	1876	2350
G1DWQ	1454	1812	——	1836
G1EZF	1730	1757	1920	2375
G1KOF	3023	1421	——	2386
G1LSB	1319	733	1732	2723
G1SWH	3035	1429	——	2372
G3FPK	1835	1686	——	2337
G3LTF	1824	1846	2021	2174
G3SEK	1560	1681	1872	2154
G4ASR	2848	2029	2107	2853
G4DHF	1498	1530	2000	2448
G4JCC	1334	1158	1018	2173
G4MUT	1163	684	1533	2068
G4RGK	1466	1757	1920	2375
G4VXE	2862	1446	1501	2880
G4YTL	1404	1774	2025	2172
G4ZTR	935	1535	——	1978
G6DER	1834	997	1957	2068
G6DZH	1357	711	——	2233
G6HCV	2880	1450	1912	2880
G6HKM	1304	1555	——	2265
G6LEU	2620	910	——	2430
G8HHI	1742	——	——	2058
G8JDX	2667	1368	——	2663
G8LHT	3070	1780	1868	2510
G8MFJ	1209	1210	1329	2168
G8PYP	1083	1451	——	2318
GD4XTT	3053	——	——	1700
GI1JUS	3067	1614	1507	2216
GI8YDZ	1216	1809	1901	2562
GJ4ICD	1620	1100	2050	2090
GM4CXM	1428	1750	2100	2023
GM4YXI	3160	1881	2048	2513
GW6VZW	2830	1473	——	2236
ON1CAK	1420	1166	1948	2725
ON1CDQ	1420	1166	1948	2124

The 144MHz Band

Propagation during December was pretty uninspiring, although some stations situated in northern England reported good tropo conditions during the weekend of the 144MHz Fixed station contest, giving contacts with stations in Sweden, Germany and Poland. A few UK stations reported contacts with Latvia and Lithuania. Propagation was very localised, the ducting being caused by a subsidence inversion. Towards the end of the month there were a number of reasonable auroras. On December 29, some stations in eastern England, the Midlands and central Wales worked SK3LH (JP93). **Andy Stephen GM4IPK** (Shetland) reported an Auroral-E contact with UA1ZCL, the Russian station being heard for almost an hour.

Noel Moore GI7CMC reports that on hearing an aurora on November 17, he opened the December *Practical Wireless* to re-read the article on auroral operation. Following my advice, Noel went on to work six G stations plus PE1CIO, ON1ALD and ON4KST, the latter being 59A+ in both directions. Noel mentions that his site in Belfast has a poor take-off and that he was very pleased to work these stations with a nominal 10W into a 10-element Yagi.

John GM1ZVJ running 100W into a 16-element Yagi, worked G1DFN (DHM) and G6IJM (LNH) in the aurora on December 1 and GM1SZF (HLD) in a similar event on December 4.

In an aurora on December 27, John **Lemay G4ZTR** (ESX) worked GM0GTU (IO77) and GM4JJJ (FFE). Another aurora, on December 30, produced a solitary contact with GM0JOL (HLD).

Ian Wright GW1MVL (CWD) caught both tropo and auroral propagation in early December. On December 1, tropo accounted for ON2AER & ON4AUC (JO11) and FC1AMZ (JN09), whilst the aurora on the same day gave contacts with GI4KIS and GM4IPD. By the next day the tropo

QTH Locator Squares Table

Station	1296	430	144	Total
G3IMV	48	124	429	601
G4KUX	—	120	372	492
G3UVR	82	135	246	463
G4RGK	50	124	284	458
G3XDY	91	148	206	445
GJ4ICD	59	119	263	441
G0DAZ	27	128	277	432
G3JXN	87	134	179	400
G0LBK	46	89	254	389
G1EZF	—	93	263	388
G4XEN	—	111	274	385
G6HKM	46	109	217	372
G6DER	78	110	183	371
G4DEZ	49	49	249	347
ON1CAK	7	53	277	337
G4RRA	—	80	255	335
G3COJ	44	103	186	333
G4SSD	—	93	229	322
G4FRE	72	146	102	320
G1KOF	37	102	180	319
ON1CDQ	7	54	251	312
G4TIF	—	110	200	310
G1LSB	—	139	170	309
G4DHF	—	—	307	307
G1EGC	23	80	198	302
G8HHI	38	110	148	296
G8PNN	64	99	129	292
G6MGL	59	89	141	289
G4NBS	63	105	119	287
G8LHT	10	91	181	282
DL8FBD	—	—	280	280
G8ATK	45	91	143	279
G4MUT	31	93	153	277
G0EVT	—	57	206	263
G4PCS	—	3	258	261
G1GEY	11	77	168	256
G3NAQ	—	80	175	255
G6STI	24	69	152	245
G6DZH	—	87	154	241
G4IGO	—	—	238	238
G3FPK	—	—	236	236
G0EHV	—	75	160	235
GM4CXP	—	31	198	229
EI5FK	—	56	172	228

Station	1296	430	144	Total
G4MEJ	—	—	213	213
G8LFB	—	—	209	209
GW4FRX	—	—	204	204
G8MKD	—	49	150	199
GJ6TMM	—	48	151	199
G1SWH	—	57	141	198
G4YCD	—	—	197	197
GI1JUS	—	—	192	192
G4OOL	—	—	186	186
G4ZTR	30	50	97	177
G7ANV	—	—	153	153
G6MXL	16	45	91	152
GW6VZW	—	6	143	149
G4FVK	21	49	78	148
G4AGQ	1	42	104	147
G0FYD	—	1	142	143
G1OWQ	—	—	142	142
G8PYP	—	31	105	136
GW1MVL	—	22	109	131
G1WPF	—	29	97	126
G0FEH	—	24	101	125
G8XTJ	—	—	116	116
G1IMM	—	17	98	115
GM0HBK	—	—	107	107
GI4DWA	—	—	103	103
GM0GDL	—	22	81	103
G1TCH	—	6	95	101
G1SWH	—	53	148	101
G1DDX	8	16	73	97
G1SMD	—	—	93	93
G6MEN	4	26	63	93
G7ENF	—	19	70	89
G1CEI	—	15	74	89
G4WHZ	7	—	76	83
G0ISW	—	17	59	76
G0HEE	—	—	73	73
GU4HUY	—	—	73	73
G0HDZ	—	—	64	64
G1NVB	—	—	58	58
GM1ZVJ	—	—	48	48
GM0JDL	—	—	47	47
G2DHV	2	7	33	42
G7CLY	—	2	40	42
G7AHQ	—	—	34	34

No satellite or repeater QSOs
Starting date 1 January 1975

Back-Scatter

front had swung around to Scandinavia, giving Ian contacts with OZ1BUR & OZ1JVX (both in JO46), OZ1LLY and SM6KYR (both in JO57), SM6MNS (JO67), SM6NET (JO68) and SM6RTM (JO78). The band was still in good shape on December 4 and s.s.b. QSOs were made with ON1CDQ (JO20) and DB8KJ (JO30).

The Scandinavian opening on December 2 didn't suit everyone. **Ela Martyr G6HKM** (ESX) reckons the signals were going straight over her head with only SM6NET, SM6RTN and LA9DI (JO59) making it into Chelmsford.

David Law G0LBK (YSS) thought that the Geminids meteor shower was poor compared to other years, the peak appearing at about 0500UTC on December 14. The longest reflection heard was about 6 seconds. Stations worked on c.w. included EA3BEW, HG7KPL, HG7UL/P, I0NLK, IK0FEC and IK1LGV. David asks if meteor showers are getting worse or is he getting complacent? I'll have to make a few assumptions about when David was playing the meteors, probably 0000 to 0800UTC. Most of the contacts made were on a south-easterly beam-heading from Rotherham which, according to my calculations, would produce best results between 0200 and 0600UTC, the times when David was active. It is sometimes the case that operators can get poor results after upgrading the antenna system. Confused? Well, let me explain. A single long Yagi may have a typical vertical beamwidth of between 30 to 40 degrees. Noting that the ideal m.s. geometry is when the meteor trail is mid-way between both stations, and at an elevation angle of 45 degrees, a single Yagi, mounted high above the ground generally gives very good results, up to 2000km or so. In David's case, the antenna system consists of two 14-element NBS Yagis. The vertical beamwidth of this stacked array may possibly be as low as 15 to 20 degrees. Further calculations show that the ideal vertical angle for communication into Hungary and Italy should have been around 50 to 60 degrees. Perhaps this is the reason why the shower and reflections seemed poor. Each shower has different characteristics. The Geminids shower, for example, is noted for its long duration meteors peaking about three hours later than the main peak.

All this information about meteor scatter has reminded me that **Peder Rodhe SM6DWF** is interested in early morning schedules on c.w. via sporadic meteors. He is testing an automatic device for receiving high speed c.w. signals without the use of a tape recorder. He can receive speeds up to 2500 letters per minute. Peder's address is Kallsprangsgatan 5, S-413 20 Gotenborg, Sweden.

The 430MHz and Microwave Bands

Not very much was reported regarding the u.h.f. and s.h.f. bands although tropo conditions were particularly good during the period December 2/3, enabling many contacts to be made from the UK into central Europe.

Annual v.h.f./u.h.f. table
January to December 1989

	50MHz		70MHz		144MHz		430MHz		1296MHz		Points
Station	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	
G1SWH	67	33	71	7	93	24	60	9	—	—	364
G6HKM	57	46	—	—	82	29	50	18	36	10	328
G8LHT	56	17	34	5	79	31	53	15	8	4	302
G4ZTR	30	17	49	8	73	27	25	8	23	5	265
G0IMG	69	29	41	5	56	12	27	5	—	—	244
G1DOX	36	18	49	6	66	18	29	8	16	7	241
G6NB	70	44	—	—	56	17	26	4	—	—	217
GW6VZW	72	33	—	—	75	21	—	—	—	—	201
G4LDR	43	12	—	—	61	16	52	12	—	—	196
G8PYP	34	27	1	1	59	26	29	11	—	—	188
G4XEN	21	9	13	2	63	21	33	9	—	—	171
GD4XTT	34	9	—	—	57	15	30	11	—	—	156
GM4CXP	28	11	4	1	61	19	4	2	—	—	130
G0EVT	24	24	—	—	40	29	6	7	—	—	130
GM1SZF	33	11	—	—	57	16	5	6	—	—	128
G0EHV	—	—	44	5	62	16	—	—	—	—	127
G0FYD	3	5	—	—	88	23	4	2	—	—	125
G8XTJ	40	14	—	—	54	13	—	—	—	—	121
G3EKP	25	15	27	6	25	7	5	4	—	—	114
G4VOZ	—	—	64	8	—	—	31	7	—	—	110
G1VJP	15	4	—	—	74	12	—	—	—	—	105
G1TCH	21	23	—	—	38	15	—	—	—	—	97
GW4HBK	—	—	61	7	—	—	24	4	—	—	96
G1CEI	5	5	—	—	51	14	8	4	—	—	87
GW1MVL	—	—	—	—	56	22	3	4	—	—	85
G7CLY	—	—	—	—	58	14	4	1	—	—	77
G7CFK	43	33	—	—	—	—	—	—	—	—	76
G3FPK	—	—	—	—	51	19	—	—	—	—	70
G1GEY	4	2	—	—	—	—	34	8	2	2	52
G4AGQ	—	—	16	3	14	8	9	2	—	—	52
GM1ZVJ	3	4	—	—	26	16	—	—	—	—	49
G0HGA	—	—	—	—	32	12	—	—	—	—	44
G6MXL	2	1	4	1	7	4	8	5	—	—	33
G0HDZ	—	—	—	—	25	4	—	—	—	—	29

Geoff Pike GI0GDP (ATM) made the most of prevailing conditions on both the 430MHz and 1296MHz bands. Running a home-brew MRF646 430MHz amplifier at 40W output into a 19-element Yagi, a large number of qsos were made on December 3. Contacts into G were mainly restricted to stations in locator squares JO01, JO02 and IO90. Continental contacts included ON1BXQ, ON4ZN, PA0FRE, PA3AEF, PA3DTL, PA3DZZ, PE1GHG, PE1LCG, PE1LCL, all in JO21, and with PA0AP and PA0EZ in JO22. Most of these contacts were around a distance of 800km and Geoff comments that it was very difficult to decide on which band to operate. When he did make it to 1296MHz, the conditions were found to be just as good if not better than 430MHz. The beacon GB3MHL was first copied at 0700UTC at 599+ but no real DX was heard until 1256UTC. As with 430MHz, G contacts were restricted mainly to stations in locators JO01 and JO02. Continental QSOs were made with ON7YK, PA0FRE, PA2JOK, PA3AEF, PE1GHG, all in JO21, and with PA0AO in JO22. Best DX of the day occurred at 2040UTC, when DL2KBB (JO30BT) was worked over a 910km path, with S9 signals bothways. The 1296MHz station at GI0GDP consists of an FT-290R, into an LMW transverter, driving a 2C39 p.a. to 30 watts output. The antenna system is a group of four 26-element DL6WU Yagis. A mast-head GaAsf.e.t. l.n.a. is also used, being particularly useful at this frequency. Geoff comments that this was his first tropo opening on 1296MHz. It was very enjoyable, but at the same time frustrating to hear GB3MHL for 6 hours before activity picked up. I suppose the 144MHz contest occurring at the same time didn't help matters much.

During the 430MHz cumulative contest on November 30, Ela G6HKM made 60 QSOs but nothing new was worked. Ela was one of the few G stations to appear in the log of GI0GDP on both 430MHz and 1296MHz on December 3. On the same day s.s.b. contacts on 1296MHz were made with GI4OPH, G1SLE, G3UVR, G4OIG, G4XEN, G6LZO, G8UYR and DL2KBB. The previous day had seen contacts with ON1CAK and ON1CDQ.

VHF News

As of January 4, another European country, Denmark, has obtained permission to operate on 50MHz. More details as and when I get them.

The RSGB VHF Committee would be interested in finding out if there are any nets, or stations using f.m. above 51.1MHz. If you know of any activity at the top end of the band, please let me know. Still on the 50MHz theme, the VHF Committee have recommended that 50.185MHz be used as the centre of crossband activity. This is to encourage crossband contacts to be moved out of the DX working zone between 50.100 to 50.130MHz.

Whilst on the subject of band occupancy, I have just received two letters, both commenting on the same theme. **Ron Wilson G4NZU** reports that the v.h.f. bands were very quiet during 1989. Ron reckons that the level of activity has been dropping quite noticeably over the last few years. Sporadic-E and Auroral openings do not seem to have excited the level of activity of former years. Contest activity has also declined, hence one must wonder what is happening to our hobby. Ron's mentions that his c.w. ladder score has shown a steady drop over the years to such an extent that it is now a struggle to find new stations. A letter from **Pat G4AGQ** echoes the same. On the 70MHz and 432MHz bands little activity is noticed outside of contests. He has called CQ for a couple of hours on a number of Sunday mornings without any replies on either band. He also mentions that activity on 144MHz c.w. is well down on previous years. Pat suspects it is due to a combination of excellent h.f. conditions and the release of the 50MHz band to B class licensees. I personally don't think that the release of 50MHz is to blame. Most certainly band occupancy has been on the decline in recent years. You may recall that in last month's column I reported that the move from 25kHz to 12.5kHz f.m. channelling will now not be implemented purely because activity, even on f.m. has reduced. Statistics from the RSGB Repeater Management Group back this up. Perhaps everyone has gone onto Packet Radio. Who knows? What should we do about this decline? Does it matter at all? I would be interested to hear your views. Assuming of course that you can make the effort to write a letter!

Des Carne G6HRH (CNL) passes on the news that there are now two more stations active on 70MHz from Cornwall. Des, located in Par and Clyde G6XNH, in Newquay, both have Microwave Modules transverters and listen most days, beaming to the north-east. They also have an f.m. sked each evening on 70.425MHz using horizontal polarisation. Whilst on the subject of 70MHz f.m. it should be noted that the Chiltern DX Club Packet Cluster system officially started on January 1 using the callsign **GB7DXI**. Access is on 70.325MHz, the packet working frequency, or via WOK22 on 144.675MHz. Operators may care to note that 70.4875MHz is also used for packet radio.

Wet Squares

The Royal Research Ship *Challenger* will soon be carrying out a scientific cruise, between March 1 to 31, in the Atlantic Ocean, west, and north of the UK. The ship

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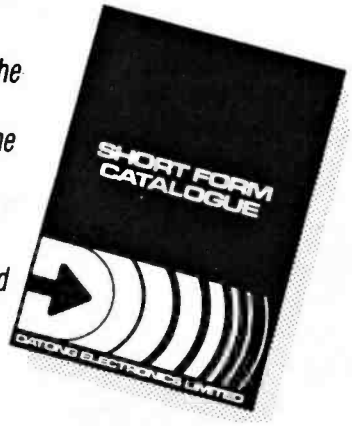

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Back-Scatter

will sail from Barry, South Wales, on March 1, via locator squares IO81, 71, 61, 51, 41, 42, 33, arriving in IO34 on or about March 4. The area covered by locator squares IO35, 36, 45, 46, 55, 56 will be visited between March 8 to 11. *Challenger* will then sail to Torshavn in the Faroe Islands via locator squares IO65, 66, 56, 57, 47, 48, 58, 59, IP50, 51 and 61, arriving overnight on March 19. It will then continue via IP72 to an area covered by locator squares IP81, 82, 83, 91, 92, being in this area between March 22 to 27. Moving southwards she will sail via IP81, 80, IO89, arriving in IO88 on March 29. *Challenger* will then proceed down the North Sea, through locator squares IO88, 98, 97, 96, JO05, 04, 03, 13, 12, docking in JO02, Great Yarmouth, on April 1. **Andy Adams GW0KZG/MM**, 2nd Engineer aboard R.R.S. *Challenger* will again be operating on 144MHz, using a Trio TR-9130 and Microwave Modules 100W amplifier into either an 8-element Yagi, or an 8 over 8 slot-fed Yagi by Jaybeam. A 5λ/8 vertical collinear can also be used if necessary. Andy hopes to be active during any auroras and maybe try meteor scatter, although during this period there will be no meteor showers to aid communication. The dates are approximate and are subject to weather and operational delays. Operating times, to fit in with work schedules, will be 1200 to 1300UTC, and 1700UTC onwards. Some operation will be possible on Saturday afternoons, again depending on work loads. Operation will not take place during port calls, or whilst in Foreign Countries territorial waters. QSL cards can be sent either via the bureau, or direct to: Mr A Adams, 2nd Engineer, RRS Challenger, c/o Natural Environment Research Council, Research Vessel Services, No.1 Dock, Barry, South Glamorgan CF6 6UZ.

I can supply, on receipt of a stamped addressed envelope, a locator map giving a plot of the proposed cruise track. In addition you will also get a mapped plot of the cruise commencing April 4, lasting 30 days, covering most of the wet squares in the North Sea. Details of this trip will be in the April issue of PW.

Just a reminder that GW0KZG/MM is not the only station to be found sailing around the North Sea. For some time LA0DT/MM has also been active from a watery location in the North Sea. When active; he usually operates every other month; he can be found on 144.300MHz or 144.275MHz. He will also use c.w. if requested.

Beacon and Repeater News

Recently the RSGB VHF Committee discussed which frequency within the 70MHz band should be utilised for unattended low power beacons running with a maximum power of 14dBW e.r.p. It was decided that a common frequency of 70.070MHz should be used for this purpose. Readers who are unclear on unattended station operation should refer to page 3 of the Amateur Radio Licence booklet BR68, issued by the DTI.

The packet radio mailbox, GB7DAD, located in Matlock, has recently commissioned two new ports, one on 50.650MHz for user access and a trunk link on 1.3GHz.

Annual c.w. ladder

	Band (MHz)				
Station	50	70	144	430	Points
G4ASR	121	7	386	1	515
G4OUT	-	31	240	-	271
G4NZU	7	19	236	3	260
G0HGA	-	—	192	-	192
G4XEN	7	—	144	9	160
GM4CXP	29	1	114	1	145
G0FYD	-	—	117	-	117
GW4VVX	-	—	73	-	73
G4AGQ	-	15	53	-	68
G4VOZ	-	46	—	8	54
G3FPK	-	—	32	-	32
G0FYD	-	—	31	-	31
GW4HBK	-	22	—	-	22
GD0ELY	1	—	14	-	15
GW4VVX	-	—	9	-	9

Number of different stations worked since January 1 1989

The Wirksworth packet node also has two new ports, one on 70.4875MHz and the other linking to the rest of the network on 1.3GHz. This is in addition to the existing port on 432.675MHz. You can get more information from G0CXD.

The Bury St Edmunds packet repeater, GB7EA on 144.650MHz has ceased operation permanently.

PW VHF Award Scheme

In recent months I have received a number of applications for details of the *PW* v.h.f. awards. The scheme dates back to the days when Norman Fitch G3FPK wrote this column in *Short Wave Magazine*, so it has been decided to close the old scheme. Anyone who has already obtained their basic certificate can apply to the Editorial Offices for the approriate incremental stickers. Details of any new schemes will be publicised as and when they are finalised.

RF Software for IBM Compatibles

I don't really want to turn this column into a computer buff's corner but there are times when it is worth mentioning specific software of use to the v.h.f. enthusiast. For a number of years I have been handling the release of material based on articles by Ian White G3SEK on front end optimisation (TCALC) and long Yagi design (DL6WU). Additionally, I also distribute the US/UK RF library of BASIC programs. These programs cover r.f. design, Antenna design, Propagation and other areas. Programs on the US/UK library disk include design of microstrip circuitry, v.h.f. front end optimisation, DL6WU Yagi design, gamma match design, an upgraded MINIMUF program, path loss calculators, WA1JXNs multi- function moon tracker, G3SEKs e.m.e. program, W9IPs famous meteor scatter program, satellite trackers and much, much more. A total of 33 excellent programs are crammed into one 360K disk. Two new program disks are also available. The first one is VK3UMs do-anything e.m.e. program - a real masterpiece. Facilities include tracking the moon, sun, stellar radio sources and quiet sky. The program will calculate mutual moon windows and spatial polarisation offsets for any two locations, and has a signal/noise calculator and a 2.5 minute sequence timer for good measure. The program is written in Turbo Pascall and is distributed as a compiled, ready to run .EXE file with full instructions. The other disk is MACE, an l.f. to v.h.f. circuit program, written by Roger Blackwell G4PMK. Specify the values of components and how they are to be interconnected, and MACE will predict the frequency and phase response of your circuit. The disk is distributed as a compiled and ready to run .EXE file, with documentation and sample circuit and device data files.

To obtain any of these three disks, sent me sufficient 360K formatted 5.25in disks plus return postage and packing. As you are getting this material free of charge, it would be appreciated if you could include some details for this column. Even an updated entry for the various tables would be useful.

QRZ Contest!

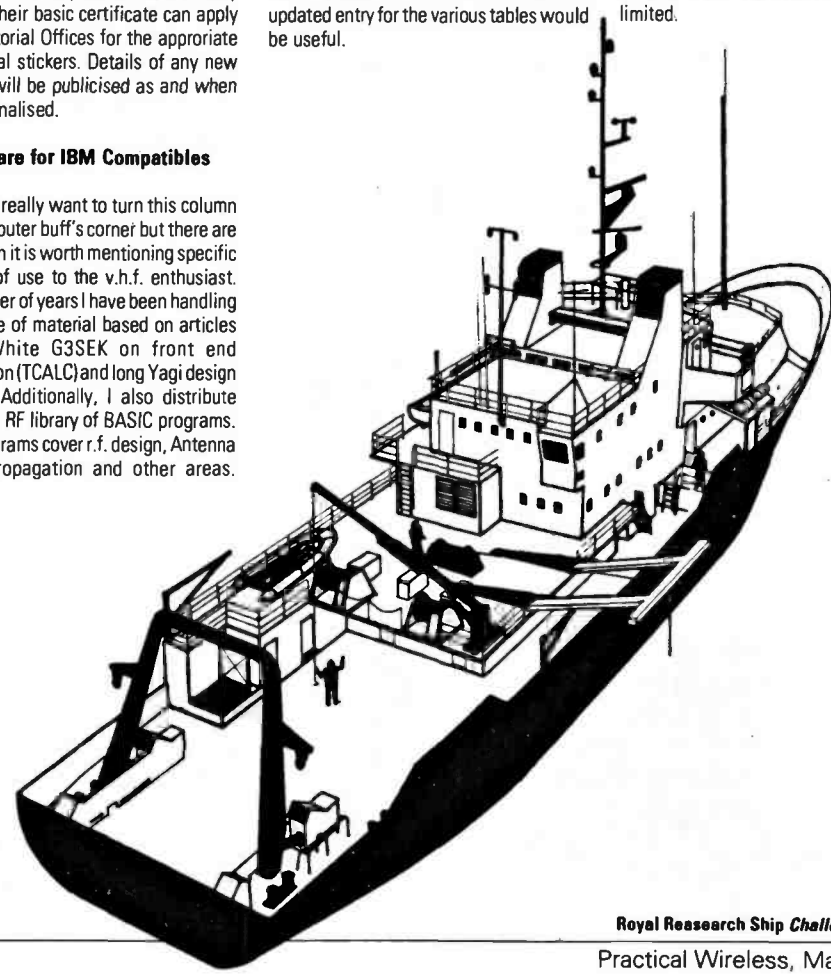
Stations equipped for 70MHz should note that cumulative contests will be run from 0900 to 1100UTC on February 11, February 25, March 11 and March 25. The Fixed station contest will also be run on March 25 and contestants can enter both sessions, using the same contacts, but with separate logs.

The 144MHz/432MHz contest is scheduled to run for 24 hours, starting at 1400UTC on March 3. There are 4 sections; Single operator portable, Single operator fixed, Multi-operator portable or fixed, Listeners. Single band entries will not be allowed.

The Derby and District Amateur Radio Society 144MHz contest will be held on Sunday March 11 between 1300 to 1700UTC. A full set of rules is available upon receipt of a stamped addressed envelope from the club at 119 Green Lane, Derby DE1 1RZ.

VHF Tables

Just a reminder that the final table placings will appear in the April issue of *PW*. The new 5 band locator squares table will commence from the May issue. In the meantime please keep those reports rolling in. Letters in to me by March 26 at the very latest. In my role as RSGB VHF Manager I will be attending the IARU Region 1 Conference in Torremolinos, Spain, during the first week of April, and by consequence, time to write the column will be very limited.



Royal Reasearch Ship *Challenger*

Back-Scatter

RTTY

Reports to
Mike Richards G4WNC
200 Christchurch Road,
Ringwood, Hants BH24 3AS

Readers Letters

Ian Hatton of Chaddeston is a newcomer to RTTY and, like many, is starting as a short wave listener. His station at present comprises an ERA Microreader II decoder and a Philips D2935 receiver. The antenna system is a 10m vertical with 20m radials which should be very effective for DX. Having familiarised himself with the equipment, Ian is reporting very good results. His log of prefixes heard already makes impressive reading, so well done Ian and perhaps we may even work on the air one day.

Michael Greig GM0MMN was the inspiration behind my feature on packet in Scotland a few months ago and has written with an update on his own progress. As you can see from his call he has now achieved his Class A licence which has mean a shift of interest towards RTTY and AMTOR of the h.f. bands. He has promised to send me a report of his experiences so I shall look forward to that and obviously publish details of any interesting features in the column. **Bill Atkinson G1LDG** has a software problem and hopes that a reader can help him out. Bill currently uses a Yaesu FRG-9600 receiver which is fitted with the CAT-233 interface. He would like to be able to control the FRG-9600 using a Spectrum 48K or Amstrad CPC-464 computer, but has been unable to find any suitable software. Can anyone out there help? If so, please drop me a line and I will pass on the details to Bill and publish them in the column.

If you have any problems (radio orientated that is!) please drop me a line and I will endeavour to help.

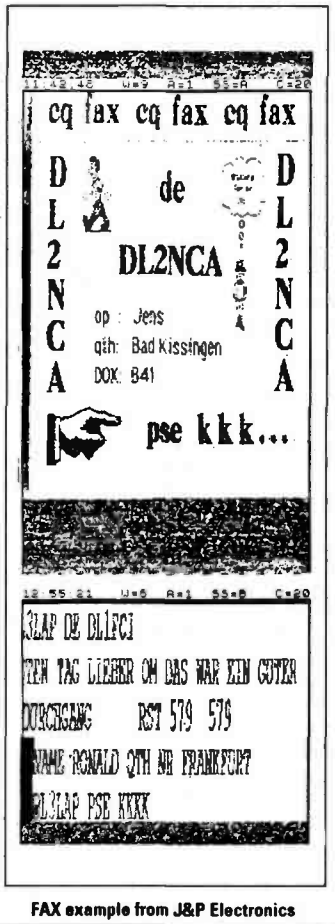
J & P Electronics, the producers of a wide variety of RTTY, FAX and SSTV software and hardware, have sent me samples of some amateur FAX signals that were received by a customer using a Spectrum computer. If I have organised my paperwork correctly there should be some examples in this column.

RTTY Filter

BARTG (British Amateur Radio Teledata Group) have recently announced that they can now supply p.c.b.s for the G3ISD filter which they featured in the Autumn and Winter '89 issues of their magazine Datacom. This versatile filter design originated from an article in the American *QST* magazine and has subsequently been enhanced by Ted Hatch G3ISD. The key to the versatility of this filter is in the use of switched capacitor filter technology, which greatly simplifies the tuning of audio filters. This unit, known as the R5 Filter, actually employs two audio filters - a high-pass and a low-pass which, when combined, create a band-pass function. Both of the filters are electrically tunable in 100Hz steps over a range of 40Hz to 3600Hz giving the filter its excellent versatility. The out-of-band rejection at +30% of the low-pass and -30% of the high-pass frequencies is a creditable 51dB. The tuning can be acheived in a variety of ways, e.g. four BCD thumbs wheels, two 40-channel CB switches, etc.

The power requirements are a modest 12-14V at approximately 200mA. Newcomers to this mode may well be thinking - "OK it sounds good, but what does it do for my RTTY operation?" So let's examine the process and see how a filter can help. I'll actually describe a RTTY signal, but the same principle applies to most of the data modes. The transmission system used for RTTY involves sending one of two carrier frequencies, one to represent each of the two possible states in RTTY - mark and space. When these carriers are received they appear as two audio tones and it is these that are then decoded by your terminal unit and computer. The number of errors in the display signal is very much dependent on how good your computer or terminal unit is at sorting out these audio signals. These signals are rarely noise free and are usually buried in all manner of unwanted whistles, whines, clicks and whirrs! This is where the filter can help, because it can take away a lot of these unwanted signals and so give your decoding equipment a far better chance of decoding the RTTY signals accurately.

Of course, as well as being very useful for RTTY and general data operation, the wide tuning range of the BARTG filter means that it can be equally effective on s.s.b. The p.c.b. from BARTG costs £5.25 inclusive of post and packing and comes complete with instructions. The address for your orders is: **Mr E.J. Hatch G3ISD, 147 Borden Lane, Sittingbourne, Kent ME10 1BY.** Incidentally, if you would like to take up membership of BARTG, the 1990 UK subscription rate is £10 and the membership secretary is: **Miss Ann Reynolds G6ZTF, 169 Bell Green Road, Coventry CV6 7GW**.



FAX example from J&P Electronics

BARTG Spring HF RTTY Contest

Yes it's contest time again! This popular contest takes place on the weekend of March 17-19 and is always well worth having a go at. The period of operation is actually 0200UTC on March 17 till 0200UTC on March 19. Although this is a 48 hour period, only 30 hours of operation (that includes listening) is permitted. The 18 "rest" hours can be taken at any time, but must not be less than 3 hours and all times of operation must be recorded on the contest summary sheet.

Categories:
Single operator, all band. Single operator, single band. Multi-operator, all band. Short wave listener.

Bands:
3.5MHz, 7.0MHz, 14MHz, 21MHz and 28MHz amateur bands.

Stations:
Stations may not be contacted more than once on any band, but additional contacts with the same station may be made on other bands. Transmission on two or more bands at the same time is not allowed.

Countries:
The ARRL DX countries list will be used and each W/K, VE/VO and VK call area will be counted as a separate country.

Message:
This will comprise time, RST and message number. The time, in UTC, must be the full four figure group and the message number must be a three figure group starting at 001 for the first contact.

Points:
All contacts within own country score two points. Contacts to another country score ten points. In addition all stations can claim a bonus of 200 points for each country worked on each band, including their own. NOTE continents only count once.

Scoring:
A:Contact points x total countries worked.

B:Countries worked x 200 x number of continents worked (max 6). The final score is the total of A and B.

Log Sheets:
Separate log sheets are required for each band and these must show: band, date, time, callsign, message sent, message received, countries and points claimed. SWL log sheets need: date, time, callsign of station heard, report sent by that station and callsign of the station being worked.

Summary Sheets:
These must show: full scoring, times of operation, address for correspondence and for multi-operator entries, names and callsigns of all the operators.

Entries and check logs must be received by May 26 at the following address: John Barber G4SKA,32 Wellbrook Street, Tiverton, Devon EX16 5JW.

AEA FAX/SSTV System

The latest press release from ICS Electronics reveals details of a brand new FAX and SSTV system from AEA Inc. which is designed to run on the Commodore Amiga computer and is called AVT Master. The FAX capability covers all the modes used by amateurs and a good range of commercial signals. Drum speeds are 60 r.p.m., 120 r.p.m. and 240 r.p.m. whilst the picture length is determined in lines at 400, 800 or 1200. Each received line is displayed as 1024 pixels, with each pixel set to one of sixteen grey levels. These images can be printed using the standard Amiga printer device and can be stored as standard Amiga IFF (Interchange File Format). This is a great advantage, as it allows the images to manipulated and enhanced using a wide range of Amiga software packages.

There are various options for starting the reception process, including fully automatic where the program detects the start tone and synchronising pulses. This mode ends when the end of message tone is received. An unusual but very handy feature is the timed auto-start which puts the program into auto start mode at a particular time and then stops on successful receipt of a picture. I can see this being particularly useful for the reception of some of those very interesting pictures which are often sent from weather stations in the early hours. One very powerful facility is the ability to select a number of demodulation curves, including - linear, log, antilog, etc. This has great value when receiving photographs rather than charts and can be very useful for enhancing the visibile detail in dark areas such as the land masses on Meteosat images. This facility is made even more powerful by the fact that you can make up custom demodulation curves, e.g. you could specify a log curve for the bottom quarter and leave the rest of the curve untouched. This gives immense potential for obtaining the best image quality for a given signal quality.

In addition to all this, the image can be flipped horizontally and vertically and even rotated through 90 degrees. If the image has been received on the wrong sideband and is negative, it can be corrected by inversion. There is also a real time low-pass filter included to process the received signal. Having received and manipulated the image you then have access to an assortment of text modes so that you can add all manner of useful detail. On the transmit side, you have all the aformentioned image manipulation features, plus the program can send any

Amiga IFF type file. These can either be generated by the AVT Master, one of the popular 'paint' packages or by digitising the ouput of a video camera. Providing your computer has enhanced memory, the program supports up to sixteen high resolution image memories, so a complete QSO could probably be stored in memory if necessary! Moving on to SSTV the AVT Master is really quite revolutionary, not only does it support all the existing modes but it adds a totally new narrow band mode. The narrow band mode uses a 400Hz shift which is somewhat narrower than some of the more conventional signals which use up to 1100Hz or 1200Hz. The advantage of using a narrow band mode is one of reduced interference, as you wind-in the i.f. and a.f. filters to a 400Hz bandwidth, this reduces a lot of the interference. Having achieved a reasonably clean picture you can of course use the picture manipulation features to further improve the result.

Another great advantage of the AVT system is that both sending and receiving stations are crystal locked, so synchronisation is kept throughout the transmission even if large chunks are missing due to interference. This is a big improvement over some of the existing systems where interference causes all manner of alignment problems. The only snag with the system is that to take advantage of the narrow band modes both stations must have the AVT system. So before you rush out and buy the system, what are the system requirements? The AVT Master plugs into the parallel port of the Amiga and uses some of the audio channels. The system will run on any Amiga (68000, 68020, 68030, with or without maths co-processor), models 500, 2000 or 2500. The minimum memory requirement is 1Mb, but the capabilities are enhanced if 1.5Mb are installed. It is with this extended memory that you get the sixteen image memories and faster operation. The AVT Master costs £299.95 inc VAT from **ICS Electronics, Unit V, Rudford Industrial Estate, Ford, Arundel, West Sussex BN18 0BD**.

Back-Scatter

Amateur Satellites

Reports to
Pat Gowen G3IOR
17 Heath Crescent
Hellesdon, Norwich, Norfolk NR6 6DX

The New Micro-satellites

At the time of writing this column, the cluster of six amateur radio satellites accompanying the SPOT-II Ariane launch are all mated, integrated with the launch vehicle platform, and are set and ready to fly into space. They have all been positioned and fixed around the 'ASAP' 'bolt-around' system, which permits the simultaneous orbital injection of all of the AMSAT satellites in one single release. The main mission, the SPOT-II satellite, is sitting right on top of our AMSAT birds in the final stage and will be the primary injection.

The original launch date and times has changed four times in a week and is now officially given as "postponed to 21 January 1990 at 0135..28UTC, due to a recorder failure on board the SPOT-II satellite." A 10 minute launch window follows the time and if the launch was aborted the next possibility would have come 48 hours later.

It was stated just before launch time that although the power system of each satellite would have been automatically actuated on release, no ground commands would be given to activate the systems until after 1.5 and 5 hours had elapsed. In the singular case of the AMSAT-Brazil 'DOVE' satellite, no 'on' command would be given until possibly much later. A sufficiency of time had to elapse to permit adequate separation from the other five satellites from the common launch injection, otherwise the proximity of the 145.825MHz f.m. speech transmitter could give critical QRM problems to the 145MHz inputs of WEBERSAT, LU-SAT, PACKSAT, etc.

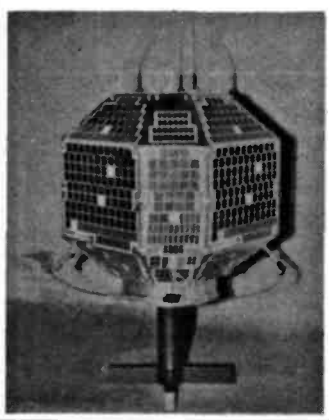


Fig. 1: JAS-1-B

Dr. Martin Sweeting G3YJO, head of the University of Surrey AMSAT/UoSAT team, on return from the ESA French Guiana launch site, said that the preparation and integration team produced a hive of activity at Kourou, but, despite the hecticity, all went very well indeed. The six satellites all checked out perfectly under their numerous final tests and were found to be fully functional.

Not all the information on all of the satellites is yet to hand. We still await the ATV data and format on the WEBERSAT, and details of data parameter and decodes on the various telemetry frames, and hope to have this available in time for the next issue.

As for the UoSAT pair, Martin states that the antennas in use on both the 'D' and 'E' satellites are linear, and not circularly polarised. Thus, to avoid rotational fade outs, and to keep QSB to a minimum, it is even more important for users to possess circularly polarised antennas at the ground stations, but either right hand or left hand will be acceptable.

The latest metered sets of elements for tracking and the resultant pass times will be issued regularly on the numerous AMSAT nets that were listed in last months column, but, to give you an idea where and when to look, here is a temporary provisional set for the cluster group provided by Richard Limebear G3RWL. They are based on a 9 November launch window, so will be fairly approximate to the general pass time average, unless any major offsets or postponments occur.

Satellite	Micro-Satellite Cluster.
Epoch Year	89
Epoch Day	313.08025463
Inclination	98.73 degrees
Right Asc.of Ascending Node	24.3439
Eccentricity	0.001362
Argument of Perigee	167.313
Mean Anomaly	240.63
Mean Motion	14.23617560
Decay rate or Drag factor	1.6E-06
Epoch Orbit Number	0

RS-10/11

Many users think that RS-10/11 is being switched off from time to time, as the signal has been noticeable by its absence at known passes well within range. This commanding off as assumed is not the case. The scarcity of signals are due to daylight path attenuation of the 29MHz downlink by the dense 'E' layer ionisation, this is brought about by the high solar flux. Only too often, particularly when the satellite pass is at low elevation angles, daytime passes produce extremely low signal strengths deep in the noise, and when it is audible, the incoming tone is frequently very auroral, sounding like a rough hiss. The night- time dark path passes are clean, clear, invariably very strong, and free from the daytime multipath variables. Signals have been heard from RS-10 by many users when the satellite is well below horizon on the far side of earth, over the Pacific, above Japan, Alaska and California.

Of course, the re-angulation of the 145MHz uplink is insufficient to permit accessing the satellite at such times, but some degree of sub-horizon access is possible to assist the optimum range limits. One such 'out of range' QSO was made by **Dave Rowan G4CUO**, who succeeded in working N5TAK in Arkansas for a new one, getting a RST 33A report to boot!

RS3A operator Andy Mirinov has been asked to reconsider putting the 21MHz uplink/29MHz downlink 'KA' mode on, as this would enable many round the world and indeed antipodal QSOs to be made by RS-10/11. He has so far declined to do so, as it is felt that the QRM produced by those using the 21MHz uplink satellite band section without adequately first listening could be embarrassing and counter productive. Similarly, most RS operators feel that abandoning the 3kHz sections of the passband each with individual computer a.l.c. command levels is a retrograde step, as it means that high powered stations seize most of the available power, so eliminating the modestly powered users. The fact that they still only produce a solar flux high attenuated weak downlink means they try to make up for it by using even more power, despite the fact that the 145MHz uplink attenuation is rarely more than 6dB.

Presumably, it is thought that it is better to have one or two strong signals produced over the noise rather than a large number of lesser readable signals under such conditions, but this practice does not do much to encourage the problem users to improve their downlink antennas rather than their linear outputs!

Finally, the users in USA say that they are unable to copy stations on s.s.b. between 29.390 and 29.400MHz, e.g. the top 10kHz of the current space band. The ROBOT is also very difficult to work, all due to an f.m. repeater output now being on 29.400MHz. As if simplex f.m. is not enough to contend with!

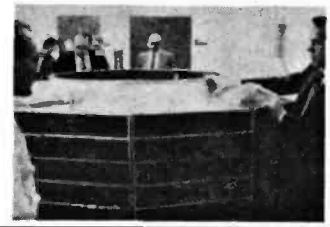


Fig. 2: Phase IIID

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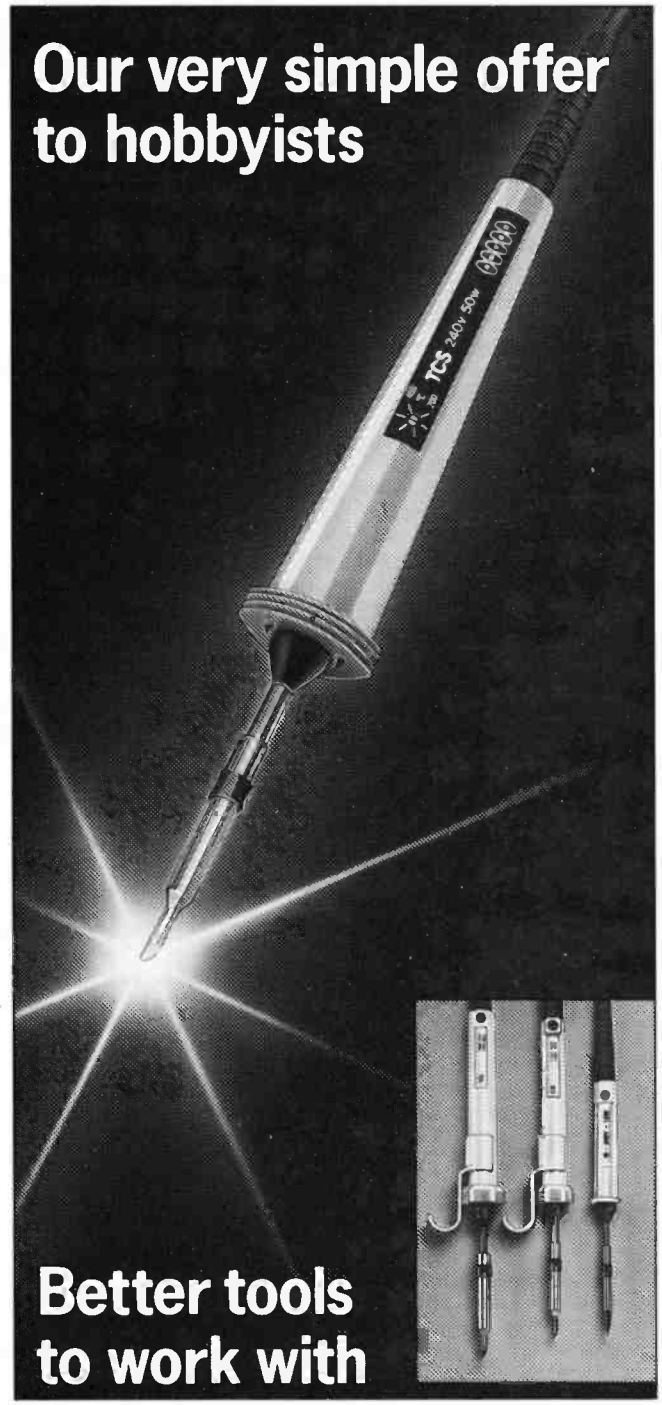

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Back-Scatter

RS-12/13

Further to last month's input on the launch time possibilities, we now have provided from source the latest probabilities, plus the test findings on the coming pair of RS-12 and 13 transponders, which were integrated with the COSMOS NAVSAT at the end of 1988.

Leonid Labutin UA3CR, on his recent visit to Britain supporting the British North Pole Ski-Trek, described the forthcoming compound satellite. The very earliest launch date, he thinks, will be in April this year. May or June is thought to be more likely, but it could possibly be held over until the end of 1990. It will fly as a single unit with a COSMOS Maritime Navigational Satellite, the demand for which will determine the launch time. It will be placed into a 1000km (621 mile) high orbit, at an inclination of 83 degrees, giving a 103 minute period.

The transponders will give modes 'A' (2m to 10m), 'K' (15m to 10m), 'T' (15m to 2m) and any combination of these, e.g. 'KA', 'KT', etc.

The ROBOT system will be flown, and will also operate on modes 'A', 'K', 'KT', etc.

The measured mean power provision to RS-12 was 35 watts, and with RS-13 25 watts. The 10m downlink output power of both RS-12 and RS-13 was measured as between 0.45 watts and 1.2 watts. The 2m downlink transmit powers were found to be 12 watts for RS-12, and 8 watts for RS-13.

RS-14

Whilst RS-12/13 is still awaited, probably not for long now, RS-14 is not far behind. Some six different USSR AMSAT groups are now busily working on this satellite, and are making good progress. The 'RUDAK-II' intended to fly with RS-14 has now been handed over from AMSAT-DL to UA3CR for incorporation and integration. If the descriptive handbook for this advanced digital communications system is required, a s.a.s.e. to Ron Broadbent G3AAJ QTHR, Secretary of AMSAT UK, will result in the availability and price. No further information has evolved on the condition of the original RUDAK aboard OSCAR-13, but hope still exists.

OSCAR-13

A further memory wipe-out was suffered by this satellite just as soon as the 'hot' side of the highly active sun came round to face earth again. It was soon overcome by the command stations, who had the satellite up and running again within 24 hours. All users report that it is performing very well indeed, up to all expectations. Lots of new stations are appearing on this satellite, as the last section headed 'Satellite DXCC Listings' will show.

The current transponder operational schedule reads:-

Mode 'B' MA 000 to MA 110.

Mode 'JL' MA 110 to MA 145.

Fig. 3: Updated list of active satellite stations

Callsign	Country	Thie	Notes
3A/DG1PJ	Monaco	1.00	*N
3D2JS/KA7APJ	Fiji Islands	2.00	NA
3D6QL	Swaziland	3.00	NA
4J1FS	M-V Island	4.00	*EXP
4S7EA	Sri Lanka	5.00	*A
4U1ITU	ITU, Geneva	6.00	*EXP
4X1AS	Israel	7.00	*A
5B4QA	Cyprus	8.00	NA
5N0/JR8BUU	Nigeria	9.00	NA
5R8ADA	Madagascar	10.00	NA
5Z4DJ	Kenya	11.00	NA
6W1CK	Senegal	12.00	NA
7J1ACH	Minami Torishima	13.00	NA
7O6CAD	South Yemen	14.00	NA
7P8CM	Lesotho	15.00	NA
7X2AJ	Algeria	16.00	?A
8Q7AV	Maldive Islands	17.00	NA
9H1EJ	Malta	18.00	*VA
9K2DZ	Kuwait	19.00	*A
9M2DT	West Malaysia	20.00	*A
9X5HN	Rwanda	21.00	*?A
9Y4NP-d	Trinidad	22.00	NA
A71AD	Qatar	23.00	NA
A92P	Bahrain	24.00	NA
AL7JM	Alaska	25.00	*A
BY1PK	China	26.00	NA
C30BBO	Andorra	27.00	EXP
C6A/DG1PJ	Bahamas Is	28.00	*VAC
CE0A/K6MYC	Easter Island	29.00	EXP
CE3BFZ	Chile	30.00	*VA
CN8BA	Morocco	31.00	*A
CO2JA	Cuba	32.00	NA
CT1VZ	Portugal	33.00	*A
CT3BX	Maderia Islands	34.00	*A
CX2GB	Uruguay	35.00	*A
CY0SAB	Sable Island	36.00	EXP
DC8TS	West Germany	37.00	*VA
DP0GVN/DJ4SO	Antarctica	38.00	EXP
DU1POL	Philippines	39.00	*A
EA1KT	Spain	40.00	*A
EA6TQ	Balearic Islands	41.00	*VA
EA8SK	Canary Islands	42.00	*VAC
EI1CR	Ireland	43.00	*A
F9FT	France	44.00	*VA
FH8CL	Mayotte Island	45.00	*?A
FK1SU	New Caledonia	46.00	*A
FM5CS	Martinique	47.00	*A
FO0XX	Clipperton Island	48.00	EXP
FO8LQ	F. Polynesia	49.00	EXP
FR3FK	Reunion Island	50.00	*?A
FS/AA4SC	Saint Martin	51.00	*EXP
FT3ZL-HRDBYME	Fr. Antarctica	52.00	*EXP
FT8X	Kerguelen Island	53.00	NA
FY0EK	French Guiana	54.00	*EXP
G4JUJ	England	55.00	*VVVA
GD4CUO	Isle of Man	56.00	*EXP
GI8HXY	Northern Ireland	57.00	*A
GJ6MMX	Jersey	58.00	*A
GM4DJS	Scotland	59.00	*A
GU/HB9PJM	Guernsey	60.00	*VAC
GW1MNC	Wales	61.00	*A
H44PT/G8BCG	Solomom Islands	62.00	NA
HB0HTA	Liechtenstein	63.00	*A
HB9RHV	Switzerland	64.00	*VA
HC1BI	Ecuador	65.00	*A
HC8E(HC1BI)	Galapagos Island	66.00	*VAC
HG2RD	Hungary	67.00	*A
HI8/WA0NZI	Dominican Rep	68.00	VAC
HK4CZE	Columbia	69.00	*A
HL9KT	Korea	70.00	*VA
HV2	Vatican City	71.00	NA
HZ1A8	Saudi Arabia	72.00	*A
I8CVS	Italy	73.00	*VA
IS0AGY	Sardinia	74.00	*VA
J37AB	Grenada	75.00	NA
JA1ANG	Japan	76.00	*VA
JD1/JA1YWX EX	Ogasawara	77.00	NA
JY4MB	Jordan	78.00	*A
KG4TM	Guantanamo Bay	79.00	*?A
KG6SL	Mariana Islands	80.00	?A
KH2/W1YRM	Guam	81.00	*VA
KH6JJI	Hawaiian Is	82.00	*VA
W0DQY	US	84.00	*VA
KP4EKG	Puerto Rico	85.00	*VA
KP5/KB6AFZ	Desecheo Island	86.00	VAC
KV4AD	St Thomas	87.00	NA
KX6BA	Marshall Islands	88.00	?A
LA1K	Norway	89.00	*A
LU8EBH	Argentina	90.00	*VA
LX1RB	Luxembourg	91.00	*A
LZ1QM	Bulgaria	92.00	*A
OA4ZV	Peru	93.00	?A
OE6DGG	Austria	94.00	*A
OH0/OH2AQ	Aland Island	95.00	?A
OH0M/OH2AP	Market Reef	96.00	*EXP
OH5LK	Finland	97.00	*VA
OK1DTG	Czechoslovakia	98.00	*A
ON1KYC	Belgium	99.00	*A
OX3AM	Greenland	100.00	*?A
OY5JD	Faroe Islands	101.00	*?A
OZ1ABS	Denmark	102.00	*A
P29ZFS	Papua New Guinea	103.00	#NA
P4/KP4EKG	Aruba	104.00	*BUS
PA0ZM	Netherlands	105.00	*A
PJ7/KA2MUM	St Maarten	106.00	VAC
PJ9JT/W1BIH	Curacao	107.00	*VAC
PY2ACM	Brazil	108.00	*A
PZ1AC	Suriname	109.00	NA
RA2FAG	Kaliningrad	110.00	*?A
SM4JWI	Sweden	111.00	*VA
SP6RLA	Poland	112.00	*?A
SU3AM	Egypt	113.00	NA
SV1IT	Greece	114.00	*A
T70A	San Marino	115.00	EXP
TF/WB9ZIF	Iceland	116.00	VAC
TG9SO	Guatemala	117.00	*VA
TI2SW	Costa Rica	118.00	*A
T2/F9FT	Corsica	119.00	*VAC
TR8CA	Gabon	120.00	*A
TU4OA	Ivory Coast	121.00	*VA
TZ6FE	Mali	122.00	NA
UA0ALA	Asiatic Russia	123.00	*VA
UA6LJV	European Russia	124.00	*A
UB5EAG	Ukraine	125.00	*A
UC2AAB	Byelorussia	126.00	*A
UL7DD	Kazakhstan Russia	127.00	?A
V3CAE	Belize	128.00	EXP
V85GA	Brunei	129.00	NA
VE6LQ	Canada	130.00	*VA
VK0?	Heard Island	131.00	EXP
VK5AGR	Australia	132.00	*A
VK9ZM	Willis Island	133.00	EXP
VP2ESE	Anguilla	134.00	?A
VP2V/K9PW	Br Virgin Island	135.00	VAC
VP5D/W3HNK	Turks-Caicos Is	136.00	VAC
VP8ALJ	Falkland Islands	137.00	*A
VP9IB	Bermuda	138.00	*A
VS6EL	Hong Kong	139.00	*?A
VU2DVP	India	140.00	*VA
XE1XA	Mexico	141.00	*A
XF4L	Revilla Gigedo	142.00	*EXP
XQ0ZFZ/EA4LH	J.Fernandz Island	143.00	VAC
Y24BO	D. Rep Germany	144.00	*A
YB0QC	Indonesia	145.00	*A
YI1BGD	Iraq	146.00	*A
YJ8RG	Vanuatu	147.00	NA
YN3UNI	Nicaragua	148.00	*VA
YO2IS	Romania	149.00	*A
YU3N	Yugoslavia	150.00	*A
YV5ZZ	Venezuela	151.00	*A
Z21GH	Zimbabwe	152.00	?A
ZD7KD	St Helena	153.00	NA
ZD8MG	Ascension Island	154.00	NA
ZF1GC	Cayman Islands	156.00	*A
ZK1WL	N. Cook Islands	157.00	NA
ZK2RS	Niue	158.00	NA
ZL1AOX	New Zealand	159.00	*A
ZL8AFH	Kermadec Island	160.00	NA
ZR1L	South America	161.00	*VA

All transponders off from MA 145 to MA 150.

Mode 'S' (beacon only - no transponder activated) from MA 146 until MA 147.

Mode 'S' transponder on from MA 147 to MA 160.

Mode 'B' transponder on again from MA 150 to MA 255.

The omni-directional antennas (as distinct from the beams) will be used from MA 225, through perigee, to MA 035.

The current positional pointing is A.LAT +3.6 degrees, A.LON. +179.4 degrees (i.e. -0.6 degrees).

JAS-1-B

A new firm launch date and time of February 1 between 0125 and 0200UTC for JAS-1-b, the bigger and brighter FUJI-OSCAR-12 replacement, was given out just after Christmas by NASDA, JARL and JAMSAT. It is thus expected that at about the time you receive this issue of *PW*, it will be up and fully operational. One of the last pictures of JAS-1-b, to probably be known as FUJI-OSCAR-20 when in orbit, is shown by Fig. 1.

Phase III-c

Dr. Karl Meinzer DJ4ZC, head of AMSAT-DL points out that despite the generous 880 000Dm grant of the German Federal Government to the next elliptical orbit satellite project, an insufficiency of capital exists. Additional funding is still required, and needs to be sought from the world amateur radio community.

Hams in Space

Information from **Chris Van der Berg PA0DLO** and TASS prove that the present MIR cosmonauts have had little time to come up for QSOs on 145MHz f.m., as the 26 November launch of the 19.5 metric tonne KWANT-II module gave them a very busy schedule. The solar panels of the addition were initially jammed, right over the thrusters, but were successfully unfolded on December 1. Two attempts were made to dock, but when the module was only 20 metres away, the navigational computer failed, and the docking was aborted. Attempts by the Alex pair to re-activate the computer also failed, so manual skills were brought in, re-manoeuvering the spacecraft on December 3 to give a good docking at 1222UTC that day. On 6 December, KWANT-II was removed from the main docking port and was fully coupled to the main side port on 8 December, now giving the 60 metric tonne combined spacecraft an 'L' configuration. All this was performed by the cosmonauts working in space suits from SOYUZ-TM-8, no easy task!

On December 10 the electrical system was coupled, and TM-8 was moved to the free docking port to permit taking another Progress docking on December 17. The large 'T' module is now due for launch on March 6, and after a weeks free flight will be docked to the already big MIR assembly, thus giving a symmetrical and stable space station again capable of easy manoeuvre and boosting.

From Bill Tynan W3XO, *QST* VHF/UHF columnist and AMSAT Vice-President for Manned Space Programmes, comes the latest news on the Shuttle amateur radio activity scene.

The bad news is that as the STS-35 mission now set for a lift off on April 26 is to be extended to 10 days, additional storage capacity is needed for food, water, etc. This means that Ron Parise WA4SIR, will no longer be able to take aloft the FSTV and SSTV system as intended. The good news is that the 145MHz voice f.m. and the packet TNC system will still go, the latter now using the on-board back up computer of the Shuttle itself.

Even better news is evidenced by the fact that Ken Cameron, scheduled to fly on Shuttle Mission STS-37 has just passed his Amateur Radio Examination and has the callsign KA5EWP. Plans are now in progress in the hopes that both the Fast and Slow Scan TV experiment now aborted on STS-35 may fly on this STS-37 mission, soon after WA4SIR's activity.

Quicker Keplerian Elements

Here are sets of 'smoothed' Keplerian element sets for our two elliptical orbiters provided by G3RUH and G4ULS respectively. They are devoid of long runs of many decimal places, having been abbreviated to a mean value giving more than a sufficiency of accuracy to keep in your computer sets for at least a year without change. The pass times given will be well within the limits of your timepiece

Back-Scatter

and your beam elevation and azimuth accuracy.

Satellite	OSCAR-10	OSCAR-13
Epoch Year	89	89
Epoch Day	330.318	324.328282
Inclination	25.9	57.12
Right Asc.of Ascending Node	232.0	181.5
Eccentricity	0.6	0.6831
Argument of Perigee	96.0	215.48
Mean Anomaly	331.0	0
Mean Motion	2.0588	2.09699972
Decay rate or Drag Factor	0	0
Epoch Orbit Number	4855	1099

When the regular sets of Keplerian elements that emanate from NORAD, NASA and AMSAT and provided for us bi-monthly by Berger Lindholm appear, parameters that vary little, if at all, are seen to change considerably. What is more, the long string of decimal places supplied suggests an enormous accuracy, which is not the real case, as it is merely a fit at that time and point in space.

The point was noted last month by **John Branegan GM4IHJ**, when he noticed that the element sets for MIR, KWANT and SOYUZ-TM-8 indicated mean motions of 15.556072, 15.556276 and 15.5566281 respectively, which would indicate that MIR is separating from these attached modules by about 8km per day. He now points out that a similar elasticity is shown for SALYUT-7 and the attached COSMOS module, which, after a few weeks of absence, is now back transmitting again on 19.955MHz. At first it was thought that the beacon had been separated as a first stage to bringing SALYUT-7 back to earth this year, hence the parameters were closely scrutinised. Whilst the separate supplied elements showed a distinct separation between the spacecraft, visual observation proved them still to be connected.

As we have pointed out many times, the elements are not intended to be used for precise scientific tracking, but merely to enable enthusiasts to track the various spacecraft to within reasonable limits. Even if we published the precise additional values that would permit accurate tracking for several passes ahead only, the average home computer tends to round off decimal places and produces an incremental error.

If you tire of typing in all those long numbers every two months, then it will please you to know that you will not see a significant departure from good tracking if you round up most of the elements supplied to the nearest first decimal place. On the proviso that you are sure to place in the full figures given for the Epoch, the Mean Motion and the Decay or Drag Factor (and this alone is subject to dramatic changes day by day in present solar conditions) you will not go far wrong.

I leave some of mine in the computer for months at a time, only bothering to change them to the latest set when the AOS, TCA and LOS are noticeably out of true due to the incrementing error. I then try the latest set and check them against a pass or two. If they do not fit, I subtley change the drag factor on the lower orbiters, or the mean motion on the higher ones, until a good fit results.

For those active on the packet radio network who feel the urge to regularly update their element sets, G1LYH is putting them out on this media the moment he has received them direct from source. 'L< G1LYH' will list his bulletins, and his notes on how best to use them.

Phase-IV

Amateurs in North America are keen to pioneer the 'Phase IV' era, a phrase coined by Joe Kasser G3ZCZ in the January 1981 issue of *Orbit* magazine. The idea is to provide a pair of geostationary spacecraft, one to the east of the USA, and one to the west, which, requiring no tracking, means that high gain fixed antennas can be used by ground stations, providing continuous 24 hours per day coverage to the majority of the worlds amateurs.

Such a concept is not without it's critics, who are concerned at the high relative cost of such a venture, the limitations of use to those not 'in view', and the sheer simplicity of access and use without the need for the skills required otherwise developed by those plotting and tracking the existing Phase 2 and 3 satellites. The debate is not unlike to that of the 'commercial or home-brew' argument, the c.w. test or code free' or even the 'full examination or novice licence' controversies, but with satellites comes the additional concern as to whether the limited finanace available is being well spent, and whether satellites should be a simple to use chat-box for the masses or a means of training and education, or even both if that is possible.

Additionally comes the point that whilst the earlier satellites could be used and enjoyed by the whole world community of radio amateurs without recourse to expensive equipment and difficult technology, latter day satellites have appeared to be quite difficult to the newcomer and those without the needed supply of money and resources, both of which are short of availability in the majority of the world.

A similar debate is ongoing today due to the equipment costs and technology demands of both the packet satellites and the high elliptical orbiters, and this is reflected in the sources of activity, or rather the lack of it, on the more recent satellites compared with the early OSCAR and RS spacecraft.

Whilst mass use may provide the wide interest, the enlarged user numbers, and hence the finance needed to build and launch such AMSAT GEOSATS, the numbers actually able to use them may be limited more by income and frequency allocations than by the availability over their horizons.

Notwithstanding, AMSAT has already built a model of the projected Phase-IV spacecraft, seen in our Fig. 2 this month, during it's unveiling at the Weber State College in Utah. Designer Dick Jannson WD4FAB is on the left, and the College President Stephen Naudauld on the right, the comparison of people to model giving an idea of the size of the structure. AMSAT have set a goal of $80 000 US for funding, the first $30 000 to be used for completion of the current microsats, the remaining $50 000 for Phase-IV. Already donations exceed $23 000 and are steadily growing.

Satellite DXCC Listings

Ed Steebe WA2RDE of Buffalo, New York has provided Fig. 3, an updated list of stations active, current and past, on OSCAR-10 and 13. Ed suffixes the DXCC country and callsign with an indicator to show the status. '#' indicates that the station is on OSCAR-13, 'A' shows he/she is currently active, 'VA' is very active, 'NA' not currently active, 'EXP' indicates a special DXpedition visit, 'VAC' is vacation, whilst '?' means current position unsure or unknown.

Ed points out that the '1D' following 9M8STA means that he was active on a day one operation only. He asks that amateurs provide input to him either via the mail (QTHR) via this column, or via the satellites themselves, providing the actual call or calls worked that are not on this latest list of countries, so that assistive updating is possible. His address is: Ed Steeb, WA2RDE, 15 Groveland Street, Buffalo, NY 14214, USA.

Already a number of OSCAR-13 user stations have worked over 100 different countries, among them being G4CUO, KL7GRF/6 and W6QUV. We suspect that many more such exist out there who are too modest to stake their claims! Any contributor may claim anonymity if desired!

Dial Wireless Line for the latest news, see page 68

Back-Scatter

Propagation

Reports to
Ron Ham
Faraday
Greyfriars, Storrington, West Sussex RH20 4HE

Solar

November 30 was a memorable day for **Cmdr Henry Hatfield** at his observatory in Sevenoaks. Between 1000 and 1500 his radio telescope recorded a high level of solar activity and in particular, a massive burst at noon on 1297MHz, Fig. 1. "There was more or less continuous noise at 136MHz as soon as the machine was switched on. This noise increased at about 1040 and remained high thereafter," said Henry. At 1145, when the sun came from behind a local yew tree he was able to use his spectrohelioscope and although he located four sunspot groups, 29 filaments and 11 quiescent prominences he was surprised to find nothing very vigorous. "An 'S' shaped plage in 030°N, 089C was quite active, but certainly not flaring and there was nothing else very interesting," wrote Henry. Then suddenly, at 1200, came that big 'blow' at 1297MHz which triggered the observatory alarm and within half a minute Henry's spectrohelioscope was back on and discovered a flare in 30°N, 089°, the 'S' shaped plage, Fig. 2 (taken at 1213), had turned into a ribbon flare and one other hot spot. Henry told me that by 1220 the ribbon was double and its bandwidth was 4 Angstroms. A further observation at 1400 found the area quieter, both ribbon flares had gone and been replaced with two thin ribbon filaments and two small sub flares were located just to the NE of the former active area.

At his observatory in Selsey, weather permitting, **Patrick Moore** observes the sun, by the projection method, as frequently as possible and his drawings, showing the distribution of spots on the sun's disc for November 25 and 30 and December 6 can be seen in Figs. 4, 5 and 6 respectively. While **Ron Livesey** was using his optical equipment in Edinburgh or Glasgow, he identified 4 active areas on the sun on November 9, 14, 16 and 17; 5 on the 1st; 6 on days 2, 3, 7, 22, 23 and 25; 7 on the 27th; 8 on the 4th, 5th and 30th and 9 on the 6th.

The computer print-out in Fig. 8, kindly supplied by **Neil Clarke G0CAS** (Ferrybridge), clearly shows the very high level of solar flux during the first half of November and the big climb again on the 30th. Henry Hatfield recorded gentle bursting at 136MHz for much of the day on December 1 and 28 and **Ern Warwick** (Plymouth) heard a "noise flare up" on 28MHz on December 11 and 12.

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Auroral

Ron Livesey, the auroral coordinator for the British Astronomical Association received reports described as "glow, patch" from observers in Scotland for the overnight period of November 3, 6, 23, 24, 25, 27 and 28, "quiet arc or band" on the 7th and 8th, "rayed arc or rayed band", on the 6th and 26th, "Active forms, flaming, flickering" on nights 2, 3, 4, 5, 17 and 29 and "all sky aurora", from Denmark and Scotland on the 17th. "Ray bundles", were also reported from Eire, England and France on the 17th. "The storm of 17/18 was the 27 day repeat of the 21/22 October storm and was more intense," said Ron and added, "Aurora was visible in N.Scotland 1900-2300, S.Scotland 1830-2000, England 2000-2100, S.England 2120-2140, Denmark 1630-2250, Eire 1730-2200, Nova Scotia 0420-0520 and France 2200." **Doug Smillie** (Wishaw) noted the auroral effect on 144MHz radio signals on days 11, 13 and 17 and **Tony Hopwood** (Worcester) heard such signals on the 17th and 26th.

Ern Warwick noticed a small echo on the signals from The Rutherford Appleton Laboratory beacon (GB3RAL - 28.216MHz) on November 29 and 30 and on the American beacon (KH6O/B - 14.100MHz) on December 1. He also reports weak

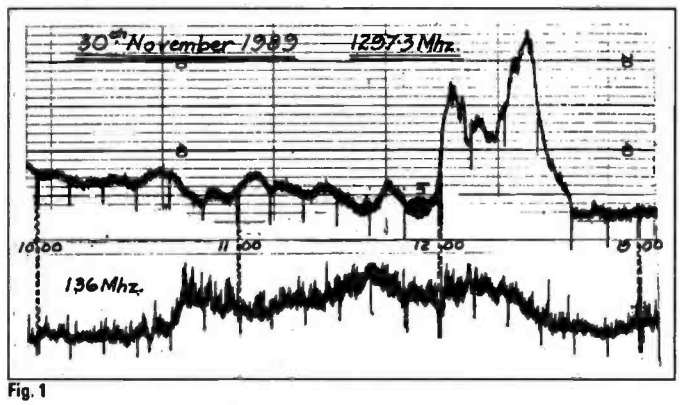

Fig. 1


Fig. 2

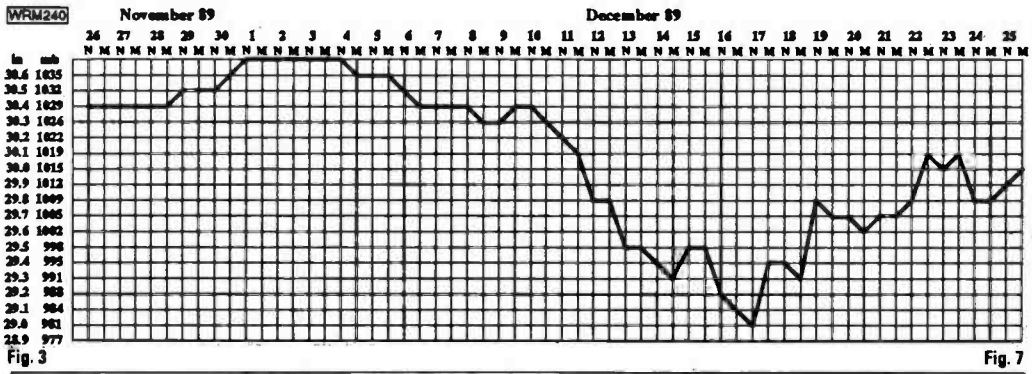

Fig. 3

Fig. 7

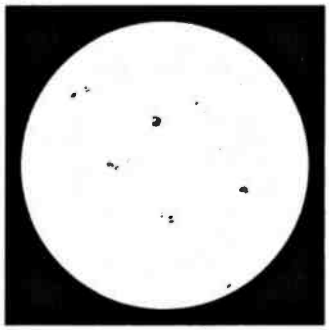
Fig. 4

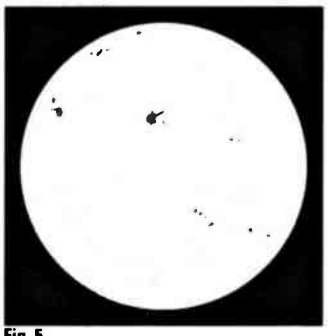
Fig. 5

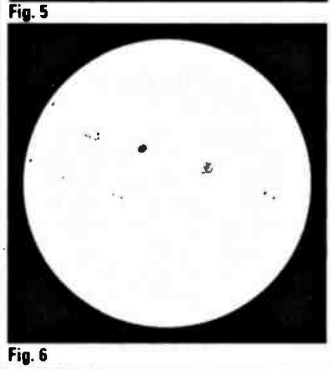
Fig. 6

	November					December																					
Beacon	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
AL7GQ			X					X									X													
DF0AAB	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
OL0IGI	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
EA2HB														X																
EA3JA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
EA6RCM	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
IY4M	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
KA1NSV																					X									
KB4UPI		X		X		X	X	X	X				X	X	X		X	X	X	X	X	X	X	X	X	X	X		X	X
KC6BSJ																				X	X	X	X	X	X	X	X		X	X
KD4EC	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X						
KE2OI	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X
KF4MS	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X
KJ4X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X		X		X		X	X
KK4M	X																			X	X	X	X	X		X	X		X	X
KM4MY	X						X																							
KW7Y/B	X			X					X	X	X		X	X	X	X	X				X									
LA5TEN	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X				X		X					
LU1UG	X	X		X				X	X	X	X		X	X		X				X	X	X	X		X		X		X	X
NX20/B	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X			X	X					
N8KHE														X	X					X	X	X	X	X	X	X	X		X	X
N3GPP															X	X														
OK0EG	X				X	X	X		X	X			X	X			X	X												
OH2TEN	X													X	X	X	X	X	X					X						
PT7AAC	X	X	X	X	X	X	X													X	X	X	X	X	X	X	X	X	X	X
PY2AMI					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X											
SK5TEN	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
VE1MUF						X							X		X					X	X	X	X	X	X					
VE2HOT	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X											
VE3TEN																				X	X	X	X	X	X	X	X		X	X
VE6YF									X	X	X	X	X	X	X	X	X									X	X		X	X
VK2RSY	X							X	X		X		X	X	X									X	X					
VK5WI	X							X			X					X				X	X		X	X	X	X	X	X	X	
VK6RWA	X										X			X	X					X	X									
WA4OJS		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X									
WA8RUF	X	X						X												X	X	X	X	X	X	X	X			X
WB9VMY																														
WC8E	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					X	X					
W3VD	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X
W3SV																	X	X	X	X	X	X	X	X	X				X	X
W7JPI/B	X			X	X	X	X	X	X		X		X		X	X	X		X	X	X	X	X	X	X	X	X			
W8UR	X	X	X	X		X	X	X		X			X	X	X	X	X	X	X	X			X	X	X					
W8FKL/4																							X	X	X	X			X	X
W9UXO	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X									
YO2KHP	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X
ZD8HF	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X
ZL2MHF											X					X				X	X	X	X	X	X	X	X	X	X	X
ZS1LA				X					X		X			X	X	X	X		X											
ZS5VHF	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X			
ZS6PW	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	
Z21ANB	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4N3ZHK	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
5B4CY	X	X	X	X	X	X	X	X	X	X	X			X		X		X	X		X	X	X							

Back-Scatter

auroral effects on signals at 1900 on November 21, 1747 on the 22nd and on the 10MHz German beacon (DK0WCY) during the early evenings of December 27 and 29. In Storrington, **Fred Pallant G3RNM** suspected aurora when he heard "a good echo effect" on several Scottish stations at 1000 on December 10 and Ern Warwick logged echoes on the Italian beacon (IY4M) on the 6th and 14th, the American beacon (WA4DJS) on the 4th and 10th, signals from the UA4 area of the USSR on the 24th and some from Japan and the USA on 24MHz on the 5th and 6th.

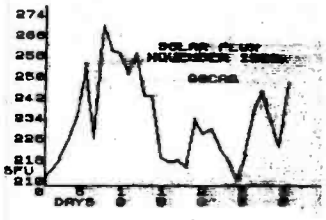

Fig. 8

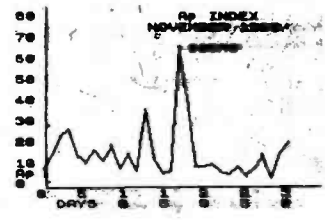

Fig. 9

Magnetic

Although the Ap index up to November 19 was generally unsettled there were storm peaks on days 13, 16 and 17 which can be seen on the graph sent by Neil Clarke, Fig.9 and the beginning of a rise at the end. "From the 19th to the end of the month the field became quiet with just the odd unsettled day," said Neil and the various magnetometers used by Tony Hopwood, **Kerl Lewis** (Saltash), Ron Livesey, **David Pettitt** (Carlisle) and Doug Smillie, between them, recorded magnetic storm conditions on November 5, 8, 9, 13, 14, 15, 17, 18, 19, 26, 27 and 29 with a note of "severe" on the 17th and 18th.

Sporadic-E and 'F2'

Smeary and unlockable domestic television pictures were received on Ch. R1 (49.75MHz) during an 'F2' opening early on December 1 and a test card from Sweden, via Sporadic-E, on Ch. E2 (48.25MHz) between 1000 and 1115 on the 7th. In Meerut, India, **Lt. Col. Rana Roy** saw adverts and cartoons from Malaysia on Ch. E2 (48.25MHz) and Bangkok on Ch. E3 (55.25MHz), via 'F2' early on the 3rd and I heard weak television sync. pulses on Ch. R1 again at 0850 on December 29. **Bob Brooks** (Great Sutton) identified Arabic announcers and dancers, via 'F2' on Ch. E2, at 0848 on December 1 and 18 and unidentifiable signals on Chs. R1 and/or E2 between 0800 and 1200 on days 2, 4, 23, 24, 27 and 30.

Propagation Beacons

First, my thanks to **Mark Appleby G4XII** (Scarborough), **Chris van den Berg** (The Hague), Henry Hatfield, **John Levesley G0HJL** (Bransgore), **Greg Lovelock G3III** (Shipston-on-Stour), **Ted Owen** (Maldon), Fred Pallant, **Ted Waring** (Bristol) and Ern Warwick for their 28MHz beacon logs which enabled me to compile this month's comprehensive chart, Fig. 7.

Ted Waring heard "WA8RUF/B MILFORD MI TEMPORARY GND WAVE PROP STUDY" on November 26 and Mark Appleby copied "DE KA1NSV/BCN CAPE COD, MA. 10 WATTS VERT DIPOLE" with an S2 'watery' signal on 28.258MHz at 1400 on December 16. Greg Lovelock logged "N3GPP/BCN 1 WATT BEAMING N/NE PLSE QSL TO BOB HOFFMAN 3038 NORTH BROOK DVE LANCASTER PA ! 17601" on 28.286MHz and Ern Warwick heard the ending, "HAPPY HOLIDAYS 73 73 DE N3GPP/BCN." Ern also reports a "very very strong" signal from OK0EG on December 4 and, in addition to a detailed 28MHz log, he heard, almost daily, the beacons IK6BAK and PY2AMI on 24MHz, OH2B, ZS6DN/B and 4X6TU/B on 14MHz and DK0WCY on 10MHz.

Tropospheric

The slightly rounded atmospheric pressure readings, Fig. 3, for the period November 26 to December 25 were taken at noon and midnight from my own barograph. The v.h.f. radio and televison bands II (87.5 - 108MHz) and III (175-230MHz) were open in varying degrees while the pressure was really high from November 26 to December 4. It peaked at 30.8in (1043mb) around noon on the 2nd. While these bands were open continental radio and television programmes were received in many parts of the UK on December 1, 2, 3, 4 and 7. On the 3rd and 4th, **Simon Hamer** (New Radnor) received a congestion of broadcast signals throughout Band II from many parts of Europe and Scandinavia. During another opening toward the end of the month **George Garden** (Edinburgh) parked his car near Inverbervie at 1600 on the 28th and logged BBC Radio Cumbria from Sandale "at phenomenal strength" and ILRs Forth and Tees, while at the opposite end, in southern England, at 0850 on the 29th, I received strong signals from BBC Radios Bristol and WM and ILR GWR with adverts for the Swindon area, plus a couple of French stations. Another high pressure system was moving on January 3 and while parked in East Sussex, using my Plustron TVR5D with its own rod antenna, I received a strong negative picture from France in Band III and identified several Dutch and French stations in Band II.

934MHz

John Levesley UK-627 is the contest manager for the UK 934MHz Club and wishes to thank all those members and non-members who took part in their contest last October. The leading entrants came from East Sussex, Greater London, North Staffs and South Devon and during the event, contacts were made between stations in Avon, Berkshire, Cornwall, Cheshire, Clwyd, Devon, Dorset, Gloucester, Guernsey, Gwent, Hants, Hereford, IOW, Jersey, Kent, Lancashire, Leicester, Lincolnshire, Manchester, Merseyside, Midlands, Nottinghamshire, Oxford, Shropshire, Somerset, Staffordshire, Surrey, Sussex, Wiltshire, Worcestershire and Yorkshire.

In Walton on Thames, **Terry Wyatt UK-845** took advantage of the high pressure system of 1037mb on December 2 and 3 to work some u.h.f. DX and, in addition to contacts with stations ranging from the Isle of Wight to Harwich, he hit the jackpot of 488km by working UK-513 in Darlington, Co. Durham. "The longest distance QSO I have enjoyed on the frequency," said Terry. John Levesley received signals from the Channel Islands on December 1, 2, 9, 10, 23, 24, 25 and 26.

Back-Scatter

Broadcast Round-up

Reports to
Peter Shaw

It has been a dramatic few months in international broadcasting, with stations in the Eastern Bloc benefitting from the revolutions - both peaceful and bloody - which have occured during the end of 1989. In particular Romania's external service provided dramatic details of events there.

On December 22, Radio Bucharest's scheduled external programme at 1130 in French was replaced by the station's interval signal, which changed at around 1153 to tone and shortly after 1200UTC all transmitters went off the air. Nothing more was heard until 1830, when announcements in English and Romanian asked listeners to stand by for more information. At 1900, an announcement about the current situation in the country was heard on four frequencies in Romainian, French, English and three other languages. Broadcasts from Radio Bucharest were somewhat erratic on the following two days, but on Christmas Day, normal programmes resumed, but on less frequencies than scheduled. Meanwhile, regional broadcasting in Romania has restarted. Radio Free Timisoara-Romania has restarted broadcasts in Serbo-Croat, several years after the station was closed, replaced by Radio Bucharest's three programmes.

Czechoslovakian radio has also made some changes recently. The long wave programme on 270kHz has a new signature tune and is no longer known as Hvezda, but Radio Station Czechoslovakia, or in Czech, Rozhlasova Stanice Ceskoslovensko.

Back in the west, Radio Canada's feared cutbacks were far less severe than had been anticipated. The station's output will remain at the present level and the station is investigating the possibility of starting a live daily two-hour programme exchange with Radio Korea's international service. It is hoped that RCI will use South Korean transmitters for its new Mandarin service beamed towards mainland China, whilst the RCI Sackville transmitter will be used by Radio Korea for English and Korean programmes to the North American continent. RCI is also looking towards exchanging transmitter time with broadcasters in West Europe and the Mediterranean for a new Arabic service which it is hoped will be established in 1990. RCI still has some free air time on the Sackville transmitter and plans to rent this out to almost anyone who wants it and the station is also thinking of carrying advertising between programmes. Radio Canada International is well on the way to completing its programme of work on antennas for use on the 13MHz band at the Sackville plant. The European and African 13MHz array is in half-working condition, whilst the South American array will be commenced during the early part of 1990.

The station is also contemplating the installation of two smaller 13MHz arrays for coverage of North America. Radio France International is to install three 500kW transmitters in Jibuti to carry French and Arabic programmes. The f.m. transmitters in Jibuti will also be built to carry French to the local community and these should be running by the end of 1990, although the h.f. station will take at least 18 months to complete. The Voice of America will start Tibetan language broadcasts during 1990, for two hours a day, although the station anticipates some problem finding Tibetan-speaking broadcasters in the United States. Radio

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PART EXCHANGE POSSIBLE

Back-Scatter

Portugal started using a new 300kW sender in early December which should benefit reception particularly in Africa, but may also aid reception here in the UK.

European Stations

All times UTC (=GMT)

In Nicosia, the Cyprus Broadcasting Corporation sends Greek to the UK on Friday, Saturday and Sunday for thirty minutes at 2215 on 9.535, 7.18 and 6.18MHz. Radio Berlin International in East Germany has made some changes to its programme line-up following suggestions from listeners. A new programme *Viewpoint* is heard on Wednesday, whilst *Berlin in Focus* is a new Friday broadcast. English to Europe is carried:

0600 on 5.965 & 6.115MHz
0845 on 6.04, 6.115, 7.185 & 9.73MHz
1045 on 6.115MHz
1200 on 6.115, 9.665 & 17.78MHz
1400 on 6.115MHz
1445 on 9.73MHz
1645 on 7.295 & 9.73MHz
1815 on 7.26, 7.295 & 9.73MHz
2045 on 6.115 & 1.359MHz
2245 on 5.965MHz

Radio Budapest's English schedule for Europe:

DX programmes

1045-1100 on 15.22, 15.16, 11.91, 9.835, 9.585 and 7.22 (Sun DX) 1130-1145 on same frequency (Sat DX)

1615-1630 on same frequencies (Mon and Thurs DX)

Daily mainstream programmes

1930-2000 on 15.16, 11.91, 9.835, 9.585, 7.22 and 6.11MHz 2100-2130 on same frequencies

From Iceland, the Riskisutvarpid Short Wave service beams programmes to Europe: 1215-1245 on 15.79, 15.767, 13.861 and 11.418 (all u.s.b.) 1855-1930 on 17.44, 15.78, 15.767 & 13.855MHz (all u.s.b.) These are relays of Iceland's domestic RAS 1 channel. The Voice of the Mediterranean in Valletta, Malta has English: 0600-0700 on 9.765 & 1.557MHz

1400-1500 on 11.925MHz

Radio Mediterannean, also in Valletta, has a daily English programme at 2230 for sixty minutes on 6.11 and 1.557MHz Relays to Moscow of the domestic Republican radio stations on short wave on the USSR are currently:

Ukrainian
0100-1515 on 6.03MHz
1520-0015 on 15.385MHz
Belorussian
0315-1700 on 6.15MHz
1705-2000 on 15.27MHz
Uzbek
0200-1725 on 5.945MHz
1730-2000 on 17.84MHz
Kazakh
0100-1800 on 9.69MHz
Georgian
0200-1600 on 7.125MHz
1605-2000 on 15.24MHz
Azerbaijan
0300-1730 on 7.30MHz
1735-2100 on 9.675MHz
Lithuanian
0400-1655 on 6.01MHz
1900-2200 on 9.695MHz
Moldavian
0315-1900 on 6.075MHz
1905-2050 on 15.36MHz
Latvian
0400-1855 on 5.920MHz
1900-2200 on 9.695MHz
Kirghiz
0000-1645 on 9.735MHz
1650-1850 on 17.785MHz
Tajik
0015-1805 on 9.785MHz
Armenian
0555-1515 on 7.175MHz
1520-2000 on 15.11MHz
Turkmenian
0515-1555 On 7.145MHz
1600-1900 on 17.635MHz
Estonian
0330-0430 on 5.98MHz (Mon-Fri)
0430-1500 on 5.98MHz
1505-2330on 9.56MHz
Tatar
0330-1555 on 11.945MHz

The English Service of Radio Moscow to Great Britain and Ireland is broadcast at 2000 for one hour on 9.685, 7.17, 7.115, 6.165, 6.03 and 1.143MHz. Radio Station Peace and Progress to Europe is at 2200 for an hour on 9.58, 7.36, 7.205, 6.145, 4.795 & 1.386MHz. Overseas services from some of the Soviet Republics have broadcasts in English, including:

Radio Yerevan in Armenia
0345-0400 on 17.69, 17.665, 15.18, 9.765 & 7.40MHz (to N America)
2150-2200 on 9.48, 7.30, 7.205 & 6.045MHz (in French to Europe)

Estonian Radio, Tallin
2100-2200 on 9.56, 5.925, 1.332, 1.215 & 1.035MHz (either Swedish, English or Estonian)
2130-2200 Monday on 5.925MHz

Radio Vilinius, Lithuania
2230-2300 on 6.10MHz & 666kHz

Radio Kiev, Ukraine
1900-1930 on 7.115, 6.165, 6.09 & 6.01MHz
0030-0100 on 17.69, 17.655, 15.18, 9.764 & 7.40MHz (to N America)

Radio Tashkemt, Uzbekistan
1330-1400 on 15.47, 11.785, 9.60, 9.54 & 5.945MHz (to Asia)

African & Middle Eastern Stations

Radio Douala in Cameroon has been noted on the new frequency of 4.975MHz instead of the announced 4.795MHz. This may be a simple operating error by transmitter staff. The station broadcasts in English and French 0400-2400 with English 0500-0600, 1300-1500, 1705-1845. National Guinean Radio in Conakry has been noted on 4.9MHz with French and vernaculars at around 2000. The clandestine station, Iran's Flag of Freedom Radio, changed its frequency to 11.615 in parallel with 15.10MHz between 1630 and 1820. Turkish Police Radio has been heard during the afternoon period on new 7.362MHz, replacing the channel of 6.34MHz, which has been in use since the mid 1970s. The station operates between 0600 and 1600. The frequency of 7.38MHz has also been noted. The Voice of Turkey in English to Europe is now:

2100-2150 & 2300-2350 on 9.795MHz.

Asian & Pacific Stations

Radio Australia introduced a new schedule at the end of 1989, with programmes tailored more specifically to audiences in the Pacific region. Times of the media programme, *Communicator*, have changed, and the programme is now heard on Sunday at 1430 and Monday at 0730. Suggested frequencies are now:

0400-0630 on 11.91MHz (Shepparton 100kW)

0700-1000 on 9.655MHz (Shepparton 100kW)

1530-2030 on 7.205MHz (Carnarvon 300kW)

2100-0700 on 15.24MHz (Shepparton 100kW)

In New Zealand, Print Disabled Radio in Levin has been allocated the new frequency of 3.935MHz. The station will operate 2100-1100 daily, which should provide a potential catch here in Europe. English from Radio Pyongyang, North Korea, beamed to Europe:

1300-1350 on 11.735, 11.335, 9.60 & 9.345MHz

1500-1550 on 11.76, 9.977, 9.64 & 9.325MHz

1700-1750 on 11.76, 9.977, 9.64 & 9.325MHz

2000-2050 on 9.977, 9.64, 9.345 & 6.576MHz

The station KYOI in Saipan is no more - the Christian Science Monitor, which has owned the station for some time, has altered the callsign to KHBI (standing for Herald Broadcasting International). The station now has two 100kW transmitters and the old antenna system has been refurbished, which will greatly improve geographical coverage.

N, C & S American Stations

Changes to RAE's English services have been made, with programmes restricted to weekdays only, with no announcements as to when weekend English programmes will return. Currently, the schedule is:

1630-1730 & 2100-2200 on 15.345MHz

0100-0200 & 0300-0400 on 11.71MHz

Radio Havana Cuba has altered its schedule to Europe in English to:

1900-2100 on 11.80MHz

Back-Scatter

ATV

Reports to
Andy Emmerson G8PTH
71 Falcutt Way
Northampton NN28PH

ATV, HDTV and all that

This month's article is all about ATV but this time it's the other ATV, advanced television. Confused? I hope you won't be when you've read this.

All the same these days it seems you're not fit to follow your chosen profession or hobby unless you're in command of all the abbreviations and acronyms. Most of them are TLAs (three-letter abbreviations) in fact, but that does not make them any more meaningful ay all: a few are more or less obvious (once they have been explained to you) but not all are memorable.

TV is full of these abbreviations at the moment, largely because transmission techniques and receiver technologies are changing (or at least the manufacturing interests wish they would!). Because of this you may be a bit baffled by all the jargon and I thought I'd take a bit of time out to clear things up.

There is of course a rearguard reaction to these novelties: in the satellite world the proprietors of Sky Television have taken the attitude that there's little wrong in the existing PAL system or at least it's quite good enough for programmes like *The New Price is Right* and *Sale of the Century*. I'm inclined to agree personally but if I had my way we'd all be back on 405 lines, so we had better keep this article entirely objective.

New Techniques

All of these new technologies may be important one day. It's unlikely that they will all be adopted, but some of the techniques to which they relate are bound to filter down to domestic reception and surplus equipment one day. For this reason alone - and because you like to keep abreast of what's happening in the world of TV, you may care to note what the abbreviations stand for.

All of these new ideas are intended to

Back-Scatter

make TV better, generally by improving the definition of the picture. That's not all though, and there are some fundamental differences in what you do and how you do it which may not be obvious at first sight. There is a distinction, for instance, between extended definition and improved definition. Some improvements can be made entirely at the receiver end, but most imply changes to the transmitted signal as well. Some of the new transmission systems are compatible with existing receivers and some are not. Some use digital techniques, others are still analogue. Some of the improvements can be implemented straightaway and some can not. Some can be applied to terrestrial TV, others only to satellite or cable transmissions.

IDTV and EDTV

The most basic split is between IDTV and EDTV. The term IDTV means improved definition TV and that means adding extra lines to the structure of the signal which implies a fundamental change from existing TV standards. EDTV is extended definition TV, which is taken to mean anything to do with making improvements to the existing PAL, SECAM or NTSC picture.

IDTV will retain the existing 4:3 aspect ratio of the picture (4 units wide by 3 units tall); other systems are likely to use a 16:9 'letterbox' or motion picture-style format. Further technical details are given below.

HDTV is generally taken to mean that the picture definition is greater than twice the existing resolution: anything less than this is only EDTV. HDTV schemes include 1050-line and 1125-line systems for NTSC countries and a 1250-line one for Europe. These schemes have a wide ('letterbox') aspect-ratio picture.

Dossier

Here is a summary of the main expressions which you may come across and what they stand for.

ACTV - advanced compatible television. An American 1050-line, 59.94Hz HDTV system compatible with existing broadcasts.

ATSC - Advanced Television Systems Committee. A USA body investigating ATV systems.

ATV - advanced television, i.e. anything more advanced than what we have at present.

DIGIT 2000 - a chip set made by ITT Semiconductors and intended to be incorporated in new generation TV receivers. The chips are capable of processing PAL, SECAM, NTSC, C-MAC, D-MAC, D2-MAC and NICAM transmissions.

EDTV - extended definition television. EDTV-WIDE involves changing the aspect ratio and adapted TVs will change picture format automatically. The extra picture information will, of course, only be seen on sets equipped to display this.

EPAL - extended PAL. A system devised by the BBC some while ago for sending PAL signals with additional picture information in the frequencies above the 6MHz sound carrier. Suitably equipped receivers would use this to display improved pictures.

EUREKA 95 Project - a 1250-line, 50Hz system widely backed in Europe. Conversion to/from 625 line systems is easy but 24 f.p.s. film transfer is still a problem because of the 1Hz flicker.

EUREKA EDTV - a European 625-line, 50Hz system with 16:9 picture. Much cheaper than 1250 lines and may become a European standard.

HD-MAC - high definition multiplexed analogue component. European proposal for HDTV by upgrading the existing MAC system. A high definition analogue video signal of about 25MHz bandwidth is reduced so that it can fit within a transmission channel of 12 MHz bandwidth.

HDTV - high definition television. Back in 1936 this meant 405 lines monochrome TV (with absolutely no colour compatibility problems). Nowadays, it means anything better than your existing system, be it 525 or 625 lines.

HDVS - a 1125-line, 60Hz HDTV system already in use for some television production. Most support comes from Japan. Not directly compatible with any existing system.

HIGH-SCAN - a proprietary design of multi-standard TV receiver made by Thomson which takes normal 625 line transmissions and electronically enhances the picture. It can display both 4:3 and 16:9 format pictures and can take a HDTV adapter.

Hi-Vision - (see HDVS).

IDTV - improved definition television. At the transmitter end improvements can be made in encoding and filtering, but most of the improvements will be in the receiver. For instance a frame store will allow the picture refresh rate to be increased to 100Hz, totally eliminating the flicker effect.

MAC - multiplexed analogue component. Extended bandwidth transmission system intended for use on satellite and cable systems, having a high immunity to interference.

MUSE - multiple sub-Nyquist sample encoding. Japanese signal encoding technique that reduces the amount of signal needed to send a HDTV picture.

NTSC - (National Television Standards Committee or 'never twice the same colour'). The existing 525-line colour system used in the Americas, Japan and elsewhere.

PAL - (Phase Alternating Line or 'perfection at last'). The 625-line colour system used in Britain, most of Europe, Australia and New Zealand and elsewhere.

SECAM - (Sequence a Memoire or 'system essentially contrary to anything American'). An ingenious and much underrated 625-line colour system used in French territories and the Soviet bloc.

SUPER NTSC - an American 1050-line, 29.97Hz system which is cheap to implement and completely compatible with existing NTSC channels and receivers.

NB: this list is not claimed to be exhaustive, since so many new techniques (and acronyms) are appearing now. It is hoped, however, that all the explanations are accurate and meaningful.

Sign-off

Once again that's it for this time. Please continue to send in your comments, reports and letters ready for the next article. Thanks.

Helpline

USE THIS COLUMN WHEN YOU THINK THERE'S NO HOPE FOR THAT ODD PROBLEM...SOMEONE, SOMEWHERE MIGHT BE ABLE TO HELP!

Does any reader know of a company that produces a good **logbook for the short wave listener**? George Brooks is looking for one that's horizontal A4 format, spiral bound and around 50 -100 pages. He would like one that has no limit to the number of lines per entry so that it can be ruled off when completed. **George Brooks, 73 Percy Road, Ramsgate, Kent CT11 7JB.**

A **Grundig Satelit 210 model 7001** has lost some of its controls, the KW2-9 tuner selector knob and the tuner dial knob. Does anyone know the wherabouts of spares for this piece of equipment. **K. Coulbeck, 98 Legsby Avenue, Grimsby, Lincs**.

Mr W Smith recently bought an **AR900** UK scanning receiver. During his initial 'fumblings' he confused the scanner and it covered a range well outside the spec, but doesn't know how he did it. Does anyone know what to do? **Mr W Smith. 36 Lundhill Road, Wombwell, Barnsley, South Yorks S73 0RB**.

Where can a c.w./RTTY/AMTOR program for the **Atari 520 STFM** computer be purchased? **R. McKinnon, 9 Brandywells, Kingsnympton, Umberleigh, North Devon EX37 9SP**.

Has anyone got circuit information on a **Sony 9-90UB Mono TV**. It was built around the late 1970s, it has a 9in screen and seems to be 405/625 lines. Other information required is a mod for switching pos/neg. **Mike Evans, 120 Loughton Way, Buckhurst Hill, Essex IG9 6AR**.

P.F. Thompson has recently bought the book *Solid State Short Wave Receivers for Beginners* by R.A. Penfold and hasn't been able to obtain the **Denco** tuning coils. The manufacturers say they are no longer made. Can any reader help with a possible source, equivalents or winding details? **P.F. Thompson, Flat 3, 29 Cannon Place, Brighton, Sussex BN1 2FB**.

Does anyone have a copy of the **September 1989 issue of *SWM*** as John Fryatt wants the 'Hot Rodding the ICF-2001D' article. **John Fryatt, 22 Alverstone Road, Manor Park, London E12 5NJ**.

Mr Hartwell has been told of an article which appeared in *Popular Electronics* sometime between 1957 and 1960 describing a **non-parabolic microphone for picking up birdsong**. The unit was made up of a bundle of aluminium tubes of different lengths. **Harry Hartwell, Ffos Y Ffin, Llanfair Clydogan, Lanpeter, Dyfed, Wales SA48 8LL**.

Circuit diagrams and technical information is being sought on the **Safgan oscilloscopes, type DT-520** by the Brighton College Electronics Department. If you can help, the address is, **Patrick Billingham G4AGQ, Brighton College, Eastern Road, Brighton BN2 2AL**.

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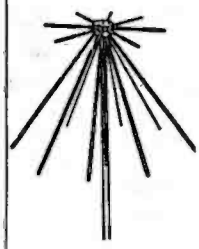

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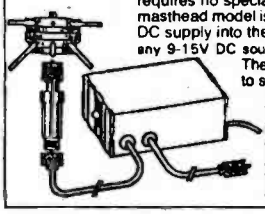

The PA3I finds application in instrument work, e.g. input to spectrum analysers, boosting the output from signal generators to give a low-power TX.
The standard version of the PA3I has BNC sockets and is designated "PA3I/B"; available to special order N-type sockets ("PA3I/N") or SO239 ("PA3I/S").
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