PRACTICAL WIRELESS

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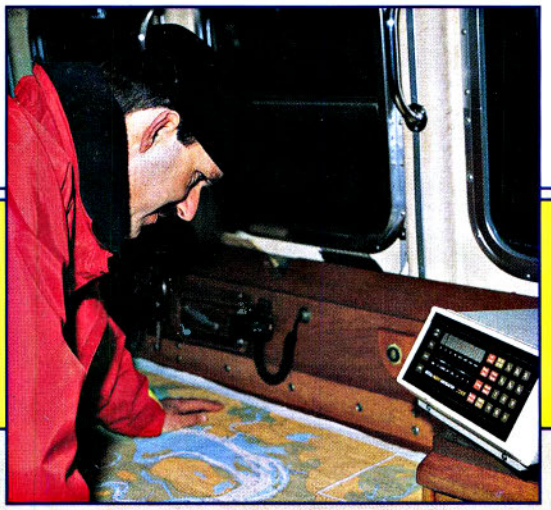
Featuring the Racal-Decca Navigator assisting the Dorset Police with marine enquiries



FEBRUARY 1990
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***BUILD** - A TRANSISTOR FET & DIODE TESTER*
***REVIEW** - TEN-TEC OMNI V TRANSCEIVER*
***WORLD SERVICE** - HIDDEN VOICE OF THE BBC*

PACKET RADIO - COMPETITION - TEN SPOT
PLUS LOTS, LOTS MORE INSIDE YOUR BIGGER, BRIGHTER PRACTICAL WIRELESS

THE NEW
FT-1000 FOR DYNAMIC DX

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The FT-1000 is a new top of the range all mode h.f. transceiver that is the result of more than 25,000 hours of intensive research by Yaesu's top design engineers. They have adopted a completely new approach to the application of digital and RF technology. The extensive use of surface mounted components has allowed *six* microprocessors and *five* Direct Digital Synthesisers to be integrated with a simple to use operator interface to give a highly reliable full featured transceiver that has been optimised for serious h.f. applications. Please write or call SMC or your local authorised Yaesu dealer for the full specifications of this dynamic new transceiver and discover how you can open up the bands.

YAESU

UK Sole Distributor

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Prices and specifications are subject to change without notice

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ICOM

Count on us!

IC-725 Budget HF

- **General Coverage Receiver**
- **105dB Dynamic Range**
- **100W Output**
- **DDS System**
- **26 Memories**
- **Scanning**
- **CI-V Computer Control**
- **Semi Break-in**

The new ICOM IC-725 budget H.F has been produced due to the demand for a simple, high specification transceiver. Despite the limited features, compared to more expensive equipment this set retains a superior level of technical performance necessary to operate on the H.F. bands today.

Additional features include Noise Blanker, Pre-amp, Attenuator, AGC and RIT. The DDS Sytem (Direct Digital Synthesizer) ensures fast Tx/Rx switching times, ideal for Data Communications. An A.T.U. controller is built into the IC-725 for use with the AH-3 H.F. Automatic Antenna Tuner for mobile or base station operation.

Accessory options available are the PS-55 20A P.S.U., AH-3 Auto Antenna Tuner, UI-7 AM Tx. FM Tx/Rx Unit, FL-100 500Hz CW Filter, FL-101 250Hz CW Narrow Filter and SP-7 External Loudspeaker.

For more information on the IC-725 budget H.F. and other ICOM amateur equipment contact your nearest authorised ICOM dealer or phone us direct.

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 Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.
Datapost: Despatch on same day whenever possible.
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ICOM

Count on us!

IC-735 Compact HF.

As predicted the Icom IC-735 has rapidly gained the reputation it deserves. This compact transceiver is ideal for mobile, portable or base station operation. It has a general coverage receiver from 0.1Mhz to 30Mhz with superb sensitivity in all modes, SSB, CW, AM and FM. Spectacular specifications are also achieved on RF Intercept, Dynamic Range, Reciprocal Mixing and I.F. Blocking. As HF conditions improve over the next few years it is equipment like the IC-735 that will provide clear reception even under the worst pile-ups.

The IC-735 has a built-in receiver attenuator, preamp, noise blanker and RIT passband tuning and a sharp IF notch filter ensures clear reception. The twin VFO's and 12 memories can store mode and frequency. Scanning functions include program scan, memory scan and frequency scan. The HM12 scanning microphone is supplied.

RF output is approximately 100 watts and can be continuously adjusted down to 10 watts. The IC-735 is one of the first HF transceivers to use a liquid crystal display, which is easily visible under difficult conditions. Controls that require rare adjustment are situated behind the front cover but are immediately accessible.

Options include the PS-55 AC Power Supply, AT150 Automatic Antenna Tuner, AH2a Automatic Antenna Tuner, SM6 and SM8 Desk Mics, SP7 External Loudspeaker. Why not find out more about the IC-735 contact your local ICOM dealer or contact ICOM (UK) LIMITED.

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Datapost: Despatch on same day whenever possible.
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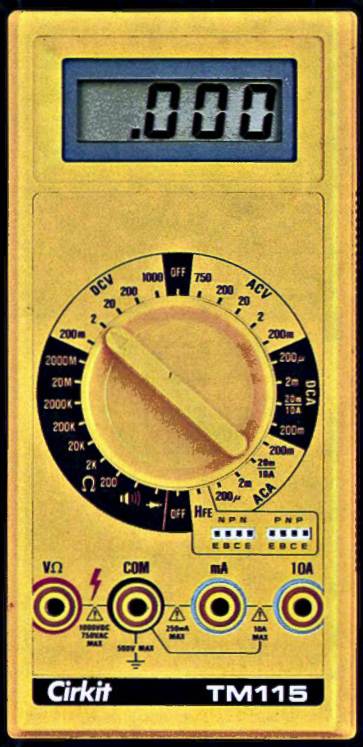
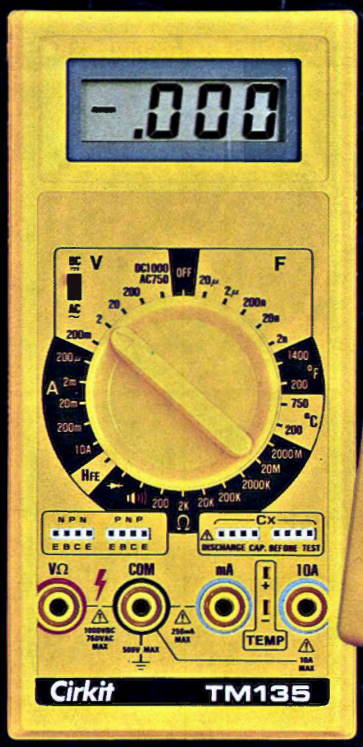
MULTIMETERS from Cirkit

THEY'RE D-MM GOOD VALUE!!



TM115



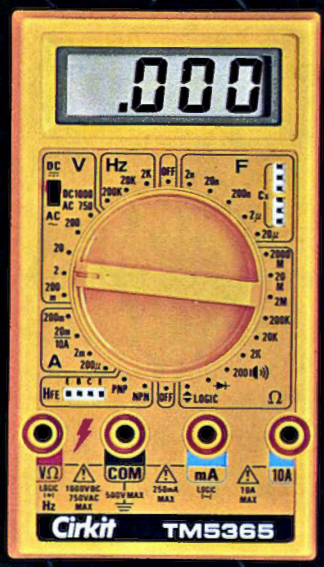
TM135

TM175

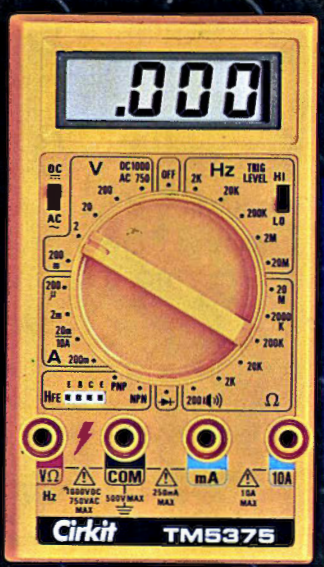
Cirkit's new range of Digital Multimeters offer a quite unbeatable combination of features and value:

- 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**

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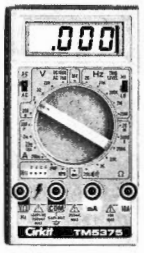
TM5375



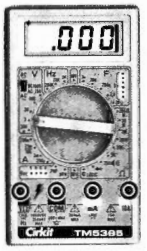
- **Frequency measurement to 20MHz**
- **ac/dc current to 10A**
- **24 ranges**

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



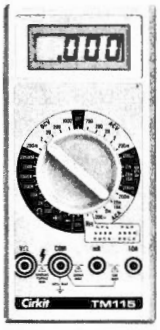
- **30 ranges**
- **Frequency and capacitance measurement**
- **Compact size**

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

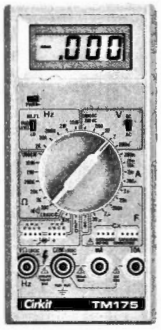
- **Temperature measurement**
- **Capacitance measurement**
- **40 ranges**

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**

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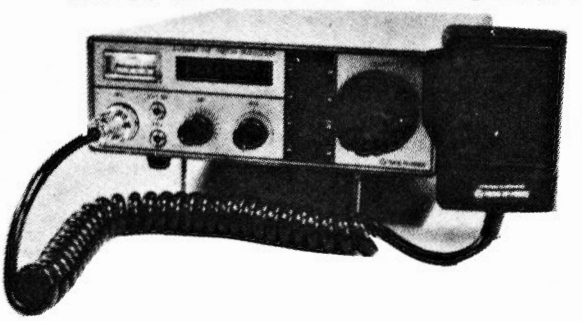
Now available from stock are the complete range of HF transceivers, the HT100 series. These HF SSB/CW monoband transceivers are both compact and lightweight whilst providing all the necessary operating features for the discerning HF operator. Simplicity is the key with the HT100 series being ideal for mobile/portable operation. There are 3 versions, all are 13.8vdc, 10W P.E.P. RF output, the HT120 20m, the HT180 80m and the HT106 6m. A comprehensive series of accessories are also available to further enhance and personalise the system as required.

HT106 6M CW/SSB 10W PEP **£299.00**
HT120 20M CW/SSB 10W PEP **£299.00**
HT180 80M CW/SSB 10W PEP **£299.00**

HT106 6m SSB/CW TRANSCEIVER



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HC100 ANTENNA TUNER 80-10M 200W **£109.00**
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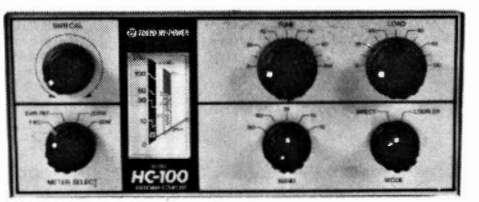

HC100

HC400L

Antenna Tuners

HC200A 80-10M 200W PEP **£115.00**
HC400L 160-10M 350W PEP..... **£199.00**
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HX240 2m to HF TRANSVERTER

Only

£249.00

Inc VAT

HX240: 2m to HF Transverter

Frequency Coverage: 80m, 40m, 20m, 15m, 10m

Output power: 30-40W PEP (SSB/CW)

RF Drive: 2.5W/10W Selectable

Rx Preamp Gain: 8-10dB

Power Requirement: DC 13.8V, 7A

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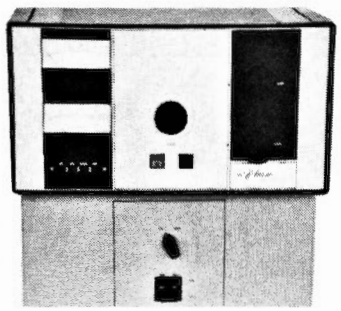

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160–10m HF Linear. 3kW P.E.P. RF Input.
100W Drive. 1 x 3CX1200A Triode.
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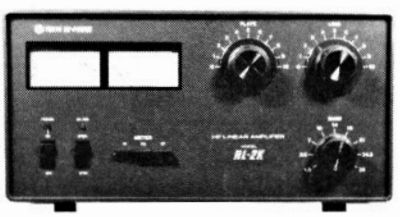

TOKYO HY-POWER HL2K
160–10m HF Linear. 2kW P.E.P. RF Input.
60–120W Drive.
2 x 3–500Z.
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2m Linear. 600W Output. 25W Drive.
2 x 4CX250B.
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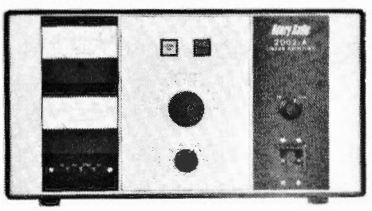

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2m Linear. Max. Input 2kW.
25–40W Drive. Typical.
1 x 3CX800A7 C/W Coax Relay.
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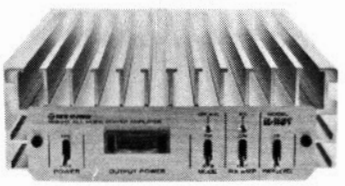
YAESU FL7000
160–10m HF Linear.
500W P.E.P. RF O.
100W D. Four FT757GX, FT747GX, FT767GX
£1600.00

70cms 2004A. Max. Input 2kW.
25–40W Drive.
1 x 3CX800A7 W/O Coax Relay.
£1395.00



HL100B/10	10m 10W in 100W out PEP	**£179.00**
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HL100B/80	80m 10W in 100W out PEP	**£179.00**
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HL37V	2m 3W in 32W out RX Preamp	**£ 89.00**
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HL110V	2m 2/10W in 100W out RX Preamp	**£215.00**
HL180V	2m 3–25W in 120W out RX Preamp	**£295.11**

HL36U	70cm 3/10W in 40–50W out RX Preamp	**£135.00**
HL60U	70cm 12W in 50W out RX Preamp	**£179.00**
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MMT432/28S	Transverter 10m–70cms	**£155.00**
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MMT50/28S	Transverter 10m–6m	**£240.00**
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For full addresses see previous page.

I'm certain that, like me, at least half the readership of any magazine is infuriated by adverts for equipment which do not include the prices. So — just to turn the tables I thought I would give you a list of prices without pretty pictures of the equipment. Detailed brochures are always available on request, either by mail from Matlock, or by calling it at any of our branches up and down the country. See bottom of page for their telephone numbers. Read the list of prices carefully; there is sure to be something from the Kenwood range for you.

KENWOOD EQUIPMENT		Price	Carr.
TS950SD	NEW Deluxe HF Transceiver From Kenwood with DSP	3199.00	8.00
TS950S	NEW Standard version of TS959SD (both models have built in ATU.)	2499.00	8.00
DSP10	NEW Digital signal processor unit for TS950S	399.00	8.00
SM230	NEW Station monitor with Pan Display	773.00	8.00
SO2	NEW High stability TCXO for TS950S	99.00	1.00
VS2	NEW Voice synthesizer module	32.26	1.00
SP950	NEW External loudspeaker unit with switched filters	87.55	2.50
For crystal filter options please refer to CRYSTAL FILTER section			
TS940S	HF Base Station Transceiver. General coverage receive	1995.00	8.00
AT940	Automatic ATU 160M-10M ham bands. Fits inside TS940S	244.88	8.00
SP940	External speaker unit with switched filters	87.55	2.50
940MOD	Special TS940S receiver upgrade modification	98.00	8.00
SO1	Temperature compensated oscillator unit	193.53	1.00
VS1	Voice synthesizer module	32.26	1.00
TS440S	HF band transceiver with gen. coverage receiver	1138.81	8.00
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PS50	Heavy duty PSU for TS440 (PS430) can also be used	222.49	8.00
VS1	Voice synthesizer module	32.26	1.00
*NB	Speaker and mobile mount see TS140S		
TS140S	HF transceiver 160-10M. Ask for details	862.00	8.00
TS680S	Similar to TS140S with 10W 6M. PA	985.00	8.00
PS430	Mains PSU for TS140S with built in cooling fan	173.78	8.00
VOX4	VOX unit for TS680S	58.42	2.00
SP430	Attractive matching speaker for TS140S/430S	40.81	2.50
AT250	Automatic ATU for TS140S/430S. Can also be used with other rigs	366.00	8.00
AT130	Compact mobile or base ATU 80-10M	140.58	3.00
MB430	Mobile mounting bracket for TS140/430S	15.80	2.00
AT230	All band ATU and power meter. General purpose ATU	208.67	8.00

HF STATION ACCESSORIES		Price	Carr.
TL922	160-10M 2KW linear. 3-500Z valves included	1495.00	8.00
SM220	Station monitor scope	343.62	8.00
BS8	SM220 panoramic display option. TS830/940	77.00	1.50
LF30A	HF Low pass filter 1KW rating	32.26	2.00

CRYSTAL FILTERS		Price	Carr.
YK88A	AM 6kHz for TS430 TS670	49.37	1.00
YK88A1	AM 6kHz for TS940 TS930 R5000	48.05	1.00
YK88C	CW 500Hz for TS430/440 TS530/830 TS670 R5000	46.08	1.00
YK88C1	CW 500Hz for TS940 TS950S	48.05	1.00
YK88CN	CW 270Hz for TS430/440 TS530/830 TS670 R5000	54.64	1.00
YK88S	SSB 2.4kHz TS440	47.40	1.00
YK88SN	SSB 1.8kHz for TS430/440S TS530 R5000	46.74	1.00
YG455C	CW 500Hz for TS830 R2000	110.58	1.00
YG455CN	CW 270Hz for TS830 R2000 **SPECIAL OFFER PRICE**	39.50	1.00
YG455C1	CW 500Hz for TS950S TS940S TS140S	112.57	1.00
YG455CN1	CW 270Hz for TS950S TS940S	131.66	1.00
YK455C1	CW 500Hz for TS140S	54.04	1.00
YG455S1	NEW Extra SSB filter for TS950S	112.57	1.00

MICROPHONES		Price	Carr.
MC50	Deluxe dual impedance desk microphone, 4 pin plug fitted	46.08	2.50
MC60A	Deluxe desk microphone with built in pre amp	88.22	2.50
PG4	Mic lead for MC60A/MC85 4, 6, or 8 pin Please state which	9.87	1.00
MC80	Electret desk microphone with UP/DOWN facilities	53.98	2.50
MC85	Deluxe desk microphone with built in Audio Level Compensation	99.00	2.50
MC35S	Fist microphone 50K impedance	21.72	1.50
MC43S	Up/down hand microphone for TS930S etc.	22.22	1.50
MC44DME	Up/down hand mike with built in DTMF key pad	42.60	1.50
MC55	Mobile microphone with control box (up/down etc.) 6 or 8 pin	52.67	2.00
MJ86	8/6 pin mic adapter, Also MJ84, MJ68, MJ64, MJ48, MJ46	6.59	1.00
HSMX2	Mobile microphone with control box (Made by HOKUSHIN)	39.80	2.00

VHF-UHF BASE STATION TRANSCEIVERS		Price	Carr.
TS711E	2M Base station multimode transceiver with DCS	898.00	8.00
SP430	Attractive matching speaker for TS711/811E	40.81	2.50
VS1	Voice module	32.26	1.00
TS790E	NEW Dual band all mode transceiver 2m/70cm with 1296MHz option	1495.00	8.00
PS31	Matching power supply for TS790	186.00	8.00
SP31	External speaker for TS790	63.46	3.00
UT10	23cm. transceiver option module	379.51	8.00
VS2	Voice module	32.26	1.00

VHF/UHF MOBILE TRANSCEIVERS		Price	Carr.
TR751E	2m multi mode mobile/fixed station transceiver	599.00	8.00
TR851E	70cm multi mode mobile/fixed station transceiver	599.00	8.00
MU1	DCL option for TR751E/851E	30.95	1.00
VS1	Voice module	32.26	1.00
TM231E	NEW Compact 2m mobile transceiver, 50/10/5W	289.00	8.00
TM431E	NEW Compact 70cm mobile transceiver, 35/10/5W	318.00	8.00
TM531E	NEW Compact 23cm mobile transceiver, 10/1W	385.00	8.00
RC10	Remote controller/handset	169.00	3.00
RC20	Full function remote controller	165.20	3.00
IF20	Interface unit	152.43	3.00
PG4H	Interface connecting cable	9.38	1.00
PG4J	Extension cable kit	30.47	1.00
DRU1	Digital recording system for TM231E/431E	85.72	1.00
TM701E	NEW Compact 2m/70cm mobile transceiver. 25w (VHF and UHF)	469.00	8.00
RC10	Remote controller/handset	169.00	3.00
RC20	Full function remote controller	165.20	3.00
PG4G	RC10 extension cable	9.87	1.00
SP41	Mobile speaker unit for most models	18.61	1.00
SP50	Mobile speaker unit for most models	20.41	1.50
TM731E	NEW Deluxe Dual band 144/432MHz. Mobile transceiver. 50w/35w	665.00	8.00
TM721E	Dual band 144/432 mobile transceiver. SPECIAL OFFER PRICE	525.00	8.00
TSU6	CTCSS unit for TM721E	30.68	1.00
MB11	Mobile mounting bracket. For TW4100E, TR721E, and TR731E	15.54	2.00
MA700	NEW VHF/UHF mobile antenna with diplexer	54.50	8.00

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TH25E	2m FM compact handheld transceiver ...	238.00	8.00
TH45E	70cm FM compact handheld transceiver	269.00	8.00
TH75E	NEW Dual band FM 2m/70cm handheld transceiver	398.00	8.00
TSU6	CTCSS unit for TH75E	30.68	1.00
RA5	Dual band telescopic aerial	18.45	1.00
HMC2	Headset/mic. with VOX/PTT	34.25	2.00
DC1	DC Adaptor. Use with PG2V to power TH25/45E	13.62	0.75
SMC31	External speaker/microphone	29.79	1.50
SMC32	Miniature speaker/microphone with earphone socket	23.95	1.50
PB5	Ni-cad battery pack. 7.2V, 200mAh	26.96	1.50
PB6	Ni-cad battery pack. 7.2V, 600mAh. (supplied).....	26.96	1.50
PB7	Ni-cad battery pack. 7.2V, 1100mAh	41.53	2.00
PB8	Ni-cad battery pack. 12V, 600mAh	38.64	2.00
BT6	AA battery case (batteries not supplied) .	7.27	1.50
BC9	Spare charger for TH25/45/75E transceivers	14.95	1.00
BC10	Compact drop in charger	20.42	2.50
BC11	Rapid drop in charger	100.43	3.00
SC14	Soft case (using PB5). For TH25/45E ...	7.27	1.00
SC15	Soft case (using PB6, BT6). For TH25/45E	8.02	1.00
SC16	Soft case (using PB7, PB8). For TH25/45E	8.79	1.00
SC22	Soft case for TH75E (using PB5, PB6, BT6)	11.83	1.00
SC23	Soft case for TH75E (using PB7/8/9) ...	11.83	1.00
WR1	Water resistant bag	7.27	0.50

ACCESSORIES FOR OLDER TRANSCEIVERS		Price	Carr.
PB21	Ni-cad battery pack for TH21E/41E	24.36	1.50
PB21H	High cap, battery pack TH21/41E. Charges with BC2 or BC6	32.26	1.50
PB26	Ni-cad battery pack for TR26/3600E Can also fit 2500/3500	37.54	1.50
BC2	Charger for TR2600/3600E and PB21H	11.86	1.50
DC21	Mobile DC converter for the TH21E/41E	25.00	1.50
C6	Desk charger/PSU for TH21/41E Can charge 2 nicad packs together	99.00	2.50
BT2	Dry battery case for TH21E/41E	11.86	0.75
BT4	Dry battery case for TH21/41E	13.82	1.00
SC11	Soft case for TH21E/41E when using PB21H	10.47	0.75
AD1	Screwed phono to BNC adapter for TH21/41E ant	3.85	0.50
RA8A	Stubby helical antenna for TH21E	8.56	1.00
TH205E	2m handheld transceiver with LCD readout	199.00	8.00
TH215E	2m handheld transceiver with keypad entry	228.00	8.00
TH405E	70cm handheld transceiver with LCD display	245.00	8.00
TH415E	70cm handheld transceiver with keypad entry	268.00	8.00
PB1	Nicad pack 12V 800 mAh	57.27	2.00
PB2	Nicad pack 8.4V 500 mAh	34.22	2.00
PB3	Nicad pack 7.2V 800 mAh	38.82	2.00
PB4	Nicad pack 7.2V 1600 mAh	63.19	2.00
BT5	Dry battery case	11.86	1.50
BC7	Rapid nicad charger	97.42	3.00
BC8	Compact nicad charger	38.82	2.00
SC12	Soft case (for PB2/3)	13.82	1.00
SC13	Soft case (for PB1/4)	14.49	1.00
BH4	Belt hook for TH205/215E	4.60	1.00
BH5	Swivel mount for TH205/215E	31.59	1.50
MB4	Mobile mounting bracket for TH205/405 series. (Needs BH4)	9.22	2.00
PG2V	DC power cable	3.96	1.00
SMC31	Speaker microphone for TH205E/TH215E	29.79	1.00
SMC32	Miniature speaker/microphone with earphone socket	23.95	1.50
RA3	Telescopic whip antenna for TH205E/TH215E	13.17	0.75
RA8B	Stubby helical antenna for 2m. BNC plug	13.82	1.00
HS2RB	Rubber flexible antenna for 2m. hand helds. BNC plug	8.00	0.75

RECEIVERS AND CONVERTERS		Price	Carr.
R5000	HF General coverage receiver. See CRYSTAL FILTERS	875.00	8.00
DCK2	Option kit for 12Volt DC operation	9.29	1.00
VC20	VHF converter option for R5000 108-174MHz	167.21	3.00
VS1	Voice module for R5000	32.26	1.00
R2000	General coverage receiver with host of features See CRYSTAL FILTER	595.00	8.00
DCK1	Option kit for 12 Volt DC operation	4.00	1.00
VC10	VHF converter for R2000 118-174MHz .	161.94	2.50
RZ1	Wide range scanning receiver. Send for details	465.00	8.00
HS6	Ultra light deluxe headphones	24.36	2.00
HS5	Deluxe headphones for all KENWOOD equipment	37.54	2.00

ACCESSORIES		Price	Carr.
AL1	Lightning and static protector 100w S0239 connector	32.91	1.00
AL1N	Lightning and static protector 100w N connector	39.50	1.00
AL2	Lightning and static protector 1Kw S0239 connector	39.50	1.00
PL1	Power lead for TR2200/2300 series and AR2001/2.....	1.44	0.50
PG3A	Mobile transceiver DC line filter	9.87	1.50
PG2R	12V DC lead for TR7800/7850/7950/ 7930/9130/130V	8.56	1.00
PG2L	12V DC lead for TM201A/401A/ 211E/411E/4000A/TR7730	3.29	1.00
PG2U	12V DC lead for TS711E/811E	5.92	1.00
PG2P	12V DC lead for TR7500/8400/ R600/R2000 etc	3.29	1.00
PG2N	12V DC lead for TM2550E/TR751E/ TR851E	6.59	1.00
PG2S	12V DC lead for TS440S/TS140S/ TS680S/TS790	9.22	1.50
PG2V	12V DC lead for TH205/215E TH405/415E	3.96	1.00
MB201	Mobile bracket for TM201/401/ 211E/411E	11.86	2.50
MB4000	Mobile bracket for TW4000A	12.50	2.50
MB430	Mobile bracket for TS430S/711E/ 811E/440S/670 etc	15.80	3.00
MB10	Mobile bracket for TR751E/851E and TM2550E	18.45	2.50
MB11	Mobile bracket for TW4100E, TR721E and TR731E	15.54	2.00
MB4	Mobile mounting bracket for TH205/405 series. (Needs BH4)	9.22	2.00

COMPUTER INTERFACE UNITS		Price	Carr.
IF232C	RS232 Interface adaptor. TS711/811E/ TS940/440S/R5000/TS140/TS680	69.13	2.00
IF10A	Interface unit for TS711/811E	53.98	2.00
IF10B	Interface unit for TS940S	53.98	2.00
IF10C	Interface unit for TS140S/TS680S	31.87	2.00
IC10	Interface unit for TS440S and R5000	27.65	2.00

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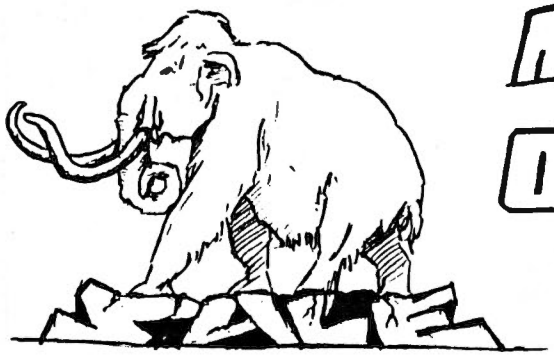

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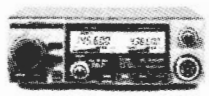

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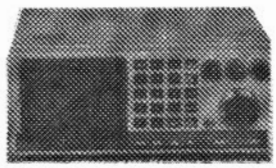

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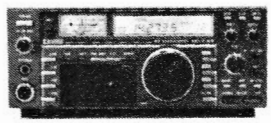

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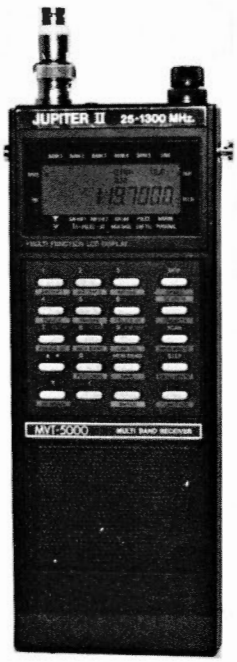

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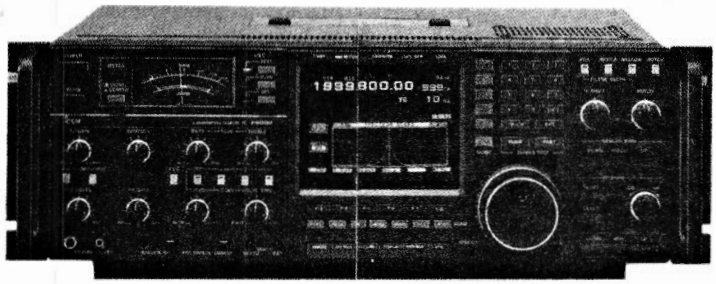

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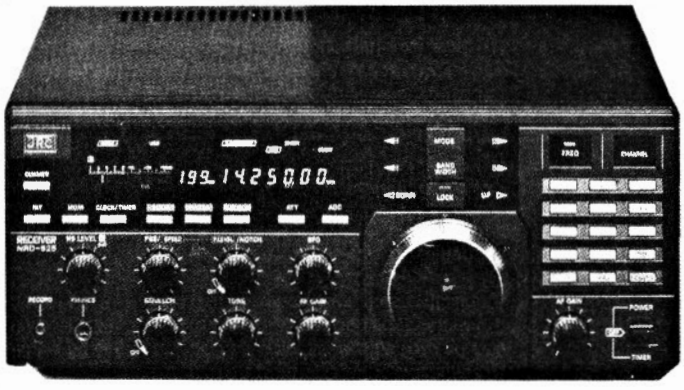

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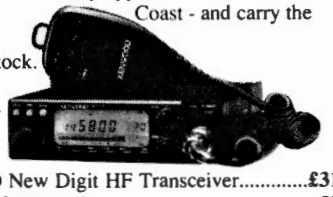
We are now officially appointed Kenwood dealers for the South Coast - and carry the complete range in stock. Heres a selection:-



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

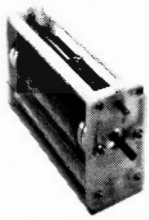
TALK ATU'S

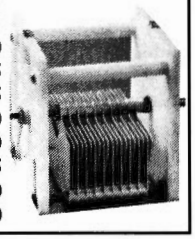
TM 1000 1 KW ALL BAND ATU

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

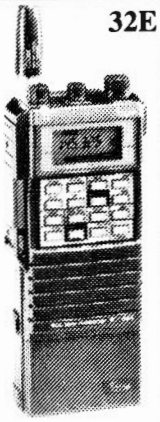




Roller Coaster 30 µH	£28.00
Var. cap 150 pF (4Kv) (For mag. loops)	£16.95
Var. cap 250 pF (10Kv)	£19.95
Var. cap 250 + 250 pF (10Kv)	£28.00
Var. cap 750 pF (4Kv)	£28.00
Turns Counter (For Roller)	£14.95
Empty ATU Case	£26.00
2Kw Balun Assembly	£28.00

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!

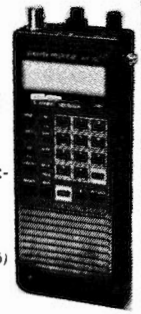


IC - 2SE	Call
IC - 32E 2/70 H/held	Call
IC - 3210E 2/70 Mobile	Call
IC - R7000 Receiver.	Call
IC - R71E Receiver.	Call
IC - 725 HF TCVR.	Call
IC - 735 HF TCVR	Call
IC - 751A HF TCVR	Call
IC - 761 HF TCVR	Call
IC - 765 HF TCVR	Call
IC - 228H 2m/45w.	Call
IC - 448E 70/25w.	Call

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: 25 - 550 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

OTHER POPULAR MODELS:-

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

NEW MULTI PURPOSE PRE-AMP

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

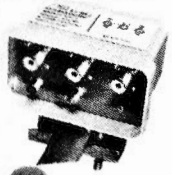
£79.95

SCANNER ANTENNAS

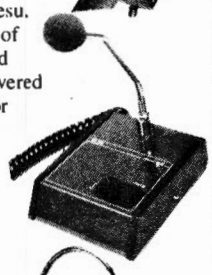
Nevada Discone (50 - 700 MHz)	£24
WB1300 Discone (25 - 1300 MHz)	£59.95
PA15 Colinear (200 - 960 MHz)	£49.95

TALK ACCESSORIES

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

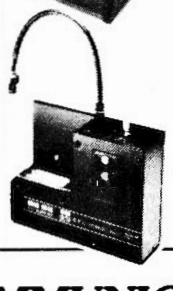


SADELTA XL30 Mic
A new electret base mic, that will give your Kenwood, Yaesu, Icom, or other leading brand of Transceiver extra 'punch' and 'clarity'. The micmay be powered from the Transceiver direct or with an internal PP3 battery.
Introductory Offer £39.95

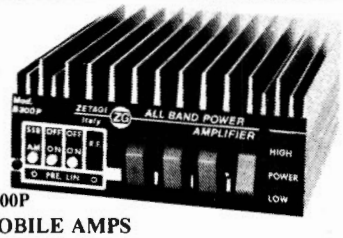


SADELTA CM 40 Mic
As the XL 30 above, but with Vol/Tone controls
Introductory Offer £49.95

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

TC50DX 50 MHz amplifier

MOBILE AMPS

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

BASE AMPLIFIERS

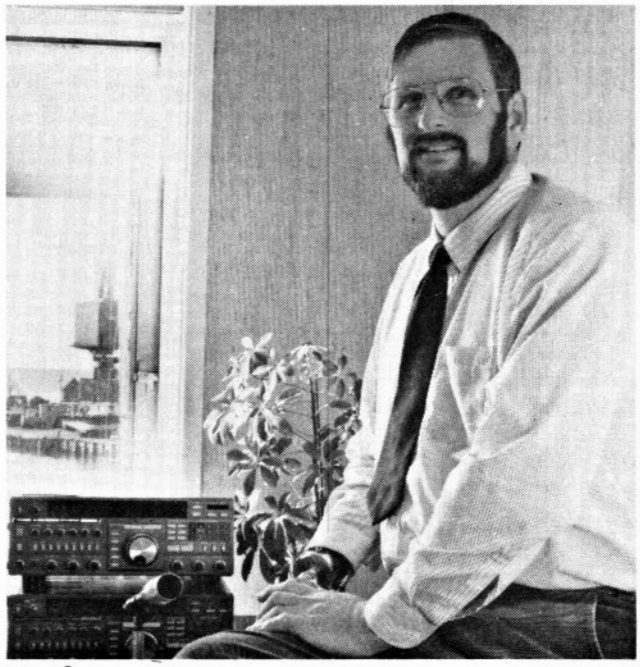
B132 240w (6 - 30 Mhz)	£129
BV131 250w (26 - 30 Mhz)	£115
B507 300w (6 - 30 Mhz)	£278
HL1K/6 500w (50 -52 Mhz)	£695

SEND IN NOW JUST £2 FOR OUR NEW BUMPER CATALOGUE (INCLUDES £2 VOUCHER)

NEVADA COMMUNICATIONS.....WE TALK YOUR LANGUAGE

189 LONDON ROAD, NORTH END, PORTSMOUTH, PO2 9AE, ORDER HOTLINE 0705 662145

Keylines



Rob Mannion G3XFD

Ever since I first started reading *PW* nearly 40 years ago, I've always enjoyed building my own radio projects. The circuits have been varied and some of them have been unusual to say the least! Receivers, transmitters, test equipment and one-off items such as the *PW* 'Treasure Tracer' have provided much fun, experience and education.

But why build your own equipment now? Financially the argument could be proved I'm sure, that by building his own the amateur will lose money and time. However, the satisfaction of building your very own simple transmitter or receiver, with parts often coming from the junk box, radio jumble sale or mobile rally, has to be felt to be appreciated.

Some of the most pleasing amateur radio QSOs I've had have been achieved by using less than 10W d.c. input to a c.w. transmitter running into simple antennas. So, I've got to nail my own colours to the mast and admit that I'm a QRP (low power operation) enthusiast who enjoys the challenge that this particular operating technique of amateur radio offers.

Fortunately, home construction and low power operating seem to go together like the proverbial peaches and cream. Looking back over the years since I became licensed, it comes as no surprise to see that most of the transmitting designs built from *PW* circuits have been for equipment with d.c. inputs of less than 50W. In fact, my most successful project was the *PW* Severn, a design originating from George Dobbs G3RJV, and this little transmitter has provided excellent results despite its low level output.

I was attracted to the *PW* Severn because of the fun that I had from building and operating a Heathkit HW7 direct-conversion transceiver in the early 1970s. Unfortunately, I made the mistake of selling the HW7 a few years back...and now regret parting with the rig!

Many home-constructed radio projects can soak up a great deal of time and money before they are completed. Despite the fact that such equipment can then give many years of trouble free service, even well built home-made gear fetches very poor prices when sold on the open market. This sad fact of life can deter many would-be constructors, who shy away from complex and costly projects which could show them a very poor financial return.

Heathkit equipment, which I'm pleased to say is still popular in America, never seemed to suffer very much in this way and second-hand items would often appear (and be sold) at realistic prices whether it was factory assembled or home-built. What a pity that some of the excellent home-made, one-off projects that I've seen in the past have not repaid the dedicated designer/builder in a more handsome way. Perhaps it's down to us to be prepared to look more closely at the home-brewed equipment on offer at the next 'junk' sale. Who knows what well-built bargain could come our way?

The commercial kit such as those made by the Heath Company have a particular advantage over the 'one off' design in that they'll have a well known and published specification. The equipment and its capabilities will also be known to many enthusiasts via 'hands-on' experience and through comments by other operators and listeners.

Completed constructional projects built by enthusiasts from *PW* articles may not be factory produced, but you can be sure that the equipment design will have been tried, tested and modified where needed, before it is presented to the reader. Many projects are also accompanied by an option to purchase a ready-made, professionally designed printed-circuit board.

The option of the prepared p.c.b. will encourage many constructors to "have a go" and naturally, much feedback is generated by the builders as they discuss modifications, problems and the various ways to trim costs, etc!

With this in mind, I would very much like to hear from *PW* readers who have built any of our published projects in recent years. I would especially like to see any of your own ideas for future projects and remind potential contributors that they will be paid for any design published in the magazine. Don't be put off by the fact that you may not have the time or facilities to submit a constructional project, if you have an idea and think it may be original, different, or be particularly attractive to other radio enthusiasts, drop me a line and tell me all about it!

While on the subject of home construction, I should also admit to you all that I still use valves! And judging by the interest shown in Pat Hawker's 'Technical Topics' in *Radcom* whenever a valve project is mentioned - many other radio enthusiasts use them too!

At the Leicester show I was approached by several readers asking for the occasional valved-equipment project. It was interesting to see that of the four people that requested valve projects, only two of them had actually been born when valves were in general use!

Equally I should state that one or two readers approached me (on hearing the pro-thermionic discussion) and voiced their disinterest in the revival of such projects in *PW*. What do you think? Would you be interested in one or two *PW* valved circuits using valves that are available? Don't forget that many circuits will work with a very wide range of valves, especially in transmitter circuits where you can quite safely have a mis-match and not damage your final amplifier! So, let's be hearing from you on this point, at least in the winter our shacks could be warmer!!

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

Whilst between QSOs the other Sunday, I heard a Dutch station say that reciprocal licences will in future not be required by licensed amateurs visiting member states of the European Community.

I am sure you have not heard of this yourself as otherwise you would have made some remark in *PW* September.

Your comments on this, especially if the Dutch colleague was right, would be greatly appreciated as this news would be of great interest to many fellow radio amateurs.

Thank you for a wonderful magazine.

Louis Payas
Gibralter

The RSGB Replies

David Evans G3OUF, Secretary and Chief Executive of the RSGB, replies to the letter from Mr Louis Payas, Gibraltar.

"The RSGB have advised that discussions are taking place within Europe on a Euro-Licence similar in concept to an international driving licence, however, no such licence is yet in place or indeed likely to be for many years to come.

There are two forms of international licensing currently in operation. First of all, reciprocal licences. To obtain a reciprocal licence in a European country the British amateur concerned has to apply in advance of the date of his/her visit. Normally a fee is payable. The second type of licence is known as a CEPT licence. This permits British amateurs to operate under certain conditions within other countries who are members of the CEPT organisation (The conference of European Posts and Telecommunications Administrations). While the CEPT organisation includes some of the countries within Europe, it also includes some countries who are not in Europe. So far as British amateurs are concerned, a list of countries that British amateurs can operate in without prior formalities under the CEPT agreement is listed on the licence validation document. UK radio amateurs who have received their validation document since January 1989 will have this list. The RSGB hopes that the above will put the remarks of the Dutch amateur radio station into context.

Full information of the CEPT licence, etc., is available to RSGB members from the Membership Services Department at RSGB HQ".

Kindest regards.

David Evans G3OUF
Secretary & Chief Executive
RSGB

Dear Sir

I am disgusted with A. J. Hind's letter in your December 1989 *Practical Wireless*, concerning QSL cards. May I remind him that amateur radio is a hobby and a very good one.

If an amateur station does not send QSL cards fair enough, but I think they should at least have the manners to return the IRC, etc. Also, all s.w.ls. do not send bad reports, in fact, I have had some very nice letters thanking me for such good detailed reports.

I think A. J. Hind should get off his high horse and leave other people, such as myself, to enjoy the hobby.

Oh Ed, keep up the good work with your magazine.

P. J. Lloyd
Essex

Dear Sir

Please use every inducement you can muster to persuade Peter Rouse GU1DKD, to write at least one more article to follow 'Batteries Not Included', December *PW*. It was your best feature this year.

Peter's wit is hilariously funny because it is so wickedly close to the truth. 'Sprocket Radio' is a gem and should go into the *Radio Amateurs' Handbook*.

Jack Pemberton
East Sussex

★★★★★STAR LETTER★★★★★

Dear Sir

For a number of years I have been against capital punishment. However, since spending many hours straining my eyes over 'Wordsearch' (not that I ever win anything) I have since changed my mind.

How could you be so wicked as to torment us so!!!

Hang the Editor? Well, not until after the December issue of *PW*!!! Joking aside - Great Fun. Great Prizes. What other dastardly competitions have you in mind?

Frank Thornton, Clwyd

Wait and see! Ed.

Dear Sir

With increasing numbers crossing the Atlantic, both for business and pleasure, it must have occurred to many radio amateurs undertaking the journey, that it might be advantageous to buy gear in the States. What are the snags?

Unfortunately, with the present exchange rate of the dollar and the pound, there would appear to be little advantage in buying anything new - as both import duty and VAT have to be paid at the Customs on bringing it into the country.

However, second-hand (or "used" as it is called in the States) apparatus is quite a different matter, for the Americans are continually changing "old for new", and the prices drop substantially after only a few years. They also keep their sets in truly immaculate condition, with a view to an exchange later - and go to the length of storing the original cardboard box! Then, they do have capacious cellars.....

However, I ran into two serious problems, on a recent trip to Iowa. The first was that all the stores selling amateur gear were hundreds, if not thousands, of miles away - either on the East or West coasts, with none in the corn-belt of the mid-West.

That meant having to use the phone, but at least the calls were free with their 0800 system, and the salesmen I spoke to were all well-informed and courteous. Finally, settling on a transceiver, only a few years old and about half the price asked in this country, I thought all my troubles were over - when problem number two appeared from nowhere!

The store refused to accept payment by Access or Visa card unless presented in person, and there certainly wasn't the time to send a cheque through the post. It was explained that for security reasons all cards from outside the USA had to be "fed into the machine", which made me wonder if they had a robot computer which lived on a diet of plastic bank cards!

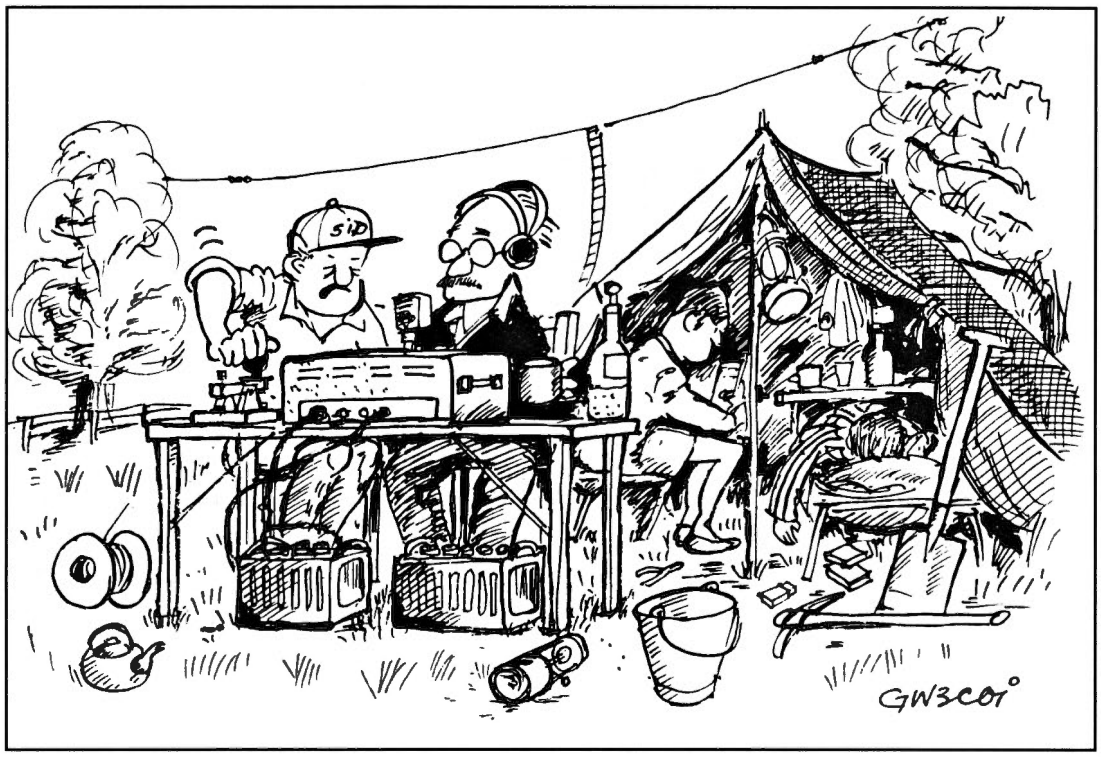
Fortunately, my host came to the rescue by offering the use of his banker's card, which was accepted as he had a permanent address in the States plus a local bank account.

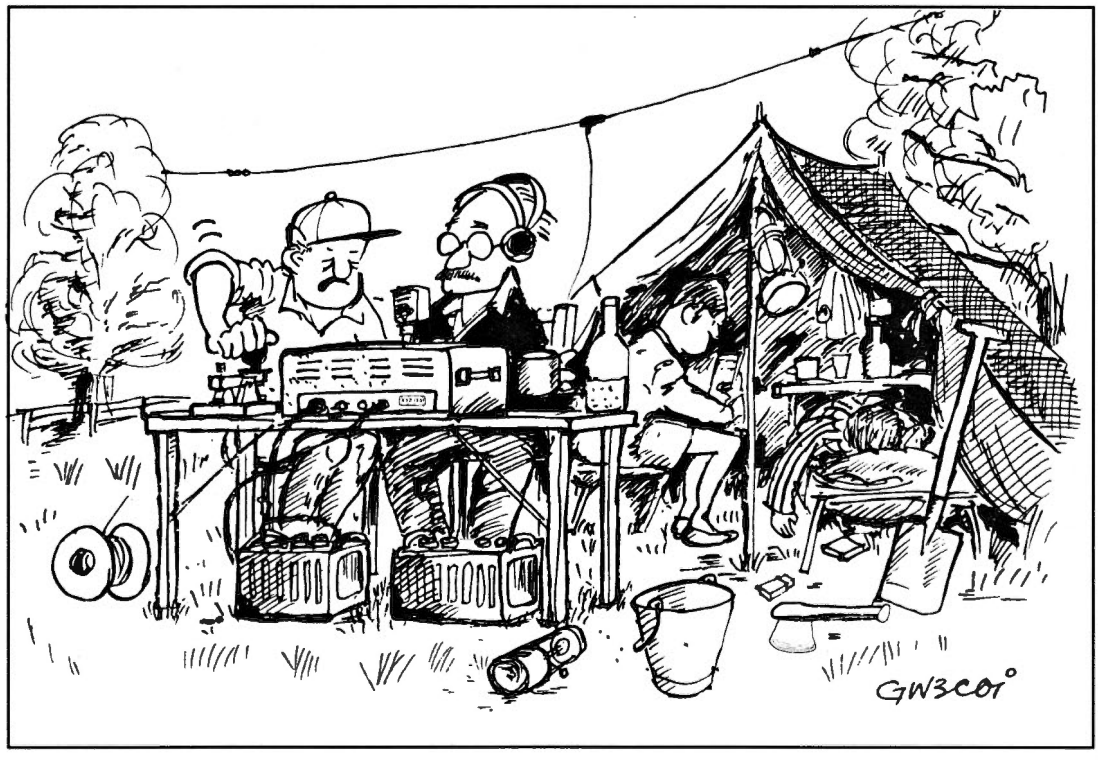
Three days later the set arrived via UPS for a transit cost of less than five dollars, packed securely in a large cardboard box, and in what can only be described as immaculate condition - a real bargain, even after paying import duty and VAT.

Douglas Byrne G3KPO
Isle of Wight

Competition Corner *Spot The Difference*

Spot the twelve differences and circle them in ink.





PRIZES...

First prize will be awarded to the first correct entry drawn from a 'hat' on monday 19 February 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.

Circle the twelve differences, fill in the form below and send your entry to PW Publishing Ltd., February 1990 Spot The Difference Competition, Enefco House, The Quay, Poole, Dorset BH15 1PP. Closing Date last post received Friday 16 February 1990. The Editor's decision on the winner is final, no correspondence will be entered into.

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

.....

Please tick choice of prize if you win.

☐ Subscription

.....

☐ Vouchers

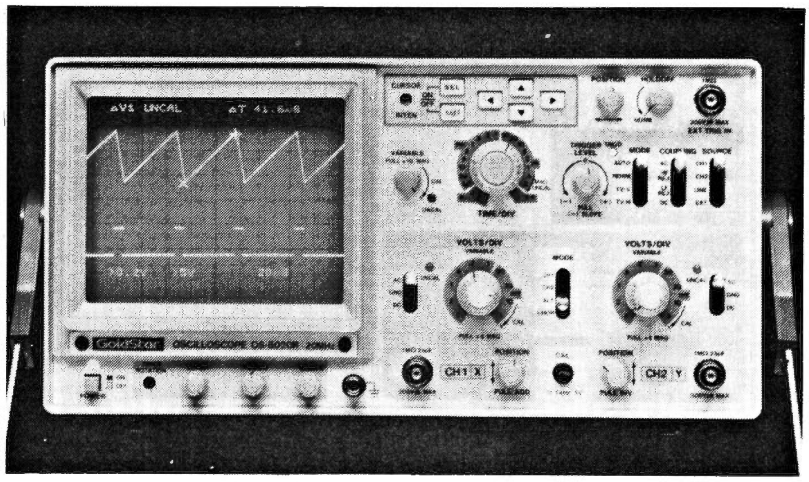
Postcode .....

Newsdesk '90

On-screen Cursors

The latest GoldStar instrument available from Alpha Electronics is an oscilloscope with a c.r.t. readout that enables waveform settings and measured values to be displayed on the screen. The OS 8020R has mobile on-screen cursors which make the unit extremely simple to operate. The cursors provide a direct readout of voltage, time and frequency without the need for time consuming calculations.

Front panel controls for this feature include push-button keys for selection, directions and frequency measurement plus adjustable intensity.



With the cursor function off, the 'scope remains a dual-trace 20MHz unit which features scale illumination and beam rotation on a 6in rectangular c.r.t. with an internal graticule.

Sensitivity is to 1mV/div and sweep speed to 100ns/div. The unit measures 290 x 145 x 375mm and weighs 7.4kg with a carrying handle that doubles as a safe tilt stand. The unit costs £490 including two switched probes but excluding VAT, and is fully guaranteed for 3 years by Alpha.

Alpha Electronics Ltd.,
Unit 5,
Linstock Trading Estate,
Wigan Road,
Atherton,
Manchester M29 0QA.
Tel: (0942) 873434.

All Change

Allweld Engineering are moving to new and larger premises later this year. As from January they will be based in South Wales at the Cross Hands Business Park, Cross Hands, Llanelli, Dyfed. Here they are erecting a purpose-built factory which will be ready in March. Until then, they will be nearby at **Unit 1 Plot 27**.

The new site has easy direct access from the M4 motorway, ample free car parking, they will have an increased product range with more on display and they will be within 200 yards of a large shopping complex. The new telephone number is **0269 845251**.

Star Electronics

Star Electronics in Tyne & Wear have been appointed authorised dealers for Yaesu/SMC products and Northern distributor for Revco. They also stock Met antennas, Howes kits and Navico products.

Star Electronics.
Unit 5c Robert Frazers,
Industrial Estate,
Station Road,
Hebburn,
Tyne & Wear NE31 1DB.
Tel: (0836) 293738.

BARTG

The British Amateur Radio Teledata Group (BARTG) have set the rates for the 1990 subs at: UK - £10, Europe & Eire - £13, Overseas surface mail - £13 and Overseas air mail - £24. For membership please contact:

Miss Anne Reynolds G6ZTF.
169 Bell Green Lane,
Coventry,
Warks CV6 7GW.

Special Event Stations

GM90CC: On January 20/21 this station will be on air for Glasgow Cultural City of Europe 1990 under the auspices of West of Scotland ARS.

GB2SSD: On May 12/13 this station will be on the air as part of the Heritage of Whiskey Event. Four distilleries will be on the air and certificates are available.

GB2RBC: On June 9/10 a station will be on air from Balmoral Castle, they have been invited to return to this venue.

GB2NTS: From Jul 15 to 22 there will be four NTS castles on the air, again certificates will be available.

GB2NTS: On September 22/23 there will be the five nations NTS event for the second year.

For further details of these stations and the various awards available, send an s.a.e. to:

GM3MTH. PO Box 59,
Hamilton ML3 6QB.

Triple Output PSU

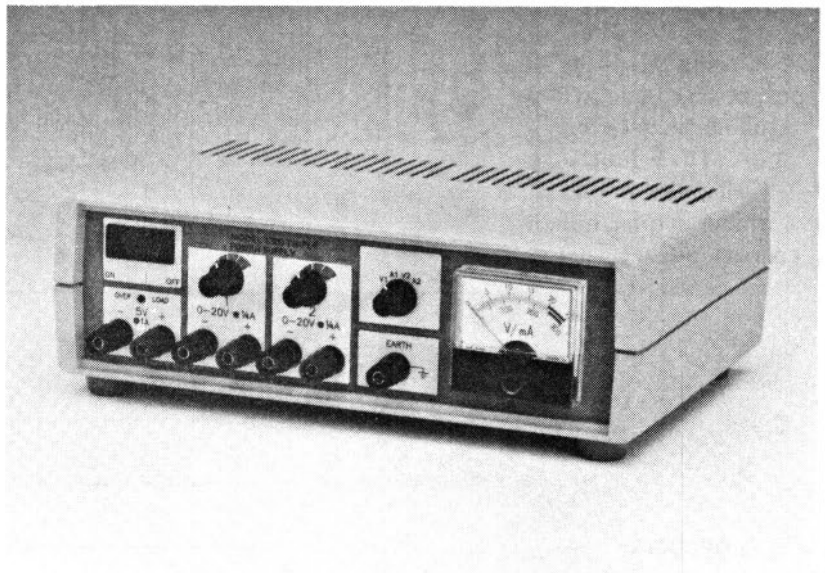
The UK-manufactured Model 1300 has a fixed output of 5V d.c. (±0.25V) at 1A maximum, with a line regulation of 0.2%, load regulation of 1.0% and a maximum ripple of 10mV peak-to-peak.

The outputs can be used independently, or can be interconnected to accommodate voltage and current requirements. Current limiting prevents damage from short circuit.

The front panel voltage and current meter has an accuracy of ±5% of full scale. Also included is an l.e.d. overload indicator.

The Model 1300 measures on 76 x 254 x 178mm and weighs 2.7kg. The cost of the p.s.u. is £89.50 plus VAT.

Global Specialties. Rackery Lane, Llay, Wrexham, Clwyd LL12 0PB.
Tel: 0978 833920.



Newsdesk '90

CQ GN-950

A famous proverb, amongst the citizens of the city of Groningen in the Netherlands is: "People that don't know about Groningen, don't know the Netherlands".

That is one of the main reasons for the radio amateurs in this city giving special attention to the 950th anniversary of their town.

Starting on January 13, the radio amateurs of Groningen will man an exhibition that will last a fortnight. During this exhibition, a special event station will operate from the exhibition site in the building of Groningen's Regional Broadcasting Organisation Radio Noord.

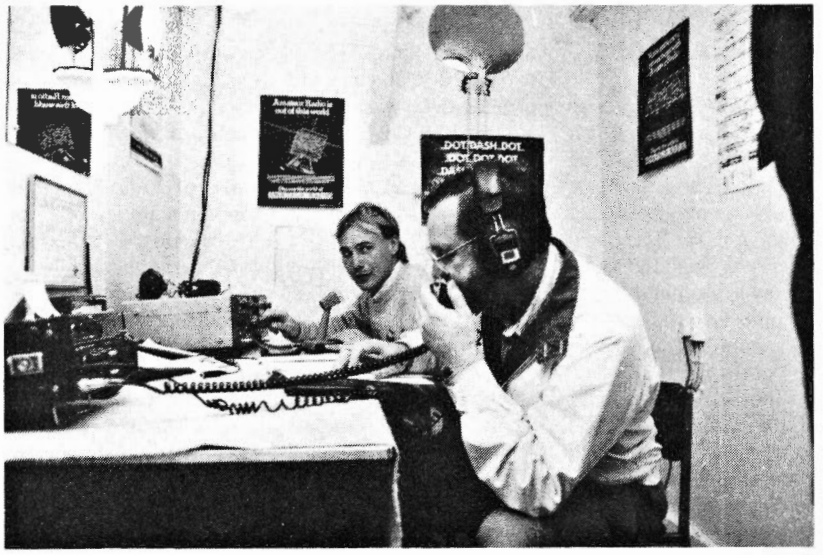
One of the highlights will be on January 20 when Radio Noord will put the spotlight on amateur radio. That day, the station will try and contact many former Dutch amateurs and many former townsmen around the world.

The operators of PA6GN will operate on at around the following frequencies:

3.530MHz c.w. - 3.660MHz s.s.b.
7.030MHz c.w. - 7.060MHz s.s.b.
14.030MHz c.w. - 14.260MHz s.s.b.
21.030MHz c.w. - 21.260MHz s.s.b.
28.030MHz c.w. - 28.560MHz s.s.b.

and for local and regional stations they will also be using 145.25MHz f.m.

950
GRONINGEN
1040 1990



Amateur Glasnost

On Saturday 7 October 1989, HMS *Warrior* was visited by Igor Khrustalev UA3QJC at the special invitation of Captain Colin Allen and Rodney Smith G0ERS, manager of GB3HMS. During the visit, the group were unexpectedly joined by Calvin Bacon KC2KD from Long Valley, New Jersey.

Both stations were invited to use the radio equipment at GB4HMS by the station manager and Captain Allen. The photograph shows Igor using the 14MHz band equipment and Calvin using the 144MHz band equipment.

Catalogues

Electrovalue have sent us a copy of their latest catalogue. It's got 134-pages and can be sent free to any address in the world. All you have to do is write, 'phone or FAX them with the details. **Electrovalue Ltd., FREEPOST, 28 St Judes Road, Englefield Green, Egham, Surrey TW20 0BR. Tel: (0784) 433603, FAX (0784) 435216.**

STC Electronic Services have produced a new 10-page technical brochure on the Aerovox M range of computer grade and snap-mount aluminium electrolytic capacitors. The publication features details of performance characteristics such as voltage, capacitance tolerance, QA stability, ripple current recommendations and d.c. leakage current. Copies are available, free-of-charge from: **The Capacitor Group. STC Electronic Services. Tel: (0279) 503173**.

SRS has introduced a new brochure on the Dimension 90 range of desk-top enclosures.

Highlighting the many advantages of the new series which is designed for the electronic housing requirements of the 1990s, the publication details standard as well as the customised products offered. **SRS. Tel: (0279) 418401**.

Batteries

A wide variety of batteries, from NiCads to sealed lead-acid batteries in boxes are available from Strikalite. Readers may have seen the company at some of the radio rallies around the country last year.

Other products available are emergency luminaires, button cell telephone packs as well as packs of batteries made up to your specification. For more details, contact: **Strikalite. Laurel Drive, Rugeley Road, Burntwood, Staffs WS7 9BL. Tel: (05436) 3122.**

Strikalite

Video Repeater Group

The inaugural meeting of the Dorset Video Repeater Group was held on 29 November 1989 in Weymouth. The group have set an initial subscription level of £5, any financial donations would be greatly appreciated. The group are aiming towards a 24cm TV repeater (GB3DV?).

For further information contact:
Les G0FAJ.
29 Overlands Road,
Wyke Regis,
Weymouth,
Dorset.

Newsdesk '90

Worked All Britain Award

The WAB Group was founded in 1969 by the late John Morris G3ABG. The group aims to promote a greater amateur radio interest in Great Britain and Northern Ireland through an award scheme. This scheme is based on the geography and administration of the UK.

These awards are available on a world-wide basis to all radio amateurs and short wave listeners. QSL cards are not required for any of the awards and they can be claimed on any band (including 10, 18 and 24MHz) or by any mode open to radio amateurs.

WAB is an independent, self-financing, group and life membership is via the purchase of a WAB record book. The group also makes, when possible, financial donations to groups helping disabled radio amateurs and short wave listeners.

The main award from the group is The WAB Award and is based on working WAB areas. WAB areas are based upon map references used on official (OS) maps of Great Britain and Northern Ireland. The map reference system divides the country into 100 x 100km grid squares. These are referred to as **large squares**. In Great Britain these are given a two letter reference (e.g. SP, SS, NN, SC) while in Northern Ireland they are given a single letter reference (C, D, G, H, J).

These large squares are then broken down into 10 x 10km squares. Two digits are added to the large square reference, the first digit gives the position on a horizontal scale and the second digit the position on the vertical scale (e.g. SP38, SS99, NN72, etc.).

The final stage is to add the administrative county to the 10 x 10km square to give the WAB area. There are over 4000 WAB areas. This award is given for working various numbers of these areas. There are six classes of award:

Basic, Bronze, Silver, Gold, Platinum and Sapphire.

A certificate is given for the Basic Award and endorsement stickers for the higher classes of award. There are more higher classes of award and an Honour Roll for working areas beyond the requirement for the Sapphire Award. Specially engraved trophies are given out for these classes.

Stations outside Europe must work:

100, 200, 400, 600, 800 and 1000 areas on the h.f. bands.

Stations in Europe must work:

300, 500, 750, 1000, 1500 and 2000 areas on the h.f. bands, v.h.f. requirements are lower.

Stations in the UK must work 250, 500, 750, 1000, 1200 and 1350 areas.

The WAB Large Squares Award is given for working the 100 x 100km squares. A certificate is awarded for working 30 large squares and endorsements for 40, 55 and all 61 large squares.

The WAB Counties Award is offered for working counties in Great Britain and Northern Ireland. It has two classes, Class II for 55 counties and Class I for 76 counties.

The WAB Islands Award is given for working off-shore islands. There are well over 2000 such islands around the county although many of them are uninhabited. A certificate is awarded for working 25 islands and endorsements for 40, 50, 60, etc islands.

The WAB Bookholders Award is awarded for working 100 bookholders, endorsements are given for each additional 100 bookholders worked. To keep track of WAB contacts members are issued with a sequentially numbered WAB record book.

The WAB Overseas Introductory Award is intended for stations who live outside Europe as an introduction to WAB. A certificate is awarded for working 25 WAB areas and 10 counties.

The various costs for awards and the life membership record book costing £7 (or 12$ US). and can be obtained from:

The Membership Secretary,
Brian Morris G4KSQ,
22 Burdell Avenue,
Sandhills Estate,
Headington,
Oxford OX3 8ED.

Glasgow 1990

Glasgow 1990 - Cultural Capital of Europe. A prize draw will decide the winner of a seven day trip to Glasgow, Scotland. This will include return air fares for two people from the winner's country of origin to Glasgow, hotel accommodation for the winner and a guest in Glasgow and complimentary tickets to events taking place in Glasgow during the winner's stay. A secondary prize of two 7-day Freedom of Scotland Rover Tickets will be offered.

Amateur Radio Clubs in the Greater Glasgow Area have joined forces in celebrating from club premises and cultural events during the year. The main callsign for Glasgow 1990 is **GM90CC**. The participating club callsigns are: GB0CCE, GB2CCE, GB4CCE, GB5CC and GB6CC.

Callsigns at other special events include: GB8CA - GB8CZ, GB1CCE, GB6CCE and GB8CCE.

To enter the draw you need one contact with GM9OCC on any band and any mode plus any four of the other stations. Send your QSL for GM9OCC only, via the GM Bureau or direct to PO Box 599, Glasgow G1 1EW. Quote the other four stations you have contacted on that QSL card. Please do not QSL individual GB callsigns involved in this event unless requested to do so by the station.

The draw will take place on 1 May 1990.

If you wish your card to be entered for the secondary prize draw, please mark 'Flying Scotsman' on your QSL card. This draw will take place on 1 June 1990.

Pocket-sized Tester

A new range of electrical circuit testers is now available in the UK from Longs Ltd of Surrey. The digital volt meters made by Soar are unusual because of their compact size.

The virtually drop-proof circuit testers measure about the same size as a pocket calculator weighing in at just 100g. They can be operated by one hand to show accurate readings of a.c. or d.c. volts and ohms test on large digital displays.

Top of the range is the high speed ME3060 which has a bar graph display for fast and accurate readings. This unit costs £35.08 including carriage and VAT. Its battery life should give over 250 hours of operation as it has an automatic shut-off safety function.

The ME3020 costs £23.58 including carriage and VAT and this unit is fully protected up to 450V r.m.s.

Longs Ltd.,
Hanworth Lane,
Chertsey,
Surrey KT16 9LZ.
Tel: (0932) 561241.

Newsdesk '90

Aircastle Products

We recently carried a series of advertisements for Aircastle Products. We would now like to hear from anyone experiencing difficulty in obtaining goods or refunds from this company. Please contact:
Roger Hall.
PO Box 948,
London SW6 2DS.

Waived Subscriptions

The RSGB have the mechanism whereby certain members may have their annual subscription waived.

The applicant must be a current member of the Society and have been a member for at least one year.

The member must be blind or disabled such that he/she is unable to obtain or follow full-time employment.

The member must either be a UK resident or an expatriate.

The applicant must complete the appropriate form, sign the declaration and return it together with a Doctor's certificate/letter to:
The RSGB. Lambda House, Cranborne Road, Potters Bar, Herts EN6 3JE.
Tel: (0707) 59015.

Wireless Line

Starting on January 8 readers can call PW's new dial-and-listen service on (0898) 654632 for up-to-date news and information catering for the radio enthusiast and licensed amateur.

Updated every Friday evening, calls are charged at 38p per minute peak, 25p per minute off peak.

Helpline

Mr F. J. Dooley is looking for any information at all on an **American Skyrider SX-2B** he has picked up. Can you help? He may be contacted on **Woodford Green 01-505-8080.**

Mr Jennings is looking for details on the **Thorn TX10 Export tuner**, especially the pin connections. He want to know where the supplies should be connected to the tuner and the attached +256 prescaler. **Mr Jennings, 407 Heath Road South, Northfield, Birmingham B31 2BB.**

Has anyone got a copy of the instructions for a Trio h.f. receiver, **9R59DS**. **Gareth Morris, 7 Renfrew Road, Norton, Cleveland TS20 1JH.**

Bill Vann is looking for a circuit or any other information on the **GEC Communications receiver serial No 516**. This is a four-waveband 2-20MHz, 12-valve, 12 volt input c.w. and m.c.w. unit. **Bill Vann GM3TBV, 'Birchwood", Emma Terrace, Blairgowrie, Perthshire PH10 6JA.**

It is rumoured that there are some **R1155** receivers being issued from an Ex-WD warehouse in the Liverpool area. Any details to **R. Smith. Tel: (0223) 464005**.

Has anyone got an **Eddystone Circular Speaker** they wish to dispose of? If so contact: **Mr R. Williams, 62 Kingscliffe Road, Grantham, Lincs NG31 8ET**.

Can anyone help in identifying the **frequencies** used by Formula One racing teams, either the voice comms or the car data. **Peter Collins, 6 King Street, Earls Barton, Northants NN6 0LQ.**

John Hackett is renovating a **Codar AT5** a.m./c.w. transmitter along with its 250/S power supply. Has anyone got circuit diagrams, operating manual, etc., for this equipment. All reasonable costs met. **John Hackett, 42 Central Avenue, New Basford, Nottingham NG7 7AF.**

USE THIS COLUMN WHEN YOU THINK THERE'S NO HOPE FOR THAT ODD PROBLEM...SOMEONE, SOMEWHERE MIGHT BE ABLE TO HELP!

Count on us!

TH HF TRANSCEIVER IC-781

The IC-781 has a dual-watch function which allows simultaneous receive of two frequencies in the same band. Balance controls adjust VFO A/B receive strength levels. This feature is especially useful on Dx-expeditions or contests to check band activity or to tune in your next contact. The newly developed ICOM DDS (Direct Signal Synthesizer) system is incorporated to provide a fast transceiver lock-up time. This is essential for data communication systems.

The IC-781 communication system includes a built-in 100% AC supply, high speed automatic antenna tuner, iambic keyer, semi-automatic, or full QSK CW break in to 60 wpm, audio peaking filter, RF speech processor, multi-scanning plus much more. Look into the future of Amateur communications, ICOM products will be setting the pace others try to follow. For more information on the IC-781 contact your local authorised ICOM dealer or phone ICOM (UK) Ltd direct.

- **SSB, CW, FM, AM, RTTY**
- **160-10m/general coverage receiver**
- **Direct keyboard entry**
- **150 watt output**
- **QSK up to 60 wpm**
- **CI-V communications interface**

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 Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.
Datapost: Despatch on same day whenever possible.
Access & Barclaycard: Telephone orders taken by our mail order dept, instant credit & interest-free H.P.

Reg Ward & Co. Ltd.

1 Western Parade, West Street, Axminster, Devon, EX13 5NY.
Telephone: Axminster (0297) 34918

Yaesu

FT767	HF Transceiver	1599.00	(—)
FEX767(2)	2m Module (767)	169.00	(3.00)
FEX767(70)	70cm Module (767)	215.00	(3.00)
FEX767(6)	6m Module (767)	169.00	(3.00)
SP767	Speaker	69.95	(2.50)
FT747GX	Budget HF Transceiver	659.00	(—)
FT757GX	MkII HF Transceiver	969.00	(—)
FP700	20A P.S.U.	219.00	(4.00)
FC700	Manual ATU	149.00	(3.00)
FP757HD	Heavy Duty 2m P.S.U.	258.75	(4.00)
FAS14R	Remote Aerial Switch	80.00	(3.00)
FT4700	New 2m/70cm Dual Band FM Mobile	675.00	(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)	87.85	(2.00)
NC18C	Charger (23/73)	17.71	(2.00)
SMC28	Charger (23/73) 13A Plug	17.71	(2.00)
NC28	Charger (23/73)	17.71	(2.00)
NC29	Base Charger (23/73)	89.00	(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	509.00	(—)
PA4C	Power Supply for 9600	29.00	(2.00)
MMB10	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	59.00	(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	28.75	(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)

Antennas

VLF	50-500MHz RX Discone	22.50	(3.00)
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)
IC765 **NEW**	HF Transceiver	2499.00	(—)
IC751A	HF Transceiver	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)

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	(—)
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	6.90	(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)
SMB	1.3kμ/600μ 8P Base Mic	82.00	(2.50)
SM10	Comp/Graphic Mike	116.20	(3.00)

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)

KENWOOD

TS950S	**NEW** Transceiver	P.O.A.	(—)
TS940S	9 Band TX General Cov RX	1995.00	(—)
AT940	Auto/ATU	244.88	(3.00)
SP940	Ext Speaker	87.55	(3.00)
TS140	HF 9 Band Gen. Cov. TX/RX	862.00	(—)
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	208.67	(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	343.62	(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	269.00	(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	875.00	(—)
VC20	118-174MHz Converter (R5000)	167.21	(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	289.00	(5.00)
TM431E	**NEW** 70cm FM Mobile 35/10/5W	318.00	(5.00)
SMC30	Speaker/Mic TH21/4/2600	28.31	(2.00)
MC50	4P Desk Mic	46.08	(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)	52.67	(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)

SWR/PWR Meters

HANSEN			
W720S	130/440MHz 20/200W	52.75	(2.50)
JD110	1.5-150MHz	12.50	(2.00)
YMIX	3.5-150MHz	31.50	(3.00)
Yaesu Y560	1.6-60MHz	93.15	(3.00)
Yaesu YS500	140-525MHz	81.65	(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	145.51	(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	154.80	(3.00)

VISA

Instant credit available
Mail/Telephone order by cheque or credit card Cheques cleared before goods despatched. (E&DE)

Access

OPEN TUES.-SAT. 9.00-5.30 (CLOSED MONDAYS)

STOCK ITEMS USUALLY DESPATCHED WITHIN 48 HRS

DELIVERY/INSURANCE PRICES IN BRACKETS

A Simple Transistor & FET Tester

Construction

How many of us have 'just wanted to test the odd transistor', well J.A. Brett G6EBR obviously had such a need. This superbly simple project is his answer to that need, and also to 'I wish I knew the gain of this f.e.t!' as well as 'I wonder if this diode is OK, and which is the cathode end?'.

The circuit described in this article will check *pnp* and *npn* transistors, small signal *p*- and *n*-type f.e.t.s, along with diodes.

If checking a transistor, then the unit will automatically show the type of transistor connected to the terminals be it *npn* or *pnp*. There is also a provision to measure the H_{FE} at a collector current of 5mA. This value of H_{FE}, or static (d.c) current gain, is useful when calculating the resistors required for biasing purposes. The parameter, H_{fe} or small signal (dynamic) gain of the transistor is very close to value of H_{FE}, and for most purposes may be assumed to actually be the same.

When measuring either *n*- or *p*-channel f.e.t.s a simple approximation of transconductance (G_m) may be made using the calibrated gate voltage level and the meter indicating drain current. An additional test position enables normal diodes and low voltage Zeners to be tested with their polarities indicated.

Method of Testing

Referring to the circuit diagram shown in Fig. 1, the transistor under test is subject to an alternating low voltage square wave. As the reverse voltage is kept to a low value the transistor under test (t.u.t.) is in no danger of being damaged. This statement however, does not apply to ALL f.e.t.s. These are unipolar devices, and so are capable of passing current when connected 'the wrong way round'. So to minimise the chances of this changing, or even destroying the device, the circuit has been set up to ensure that the f.u.t. (f.e.t. under test) has only the correct voltages applied to it. There are two test positions specifically for f.e.t.s., these are of course suitably marked as, '*p*-channel' and '*n*-channel'.

When power is applied to the circuit by pressing S2, the integrated circuit IC1 begins to toggle the output line pin 3 between 0 and 9 volts, with a frequency of around 500Hz. The mark-to-space ratio is almost 1:1, meaning the time at 0V is the same as the time at 9V. Diodes D2-5 and D6-9 serve to limit the swing between 2.6 and 2.8V in any one direction. This arrangement is used rather than a Zener diode as it has a better stabilising action, in that the dynamic impedance is around 25Ω as opposed to the 100Ω of a 400mW Zener.

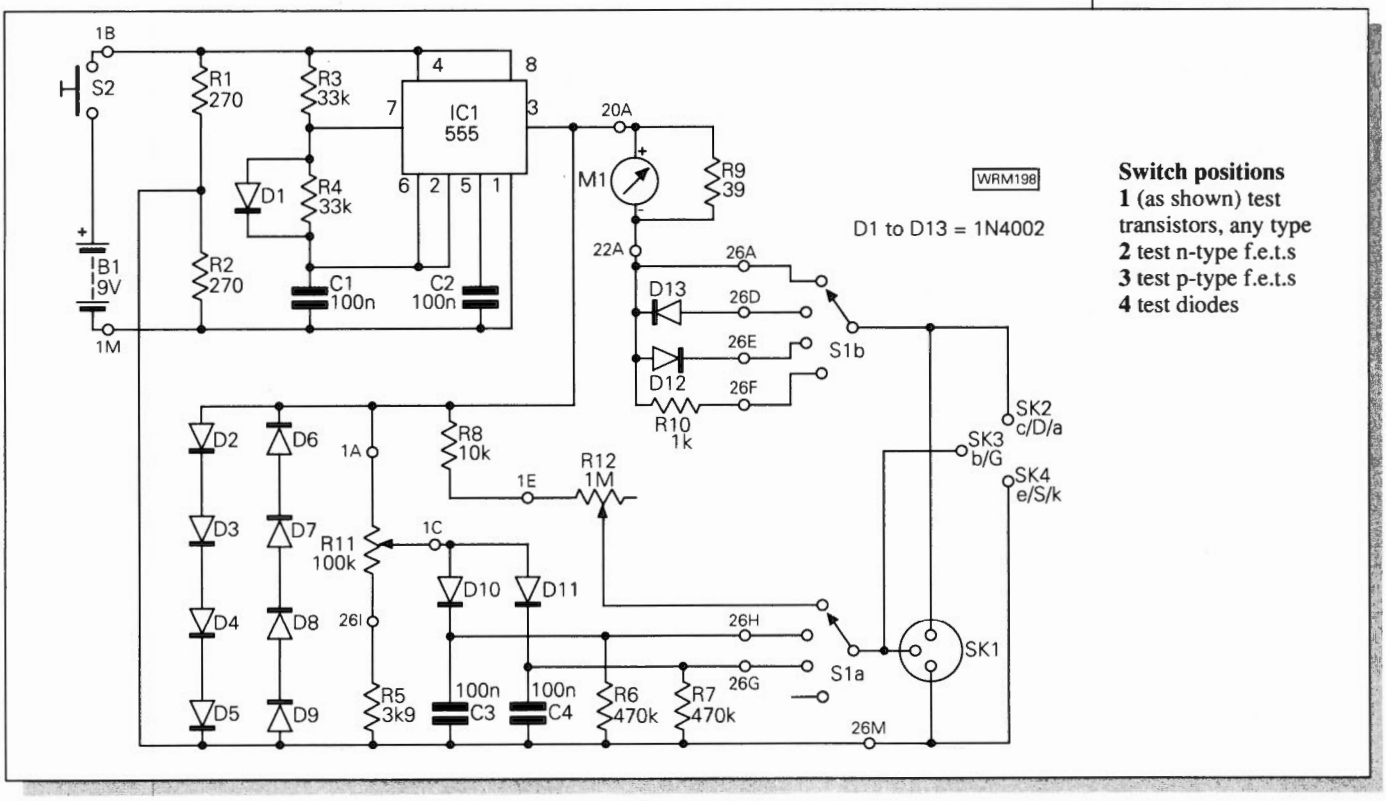
Consider now the switch S1 in the position for a testing a transistor. Resistors R1 & 2 form a potential divider to set the emitter of the t.u.t at half the battery voltage. The base current flows through limiting resistor R8 and the variable resistor R12 into the t.u.t during the period in which it is forward biased. As the device will only conduct when the correct polarity is applied across it, pulses of current are driven through the meter only in conduction.

In both f.e.t. testing modes the method of working is the same, merely the polarity changes. Diode D10 in conjunction with C3 (or D11 and C4) act as peak sample and hold networks, the value of which is dependent on the setting of R11, resistors R6 or R7 forming a discharge path for the capacitor.

The arrangement described above and steering diodes D12 and 13 make sure that the f.u.t always has the correct polarity across the drain-collector path and is always reverse biased, the value of biasing being set by varying R11.

Meter Shunting

Meter M1 is a 50-0-50µA meter with a shunt resistor R9 across it. This shunt resistor gives an



Switch positions
1 (as shown) test transistors, any type
2 test n-type f.e.t.s
3 test p-type f.e.t.s
4 test diodes

Fig. 1: Circuit diagram of the unit, simple yet belying its capabilities

TABLE 1
Table of calculated HFE figures against total resistance of R8+R12 for the t.u.t.

Gain figure	Resistance
10	10.5kΩ
20	21kΩ
40	42kΩ
80	84kΩ
160	168kΩ
320	336kΩ
640	672kΩ
960	1010kΩ

f.s.d. of 2.5-0-2.5mA, but due to current only flowing half of the time it should be marked as 5-0-5mA. By this means the deflection is is used to gauge both polarity and H_{FE} of the t.u.t. The mathematics to enable you to change this value of f.s.d are relatively simple. Divide the new f.s.d. (in our case 2.5mA) by 50μA (50 in our case) then add 1 to it i.e. 51, then using this figure, divide the meter resistance to find the shunt resistor value. Again in our case 2000Ω ÷ 51=39.216Ω. Take the nearest preferred value of 39Ω as the value of the shunt resistor. If this were to be altered to 1mA f.s.d. then this shunt would be 181.8Ω. Do not forget though, that the meter would have to be marked 2-0-2mA.f.s.d.

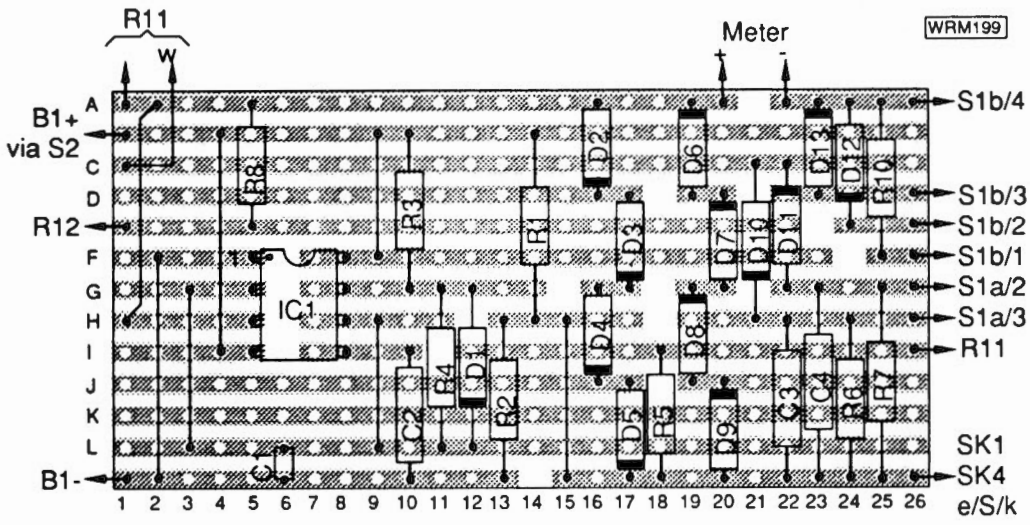
If the recommended meter is used then little needs to be done to remark the scale. Using either a modelling knife or a razor blade gently scrape away the unwanted zeros from the scale. When using another meter this becomes more of an artistic exercise, as the complete face may need rewriting using a fine nibbed pen and ink.

Construction

The majority of the circuit has been built on a strip of 0.1in pitch Veroboard of 13 tracks of 26 holes, and Fig. 2 shows the layout. Using a sharp 2.5mm drill make the track cuts as shown in Fig. 2, before starting to assemble the circuit. Then using a 3.0mm drill carefully drill completely through the board at locations 2K and 26K, these are the mounting points, through which the screws to hold the board in place will pass. After drilling these holes, carefully countersink the track side back a little more, so as to ensure that the track cannot touch these screws on assembly.

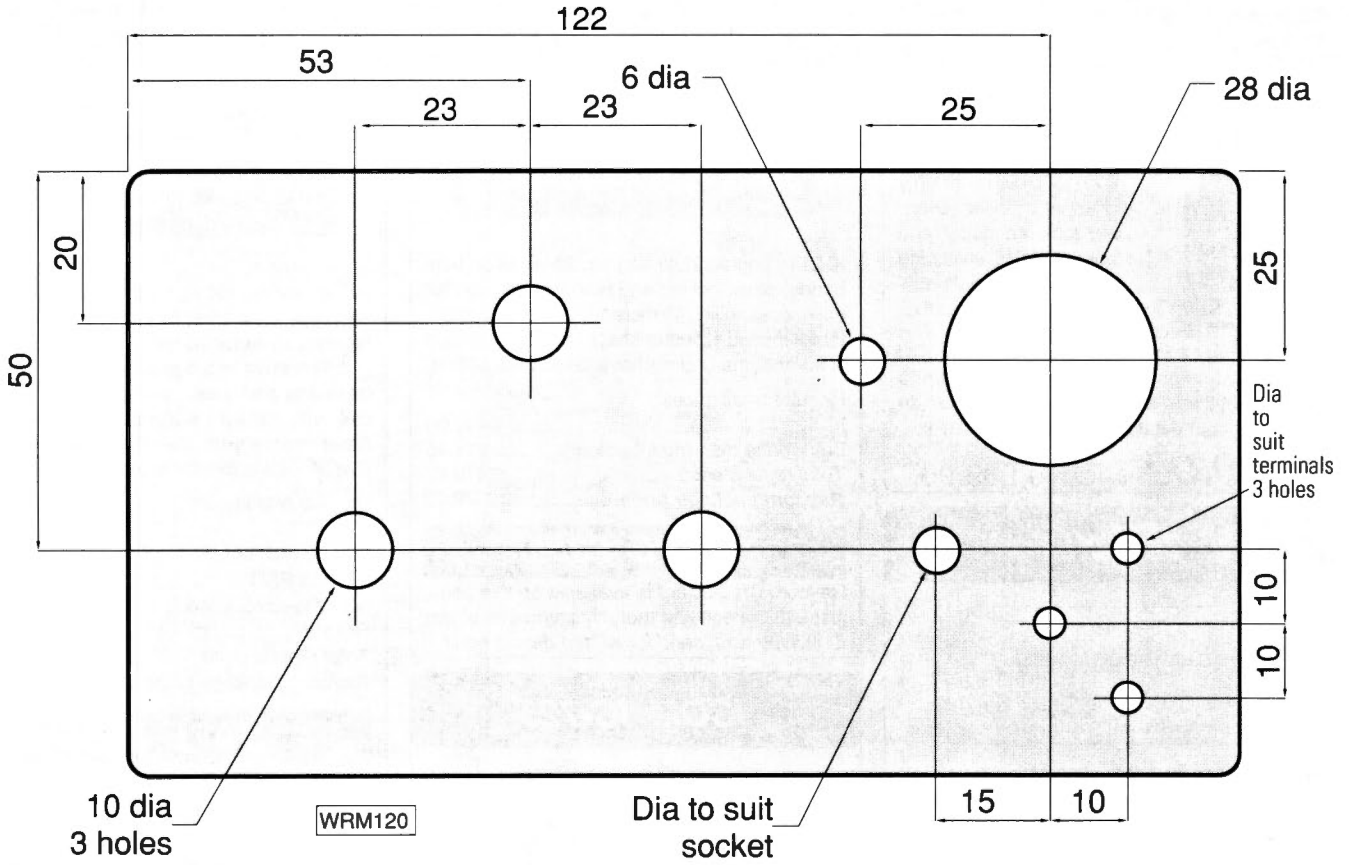
Referring again to Fig. 2, solder the rest of the components into their correct places, taking care with the orientation and location of each item. Then place and solder the connecting leads into their respective holes on the board. That completes the circuit board construction. We now turn to marking and drilling the box, Fig. 3a shows the drilling template if using the recommended Bimbox of 152 x 82 x 50mm dimension. Care taken at this stage, to achieve accuracy, will enhance the whole look of the completed project. Socket SK1 should be a tight fit in its hole at this point and when satisfied with the fit, roughen the sides of the socket with emery paper to enable the epoxy glue a good surface to adhere to.

Dry transfer lettering may also be used to good purpose to annotate the various control and socket functions and positions. The marking of the scale for potentiometer R11 should be simple to do, being a linear one varying between 0 at minimum and 2 volts at the maximum. The calibration markings for variable resistor R12 are somewhat more dificult to arrange. Refer to Table 1, in which the values of H_{FE} are shown against the total resistance value of R8 & 12 in series. Final calibration marking should be done after complete assembly of the unit. Using Table 1 as a guide, with the unit switched off, attatch an ohmmeter between the test terminal marked 'b/g', and the positive side of the meter, and



Track breaks at:-
21A
18D,21D
23E
6F,24F
6G,15G,18G,21G
6H,12H,18H
6I,11I
18J
14M

Fig. 2: Layout and track cutting pattern



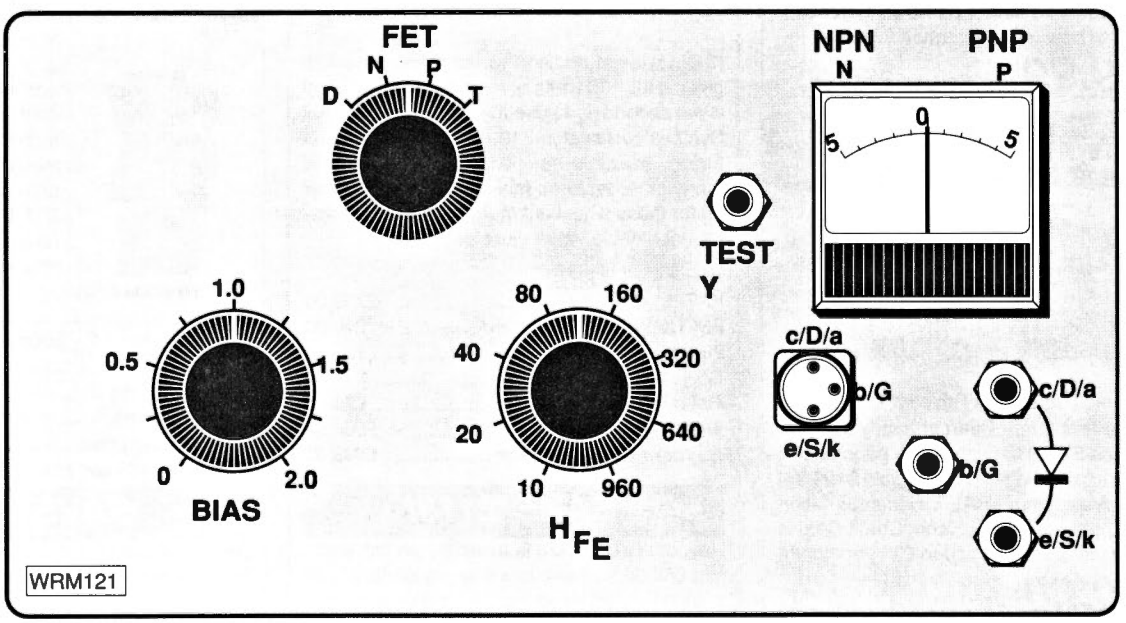


Fig. 3a: Marking and drilling template

Fig. 3b: Drawing of the finished front panel

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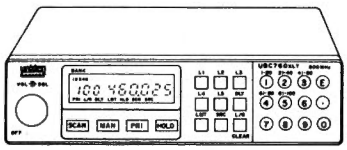
760 XLT



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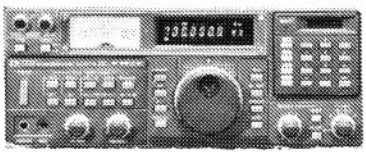
£239.99 .. save £30.00.

ICOM IC-R7000



An unbeatable offer from Raycom - £30 off the retail price and a *free* Bearcat handy scanner covering 29-512MHz (with some gaps) worth £99.95 - a total saving of an incredible £129.95! Can't believe it? Send SAE for an information leaflet and offer details. Raycom Credit Card is available - just £96 deposit and £36 per month!

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Regular retail prices:

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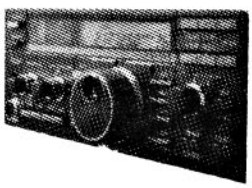

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Raycom package price	***£849.00***

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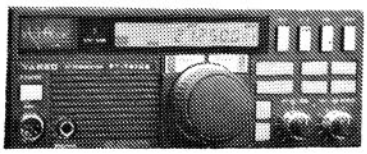
YAESU FT-747GX



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Raycom RX mod	£59.00
20 Amp PSU	£129.99
G5RV ½-sized antenna	£14.95
Fist mic	£21.00
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Raycom package price	***£749.00***

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Regular retail prices:

FT-470	£389.00
FNB-10 nicad 7.2v, 600mAH	£34.50
Wall charger	£17.71
Soft carry case	£10.58
Broadband mag-mount antenna	£14.95
Total regular price	*£466.74*
Raycom package price	***£425.00***

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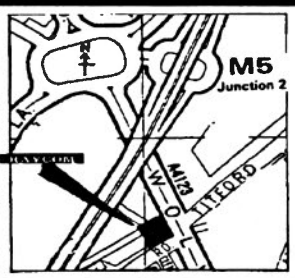
RAYCOM

COMMUNICATIONS SYSTEMS LIMITED



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25 to 550 Mhz and
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- 13.8 volt fully regulated
- 20 AMP output (30 minutes)
- 25 AMP surge
- Over voltage protection
- High current connectors fitted
- Designed for RF service

Fitted in an attractive case with chrome grab handles, the R1320 makes a worthy addition to any shack!

R1320 13.8 v 20 amp PSU £129.99 inc. VAT

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A quality unit manufactured in Britain, the Royal 1300 is ideal for wideband scanners & scanning receivers.

Specifications:
Receive **25-1300 MHz**
Transmit **50, 144, 430, 900, 1200 MHz**
Power **200 watts**
Connector type **'N'**
Cable supplied **RA519**
Type **Discone 8+8**
Length **1.7 metres**
Weight **1 Kg**

HR1300 discone £59.50

BB-145S BROADBAND MAGMOUNT

Another exclusive Raycom import, the BB-145S ia a broadband ¼ wave mag mount antenna for mobile scanners and 2 metre transceivers. Supplied complete with 4 metres of quality co-ax and PL259 plug, this easily installed antenna is compact in size due to the integral loading coil and is specified for 138-172MHz, but often loads at 70 cms!

BB-145S magmount £14.95

rotate to shaft of R12 until the resistor value is obtained and then mark the pointer position on the front panel. When all points have been marked, take the knob off and tidy up the markings.Then using the interwiring diagram shown in Fig. 4, trim to length the flying leads from the board and solder them to the appropriate place.

The board is mounted, trapped between two nuts on each of, two screws passing through the lid of the box. A plain insulating washer should be placed under the nut at the track side of the board. The battery may be held in place by two double-sided adhesive pads.

Testing

After assuring yourself that all connections are correct and in place, connect the battery with a multimeter on the current range in series. No current should flow at this time. Press switch S2, and a current in the order of 20 to 25mA should flow, but there should be no deflection at all on the centre zero meter. If all is in order, continue to the next stage otherwise stop and check all components and wiring. Place a diode with the cathode (marked end) at the terminal post marked 'e/s/k' and the other end at the terminal marked 'c/d/a'. Rotate switch S1 to the diode position then press switch S2 again. An indicated current of about 2mA should flow, and the meter should deflect to the right. Reversing the diode should now allow the meter to deflect the same amount to the left.

Testing a Transistor

Having determined that the system works take a known good transistor and connect it to the correct socket on the front panel, base to 'b/g', collector to 'c/d/a', and emitter to 'e/s/k'. Press S2 and adjust R12 to show full scale deflection of the meter. It is now possible to see the type, and gain of the transistor. Should you not be able to vary the current by use of R12, or there is no deflection at all, then check for correct orientation of the t.u.t. If after checking it is still impossible to set any deflection, then there is a fair chance that the device if dead. Conversly if it is not possible to set f.s.d., then set 1mA on the meter, and **divide the gain figure read off by 5.**

Testing FETs

Now moving on to testing f.e.t.s., the method used is a little different. Firstly try to establish if the device is an *n*-, or a *p*-channel one, and set the switch to the appropriate setting before connecting the f.e.t., source to 'e/s/k', gate to 'b/g', and drain to 'c/d/a'. Turn control R11 to the maximum setting and press S2, when the meter should deflect to either left or right depending if it is n-channel or p-channel. Should there be no reading then rotate R11 slowly anticlockwise until a reading is obtained. The value of the setting of R11 gives the reverse bias required for a standing current as shown on the meter.

To calculate the transconductance, a variation of this technique is used. Set a small current and note the setting of bias volts as set on R11, reset the bias volts whilst noting the new drain current. The change in in current (∂I) in mA is the difference between the two current readings, similarly, calculate the change in bias volts (∂V). The transconductance in milliSiemens (mA-per-volt), is ∂I÷∂V.

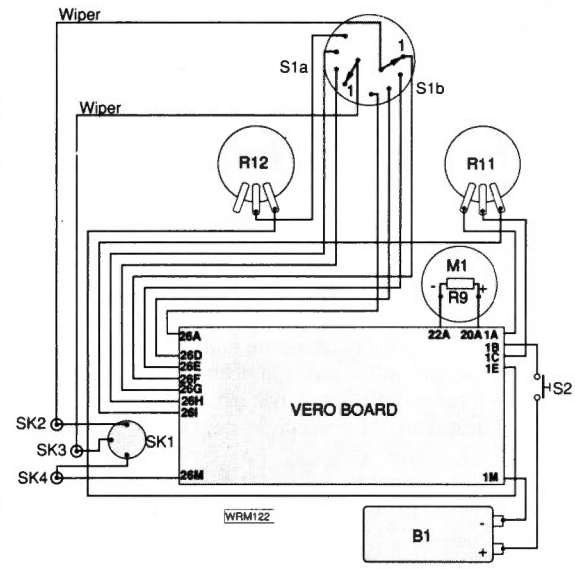

Fig. 4: When the board is completed the flying leads are connected following this diagram as the pattern.

Diodes

Lastly we come to testing diodes, and you should connect the diode between 'e/s/k' and 'c/d/a'. If the meter deflects about 2mA to the 'NPN/N' side then the cathode, (banded or marked end), is on the terminal marked 'e/s/k', and if deflected to the 'PNP/P' side then the cathode is on the post marked 'c/d/a'. If no deflection is obtained then the diode is either short or open circuit. **PW**

Shopping List

HOW MUCH ?
£ 19.50
HOW DIFFICULT
Intermediate

Resistors
0.25W 5% Carbon film

39Ω	1	R9
270Ω	2	R1,2
1kΩ	1	R10
3.9kΩ	1	R5
10kΩ	1	R8
33kΩ	2	R3,4
470kΩ	2	R6,7
Potentiometer		
100k	1	R11
1MΩ	1	R12

Capacitors
Disc ceramic

100nF	4	C1-4

Semiconductors

LM555	1	IC1 almost any '555' should be suitable.
1N4002	13	D1-13

Miscellaneous
Box 152 x 82 x 50mm, a piece of Veroboard 0.1in pitch 2.7 x 1.4in., 2 pole 4-way rotary switch (S1), push-to-make switch, 50-0-50μA meter, 2 knobs to suit, 1 off TO5 transistor socket, 3 small insulated terminals of various colours to suit, a 9V battery and connector, nuts and bolts, insulating washers to suit, double-sided sticky pads.

Reading & Understanding Circuit Diagrams

(with a bit of theory thrown in)

In Part 22, Ray Fautley G3ASG looks at the last three types of impedance matching circuits as well as practical examples of matching.

The first type of circuit to look at this time is Type 7. This is with one complex impedance comprising resistance and reactance in parallel. The value of the resistance in the series impedance being higher than the value of the resistance in the parallel impedance. The circuit of the matching network is shown in Fig. 22.1

(i) Let the higher value of the resistance in the series impedance be designated R_A and the lower value of the resistance in the parallel impedance R_B, regardless of which is source or load

(ii) Change the series impedance R_A and X_A to the parallel form R_A' and X_A'

(iii) Change the parallel impedance R_B and X_B to the series form R_B' and X_B'

(iv) Let $p = \dfrac{R_A'}{R_B'}$

(v) Let $q = \sqrt{(p - 1)}$

(vi) Determine $X_1 = +(R_B' \times q)$

(vii) Determine $X_2 = -\left(\dfrac{R_A'}{q}\right)$

(viii) Determine $X_3 = X_1 - X_B'$

(ix) Determine $X_4 = \dfrac{X_2(-X_A')}{X_2 - X_A'}$

Example of Type 7. Match a series impedance of 85Ω resistance and -15Ω reactance to 12Ω resistance and +70Ω reactance connected in parallel.

(i) $R_A = 85$ and $R_B = 12$

(ii) $R_A' = \dfrac{85^2 + (-15)^2}{85} = 87.647$

$X_A' = \dfrac{85^2 + (-15)^2}{-15} = -496.67$

(iii) $R_B' = \dfrac{12(70^2)}{12^2 + 70^2} = 11.657$

$X_B' = \dfrac{12^2(70)}{12^2 + 70^2} = +1.998$

(iv) $p = \dfrac{87.647}{11.657} = 7.5188$

(v) $q = \sqrt{(7.5188 - 1)} = 2.552$

(vi) $X_1 = +11.657 \times 2.5532 = +29.763$

(vii) $X_2 = \dfrac{-87.647}{2.5532} = -34.328$

(viii) $X_3 = +29.763 - (+1.998) = +27.765$

(ix) $X_4 = \dfrac{(-34.328)(496.67)}{(-34.328) - (-496.67)} = -36.877$

The values are shown in Fig. 22.2.

Arithmetical check, determine Z_{in} (Fig. 22.2)

(i) Use the series form of R_B' and X_B' for R_B and X_B

$R_B' = 11.657$ and $X_B' = +1.998$

(ii) Add X_3 to $X_B' = +27.765 + (+1.998)$

$= +29.763$

(iii) Final form of the series impedance 11.657Ω resistance and +29.763Ω reactance

$R' = \dfrac{11.657^2 + 29.763^2}{11.657} = 89.179$

$X' = \dfrac{11.657^2 + 29.763^2}{29.763} = +34.329$

(iv) Determine the effective reactance of X'(in (iii) above) and X_4 in parallel

$X = \dfrac{(34.329)(-38.877)}{34.329 + (-38.877)} = +496.84$

(v) Convert R' in (iii) above and X in (iv) above to series form, R_S and X_S

$R_S = \dfrac{89.174(496.84^2)}{89.174^2 + 496.84^2} = 86.39\Omega$

$X_S = \dfrac{89.174^2(+496.84)}{89.174^2 + 496.84^2} = +15.5\Omega$

Close enough to resonate X (-15Ω) leaving the resistance 86.39Ω, near enough to R_A (856Ω).

Type 8. One complex impedance and resistance in parallel, the other a complex impedance comprising resistance and reactance in series. The value of the resistance in the parallel impedance being higher in value than the resistance in the series impedance. The circuit of the matching network is shown in Fig. 22.2.

(i) Let the higher value of the resistive part of the complex parallel impedance be designated R_A and the lower value of the resistive part of the series impedance R_B, regardless of which is source or load.

(ii) Let $p = \dfrac{R_A}{R_B}$

Take care when doing the worked examples, make sure you have the right component values

(iii) Let $q = \sqrt{(p - 1)}$

(iv) Determine $X_1 = +(R_B \times q)$

(v) Determine $X_2 = -\left(\frac{R_A}{q}\right)$

(vi) Determine $X_3 = X_1 - X_B$

(vii) Determine $X_4 = \frac{X_2(-X_A)}{X_2 - X_A}$

Example of Type 8. Match an impedance comprising 220Ω in parallel with -300Ω to an impedance of 44Ω in series with -50Ω.

(i) $R_A = 220$ and $R_B = 44$

(ii) $p = \frac{220}{44} = 5$

(iii) $q = \sqrt{(5 - 1)} = 2$

(iv) $X_1 = +44 \times 2 = +88$

(v) $X_2 = -\frac{220}{2} = -110$

(vi) $X_3 = +88 - (-50) = +138$

(vii) $X_4 = \frac{(-110)(-(-300))}{(-110) - (-300)}$

$= \frac{-(110 \times 300)}{+190} = -173.68$

The values of the matching reactances are shown in Fig. 22.4

Checking the arithmetic, Z_{in} in Fig. 22.4 should be 220Ω in parallel with +300Ω reactance (to tune out the -300Ω of X_A).

(i) Add X_B to $X_3 = -50 + (+138) = +88$

(ii) Find parallel form o f 44Ω resistance in series with +88Ω reactance :

$R' = \frac{44^2 + 88^2}{44} = 220$

$X' = \frac{44^2 + 88^2}{88} = +110$

(iii) Find value of X' in parallel with X_4 :

$= \frac{-110(-173.68)}{110 + (-173.68)} = \frac{-110(-173.68)}{-63.68}$

$= +300$

So finally we have 220Ω resistance in parallel with +300Ω reactance. Just right!

Continued over

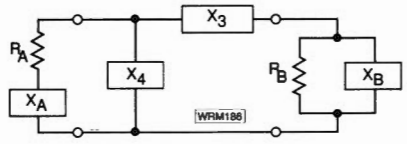

Fig. 22.1

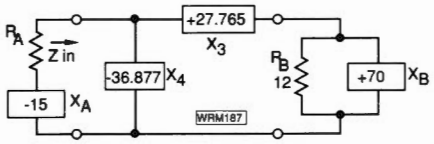

Fig. 22.2

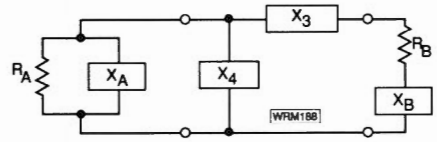

Fig. 22.3

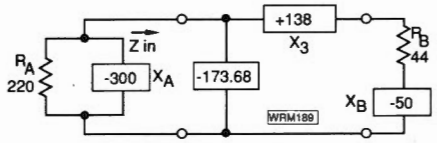

Fig. 22.4

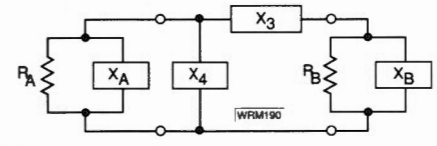

Fig. 22.5

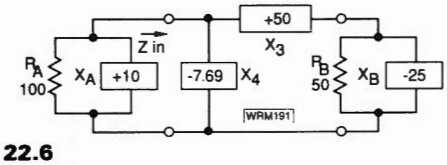

Fig. 22.6

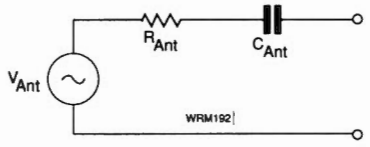

Fig. 22.7

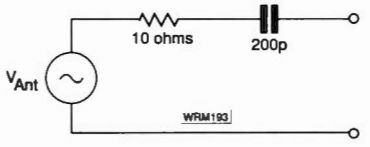

Fig. 22.8

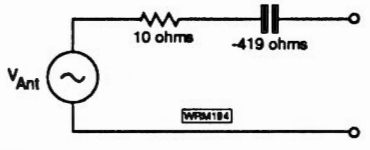

Fig. 22.9

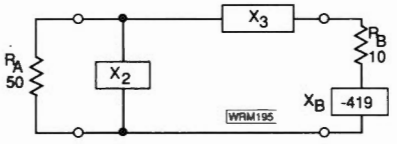

Fig. 22.10

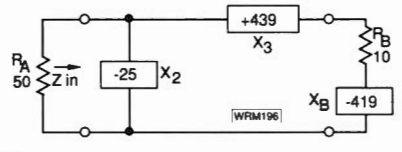

Fig. 22.11

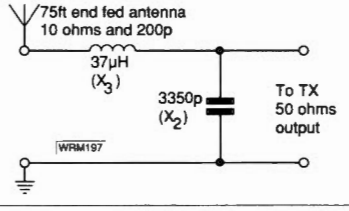

Fig. 22.12

Try the step-by-step approach on your own calculator on the worked examples.

Ray Fautley provides a practical example - A Top Band Antenna - as an exercise

Type 9. Both impedances complex comprising resistance and reactance in parallel. The circuit of the matching network in shown in Fig. 22.5.

(i) Let the higher value of resistance be designated R_A and the lower value of resistance R_B, regardless of which is source or load.

(ii) Change R_B and X_B to their series form R_B' and X_B'

(iii) Let $p = \frac{R_A}{R_B'}$

(iv) Let $q = \sqrt{(p - 1)}$

(v) Determine $X_1 = +(R_B' \times q)$

(vi) Determine $X_2 = -\left(\frac{R_A}{q}\right)$

(vii) Determine $X_3 = X_1 - X_B'$

(viii) Determine $X_4 = \frac{X_2(-X_A)}{X_2 - X_A}$

As an example of the last type, type 9, we'll match a parallel impedance of 100Ω resistance and +10Ω reactance to another parallel impedance comprising 50Ω resistance and -25Ω reactance.

(i) $R_A = 100$ and $R_B = 50$

(ii) $R_B' = \frac{50(-25^2)}{50^2 + (-25^2)} = 10$

$X' = \frac{50^2(-25)}{50^2 + (-25^2)} = -20$

(iii) $p = \frac{100}{10} = 10$

(iv) $q = \sqrt{(10 - 1)} = 3$

(v) $X_1 = +(10 \times 3) = +30$

(vi) $X_2 = -\frac{100}{3} = -33.33$

(vii) $X_3 = 30 + 20 = 50$

(viii) $X_4 = \frac{(-33.33)(-10)}{(-33.33) - (+10)} = -7.69$

The values are shown in Fig. 22.6

Last arithmetic check!

(i) Add X_B' to $X_3 = (-20) + (+50) = +30$

(ii) Find parallel equivalent of R_B' and +30Ω reactance :

$R' = \frac{10^2 + 30^2}{10} = 100$

$X' = \frac{10^2 + 30^2}{+30} = +33.33$

(iii) Find value of X' in parallel with X_4 :

$= \frac{(+33.33)(-7.69)}{(+33.33) + (-7.69)} = -10$

This gives a Z_{in} of 100Ω resistance in parallel with -10Ω reactance, just right to cancel X_A and leave 100Ω.

A Practical Example

Let's take a look at an example of the practical use of impedance matching.

How to use a short end-fed antenna on Top Band.

Supposing it is required to connect to an end-fed antenna to the 50Ω output of an h.f. transmitter to enable operation on the 160m band (1.81-2MHz). This can be a difficult one to solve unless the terminal impedance of the antenna at the required operating frequency is known.

'Terminal impedance' of the antenna? This is the impedance measured between the end of its lead-in in the shack and the station earth connection. In this case, it would be required to be known at about 1.9MHz for operation on the 160m band.

If the total length of antenna wire right down to the shack is less than 38m the antenna is likely to have an effective **electrical** length of less than a quarter wavelength at 1.9MHz. This can be represented by the network in Fig. 22.7 where the antenna is shown as a source V_{ant} in series with a resistance R_{ant} and a capacitance C_{ant}.

The source V_{ant} is shown because when used for reception the antenna is a **source**, but when used for transmission it becomes a **load**! In the latter case, as a.c. and d.c. **sources** are considered to have zero impedance, they may be replaced by a dead short.

Refer back to Fig. 22.7. Why should the antenna look capacitive and not inductive? At a specified frequency, an antenna which is electrically less than a quarter wavelength long is capacitive; at **exactly** a quarter-wavelength long it is purely resistive; and if between a quarter and a half wavelength it's inductive. At **exactly** a half wave long the antenna will again be purely resistive; between a half and three quarters long capacitive; when exactly three quarters long it will be purely resistive; between three quarters and a full wave it will be capacitive and finally at **exactly** a full wave long it will again be purely resistive. Got it?

So, back to our imaginary end-fed antenna, which for out example we'll assume has a total length down to the shack of 23m.

Giving R_{ant} and C_{ant} values we can determine what matching elements we will need to make the antenna look like a 50Ω resistance to load the transmitter correctly.

For an antenna around 23m total length, R_{ant} would be about 10Ω and C_{ant} about 200pF at 1.9MHz our Fig. 22.7 may then be replaced by Fig. 22.8.

First, let's find the value of the reactance of the 200pF capacitance at 1.9MHz.

From the formula for capacitive reactance it will be:

$$X_C = \frac{1}{2\pi fC} = \frac{1}{2\pi \times 1.9 \times 10^6 \times 200 \times 10^{-12}}$$

$$= \frac{10^{12}}{2\pi \times 1.9 \times 200 \times 10^6}$$

$$= \frac{10^4}{2\pi \times 1.9 \times 2} = 419\Omega$$

Capacitive reactance is conventionally negative so $X_C = -419\Omega$

Now we can replace Fig. 22.8 by Fig. 22.9.

So we require a pure resistance of 50Ω (to connect to the transmitter) to be matched to the antenna which is a series connected complex impedance of 10Ω resistance and -419Ω reactance. As the pure resistance (50Ω) is a higher value than the 10Ω

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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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resistive part of the antenna series impedance, the matching problem is a Type 2 case with:

$R_A = 50$, $R_B = 10$ and $X_B = -419$

The required network looks like Fig. 22.10

Following the Type 2 procedure we get :

(i) $R_A = 50$ and $R_B = 10$

(ii) $p = \frac{50}{10} = 5$

(iii) $q = \sqrt{(5 - 1)} = \sqrt{4} = 2$

(iv) $X_1 = +(10 \times 2) = +20$

(v) $X_2 = -\frac{50}{2} = -25$

(vi) $X_3 = +20 + (+419) = +439$

These values give us the required matching resistances, see Fig. 22.10. Check the arithmetic for yourself as we did for the original Type 2 problem. Zi_n should work out to be 50Ω resistance!

All that remains to do is to determine the inductance and capacitance values having reactances of +439Ω and -25Ω respectively at 1.9MHz to complete the antenna matching problem.

$$L = \frac{X_L}{2\pi \times f} = \frac{439 \times 10^6}{2\pi \times 1.9 \times 10^6}\mu H$$

$$= \frac{439}{2\pi \times 1.9} = 37\mu H$$

$$C = \frac{1}{2\pi \times f \times X_C}$$

$$= \frac{10^{12}}{2\pi \times 1.9 \times 10^6 \times 25}pF$$

$$= \frac{10^6}{2\pi \times 1.9 \times 25} = 3350pF$$

The final antenna matching circuit is shown in Fig. 22.11and as components in Fig. 22.12. If the inductor were to be a variable component (such as a rotary coil having a pulley wheel running along the winding to provide a continuously variable value of inductance - sometimes called a 'whirley whirley' coil) the network can be kept resonant as the frequency is changed within the band.

Fig. 22.12 illustrates the short end-fed antenna used as a practical exercise to demonstrate the technique of matching a transmitter to an antenna which is electrically short on the 160m, (1.81-2MHz) band.

How do we known when the antenna and network are resonant and presenting the correct value of resistance to the transmitter? That's something we'll talk about next.

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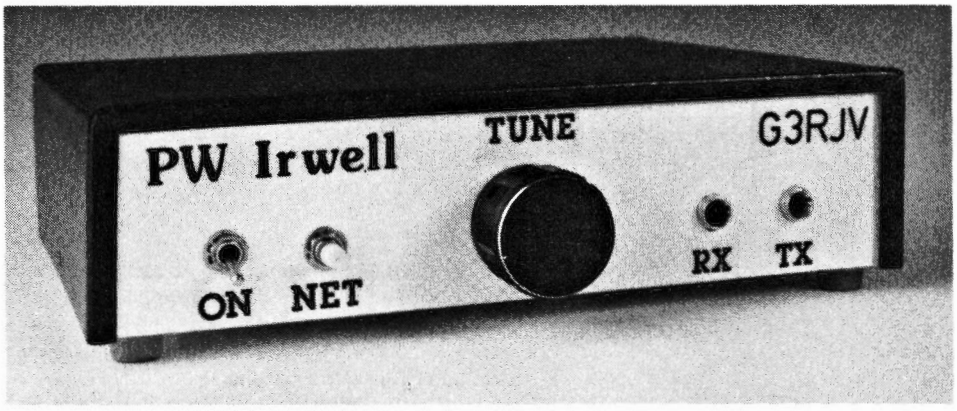
PW Irwell Part 2

In this second part of the PW Irwell, The Reverend George Dobbs G3RJV describes building the transmitter power amplifier and the transmit/receive change-over board



The circuit of the transmitter board is shown in Fig. 2.1. This is a version of a circuit which I have used for several projects over the years and has a well proven record. The original idea came from W7ZOI several years ago and has been used in circuits for most of the h.f. bands. This version should be capable of at least 3W of r.f. output which is an acceptable power level for QRP work and reasonable results on the air.

The Transmitter Board

The board is a three stage amplifier using a BD131 transistor as the power amplifier. This may seem an odd choice as the BD131 is an audio output transistor. Genuine r.f. power transistors can be quite expensive and I have used the BD131 as an r.f. amplifier and it seems to work well, even up to 7MHz. The pre-driver stage, TR6, and the driver stage, TR7, are both tuned stages. The bandwidth of the amplifier stages is limited by the pre-set tuning but a maximum of 50kHz is required for c.w. operation on the 7MHz band. Peaking the tuned circuits on about 7020kHz seems to nicely cover the whole band sector usable for c.w. operation.

Inductors L2/3 and L4/5 are wound on T50-2 cores, both have link windings and L2 is centre tapped. I wound the link windings, L3 and L5, using thin pvc covered solid wire sometimes known as 'hook-up wire'. Semi-airspaced p.c.b. mounting trimmers, sometimes called 'Mullard PCB Type', are used to tune the inductors L2 and L4. Several types of transistor would have served for TR6 and TR7 but I have quoted the easily available BC238 and 2N3866 types. The transmit board is keyed via the power supply to the two driver stages.

Output Stage

The BD131, which is mounted flush to the board, requires a small heatsink. To save space, I made a simple heatsink out of aluminium sheet cut to about twice the width of the device but a little longer. The end away from the leads is bent up into an L shaped form to give a fin rising away from the board. The heatsink will require a mica spacing sheet and insulated washer in the normal manner of mounting these devices. This heatsink, small and humble though it is, provides adequate protection for the BD131. The r.f. choke RFC2 that provides the load for TR8 is homewound. It is 10 turns of 32s.w.g. enamelled wire wound through a ferrite bead. This winding is a little tight and care must be taken not to scrape the enamelling from the wire on the sharp edges of the ferrite bead.

The power amplifier transistor TR8 is operated in 'Class C' and so is rich in harmonics requiring a comprehensive low pass filter to be added in the output circuit. The filter shown is a seven element low pass filter built to the standard capacitor specifications values provided by Ed Wetherhold W3NQN. The inductors are wound on the smaller T37-2 cores, which have proved more than adequate to handle the output power.

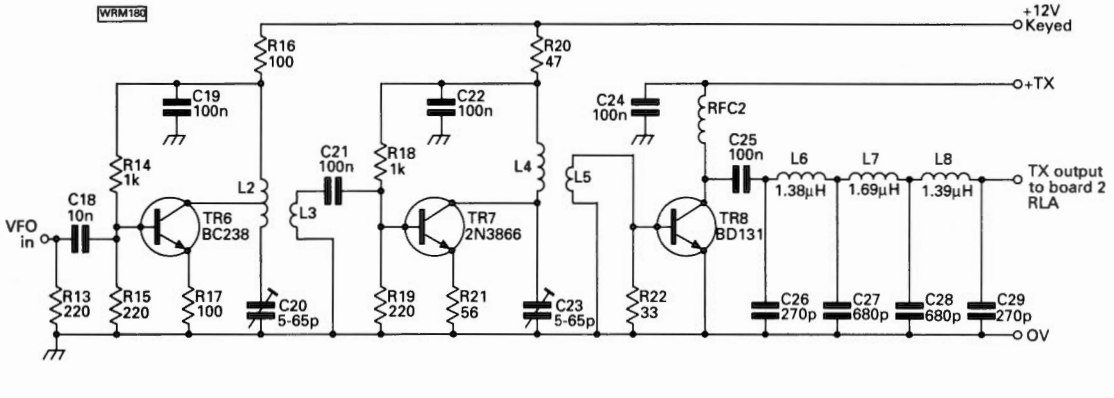


Fig. 2.1: Circuit diagram of the *PW* Irwell power amplifier

Pre-driver Stage

The layout for the Transmit Board is shown in Fig. 2.2a and b. This board can be built a section at a time and tested. Begin by building the board as far as R19. Take care to accurately count the turns on the inductor as it is wound, each pass through the core is one turn. Connect the v.f.o. to the input of the board on R13 and apply power to both the sections of the v.f.o. and to the amplifier board.

Applying the r.f. probe to the top of R19 should indicate around 1.5V when C20 is peaked to the frequency of the v.f.o. The second stage comprising TR7 and as far as R22 may be constructed and tested in the same way. On the prototype the r.f. probe when placed at the top of R22, gave a reading of about 5V when C23 was peaked for maximum output.

The power amplifier stage including the low pass filter may now be completed. This stage must not be tested without a load. A non-inductive resistance of around 50Ω and a power dissipation of at least 2W is required before the completed board may be tested. With this load connected to the output of the board, the r.f. probe can be applied to the output point. This should give a meter reading of 40V or more. The amount of output, which will vary from board to board, depends upon individual examples of the BD131.

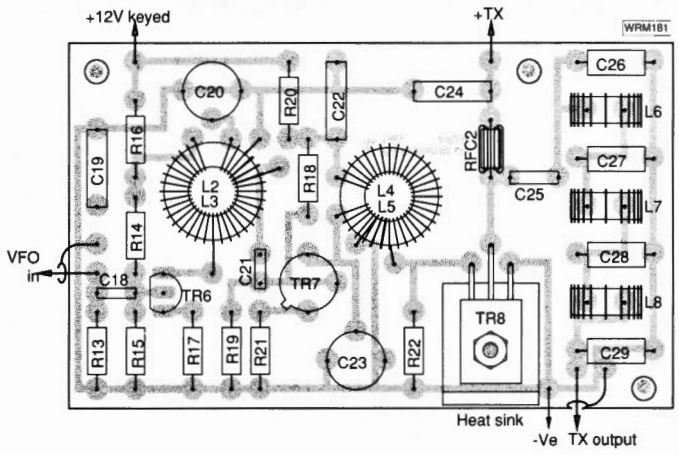


Fig. 2.2a: Component overlay of the power amplifier

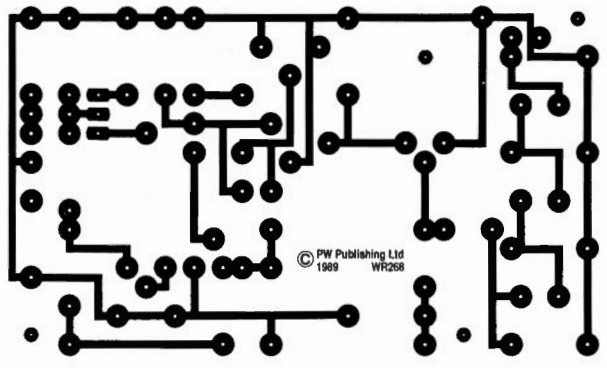
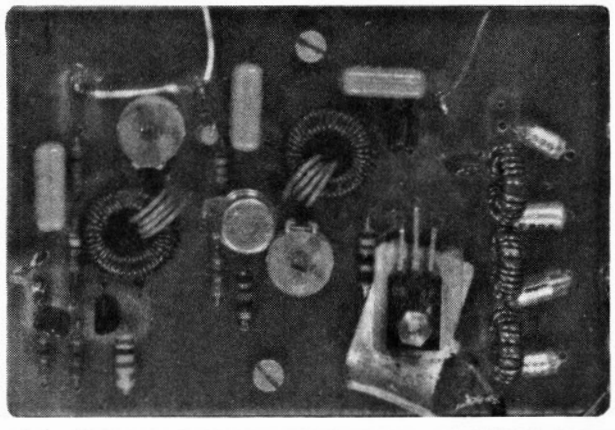


Fig. 2.2b: Track pattern of the power amplifier board

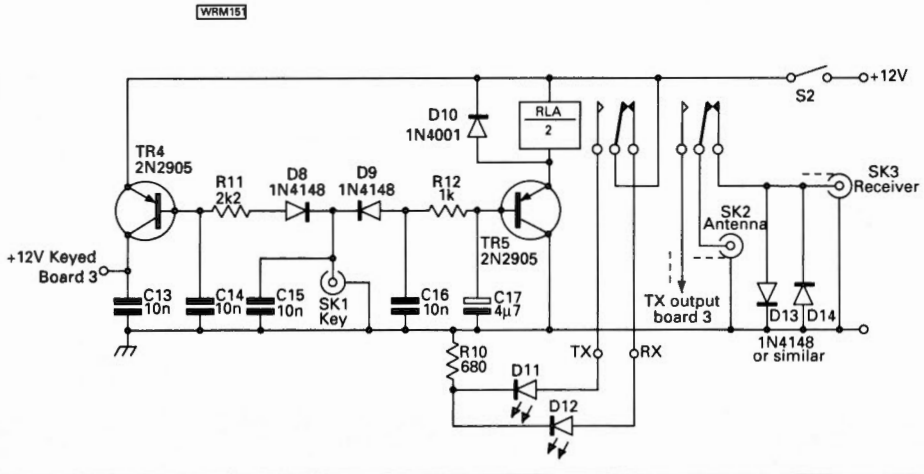


Change-over and Keying Board

The diagram of the circuits required to control the change-over of the transmitter are shown in Fig. 2.3. The method used to key and change the transmitter from receive to transmit is the one sometimes called 'semi-break-in'. When the key is closed the transmitter is keyed via a d.c. switching transistor TR4 which provides the 12V keyed line. This action is softened a little by C15, C14 and R11. Another switch, TR5, drives a relay which changes the antenna from receiver to transmitter output and provides the +TX and +RX voltages. These two transistor are *pnp* types and are shown 'upside-down' with the emitters at the top.

This transistor includes a hang circuit. The hang is a small delay controlled by R12 and C17 which

Fig. 2.3: Circuit diagram of the change-over board



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enables the relay to hold closed at normal keying speeds. This prevents the relay clattering on and off during the keying action, and the hang time could be changed to individual taste by altering the value of C17. Diode D10 protects the transistor emitter from back e.m.f. surges as the relay is switched off.

Also shown in Fig. 2.3 is the relay switching action. The relay is a double pole change-over type with one half used for antenna change-over and the other half to provide the +TX and +RX voltages. Two front panel l.e.d.s are used to show the receive and transmit states with voltages taken from the +TX and +RX lines. Moving on to Fig. 2.4a and b, which show the layout of the changeover and keying board. This board is the simplest of the three to build and test, but do remember that the transistors are p.n.p. type and take care to ensure their correct placement. The changeover section which provides the +TX and +RX lines is routed to tags on the board. Miniature coaxial cable should be used to interconnect the antenna socket to either the output of the p.a. board or the receiver.

To test the board apply the power and short out the the key contacts. The relay should close. On opening the key contacts, the relay contacts should open after a short delay. Opening and closing the the key contacts at a typical rate, expected in morse keying should hold the relay closed. Stopping the keying action will allow the relay to release. The output from TR4 may be checked with a meter. The 12V appearing from the collector of TR4 should follow the keying. **PW**

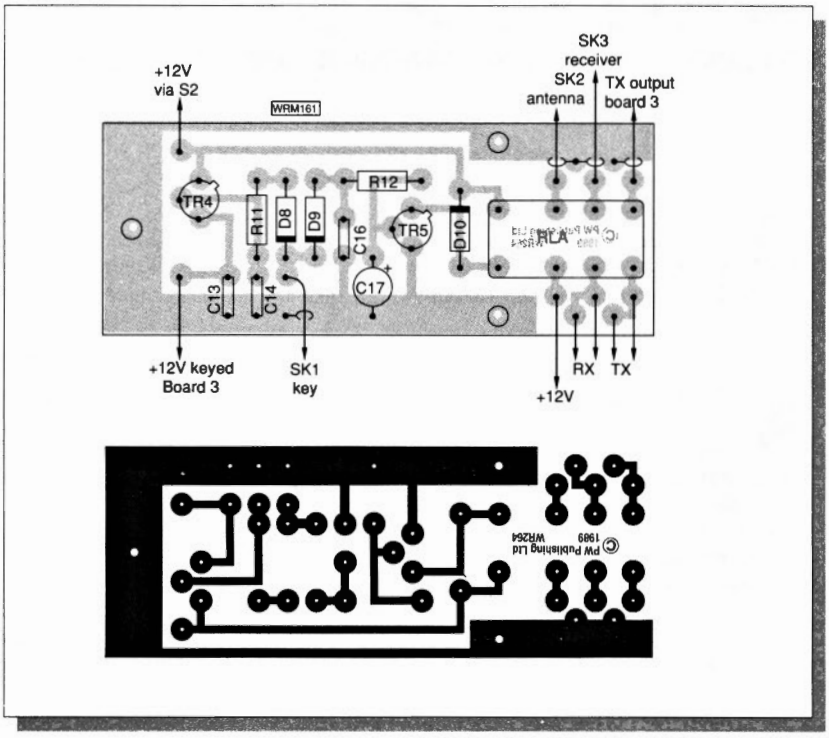


Fig. 2.4b: Track pattern of the change-over board.

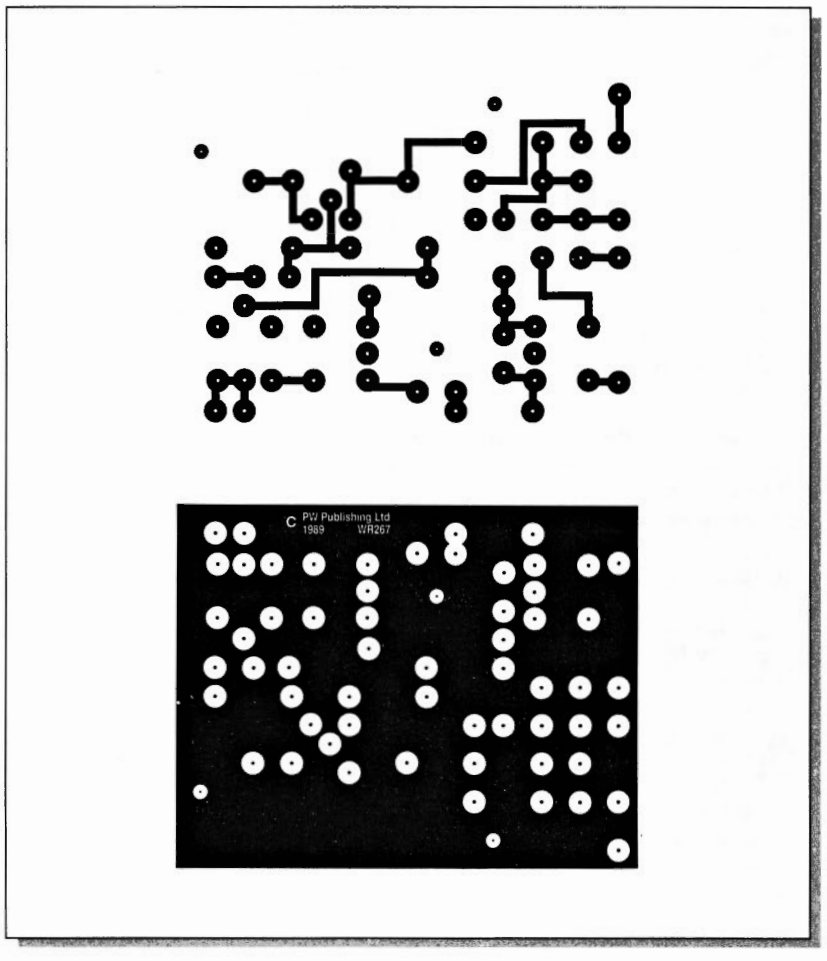
TO BE CONTINUED...

Errors And Updates

PW Irwell Part 1 January 1990

An error crept into the shopping list on page 29 of the January issue of *PW*. The description of L3, the number of turns is correct at 4t thin insulated wire, but they should be wound over the coil L2 on the power amplifier board featured in this issue and not the v.f.o. coil as stated. Also R13 missed the Shopping List for some reason, it should be 220Ω along with R2,15 and 19.

The p.c.b. track pattern needs to be reprinted for those wishing to make their own boards



The G2BCX

Antenna Clinic

Session 11

Whilst it's satisfying to receive letters from readers praising the performance of antennas they have constructed from details given in *Practical Wireless*, these often contain a query as to whether the performance of this or that antenna could be further improved. If the original design work and measurements, etc., were carried out competently and proved satisfactory, then the designer must have concluded that performance was optimum and could not be further improved. An antenna re-design to obtain a higher degree of performance may well become a different antenna entirely. This observation applies in the case of a query sent in by a reader from Malta and which is typical of others received.

Q I have constructed Slim Jim antennas, not only for the 144MHz band but for other frequency bands as well. Results in each case have been satisfactory. *Is it possible to get a better performance with this antenna?* Would a collinear antenna be worthwhile? I require an omni-directional antenna as I cannot use a multi-element beam.

A The Slim Jim has unity directivity gain (0dBd) and is an efficient antenna. Its efficiency cannot be improved. A close spaced 2-element collinear has a directivity gain of slightly less than 2dBd which would not make a great difference in performance. *Raising the height of the Slim Jim by a few feet would do more good in this respect.*

However, this reader was sent full details for the construction of a collinear Slim Jim (2-elements) published in *Practical Wireless* January 1989. He was referred to others with more elements and also warned about the performance of certain 'manufactured' v.h.f. and u.h.f. collinear antennas advertised as having a high directivity gain and generally superior performance, but which may be considerably poorer than claimed. *Caveat emptor.*

Q Way back in 1984 you very kindly advised me on the type of antenna to use in the loft for general listening on the h.f. bands. You may remember, this was a 'doublet' type made as long as possible and centre fed. It has brought in many stations from all over the world. I am very pleased with it indeed.

I would now like to construct an antenna, again for use in the loft, to cover the 'aircraft band' 118 to 136MHz. Can you please advise. Thank you.

A Dimensions, etc., were given in *Practical Wireless* April 1989 for the construction of a Slim Jim for the aircraft band. However, this band is pretty wide (18MHz) and really necessitates a wideband omnidirectional antenna. Discone? Ideal perhaps, but might be difficult to get into an average sized loft. First, how long is a half wavelength at the band centre frequency of 127MHz? Wavelength = 300/127 = 2.36m. Halfwave = 1.18m (a little under four feet). This could be accommodated upright in most loft spaces. A possibility is a 'Butterfly dipole' as in Fig. 1. Whilst this would not provide a full linear bandwidth of 18MHz, the performance would be far better than a thin tube or wire dipole.

For omnidirectional reception it should be installed vertically and insulated from any supports or suspension. The feed cable run should be at right angles from the antenna for at least a half wavelength before being taken downwards to the receiver.

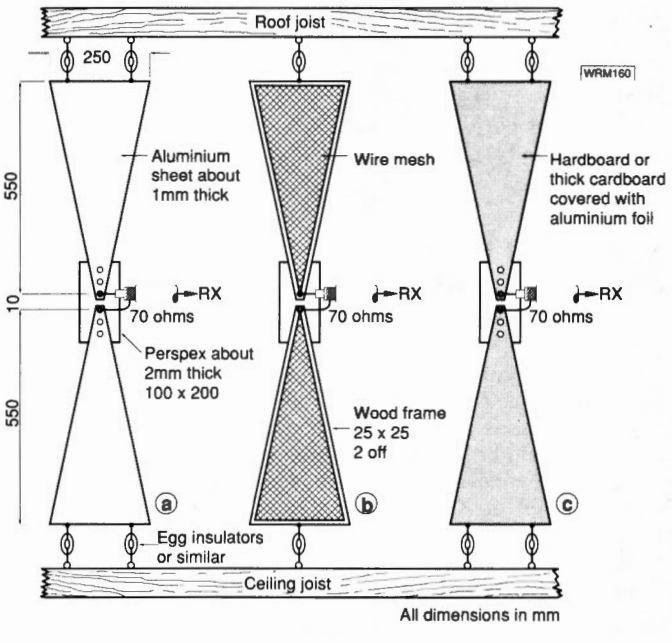


Fig. 1: Butterfly dipole for aircraft band reception. (a) made from thin aluminium sheet, (b) thin mesh wire on wood frame (small mesh chicken wire would do) and (c) hardboard (or thick cardboard) with aluminium foil pasted on as conductor, Soldered connections can be made on this material with special aluminium solder available from d.i.y. shops. Dimensions of conductor sections and Perspex centre support plate are the same for each arrangement.

Q Is it possible to construct a 12-element ZL Special for the 50MHz band? I have tried to work out the dimensions from those given for the 144MHz version but am having difficulty.

A Apart from cost and the work involved in constructing a 50MHz version of the 12-element ZL Special, even with the requisite dimensions, this reader would have encountered some difficulties he may not have foreseen. These were explained more or less as follows.

With a scaling multiplier of 2.9 (from 145MHz) the overall length of the 50MHz version would be about 30.5 feet with a width on the longest element of 9.18 feet. The elements would need to be constructed from at least 3/4in diameter aluminium tube all assembled in a boom of about 2in square, thick-walled aluminium tube. The supporting mast, or tower, would also need to be pretty substantial and well guyed to take the weight and withstand high winds. I asked the reader, "was he now having second thoughts about this?" and explained that a 3 or 4-element beam would be a much easier proposition. See *Practical Wireless* July 1989 for details of an easy to construct small beam for 50MHz. He wrote again to express agreement on this.

Feature

On Track with the Racal-Decca Navigator

Radio communication plays many roles in the modern-day world, especially so in navigation. Rob Mannion G3XFD homes in on a radio-navigation system that entered service many years ago and yet is still a very popular aid to both professional and pleasure-craft seafarers.

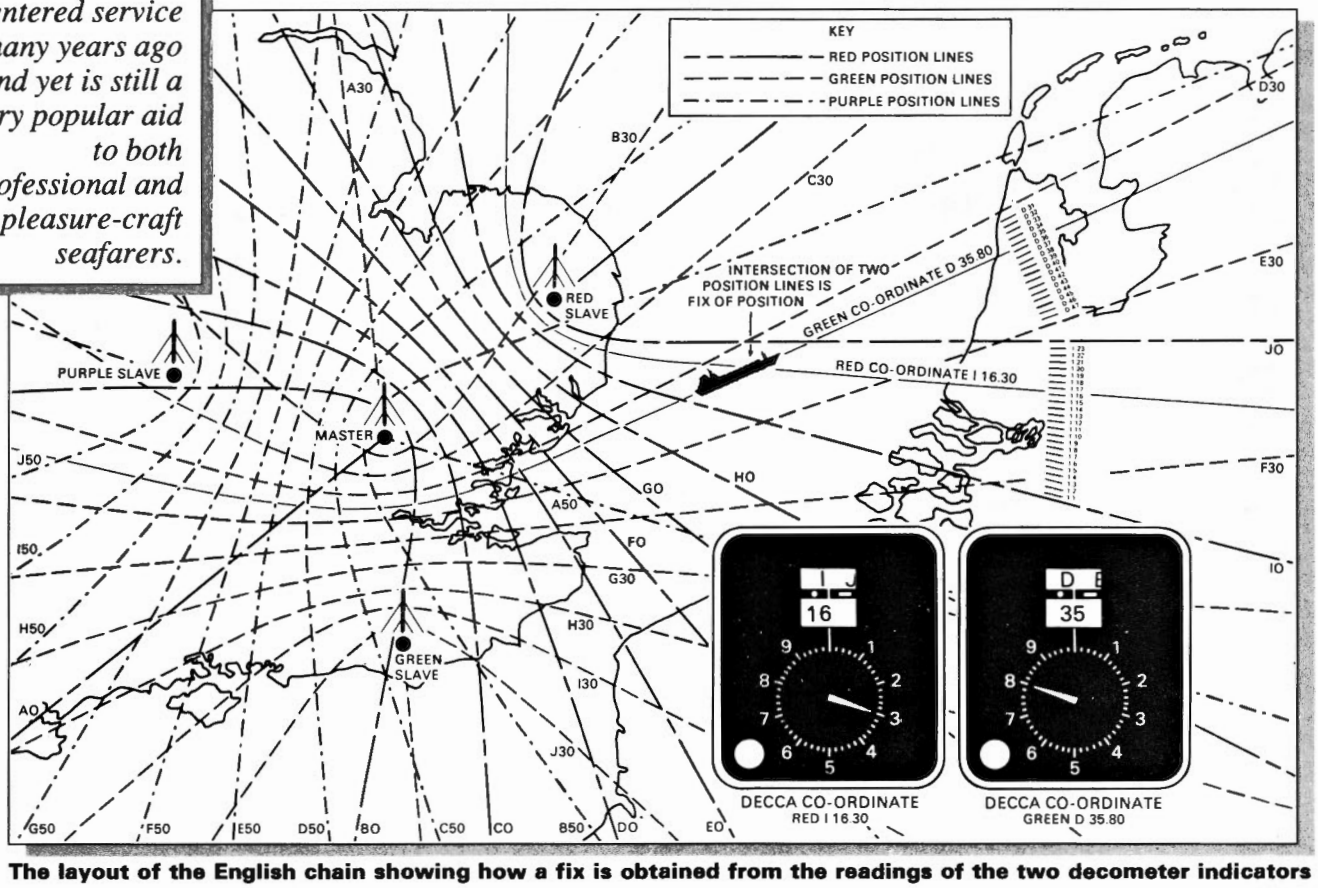
The system now known as the Racal-Decca Navigator was conceived in 1937 by W.J. O'Brien an American radio engineer and was developed during the Second World War by the British Admiralty in conjunction with the Decca Record Company. Decca's Chief Engineer was then H. F. Schwartz, also an American and a friend and former colleague of O'Brien.

After a series of brief but highly successful trials the system's first operational use was during the Allied invasion of Normandy in 1944. With transmitters sited along the south coast of England, minesweepers cleared channels through the off-shore minefields navigating by the Decca system along a series of predetermined lanes. Subsequently the invasion barges, also fitted with the new invention, successfully followed the same lanes.

In 1946 the British Government gave permission to the Decca Company to further develop and market the system for international civil use. The Decca Navigator Company became part of the Racal Electronics group in 1980.

How the Racal-Decca Navigator System Works

The Racal-Decca Navigator is a radio position-fixing system for marine, air, and land-based use utilising continuous wave signals in the low frequency band 70-130kHz. The system is of the type in which fixed transmitting stations at known locations provide hyperbolic lines of position. The range of the system depends on various factors but is typically in the order of 240 nautical miles by night and about twice that distance by day. Each user craft carries a special receiver which, in its simplest form, delivers the position lines as numerical readings which are plotted manually on a lattice chart. The intersection point of two such lines gives the position fix. Automatic and computer based methods of reducing and displaying the Decca position fix are also widely used. A chain of Decca Navigator stations consists of a central master, which is often associated with a supervisory control/monitor station, together with three (in a few cases two) outlying slave stations. Each slave station generates a pattern of hyperbolic position lines in conjunction with the master. The slaves are termed Red, Green and Purple from the colours in which the



The layout of the English chain showing how a fix is obtained from the readings of the two decometer indicators

patterns are printed on the chart. The length of the inter-station baselines is generally within the limits 40-120 nautical miles (73-220km).

Position Lines

A Racal-Decca position line is generated by a pair of synchronised transmitting stations. Consider a pair of stations A and B, separated by distance S, which are assumed to be sending pure c.w. signals of identical frequency and locked in phase. At a point in the coverage at a distance r_A from the master station and r_B from the slave the phase difference will be:

$$\phi = \frac{(S + r_A - r_B)}{\lambda} + k$$

where λ is the wavelength of the commor frequency

The locus of the points at which r_A-r_B are constant is a hyperbola focused on the two transmitting stations, which thus constitutes a navigational position line if the station locations are known. The principle is illustrated diagrammatically in Figs. 1 and 2 in which the concentric rings represent the the wavelengths of the common frequency and the pattern assumes the form of a set of stationary waves generated by the inter-action of the two signals. Repeating this arrangement for a second pair of stations provides a second pattern of hyperbolic position lines intersecting the first and hence provides a position fix. The monitoring constant k is generally zero. The effect of transmitting signals of equal frequency from the master and slave is achieved by assigning harmonically related values to the two frequencies, so that the multiplying circuits in the receiver can derive from each a common harmonic. Thus, the red hyperbolic pattern is the result of comparing the master and slave signals after multiplication to a common frequency of 24f, where f is a non-transmitted fundamental value of about 14kHz. The master transmits a signal of frequency 6f and the red slave 8f, the respective channels in the receiver being followed by x4 and x3 multiplier stages. Geometrically the system behaves as if the common frequency 24f (about 340kHz) were radiated from the two sites. The other two patterns are generated similarly with the comparison frequencies of 18f for the green pattern and 30f for the purple pattern.

Lane Identification

To provide an independent means of reducing the lane ambiguity, so that a user can set in or check the lane numbers when uncertain of his position to within a lane, each chain radiates lane identification signals three times a minute. For this purpose the chain transmissions are periodically interrupted and regrouped so that the receiver can extract a signal of frequency f from the master and from each slave. Comparing the phase of these signals generates a coarse hyperbolic pattern confocal with the fine one, such that one cycle of phase differences embraces 18 green, 24 red and 30 purple lanes. An additional phase difference display responds to the coarse pattern and gives periodic readings which indicate, in turn, the correct lane of each pattern within a known zone. For lane identification each station in turn, starting with the master, radiates all four Racal-Decca frequencies (5f, 6f, 8f, 9f) simultaneously in a phase-coherent relationship. In the receiver, the four harmonics in each transmission are processed so as to derive a pulse train having the fundamental value of f, given means of memorising the master signal so that it can be compared with the successive slave, this reconstituted pulse signal forms the basis of the desired f-frequency coarse pattern. This lane identification process is known as the Multipulse.

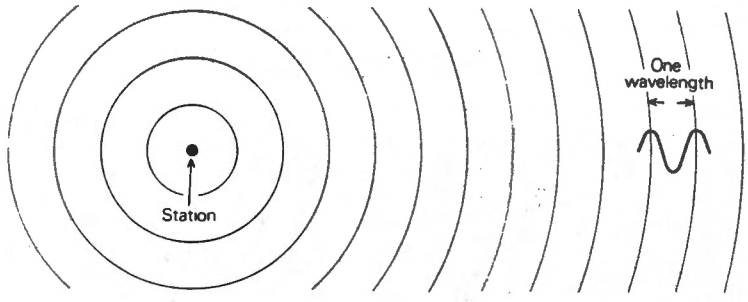


Fig. 1 Continuous-wave transmission from a single station.

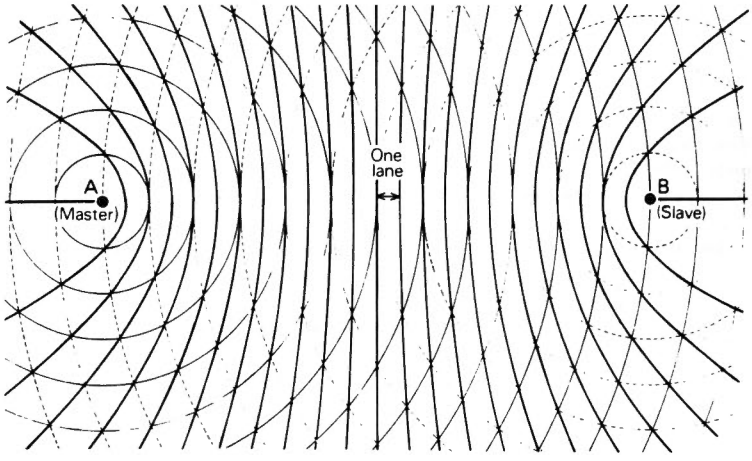


Fig. 2 Position-line pattern generated by synchronised c.w. transmissions

Above. Continuous-wave transmission from from a single station

Below. Position-line pattern generated by synchronised c.w. transmissions

Transmitting Stations

Each Racal-Decca Navigator transmitting station occupies a site of approximately 240m^2 and typically, comprises a centrally situated transmitting mast 100m high with an earth mat of 100 copper radials of equal length to the mast height. The transmitter building, diesel hut, fuel store and living accommodation where required are outside the earth mat perimeter with a trenched feeder cable run to the coil house located at the base of the mast. Modern master stations sometimes incorporate the chain control facilities and chain monitor, but this can be quite separate to suit local circumstances. Where countries have more than one Racal-Decca chain the current trend is to have just one central monitor and control station for all chains. This reduces the manpower requirements and annually recurring operational costs. All stations have standby systems for the phase control, transmitting and power equipments. Battery systems and diesel generators provide a no-break protection against mains failures. In terms of operational reliability measured over a 12 month period, Racal-Decca stations achieve an operating level of 99.95 per cent. At present there are 42 chains of Racal-Decca

The MK53 Decca Navigator which has been developed as a very reliable high performance receiver for the Fisherman and Professional Navigator

Navigator stations in 14 countries with over 140000 users, and this figure includes a large number of pleasure craft whose owners have come to appreciate the benefits of the system in the past few years.

Advancement With Technology

In line with all electronic systems the Racal-Decca Navigator has over the years, taken advantage of the rapid growth and development of the electronics industry. In the early days the ground station transmitting equipment was very large and needed extensive civil works to house the installation. All transmitter stations were attended by operators, a typical four station chain requiring up to 16 people. Due to the valve technology power requirements were heavy and expensive. In the mid-1950s a new development started, making use of solid state technology. Apart from reducing the size of the equipment and the buildings to house it, an important consideration was to find ways of reducing the number of operating staff. In the mid-1970s with the use of integrated circuits and the microprocessor, further developments were taking place to reduce the size of the two major elements, the phase control equipment and the transmitters. In so doing, the power requirements for the transmitter stations were further reduced. The size of buildings to house the latest type of equipment - referred to as the 5450 series - has been reduced by 60 percent. In areas where there are multiple chains it is possible to control the operation from one central point. A number of operating authorities are able to further reduce the cost of operating the chains by combining the resources of other marine departments.

First Users

Initially, it was the coasters of the Royal Navy Home Fleet which enjoyed the benefits of the Racal-Decca system. Then, as the system spread into Europe and other areas of the world, ferries, other merchant shipping and the fishing fleets joined the steadily increasing number of Racal-Decca fitted ships. At the end of the 1970s the first receivers incorporating microprocessor technology were developed. Modern sets process the received signals and display - virtually instantaneously - all the information that a mariner demands for safe and efficient navigation. Today the Racal-Decca Navigator receiver market is very competitive, with many different models designed and marketed by several different European companies. Varying degrees of design sophistication are employed, aimed at different categories of vessels. Prices range from around £200 to £3000, and all now provide a computer calculated read—out of Latitude and Longitude with facilities for waypoint navigation.

Pilotage Aid.

Apart from its role in coastal navigation and fishing, Racal-Decca Navigator chains have been geographically located for the prime purpose of port-approach by very large oil tankers. An example of this application is at Europoort (Rotterdam) where the Holland chain forms an aid to pilotage for deep-draught tankers as well as contributing to the general coverage of the southern part of the North Sea. The carriage of a serviceable Racal-Decca receiver is mandatory at Europoort for all ships over a specific draught in the dredged channels. The across-track accuracy of the system for ships in the final approach channel is 11m by day and 22m at night at the 1 sigma level of probability. Other chains having a similar role are located at Dampier in Western Australia and the Gulf of Kutch in India (Salaya chain). As the Racal-Decca system is used by both ships and aircraft, it forms a common frame of positioning reference for air-sea rescue and other combined operations. The system is also used by many fixed-wing aircraft and by virtually all the helicopters operating in support of the off-shore oil activities in the North Sea. In Swedish waters it is employed for policing the off-shore fishing limits.

The Future

In spite of the availability of satellite-based Global Positioning Systems, it is not envisaged that the user demand for the Racal-Decca system will lessen as GPS receivers will be an order higher in price than Racal-Decca equipment. Another factor to be considered is that in large areas by day, the accuracy is as good if not better than standard (non-military) fix by GPS. Essentially GPS is a system designed and developed for military purposes and is fully controlled by one nation. Accordingly, other nations have already declared their intention to retain their own land-based systems for the very large number of fishing and small boat users. Marine radio-navigation in the United Kingdom waters is currently the subject of a Government Green Paper. Basically the choice lies between the Racal-Decca system or the American Loran-C system using the European stations for which the United States Navy will have no use once GPS is fully operational. Loran-C is a pulse system as compared with the Racal-Decca Navigator's use of continuous wave transmissions. Loran C requires the whole of the 90-110kHz band and begins transmission at 60kHz and finishes at 140kHz, although not authorised for this band. This is likely to cause problems of interference both to and from the Loran-C system in the already overcrowded European radio spectrum. If the decision is for Loran-C, it has been proposed that the UK Racal-Decca chains will be switched off in 1996-7. If the decision is to continue with the Racal-Decca system, then the UK chains will be up-dated in accordance with a proposal already in the hands of the Government. This will bring the UK into line with Denmark, Holland, Ireland and Sweden and will permit the Racal-Decca Navigator to provide a service well into the 21st Century. **PW**

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Ten-Tec Omni-V VHF Transceiver

REVIEW

The Omni-V amateur bands transceiver from Ten-Tec is the latest release from this famous stable and represents the flag-ship of the range. The Omni-V maintains Ten-Tec's very individual styling and includes a whole host of features to enable effective operation on the amateur bands, Mike Richards G4WNC checks it out.

In addition to the Omni-V which is actually called a Model 562, HRS Electronics, the UK agents also supplied the matching combined power supply and extension speaker.

The manual was my first stop, in order to familiarise myself with the connections and basic operation. The manual was presented in a stiff backed A4 ring file making it comparatively easy to add your own notes or associated information. The only slight problem was that the file used a three hole system which is non-standard - at least in the UK.

The content of the manual was actually very good, striking a fine balance between too much and too little detail. Some of the more complex operations were well explained using simple diagrams and the whole manual was very concise.

In addition to the operational aspect of the Omni-V the manual contained a full set of circuit diagrams and circuit board layouts which were spread over some pages. This is obviously of particular value as a transceiver ages and repairs may be required. Diagrams are also useful for those technically competent amateurs who want to undertake their own modifications to add extra features, etc.

The basic connections were simplified somewhat by the use of the Ten-Tec power unit which came complete with a four-way plug fitted, allowing direct connection to the power socket at the rear of the Omni-V. The plug used was a four-pin-in-line type and a spare plug was provided with the rig, so other power units could be easily used if required.

The antenna connection came next and this was the now standard SO-239 with a nominal impedance of 50Ω.

The supplied microphone used an electret element and connected to the Omni-V via a standard four pin microphone socket on the front panel.

For phone operation that was the full extent of the required connections. As you would expect from a top of the range model there were a number of additional connections to allow the operator access to the full range of facilities.

A separate receive antenna could be connected to a phono socket on the rear panel which could also be used to accept the output of a v.h.f. or u.h.f. transverter when combined with transverter-out and transverter-enable sockets. The application of the transverter enable signal provides a 0dBm transmit carrier output and disables the main r.f. power amplifier.

The p.t.t. output was slightly unusual in that it was only operational on the phone modes - c.w. being entirely controlled by the key with a separate key jack for RTTY. Also connected with RTTY operation was a MARK/SPACE input which was used to key the Omni-V when operating true f.s.k. The signal levels required for this operation were 0 to -15V for a mark and +2.5V to +15V for a space. With most RTTY and packet operators using a.f.s.k. these days the audio in and out sockets on the rear panel will prove very useful. The audio out provides a line-level audio signal which is independant of the volume control setting, whilst the audio in will accept signals from the tone generator of the terminal unit/TNC.

CW operation was catered for by a standard 6.3mm key jack on the rear panel which was compatible with positive open collector keyer outputs as well as conventional keys.

The remaining two connections were for an external speaker and an unfused 13.8V output for powering auxillary equipment such as a RTTY terminal unit or perhaps a Packet TNC.

Operation

Despite the wide range of features provided in the Omni-V, operation was very simple and the clear panel markings made the control functions obvious. This is one of those rare items of amateur radio equipment that you can operate quite happily without having to wade through the manual first!

The front panel was dominated by the large tuning knob and the main display unit. The tuning options provided were very straightforward, but also extremely effective. As the Omni-V was amateur bands only, the first job was to select the required band was achieved by a single press of the appropriate band selection button. Each band was

allocated its own button, with the exception of 28MHz where the band was divided into four 500kHz segments each with a separate buttons. However, once a segment had been selected you could tune across the whole 2MHz band without having to manually select the next segment.

The tuning control was of the digital shaft encoder type, so the frequency changed in steps rather than being continuously variable. However, the feel of the tuning knob was very smooth and very nicely weighted. The size of the tuning steps was dependent on the mode and the speed that the knob was turned. For all modes except f.m. the steps were 10Hz for normal tuning and 50Hz if the knob was turned quickly. On f.m. this changed to 100Hz and 500Hz respectively. For an even coarser tuning rate the FAST key could be pressed to give 500Hz steps on f.m. and 50Hz or 100Hz on the other modes.

The Omni-V was equiped with dual v.f.o.s to enable split frequency operation between any two bands or parts of bands. This aspect was well thought out and you could very quickly swap transmit and receive frequencies if necessary.

In addition to the tuning knob, there were a pair of buttons marked with up and down arrows which could be used to step the frequency either up or down in 10kHz or 30kHz steps, depending on whether or not the FAST button had been pressed. This was a useful facility for moving about the band quickly.

As with most modern transceivers the Omni-V featured a number of memories for storing both mode and operating frequencies for later recall. There are a total of twenty-five standard memories and one scratch-pad memory.

The standard memories were slightly unusual, mainly because the Omni-V lacked the usual direct entry keypad. This meant that frequencies to be stored in memory first had to be tuned in using one of the two v.f.o.s. Actually storing the frequency and mode was extremely simple, with the microprocessor automatically selecting the next free memory, as opposed to some systems where you have to decide the memory number to use. If all the memories are full you get a warning so you can decide either to abandon the operation or to clear one of the existing memories. The method of recalling memories was also slightly unusual as the main tuning knob was used to select the memories after first pressing the MT button on the front panel. The only disadvantage with the Omni-V's memory system was that there was no indication of a memory channel number. Consequently you couldn't turn to specific memory number you had to search for the frequency you wanted.

The scratch-pad memory was a very useful addition and was used, as the name implies as a temporary store - ideal for storing a working frequency when you want to look around for a quieter one, etc.

As you would expect, all the memories were protected by a battery back-up system using a 3V lithium battery. According to the manufacturers this battery should last about two years.

Incidentally, the manual described a technique for changing the back-up battery without losing the contents of the memory, which was useful.

Moving on to the audio sections, the Omni-V was very well equipped with features to tailor the audio response. The first was a conventional tone control, which was mounted concentrically with the volume control. There was also a tunable notch filter which could be used to reject interfering whistles. One rather novel and extremely useful feature was the variable band-pass filter. This was controlled by two concentrically mounted knobs. The band-pass filter itself has a centre frequency variable between 220Hz and 1700Hz with a -6dB point of 35% of the centre frequency. By using the FADE control the audio response could be varied between flat and full band-pass - an unusual, but very useful feature.

Impulsive noise is often a problem and the Omni-V tackles this with an excellent noise blanker. Rather than operating with the fixed parameters, as is common with many receivers these days, the Omni-V features a variable width control which alters the width of the blanking pulse. This gives a very wide control range for the noise blanker.

Other receive facilities included Pass Band Tuning (p.b.t.), r.f. gain, attenuator, squelch and a.g.c. operation.

The transmit side of the Omni-V featured a fairly standard range of facilities for a modern transceiver. A fully adjustable r.f. speech processor was provided - very useful when operating under difficult conditions.

An unusual facility was the ability to select either a fast or slow recovery of the receiver when changing over from transmit to receive. The fast position provided full break-in on c.w.

The indication systems used in the Omni-V comprised the main frequency and mode display which was of the flourescent type with usefully large 15mm digits . A conventional back-lit analogue meter was provided as a multipurpose indicator for signal strength on receive and forward power, reflected power, Ic or processing level on transmit.

Mounted on the rear panel were several pre-set controls for varying a number of of the Omni-V's parameters.

The c.w. side tone could be varied both in level and pitch which was rather novel. An interesting extra was the facility to monitor the transmit audio after the processor. This audio signal was fed into the audio stages of the receiver, the level being controlled by a pre-set on the rear panel. Of course, you really need to monitor this signal using headphones in order to avoid problems with acoustic feedback. Its main use is when sending SSTV, RTTY, etc., using tones via the mic input where the monitor facility can be used very effectively as a basic check of the modulation quality.

These days it seems as though it is essential to accompany any key press with some sort of sound, usually a beep! The Omni-V included this feature but the subtle difference being that the level could be adjust to suit the operators preference - right down to my preferred option, silent!

Voice Operated Switching (VOX) was also provided with the delay, gain and anti-vox pre-sets on the rear panel.

The i.f. filtering options were very versatile with a 2.4kHz filter being provided as standard. In addition you could have 1.8kHz, 500Hz and 250Hz installed along with an extra 6.3MHz filter on the 2nd i.f. for tightening the response even further.

Technical Performance

Due to the tight time scales for this review I was only able to make a brief visit to the Lab, but nevertheless the results were worthwhile.

I started with transmit side of the Omni-V and a check of the r.f. power output. This exceeded the specified 100 watts at all frequencies, with a maximum of 110 watts and a minimum of 106

watts. The spurious outputs were also well controlled at -56dBc. The three main pairs of spurious signals occured at +-400kHz, +-1MHz and +-4MHz from the centre frequency. All other characteristics of the transmitted signal were well within the specification.

The specification stated that the Omni-V p.a. could stand 100% duty cycle operation for up to 20 minutes. This was tried successfully though, on completion, the heatsink was hot enough to cause a burn, so if you are likely to use high duty cycles it would be advisable to use some additional cooling, i.e. a fan!

The receiver sensitivity was quoted as .15µV for 10dB signal to noise on all bands. I found that the review model strayed from this on five of the ten bands though I ought to qualify this as the signal to noise measurement quoted is a difficult one to reproduce and I generally prefer to use SINAD wherever possible. The worst band was 10MHz where the sensitivity was .29µV for 10dB S/N, whilst the best performance was achieved on 3.5MHz, where the sensitivity reached an excellent 0.13µV again for 10dB S/N. That represents a range of some 7dB, which is rather more than I would have liked to see, but may be indicative of the hard treatment the review model had suffered.

The i.f. and image rejection was excellent as was the quoted third order intercept point at +12dBm. I ought to stress that I didn't have time to measure these particular parameters.

The main filter bandwidth was very well controlled and easily fell within the published specification.

The audio output at 1.5 watts was a little on the low side but shouldn't present any problems, especially as the distortion at 2% was low for a communications receiver.

Under the Bonnet

At this point I hit a problem in that section six of the manual was missing this comprised about 100 pages of circuit diagrams p.c.b. layouts and circuit descriptions, i.e. all the information I needed. However, thanks to the UK agents, HRS Electronics, I did manage to get my hands on a block diagram in time for the review.

Starting from the antenna and looking at the receive direction first. The signal passes through a set of seven switched low pass filters, which were common to both transmit and receive, before encountering the trans/receive switching. The signal is then fed to the first mixer via nine diode switched tuned circuits. The first i.f. was the standard 9MHz and the first receive filter had a bandwidth of 15kHz. This first i.f. board was also used to generate the s.s.b. signal for transmission and included an a.l.c. function. The main selectivity was also provided at 9MHz, with a 2.4kHz 8-pole crystal filter. An unusual facility was the provision of an option slot for an additional filter which is cascaded with the main filter. The object being to narrow the overall bandwidth even further.

The second and final i.f. for all modes except f.m. was 6.3MHz and it was here that the pass-band tuning facility was applied. There was also an additional 2.4kHz filter and the provision for three optional filters with bandwidths of 1.8kHz, 500Hz and 250Hz. The signal was then demodulated and filtered on the main audio board.

If the optional n.b.f.m. adaptor is fitted a third i.f. of 455kHz is introduced.

The transmit signal generation is quite straight forward with the basic signal generated at 9MHz and modulated up to the required frequency using the same local oscillator as the receiver. Final

Specifications

Frequency Range	All amateur bands from 1.8MHz to 30MHz in 500kHz segments, plus 30kHz overshoot.
Stability	1 p.p.m. per degree C at 29.999MHz.
Accuracy	100Hz @ 25 C
Power Requirement	13.8V d.c.at 20A max
Modes	u.s.b., l.s.b., c.w., RTTY (f.s.k. & a.f.s.k.) Optional f.m.
Transmitter	
RF Output	25 watts to 100 watts
Carrier Suppression	60dB typical
Unwanted Sideband Suppression	60dB typical with 1.5kHz tone.
Spurious Output	>45dB below peak power output.
FSK Shift	170Hz
Receiver	
Sensitivity	0.15µV for 10dB S:N (s.s.b., c.w. & RTTY) 0.3µV for 12dB SINAD f.m.
Selectivity	2.4kHz -6dB or optionally 1.8kHz, 0.5kHz or 0.25kHz
I.F.s	1st 9MHz, 2nd 6.3MHz 3rd 455kHz f.m. only
Image Rejection	> 60dB
I.F. Rejection	> 60dB
Dynamic Range	97dB typical
Third order Intercept	+12dBm
Pass-band Tuning	1.2kHz
Audio Output	1.5 watts in 8Ω
Notch Filter	250Hz to 2.2kHz 50dB notch
Tone Control	15dB roll-off at 5kHz
Dimensions	146mm high 374mm wide 432mm deep
Weight	7.25kg

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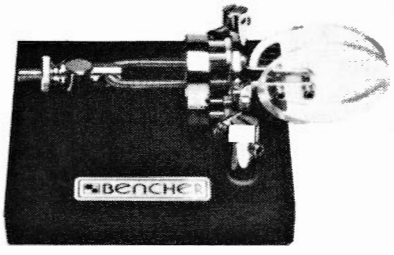

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amplification was achieved by an all solid state transmit amplifier chain.

The local oscillator used phase locked loop and mixing principles with the output well filtered by a bank of diode-switched filters.

On The Air

This is the area that really matters and one where the Omni-V fared very well. The antenna used throughout the review was my own nest of dipoles which have been cut for optimum performance in the RTTY segments of each band, i.e. between c.w. and phone. For all the tests I used the supplied fist microphone and Ten-Tec power unit.

Phone operation was tried first and on the weekend in question there was a contest running on h.f. (isn't there always!). Tuning-up was very simple thanks to the provision of the TUNE button which when depressed put the Omni-V into transmit with a carrier up. The a.t.u. could then be used if necessary to improve the match between antenna and transceiver. The panel meter when set to indicate reflected power was very responsive giving a clear indication of the ideal matching point. The Omni-V p.a. stage and a.l.c. were also very tolerant of mismatched loads with a current demand exceeding 20A being the criteria for reducing the drive level. Another feature I found extremely helpful was a small l.e.d. that was mounted adjacent to the MIC control. This indicated when the a.l.c. circuit was operating and could be used very effectively to set the optimum mic drive level. You simply adjusted the mic level so that the l.e.d. just lit on voice peaks. The transmitted audio quality was very good, being a fine balance between that required for communications under difficult conditions and the fuller quality prefered for local 'rag chewing'. I received a number of complimentary comments on the quality to back this up. Whilst working the contest I managed to achive a high number of first time successes despite the fact that I was competing with high power stations using beam antennas. The message was also copied first time virtually every time, again confirming that the communications quality was good.

The speech processor was also very easy to use and very effective, though as with all processors it was important to avoid the temptation to over-process. Adjustment of the processing level was achieved by switching the the panel meter to the process option where the level of processing was clearly displayed. The technique then being to adjust the processor level so that the meter indication stayed within a black band on the meter scale. The fast response of the meter was particularly useful here to catch speech peaks. The on-air reports confirmed that when properly adjusted the processor added a very useful extra punch to the signal.

On the receive side the audio quality was excellent and the audio filtering facilities gave the operator a very wide range of control. The notch filter was extremely narrow with an impressivly deep notch. This did however, create a problem as it required very careful tuning, particularly if you were trying to notch out a c.w. signal, as you could easily tune through the notch and not notice it. The variable band-pass filter was something I had not tried before on a communications receiver, but after some practice, I found it to be very useful for minimising the effects of an assortment of interfering signals.

One area that I was slightly uncomfortable with was the a.g.c. characteristics. This could be switched between fast and slow, whilst I thought the fast position as excellent, the slow was still too fast for my liking as it allowed recovery in natural voice breaks, thus allowing the QRM to rise. This may only be a personal preference so may be perfectly acceptable to many users. The other point that could be a little irritating was the a.g.c. pumping which became apparent when operating on a quiet band, though once again this is down to personal taste.

The VOX was slightly unusual in that the p.t.t. had to be pressed before it was activated. At first I though this was a bit of a chore but of course it did have the advantage of preventing accidental transmissions which are so easy with some systems.

The lack of an r.i.t. control took a little getting used to, but was quite easily overcome using split frequency operation with one v.f.o. for transmit and the other for receive which could be used as the r.i.t.

Memory operation was also slightly different from many modern rigs, but it didn't cause any problems once I had familiarised myself with the operation.

Moving on to c.w., the Omni-V was exceptional, with true break-in available - you could even hear through the inter-dot pause quite comfortably. The filtering options were also very effective, especially when using the 250Hz filter with the narrow option activated. I spent quite some time operating c.w. and the Omni-V certainly rates as one of the best c.w. rigs I have encountered.

RTTY operators have the option to use true f.s.k., though the slightly odd voltage levels required for the keyer mean that operators may have to slightly modify their equipment. The other snag, for operation on this side of the Atlantic, is the receive tones used, which were the American standard of 2125Hz and 2295Hz. This is not serious however as most RTTY operators seem to use audio f.s.k. by applying tones to the mic socket and this is fine with the Omni-V. Packet and other data modes can also be operated with the Omni-V using this technique.

The only mode I couldn't evaluate was the optional f.m. as this was not fitted to the review model. **PW**

Summary

The overall performance of the Omni-V was very impressive and it is likely to appeal to the serious amateur. The styling was very individual and perhaps a little old fashioned, but the facilities provided were well thought out and very effective. None of the odd shortcomings I found were serious and the build quality was very good.

Overall then, the Omni-V is a very competent transceiver which I can thoroughly recommend for the serious amateur.

The Model 562 Omni-V is available from **KW Communications Ltd., Communications Centre, Chatham Road, Sandling, Near Maidstone, Kent ME14 3AY. Tel: (0622) 692773.**

Price £1900.18(inc. VAT).

My thanks to HRS Electronics, the UK agents, for the loan of the review model.

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Feature

RF Interference from Vehicle Engines

With reports coming in from friends who had bought new cars, B.A. Berry is convinced there is a new style 'gremlin' in the world of mobile radio. It is due entirely to the current craze for a greater use of electronics in the car.

Major Problems!

Electronic devices, fitted in cars to reduce petrol consumption and add reliability, also bring problems with them. Not least of these is the difficulty facing the home mechanic when it comes to fault finding under the bonnet.

I came across this problem when a friend brought his car round to me in desperation. He is a radio amateur and, naturally, wished to install his 144MHz rig in the car, together with an h.f. rig for use on holiday. He has installed rigs in most cars that he has had over the years and has experienced no troubles in the past. He was well aware of the need for suppressing the ignition, charging circuits and wipers but, in this instance, although all normal precautions had been taken, he really had a problem. Two problems in fact.

The Problems

Problem number one concerned the 144MHz band rig. Receiving was fine, it was on transmit that things got out of hand. First, if he was using the indicators whilst speaking, the flashing rate speeded up so much that the indicators appeared to be on almost continuously. Secondly, the engine revs dropped! Of course, he wasn't at all happy with this, for although it was all very well and good to avoid use of the trasmitter during a turn, it was definately not on to have the engine revs dropping when driving on a straight road whilst conducting a QSO.

Problem number two occurred when transmitting with the h.f. rig. In this case the engine actually cut out completely when transmitting - which was, of course, extremely dangerous.

The Modern Car

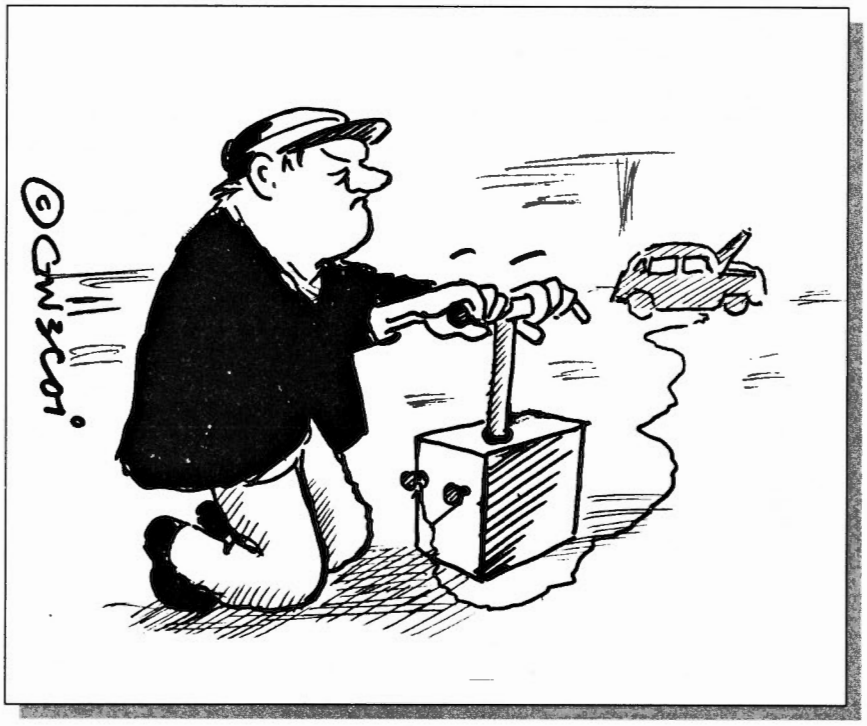
Not owning owning a new car, I wasn't aware until I took a look under his car bonnet just how far the craze for electronic control had spread. As an instrumentation technician by trade, I was well versed in electronic instrumentation in industrial plant - but to find, for example, a stepper motor on the carburettor was quite a shock. Knowing as I did that where there were stepper motors, a computer would not be far away I set off to find it. I eventually traced it, hidden under the dash. It was obviously receiving and processing information from six or seven sensors located in various parts of the engine compartment.

During my initial inspection, prior to an attempt at diagnosing the cause of the problems, I took a quick look at the indicator unit. Fortunately it was one whose outer case was removable. On looking inside, where I'd expected to find the old bi-metal strip, there were three or four transistors and a relay! Fine I thought. A flip-flop is definitely an improvment on the electro-mechanical version, but the outer case of the unit was plastics. Now, the cause of my friend's problem began to dawn on me.

Diagnosis & Cure

First the 144MHz band rig. Deciding to tackle the simple problem first, I started on the indicators. It was pretty certain that r.f. was getting back into the indicator unit - but from where? It couldn't have been direct radiation from the antenna, since the car formed a virtual screen around the unit. Not only that, the output of the 144MHz band rig was only 2W. The connections to the antenna were well made and it was well matched. So I turned my attention to the power cabling to the rig, which was located on the drivers side, under hte dash. The power cables from the rig to the battery ran through the firewall directly behind the rig, and thence to the battery. As far as I could see, any radiation affecting the indicator unit must have been coming via these

Always a difficult thing to get rid of!



cables, since they travelled within 150mm of it. Accordingly I did a quick test by pulling and temporarily re-routing the cables away from the unit.

A transmission test showed that this was indeed the case, although the frequency of the indicators still changed, the rate of change had now diminished considerably. I was, I must admit, surprised to have my diagnosis confirmed, since I had assumed that any reasonable rig would have had r.f. filtering already on the supply lines. At the same time I was aware that it could have been a case of r.f. feedback, which is always a difficult thing to get rid of. But since there were no other indications of this I decided to go ahead with a major re-routing of the cables. The end result was that only a very small amount of interference with the indicators was now noticeable. I had previously noted that there was plenty of space inside the indicator unit itself and so I next decoupled each of the 'live' sides of the indicator unit down to earth with a couple of 10nF capacitors mounted inside the unit. This completely cleared up the problem. The re-routing of the cables also cleared up the engine revolution change and left only the question of the h.f. rig to resolve.

The HF Rig

This time conditions were rather different. The h.f. rig no longer affected the indicators, but the engine still stopped. Clearly, with the greater power of the h.f. rig something more was needed. As far as I could see the problem was occuring as a result of induction into the pick-up coil which has replaced the points and other distribution components. In view of the fact that we were now dealing with 100W of r.f., it was within the bounds of possibility that it could have been direct radiation into the engine compartment. The first action to take was to ensure that the engine compartment was as effectively screened as possible. A common problem in this respect is the hinge where the bonnet joins the chassis. Often oxidisation takes place here, effectively insulating the bonnet from the rest of the chassis. The cure is simply to wire some flexible heavy duty earthing strap from the bonnet top to the nearest point on the chassis. The next question to be settled was whether re-routing of the power cables would help. It did. Re-routing didn't completely solve the problem; the engine no longer stopped, but it still mis-fired on transmit. Obviously some other precautions were going to have to be taken. In the end, rather than attempt to modify the rig, an external filter was constructed and placed close up to the rig in each of the supply lines. Each filter consisted of winding about 20 turns of the supply lead around a 130mm length of 16mm ferrite rod, close to the point where the lead left the rig. This completely cured the problem. It is a moot point as to whether such a filter would have been needed in the negative or earth line, had it been connected to chassis near the rig, but in this instance the negative line went right back to the battery, so it was considered essential.

Conclusions

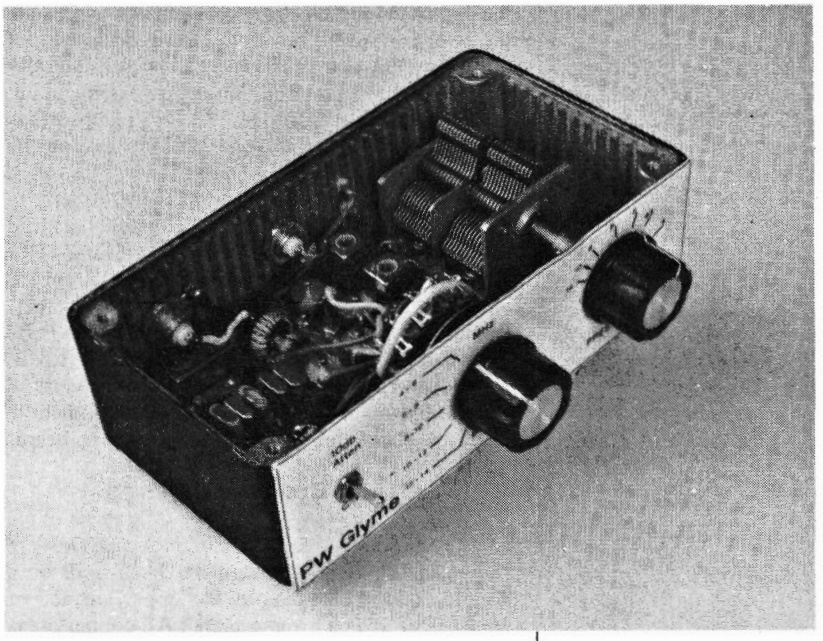
The computer itself, although also in a plastic case, seemed to be completely unaffected by r.f. However, careful thought will reveal that actual engine failure in the form of a mis-fire does not necessarily have to occur. A burst of r.f. could affect the computer in such a way, that far from ensuring maximum efficiency and economy, a drop in performance in these areas could occur for some considerable time without the driver becoming aware of it. Some items seem particularly susceptible to r.f. pick-up. In the case of the indicators there was only 2W of r.f. in the vicinity and that was being fed by coaxial cable to the rear of the vehicle where the antenna was situated. The pick-up coil for the ignition timing, senses the small magnetic field of the rotating distributor or flywheel magnet. So it obviosly takes little stray r.f. to effect it, to the extent of stopping the engine.

Until manufacturers realise that high powered transmitters carried in some vehicles can affect engine performance and take the necessary steps to shield sensors that depend on a magnetic field for their operation, the trouble is going to persist.

PW

The PW 'Glyme'

Construction



This converter is a simple but efficient unit which, when placed ahead of a receiver tuning from 28 to 30MHz, allows signals in the 4 to 14MHz portion of the short wave spectrum be be received in five 2MHz wide portions. This portion of the spectrum is probably the busiest, as it contains numerous marine, aircraft and other utility stations as well as the 49, 41, 31, 25 and 21m broadcast bands. If your receiver has the facility to resolve both s.s.b. and a.m. then there is considerable listening scope. Perhaps though your receiver is s.s.b. only, this should present few problems, as in most receivers the stability of the v.f.o. is more than adequate to enable the resolution of an a.m. signal. This method of carrier reinsertion was used by the BBC monitoring services at Caversham Park, by using either the upper or lower side-band it allows an interfering signal to be moved further away from the desired frequency and, in most cases, an excellent audio reproduction in view of the i.f. bandwidth available.

The design of this project has been kept as simple as possible in order to make it easily reproducible, relatively cheap and easy to align with the minimum of test equipment, but without sacrificing quality. When used with a good receiver this unit will provide many hours of listening pleasure from all over the world.

Circuit Description

The block diagram of the converter in its ultimate simplicity is shown in Fig. 1, a mixer preceded by a band-pass filter. What could be simpler and yet work so well? Moving to Fig. 2, this shows that the circuit diagram is in reality only a little more complex. Not shown on the block diagram, but present in the circuit diagram is a 10dB attenuator. This was found to give better results on certain bands which have high signal levels present.

Also, purists may note that the double tuned coupled filters, comprising of C9a and b with T1 and T2, are coupled directly together and not via a small value capacitor as is to be found in most text books. Measurements showed that this configuration gave more consistent bandwidth figures over the complete tunable range than the more theoretical circuit. The text book approach was found to have a bandwidth of a few kHz at the low frequency point, but at the high frequency setting this had deteriorated to several megahertz. By replacing this coupling capacitor with a direct connection the bandwidth, whilst not ideal, remained more than adequate throughout the complete tuning range. This results in a higher rejection of unwanted frequencies and a reduction in the image response of the circuit.

With a local oscillator frequency of 18MHz the resultant i.f. is 28-30MHz, for the 10 -8 MHz band,

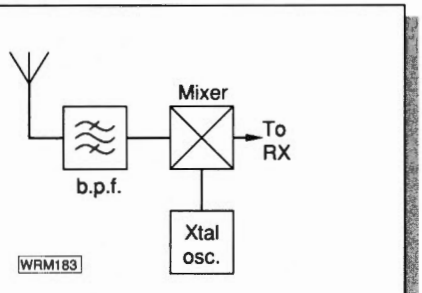


Fig. 1

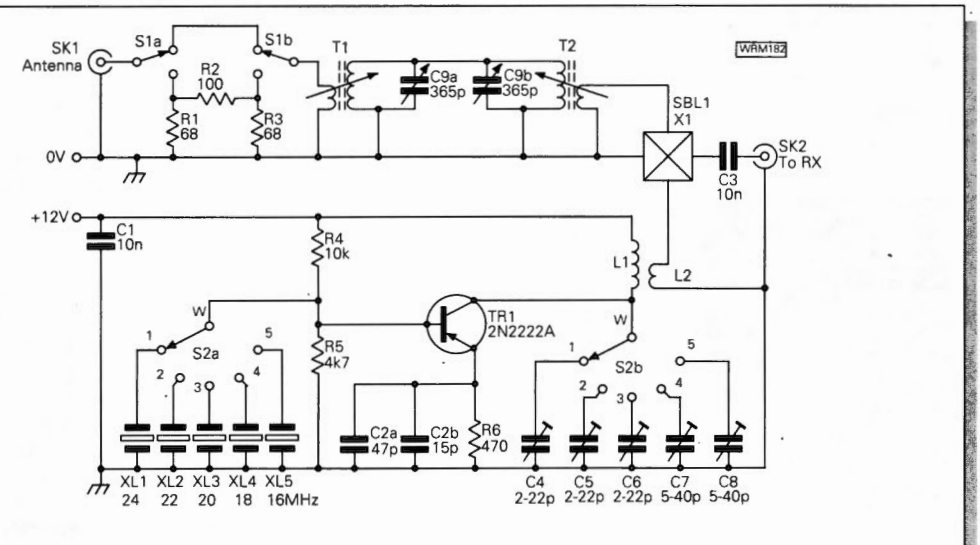


Fig. 2

A few years ago there emerged the amateur band transceiver which also doubled as a general coverage receiver. There are a large number of the earlier type of amateur band only transceivers which are perhaps not being fully utilised. They sit idle when the bands are are less active, or when the mood to operate does not prevail. This latter reason prompted Brian Robertson G4POL to design a converter which would make good use of the s.s.b. filtering which exists on most amateur receivers. Thus evolved the PW *Glyme.*

but the (2 x l.o.-i.f) is 6 to 8MHz. These two responses are close to each other and, as you will find out, both may be tuned to a particular place on the dial of the preselector. So as you can appreciate the rejection has to be good. However by careful tuning the unwanted response can be substantially reduced and, with the addition of an a.t.u. in circuit, may be eliminated all together. This example has been quoted as it is the worse possible case of the five crystal l.o. frequencies.

The preselected signal output is fed directly to the 50Ω input port of the Schottky double balanced mixer X1. The local oscillator transistor TR1 generates sufficient drive (+7dBm or 5mW) for X1 on all crystal frequencies. Band switch S2 selects and tunes the correct crystal frequency.

Although the conversion loss of this unit is 7dB, it was found in practice that with a good antenna, no discernible signal losses were noticed and there were, and should be, a wealth of signals to be heard.

Construction

The component layout and track patterns are shown in Fig. 3. The circuit has been built on a double copper clad board, the upper surface of which is used as a ground plane. All copper areas around the holes, other than those used specifically to earth the pins of the mixer and crystals pins should be cleared away from the holes by using a small sharp drill bit.

Once the board has been prepared, bend the tags on the screens of T1 and T2 then fit and solder them into place on the board. The pins connecting to the centre tap windings of T1 & 2 are not used, but should not be cut off, as damage can occur when doing so and confusion may occur when placing them on the board.

The trimmer capacitors C4-8 have their 'earthy' connections made on the upper side of the board, so these legs of the components should be bent very carefully at right angles to their original positions before placing and soldering them on the board.

Oscillator coils L1 and 2 should be wound on a T50-6 toriod, L1 being 19 turns of 24 s.w.g., and L2 being 2 turns of the same wire. When fitting this component take care that it does not touch the earth plane. A quick curing epoxy glue should be used to fix the toriod to the board then, smeared on the rest of L1 and 2 to lock the windings in place on the toriod **after** you are sure that the unit is functioning.

Fit the other resistors R4-6 on the board and then the transistor TR1. Solder Veropins to those places which will have external connections on them and connect short flying leads to the open ends of the crystals and the trimmer capacitors. Solder short lengths of miniature coaxial cable to the input and output points of the board. When this is done, check very carefully for orientation and correct soldering of each component, followed by a check to see there are no solder splashes on the board.

Using the layout shown in the drawing of the front panel as a guide, mark and drill the box for the switches. The input and output coaxial sockets and power supply points or leads are mounted on the back panel of the box, and may be placed in convenient positions. Mount the board inside the box as close to the band change switch as possible, so that the flying leads are ideally less than 50mm in length.

Trim the flying leads to the minimum length and solder them to the correct contacts of the band change switch. Solder the resistors R1-3 to the attenuator switch S1 in the manner shown in Fig. 3b on page 51 of the Jan 1990 *PW*, and mount it so that it comes into operation in the toggle down position. Connect the coaxial cable from the board to one side, and using more coaxial cable connect the other side to the input socket SK1. Trim and fit the output coaxial cable from the board to socket SK2.

Testing

When you are sure that all is in order, and with a multimeter measuring mA in line, connect 12V to the unit. The total current drain should be of the order of 10mA at this stage, if not switch off and find out why. If you have an r.f. probe, measuring at TP1 should give a reading at all positions of the bandchange switch. Set all the trimmer capacitors to about half mesh and the cores of T1 and 2 about 2mm below the top of the cans. Please use the correct plastic tuning tool to do this, otherwise you may damage the cores.

Assuming all is in order connect an antenna to SK1 and switch on the receiver and note the noise level. Connect the output of the unit to the antenna connections of the receiver and an increase in receiver noise level should be heard. Using an suitable r.f. measuring probe measure at test point TP1. Switching to each band in turn, peak the

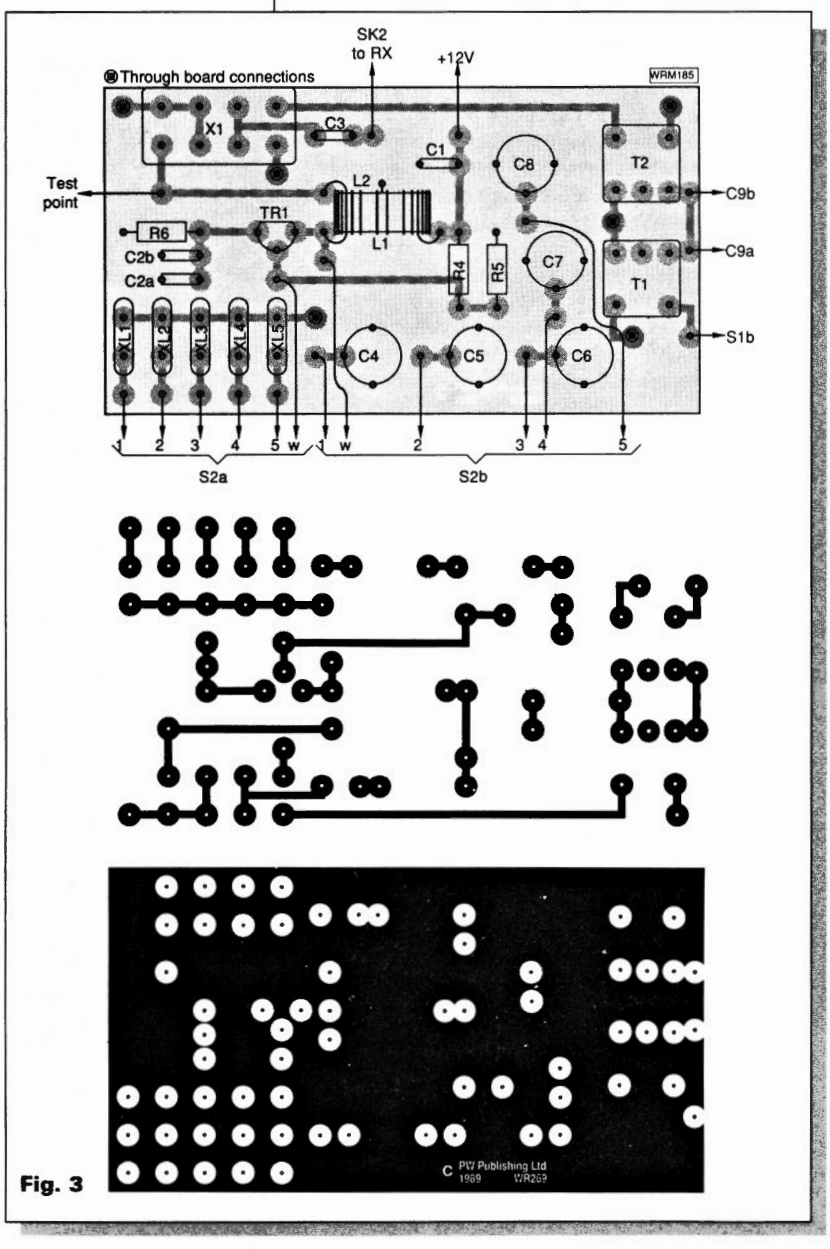


Fig. 3

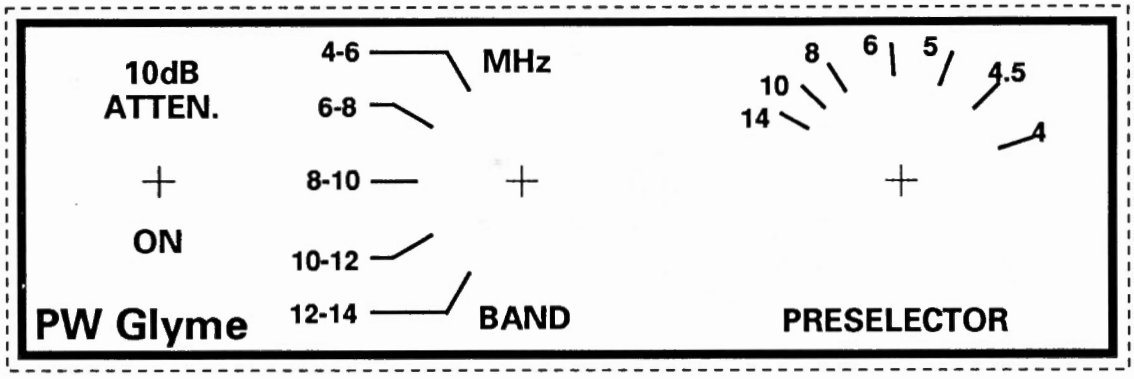


Fig. 4
Actual size

amount of mixer drive for each crystal switched into circuit.

Inductor L1 is resonated with one of the trimmer capacitors C4-8, to give a slight pulling of the crystal frequency as measured at TP1. Also at TP1, it should be possible to measure the 50Ω output drive to the mixer X1. A suitable r.f. probe for this job is shown in Fig. 1.3 on page 23 of the January 1990 PW. and a reading of around 0.6V should indicate sufficient drive.

Counterless Alignment

If a frequency counter is not available, alignment is still quite easy. First set the band switch to 4-6MHz, tune the receiver to 28.772MHz u.s.b. Peak the preselector to 4.7MHz approximately. You should now be able to hear the RAF's VOLMET broadcast on 4.772MHz. If nothing is heard then carefully adjust the trimmer capacitor C8 until something is heard. Once this has been achieved switch to 6-8MHz and tune the receiver to 28.090MHz and the preselector to 6.1MHz. This combination should enable you to hear Radio Luxembourg in the 49m band. On the 8-10MHz band with the receiver tuned to 29.535MHz and the preselector to 9.5MHz, you should hear Swiss Radio International. The band 10-12MHz and 29.2MHz (11.200MHz u.s.b.) is again RAF VOLMET which should be audible.during daylight hours, if not then try for a strong signal in the 25m broadcast band. Lastly on the 12-14MHz band tune to around 13.6-13.8MHz on the preselector, receiver around 29.6-29.8MHz.

If you have access to an r.f. signal generator, it must be accurate and stable to be of use, otherwise use it as a start off and proceed as outlined above. The above frequencies have been chosen from the author's knowledge as a UK resident. If the unit is to be constructed outside the UK then some of the transmissions mentioned may not be audible. In which case one of the excellent references such as *Klingenfuss Guide to Utility Stations* or the *World Radio Television Handbook* should be consulted, and in fact are reccommended reading for anyone interested in radio listening.

Once alignment is complete, fasten down the lid of the box and the world is now yours!

General

The original prototype consisted merely of the mixer and local oscillators, but it was noticed that the receiver showed signs of distress at times.With these results it was thought neccessary to build an attenuator into the circuit and 10dB was found to be sufficient. The mixer contained within the unit is unlikely to overload with a long antenna and gave excellent results on a Racal RA17, a Trio 830S and a Sony 2001D, so it should work well with any receiver tuning 28-30MHz. Although the conversion loss is 7dB, about 1 S-point, it was not noted as being insensitive, and so even modest antennas should produce good results. Good hunting! **PW**

Shopping list

HOW MUCH ?
£ 47.00
HOW DIFFICULT
Intermediate

Resistors
0.25W 5% Carbon film

68Ω	2	R1,3
100Ω	1	R2
470Ω	1	R6
4.7kΩ	1	R5
10kΩ	1	R4

Capacitors
Metalised ceramic 5%

15pF	1	C2b
47pF	1	C2a

Disc ceramic

10nF	2	C1,3

Variable
Miniature foil trimmers

2-22pF	3	C4-6
5-40pF	2	C7,8

Jackson type 0

365+365pF	1	C9a,b

Semiconductors

Schottky balanced mixer

SLB1	1	X1

Transistor

2N2222A	1	TR1

Coils and inductors

TOKO KANK3334R	2	T1,2

L1 is formed by winding 19 turns of 24 s.w.g. enamel covered wire on a T50-6 toroid.
L2 is an overwinding of 2 turns of the same wire on the same toroidal core.

Crystals
1 off of each 16, 18, 20, 22, 24MHz HC18U§

Miscellaneous
Bimbox type 95005, p.c.b.†, double pole double throw miniature switch, 2pole 6 way switch for bandchange. Toroid T50-6, 2 coaxial sockets to suit, 2 knobs, 2 feedthroughs for the power supply lines, Miniature coaxial cable, thin insulated wire for interconnections, 18 off Veropins, nuts and bolts.

† PW PCB service
§ Golledge Electronics, Merriott, Somerset TA16 5NS. Tel:0460 73718, Have a kit of all five crystals for £17-50 inclusive, ask for *PW* Glyme kit.

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ELH260D	2m amp. 1-3W/50W	119.00

AZDEN

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W544	Vswr 140-460 MHz	119.00
W570	Vswr 1.8-1300	119.00
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S20N	Switch 1kW *N*	45.00
rodD24N	With *N* & PL259	26.95

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TOYO

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XTALS	VXO xtals	10.00
BM6	Carry case	9.00
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PL7S	40m 10W linear	129.00
PL14S	20m 10W linear	129.00
PL1000	80-10m linear	189.00
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PR3S	Mobile mount	27.00
AN-¾	40m 4ft whip	29.00
AN-14	20m whip (BNC)	29.00

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MISCELLANEOUS

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GP125	3dB VHF Air Ant.	49.00
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MORSE	Learning Morse	4.95
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VHF	VHF Handbook	5.95
SLWA	Low Cost Wire Ant	6.95
WRTVHB	World Radio & TV	17.95
ATC	Air Traffic (Adair)	6.99
ARHB	Airband Radio (Smith)	5.99
ATCIA	Air Traffic (Duke)	3.95
RAAH	Amateur Ant H'book	6.95
SWRHB	SW Radio Handbook	6.99
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TS950SD	HF tevr. + +	3199.00
TS940S	HF all band tevr.	1995.00
AT940	Automatic atu	244.00
SP940	Ext. spkr. + filter	87.50
VS1	Voice synthesizer	32.25
TS440S	HF transceiver	1138.00
AT440	Internal auto atu	144.75
PS50	Heavy duty PSU	222.00
TS140S	HF transceiver	862.00
TS680S	TS140S + 6m module	985.00
PS430	Mains power supply	173.75
SP430	Matching speaker	40.75
AT250	Automatic atu	366.00
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MB430	Mobile mount	15.80
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SP40	Mobile Speaker	21.00
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IC2E	2m FM handy 1.5w/BP3	235.00
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IC228E	2m FM mobile 25w	365.00
IC228H	2m FM mobile 45w	385.00
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IC275E	2m multimode base AC	1069.00
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IC24ET	FM 2m/70cms	385.00
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DATONG

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TONNA

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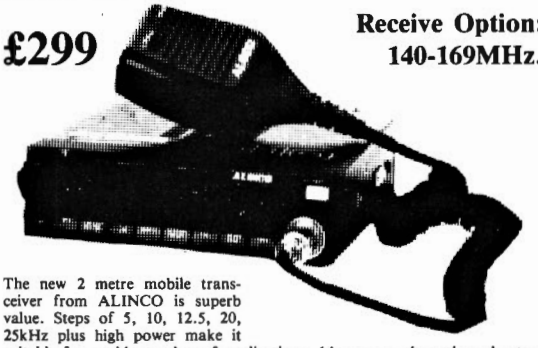
Receive Option: 140-169MHz.



The new 2 metre mobile transceiver from ALINCO is superb value. Steps of 5, 10, 12.5, 20, 25kHz plus high power make it suitable for a wide number of applications. 14 memory channels and rotary dial control make operation a joy. Improved LCD display makes night operation much easier. The dimunutive size (5.5' × 2.5' × 6.75') makes for easy installation in the modern car. Other features include up/down mic., 3 way scanning, 1750Hz tone-burst, reverse imput, memory skip, and of course a full mobile mounting kit. Send for colour brochure today!

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5, 10, 12.5, 25kHz steps
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Programme Shifts
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NO EXTRAS!
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- **700 MHz first IF**
- **Proper English Manual**
- **Superb sensitivity.**
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No other similar receivers offer the same features at anywhere near the price! And inside the construction is a Joy! Lots of space, nicely laid out boards all linked with quick connect plugs. Not a "Taiwanese Rat's Nest!"

- **Direct up/down control.**

No need to punch anything into memories. Just enter frequency and use up/down buttons for manual or electronic tuning.

- **AF Scan.**

No more annoying blank carriers for the receiver to lock on to. Simply tell it to ignore carriers not containing audio and it will!

- **One Button Memo Read.**

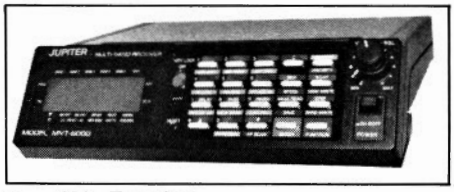
A single button takes you directly into the memory bank. Up/down or scan will quickly move you around or use direct access for a particular channel number.

- **Battery Saver.**

For long term single channel monitoring this feature will reduce battery consumption by 70%.

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

£379



- **Skip Function.**

Whether you want to bypass a single memory channel or an entire bank, this control provides the answer.

- **High Speed Scan.**

Select high speed scan or search and you will whiz through the range at a healthy 20 steps per second! That means you can scan 100 memories in 5 seconds or 1 MHz of space (25kHz steps) in 2 seconds. It really works!

- **Fast Memo Write.**

Enables you to quickly write into the memories, no need to select a number, the receiver will use the next empty memory.

- **User Friendly Search Programme.**

You can search in either direction and change direction at the press of a button. Total agility with a speed to match.

- **Unique Multiband Programme.**

No less than 10 separate band segments can be stored in the receiver's memory.

- **Total Flexibility.**

The basis upon which the receiver has been designed. It means you tailor the receiver to do exactly what you want it to do, almost like having a receiver that was designed for your own personal needs. No other receiver can match it, feature for feature and the good news is the cost!

World demand is tremendous. We are getting only small quantities so pick up the phone now and you could be lucky!

FREE CATALOGUE & PRICE LIST! We now have an illustrated catalogue of some interesting products for the radio amateur that we have never had the space to advertise. Also details of new items coming along. Just drop us a first class stamp and we will send you this plus our price list of over 700 items!

MIZUHO "MX" QRP SSB/CW RIGS
£189

Now in stock these 2 watt single banders for 80, 40 or 20 metres are real beauties. VXO control (one xtal supplied) gives 25kHz segments on 80 and 40. and 50kHz on 20 metres: Features IRT, noise blanker, S-meter, speaker, morse key. BNC socket. Powered from AA cells or external supply. Pocket size 66W × 39H × 142mm deep. As used by GRSRN on Ben Nevis. Over 100 in use already. Send for gen.

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R535	VHF/UHF Airband Good.	199.00	BC100XL	Handheld VHF/UHF Exc	159.00
R537S	VHF Air Exc	45.00	AOR900	Handheld VHF/UHF Exc	159.00
PRO-2004	Base VHF/UHF Exc	239.00	ALR22E	2m FM transceiver Exc	229.00
PRO-2021	Base VHF/UHF Good	149.00	TR7730	2m FM transceiver Fair	159.00
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AOR-2002	Base VHF/UHF Exc	369.00	FDK700E	2m FM Mobile Fair	139.00
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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
PRO-30	Handheld VHF/UHF Exc	129.00	DR110	2m FM Mobile Mint	249.00

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WATERS & STANTON

Feature

Practically Yours

This month's project from Glen Ross G8MWR, is a little out of the ordinary in that we venture into the world of v.l.f. (very low frequencies). This is a part of the spectrum that few receivers cover but it contains a lot of interesting transmissions including the 15kHz output from Rugby which is able to communicate with submerged submarines anywhere in the world.

Most receivers for these very low frequencies require very large tuning coils and capacitors to resonate at the very low frequencies used but the receiver to be described uses neither.

The Circuit

The circuit configuration is that of a direct conversion receiver with a non-resonant input circuit. The oscillator is a free running multivibrator with adjustable emitter bias for frequency control, based around TR1 and 2, both of which are BC108. Using the values given for R4, R6, C3, C5 and the tuning control R13, the tuning range of the oscillator is around 15 to 30kHz. But, due to the high harmonic content of the oscillator, use can also be made of the second and third harmonics so increasing the tuning range of the receiver section from 15 to 100kHz. The tuning range can be modified easily. Increasing the value of C3 and C5 will lower the oscillator frequency. Components D1, R15 and C8 are included to ensure that the oscillator starts readily. Without them TR2 could be cut-off by the large amount of emitter resistance when the tuning control is at the top end of its travel. When power is first applied C8 has no charge and D1 conducts, effectively connecting the emitter of TR2 to ground. As oscillation builds up C8 charges positively to the point where the diode D1 is cut off, effectively removing C8 from the circuit.

Receiver Section

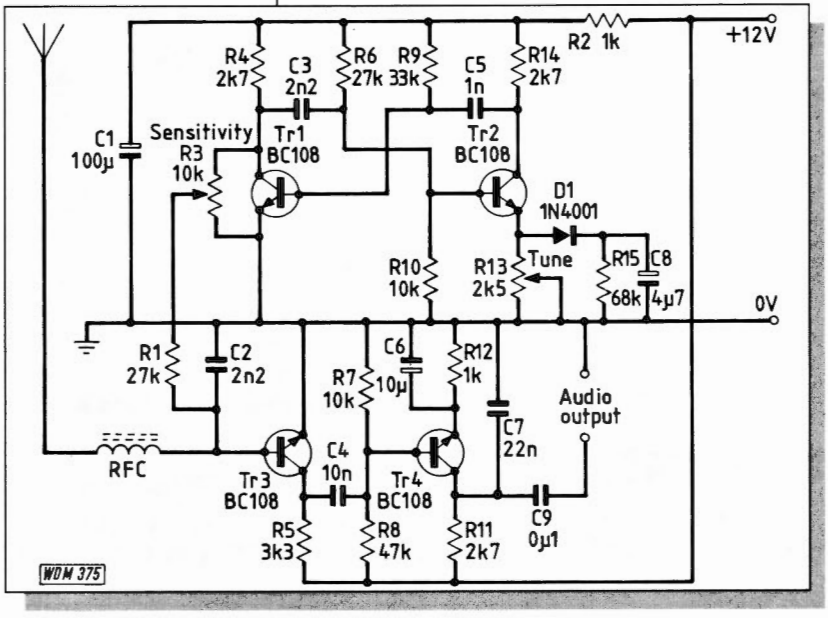
The detector TR3 is untuned and the antenna is connected to the base of the transistor via RFC. This serves two purposes, first it acts as a loading coil to bring, in terms of wavelength, the short antennas nearer to resonance. Its second but more important function is, that in conjunction with C2, it forms a low pass filter and effectively blocks strong broadcast band signals which would otherwise be a nuisance. The oscillator is coupled to the base of TR3 via the sensitivity control R3. The setting of the sensitivity control determines the bias level for TR3. The signal from the oscillator swings the base current of TR3 through the optimum point twice every cycle resulting in an audible heterodyne which is then amplified in TR4.

The capacitor C7 removes any residual r.f. which appears in the amplifier circuit. The output from TR2 is sufficient to drive a pair of medium impedance headphones or it may be coupled to a small audio amplifier such as an LM380. As shown the circuit draws about 15mA from a 12V supply.

Construction

There is nothing at all critical about the layout and the prototype was built on a piece of Veroboard mounted in a small die-cast box. The tuning and sensitivity controls should both be panel mounted. The receiver should be provided with a good antenna and earth system.

In operation the sensitivity control should be adjusted to the point of maximum background noise, this corresponds to greatest sensitivity. As the main tuning is adjusted it may be found that the sensitivity control needs minor adjustment although a setting of about half rotation seems about right. **PW**



Components List

Resistors

0.25W 1% carbon film

1kΩ	1	R2, 12
2.7kΩ	3	R4, 11, 14
3.3kΩ	1	R5
10kΩ	2	R7, 10
27kΩ	2	R1, 6
33kΩ	1	R9
47kΩ	1	R8
68kΩ	1	R15

Variable Resistors Linear

2.5kΩ	1	R13
10kΩ	1	R3

Capacitors

Mylar

1nF	1	C5
2.2nF	2	C2, 3
10nF	1	C4

Polyester Layer

22nF	1	C7
100nF	1	C9

Radial Electrolytic

4.7µF	1	C8
10µF	1	C6
100µF	1	C1

Inductors

2.5mH	1	RFC

Semiconductors

IN4001	1	D1
BC108	4	TR1-4

Miscellaneous

Veroboard, Veropins, connecting wire, die-cast box, etc.

What is Propagation?

Feature

Ron Ham continues with his explanation of meteors and how they affect communications, especially with regard to the amateur. This month we read more about some of the experiments he has conducted.

Following a period of successful tests with an electronic counter attached to my receiver, a daily observational programme began, on 27 September 1971 to count the number of times that the signal from the v.h.f. broadcast station at Gdansk was being deflected by the random ionisation left by meteor trails decaying in the earth's atmosphere. The equipment was switched on at 0800 each day and off at 2300 and a reading taken from the counter, on the hour, as often as possible throughout the period.

Interference

Transmissions from Gdansk on 70.31MHz cannot be received at my home in Sussex under normal atmospheric conditions, therefore only the receiver background noise plus the random 'pings' from their meteor reflected signals can be heard and the counter was set to respond to a positive 'ping'.

However, for most of the time this all worked well but the system had three main enemies, thunder static which added each 'crack' to the count, aurora which made the incoming signal 'burble' at the trigger level and sent the counter mad and Sporadic-E which produced such a powerful signal from Gdansk that the counter locked while the event lasted. Although these disturbances are tolerably infrequent during a year the only action to take when they manifested themselves was to close down and write off that day's count. For instance from 1 January to 31 December 1972, my first full year's observation, I lost 106 hours to interference out of a possible 5243 which was unlikely to distort the findings of the remaining 5137 hours work.

It is worth noting that visual observers also have problems because they can only watch for meteor trails during the hours of darkness and this can be further limited by overcast or moonlit skies and/or extreme cold in the winter.

Positive Results

The first seven days, or 105 hours (7 x 15), of full time observations produced 58 086 'pings' giving an average rate of 553 to the hour. I then eagerly awaited the Leonid and Geminid meteor showers to see if the results were consistent and as illustrated on the charts in Figs. 1 and 2, all was well. Both events clearly showed a rise and fall in the number of meteor 'pings' as the earth passed through these great swarms of particles on its annual orbit around the sun.

1972, The First Full Year

Throughout 1972 the equipment observed for 5137 hours and counted 1,299,587 meteor 'pings', which represents an hourly average of 253. The lowest number counted in one day was 530 on January 18 and the highest was 14500 on August 12 at the peak of the Perseid shower. The latter would have been more but the last hour 2200-2300 was lost to static and as you will see in Fig. 3, there was no observation on the 13th because the band was being used for a radio contest. The proof of the pudding came when the system observed the Geminids for the second time in December 1972, Fig. 4 and repeated that distinct peak.

PW

Fig. 1

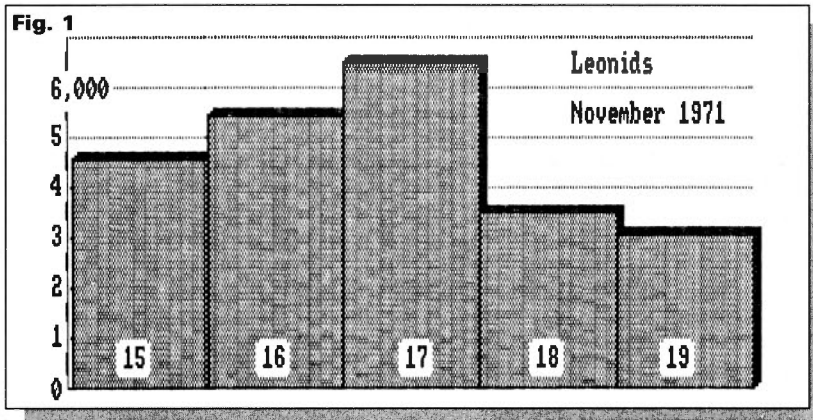


Fig. 2

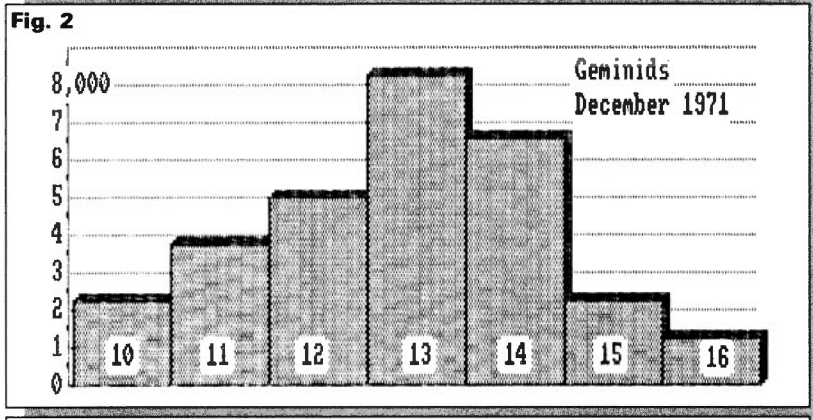


Fig. 3

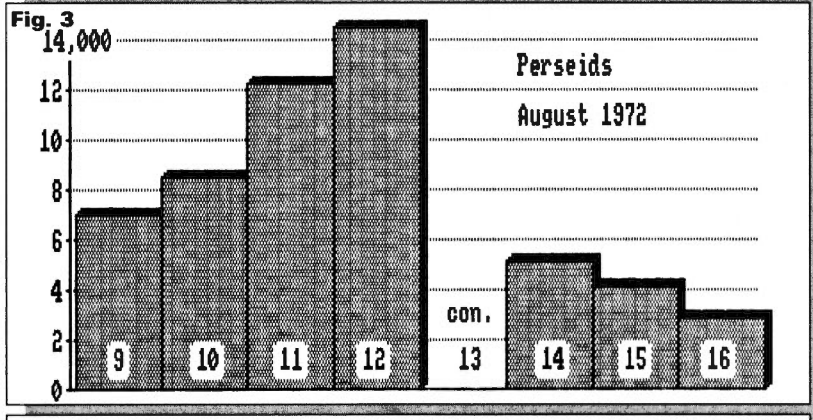
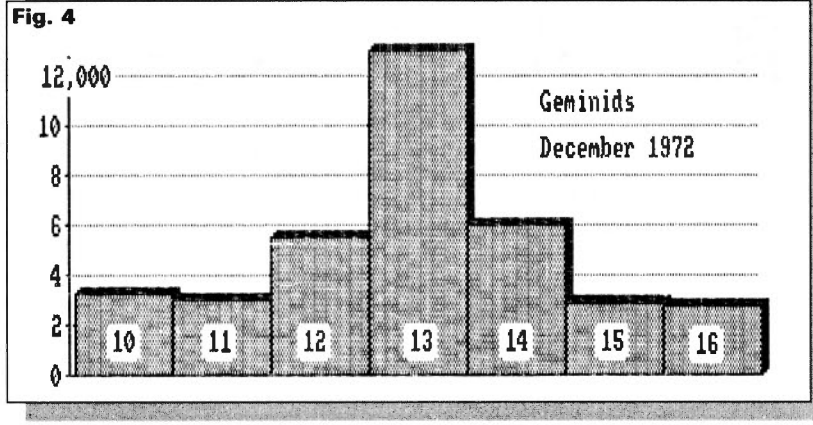


Fig. 4



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Feature

The World Service - The BBC's Hidden Voice

Although the BBC World Service provides 24-hour news, information and entertainment programmes that can be heard in both hemispheres, very few people realise the extent of the engineering required to maintain the service. Rob Mannion G3XFD looks at the engineering aspect and a little history of the World Service...the hidden voice of the BBC which can be traced back to the pioneering experimental service operated by Gerald Marcuse G2MN during 1927-8.

The 1930s were certainly the major growth years for international short wave broadcasting. From the early experimental broadcast test transmissions by radio amateurs - which proved beyond all doubts that the four corners of the globe could be reached with relatively low power - international short wave broadcasting grew. Unfortunately for the United Kingdom it was a decade of economic depression, and as the Second World War approached, the BBC had only eight short wave transmitters. All were located at the Daventry Northamptonshire site and because of possible enemy action it was considered undesirable to have all the BBC's short wave facilities concentrated at one station. Consequently plans were made to build additional transmitters in other areas including a modern facility in the west country county of Dorset.

The original 189 acre site at Rampisham Down, near Maiden Newton between Bournemouth and Yeovil, was purchased in November 1939. With a great deal of determination despite the inevitable wartime shortages, difficulties and labour problems, the new station came into service on 16 February 1941.

Many innovations were provided at the station, and special precautions were built to protect the four Marconi type SWB18 100kW short wave transmitters from bomb damage by separating the units from each other by heavy blast walls.

A comprehensive antenna system was installed consisting of 29 arrays supported between 15 masts of various heights between 30 and 98m. Full world coverage was given by this antenna system, although the transmissions were primarily intended for areas outside Europe.

Rampisham was the first of the BBC short wave stations to be equipped with four-wire transmission lines, following tests made at Daventry. A unique remotely controlled switching tower for connecting any transmitter output to any antenna array was also provided.

Standby electrical power for use when the mains supply was interrupted was provided by two 750bhp diesel-driven alternator sets, originally made for railway locomotives intended for export. The usual compressed-air driven starting equipment for the diesel sets was replaced by electrical starting facilities for their use at Rampisham.

Rampisham Modernisation

Along with many other of the BBC World Service transmitter sites, Rampisham provides an essential 24-hour service and has done so since it entered service in 1941. The station radiates short wave broadcasts in English and the appropriate foreign languages to west, south-west, central and south-east Europe, northern Europe, USSR, North and West Africa, Middle East and the Americas.

Recently the Rampisham facilities have undergone a radical refit with many new ideas being incorporated. Computerised control equipment - designed and built by the BBC Research Department - enables the transmitter and antenna switching to be programmed automatically from the Bush House control centre in London, while the essential maintenance and day-to-day running of this complex installation is looked after by 40 local staff of engineers and ancilliary workers. Some of the staff based at the site are responsible for the maintenance of the BBC's various u.h.f. television transmitter sites in the region, along with domestic v.h.f. and m.w. radio transmitting installations.

The refurbishment programme at Rampisham Down has included the replacement and

Ground maintenance sub-contractors at lunch, in the 180 acres of grounds that surround the BBC's short wave transmitting site at Rampisham in Dorset.
The sheep perform a vital function within the station's many acres of grassland by keeping it trimmed down to a reasonable level without causing damage to themselves or equipment.
At the start of the Second World War, the BBC had only eight short wave transmitters and all were located at the Daventry, Northamptonshire, site. For obvious reasons it was considered undesirable to have all the BBC's short wave facilities concentrated at one station and plans were made to build additional transmitters at diverse locations.
The original 189 acre site at Rampisham Down, near Maiden Newton in Dorset, was purchased in November 1939. Despite wartime difficulties and labour shortages Rampisham came into service on 16 February 1941.

modernising of two 100kW, eight 500kW transmitters and by the end of 1991 will also include two new 500kW units replacing two older 100kW transmitters.

Few people, especially radio enthusiasts can fail to be impressed at the electronic engineering visible at the average broadcasting transmitting station. Many medium wave transmitters have masts over 30 metres and would be a valued possession for those of us with limited space for antennas! Modern day u.h.f. TV transmitting stations can also be impressive although they usually have but one slender, stayed structure. However, all other broadcasting stations pale into insignificance when compared with the towering and very complex antenna systems used for short wave broadcasting. Apart from the sheer size of the antenna systems...the variety of types and the huge areas of ground needed to site them has to be seen to be fully appreciated.

Many motorists will have seen the historic BBC Daventry transmitter as they drove by on the M1 motorway. Unfortunately, Daventry is somewhat dwarfed by the nearby British Telecom v.l.f. transmitting station near Rugby, but despite this, Daventry's antenna 'farm' is awesome when viewed from the town of Daventry.

It may seem odd to the s.w.l. or radio amateur that very many people in the UK don't know anything of the World Service or of their programmes. This is surprising, especially when the high opinion held by many foreign listeners for the BBC's unbiased news reporting and opinion is taken into account. Many UK residents only discover the BBC World Service when they venture abroad. This is despite the fact that many British newspapers carry World Service day-to-day schedules on the entertainment pages!

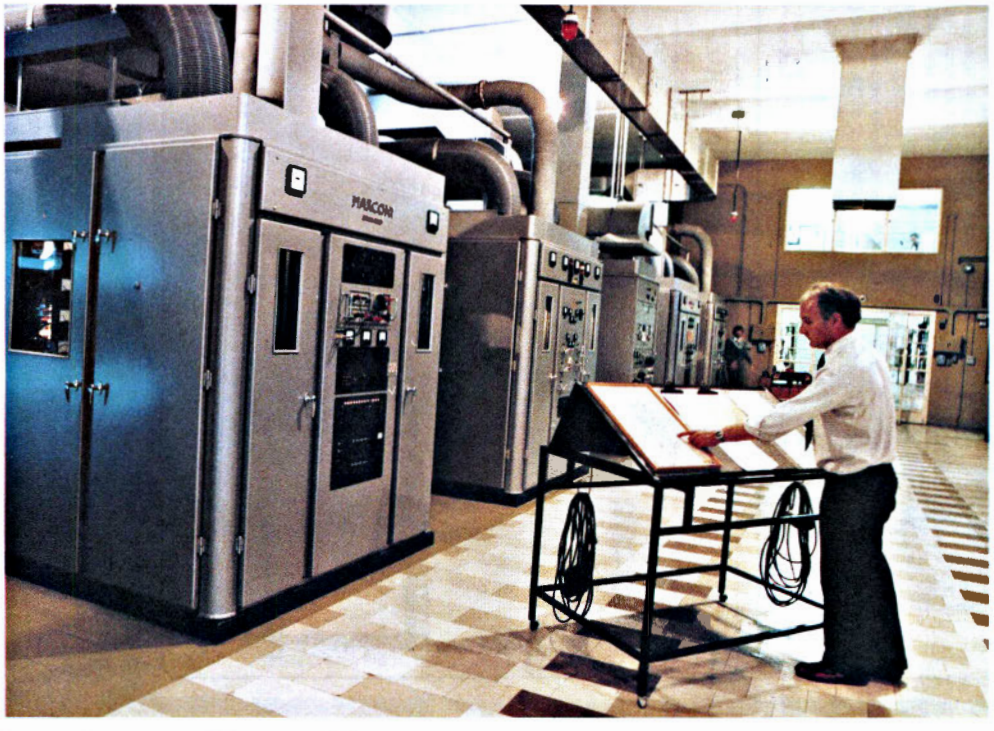
Nerve Centre

The headquarters of the World Service are located at Bush House, off the Strand in central London. The entire operation of the programming is overseen from this building. Transmitters world-wide are fed by relays, and in some cases by satellite links, to provide the reliable service which has become a watch word for many, and in the case of the recent tragedies in China, often the only way of hearing reliable news of current events.

For the listener and enthusiast in the UK, the World Service can be heard on the 648kHz frequency on medium waves. The new, high power transmitter at Orfordness in Suffolk, with an output of 1000kW (1MW) is considered to be one of the most powerful m.f. transmitters in the world. However, for many listeners in the UK the most reliable reception of the World Service programming is from the various transmitters radiating on the 6MHz (49 metre) band. On these frequencies Rampisham, Daventry, Woofferton (West Midlands, near Ludlow in Shropshire) and Skelton (near Penrith in Cumbria) can be heard.

Additionally, following the close-down of BBC Radio 4 on the 198kHz long wave frequency from Droitwich, the World Service uses that channel until 0545.

Both Skelton and Woofferton transmitters entered service in 1943 after a long search by the BBC to find suitable sites. Skelton, which was the largest transmitting station of its kind at the time, actually consisted of two transmitting station located within the same site but separated from each other by about one mile. The equipment at the remote Cumbrian station consisted of six 100kW Marconi type SWB18 transmitters and six CS8 type transmitters supplied by STC. The latter were



Routine maintenance in the transmitting hall at Rampisham. Along with the other BBC World Service transmitter sites, Rampisham provides an essential 24-hour service. This important station radiates short wave broadcasts in English and the appropriate foreign languages to west, south-west, central and south-east Europe, northern Europe, USSR, North and West Africa, Middle East and the Americas.

Rampisham has recently undergone a radical refurbishment programme including the replacement and modernising of two 100kW, eight 500kW transmitters and by the end of 1991 will also include two new 500kW units replacing two older 100kW transmitters.

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£359.00

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

£575.00 (PSU EXTRA)

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.

This radio really is different – come into the shop and try it for yourself.

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NORMAN G4THJ

capable of operating as six double-channel 70kW transmitters, with each pair of channels having a common modulator.

The two separate antenna systems at Skelton consisted of a total of 51 arrays supported by 31 masts ranging from 60m to 90m in height. The station was also equipped with emergency standby power supplies which could run six transmitters at 50kW and five channels with an output power of 60kW.

Amateur Radio

Short wave broadcasting from Britain can trace its origins back to the early, very successful experiments, carried out by pioneering radio amateurs in the late 1920s. Amongst these innovative experimenters was the late Gerald Marcuse G2NM who gained permission from a rather reluctant Post Office to carry out broadcasting test transmissions to the then very extensive British colonies.

Throughout the years from 1923 to 1927, Gerald Marcuse who then lived at Caterham in Surrey, had been prominent in developing the short waves for international communication. His consistent work with the Rice-Hamilton expedition in 1925, for example, had brought his name and achievements to the notice of the general public. Pictures of his station had been featured in the national and technical press of many countries and he was well known as a spokesman for the Radio Society of Great Britain on amateur radio licensing matters.

Gerald Marcuse had pressed the Post Office hard to allow transoceanic permits and for improved operating facilities. He had been one of the first British radio amateurs to use radio telephony and his voice had been heard in many parts of the world by other amateurs and keen short wave listeners using commercially made receivers.

In his life story, recorded just before he died in 1961, G2NM recalled that he was first drawn to the idea of providing a broadcasting service to the British Empire as the result of contacts with an amateur in Bermuda, who re-broadcast the G2MN transmissions to other radio amateurs in neighbouring islands.

The RSGB book *World at Their Fingertips* and the *BBC Engineering History 1922-72* (BBC Publications 1972) pay handsome tribute to his pioneering efforts and record the difficulties that lay before him in his efforts to prove the idea viable.

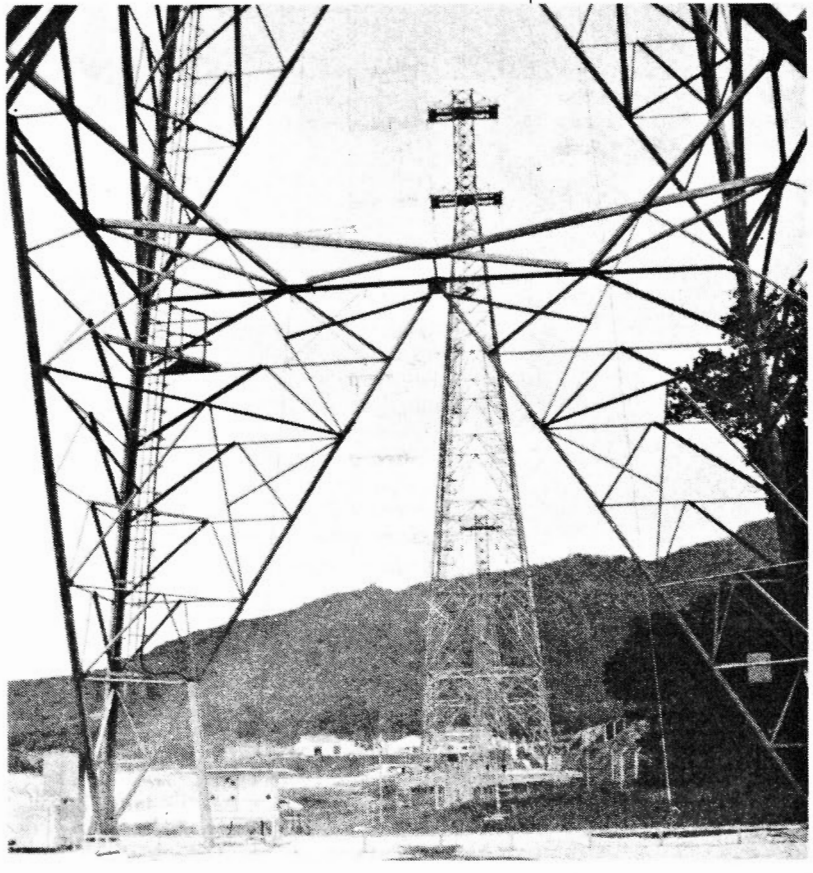
After a great deal of correspondence with the Post Office, Gerald Marcuse was finally informed in a letter from the Assistant Secretary, dated 9 August 1927, that the Postmaster General had decided to authorise him to "transmit speech and music for a period not exceeding six months from 1 September 1927, by means of wireless telephony with power for transmissions not exceeding 1kW and waves of 23 and 33 metres". The letter of authority also restricted his operating times to two hours on each occasion, prohibited him from broadcasting news of current affairs, limited the number of gramophone records he could use during the whole period of the experiments to 50 and prohibited him from advertising on behalf of the recording companies!

The BBC's Atlantic Relay Station on Ascension Island showing satellite receiving dish for programme feed

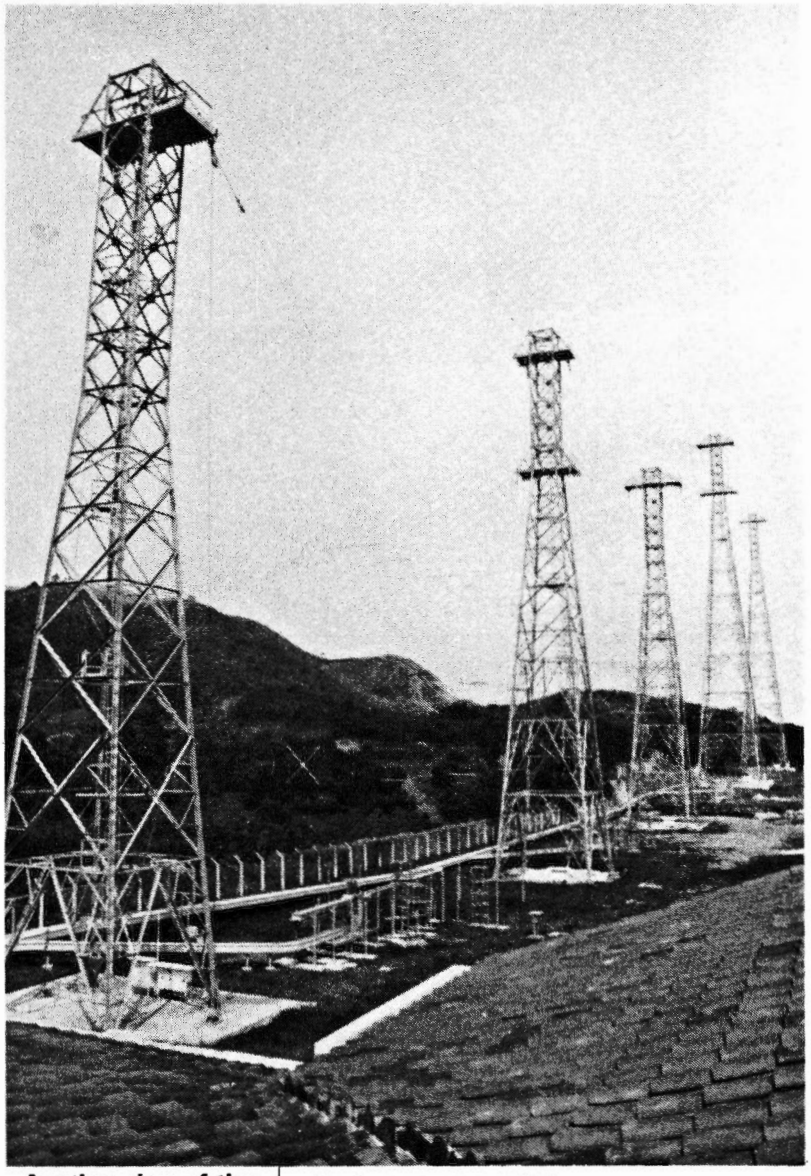
He was also informed that "the Postmaster General held out no hope that a licence to transmit regular programmes to the Dominions or Colonies would be granted to any body other than the British Broadcasting Corporation".

Special Concert

Marcuse officially inaugurated his programme of "experiments to the British Empire" by transmitting a special concert to Australia on 11 September 1927. Several well-known artistes were enlisted and he also arranged for Captain Ian Fraser MP G5SU (President elect of the RSGB) and the then High Commissioner of Australia to speak during the course of the broadcast.



The BBC East Asia Relay Station in Hong Kong which serves audiences in Northern and Central China, Japan and Korea. It also played an important part in the events of 1989 in that area of the world



Another view of the BBC East Asia Relay Station.

All photographs supplied by BBC World Service

Unfortunately, the "experiment" was only partially successful due to a breakdown in the transmitter power supply, but enough of the programme was received in various parts of the Empire for it to be hailed a great achievement. Marcuse was showered with messages of congratulation...but an application he made to the Post Office a week later to complete the programme was rejected by the Postmaster General on the grounds that the object of the "experiment" had been achieved. Could it have been that the W/T Board, the Post Office and the BBC were all a little envious of the accomplishment of just one radio amateur?

Short wave broadcast transmissions continued almost daily from G2NM until the end of August 1928. Many years later Marcuse admitted that he had used 1.5kW into his Zeppelin antenna. His own words "the gear really did its stuff" sum up those remarkable experiments of so long ago and the test transmissions are commemorated today by a plaque mounted on G2MN's old home 'Coombe Dingle' in Caterham, which was erected by the Radio Amateur Old Timers' Association in 1962.

Empire Broadcasting

Following the successful amateur tests the BBC began experimental short wave transmissions to the Empire on 11 November 1927, from a transmitter - callsign G5SW - located at Chelmsford in Essex. Their transmissions were on a wavelength of 20m and as a result were not heard as well and as consistently in Australasia as the original experimental service from Gerald Marcuse's transmitter working on a wavelength of 33m.

The BBC's decision to proceed with a short wave service was a correct one, within three years every major nation had begun to realise the vast potential of the short waves as a means of communicating news - and ultimately propaganda -to the remote corners of the globe.

By the end of 1928 the Marconi G5SW transmitter in Chelmsford was becoming unreliable and there were many long breakdowns. The unit had been hurriedly assembled for the short-term tests and after long deliberation and examination of the costs involved - remember that this was at a time of severe economic depression - the decision was taken by the BBC to proceed alone with an Empire short wave service.

A first step was to replace the Chelmsford transmitter with with a completely new station located at Daventry, and on 13 January 1932 the BBC Board approved the sum of £50 000 for the erection of this station.

Daventry, located in a county set in the heart of the English countryside, was originally equipped with two transmitters which were modulated at low level and could deliver a power output of 10 to 15kW to the antenna feeders. The higher output power was available for the longer wavelengths used, in the 49m band. Operationally it was arranged so that either transmitter could work on any of the wavelengths assigned to Daventry at that time and could be connected to any of the antennas via a two-wire open feeder system.

The station started short wave test transmissions on 14 November 1932 and the programme service began on December 1932. The Christmas Day broadcast by King George V was radiated by the Empire station and this was the first time that this special broadcast had been transmitted to listeners outside of the UK.

Thus began the long association of Daventry with broadcasts to listeners abroad and from those (compared with the service nowadays!) small beginnings, the station has grown and been modified to such an extent that it now boasts four 100kW and six 300kW transmitters for services to west, south-west, central and south-eastern Europe, northern Europe, USSR, Middle East, Africa and the Americas while also relaying programmes for Radio Canada.

As the BBC World Service approaches the 1990s, new equipment and relay stations around the world take the programmes to the listener whether they be in Iran or India, Chile or China and with the past events of 1989 to reflect on, who can doubt the important part played by the BBC's new Hong Kong transmitters in relaying information to China following the events in the summer of 1989? **PW**

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- Compact size
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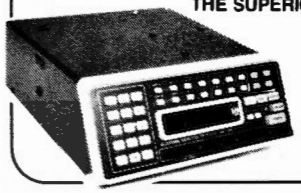

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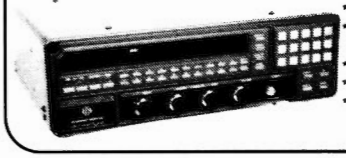

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- Wide coverage 26-30MHz, 60-90MHz, 108-180MHz, 210-260MHz, 380-520MHz.
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- Car adaptors and other accessories available.

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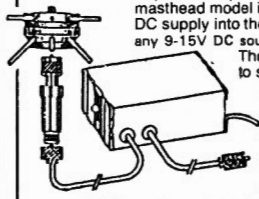
- UK version — full service backup.
- Covers 108-180MHz, 220-280MHz, 300-380NHz, 420-470MHz, 830-950MHz.
- AM and FM all bands, manual and programmable.
- 100 memories (5 banks of 20).
- Nicads, charger, flexiwhip antennas.

£199

WIDE-BAND PRE-AMPLIFIERS

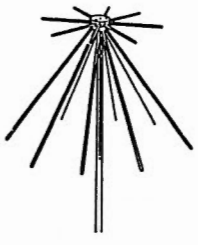
The problem with omni-directional wide-band antennas is their lack of gain.
The REVCO PA3 range of wide-band pre-amplifiers complement the antennas and compensate for their short-comings.
The basic specification of the products is similar: coverage 20MHz-1GHz, at 1GHz: minimum gain 13dB, noise factor 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



The UK's favourite discone composed of traditional British quality engineering.
The REVCONE works well without exaggerated advertising claims. It is designed to cover 50 to 500MHz, and thousands of satisfied users will testify to its efficiency. Unlike some manufacturers we do not quote inflated figures for gain. A gain figure is meaningless unless the reference point is stated.
Optional vertical whip feature: It is possible to fit a vertical whip section to a discone. We do not want to give you the "Hard sell" where this vertical element is concerned, but there is some evidence that it may improve the performance of the antenna around the resonant frequency of the whip. That's why we make it an optional feature.
Another option is the N-type connector instead of the popular S0239. N-types give a better UHF performance, but they cost a bit more. The choice is yours.
Because the REVCONE is British-made by a company which has been in business for 30 years, you buy with confidence, knowing that there is back-up should anything go wrong.

Standard model (S0239 socket) **£35.95**
N-socket model **£37.95**
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Ten SpOt

This month, John Petters G3YPZ alks about the antennas to use on the 28MHz band as this is the most dangerous area as far as success or failure on the band is concerned

Many amateurs are willing to invest vast sums of money on their rigs, but relatively few pay the same attention to the antenna system. It is a fact that a rig costing thousands-plus, running into a lump of wet string will not give as good results as a pile of junk into a good properly resonated and dedicated antenna.

The first step to being that exceptional signal on 28MHz is to decide what you want to do on the band. If you want a good all-round antenna that takes up little space and has some degree of directivity and some gain over a dipole, then the single element full wave loop either in a triangular shape (Fig. 3) or as a quad loop (Fig. 1) will give excellent results. The correct length for resonance on 28.500MHz is found by using the formula:

468/f(MHz) = 468/28.5 = 16.42 feet

The same calculation can also be used to work out dimensions for dipoles, groundplanes and end-fed wires, etc.

The loop will work well at very low heights above ground, and in the case of the quad can be made to radiate vertical polarisation by feeding the coaxial cable halfway up the vertical section, Fig. 1, whereas horizontal polarisation can be achieved by feeding halfway along the horizontal section as shown in Fig. 2.

The radiation is broadside or through the loop and is bi-directional.

The addition of a reflector element 5% longer and spaced about 0.2λ from the driven element will provide a very potent and gainy beam antenna. Both the delta loop and the quad loop will function very well for DX as well as giving good results to like-polarised inter-G stations.

It should be noted here that the polarisation of the antenna is not at all critical when working DX on skip, because the ionosphere constantly changes the polarisation of the signal. I have observed many DX signals fading into the noise on my 3-element Yagi, while building up to a considerable strength on the 5λ/8 groundplane. Within a few seconds the reverse is true.

When working groundwave (spacewave) line-of-sight signals, or indeed those stations arriving on a tropspheric enhanced path it is essential to have the same polarisation. Working cross-polarised will result in losses often in excess of 20dB. Stations using beams often notice very little difference in beam direction when working local stations using vertical antennas.

If space, money, local planners and the XYL permits, the quad or the Yagi beam will give excellent results on both local and DX signals.

The most common size Yagi antenna is a 3-element. This is manageable in most gardens, with an element length of roughly 5m. Unlike the quad, which can be run at heights as low as 2m above the deck, the Yagi needs to be at least a half-wave above the ground (or the roof) and better still at a full-wave high. Running the Yagi close to the ground will result in an undesirably high angle of radiation.

Typical range on a 2-element quad or 3-element Yagi on non-skip propagation should be in excess of 100 miles under flat conditions. Distances of 300km plus have been worked under enhanced conditions. Of course, when the band is open then the world is your oyster.

The Vertical Antenna

One of the most cost-effective antenna systems is the groundplane. The optimum length is the 5λ/8 wave which gives the lowest angle of radiation and gain over a reference dipole.

There are a number of CB antennas on the market which can readily be modified for the 28MHz band. The most common being the 1λ/2 wave end-fed. These antennas need to be mounted at least a 1λ/2 wave above the ground, and preferably higher. Grounding to a metal pole is necessary to enable a good match. Again using the formula quoted above for the loop it is possible to calculate the resonant length for any part of the band.

These antennas use a tapped coil to match the impedance from the high Z of the half wave to the 50Ω required for the coaxial cable. In most cases it should just be adequate to shorten the length of the vertical itself for a good 1:1 v.s.w.r. but it may in some cases require the matching network to be adjusted.

This will entail drilling the housing off, and ensuring that the assembly is satisfactorily waterproofed afterwards

NEVER, NEVER, NEVER use an a.t.u. or Transmatch when using or tuning one of these antennas. They are designed to match into 50Ω cable and if you have a high s.w.r. you will not cure the problem by inserting an a.t.u. at the shack end between two pieces of coaxial cable. The matching has to be achieved between the antenna and the cable, all they achieve is to make the feeder become part of the antenna system.

The 1λ/2 end-fed does not need any radials and must be viewed as a free space antenna.

The 5λ/8 is a groundplane antenna and needs a good radial system. The antenna will work at ground level but, of course, performs better at greater heights. The same calculation can be made to adjust the length of the vertical element and also of the 1λ/4 radials. The matching network should not need adjusting on these antennas.

Both 1λ/4 and 3λ/8 antennas will work well but not as efficiently as the 1λ/2 or 5λ/8, but 3λ/4 verticals should never be used as the angle of radiation is far too high for good results.

Trapped multi-band verticals are always a good compromise and should be avoid at all costs. They, along with mini beams, trapped dipoles, 5RVs, etc., will not give you that big signal and will no doubt leave you highly disappointed in the band.

Next month, we will take a look at mobile operation, what's happening on the band and your reports. **PW**

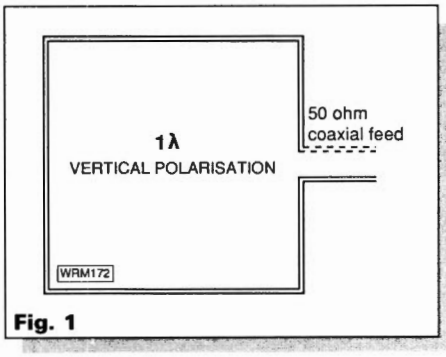

Fig. 1

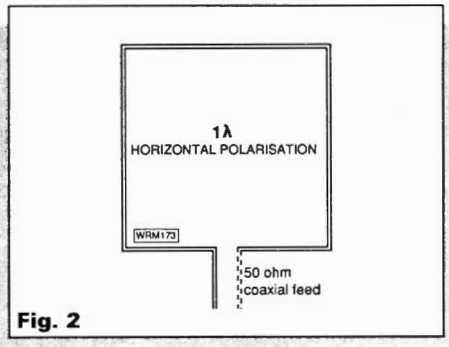

Fig. 2

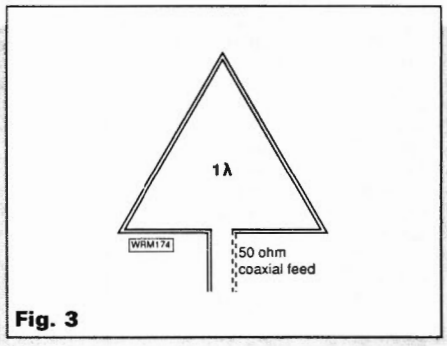

Fig. 3

Feature

Packet Update 8

Roger J. Cooke G3LDI continues his popular series with news and views from around the world of packet radio

I have received a few telephone calls during the past month or so regarding the software I described in previous articles. The concern of the callers was that despite enclosing disks, return mailers and sufficient return postage, the software has not been forthcoming. In one case, the applicant enclosed ten dollars, publicity material and double the amount of disks necessary! We all know that a certain delay is inevitable (goodness knows I am to blame for certain in that respect!) but since it was suggested in several bulletins and magazines that one should apply to these particular amateurs for this software and considering that the conditions of application were more than met, I feel it is incumbent on that amateur to supply the required software, even though the particular programs are now widely available in this country. I am sending some reminders to those suppliers on behalf of those still waiting. I should perhaps mention that the delay in question is several months, which would seem to be unacceptable.

A cry from the heart! An EI station telephoned me one evening with a request for packet software for the Sinclair QL. If anybody can help, I would be pleased to hear from you so that I may pass any information along.

AMTOR LINK

Some of you may not know that in May 1989, the GB7PLX AMTOR Gateway was fully licensed and is now operational. This makes the requirement for hierarchical addressing and forwarding more desirable than ever. Messages can be forwarded from UK packet mailboxes to the gateway and from there to a number of AMTOR mailboxes wold-wide, and via several of these to the national packet networks of some foreign countries. To use the gateway, first check with the Sysop of your home BBS that he has a forwarding route to GB7PLX that is entirely via mailboxes using W0RLI software with hierarchical addressing capability. (This is where the UK network comes unstuck!) If so, then you can send messages through the gateway as follows:

1: For messages to foreign packet mailboxes, enter:

SP<Callsign>@<BBS>.<ccc>. AMTOR. For example, SP VK4AHD @ VK4BBS.AUS.AMTOR. The <ccc> is the three-letter country-code. (I described this hierarchical addressing in one of my previous articles) Check with regular bulletins for the country-codes that are valid. The initial list consists of :

NORway
SWEden
AUStralia
USA

2: For messages to world-wide AMTOR mailboxes, enter:

SP <Callsign> @ <AMTORBBS>.AMTOR

For example, SP VK2SG @ VK2AGA.AMTOR

Again, check from the bulletins which Amtor BBS callsigns can be reached. The initial list consists of:

PA0RYS
LA9OK
HB9AK
SM6GXQ
SK7CS
KS5V Texas
KB1PJ Ohio
WA8DRZ California
VK2AGE Sydney

3: To send messages just to the GB7PLX mailbox, for collection on h.f. just enter:

SP <Callsign> @ GB7PLX

If your home BBS does not have an hierarchical route to GB7PLX, then this last facility is the only one open to you. Note that return messages may not, initially, come via the same route.

Sysops en route to GB7PLX, please arrange for traffic for AMTOR and GB7PLX to be forwarded to GB7PLX via GB7KCM. This has probably already been implemented. Any queries, please address them to Peter G3PLX @ GB7PLX. Peter will be happy to help.

The AMTOR linking with the Aplink facility is very popular and useful on h.f. It provides an alternative as well as a supplement to the h.f. packet forwarding system. I receive the RTTY DX bulletins regularly from OD5NG using AMTOR as its origin.

If you are interested in trying the Aplink connection, the the stations shown in Fig. 1 are reported to be operating 24 hours a day.

A comprehensive list of commands for operating AMTOR was produced by G3XTL and is reproduced in Fig 1. This would be very useful to have by your side if you intend operating this mode.

TEXNET

The Texas Packet Radio Society (TPRS) was founded in 1985 as an educational, public service and scientific research non-profit corporation. The

Table 1

Call	SELCAL	Name	QTH	Frequency
AH6D	AAHD	Paul	Aiea, Honolulu	14.071.5, 14.0735, 14.075 & 14.0775MHz
DU9BC	DUBC	Fred	Davao City, Philippines	14.072 (24hrs) & 7.023MHz (mornings)
G4SCA	GSCA	John	Plymouth, England	14.070MHz (1800-2200UTC, temporary)
HL9TG	HLTG	Gary	Pyongtaek, Korea	14.0735MHz
KB1PL/8	KBPJ	David	Shaker Heights, Ohio	14.0705MHz
K7BUC	KBUC	Del	Phoenix Arizona	7.0475, 7.071, 10.140, 14.0725, 14.0735 & 14.074-6MHz
KS5V	KKSV	Ed	Cacyon Lake, Texas	14.0725MHz
NI9Y	NNIY	Dan	Mishawaka, Indiana	14.0725MHz
PJ2MI	PJMI	Jose	Curacao, Neth Antilles	14.0778MHz (1000-1200 & 2200-0100UTC)
VK2AGE	VAGE	Gordon	Goonellabah, Australia	7.045, 14.075, 14.077 & 21.076MHz
VK2EHQ	VEHQ	Peter	Australia	14.081MHz (1400-2300UTC beaming Europe) (2300-1000UTC Beaming South Pacific)
VK6YM	VKYM	Herve	Perth, Australia	14.081MHz (1400-2300UTC beaming Europe) (2300-1000UTC Beaming South Pacific)
WA8DRZ/6	WDRZ	Craig	Palomar Park, California	14.0725, 14.0735, 14.0745 & 14.0755MHz
WB7QWG/9	WQWG	Bob	Indianapolis, Indiana	14.0715MHz
ZF1GC	ZFGC	Frank	Georgetown, G. Caymen Is	14.0715MHz (1100-0300 Sun-Thurs, 1100-2300 Fri & 0000-0300 Sat)
ZL1ACO	ZACO	Neill	Pukekohe, New Zealand	14.0725MHz

primary goal of the TPRS is to design and research amateur radio packet networks. In 1987, the Texas VHF-FM Society commissioned the TPRS to co-ordinate digital communication networks within the state of Texas. Both organisations have recognised the need for reliable network systems to handle large volumes of packet radio traffic efficiently.

TPRS has organised state-wide working groups to cover various networking topics. New groups are planned to form as needed to provide channels for discussion and to help provide direction for that area of digital communications. The current working groups are the Texas Network Group, the Mailbox/ BBS group, and the Texnet Support Groups (Software and Hardware).

TPRS has established a digital packet network protocol, a standard hardware package for the network nodes, and is conducting on-the-air tests of the software modules that implement the Texnet network. The basic design philosophy of Texnet is of an open, inexpensive, multi-resource, high-speed 'backbone' with access through multi-connect capable local nodes. On the high-speed side, Texnet is a 9600 baud network system. For local access, compatibility with the typical 144MHz Band, AX25, 1200 baud, AFSK/FM station is the normal system of operation. Other baud rates and modulation techniques can be supported on the primary user port or a secondary port. The system is totally compatible with both versions of the AX25 protocol specifications for user connections. With these general specifications, Texnet has been designed and tested to enable all users to take advantage of this high-speed, full protocol protected network system.

Each node offers, in addition to Texnet access, local area digipeater service, 2 conference bridges for full protocol protected roundtable or net operation, a full multi-connect, multi-user mailbox system, a local console for installation and maintenance set-ups, a debugger module for long-distance and local software monitoring, and a weather information service for the regional weather teletype wire loop.

The Texnet network system has been operational since October 1986. Use of the Texnet system is open to all amateur operators. TPRS has been co-ordinating the installation of the Texnet system and currently the network runs from Dallas to Rockport on the Gulf. Texnet boards have been distributed to California, Michigan, Oklahoma, Ohio, Indiana, Alaska, Belgium and Japan. Network nodes have been built primarily by local groups.

TPRS is interested in spreading the information and efforts as widely as possible. They will provide information to any group interested in using Texnet and can be contacted at the following address.

Texas Packet Radio Society,
PO. Box 831566,
Richardson, Texas, USA, 75083.

A summary of the users manual is given in Fig. 2.

PW

More next month - any news to G3LDI @ GB7LDI, QTHR or telephone 0508 70278. 73 de Roger G3LDI. Happy Packeting.

Fig. 1

```
From:G3XTL @GB7MUM.GBR.EU
Msg MID:D17E1387
AMTOR LANGUAGE
--------------
A LIST OF TERMS, ABBREVIATIONS AND COMMANDS NOW IN USE FOR AMTOR AND APLINK STAT
IONS.
A             MESSAGE STATUS (APLINK)
A             ABORT COMMAND (APLINK)
AAB           AUTO ANSWER-BACK (APLINK)
AMTOR         AMATEUR TELEPRINTING OVER RADIO
APLINK        AMTOR/PACKET LINK (MAILBOX/BBS.)
ARQ           AUTO REQUEST (MAIN AMTOR MODE.)
AT            COMMAND TO TRANSFER FILE TO ANOTHER STATION
BK            BREAK
B MODE        FEC MODE
CONTROL D     TERMINATOR
(CR/LF)       TO COMPLETE THE COMMAND (APLINK)
FEC           FORWARD ERROR CORRECTION
GA            GO AHEAD (APLINK)
GPLX          SELCAL OF GB7PLX
HELP          COMMAND TO READ HELP MESSAGE
HBAK          SELCAL OF HB9AK
INPUT         COMMAND TO ENTER A MESSAGE
L             LIST (APLINK)
LAOK          SELCAL OF LA9OK
LB            LIST BULLETINS (APLINK)
LIST          OUTPUTS THE LIST
LOGIN         COMMAND TO SIGN IN (APLINK)
LOGOFF OR
LOGOUT        COMMAND TO SIGN OUT (APLINK)
LR            LIST RECENT USERS (APLINK)
MB            MAILBOX
MODE A        ARQ MODE
MODE B        FEC MODE
MODE L        LISTEN (TO OTHER ARQ LINKS)
MSG           MESSAGE
N             NO (OR NOT)
NEW           COMMAND TO REGISTER  (APLINK)
NNNN          MESSAGE ENDS (APLINK)
OUTPUT        COMMAND TO READ A FILE
QRR           AUTO MODE
QRT           CLOSE-DOWN
QRU           NOTHING FOR YOU (APLINK)
QRV           READY
QUIT          COMMAND USED BY SOME AUTOS INSTEAD OF QRT
QTC           MESSAGE
R             READ (APLINK)
RM            READ MINE (APLINK)
RN            READ NEW (APLINK)
S             SEND (APLINK)
SB            SEND BULLETIN (APLINK)
SELCAL        SELECTIVE CALL (4 LETTERS IN AMTOR)
SITOR         MARITIME (SHIP/SHORE) EQUIVALENT TO AMTOR
SP            SEND PRIVATE (APLINK)
STATUS        INDICATOR IN MESSAGE LIST (APLINK)
TFC           TRAFFIC (MESSAGES)
VAGE          SELCAL OF VK2AGE (APLINK)
VKYM          SELCAL OF VK4YM  (APLINK)
WRU           WHO ARE YOU ? (APLINK)
Y             YES
+?            CHANGES OVER
//////        DELETE (APLINK)
$ (DOLLAR)    (SHIFTED D) INITIATES WRU (APLINK)
```

Fig. 2

```
                    Texas Packet Radio Society
                  TexNet User's Manual 3.3 Summary
                        August 1, 1988
                      Greg Jones, WD5IVD
================================================================================

Introduction :
  TexNet is a dedicated, remote sited, multi-access, multi-resource network
system.  Each node offers, in addition to TexNet access, several network
services which are descirbed below. Use of any of the node services is
selected by Secondary Station Identification numbers (SSID).  TexNet is open
to all amateur radio operators to use.

TexNet Node Services :
 Each service is connected to by using an ssid. Example : c WR5C-4 will
 connect the user to the DALLAS TexNet node on 145.05 in Plano, Texas.

 0 - Digipeater Operation
   All TexNet nodes can be used as digipeaters.
   The nodes call or alias can be used to digipeat through.
   Use of a node as a wide area digipeater is not encouraged.

 2 & 3 - Conference Bridge
   Each node maintains 2 conference bridges (ssid 2 & 3).
   Once connected all transmitted packets are sent to all other
   users connected to the conference bridge, providing roundtable
   communications.
   Control-U will list all other users connected to your bridge.

 4 - TexNet Network
   The TexNet network is made up of a network of nodes connected by
   450Mhz 9600 baud links (backbone).  The following is a description
   of the current network commands.  Commands are entered at the
   command prompt : NETWORK CMD?.

     Help or ?
       Returns a listing of the user commands.

     Bye or b
       At the NETWORK CMD ? prompt will disconnect you from the network.

     Location or L
       Returns a listing of all nodes on the network by name.

     Message @ NODE or M @ NODE
       Make a connection to a message server (PMS) @ NODE.
       PMS commands are a subset of the W0RLI BBS command set.
       PMS Commands : Bye, List, Kill, Read, Send  (B,L,K,R,S)
       [Example: M @ DALLAS!

     Weather or W
       Make a connection to the network weather server.
       LW lists the general weather statements.
       LS lists the server weather statements.

     Circuit or C
       Circuit allows a user at one node to make a connection to a user
       at another node over the network. Example : C K5ABC @ HOUSTON
       would allow a user to try to connect to K5ABC at the Houston
       node over the network.

     C CQ @ NODE
       Transmits a CQ using your call at the node indicated.
       To respond to a CQ call, just connect to the network and
       then type 'C CALL @ NODE'.  The network should handle
       the rest. To finish a QSO, one user must do a manual disconnect
       from the TNC cmd: prompt.

General :
  The TexNet User's Manual contains a full description of the TexNet
  node services and network commands.
```

Construction

Portable Ring Base Antenna

Although C.R. Eve GJ7AOG claims no credit for the original design, he would like to share his ideas and constructional variation of Fred Judd G2BCX's 144MHz Ring Base antenna. This version should prove to be particularly useful to the radio amateur on holiday, restricted to a very small lightweight antenna or an even smaller budget!

The attractions of the GJ7AOG Ring Base antenna are the price - £4 approximately - and the compact size (240mm) of the antenna in its collapsed, ready-to-travel form. This makes the antenna small enough to carry in the average-sized briefcase when travelling. The antenna has another important benefit in that if it is damaged or lost in transit, a replacement can be built very quickly! A further advantage of this approach is that the would-be constructor will not require special materials or metal-machining facilities, as the antenna is extremely simple to produce.

Constructing The Ringbase Antenna

The list of materials needed to build the antenna are listed below, and all items are easily available. In fact, if you find yourself needing another antenna while on holiday - you could buy the materials and even make it on a rainy day!

Shopping list: One PL259 plug to fit RG58 (UR43) cable without an adaptor. The plug should have a cable-entry boss diameter of 0.5in.

One plastics core, the printing paper-feed roll, from an electronic calculator. The empty rolls are usually approximately 57mm long and have a 0.5in bore.

497mm of coat-hanger or similar heavy-gauge wire.

102mm of 0.5in diameter tube of copper or aluminium, (an off-cut of small-bore copper central heating pipe should prove ideal for this project).

One 1.31m telescopic antenna, e.g. Maplin catalogue No. LB10L.

Approximately 518mm of 16 s.w.g. copper wire.

A suitable adhesive, rapid cure epoxy resin adhesive is recommended as it will 'cure' within ten minutes or so at normal room temperature.

Construction

Form the coat-hanger wire into a circle as shown in Fig. 1, then drill a hole through the boss of the PL259 plug to take the ring as shown in Fig. 2. Then solder the ring into the PL259 plug. Drill a hole in the plastics tube, 19mm from one end, suitable in size to take the 16 s.w.g. copper wire.

Pass the 16 s.w.g. wire through the hole in the tube and wind a coil of five turns within a length of 1.125in as shown in Fig. 3. Solder a 6BA eye-tag to the top of the coil and sleeve the tail of the coil to prevent short circuits in the plug body.

The coil assembly may now be mounted on the plug body, and the tail of the coil soldered to the centre conection of the plug, then seal it in place with the epoxy resin. The short length of copper or aluminium tube is then mounted approximatel 3/16in into the coil former body and is also glued in place.

Now take a tea or coffee-break as the adhesive cures!

Final Assembly

When the adhesive has hardened, you can connect the coil to the tubing with a suitable self-tapping screw. Mount the telescopic antenna approximately 3/16in into the top of the tube and fix with self-tapping screw. Take care not to over-tighten the self-tapper as the screw will strip the thread cut into the soft material. If you should make this mistake (it's an easy one to do!) don't despair and don't drill another hole! All you have to do is to find another self-tapper which is slightly larger!

Setting Up and Testing

All that remains to do is to fully extend the telescopic antenna section and check the v.s.w.r. The antenna may require to be adjusted by up to an inch or so, moving it in the tubing until an s.w.r. of 1:1.2 or better is achieved.

Once the optimum position for the telescopic section is found , the brass bush in the base of the telescopic section can be drilled to take a self-tapping screw. The whole assembly may then be made permanent. If the antenna is found to be a 'sloppy' fit in the tube, a small amount of 'shimming' may be necessary. Cooking foil or an aluminium soft-drink can are a suitable source of shim material. By careful selection of the material it may be arranged so that the antenna is a tight fit in the tubing.

It is also possible to make the antenna an almost 'pocket-sized' device if the ring-base is cut on the straight section and a piece of 'choc-block' terminal connector used at this point .

This lightweight antenna, which does not require a ground-plane, can be suspended from a piece of string in a hotel room or wherever you're staying. It should also provide far better performance than an helical wound antenna for very little more stowage space in your luggage. **PW**

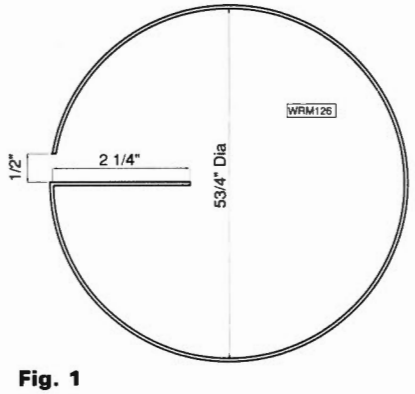

Fig. 1

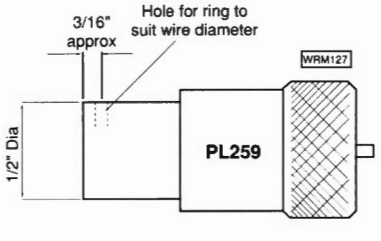

Fig. 2

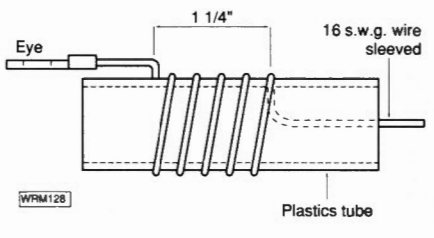

Fig. 3

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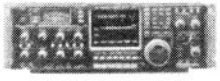

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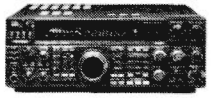

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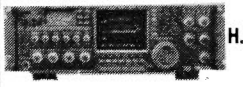

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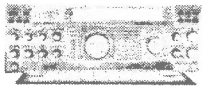

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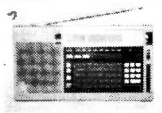

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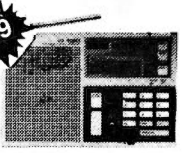


Feature

G'day - News from Down Under

Since the last column on Australian amateur radio in August 1988, the VK amateur community has seen some changes. Greg Baker reports.

Wireless Institute

The Wireless Institute of Australia (WIA), Australia's amateur representative body, has been making a concerted effort to keep old members, attract new ones and to rein in expenditures while maintaining services. To throw off the sometimes used secret society tag, the WIA is trying, in its own words, to become a 'customer driven organisation'.

The biggest drain on WIA resources is the magazine *Amateur Radio*. While keeping control of expenditures, *Amateur Radio* has been trying to become more acceptable to amateur and provide more timely information. It has gone from microscopic print to a readable size, the lead time to publication has been reduced from about six to two weeks to improve topicality but the paper quality has been reduced. The more than 400 WIA members who failed to renew in 1989 have received letters from the Federal Office requesting information on reasons for the non-renewal in an attempt to pin-point member dissatisfaction.

Despite these moves, however, last year's 53rd Federal WIA Convention in late April voted in favour of an increase in WIA membership fees to an annual $A70 (£32) Australia-wide, plus regular inflation adjustments. This $A70 was to be split $A47 to the Federal Office, $A23 to state offices.

Not surprisingly, given the huge jump in fees proposed (VK6 was about $A40, VK3 $A49), there has been an outcry from WIA members and from the seven WIA state divisions who would need to ratify the new fee structure. According to Chris Edmondson VK3YID, editor of the commercial *Amateur Radio Action* magazine, there is WIA talk of a membership loss of up to 25% and of a split in WIA ranks. The exact percentage remains to been seen, of course, but according to WIA Federal General Manager/Secretary Bill Roper, 'human nature' will dictate a drop-off in membership.

Because of the protests, an extraordinary meeting was held in mid June. At that meeting of Federal and State representatives, it was decided to reduce the total fee to the vicinity of $A65. The Federal Office has not budged from its $A47 and gained an additional $A2 for international representation. The state divisions have accepted a reduction to $A16. However, because state division services vary, the state fee may vary from the $A16. The VK2 division has indicated that its fee will be less.

Private QSL Bureau

Many members of WIA are mainly interested in the QSL Bureau operated by the state divisions. News that John VK5QD has opened a private QSL Bureau at $A10 (£4.50) per annum plus five cents a card must be a well timed stroke of good fortune. VK5QD will distribute outwards cards for his clients and act as QSL Manager for inwards cards. The WIAs $A65 annual fee may still be cheaper than QSLing direct, but *Amateur Radio Action* is pushing the line that a subscription to that magazine at $A32.50 (£15) for 13 four weekly issues plus $A10 to VK5QDs Bureau is better value than WIA membership!

Interference

The DoTC - the Department of Transport and Communication, the new enlarged government department covering communications - Task Force on interference has recommended the introduction of charges for the use of DoTC interference detection services. The new scheme introduced late in 1989 is to initially provide a free comprehensive self-help booklet to complainants. The booklet will be well illustrated and take readers through a step by step process to analyse the cause of their problem.

Where high voltage power lines are isolated as the source of the problem - about 40% of complaints in the past - the complainant will need to approach electricity supply authorities to rectify the problem.

For the 25 to 30% of apparent interference caused by set faults and propagation peculiarities, the customer will need to rectify the problem via their local electronics serviceman.

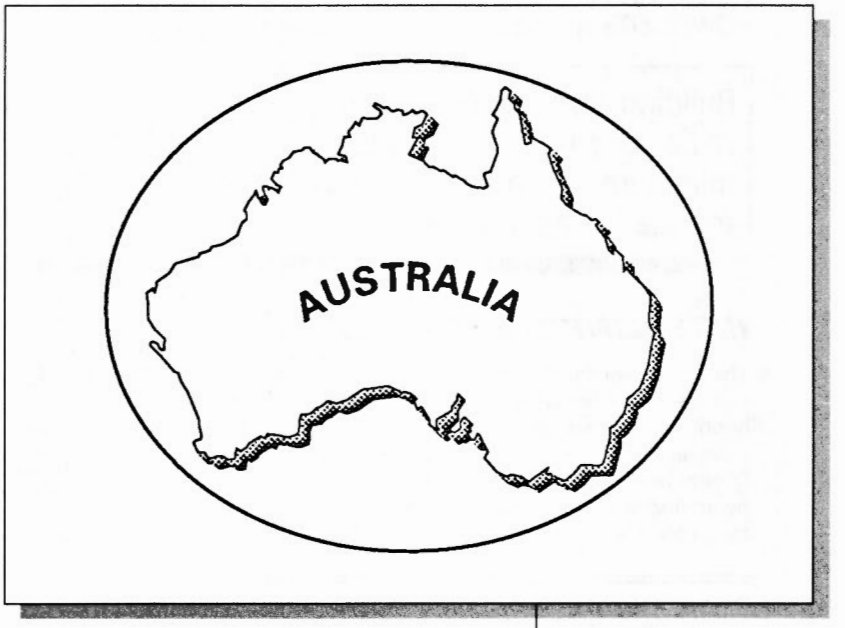
If the fault is found to be from other sources, there will be two approaches. The first will be for the complainant to lodge an interference report claim. DoTC will monitor these claims and take action should they receive a number of such reports pointing to a local area problem. The second will be for when a complainant wants a DoTC team to visit and investigate. In this case there will be a charge of $A60 (£27).

As in the past, the solution will still come from making modifications at the source of the problem. If that source is an amateur operator putting out spurious emissions, clearly modifications will need to be made to that amateur's gear. If an amateur transmitting within amateur guidelines affects a neighbouring television because of television set inadequacies, the television owner will be the one to arrange appropriate modifications.

Examinations

The devolution of the role of examiner from DoTC to community clubs and organisations and to educational institutions is progressing slowly. The first non-DoTC exam is scheduled for some time after February 1990. The delays have been in finding a suitable person to fill the full-time DoTC position of Examinations Officer and in organising the new system while operating the old. The new position has now been filled and the exam system finalised though some relevant documents have yet to be finished and the data bank of questions are still in final draft form.

The banks of questions for theory and regulations exams will be made public, potential examiners receiving theirs initially in hard copy form and eventually on computer floppy disks. The question banks will then use a dBase III Plus based program to randomly select questions and form exam papers. Once formulated, exams will need DoTC approval before use. Examiners will still be able to devise their own questions if they choose though easy approval will be less certain. DoTC will reject unsatisfactory exam papers with comments



where relevant, but their role does not extend to re-formulating exams for examiners. It is interesting to note that the prime approval is for the exam, not the examiner, though examiners will need to follow DoTC guidelines.

Candidates may sit exams at a v.d.u. screen, though DoTC will still require a hard copy of the paper, the answers and the resulting mark.

Morse exams are also computer generated with an IBM PC program. Program disks have now been distributed to examiners to gain experience in its use and for training purposes.

DoTC will collate information on time and place of examination both for their own use in a programme of visiting exam centres and for distribution to potential candidates. Examiners are not permitted to make conditions on who can sit their examinations. For example, a club cannot exclude non-members and a school or college cannot exclude those who have not taken their course of study.

Fees for exams are the prerogative of the examiners.

PW

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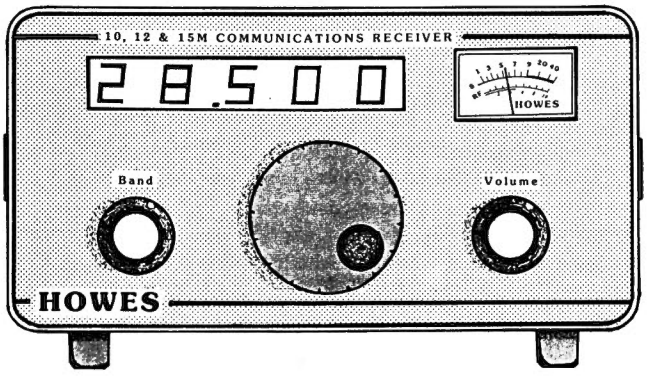

An illustration of one of our demonstration receivers.

The drawing shows the result of combining a few of our kits together and building them into one piece of equipment.

Kits used in the construction of this radio were **DXR10** (three band receiver), **DFD5** (Digital Readout), **DCS2** ("S Meter"), and **CBA2** (Buffer/Amplifier). Total cost of kits: **£78.50.** The performance is excellent, and with a little time, trouble and money spent on making a neat job of the construction, a receiver to be proud of. A little too ambitious a project for the beginner perhaps, but a DXR10 kit without the digital readout, meter, etc., will still hear as many stations, and is suitable for the less experienced constructor.

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DcRx54	5.4MHz HF Air Band Receiver	**£15.60**	**£21.50**
DcRx80	80M Amateur Band SSB/CW Receiver	**£15.60**	**£21.50**
DcRxl60	160M Amateur Band SSB/CW Receiver	**£15.60**	**£21.50**
DXR10	10, 12 &15M Ham Bands SSB/CW RX	**£24.90**	**£36.90**
MBRX	HF SSB/CW Marine Band RX	**£29.90**	**£44.90**
TRF3	SW Broadcast TRF Receiver	**£14.80**	**£20.20**
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ASL5	External Dual B/W SSB & CW Filter	**£14.90**	**£22.50**
CBA2	Buffer/Pre-amp to feed DFD5	**£5.80**	**£8.90**
CSL4	Internal Dual B/W SSB & CW Filter	**£9.90**	**£15.90**
CTU30	HF bands +6M ATU for RX or 30W TX	**£27.90**	**£33.90**
DCS2	"S Meter" for our receiver kits	**£7.90**	**£11.90**
DFD5	Digital Frequency Counter/Display	**£39.90**	**£59.90**
XM1	Crystal Calibrator, VLF to UHF	**£16.80**	**£21.90**
TRANSMITTERS			
AT160	80 & 160M AM/DSB/CW 10W PEP TX	**£34.90**	**£53.90**
CTX40	40M 3W QRP CW Transmitter	**£13.80**	**£19.90**
CTX80	80M 5W QRP CW Transmitter	**£13.80**	**£19.90**
MTX20	20M 10W CW Transmitter	**£22.90**	**£29.90**
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CVF20	20M VFO for TX or Transcieve	**£10.40**	**£16.90**
CVF40	40M VFO for TX or Transcieve	**£10.40**	**£16.90**
CVF80	80M VFO for TX or Transcieve	**£10.40**	**£16.90**
VF160	80 + 160M VFO for TX/TCVR	**£19.90**	**£34.20**
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CV220	2M Converter for 20M Receiver	**£17.50**	**£23.90**
CV620	6M Converter for 20M Receiver	**£17.50**	**£23.90**
HC220	20M Transverter for 2M Rig	**£52.50**	**£83.50**
HC280	80M Transverter for 2M Rig	**£52.50**	**£83.50**
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AP3	Automatic Speech Processor	**£15.90**	**£22.80**
CM2	Quality Mic with VOGAD	**£11.90**	**£15.90**
EM1	Electret Mic capsule to suit AP3	**£1.90**	–
MA4	Mic Filter/Pre-amp.	**£5.60**	**£9.90**
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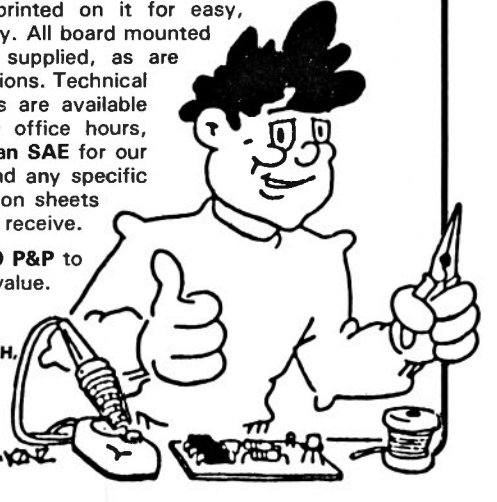

73 from Dave G4KQH,
Technical Manager.

Back-Scatter

HF Bands

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

As this comes to be written we are beginning to feel the icy grip of winter, and winter band conditions too. As I write, visibility is down to about a hundred yards, and the beam is well loaded with a great squad of birds - I have counted over forty on occasion and they don't seem to care if one swings the beam, although a couple of reversals of direction do shift them!

As for the bands, at times when I could get on for a session, they seem to have been up-and-down, but the good days have been as good as one could expect at this stage in the sunspot cycle.

Expedition News

The Revilla Gigedo, XF4T expedition popped up without warning over the contest period from a group of XEs. I also hear that a Mexican protest that XF4L be not accepted as there weren't enough Mexicans in the team was over-ruled by ARRL.

The activity of XW8KPL seems, at the time of writing, to be mainly based on lists, around 14.165 and 21.295 - on the latter he has been noted doing his own thing until the list-takers arrive, when he submits to their ministrations without protest. XW8KPL QSLs should be addressed to Inh Siphachanh, Deputy General Director, Khao San Pathet Lao, PO Box 310, Vientiane, PDR Laos. As for the proposed HA activity from this country, the word goes that they are in the country and operational, but up to the time of writing the answer seems to have been a lemon as far as hearing them goes. There also seems to be some question about the QSL route, as the French DX Association have dissociated themselves from the proposed operation totally.

The *Saturday Evening Post* Bouvet DX-pedition team are trying, I hear, to add VP8 South Sandwich to their show in February.

Some new prefixes: The Argentine DX Group will be celebrating their first anniversary by airing L73ADX, and LQ*DX, where * is a number between 1 and 26. That gives 27 new prefixes to bite on! QSLs for all these to GADX, PO Box 36, 1834, Temperley, Buenos Aires, Argentina.

Looking for Asian low band c.w. countries? Lend an ear to K9EL's activities, back on again after a hold; on 3.5 and 7MHz about 5kHz up from the bottom, and on h.f. 20kHz up.

The rumours of a San Felix operation are, so far as I know, just that. There is no hard news at the time of writing, though it is understood a licence is in existence.

A nice one for the prefix freaks: UA6U/VE6JO on a business trip to Astrakhan from about mid-January.

New Ones

The DXAC have voted on various proposals and offerings. Arising from this we can add Conway Reef and Banaba; but the applications for Frederick Reef, Austral Is, and Marquesas Is were turned down, plus Guemes and Tatoosh Is. New country applications from the Amazon State of Brazil, and the Basilica del Santo were deleted from the DXAC agenda for lack of paperwork submissions from the applicants in question. By the time you can read this, it is expected that rulings will have been given on Walvis Bay ZS9, and the question of DXCC endorsements for 10, 18 and 24MHz operations. (Incidentally, Walvis Bay is now ZS9.)

Contests

For the Top Band addicts the CQ WW 160 Metre CW contest is January 26-28, with the SSB leg on February 23-25. Rules are the same as in previous years; however the 1.825-1.830MHz DX Window is being phased out in favour of 1.907-1.912MHz for the Pacific DX stations. Mailing deadline for logs is February 28 (c.w.), and March 31 (s.s.b.) and they should be addressed to Donald McClenon N4IN, 3075 Florida Avenue, Melbourne, Florida 32904.

Still with the big contests, the ARRL DX CW contest is on February 17-18, the s.s.b. leg on March 3-4. March 24-25 is the CQ WW SSB Contest. No more details to hand at the moment.

Talking of the contest scene, for 23 years I have relied for the contest details on the devoted work of Frank Anzalone W1WY who even then had been doing this for years. Frank has now handed over the reins to John Dorr K1AR. To help him keep the Contest Calendar column going in *CQ* - and hence to almost every other DX column world-wide - please pass on to John the details of the one you are organising at least three or four months before the due date.

Band Round-up

Let's start with 28MHz. On this band, **G0JBA** (Sittingbourne) says, "I know there have been some really good days - but I've missed most of them!" Despite his shift work, Phil managed to get on for the CQ WW SSB Contest when, as one expects, the band stayed open later than usual - surprising what a bit of activity can do to 'conditions'! On 28MHz s.s.b. Phil mentions CU3ARA, CW8B, EA9TP, HL5FMF, HL0Y both short path, JA0FBZ, OA4AV, OH6MFD, TA3F, TI2DU, V31B, VE3NOV, VE5XO, VE6ATT, VE6BOS, VP5T, VP9AD, and all W call areas save W6. Turning to 29MHz f.m., Phil added N2EJQ, W3WSX and W5KZR.

Next we turn to **GM4ELV** (Glasgow), who netted, on s.s.b., JT0DX (QSL via HA6KNB), RZ0Y/UA9YX (via UA9YX), HS4WW, BY8AC, all W call areas, CN0A (via FDXF), PJ5JR (via KA3BYV), V47K, F5/KC1F, 6W7OG, ZP5XHM, PJ1B, KP2A, 3DA0BK (via Box 122, Eveni), PZ5JR (as for PJ5JR), YV5ANF, and VP9AD. On a different tack, Dale is looking for the QSL Manager for 3B8DM and an address for KA3BYV.

Now we go over the water to hear from **ON7PQ** (Kortrijk) and his c.w. winnings. Pat offers as his crop for the month FY5YE, F5/KC1F, K4PI/PJ7, C6A/AA5AV, 5C2CW, 3C1AG, FP5HL, BZ1OK, KX6OI, 9M8XX, 9M8AZ, P40V, FH5EJ, C56/G3OXC, ZP5AA, CW0L, ON5NT/5N0, 5U7QL, S9AGD, A35ML, KH8/SM7CKK, JW1MFA, JY9SR, KL7KJ, 3C0GD and DF3EC/ZS9.

On 28MHz, **G0HGA** (Stevenage) uses a half-wave vertical and ten watts; this combination yielded her c,w, contacts with W2LZX, W1PL, K4II and W8EGB.

Finally for this band enter **G3BDQ** (Hastings) stage left muttering my call as GW3FFE! My apologies to the true owner of that call. Anyway, John snapped up UL8AWL, UL8CWW, 9M8XX (Sarawak), YB9LC (Timor), P40V, PZ1DR, HR2/KB5CGA, CO2PX, YJ8NMB and 5T5CR - in between the times spent knocking 'em off on 50MHz.

Top Band

G2HKU (Minster) says the noise he normally notices in autumn on Top Band has spread to all the h.f. bands; locally the level is around the S7 mark, and Ted has heard other stations rumbling about it somewhat too, so it's not just local. Anyway Top Band included an s.s.b. contact with ON7BW, while c.w. made it to SM7BIC and PI4DEC.

As for G3BDQ, John mentions contacts with UA6WDT, UL7AAE, UI8LA, UF7VWA, YO3APJ, HG9R, IS0XIE, CT1NK, LY2BTA, 4X4NJ, OH0MM, CT3MCT, ZB2X, LZ9A, 5N3A(??), OY9JD, VE1ZZ and EA8BTU.

G0JBA has also looked at the band when the noise was bearable, but says he "only worked the locals".

The 3.5MHz Band

Not a very popular band among those who chase the distant parts of the world, though of course there is DX about for those who want it, for 5BDXCC for example. There is also a mighty amount of assorted traffic on the band, though in general one does feel the need for a front-end attenuator almost all the time. G0HGA has some 25 watts of c.w. to a 30m wire; this produced G3TLY, G3DCV, G3GIH, G4ITP, SM7GWF, OZ8O, DL1GBZ, PA63DNT, PA0SOL, DK3OP, DJ2GH, DF7KG, DK4TA, DL6ZBA, Y22NK, ON4DS, UZ3DYC and LY2BOQ

As for me, about all my 3.5MHz activity has been on the Sunday net, during which I discovered, the hard way, that if you trap one end of a mic lead and then step on t'other, something has to give. All I can say is "Thank Heaven for Heatherlite's service".

Turning to the activities of ON7PQ, Pat's 3.5MHz band list includes UJ8JI, UM8MBA, ZL4IE, a doubted ZS8MI, UA1OIQ, S9AGD, VU2IN, CO3LX, D44BC, 3C0GD and V31BB.

The 7MHz Band

G3BDQ says he didn't spend too much time on the band, preferring to go play on 50MHz: thus he only found UL7LEB and FY5EV.

The signals from G2HKU went out to V31BB and EA8AB - c.w. of course. Now Angie G0HGA, who has an enormous list of stations worked. Wielding, alas, the pruning knife, I notice - all c.w. of course - W1HMD, K1FW, NJ1P, N3CEU, WB2Q, VE1QO, W2VJN, ZC4JL, UZ9JXD. LY2BW was in UB and LY2BOC in UP; and the YLs noted included HA1XH, OK3YL whose OM is OK3YX and I2RLX. CT1BQH, EA2NF, EC1CWI, EC3CQV, ED2SEL, EC3CRW and EA2JJ were also noted, though most of the rest of the contacts were very much east-west in direction.

At ON7PQ the state of play included PJ2/OH4RH, C6A/AA5AF, K4SXT/DU3, VP2EZD, RJ3K/UA9QCQ, 9M8AX, 3C1AG, V47KH, CM0S (=S0), HZ1AB, another doubted ZS8MI, WL7E, KH8/SM7PKK, S9AGD, ZK2VB, JY9SR, JY2OD, HV0A, 5U7QL, D44BC, 9V0/JA8RUZ and 3C0GD. As to why Pat doubts his ZS8MI I don't know; ZS8MI was reported on both bands but perhaps Pat hooked the Slim who always seems to appear when a DX station is making good business.

WARC Bands

Support for these seems to have fallen away again; just two mentions this time, from G2HKU who raised KU0J and K2QIL with a burst of c.w. on 18MHz and G0JBA whose 18MHz s.s.b. reached out to IK3HXC and I6NO, while on 24MHz he made it to EA9OB and W2EIY.

The 14MHz Band

This month I certainly have missed the analysis of the band by G3NOF - one hopes he hasn't blown anything up.

G0JBA is still revelling in his 'Loudenboomer' of a signal from the new tower and tri-bander, but oddly enough Phil spent half his time on v.h.f. The time spent on 14MHz though was enough to rake up s.s.b. contacts with KV4P, NB1H, VE7ARS and 5J6CQ, the latter a 'special' from Columbia.

Now G2HKU, whose c.w. connected him up to KG9U, KN7K, UA0ALE, JF6POM, VK5AGX, WA4SNI and W1AXA.

Turning to ON7PQ, Pat is 100% a c.w. man. His gleanings during the period included 5C2CW, 5W1ML, 9M8XX, A35VB, V47KH, J3/K8CV, AH6JF, 5W1VB, KH8/SM7PKK, 5U7QL, V31BB, JA4GXS/JD1, DF3EC/Z2, ZK2RY, VP2EXX, A35ML, ZK2VB, ZS3EG, 4K1F (S. Shetlands), KX6OI and T28RW.

Angie, G0HGA had just twenty watts to a vertical for this band and this managed SM6BUV, AA1AHW, UA1AJV, YT3LW, UB5INN, HA3NX and GW3KGV.

G3BDQ isn't over-keen on this band,

and he only picked up a couple of contacts here, with XL3BLU (Canada), and AC0S/J6L on St. Lucia.

The 21MHz Band

The QRP at G0HGA netted Angela UA1AQZ, I5MJL, and a load of EUs stuff in the HSC test.

As for G3BDQ, John offers FY4FM (Cayenne), HK0BKX (San Andreas), PJ4/K3IP, XF4T (Revilla Gigedo for a new one), J6DX on St Lucia, JY9MO, NL7G, AL7CQ, 9Y4VU, YV4ABR and CN0A.

As for ON7PQ, Pat made it across to EL2CX, J3/K8IV, 5W1AML, CN0S, BY4RSA, 9M8AX, ZD7KM, S9AGD, A35ML, A35ML, ZK2VB, C56/G3OXC, KH8/SM7PKK and OF3EC/ZS9 (Walvis Bay).

G0JBA discovered CU2ARA, JH1GIC, JI7GAG, K3TUP, NO1I, N4WW, V47QQ, W1WEF, ZL1AMH and ZL1BGB, the last two being a 55-minute natter over the long path.

Finale

That's the lot for this time. Somewhat of a dearth of reports, and an unbalance too. I could do, generally with some more s.s.b. stations reporting, some more people mentioning the WARC bands, and above all some of the keen types on Top Band sending in their news. After all, the more reports and comments I get, the more interesting the column will be. Thanks!

For anyone new to the game, letters should be addressed to me at the address quoted, allowing good time for them to arrive. Again, Thanks.

Back-Scatter

VHF Up

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

Solar Data For November 1989

From the beginning of November there was a considerable improvement in solar flux levels and, as expected, a reversal of the October radio quality indices, producing many openings on the 50MHz band. In a 10 day period, between November 9/19, there were a number of ionospheric disturbances. On the 15th, there was a large proton flare which lasted for 90 minutes. A large magnetic storm commenced on the 17th, followed by an auroral opening on the same day. Solar conditions hardly changed during the last two weeks of November. The unsettled magnetic conditions also died down leaving the levels very quiet. There were major flares on November 20/21 but nothing appeared to come of them apart from a Scottish-type aurora on November 26.

Readers may like to note that an excellent source of solar factual data is available by telephoning Boulder, Colorado, on **0101 303 497 3235**. The following is the text of a typical recording made on 30 November 1989.

"Solar terrestrial indices for November 29 follows. Solar flux 224 and the Boulder A index 13. The Boulder K index at 0900UTC on November 30 was 3. Solar terrestrial conditions for the last 24 hours follow. Solar activity was low, the geomagnetic field was quiet to unsettled. The forecast for the next 24 hours follows. Solar activity will be low, the geomagnetic field will be mostly unsettled".

The message is updated every 3 hours, 0920, 1220, 1520, etc., and also give details of any flares or other events in progress. The recordings last about 30 seconds and are invaluable for real time aurora predictions and for planning when 50MHz might be open.

Those that do not wish to telephone across the pond should note that a daily report and short-term ionospheric forecast is issued by the GEC-Marconi Research Centre, on **0245 73331 extension 3152**. These forecasts are updated each day at 1600UTC.

Aurora

In addition to a number of minor auroral openings during the month, there was a widespread event on November 17. The intensity was such that a number of contacts were made on the 432MHz band.

Running an FT-290R, 100 watts p.e.p. and a 16-element Yagi, **John Hilton GM1ZVJ** (LTH) reports on the usefulness of recent auroras. On October 21, ON1CAK (JO20) and F6CTT (IN97) were both worked for a new country and square, whilst a contact with GM4SIV (IO65) picked up a new square. The aurora on November 13, gave John new counties and squares when contacts were made with G7ENF (DYS), G0EMH (GLR), G1GYI (JO02), GJ6TMM (IN89) and GM0DRU (IO68).

Erwin Brown GI1JUS (ATM) runs an FT-221R with muTek front end, 300 watts p.e.p. into a 9-element Yagi and is never far away when an aurora occurs. In the event on October 21, sixty-two QSOs were made with DL, F, G, GI, GM, GW, HB9, OE, ON, PA and Y.

Some of the more interesting s.s.b. contacts included HB9DFG (JN37), OE5OLL (JN68) and Y22ME (JO72). Scottish type auroras on October 28, November 2, 11 & 13 produced only a handful of contacts between them. However the opening on November 17 was much better. Between 1754-2006UTC, contacts were made into DL, F, G, GM, GW, HB9, LX and OE. Among those worked were HB9CRQ (JN47), LX1DB (JN36) and OE5VRL/5 (JN78). Unfortunately, Erwin had to close down early due to an unsympathetic television set.

Ian Wright GW1MVL (CWD) made one contact, GM0ERB (IO76), in the aurora on November 13, but had far more success in the event on November 17. Using 10 watts and a 5-element Yagi fixed due east, a number of good s.s.b. contacts were made. Apart from QSOs into F, ON and PA, contacts were also made with DC6SN, DG9KAN, DK7LZ, DL4KCU in JO30, DG1DQ, DL1EJA, DG7JK, DC8VJ in JO31, DB6BX in JO32, DC2AGD in JO40, DG2YEQ, DC6YEW in JO41, DF9QX, DG4YED in JO42, DC4BK, DK9HN in JO43 and DG4OAI in JO52. SP2MSL (JO92) was heard but not worked.

Last month I welcomed **Vince Shirley G7ENF** (DYS) to the v.h.f. bands. Since his last report, major changes have been made to the antenna system, upgrading to a 16-element Yagi on 144MHz, a 3-element MET on 50MHz and a 16-element Yagi on 432MHz. On October 13, Vince encountered his first opening, when checking the DL0PR beacon and finding it fully auroral. In a three hour session, commencing at 1520UTC, contacts were made with 8 GMs, 3 GIs & 2 DLs among many G and PA stations. Best DX contacts were with SM1PDA (JO97), OZ1LZQ (JO45) and OZ1BEF (JO46). The opening on November 17 was also very productive. From 1700UTC, many stations were worked in JO30, 41, 45 & 49, on a beamheading of 035 degrees. Most pleasing were contacts with F1HFN (JN26) and F1AFJ (JN06), both being new squares and the most southerly stations worked so far by aurora. Best DX however was SP4LVG (KO13) worked at 1806UTC with reports of 57A. OE5OLL (JN68) was also worked for another new country.

The aurora on November 17 proved to be very good for **Clive O'Hennessy GW4VVX** (GWT). The event was discovered at 1530UTC with a number of strong auroral signals being heard. Clive kept his beam pointing around 025 degrees to work stations between Scotland to Austria. A total of 56 QSOs were made on s.s.b. and c.w. in 23 locator squares and 11 countries. At 2105UTC, a strong OH station called, giving Clive a 59A report but disappeared before the contact could be completed.

Ela Martyr G6HKM (ESX) found the aurora, on November 17, in progress at 1640UTC. In a two hour operating session, 36 QSOs were made, collecting two new all time squares by working SP2MSL (JO92) and SP4LVG (KO13). Other s.s.b. contacts included HB9RSO (JN36), OE5VRL/5 and Y25WA (JO64).

In previous columns I have stated that s.s.b. is an inferior mode to use during auroras. Undeniably, DX can be worked via this mode but even better DX can be worked with the use of c.w. The next two reports give details of what was worked at the c.w. end of the band. I'll leave you to make your minds up.

Ian McCabe G0FYD (LNH) caught the tail end of the aurora on November 13. Using a TS-780 and 100 watts to a 15-element Yagi, contacts were made with SK7JD (JO87), SK6EI (JO68) and LA1YCA (JO38). Gotaways included LY2BJB (KO15), SM1MUT (JO97) and LA8OW (JP50). Among the more interesting contacts, in the aurora on November 17, were OK2BWR/P (JN89), OK2HRA (JN99), OK3AL (JN97), OK3TNZ (JN97), OZ6TY (JO55), SM7BHH (JO65), SP2HHX (JO94), SP4MPB (KO03), SP9EWU (JO90), SP9KDA (JO90), Y21TC (JO63), Y22SA (JO63) and Y32NL (JO61). At 1828UTC, Ian was called by SM2EKM (KP05). Signal reports of 579 were exchanged bothways, as his signal was a pure T9 note. This contact, over a distance of 1901km, was the furthest that Ian has worked during an auroral event on 144MHz and was most likely via Auroral-Es. At the same time as this opening on 144MHz, there was Auroral-Es propagation to Finland on 50MHz. Did anyone else notice this 144MHz event during the aurora on November 17?

I had a reasonable amount of success, managing to catch openings on the 13th, 17th and 26th. The openings on November 13 and 26 were of the "Scottish" type and only produced a small number of contacts. By contrast, the event on November 17

Back-Scatter

was very widespread allowing 60 c.w. contacts to be made on 144MHz, between 1620 to 2200UTC, with DL, EI, F, GM, HB9, HG, OE, OK, PA, SM, SP, UA2 and Y. Although the majority of contacts were with West German stations, a fair proportion of QSOs were made into eastern Europe. Contacts included HG0HO, OK1AYR, OK1DDO, OK1DJW, OK1FFD, OK1MJL, OK1SC, OK2BGY/P, OK2DW/P, OK2TU, OK3KMY, OK2STK, OL4MH, SP2BSF, SP2JXN, SP4BGN, SP6FXF, SP6GVU, SP6LB, SP7BCA and SP7DCS. At 1947UTC, I was called by UA2FL (KO04FO), located in Kaliningradsk, for a new DXCC country. As the aurora started to fade on 144MHz, it was observed that an Auroral-Es opening was occurring on 50MHz. Contacts on s.s.b. were made with OH1ZAA at 1855UTC and with TF6MM (IP24) at 2156UTC. Incidentally, I feed a variable audio output from both the 50MHz and 144MHz receivers into the headphones, thus enabling me to hear what is happening on either band. This is particularly useful during Sporadic-E openings, allowing me to monitor the decreasing skip distance on 50MHz whilst simultaneously waiting for an opening on 144MHz.

A number of stations concentrated on 50MHz during the recent auroral openings. **Paul Feldhahn G7CFK** (MCH) worked 23 stations between 1420-2032UTC on November 17. Among the s.s.b. contacts were QSOs with PE1LHR (JO21), PA3EUI (JO21), PE1CMO (JO22), PE1LXD (JO31) and PE1CXZ (JO32). A number of GI and GM stations were also contacted. At 1859UTC, SK3SN was heard via Auroral-Es but he faded before contact could be completed.

In the aurora on November 13, **Paul Baker GW6VZW** (GWT) worked GM0GEI (HLD) and GM0EFT (GRN) for new counties and locator squares. Dther s.s.b. contacts included GM0HSC and GM6CBG.

The opening on November 17 was very much better. In total, 66 QSOs were made in 10 countries and 34 counties, encompassing 28 locator squares. Contacts made outside of the UK included EI2GB (IO62), PA0PVW (JO21), PB0AJA, PE1CMO, PE1MIS, (JO22), FC1CDS (IN77), FC1NDG (IN88), FC1CNB (JN09) and FC1DBN (JO00). Contacts via Auroral-Es were also made with OH1ZAA (KP01) at 1837UTC and with OH1AYQ (KP12) at 1840UTC. Also heard at this time were OH5IY (KP30) and SK3SN (JP80). In the second Auroral-Es opening of the evening, TF6MM (IP24) was worked at 2158UTC.

The 50MHz Band

The month of November saw the start of the 50MHz DX season. Lengthy openings were commonplace, especially to central and North America. For some ideally located stations, openings continued into the Far East and Australia. There were also numerous openings into Africa and South America. On November 5, **Geoff Brown GJ4ICD** worked all continents in less than four hours.

The North American events were characterised by an opening to call areas W1, 2, 3 & 4, from approximately 1230 through to 1500UTC, the band then becoming less active for about an hour, until it opened up again, this time to W5, 7, 8, 9 & 0 from 1630 to 1730UTC. This trend will continue through the winter, peaking during the months of February and March. Incidentally, these two months should be the optimum period for consistently working into the west coast of America. The best times will be between 1600 to 1700UTC, with dusk at the UK end of the path and dawn at the W6 end of the path. Just like Top Band really!

Reports this month start from the north of England and work their way down to the south coast. As you can see, stations situated the length and breadth of the country enjoyed the good F2 conditions.

Clyde Hinton G1TCH (CVE) is making the best of temporary rented accommodation by using an FT-726 into an HB9CV antenna at 4 metres a.g.l. On November 12, EL2FO (IJ46) was heard but not worked. However, on November 19, conditions were very much better and contacts, between 1300-1400UTC, were made with KP2A (FK78), KP4BZ (FK78) and HH7PV (FK28). Gotaways included HI8PM, HI8W and TI2HL. From 1550UTC, contacts were made with K1RX, K1TOL and VE1BPY. Clyde mentions that all these stations were worked with the HB9CV beaming into the house, only 2 metres away.

In the adjacent county, **Stephen Burns G1WUS** (DHM) heard a similar amount of DX stations. Using an FT-690 and 4-element Yagi at 5 metres above ground, stations in Ecuador and Peru were copied at good strength on November 9. A few days later, on the 11th, the band was open, with Stephen, from the Caribbean area, right up to the east coast of the United States and Canada. A similar situation existed on November 12. At 1050UTC, EL2FO was heard, followed a little while later with an opening into the Cayman Islands, Haiti and Cuba.

At the beginning of the month, **John Hoban G0EVT** (YSW) made a couple of good contacts into Africa. On November 4, G3GJQ/5N0 (JJ16) was worked for a new one. Incidentally, as most of you know by now, this station cannot count for award purposes. The following day, TR8CA (JJ40) was worked, giving Dave his twenty-fourth country on the band.

Paul G7CFK (MCH) sent in a very comprehensive report of stations heard and worked during the first few weeks of November. The first day of the month provided a little taster for what was to come later. Stations heard included HC5K, OH2KQ, GJ3RAX/VE1, VE1HD and W1EJ. The CT0WW and ZD8VHF beacons were heard around 0950UTC on November 4. From 1135UTC, PA2VST, PA0HIP and VE1YX were heard on the non-great circle path of 220 degrees. A new country, Cyprus (UK bases), was worked on November 5, when ZC4MK obligingly came on the band. On the following day, Paul heard five continents, G, 5B4CY, EL2FO, HC5K and K1JRW. Another new country, in the form of HC2FG, was worked at 1231UTC on November 9. Stations in W1 & W2 were also heard during this opening which lasted to 1600UTC. The French Guiana beacon, FY7THF was heard at 599 on November 15. At the same time, 1150UTC, FY5DG (GJ35) was worked for country number thirty-one. A good north American opening, between 1200-1400UTC, on November 16, gave Paul a number of QSOs with stations in W1, W2 and W3 call areas.

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
G1DWQ	1454	1812	——	1836
G1EZF	1730	1757	1920	2375
G1KDF	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
G6OZH	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
GO4XTT	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

At my location, the band was open to the American continent, virtually every day during the first two weeks of November. Contacts were made with stations in every call area apart from W6. More interesting contacts included HC2FG & HC5K, both in FI07, on November 1 and ZC4MK (KM64) on November 5. The weekend, November 11/12, saw a terrific opening to the Caribbean area and also into Africa. Contacts were made with EL2FO (IJ46), EL2B (IJ46), F6CBC/6W1, DL3ZM/YV5 (FK60), KG4SM (FK29), KP2A (FK78), KP4BZ (FK78), P43AS (FK52) and 9Y4VU (FK90). On the following weekend, the band was again in good shape to the Caribbean area, with HK3AVR being worked on the 18th and HH7PV being worked on the 19th. Stations heard but unable to work because of the pile- ups included FY5DG, HI8PM, PJ9EE, V47SIX, YV4DDK and 8P6JW. An unexpected dxpedition to Fernando De Noronha, (HI36), by a Brazilian group, using the callsign ZW0F, was worked on c.w. at 1116UTC on November 22. Apparently the group only worked about 12 UK stations.

Dave Gray G8YYB (LDN) seems to have heard everything that was active during recent months. On October 31, VK6JJ (OF88) was heard and VK6KXW (OF88) was worked. Both stations were heard between 0910 to 0930UTC. Another Australian, VK4ALM (QG56) was heard at 0847UTC, on the following day. Adrian ZC4MK was worked on November 5, with the 5B4CY beacon and TR8CA (JJ40) being heard. Dave copied stations in W4 and W8 on November 10, but didn't make any QSOs in the short opening. It was a completely different state of affairs on November 11. In total, 14 countries were heard but the best contact was VO1QF worked at 59 bothways. This station gave Dave his first contact with North America and in so doing obtained his 50MHz WAC. The openings during the weekend of November 18/19, gave Dave a number of new countries in the form of DL3ZM/YV5 (FK60), HH7PV (FK28), KG4SM (FK29), PJ9EE, PZ1AP (GJ25), VP5D (FL41) and 8P6JW (GK03). During this period the following were heard but not worked - HC5K (FI07), HI8W (FK58), HK3AVR (FJ24), V29OA (FK97), V46SIX (FK87) and YV4DDK (FK50). Another good opening on November 21 gave QSOs with HC2FG and HC5K, both in locator FI07. During this event, KP2A (FK78), VP5D and 8P6JW were heard between 1146-1240UTC.

What was probably the first UK-US slow scan television contact took place on November 22. **Paul Turner G4IJE** (ESX) worked WA1UQC (FN31) over a period of 50 minutes, during which several colour pictures were exchanged.

Mike Gotch G0IMG (ESX) has been mainly active on the 50MHz band. In October, both VK8GF and VK8ZLX were worked and with ZC4MK being worked in November, WAC has now been completed. Other contacts in November included HH7PV, ZF1RC and ZS6XJ.

Peter Hirons G1CEI (HPH) was very pleased to catch his first stateside opening on November 19. Using an FT726R and 5-element Yagi at 10 metres a.g.l. contacts were made with K1RX (FN42), WA8CWA (FN20), K8MMM (EN91) and VE3RM (FN25).

Stations on the south coast always seem to do better than most, for a variety of reasons. **John Heys G3BDQ** (SXE) is not only ideally located but also has a great wealth of experience in v.h.f. DXing. On October 31, contacts were made with VK6HK at 1000UTC, ZS6XJ at 1156UTC, ZS6XL at 1204UTC and later in the day with 9H5AB. On November 1 at 0836UTC, VK4ALM (QG56) was worked on s.s.b. John mentions that the VK station had waited 25 years for his first G station. Between November 18/21, contacts were made with EL2B, HC2FG, KG4SM and KP2A. Running 10 watts from a TS-680S into a 5-element Yagi at 9 metres, over 120 QSOs have been made with North America, in 21 states and all call areas except W6, W7 and KL7.

Another station getting good results from the south is **Steve Damon G8PYP** (DOR). During openings to North America on November 10, 11 & 19, numerous s.s.b. contacts were made with stations in all U.S. call areas except W6,7 & 0. Other DX stations worked included ZC4MK on November 5 and HC5K on the November

SPECIAL NOTICE TO READERS

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Back-Scatter

Starting date January 1 1975

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

	50MHz		70MHz		144MHz		430MHz		1296MHz		
Station	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	Points
G1SWH	67	33	71	7	93	22	60	9	—	—	362
G6HKM	57	44	—	—	82	29	50	18	32	9	321
G8LHT	56	17	34	5	79	31	53	15	8	4	302
G0IMG	69	29	41	5	56	12	27	5	—	—	244
G1DOX	36	18	49	6	66	18	29	6	16	7	241
G4ZTR	19	11	49	8	59	27	23	7	13	3	219
GW6VZW	72	32	—	—	75	21	—	—	—	—	200
G6NB	66	33	—	—	56	17	24	3	—	—	199
G8PYP	34	27	1	1	59	26	29	11	—	—	188
G4LDR	43	10	—	—	53	16	50	11	—	—	183
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	31	—	—	—	—	—	—	—	—	74
G3FPK	—	—	—	—	51	19	—	—	—	—	70
G1GEY	4	2	—	—	—	—	34	8	2	2	52
G0HGA	—	—	—	—	32	12	—	—	—	—	44
GM1ZVJ	3	3	—	—	23	15	—	—	—	—	44
G4AGQ	—	—	12	2	7	7	6	3	—	—	36
G6MXL	2	1	4	1	7	4	8	5	—	—	33
G0HOZ	—	—	—	—	25	4	—	—	—	—	29

10. During the intense opening on November 19, HH7PV, HI8W, KG4SM, PJ9EE, 8P6JW and 8P9DA were heard but not worked.

The 70MHz Band

During an aurora on November 13, **Dave Lewis GW4HBK** (GWT) worked EI9FK at good strength but mentions that no other stations were copied during the evening.

G8PYP is now active with a converted Pye Europa, crystal controlled on 70.26MHz and 70.45MHz. Running 10 watts into a quarter wave vertical, Steve monitors 70.45MHz f.m. on most evenings.

GW1MVL (CWD) is hoping to be active an the band soon. He intends modifying a Pye Westminster for 70MHz f.m.

The 144MHz Band

Most of the excitement during November was provided by a number of auroral openings. Tropospheric conditions were mainly poor although there were a number of days, around the second week of the month, when conditions were enhanced.

Godfrey Manning G4GLM (LDN), better known as the *Short Wave Magazine* 'Airband' author, made a number of good contacts during the enhanced conditions on November 13. Running an FT-290R into an 8 over 8 antenna at 13 metres, contacts were made with G7AQU (HWR), G7EON (SXE) and GW3ZTH/P (GNM). The furthest contact made was with ON1ANV (JO11) over a distance of 270km.

November 15 was a good day day for Vince G7ENF. In addition to working many French stations on 430MHz, contact was made, on 144MHz, with GM4IPK (IO99) on the Shetland Islands.

Situated in the fairly rare locator square JO03, **G0DVY** made s.s.b contacts with F6OBI (IN88), GM4SIV (IO65), DH2OAA (JO42) and LA1ZE (JO28).

Dave Brown GD4XTT also had good results on November 15. Before going to work, contacts were made with DF7DJ (JO31), FD1JPH (JO10) and PA3DYY (JO21). In the evening, further QSOs were made with F6EAM (JN19), FC1LHP (JO10), FC1MOZ (JN29) and at 1912UTC for a new country, HB9DFP (JN37).

The 430MHz Band

Not much news of activity on this band but G6HKM reports that she worked 76 stations during the cumulative contest on November 14, so the stations are obviously out there somewhere.

GW4HBK reports that he experienced his first lift on the band on November 13. In an opening to northern France, Dave worked FC1ARR (IN98), FC1LFT (IN88), F6APE (IN97), F6CCH (IN96) and F6DBI (IN88). He goes on to say that you **can** work DX from a hole in the ground if you're patient.

G8PYP also worked the same French stations on November 13. The band was still in good shape on the following day, contacts on s.s.b. being made with F1FHI (IN97), FC1EZQ (JN27) and ON5TX (JO10).

Further up country, in Lincolnshire, G0DVY, also found the band enhanced on November 14. GM4LBV in locator IO75 was easily worked on s.s.b. Conditions on November 15 remained good, but despite hearing GB3ANG, on 432.980MHz, at 59 all day, only one contact, with G1GEY (TWR), was made to the north.

Over on the Isle of Man, GD4XTT reports that results are now much better, especially as the antenna now has a rotator. On November 6, a move from 144MHz with G0ICE (CBE) gave Dave a new county. The conditions on November 12 were excellent with both GB3SUT and GB3MLY beacons being received at many dB over S9. New counties worked included G1OFA (BFD), G3NOZ (HFD), G1XYW (LEC) and G6OOX (NHM). Unlike Ela, who worked 76 stations in the cumulative contest on November 14, Dave only managed 12 contacts, the good tropo conditions having moved to the east during the day. Despite this, G6HKM (ESX), G1HLT (NOT), G4YPC (SRY) and G8NEY (WLT) were worked for new counties.

The Microwave Bands

The autumn season always provides a number of days when propagation is enhanced on 1296MHz. During the period November 13/14, Ela G6HKM worked GU8IRF, G6LEU (CNL), G8GDZ (WMD), DD9DU, ON4KSI and ON4TX. G0DVY (LCN) also caught the good conditions on November 13, working DK2ZF (JO33) and hearing many Dutch stations.

John Acton G1DOX (AVN) reports working HB9AGE during the period of good conditions on October 3. In November, s.s.b. contacts were made with G3IMV (BKS), G4LU (SPE), G3GRO (SXW) and FC1AAR. John mentions that he has yet to work GM on either 430MHz or 1296MHz. If any GM can help with this, or if you want the county of Avon on either band, give John a call on 0272 693235.

From the *RSGB Microwave Newsletter*, edited by G3PHO and G8AGN, I learn of a new UK 24GHz wideband record. The previous record was set up between G3FNQ and G3NKL over a path length of 127km and although greater distances have been worked with narrowband equipment it has long been the ambition of many operators to better the wideband record. On October 15, G3PYB/P located at Blakey Ridge, on the North York Moors and G8AGN/P, on Beeley Moor, Derbyshire, worked each other over a 135km path. Both stations were using the Plessey GDHM32 doppler module giving a nominal 7mW output and 10.7MHz i.f.s of 180kHz bandwidth. Dishes, one 450mm and the other 600mm diameter, with the inefficient but effective "penny feeds", were in use at both ends of the path.

Those who wish to make an attempt on this record should note that the best time appears to be in the early morning when there are low temperatures and the water vapour content in the air is also low. Relative humidity is not necessarily the best indicator of optimum conditions.

VHF News

Peter Hall SM0FSK reports that following a meeting with the Swedish PTT, a number of changes are being made to the 50MHz permits. The number of experimental licences is to be increased by 75, bringing the total to 100. The restriction to transmit outside of TV transmission time has been withdrawn as has the restriction in areas which have TV transmitters on channel E3. The experimental period has been extended to December 31 1990.

GM7ASN (IO78TA) is reported to be active most nights on 144.222MHz. He is the only station in this locator square with a south facing take-off.

Those of you planning to visit the RSGB VHF Convention at Sandown Park should note that the event is scheduled for Saturday May 12 and not on the Sunday as reported in some magazines. To help you remember the date, it is on the same day as the FA Cup Final.

Introduction of 12.5kHz FM Chanelling

In 1986, the RSGB VHF Committee, commenced a study to see if a move to 12.5kHz channel spacing, in place of the existing 25KHz spacing, was necessary. The study was initially set up because high band occupancy, at that time, meant that it was getting difficult for stations, particularly in city areas, to find a clear channel for communication. At a recent meeting, the VHF Committee deliberated over the results of surveys carried out at the 1989 VHF Convention and responses from postal surveys following details of the scheme in the RSGB *Radio Communications* magazine. Replies from a request inserted in the July 1989 issue of *Practical Wireless* were also taken into account as were the views of the Repeater Management Group, probably the largest specialist group in the UK directly involved with f.m. communications.

In the three years since the study

Back-Scatter

Annual c.w. ladder

Station	Band (MHz) 50	70	144	430	Points
G4ASR	116	7	386	1	510
G4OUT	-	19	239	-	258
G0HGA	-	—	192	-	192
G4XEN	7	—	144	9	160
GM4CXP	29	1	114	1	145
G0FYD	-	—	117	-	117
GW4VVX	-	—	73	-	73
G4VOZ	-	46	—	8	54
G3FPK	-	—	32	-	32
G0FYD	-	—	31	-	31
GW4HBK	-	22	—	-	22
G4AGQ	-	10	11	-	21
GD0ELY	1	—	14	-	15
GW4VVX	-	—	9	-	9

Number of different stations worked since January 1 1989

commenced, it has been noticed that band occupancy is now very much lower. Because of this and responses from interested parties, the RSGB VHF Committee feel that the general introduction of 12.5kHz channel spacing should not be implemented for the time being. The survey has been of immense value in determining the usefulness of the project and will be used, in conjunction with other input, when the committee next review the need for the implementation of 12.5kHz channelling. In the meantime, the VHF Committee will be interested to hear observations and results from any group already using 12.5kHz spacing. Details and comments may be forwarded either to myself or to the VHF Committee chairman, Peter Burden G3UBX.

Beacon & Repeater News

Iain Dunworth G4SNL (CNL) has a personal beacon operating from his home location in Saltash (IO70VJ), on 10:150/10.420GHz wideband. Iain invites any interested operator to contact him on 0742 849601 so that he can switch it on as an attended beacon.

Another microwave beacon, this one located at Danbury, Essex, is expected on the air soon. It will use the callsign **G0LKW** on 10368.960MHz.

Now in operation is the Nottingham packet mailbox **GB7LED** on 70.4875MHz. More details can be obtained from **G4XMH**.

A new v.h.f. repeater, **GB3IG** on Stornoway, came into service recently. It is operating on channel R7. Contact **GM4PTQ** if you want any more information.

Following a wait of over two years, since losing the use of its previous site, the Hereford u.h.f. repeater GB3HC, on channel RB6, has now come on the air, from an elevated site overlooking the city. Reports of coverage would be welcomed by the keeper, Alan Willis G4JSN.

QRZ Contest!

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. Briefly the contest is all mode, with fixed and portable entries being permitted. There are two sections - Low Power, up to 30 watts maximum output and Full legal power output. Contestants exchange callsign, report, serial number and county. Contacts with G3ERD score 10 points, all others score 2 points. The final score is the total number of contact points, multiplied by the number of counties worked. Each country outside of the UK is scored as a county.

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
G1EZF	—	93	263	388
G4XEN	—	111	274	385
G6HKM	46	109	217	372
G6DER	78	110	183	371
G4OEZ	49	49	249	347
ON1CAK	7	53	277	337
G4RRA	—	80	255	335
G3COJ	44	103	186	333
G4SSO	—	93	229	322
G4FRE	72	146	102	320
G1KDF	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
G4DOL	—	—	186	186
G4ZTR	30	47	95	172
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
G1DWQ	—	—	142	142
G8PYP	—	31	105	136
GW1MVL	—	22	106	128
G1WPF	—	29	97	126
G0FEH	—	24	101	125
G8XTJ	—	—	116	116
G1IMM	—	17	98	115
GM0HBK	—	—	107	107
GI4OWA	—	—	103	103
GM0GDL	—	22	81	103
G1TCH	—	6	95	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	63
G0ISW	—	17	59	76
G0HEE	—	—	73	73
GU4HUY	—	—	73	73
G0HDZ	—	—	64	64
G1NVB	—	—	58	58
GM0JOL	—	—	47	47
G2DHV	2	7	33	42
G7CLY	—	2	40	42
GM1ZVJ	—	—	41	41
G7AHQ	—	—	34	34

No satellite or repeater QSO's

KEEP THE REPORTS COMING FOR YOUR ENTRY INTO THE TABLES

Back-Scatter

RTTY

Reports to
Mike Richards G4WNC
200 Christchurch Road,
Ringwood, Hants BH24 3AS

RTTY Awards

Once you're up and running on RTTY, how about trying for an award or two. There are a variety of awards available from BARTG, e.g. the Quarter Century Award and the VHF/UHF Century Award.

First, the BARTG Quarter Century Award. This involves making two-way RTTY communication with amateur stations in 25 different countries. After that, stickers are available for increments of 25 up to a total of 300. If you are an s.w.l. you can still obtain the award on a heard basis.

There are three ways to claim this award. The first is to submit the necessary QSL cards for the countries being claimed, these are returned after checking. Photocopies of the QSL cards are also acceptable, but must show both sides of the card showing both callsigns. The second method is based on a check-log of the necessary contacts. You must include date, time, band, callsign worked, RST, etc. The list and appropriate QSL cards should be examined by the Awards Manager of a national society or by two officers of a recognised radio club or society. Then the signed check-list and appropriate fee is sent to BARTG. The final method is if the stations were worked during a RTTY contest sponsored by BARTG, but you must submit the log for the award at the same time as the contest.

The cost of the Quarter Century award is: UK = £1.50, overseas = US $6 or 30 recent IRCs. If you send your QSL cards and want them returned you should add 50p to the cost of the award.

Next, the VHF/UHF Century Award. You need proof of having made two-way RTTY contact with the required number of stations in the 144, 432 and 1296MHz bands. The awards are available separately for each band. Stickers are available in increments of 25 up to a total of 250. On the 1296MHz band, the endorsements go up in steps of 10. Again, these awards are available to s.w.l.s on a heard basis.

The minimum number of contacts required on each band is as follows:

144MHz - 100 different stations worked/heard

432MHz - 50 different stations worked/heard

1296MHz - 10 different stations worked/heard

The three methods for claiming the award are the same as for the Quarter Century Award. The cost for the UK is £1.50, overseas is US $6 or 30 recent IRCs. The update stickers cost 20p for the UK or US $1 or 3 recent IRCs overseas. Again, if you send in QSLs and want them returned add 50p or 5 IRCs to the total.

Special Event Stations

I wonder how many readers have tried using RTTY, AMTOR, etc., at special event stations where the general public are involved? I suspect not too many, which is a shame as I have found that these modes genarally attract a lot of interest. Over the years amateur radio has become much misunderstood and is usually perceived either as a sort of CB or rather like the character portrayed by Tony Hancock! So it is in our own interest and that of the hobby as a whole to rectify the situation whenever we get s chance. How many times have you seen a special event station where the operator is totally oblivious to

the visitors because he is working a pile-up on eighty? The other problem of course is that s.s.b. is very difficult to understand unless you are used to it so the result is that visitors will watch for a short time and then move on having understood nothing! The RTTY or AMTOR operator can operate much more effectively especially if he or she is well organised with plenty of the standard messages stored in computer memory. The visitor can also clearly read the details of the contact on the screen. So from this you can see that RTTY/AMTOR wins on two counts. It also has a novelty value in that most people are totally unaware that such communication modes even exist.

So, having made my case let's detail a few tips that I have learned from experience.

The first and most important area is safety. With the general public around it is vital that you make sure the installation is electrically safe and that all connecting leads are tucked safely away.

Next comes the radio installation where it is absolutely essential that you have the best possible antenna and earthing system you can manage. If you use a "lash-up" not only will the performance be poor, resulting in difficulty obtaining contacts, but you will suffer all sorts of r.f. problems. For example when transmitting you may well get interference on the monitor and even r.f. in the computer, which may effect the operation of the RTTY program itself. In addition you may experience r.f. interference from the computing equipment on receive!

Make sure that the monitor or TV is easily seen by placing it up high. It may even be worth seeing if you can borrow a second monitor to be placed at the entrance to your area to attract attention.

One particular type of special event where RTTY/AMTOR goes down well is the Brownies Listening Day On The Air. These events encourage the Brownies to send messages to each other using amateur radio. I have found that the girls thoroughly enjoy using the computer keyboard to send messages, particularly as they can use the type ahead buffer to prepare the message. Most youngsters these days are surprisingly computer literate and are usually quite comfortable using a computer keyboard.

So there we are with my views on special event stations if you're interested why not approach the local Brownies or Scouts and offer your services for the next event.

The Microreader II

The review for this month is the Microreader II from Enterprise Radio Applications Ltd (ERA). This tiny self contained unit can receive RTTY and c.w. of a wide range of speeds and also includes morse tutor. Although this unit is receive only, I'm sure it will be of interest to readers of this column. One of the features that makes this very compact unit particularly appealing is the built-in liquid crystal text display.

Being self contained the external connections are very few and have been designed to be as simple as possible. The power requirements are a straight forward 12V to 16V d.c. at 150mA which shouldn't be too difficult to find. For normal operation the only other connection required is the audio from the external speaker socket of the receiver. The only problem with using the external speaker socket is that the internal speaker is usually disabled. Fortunately ERA had thought of this and provided two 3.5mm jacks on the rear panel enabling an external speaker to be connected so that you can continue to hear what you are tuned to. The impedance of the audio socket is approximately 2kΩ and thanks to a sensitivity adjustment on the rear panel can accept a wide range of input levels with 7mV as the minimum on the review model. This versatility means that it is quite feasable to use the tape recorder or fixed level output from your receiver, instead of the external speaker socket.

To keep the number of external sockets to a minimum, the audio input socket has a secondary use as the key input when using the Morse tutor feature. This does, of course, mean that the user has to swap plugs in order to use the tutor - not a serious problem!

The only other connection on the rear panel was the RS-232 socket which comprised a 3.5mm jack. Although called RS-232 it was simply a data output which would drive the receive data line of a computer or printer RS-232 port. But more of this feature later.

The front panel was very neatly laid out with the display slightly off-set to the left with the main (and only) function switch on the right. A ten-element bargraph tuning indicator and three shift indicator l.e.d.s completed the front panel.

Moving on to the operation this was controlled by a single rotary switch on the front panel. As the Microreader can resolve RTTY at various speeds and shifts as well as c.w. you may well be wondering just how all this can be controlled by one switch. Well it's all down to some clever logic - but don't expect to be able to master this control without some practice.

Probably the easiest mode to use is c.w. which for most signals is simply a case of selecting c.w. auto. Once selected, as with all the modes, a plain English confirmation message appears on the display. This is very useful and in fact essential with this type of multi-function control.

The c.w. decoding routines in the Microreader are really very good and have been specifically designed to deal with hand sent c.w. One of the features I found most fascinating was the automatic text editor. This enabled to Microreader to insert the inter-word spaces that are so often missed from amateur c.w. To do this the Microreader uses its own directory to spot common words and abbreviations - it can also correct the odd spelling mistake! There is obviously a risk that this type of routine may in fact corrupt the received signal, but ERA have resisted the temptation to overdo the corrections and I experienced no problems whatsoever throughout the review period.

In addition to the AUTO C.W. position there were two other c.w. modes - FAST and SLOW. These were self explanatory really in that they were optimised for receiving either particularly fast or slow c.w.

The c.w. tutor was the next feature to try and I started with the practice sending option. Once this option is selected a message appears on the screen reminding you to insert the key. This message is necessary because the audio input doubles as the key input, so you have to remove one plug and insert another.

In order for the decoding logic to set up to your sending speed you have to send a few character of which the first two or three are incorrectly displayed. Incidentally you don't have to do this at the start of each group of characters, as the unit remembers the current speed.

Once you start sending the Microreader quickly highlights any short comings in your c.w!

On the reception side, characters were sent in the standard five character groups and you could choose letters, numbers, letters and numbers mixed or punctuation. The punctuation option was particularly useful as this is an area where many amateurs are weak. In addition to basic punctuation, this option included continental characters and procedural signals.

Moving on to the RTTY option, this was a powerful addition and in the review model was up to software revision 2.5 The options provided were 45, 50 and 75 baud with shifts of 170Hz, 425Hz or 850Hz. As with the c.w. option the rotary switch had several levels which were quite easy to get to grips with.

One useful aid was the auto facility which allowed very quick selection of the standard speed and shift combinations, i.e. 45 baud - 170Hz.

In addition to the auto modes, all the parameters could be manually set giving the operator maximum versatility.

The only weak point with RTTY was the operation of the tuning indicator which required the signal to be adjusted so that one of the tone pair lit the centre l.e.d. whilst the other lit the end l.e.d. I found this to be a little tricky and required some practice to obtain reliable results.

Once the tuning had been mastered, the performance was actually very good even under quite difficult conditions.

So, to conclude, the Microreader II is clearly a very capable and powerful unit which belies its small size. It is also very competitively priced and by all accounts is selling extremely well.

On a personal note, I am seriously considering buying the review model which must say something about its performance!

The Microreader II is available from ERA Ltd., Unit 28, Clarendon Court, Winwick Quay, Warrington, Cheshire WA2 8QP and costs £154.95 inclusive of post and packing.

My thanks to Bill Green of ERA for the loan of the review model.

Back-Scatter

Amateur Satellites

Reports to
Pat Gowen G3IOR
17 Heath Crescent
Hellesdon, Norwich, Norfolk NR6 6DX

ARIANE SPOT-II Launch

The mission carrying the SPOT-II and the AMSAT cluster consisting of UoSAT-D and E and all the microsats has now been set for January 11 at 0135UTC with a ten minute window which, (believe it or not!) due to a postponement of the Ariane mission that was to precede it, is eight days earlier than that originally planned! If the launch is postponed beyond the ten minute window, the next opportunity comes 48 hours later. All readers are cordially invited to listen to and participate in the AMSAT launch network, on the frequencies already given in this column. The satellites will not be usable until all tests and program loadings have been completed, hopefully by late February.

ZRO Tests

The tests for the optimum satellite receive system capability dedicated to Kaz Desker K2ZRO, are proving to be very popular. (See last month's column for the brochure details). Many stations have been able to copy the Mode B 145MHz downlink produced when the associated uplink has been down to level 8, i.e. that equivalent e.r.p. put out by a hand held 2 watt transceiver. The Mode JL test of Saturday December 2 provided by W6HDO, produced a very significant downlink on 435.945MHz at level 1, slowly reducing in steps down to level 8 before it finally disappeared into the transponder hash added to by picked up solar noise.

The most surprising finding was that the presence of stations some 20dB stronger in the passband did not seem to actuate the a.l.c. sufficiently to cause the gradually weakening signal to drop out at any time during the test, which is certainly not the case on the B mode, nor on the Mode A RS system. It all reinforces the realisation that success with satellites arises from an optimum receive system and the minimal transmitting requirements. The only reason that this does not always work is due to the presence of those who practice the opposite, whom we term the 'alligators'.

MIR

The new 12.5 x 4.35m, 20 tonne, Kwant-2 'D' module which was sent up by a PROTON launch to MIR on November 26 could be seen by eye soon after dusk as it neared the manned space station. It was due to dock on December 2, but had to be rocked first in order to unfold one of its large solar panels that was jammed. On December 1 it was some 12 minutes of time from MIR, on December 2 only 20 seconds, and the sighting of December 3 showed only one bright object. Kwant-2 would appear to be painted white as, although a little smaller, it seems far more reflective than MIR itself.

It was hoped that the wait for the module would have given a little more free time to the Alex pair to operate their amateur radio experiment on 2m f.m., but no reports indicating this have evolved. Indeed, from December 1-3 it would have proved difficult, as the 145.625MHz audio from the cosmonauts was muffled, far weaker than normal, and had a distinct echo, so indicating that space helmets were being worn ready for EVA.

The orbiting space station has proved very difficult to track over the past month as before the latest Keplerian elements could be received, the manned satellite had been pushed up to higher orbit once again. The reason for the elevation is thought to be due to the fact that compensation burns for escalating drag during solar highs may prove difficult once the new module is attached, as the station would be non-symmetrical, unbalanced and difficult to manoeuvre.

For this reason it is hoped that the latest stop press element set given last in this column under the heading Keplerian Elements may hold until the next big 'T' module launch, probably on 30 January. That should arrive about a week later in early February just before the new crew go up on February 10 for a year long mission. The current crew are due to return on February 19. The final mating of the second module will permit re-balance of the the space station and manoeuvrability will be simplified again.

The new module with its 'APAS' docking system will permit the larger BURAN shuttle to go to MIR in 1991. As yet there is no life support system finalised for this shuttle, so far more work is needed before it can be flown manned. The smaller 'PETISHKA' (Little Bird) shuttle has a docking system and manipulator attached, and may go first.

OSCAR-13

A-O-13, following the solar flare induced IHU memory loss reported last month, was reloaded back on again only to be wiped out again on Sunday December 10, when the 'hot' side of the sun re-appeared facing earth. Further reports arrive of satellite losses, the latest being SOLARMAX, brought out of orbit by the very conditions it was researching, i.e. the solar maximum data. The latest operating schedule for the U-O-13 satellite as from November 22 until further notice is as follows:

Mode B Mean Anomaly 000 to Mean Anomaly 110.

Mode JL Mean Anomaly 110 to Mean Anomaly 145.

Off from Mean Anomaly 145 to Mean Anomaly 150.

Mode B Mean Anomaly 150 to Mean Anomaly 255.

The Mode S beacon will be switched on from Mean Anomaly 146 to 147, and the Mode S transponder will come on from MA 147 to 160, in tandem with Mode B. From MA 225 to MA 235 the transponder will switch from the beams to the omni-directional antennas, and only very low power uplinks will be needed at this time.

Phase-III-D

AMSAT-DL announce that building has commenced of the 200-400kg, 250W powered Phase-III-D satellite intended for a high altitude Molniya orbit (similar to OSCAR-10 and 13) has now commenced. Provision of funding for the project has been confirmed by the West German government, who exhibit an enthusiasm for space research not demonstrated in the UK.

RS-12/13

Brian Cooper G4RHZ of Doncaster provides some valuable indicators as to when we might expect the launch of the new Soviet RS transponders with the coming COSMOS satellites. He is able to decode the RTTY, like 80 baud TLM, and is a mine of information on the Soviet NAVSATS. He points out that there are four satellites in the civilian NAVSAT system and that until the launch of NADEZHDA-1 on July 4 there had been no such suitable common carrier. Unfortunately, NADEZHDA-1 carried a COSPAS/SARSAT package and thus could not carry RS-12/13 as well.

He points out that the military COSMOS 2004 navigational satellite launched on 22 February 1989 replaced COSMOS 1981, whilst COSMOS 2016, also military, launched on April 4 replaced COSMOS 1934. COSMOS 2026, another military NAVSAT launched on June 7 has yet to be replaced, as is NAZ-1, the civilian satellite launched July 4 or COSMOS 2034 launched July 27, a further military satellite. He tells how each satellite in the civilian system carries the group number 11, 12, 13 or 14. Under 11 comes COSMOS 1553 and 1791, under 12 COSMOS 1727 and 1861, under 13 is 1655, and 14 consists of COSMOS 1574 and 1816.

As the RS 145/2MHz transponder could not tolerate QRM from COSMOS 1861 TX, it must be switched off as a NAVSAT No.12 satellite, the role for which is undoubtedly currently being undertaken by COSMOS 1727. He is unsure which satellite NAZ-1 replaced, but thinks it could be a No. 11 satellite. "The next civilian satellite will be launched when any of the listed satellites fail," writes Brian. "This

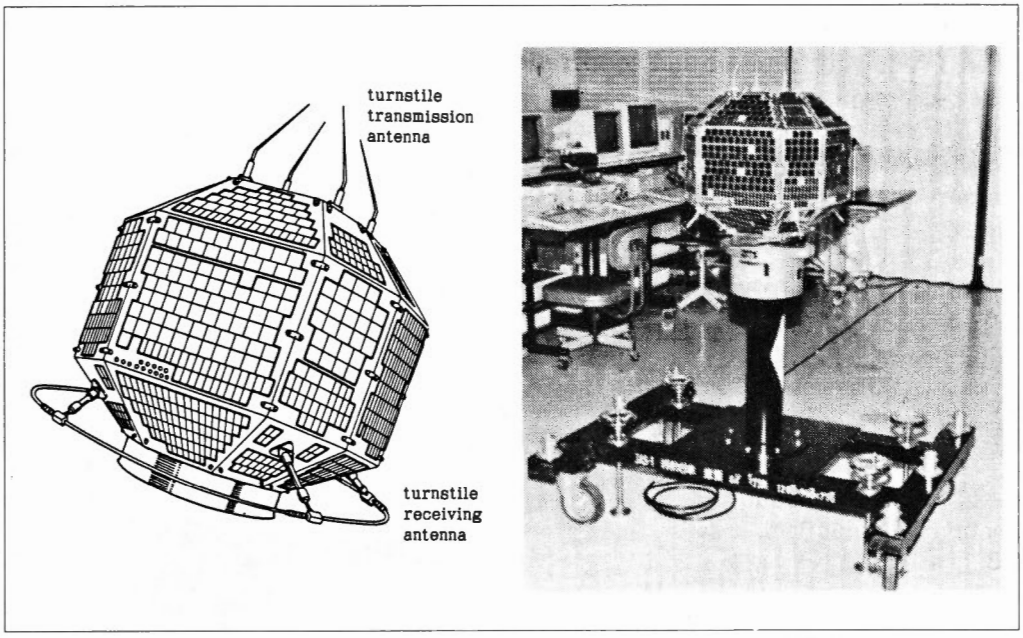

Fig. 1a: External appearance of JAS-1b

Fig. 1b: The latest photograph of JAS-1b

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SEE REVIEW PW SEPT 89

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DAF96	1.35	ECC189	1.20	EFL200	1.85	GZ33	4.20	PY81	0.75	UM84	1.30
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DF92	0.95	ECF80	1.25	EL32	0.85	GZ34*	6.00	PY82	0.75	UY85	0.85
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Back-Scatter

Keplerian Elements

Satellite	NOAA 9	NOAA 10	NOAA 11	METEOR 2/15
Int. Design	84-123A	86-073A	88-089A	87-001A
Object No.	15427	16969	19531	17290
Element Set	448	298	155	303
Epoch Year	1989	1989	1989	1989
Epoch Day	304.03231235	304.05683889	300.29885864	304.74547094
Inclination	99.1560	98.6277	98.9517	82.4647
RAAN	293.7436	331.9083	243.7772	44.2395
Eccentricity	0.0014606	0.0013016	0.0011450	0.0011627
Arg of Perigee	294.1832	213.6616	216.8663	240.7728
Mean Anomaly	65.7812	146.3736	143.1721	119.2270
Mean Motion	14.12244368	14.23248744	14.11229706	13.83784008
Decay Rate	0.00000782	0.00000851	0.00000505	0.00000377
Orbit Number	25163	16201	5610	14250
Nodal Period	102.021720	101.23495	102.095376	104.121070
P-drag	4.002e-06	4.255e-06	2.594e-06	2.051e-06
Increment	25.502751	25.308820	25.522888	26.159694
I-Drag	1.007e-06	1.017e-06	6.528e-07	5.127e-07
Beacon-QRG	137.620=APT	137.500=APT 1698.0=HRPT	137.620=APT 1707.0=HRPT	127.850=APT
Ref. EQX	05 Nov 1989	03 Nov 1989	03 Nov 1989	04 Nov 1989
Orbit	25234	16243	5536	14296
HHMM.MM	0130.04UTC	0013.69UTC	0115.28UTC	0143.04UTC
Degrees W	127.89	70.86	170.73	27.47

Satellite	METEOR 2/16	METEOR 2/17	METEOR 3/02	METEOR 2/18
Int. Design	87-068A	88-005A	88-064A	89-018A
Object No.	18312	18820	19336	19851
Element Set	330	166	293	90
Epoch Year	1989	1989	1989	1989
Epoch Day	304.95372454	305.15411318	304.87849350	305.06855756
Inclination	82.5508	82.5470	82.5408	82.5211
RAAN	111.1776	171.7147	78.9584	50.2017
Eccentricity	0.0011052	0.0015414	0.0014841	0.0012866
Arg of Perigee	168.8548	246.0980	158.0467	288.3030
Mean Anomaly	191.2855	113.8566	202.1238	71.6735
Mean Motion	13.83535504	13.84235000	13.16865408	13.83859491
Decay Rate	0.00000219	0.00000349	0.00000391	0.00000117
Orbit Number	11142	8863	6090	3401
Nodal Period	104.139882	104.087291	109.408316	104.115476
P-Drag	1.192e-06	1.897e-06	2.468e-06	6.364e-07
Increment	26.163735	26.150619	27.480856	26.157863
I-Drag	2.980e-07	4.741e-07	6.171e-07	1.591e-07
Beacon-QRG	137.400=APT	137.400=APT	137.850=APT	137.300=APT
Ref EQX	04 Nov 1989	04 Nov 1989	04 Nov 1969	04 Nov 1989
Orbit	11185	8903	6132	3442
HHMM.MM	0131.38UTC	0105.41UTC	0140.18UTC	0044.57UTC
Degrees W	317.41	250.19	351.63	6.55

Satellite	OSCAR 10	OSCAR 11	OSCAR 12	RS 10/11
Int. Design	83-058B	84-021B	86-061B	87-054A
Object No.	14129	14781	16909	18129
Element Set	435	536	174	928
Epoch Year	1989	1989	1989	1989
Epoch Day	295.83948156	303.72057471	304.07884461	305.86325932
Inclination	25.9220	97.9875	50.0168	82.9235
RAAN	237.9341	358.5160	240.6055	136.4791
Eccentricity	0.6030613	0.0012243	0.0010698	0.0012688
Arg of Perigee	86.9960	254.6117	329.6461	34.6863
Mean Anomaly	336.1703	105.3640	30.3754	325.5123
Mean Motion	2.05883801	14.64246940	12.44402051	13.72019887
Decay Rate	-0.000001	0.00002983	-0.00000025	0.00000244
Orbit Number	4785	30237	14632	11827
Nodal Period	69.2	98.403081	115.652446	105.013812
P-Drag	-	1.370e-05	-	1.362e-06
Increment	175.3	24.601673	29.239349	26.379350
I-Drag	-	3.447e-06	-	3.405e-07
Beacon-QRG	145.810/.987	145.826/435.025 2401.5	435.797/.913	29.357/.403 145.857/.903 29.407/.453 145.907/.953
Ref EQX	03 Nov 1989	05 Nov 1989	03 Nov 1989	04 Nov 1989
Orbit	4807	30315	14669	11857
HHMM.MM	0012.73UTC	0112.98UTC	0112.69UTC	0113.50UTC
Degrees W	169.40	58.81	188.98	286.78

Satellite	OSCAR 13	SALYUT 7	MIR	AJISAI
Int. Design	88-051B	82-033A	86-017A	86-061A
Object No.	19216	13138	16609	16908
Element Set	50	849	178	-
Epoch Year	1989	1989	1989	1989
Epoch Day	290.09120728	306.32756272	306.33658130	258.72253
Inclination	57.1143	51.6094	51.6251	50.0123
RAAN	186.3015	358.2784	30.1226	19.76
Eccentricity	0.6814391	0.0000875	0.0006166	0.0012
Arg of Perigee	213.3923	32.8150	262.2505	216.46
Mean Anomaly	73.7401	327.3091	97.7229	143.54
Mean Motion	2.09694922	15.47640582	15.55607235	12.44380
Decay Rate	0.00000482	0.00014459	-0.00058707	-0.00000045
Orbit Number	1027	42954	21271	14068
Nodal Period	686.6	92.983171	92.506647	115.654451
P-Drag	-	5.609e-05	2.243e-04	-
Increment	172.2	23.628780	23.511405	29.239883
I-Drag	-	1.380e-05	5.518e-05	-
Beacon-QRG	145.812/435.651 2400.325	19.953/142.417 925.240	143.625=Voice 166.130=Data/ Ranging	
Ref EQX	01 Nov 1989	07 Nov 1989	05 Nov 1989	15 Sept 1989
Orbit	1059	43027	21313	14068
HHMM.MM	0822.50UTC	0059.16UTC	0050.38UTC	1720.42UTC
Degrees W	342.08	86.02	40.19	234.99

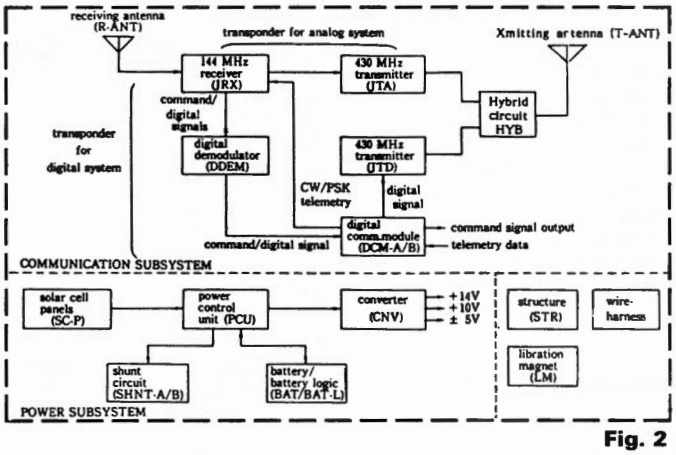


Fig. 2

will probably carry RS-12/13. If it replaces K-1861 it will appear at the same time as RS-10/11, otherwise the pass times will differ.".

UFO-432

The mystery satellite that suddenly appeared on 432.883MHz has just as suddenly disappeared again, and has not been heard by any of its many followers since 2030UTC on November 11. The feedback on the possible origin of this strange amateur band intruder has been considerable, with lots of well informed opinion now available.

Mark Shepherd ZL1TRE of Auckland, New Zealand thought that UFO-432 might be Object 83-60C, an ELINT satellite known as 'Operations-0721', launched with Big Bird 18. He had originally thought it to be Polar Bear, but Greg Roberts ZS1BI correctly pointed out that the periods differed. Mark now thinks it to be 83-52C, as it was shown in the listings as still transmitting in 1987, although from his location it is not doing so continuously.

Whilst the apperance of this satellite on one of our most monitored amateur radio beacon frequencies remains a puzzle, Brian Cooper G4RHZ suggests that there is no real mystery about object 1980-52-C itself, as NASA's satellite situation report lists it as "..United States .. elements not available.." which G4RHZ interprets to say "this means it is a military object". He points out that in Geoff Falsworth's satellite 1980-1985 lists the following is listed for the 1980-52 launch:

Object	Cat.No	Period	Inc	Apogee	Perigee	Decay
80-52A	11850	88.4	96.46	212	173	6/4/81
80-52B	11851	88.9	96.46	259	171	20/6/81
80-52C	11852	112.3	96.63	1333	1331	Not Yet

As no date is given for the 1980-52C decay from orbit, it is still aloft, and may be presumed to be functional.

G4RHZ informs us that whilst 52-A was unnamed, it was probably Big Bird No.16, also known as KH9, whilst 52-B was named as Titan 3D-19, i.e. the nineteenth Titan 3D launch. He continues "52-C is not named, but is very probably a 60kg ferret satellite. Some of the Big Bird satellites carried these 60kg satellites, but not all, as some of the earlier ones were still functional. 52-C would normally be commanded on and off, but obviously it has gone wrong, and this is the reason why it has only recently been discovered".

John Branegan GM4IHJ dismisses any possibility that UFO-432 resulted from a Shuttle launch, as KH-11 satellites have only been launched by the shuttle since 1986 to 57 degrees inclination. He points out that the orbit does resemble that of Object 1980-52-C, the secondary payload of a Big Bird 'photo recon' TITAN-3-D launch. He feels it to be far more likely that it went aloft three years ago with a KH-11 'Keyhole recon', but cannot confirm as the US ceased publication of such launches. He writes, "All we know is that several KH-11's went up together with several small supplementary payloads such as Ferrets and Embassy Comsats, so there are quite a few possible suspects for the origin of 'UFO-432'.

All about JAS-1-b

After three years of operation, OSCAR-12, alias 'FUJI', has been switched off for all time. The Japanese Radio Relay League finally succumbed to the difficulties being created by FUJI-OSCAR-12, due to the vast amount of time and energy being demanded in abortive attempts to try to maintain an operational schedule. Such was the decay of power generation due to the rapidly decaying battery and solar cells of FO-12 that in mid November JARL and JAMSAT made a joint decision to give up all command attempts, in order to devote the team effort to the new up and coming satellite JAS-1-b, its successor.

The date for the JAS-1-b launch, surprisingly, now seems to have slipped from that earlier stated, and although given as 'February 1990' no new exact launch time is yet available from the National Space Development Agency of Japan, known as NASDA. Here are the full details.

Satellite Specifications

A 50kg mass 440 wide x 470mm high spacecraft, with 26 polyhedral faces. Similar to FO-12, but 40mm wider. A line drawing (Fig. 1b) and the latest photograph (Fig. 1a) show the external appearance,

Back-Scatter

indicating the new turnstile receive and transmit antennas, with the 145MHz ring turnstile receiving antenna at the base of the side panels and the dual mode shared 435MHz turnstile transmitting antenna at the top of the satellite. Note the enlarged coverage of the 1300 solar cells. Inside resides the 70% efficient power supply regulator giving 14V, +10V, +5V and -5V and the 11 series connected 6Ah NiCad cells forming the battery stack, the analog transponder and the digital transponder, both 145MHz uplink and 435MHz downlink.

Launch and Orbit details

Lift-off is in February 1990 with the NASDA MOS-1-B Maritime Observation Satellite on a two stage H-1 rocket from the Tanegashima Space Centre, into a solar synchronous 99 degree inclination 900km orbit. As the main payload period is only 103 minutes, the solar illumination at the 99 degree inclination supplied gives eclipse for 33% of each orbit, so it is hoped that additional apogee up to 1200km may be given by the additional thrust available from the remaining fuel after MOS-1-B ejection. This would result in longer periods of solar illumination, thus better battery charge regulation, hence longer periods of operation. It would also mean the possibility of more distant DX QSOs and a gentle shift of overfly time from the initial noon and midnight passes toward dawn and dusk with time, at which time it will be in full sun.

Power supply and source

JAS-1-B will carry some 900 10 x 20mm plus some 620 20 x 20mm of the latest high efficiency dual layer GaAs solar cells, which have the added advantage of resistance to both radiation and temperature degradation. These will give an initial 11 watts of power, almost twice as much as its predecessor, and permit far longer periods of transponder operation in eclipse periods.

Thermal control

As the solar cell coverage and thermal absorption efficiency has a marked effect upon the satellite temperature, additional surfaces will be covered with paint and thermal insulation in order to provide passive control to give the optimum temperature range for NiCad battery efficiency and circuit component operation, e.g. from 0 to +40 degrees Celsius.

Attitude control and antennas

Like FO-12, the spacecraft attitude will be controlled by employing the torque generated in the earth's magnetic field by a pair of permanent magnets. The antennas will be circularly polarised and omnidirectional, used for both digital and analogue transmissions. If the spacecraft attitude is such that the analog signal is sensed as right hand circular, then the digital will be left hand circular, as they have opposite feed sources. As the satellite will be toppling and tumbling for up to several months before the magnets finally give adeqaute stabilisation control, it is suggested that at first linearly polarised antennas be employed at the ground station. Despite the 3dB loss incurred compared to correctly circularly polarised uplink antennas, they will initially provide far better signal stability.

Fig. 3: The sundial antenna

Beacons and transponder details

The JA beacon nominally gives 100mW on 435.795MHz, plain carrier, Morse code (c.w.) or p.s.k., and the JD beacon nominally 1 watt on 435.910, TLM in p.s.k. packet format. The c.w. TLM can contain 12 analog data items, 33 status items. The p.s.k. has 29 analog and 33 status items.

The transponder frequencies and modes are similar to those of FO-12, e.g Mode JA analog has an inverted transponder of 100kHz bandwidth. The JD digital mode functions as a mailbox using AX.25 link level protocol, as with JAS-1/FO-12, so ground stations can use the same equipment as they have up to now for OSCAR-12.

JA mode has a linear uplink pass band from 145.900MHz to 146.000MHz, giving a linear downlink from 435.900 to 435.800MHz within 3dB limits. A ground station uplink of some 100W e.i.r.p. is recommended.

JD mode uses bi-phase Manchester coded uplink with a bit rate of 1200baud from either 145.850, .890, or .910MHz to give a common 435.910MHz 1 watt downlink n.r.z.i. p.s.k., 1200baud. The uplink power suggested for the digital mode is also about 100W e.i.r.p. The full functional block schematic diagram of the spacecraft is shown by Fig. 2.

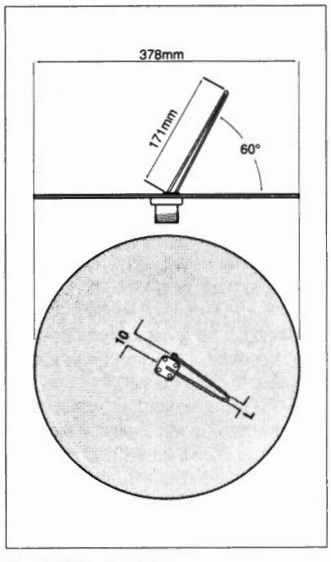


Fig. 4: DIY instructions

Sundial Antenna

Readers may recall the constructional details appearing in Oscar News (1980) and on page 51 of the June 1987 issue of *Short Wave Magazine* (as a scaled up Weather Satellite version) of the simple, versatile and inexpensive 'sundial' antenna as used for the FUJI-OSCAR-13 downlink by **David Rowan G4CUO**. He rightly claims it to be a "..good all rounder..". The photograph in Fig. 3, taken by David himself, is of his antenna taken by the light of the mid-day sun, showing that it can double up as both a good high angle satellite receiving antenna and a timepiece. Dave says, "JAS-1 was at 50 degrees elevation, and the shadow on the dial shows the time to be high noon". With such an antenna covering a wide area of sky, and no need for tracking, the satellite azimuth need not concern us, as it works well as soon as the spacecraft appears more than 10 degrees above the users horizon in any direction!

For those who would like to try this simple and inexpensive d.i.y. antenna, see Fig. 4. It consists merely of a circular sheet of aluminium plate, or an old aluminium based record disc, or even aluminium foil shaped and sealed round hardboard, with a central sloping quarter wave folded radiator. For the 435MHz version, the plate needs to be 378mm in diameter, and the folded quarter wave made of 12s.w.g. brass or welding rod spaced 10mm at the base and 7mm at the bend 171mm long. One end goes to the inner of a 'N' type coaxial chassis connector and the other to an earth tag mounted at the 'N' type bolt taking it to the sheet. It is angled at 60 degrees to the flat plate. It is rugged, virtually weatherproof, and takes up minimal space, time and cost. Whilst it does not possess the gain of tracking antennas and is not able to hear much from OSCAR-13 when on Mode JL, it is adequate for the closer 435MHz downlink FUJI orbits, especially with a low-noise pre-amplifier at the antenna feed socket.

For use on the 145MHz satellite band, the radiator angle and fold spacing stays the same, but the circular sheet grows to 1131mm, and the slanted sloper to 509mm. Whilst it captures little of the distant OSCAR-10 and 13 Mode B downlink, it performed well for the late OSCAR-9, goes well for OSCAR-11, for the RS series 145MHz Mode T downlinks, and will work well in use with the forthcoming microsats.

Keplerian Elements

We are indebted to **Birger Lindholm** for providing the bi-monthly sets again. A small problem arises, as in the near future we shall be seeing a large increase in the number of satellites of interest that readers will need the latest data on. Rather than reduce the news within the column size limits, we shall try to shrink them to, fit the same alloted area.

John Branegan GM4IHJ points out that in the latest NASA element sets for MIR, KWANT and SOYUZ-TM-8 are given mean motions of 15.556072, 15.556276 and 15.5566281 respectively, which would indicate that MIR is separating from them by about 8km per day. As they are all coupled together, John asks, "I wonder if the onboard cosmonauts are aware of this! Do they have elastic docking latches?".

Finally, there follows as a 'stop press' the latest accurately functioning available Keplerian element set for MIR, in the hope that it may provide six weeks good tracking ahead.

Epoch: 16 November 1989, 0631:48 UTC.
Inclination: 51.6249.
Right Asc.of Asc. Node:320.4145.
Eccentricity: 0.0004287.
Argument of Perigee: 42.0968
Mean Anomaly: 318.1336.
Mean Motion: 15.553848 orbits per day.
Drag/Decay: 0.0004

Don't forget to keep Pat up-to-date with your satellite activities in 1990. His address can be found at the start of this column.

Back-Scatter

Propagation

Reports to
Ron Ham
Faraday
Greyfriars, Storrington, West Sussex RH20 4HE

Let's begin this month with a technical laugh. I decided to move the 'phone across the office to a position on my recently modified desk. Next day I purchased a 5m extension lead, all nicely packed in a small oblong box, which was placed in a plastic carrier bag among other bits of shopping.

Later, I spent a while doing a bit of research in the reference section of the library but when I left, the security alarm went off coinciding with my walking through the exit. Naturally I stopped to see what had happened and also to prove that nothing not on loan to me was in my bag. However, I then offered each item in my carrier, hair oil, box of cards, a book of my own, several sheets of photocopying and this telephone lead individually to the detector panel and all was well until it sensed that small oblong box with its coil of wire, and off went the alarm again. No doubt I will think of that episode each time I use the phone, hi!

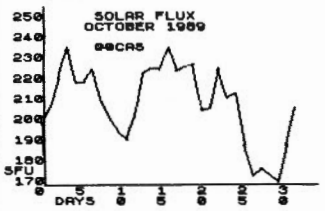


Fig. 1

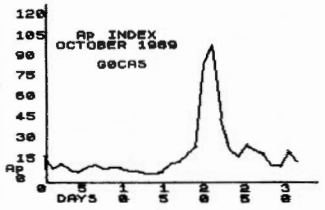


Fig. 2

WRM123

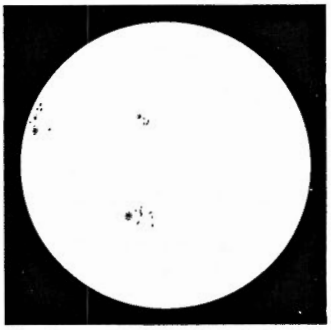


Fig. 3

Fig. 4

Fig. 7

Date	Groups	Filaments	Quiescent Prominences	Remarks
03.11.89	3	26	13	
05.11.89	4	28	9	
09.11.89	3	26		cloud prevented prominences count
12.11.89	4	26	7	
16.11.89	3	15	10	almost a flare
18.11.89	4			cloud hampered observation
19.11.89	3	20	10	almost a flare
22.11.89	2	22	7	large semi eruptive prominence on east limb
23.11.89	2	22	7	ective prominence gone
24.11.89	3	22	12	
25.11.89	3	22	12	'S' shaped plage almost flaring and erruptive filament in same area

Fig. 5

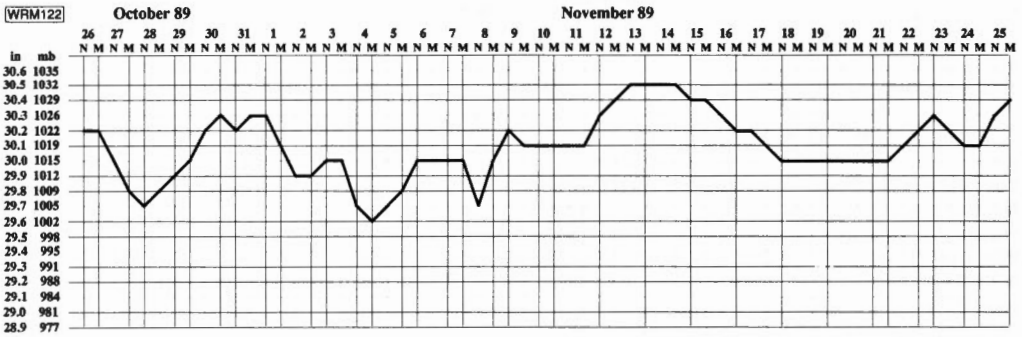


Fig. 6

Beacon	October 26	27	28	29	30	31	November 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	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	
DF0THD								X																	X						
DL0IGI	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	
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	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	
KB4UPI	X	X			X	X		X	X	X	X	X	X	X	X	X	X	X		X	X	X			X		X	X			
KC4DPC	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	
KD4EC	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	
KE2DI			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	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	X	X	X	
KK4M															X	X	X	X	X	X					X		X				
KW7Y/B					X		X	X			X		X		X	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	X	X	X	X	X	
LU1UG	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	X	X	X	X	X	X	X	X	
N8KHE	X							X		X		X	X	X	X			X													
OK0EG				X	X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X		X	X	X	X		X	
OH2TEN	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	X
PT7AAC		X			X	X	X	X	X	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	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	
VE1MUF			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	X	X	X		X	X	X	X	X	X	X	
VE3TEN	X	X	X	X	X	X	X	X	X	X	X	X	X	X																	
VE6YF							X									X										X	X	X	X		
VK2RSY	X	X	X	X	X		X	X	X	X			X		X	X	X	X	X	X		X	X		X	X		X	X	X	X
VK5WI	X		X	X	X			X	X									X										X	X	X	X
VK6RWA	X	X			X	X									X		X		X			X	X		X	X		X		X	
VP9BA								X																							
VS6TEN	X		X		X	X	X	X	X			X	X	X																	
WA4DJS	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	
WA8RUF																		X							X	X	X		X	X	
WC8E	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	
WT8D	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	X	
W7JPI/B	X		X		X		X	X			X	X		X	X	X	X	X			X	X			X	X	X	X			
W8FKL/4			X																												
W8VR		X	X	X	X		X	X		X	X	X	X	X	X	X	X	X		X	X	X		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	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	X	X	X	
ZL2MHF	X		X				X	X				X						X	X	X		X	X			X	X		X	X	
ZS1LA	X	X	X		X	X	X	X	X		X			X	X	X		X	X			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	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	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	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	X	
5B4CY	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	X

Back-Scatter

Solar

From his observatory in Selsey, **Patrick Moore** kindly sent the drawings that he made of the sun's disc showing the individual spots and groups on October 25, Fig. 3 and November 3, Fig. 4, respectively. In Bristol, Ted Waring counted 63 sunpots on the 4th and 42 on the 14th.

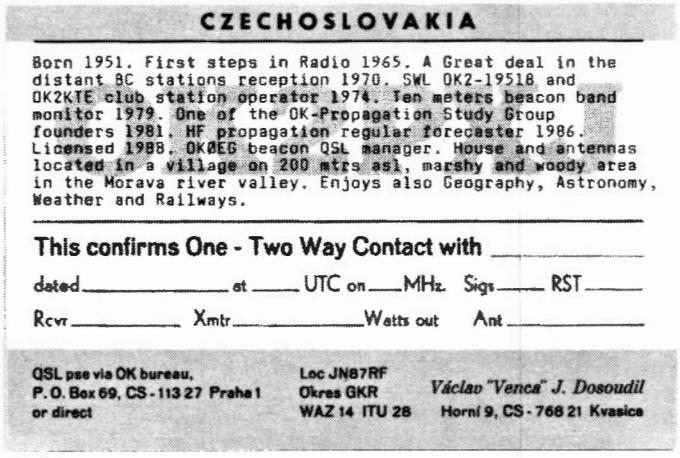
Ron Livesey (Edinburgh) identified 4 active areas on the sun's disc on October 10, 19 and 31, 6 on days 2, 5, 13 and 26 and 7 on the 1st and 20th. Details of **Cmdr Henry Hatfield's** observations for November, with the spectroheliosope installed at his home in Sevenoaks can be seen in Fig. 5. Henry's radio alarm for solar activity went off at 0844 on November 5 when a high level of noise was being generated by the sun on 1297MHz. He also recorded large individual bursts at 136MHz on days 6, 7, 16, 21, 25 and at 1297MHz on the 6th, 16th and 21st.

My thanks to **Neil Clarke G0CAS** (Ferrybridge) for his computer print-out, Fig. 1, showing the daily variations in solar flux throughout October and those two peaks of 236 s.f.u. on the 4th and 16th. **Ern Warwick** (Plymouth) heard solar noise on the 28MHz band at 1513 on October 22 and 0926 on the 26th.

Aurora

"The big aurora period of October 20 to 22 was large in activity but not as large as that of 13/14 March," wrote Ron Livesey, the auroral coordinator for the British Astronomical Association. He received reports of "strong aurora" from Denmark at 1845 on the 20th and "all evening" on the 21st from Scotland. "Although clear in north Scotland to allow observations to be made, it looks as if England was clouded out and missed any aurora that was going except on magnetometers," said Ron. Aurora was seen in various forms by 19 of his observers on the 21st ranging from Aberdeen, Alness, County Clare, Edinburgh, Fortrose, Kinloss, Lancashire, Morpeth, Richmond and south Scotland to France, Germany and down under to New Zealand. "Glows or unspecified forms" of aurora were reported overnight on days 3, 6, 12, 22, 23, 24, 25, 26, 29, 30 and 31 and "rayed arc or band" on the 7th and 8th and "ray bundles" on the 26th.

Doug Smillie (Wishaw) and **Gordon Hunter** (Hamilton) told Ron that auroral reflected signals were received on the 144MHz band on the 20th, 21st and 22nd, Doug noted a blackout on 7MHz on the 19th and Anthony Hopwood (Worcester) reported h.f. fadeouts on days 20, 21 and 22. Ern Warwick heard echos on some 28MHz signals at 1400 on the 13th and 14th and on the north American beacons WA4DJS on days 6, 12, 13, 14, 20 and 22, VE2HOT and WC8E on the 13th and W3VD on the 15th and 22nd. He also noted a weak auroral effect on the German beacon DK0WCY on 10.144MHz at 1715 on the 18th and **Dave Coggins** (Knutsford) copied auroral c.w. from a GM station at 1857 on the 13th and, along with **Mark Appleby G4XII** (Scarborough) received tone-A signals from the 28MHz beacons in Finland, Germany, Norway and Sweden after 1700 on the 17th. Also on the 17th, Dave added the beacons in England, Holland (PA0RYS), Northern Ireland, Scotland and Wales on 50MHz and the beacons in Cornwall and Wrotham, plus Germany and Holland on 144MHz to the score. To further his auroral studies Dave has purchased and assembled a v.l.f. receiver from Cambridge Kits and is delighted to find that, with the aid of a d.c. amplifier, it will drive his home-brew pen recorder. "It works very well," said Dave and I will be pleased to have his future reports on this area of the spectrum.


CZECHOSLOVAKIA

Born 1951. First steps in Radio 1965. A Great deal in the distant BC stations reception 1970. SWL OK2-19518 and OK2KTE club station operator 1974. Ten meters beacon band monitor 1979. One of the OK-Propagation Study Group founders 1981. HF propagation regular forecaster 1986. Licensed 1988. OK0EG beacon QSL manager. House and antennas located in a village on 200 mtrs asl, marshy and woody area in the Morava river valley. Enjoys also Geography, Astronomy, Weather and Railways.

This confirms One - Two Way Contact with _____

dated _____ at ____ UTC on ____ MHz. Sigs ____ RST ____

Rcvr _____ Xmtr _____ Watts out _____ Ant _____

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Fig. 8

Sporadic-E and 'F2' Openings

I received smeary and an unlockable mixture of vision signals on the Band I television channels E2 (48.25MHz) and R1 (49.75MHz) during the early mornings of November 5 and 6. Between 0900 and 1000 on the 6th I received consistent pictures of an orchestra and a play on Ch. R2 (59.25MHz) plus very strong signals from 19 East European f.m. broadcast stations between 66 and 73MHz via a Sporadic-E disturbance which added to this early morning chaos. I used a D100 v.h.f. television converter ahead of a Panasonic video recorder for the vision and my ex-military R216 v.h.f. communications receiver to check the level of the vision sync-pulses and tune through the f.m. broadcast bands. Both receivers are fed by a chimney-mounted horizontal dipole antenna. During the month prior to November 16, **Bob Brooks** (Great Sutton) observed "plenty of 'F2'" and identified pictures from Dubai, Ghana, Iran, North Africa and Malaysia and during periods of Sporadic-E on November 1, 4, 6, 7 and 15 he received programmes and/or test cards from Czechoslovakia, Hungary, Italy, Scandinavia, Spain, Switzerland and the USSR. John Levesley G0HJL (Bransgore) found "Lots of short skip around Europe" on 28MHz on November 4.

Magnetic

The Ap index for October, shown by Neil Clarke in Fig. 2, was generally quiet until the 18th and became unsettled before hitting peaks of 84 and 99 on the 20th and 21st and the various magnetometers used by Anthony Hopwood, **Karl Lewis** (Saltash), Ron Livesey, **David Pettitt** (Carlisle) and Doug Smillie indicated magnetic storms on days 18, 19, 20, 21, 22, 23, 26, 29 and 30.

Propagation Beacons

As usual my thanks are due to Mark Appleby, **Chris van den Berg** (The Hague), **Vaclav Dosoudil OK2PXJ** (Kvasice), Henry Hatfield, John Levesley, **Greg Lovelock G3III** (Shipston-on-Stour), **Ted Owen** (Maldon), **Fred Pallant G3RNM** (Storrington), Ted Waring and Ern Warwick for their 28MHz beacon logs from which I have combined their efforts to produce the chart seen in Fig. 7. Ted Owen reports hearing WA8D send "Hilton Head" on October 27 and YO2KHP give "KN 05 OS" and Ern Warwick heard "CQ CQ QST QST THIS IS A ONE WAY TO HAMS I AM QRP 5 WATTS PLEASE QSL TONY, KC6BSJ 245 UNION St SAN RAFAEL, CA.94901" [28.278MHz] on November 14 and "de KK4FM BEACON IS LAS VEGAS, NEVADA BT" [28.286MHz]. Ern and Greg Lovelock added AL7GQ (28.275MHz), KI4PJ (28.225MHz), KJ6JO/B (28.225MHz) and WA8RUF (28.278MHz) to the first timers list. Readers who have heard the Czechoslovakian beacon OK0EG and would like a QSL card should send their reports to Vaclav Dosoudil, Horni 9, CS-76821, Kvasice. Vaclav's own QSL card, Fig. 8, shows that in addition to the propagation of radio waves he "Enjoys also Geography, Astronomy, Weather and Railways".

Ern Warwick also received signals on most days during this period from the Brazilian and Italian beacons PY2AMI and IK6BAK on 24.931 and 24.915MHz respectively, OH2B, ZS6DN/B, LU4AA and 4X6TU/B on 14.100MHz and infrequently PY2AMI on 18.100MHz, JA2IGY and 4U1UN/B on 14.100MHz and DK0WCY on 10.144MHz.

Dave Coggins usually hears signals from the 144MHz beacons in Angus (GB3ANG) and Wrotham (GB3VHF) daily about S1/2, but reports that GB3ANG increased to S4 at 1245 on November 7. During the opening on the 13th, Mark Appleby heard the beacons DL0PR, GB3ANG, GB3VHF, PI7CIS, PI7ZWL and Y4IB on 144MHz and I see from the December issue of *Mid Sussex Matters*, the newsletter of the Mid Sussex ARS that one of my fellow club members Leonard Killip G0APZ (Hassocks) received a clear signal from GB3ANG during the morning of the 15th and then worked a couple of GMs for the first time on 144MHz. That what openings are for Len, hi!

Tropospheric

The slightly rounded atmospheric pressure readings seen in Fig. 6, were taken twice daily from the barograph installed at my home in Sussex. Readers in several parts of the UK received continental stations in Band II, while tropospheric openings were in progress on October 27 and November 12, 13, 14, 15, 23, 26 and 27. Conditions were very good again on the 29th when I received test cards from Belgium and programmes from France, in Band III (175-230MHz), on my Plustron TVR5D with its own rod antenna, while parked at Wakehurst Place, the National Trust gardens near Ardingly, Sussex.

934MHz

"With high pressure of 1030mb dropping to 1028mb, almost continuous tropospheric conditions were enjoyed on the three days of November 12, 13 and 14," wrote **Terry Wyatt UK-845** (Walton on Thames). He found the path north to south on the first two days and east to west on the latter. Although the contacts he made are too numerous to detail the longest distances achieved were Dorset (150km), Guernsey (290km), Leicester (155km), Norwich (190km), Suffolk (150km) and north Wales (220km). "A great deal of fog covered the country," added Terry who took full advantage of the opening and end up with a log to be proud of. John Levesley UK-627 received signals from Jersey on November 13 and both Guernsey and Jersey on the 14th and heard the Jersey stations working into Leicestershire, Oxford and Swansea.

Keep the reports coming in 1990

Back-Scatter

Broadcast Round-up

Reports to
Peter Shore

Events in Eastern Europe have continued apace in recent weeks, with holes appearing not only in the Berlin Wall but in Eastern Bloc media which, until recently most firmly toed the party line. The turn around in the Czechoslovak media was most dramatic. One week there were reports of the extremist factions which were plotting against the state, the next week interviews with the previously disowned leader of the Prague Spring, Alexander Dubcek. Listeners to Radio Prague and Radio Berlin can only now perhaps realise that they were listening to history in the making. I am including the current schedules for several East European broadcasters to help you tune in and hear what is being said now.

Glasnost continues to permeate the Soviet electronic media, too. A report recently appeared in Radio Vilnius' English language DX programme which explained about the Lithuanian Radio monitoring service. It seems that until recently, although individual listening to foreign radio stations was discouraged, with extensive jamming, Communist Party bosses. "unwilling to expose their tender ears to the noises created on air, preferred to read comfortably the next morning the corresponding texts" of broadcasts which the monitoring service prepared overnight. The monitoring station is located near the Nemiezis settlement, about 10km south-east of Vilnius. It has eight antennas, with the largest of them a Yagi directed to the south-west, together with what were described in the radio station's report as two horizontal and five other (perhaps dipole) short wave antennas. Soviet made professional communications receivers are used and Hungarian tape machines record the programmes which are translated and transcribed by TASS staff. Not quite as comprehensive as the BBC monitoring service, but until now a completely unknown and secretive operation. It is suspected that there are several other major monitoring stations around the Soviet Union, with a large complex near Moscow. This is reputed to supply transcripts of early morning BBC World Service current affairs programmes to high ranking Foreign Ministry staff, in order that they know what is going on in the world at the start of their day.

The Radio Vilnius DX programme has also reported on the transmitter near Moscow used to relay Lithuanian Radio's home service to the Soviet capital. Thus is a former jamming transmitter adapted to short wave broadcasting, located on the borders of the eastern suburbs of the city. Power is just 10kW and telephone lines feed the signal, whilst the antenna beams the signal east and north-west, leading to different reception conditions within the city. In southern parts of the city, co-channel interference from the Radio Moscow Krasnoyarsk transmitter is observed on 6.01MHz, whilst evening reception of the signal on 9.675MHz is reported as impossible because of interference from strong European stations. Relays of Latvian and Estonian home services come from this site, too.

The prospect of Danish broadcasts from Norwegian transmitters seems to have receded further into the future. Danmarks Radio has told the government that it is unable to sign the agreement with the Norwegians since the station does not know how much money will be available from an increased licence fee to pay for the new service. However, the head of Danmarks Radio's short wave service is still optimistic that the relays could start early in 1990. At the end of 1993, Danmarks Radio will decide on whether a new transmitter site should be built in Denmark, or whether the station should participate with the Norwegian authorities in building new joint transmitter sites. In the meantime, the duration of Danmarks Radio's short wave programmes has been reduced from 52 to 25 minutes each, although relays of domestic programming remains unchanged.

European Stations

All time UTC (=GMT)

Here are the schedules of English to Europe from East Bloc countries:

Czechoslovakia - Radio Prague

1530-1625 on 21.505, 17.705, 15.155, 15.11, 13.715, 11.99, 11.685, 9.605, 7.345 & 6.055MHz

1800-1830 on 7.345 & 5.93MHz

1900-2000 on 7.345 & 5.93MHz

2200-2300 on 6.055 & 1.287MHz

Interprogramme

0630-0700 on 9.505, 7.345,6.055 & 1.287MHz

0700-0900 & 0900-1200 on 9.505, 7.345, 6.055 & 1.287MHz

2300-0055 on 9.625, 6.055 & 1.287MHz

English is interpersed between Czech, Slovak, German and French language.

German Democratic Republic - Radio Berlin International

0600-0645 on 13.61, 11.81, 9.645, 6.115 & 5.965MHz

0845-0930 on 21.54, 21.465*, 9.73*, 7.185*, 6.115 & 6.04MHz

1045-1130 on 6.115MHz

1200-1245 on 17.775, 13.69, 9.665 & 6..15MHz

1400-1445 on 6.115MHz

1445-1530 on 9.73MHz

1645-1730 on 9.73 & 7.295MHz

1815-1900 on 9.73, 7.295 & 7.26MHz

2045-2130 on 6.115 & 1.395MHz

2245-2330 on 9.73 & 5.965MHz

* = not Sat or Sun

Hungary - Radio Budapest

1900-1930 on 15.16, 11.91, 9.835, 9.585, 7.22 & 6.11MHz Tuesday only

1930-2000, 2100-2130 on same frequencies

Yugoslavia - Radio Yugoslavia

0100-0145 on 11.735, 6.005 & 5.98MHz

1930-2000 on 17.735, 7.215 & 5.98MHz

2200-2245 on 11.735, 9.66, 9.62 & 7.215MHz

Radio Mediterranean in Malta transmits English between 2230 and 2330 on 6.11MHz, in parallel with m.f. channel of 1.395MHz.

Radio Station Peace and Progress in English for Europe is heard at 2200 on 11.98, 9.58, 9.61, 9.775, 7.205, 7.215, 7.34, 7.36, 7.44, 5.905, 6.145, 4.795 and 1.386MHz.

African & Middle Eastern Stations

Radiodiffusion Nationale du Burundi has moved from 3.30MHz, and now relies entirely on 6.14MHz, making it a difficult catch in the United Kingdom. English is carried Monday to Friday for an hour starting at 1500.

Radio Baghdad in Iraq is now broadcasting its English service to Europe on 13.66 at 2100 until 2250.

Libya has been noted during the evening on new 15.435MHz with Arabic in parallel with 15.415MHz at around 1900.

The Voice of Nigeria continues to experience transmitter problems, with all but the West African services off the air. As a result, programmes are transmitted entirely on the frequency of 7.255MHz, with English between 0455 and 0600, 0800 to 1100 and 1400 until 1700. French is at 0600-0700, 1200-1400 and 1800 until 2200. Hausa is heard 0700-0800 and 1700-1800.

TWR Swaziland in English uses 15.21MHz at 1600-1700 and 1800-1845.

Asian & Pacific Stations

The English service of Radio Afghanistan operates to Asia between 0900 and 1030, but is audible in Europe on 17.655 and 21.60MHz, both from transmitters in the USSR.

AWR-Asia from Guam has English at 0000 on 15.125, 0200 on 13.72 (weekdays only) and 2300 on 15.125 at weekends.

Radio Japan in English to Europe is now:

0700-0800 on 15.325, 17.89 & 21.69MHz

2100-2130 & 2200-2400 on 11.835MHz

Radio Enga in Papua New Guinea could be a good catch - it has started to use 2.41MHz. Try between 1945 and 2200 and 0645 until 1300.

English services from Radio Veritas Asia seem to be on different frequencies from those listed on the station's schedule, which suggests at 0130 that 15.22 and 15.36MHz should be heard, although it appears to be operating on 15.46 and 17.795MHz variable to 17.80MHz. At 1500, 15.445 and 9.525MHz are listed, but 11.74 and 15.445MHz have been noted.

North, Central & South American Stations

RAE Argentina now has two transmitters working, having had one off the air following a failure over a year ago. English is now at 1630, 2100, 0100 and 0300 (following the country's time change in October). Frequencies to try are 15.345 and 11.71MHz.

Radio Canada International's German Service seems to have won a reprieve since it is still on the air at the time of writing. English services to Europe are now:

0615-0630 on 11.84, 9.76, 9.74, 7.155, 6.15 and 6.050Hz*

0645-0700 as 0615*

1545-1600 on 21.545**, 17.82**, 15.325, 15.315, 13.65**, 11.935, 11.915 & 9.555MHz

1715-1730 on 21.545, 17.82, 15.325, 13.65, 7.235 & 5.995MHz

1930-2000 on 17.875, 15.325, 11.945, 7.23 & 5.995MHz*

2200-2300 on 11.945 and 9.76MHz (C8C relay Mon-Fri, RCI at weekends)

English to Africa:

1800-1830 on 17.82 & 15.26MHz (to 1900 at weekends)

1900-1930 on 17.82 & 15.26MHz

2130-2200 on 17.82, 15.15 & 11.88MHz

* = Monday to Friday: ** = Monday to Saturday

HCJB in Quito, Ecuador has been experiencing transmitter difficulties lately, which has meant some frequencies have been off the air. A new valve for the 100kW Harris transmitter has arrived and by the time this is in print, all should be well with the Andean station. New studios are planned, to bring to nine the total in Quito and a complete upgrading of the existing five will also take place during 1990.

The current European schedule is:

0700-0800 on 9.61 & 6.05MHz

1900-2000 on 21.47, 15.27 & 17.79MHz

2130-2200 on 21.47 & 17.79MHz

For the South Pacific:

0710-0800 on 11.925, 9.745 & 6.13MHz

0800-1100 on 11.925 & 9.745MHz

A separate service is carried from 0800 until 1000 on 6.13MHz.

On 20 January 1990, the DX Partyline programme will host a phone-in at 0730 to the European continent, and at 0200 to North America. To take part, dial 010 (from the UK) 593 2 241560. This will connect directly to the phone-in studio.

HCJB now has a FAX number which can be used to send in reception reports. The number is 593 2 447263.

WCSN has English to Africa at 0100-0600 on 9.84MHz and to Europe pn the same channel from 0600 until 1000. Between 1000 and 1200, programmes are beamed to North America on 6.15MHz.

Any reports for Peter can be sent via the Editorial Offices

Back-Scatter

ATV

Reports to
Andy Emmerson G8PTH
71 Falcutt Way
Northampton NN28PH

Last time I suggested that 70cm lives on and this is confirmed by **Jamie Powers G0JNK** of Ambergate. He writes, "Just a quick note to say that good old 70 is not dead - in fact I've found it quite active. From my shack five miles north of Derby I have contacted the following stations. Unfortunately not all were successful TV contacts.

"Around the Coventry area there are John G1IJT, Tony G0HOV, Len G8ONX, Dave G1GPE (Leamington) and Barry G6IKQ (Banbury). In the Birmingham area there are Arthur G5KS, Ken G1UGD and Paul G0EJL. They have regular nets in that area on Sunday mornings and Tuesday evenings.

"In the Derby area we find Pete G6KUI, Dave G8TNE, Dave G4TAY, John G6CTD, 'eyewig' Robert G7DDR and myself. Also further north near Mansfield is Chris G1UAZ and others who also have regular SSTV nets. I hope this list of callsigns will help dispel any thought that there is no activity on seventy." Excellent, and I hope to be rejoining this bunch soon myself!

SSTV Lives Too

Talking of SSTV nets we have a welcome note from **Dick G3LUI**, one of the old-stagers of SSTV.

"No doubt you will be relieved to hear that slow-scan is alive, well and living in south-east Essex. The Wednesday night net continues each week plus individual stations active on other evenings. Modes in use include 8, 16, 25, 32, 72 and 96-second frames. Several stations are equipped for high resolution pictures using the Amiga computer, Robot 1200C and the 'Wallywonga LM9000' kit. Colour is also available in 8-second frame and 25-second line sequential from Wraase, Robot 400C and WCY/ENA equipment. If anybody is interested in joining us please just call in on 144.5MHz any time after 2030 hours local - or contact G3LUI."

Good news - I know that the Essex SSTV net has several long- distance participants, so if you can get in on the 144MHz band why not try it? I presume that the use of a Wallywonga is not essential: I always thought that SSTVers were a bit of a race apart but some of their equipment leaves me standing. Seriously, we could do with a letter from someone to state definitively which standards SSTVers use these days. ('Sure, we're in favour of standards - that's why we have so many of them!').

Out and About

The BATC has been attending several exhibitions during the past few months: our presence helps keep our hobby in people's minds, enables us to keep in touch with members and also introduces the hobby to people who have never heard of ATV before. One such example was the Institute of Videography's national convention during October. Held over two days at the National Motorcycle Museum (between Coventry and Birmingham), this exhibition was primarily for wedding videographers and 'serious' devotees of the video hobby.

At the show there were presentations from all the major video suppliers and I think a fine time was had by all. The venue was pleasant without being crowded and we were able to introduce amateur television to folk who had never realised that video need not be expensive if you start doing things yourself. The institute does a useful job in co-ordinating an otherwise rather dispersed group of video users, and if you'd like to get in touch with them you can write to the Institute of Videography at PO Box 774, Erdington, Birmingham B23 7LF.

The Summer Fun Starts Here

"Summer is here at last", writes **Michael Sheffield ZL1ABS**. No, he's not out of his mind, merely resident 'down under' in New Zealand! "I have recently been out and about portable getting my 24cm f.m. ATV receive equipment into good condition. I have a home-built 10-element loop Yagi (brass elements and boom) and a Microwave Modules converter. I've added a BFR91A internally as the MM is only a diode mixer with no r.f. stage). This feeds a Yaesu FRG-9600, with another BFR91A ahead of the Yaesu.

"The Yaesu has an a.m. video board fitted, so its slope detection at the moment. Also the IF amp in the MM has been removed as it is too narrow-band for the 130-140MHz i.f. out I need. With Ralph ZL1TBG sending 10 watts I have copied him 26km away so far. Further improvements are underway - a MRF901 pre-amp to try ahead of the MM converter and a FM-IF to put inside the Yaesu. It's a toss-up whether I use a NE564 or the better NE568.

"The object of all this portable work is to get the gear working well enough to bridge the 30km gap between ZL1TBG's QTH and mine. A trial run idea is to get all the gear up on my roof and see what signals are like before I take the plunge with long Yagis and expensive 9913 coaxial cable.

"During the winter I have been building 70cm transmitters and receive converters for other people as part of the kit offer by the Auckland VHF Group. I also built a 2 watt amplifier for my wideband f.m. sound transmitter. This has meant a 10dB improvement in vision-sound ratio - 40 watts vision and 2 watts sound. One of my regular contacts can now hear my sound where he could not before, while another reports that there is less hiss on the sound. As the vision antenna is 13-elements and the sound antenna only 7-elements I could probably do with even more sound power.

"National VHF Field Day is December 9/10 and I have found a few hams to come north with me to a good high spot on the western coast near Mongonui Bluff. As the distance is more than 100km to most parts of Auckland a good points score is likely. I hope to have 6 metres, 2 metres, 70cm, 23cm phone and 70cm ATV. I haven't got a working 23cm transmitter for ATV so I might take the receive gear for a trial run anyway.

"The ATV repeater in Auckland has been back on the air for a few days now as a beacon. Some problems with the video sync detector locking up meant that it is back on Quentin ZL1BPW's workbench. Oh dear, we have't had a trouble-free run of more than a week in the last five years! That's life ... My savings towards attending Dayton in 1990 are going well. Still I will have to keep saving over the next few months if I am to have the extra need to visit the BATC convention as well. I'll be looking at getting a 24cm FM-TV transmitter kit or built-up and high-gain aerials when I make it to the UK." Well done Michael - but how do you find time for all this?!?

News from GB3ET

Back to the UK then and Clive G8EQZ advises that GB3ET, the Emley Moor TV repeater is now running on a Solent one-watt transmitter he rebuilt. This feeds a power amplifier belonging to Barry G6LIC and temporarily on loan. This is working very nicely, far better than the commercial product in use before. In due course the loan equipment will be replaced with GB3ET's own gear. Clive is also pressing ahead with plans for GB3KT, a television repeater for Kingston upon Hull. The logic is already built and running, and they are now looking for a convenient site. Clive has been promoting 24cm TV and believes that if a job is worth doing, it's worth doing well. Accordingly he is now collecting parts for a 200 watt 24cm TV transmitter using water-cooled 2C39 valves! Apparently three of these are to be built, so watch this space.

Continent Calling

Crossing the Channel, a copy of ON-Screen informs us that the Belgian ATV Working Group is in fine form. They held a convention in Lierre last September and the next will be in the Gent region during April.

From Germany it is reported by the German ATV club that the microwave managers of the national societies have decided to attempt to harmonise the microwave amateur bands across Europe and to try and achieve common allocations on a primary basis. "Pursuing this goal, even the reduction of national allocations would be toleratedd as a trade-off towards European harmonisation". At the moment most of the GHz allocations are on a secondary basis and cover different segments of the bands in different countries. In some cases international amateur contacts are not possible because of mutually exclusive allocations.

A particular problem in West Germany is on 13cm where TV broadcasters have been allotted three channels for vision links and there are seven radio channels for industry, reactors, the police and the military across the band. As these have primary status ATV operations (particularly repeater outputs) on 13cm are being restricted. What with dense packet radio activity on 70cm and loads of radar on 24, the only clear band for ATV seems to be 10GHz!

In the USA (I know it's not across the Channel!) **John KD0LO** writes from St Louis. He uses the Amiga computer for ATV captioning and is hoping to put up a fixed 10GHz vision link to his friend Dave WB0ZJP. On August 30 he reports there was a tremendous band opening and he was able to work into Ohio, Indiana and northern Illinois on 439MHz. He has been spending most of his hobby time developing a 900MHz f.m.-TV transmitter. This one is phase-locked and channelised using a synthesised local oscillator. Dave is helping the development process and the goal is to make it work both a.m. and f.m. for maximum versatility.

Back in the UK

The mystery 24cm video transmissions at Canterbury were identified to a couple of G3s (not club members) who were apparently developing the gear for commercial use. They ought to know better about setting up shop in a busy part of the band and not identifying their transmissions. My informant advises they were using 2.5 watts and an etched printed circuit board 'postcard' antenna: this kind of configuration is popular with law enforcement agencies (and buggists!).

Roy G6OKB has got himself an Atari ST computer and seems very pleased with it. He is puzzled, though, why he gets line pulling and a ripple running down the screen when he records captions on a VCR. Can anyone help? During the past year the East Kent video net crowd have run four special event demonstrations in conjunction with the Dover YMCA radio club. These have aroused a lot of interest, also, with the public at large.

G7BVH is a new station belonging to Mick, a ham in Sandwich (not my joke, honest). Regular participants in the net are David G0DQI, Brian G8ZYZ, Les G3LCW and Roy G6OKB. Les and Roy covered last year's Bleriot cross-channel flight for ATV and got themselves press passes to the landing site. They pooled their video gear for the best possible outfit and managed to get good footage of both the crashed attempt and the successful flight an hour later. Afterwards they edited this up for showing on the net. G0DQI has ben making improvements to his antenna system on 70 and now receives P5 pictures from Roy. They have also been experimenting on 24cm and have had the best results with the panel array designed by G8LES with satellite receivers for the video.

Radio Diary

January 27: The Lancastrian Rally will be held at the University of Lancaster. **Sue Griffin G1OHH. Tel: (0524) 64239.**

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 Centon 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, 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 Pontefract & DARS 11th Components Fair will take place in the Carleton Community 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 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 trand 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 has free ample parking. **Frank Martin G4UMF. Tel: (0952) 598173**.

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

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

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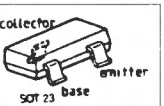

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