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Practical Wireless

THE RADIO MAGAZINE

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DIRECT CONVERSION RECEIVER
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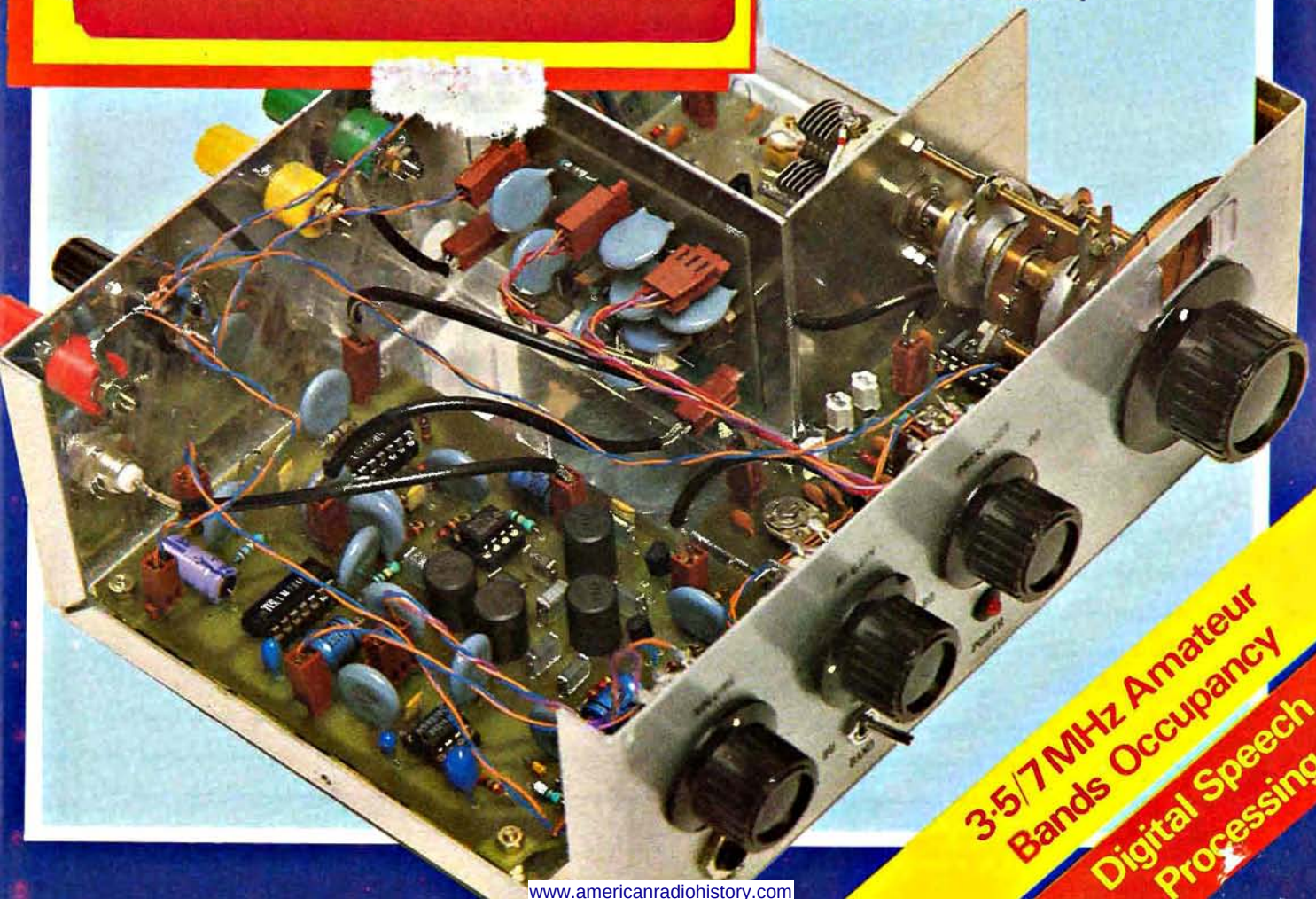

3·5/7 MHz Amateur Bands Occupancy

Digital Speech Processing

FOR THE Radio ENTHUSIAST ...

Practical Wireless

APRIL 1985 VOL. 61 NO. 4 ISSUE 937

Contents

FREE WITH THIS ISSUE!
USEFUL POCKET MAGNIFIER!

We are sorry that, because of pressure on editorial space, we have had to hold over several planned features, including the "Radio Wave Propagation" and "Valved Communications Receivers" series.

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LOWE SHOPS TRIO

TS830S

hf transceiver

The TRIO TS830S is for the operator who wants a dedicated amateur bands only transceiver, who is used to and wants a pair of rugged 6146B valves in the PA stage and who wants a compact rig which has its own in-built power supply. The TS830S is for the radio amateur who requires a rig capable of rising above today's crowded band conditions, a rig that has, as standard, the necessary features that will produce consistently good contacts where other lesser equipment would fail. The TRIO TS830S, a proven rig with an impeccable pedigree.

The TS830S covers on USB, LSB and CW the full amateur bands from 160 through to 10 metres.

Convenient to use, the transceiver has its own in-built power supply.

VBT (variable bandwidth tuning) enables the operator to, at will, vary the IF filter passband width and establish optimum IF bandwidth relative to the interference being experienced.

The IF shift control allows the IF passband to be moved up or down in frequency without having to retune the receiver. Hence, an unwanted signal, present in the IF passband, may be attenuated significantly by moving the passband in the appropriate direction.

As the IF shift and VBT are independently adjustable they can, to advantage, be used together.

The tunable notch filter in the TS830S is a high-Q active circuit in the 455KHz second IF. Sharp, deep notch characteristics will eliminate a strong interfering carrier within the passband of the receiver section.

The RF speech processor in the TS830S provides added audio punch and increases the average SSB output power whilst suppressing sideband splatter. Compression levels can be monitored and controlled from the front panel.

To cope with pulse type (such as ignition) noise, the transceiver has an in-built noise blanker.

For perfect listening, a tone control adjusts receiver audio frequency response to suit operating conditions.

Both RIT and XIT, transmitter as well as receiver incremental tuning are included to aid operating, XIT being a distinct advantage when calling a station that is listening 'off frequency'.

It is possible to monitor the transmitted audio in order to assess the effects of the speech processor: a most useful feature ensuring perfect signal reports.

TS830S amateur band transceiver ..... £832.75 inc VAT, carr £7.00

Whenever you enter a LOWE ELECTRONICS' shop, be it Glasgow, Darlington, Cambridge Cardiff, London or here at Matlock, then you can be certain that, along with a courteous welcome, you will receive straightforward advice. Advice given, not with the intention of 'making' a sale, but the sort which is given freely by one radio amateur to another. Of course, if you decide to purchase then you have the knowledge that LOWE ELECTRONICS are the company that set the standard for amateur radio shops and after-sales service. The shops are open Tuesday to Friday from 9.00 to 5.30 pm. Saturday from 9.00 to 5.00 pm except Glasgow, which on Tuesdays opens at 10.00 am. For lunchtime closing arrangements, please check with the individual shop.

In Glasgow the LOWE ELECTRONICS' shop (the telephone number is 041 945 2626) is managed by Sim GM3SAN. Its address is 4/5 Queen Margaret's Road, off Queen Margaret's Drive. That's the right turn off Great Western Road at the Botanical Gardens' traffic lights. Street parking is available outside the shop and afterwards the Botanical Gardens are well worth a visit.

In the North East the LOWE ELECTRONICS' shop is found in the delightful market town of Darlington (the telephone number is 0325 486121) and is managed by Don G3GEA. The shop's address is 56 North Road, Darlington. That is on the A167 Durham road out of town. A huge free car park across the road, a large supermarket and bistro restaurant combine to make a visit to Darlington a pleasure for the whole family.

Cambridge, not only a University town but the location of a LOWE ELECTRONICS' shop managed by Tony G4NBS. The address is 162 High Street, Chesterton Cambridge (the telephone number is 0223 311230). From the A45 just to the north of Cambridge turn off into the town on the A1309, past the science park and turn left at the first roundabout, signposted Chesterton. After passing a children's playground on your left turn left again (between the shops) into Green End Road. Very quickly, and without you noticing it, Green End Road becomes High Street. Easy and free street parking is available outside the shop.

For South Wales, the LOWE ELECTRONICS' shop is located in Cardiff. Managed by Richard GW4NAD, who hails from Penarth, the shop (the telephone number is 0222 464154) is within the premises (on the first floor) of South Wales Carpets, Clifton Street, Cardiff. Clifton Street is easily found, being a left turn off Newport Road just before the Infirmary. Once in Clifton Street, South Wales Carpets is the modern red brick building at the end of the street on the right hand side. Enter the shop, follow the arrows past the carpets, up the stairs and the 'Emporium' awaits you. Free street parking is available outside the shop.

LOWE ELECTRONICS' London shop is located at 223/225 Field End Road, Eastcote, Middlesex (the telephone number is 01 429 3256). The shop managed by Andy G4DHQ is easily found, being part of Eastcote tube station buildings and as such being on the Metropolitan and Piccadilly lines (approximately 30 minutes from Baker Street main junction). For the motorist, we are only about 10 minutes' driving time from the M40, A40, North Circular Road (at Hanger Lane) and the new M25 junction at Denham. Immediately behind the shop is a large car park where you can currently park for the day for 20p. There is also free street parking outside the shop.

Although not a shop there is on the South Coast a source of good advice and equipment – John G3JYG. His address is 16 Harvard Road, Ringmer, Lewes, Sussex (telephone 0273 812071). An evening or weekend telephone call will put you in touch with John.

Finally, here in Matlock, David G4KFN is in charge. Located in an area of scenic beauty a visit to the shop can combine amateur radio with an outing for the whole family. May I suggest a meal in one of the town's inexpensive restaurants or a picnic on the hill tops followed by a spell of portable operation.

LOWE ELECTRONICS

Chesterfield Road, Matlock, Derbyshire. DE4 5LE.
Telephone 0629 2817, 2430, 4057, 4995. Telex 377482.

the **TELEREADER** range

Those of you who have seen TELEREADER products will know that outstanding performance allied with ease of operation are the hallmarks of this particular company. The four models in our range are the CWR685E combined transmitter and receiver, the CWR675E having receive only and built in monitor, the CWR670E being a CWR675E without monitor and the CODE MASTER CWR610E which not only receives CW and RTTY (Baudot and ASCII) but doubles as a morse tutor. TELEREADER also have an AMTOR unit, the AMTOR10A, details for this are available on request.

The CWR685E has many outstanding features . . .
CW, Baudot and ASCII receive and transmit: CW at 3-40wpm, RTTY at 45 45-300 bauds (six speeds).
Built-in 5in green phosphor screen g ving a clarity and brightness that I have not seen before.
An external QWERTY keyboard housed in a substantial metal case and supplied with 3 feet of connecting cable. Not a 'rubber key or plastic faced touchpad' but a true keyboard.
6 Memory channels (63 character capacity each) In addition the 4 standard test transmissions (RY, QBF, Baudot all characters, ASCII all characters) are permanently stored in memory and can be recalled and transmitted in a variety of formats. 480 characters of transmitting buffer memory are also included.
Automatic and manual transmit/receive switching.
Printer output: Centronics compatible parallel interface for hard copy

The TELEREADER CWR675E has a similar specification to the CWR685E having the built-in 5in green monitor but not including the transmit facility. The CWR675E provides for both the enthusiastic radio amateur and short wave listener access to both the amateur and commercial world of RTTY as well as providing a visual display of received morse code The CWR670E is as the CWR675E but does not have the monitor.

The TELEREADER CWR610E Code Master is a compact CW/RTTY converter which also doubles as an audio-visual morse tutor. Features of the CWR610E Code Master are
CW, RTTY (Baudot and ASCII reception).
CW: 3-40wpm, Baudot/ASCII 45-600 bauds (seven speeds).
CW morse practice at 2-30wpm.
Display characters: 612 characters x 2 pages
Centronics compatible parallel interface for printer output.
UHF/VIDEO display output.

CWR685E	full receive/transmit	£771.64 carr £7.00
CWR675E	receive only with monitor	£449.17 carr £7.00
CWR670E	as above but without monitor	£392.80 carr £7.00
CWR610E	codemaster	£195.00 carr £3.00
PK675	printer for CWR675E	£189.00 carr £7.00
AMTOR10A	amtor unit	£253.20 carr £3.00

all prices include VAT

TS430S

The TS430S combines the facilities of a solid state HF transceiver with those of a general coverage receiver. It's the ideal rig for the radio amateur who not only wants to communicate with his fellows but also enjoys listening to the world. As an amateur band transceiver the rig covers top band to ten metres, as a short wave receiver coverage is from 150KHz to 30MHz. Operating on AM, FM, USB, LSB and CW the TS430S is extremely compact and, as such, is the perfect transceiver for mobile, portable or base station operation.
TS430S HF transceiver with general coverage receiver ..... £769.50 inc VAT.

TW4000A

Taking into account the amount of activity on the 2 metre FM channels it is not surprising that many people have turned their attention to the wide open spaces of 70 centimetres. With the TW4000A, TRIO have produced a dual band FM transceiver that gives its owner the best of both worlds. Facilities include 10 memories, two VFO's, priority channel, full repeater operation, band scan and memory scan. In memory scan mode the rig can be instructed to look for either 2 metre or 70 centimetre signals. The transceiver produces 25 watt RF output on both bands and comes complete with mobile mount and microphone. For greater safety whilst mobile the optional VS1 board will announce frequency, memory channel and whether or not the rig is set on repeater shift.
TW4000A dual band FM mobile ..... £536.51 inc VAT.

R600

For those who are banned from the house and have to operate from the shed at the bottom of the garden, why not consider an R600 to monitor the bands from the comfort of the fireside. No wife would forbid such an attractive looking receiver in the lounge, after all it could also be used to listen to *Women's Hour*. The R600 is a basic receiver covering from 150KHz to 30MHz and having switched upper and lower sidebands, wide and narrow am and cw. It has a 20dB attenuator and a noise blanker fitted as standard. Operation is simple, select the mode of operation, turn the MHz dial to the correct band and, by using the VFO knob, tune to the desired frequency. The clear digital readout makes station selection simple. The TRIO R600, your passport to comfortable listening.
R600 general coverage receiver ..... £299.52 inc VAT.

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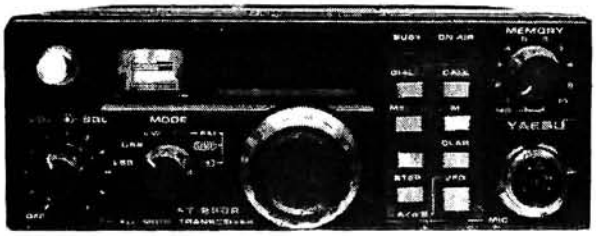

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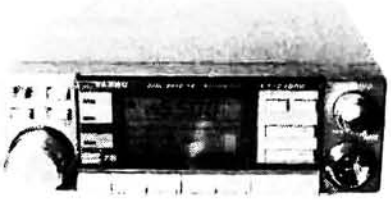

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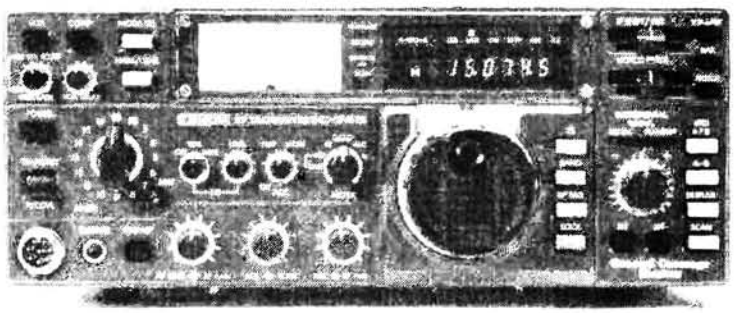

ICOM's IC-745 is the all-in-one transceiver featuring an HF all band SSB, CW, RTTY, AM (receive only) ham transceiver, plus a general coverage receiver. Options for FM transceive and an internal power supply make the IC-745 the complete transceiver in an all-in-one package

The receiver section features a 100KHz to 30MHz general coverage receiver, this allows access to all HF bands plus all the frequencies in between. The IC-745 has an adjustable AGC circuit and DFM (Direct Feed Mixer) giving a wide dynamic range of 103dB with an intercept point at + 18dBm. Exceptionally clean reception is achieved with a low noise PLL circuit and a 70MHz first IF.

The IC-745's features include IF shift, 16 programmable memories with lithium battery back-up, passband tuning, a noise blanker both wide and narrow, threshold level control, notch filter, receive audio tone control and an all mode squelch. Also available is a front end switchable receiver preamp providing 12dB gain. RIT has a ±1KHz range.

We could go on all day about the 745, but if you need the full story get in touch with us and we will send you a detailed leaflet.

IC-290D/290E

290D is the state of the art 2 meter mobile, it has 5 memories and VFO's to store your favourite repeaters and a priority channel to check your most important frequency automatically. Programmable offsets are included for odd repeater splits, tuning is 5KHz or 1KHz.

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*AT THE LAST COUNT

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IC-02E, IC-04E

The direct entry microprocessor controlled IC-02E is a 2 meter handheld features include: scanning, 10 memories, duplex offset storage in memory and odd offsets also stored in memory. Internal Lithium battery backup and repeater tone are included. Keyboard entry is made through the 16 button pad allowing easy access to frequencies, duplex, memories, memory scan and priority.

The IC-02E has an LCD readout indicating frequency, memory channel, signal strength, transmitter output and scanning functions. New HS-10 Headset, with earphone and boom microphone, which operates with either of the following:- HS 10-SB Switch box with pre-amplifier giving biased toggle on, off and continuous transmit. HS 10-SA Voice operated switch box, with pre-amplifier, mic gain, vox gain and delay. The IC-2E and 4E continue to be available.

Agent: Gordon G3LEQ, or telephone Knutsford (0565) 4040. Please telephone first, anytime between 0900-2200 hrs. **Gordon also sells Yaesu products.**

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NEC SHOW SPEC

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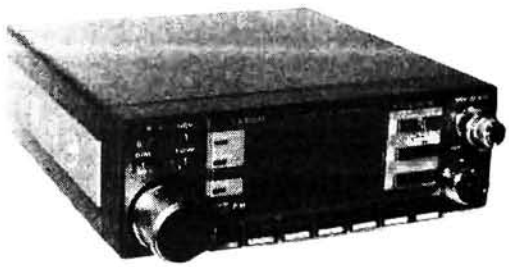

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MAINS ISOLATORS Pri/Sec 0-120V×2 (60-1KVA TAP SECS)

VA	Price	P&P
*20	5.82	1.60
60	9.49	1.80
100	11.08	2.00
200	15.69	2.25
250	18.97	2.64
350	23.47	2.70
500	29.23	2.95
750	41.28	3.70
1000	53.80	4.00
1500	68.37	4.70
2000	82.27	5.10
3000	115.35	OA
6000	246.45	OA

*115 or 240V Pri 240V

400/440V ISOLATORS to 200/240V C.T.

VA	Price	P&P
60	9.50	1.80
100	11.08	2.00
200	15.68	2.25
250	18.97	2.40
350	23.47	2.70
500	29.23	2.95
1000	52.98	4.00
2000	82.27	5.00
3000	115.37	OA
6000	228.75	OA

12/24V or 12-0-12V 2×12V Secs. Pri. 240V

12V	24V	Price	P&P
0.3	.15	2.41	.90
1	.5	3.19	1.20
2	1	4.25	1.20
4	2	4.91	1.60
6	3	7.69	1.60
8	4	8.98	1.60
10	5	9.82	1.80
12	6	10.89	1.90
16	8	12.97	2.12
20	10	17.46	2.44
30	15	21.69	2.64
60	30	44.45	OA
83	41	51.20	4.50

A M P S

96/48V. Pri. 2×120V Secs. 2×36/48V

72/96	36/48	Price	P&P
0.5	1	5.37	1.20
2	4	14.69	2.20
3	6	17.79	2.40
5	10	32.23	3.20
6	12	40.36	3.50
8	16	44.03	3.75

50/25V or 25-0-25V 2×25V Tap Secs. Volts available 5, 7, 8, 10, 13, 15, 17, 20, 25, 30, 33, 40, 20-0-20 or 25-0-25V

50V	25V	Price	P&P
0.5	1	4.13	1.40
1	2	5.03	1.50
2	4	8.69	1.84
3	6	10.36	1.90
4	8	14.10	2.12
6	12	18.01	2.20
8	16	24.52	2.70
10	20	30.23	3.00
12	24	36.18	3.20

A M P S

60/30V or 30-0-30V Pri. 2×120V. 2×30V Tap Secs. Volts available 6, 8, 10, 12, 16, 18, 20, 24, 30, 35, 40, 48, 60, 24-0-24 or 30-0-30V.

60V	30V	Price	P&P
0.5	1	4.70	1.50
1	2	7.15	1.50
2	4	9.20	1.90
3	6	13.31	2.00
4	8	15.15	2.20
5	10	19.16	2.20
6	12	21.86	2.65
8	16	30.72	3.00
10	20	35.76	3.30
12	24	41.22	3.50

A M P S

MINIATURES (SCREENS)

Sec V	A	Pri	P&P
3-0-3	.2A	3.11	.90
6×2	1A×2	3.45	1.20
9-0-9	.1	2.59	.90
9×2	0.33×2	2.41	.90
8-9×2	.5×2	3.36	1.20
8-9×2	1A×2	4.27	1.40
15×2	.2A×2	2.41	.90
12-0-12	.05	3.11	.90
20×2	.3×2	3.39	1.20
20,12,0,12,20	.9	4.13	1.20
15-20×2	1A×2	5.80	1.60
15-27×2	.5×2	4.83	1.40
15-27×2	1A×2	7.30	1.60
0-CT-15V	.5	2.53	.90
0-CT-15V	4A	6.93	1.40

WINDING SERVICES
3VA-15KVA 2 or 3-phase
Plus Toroids
Stock items by return
PLEASE ADD 15% VAT TO ALL ITEMS AFTER P&P

30/15V or 15-0-15V 2×15V Tap Sec. Volts avilable 3, 4, 5, 6, 8, 9, 10, 12, 15, 18, 20, 24, 30 or 15-0-15V

30V	15V	Price	P&P
0.5	1	3.19	1.20
1	2	4.32	1.40
2	4	6.99	1.60
3	6	8.10	1.85
4	8	9.67	1.90
5	10	11.95	2.00
6	12	13.52	2.00
8	16	18.10	2.26
10	20	20.88	2.26
12	24	23.20	2.50
15	30	26.60	3.00
20	40	35.64	4.83

A M P S

AUTOS 105, 115, 220, 230, 240V For step-up or down

VA	Price	P&P
80	4.84	1.40
150	7.01	1.60
350	11.84	2.00
500	13.30	2.24
1000	22.70	2.80
1500	28.17	3.20
2000	42.14	4.00
3000	71.64	4.80
5000	108.30	OA

CASED AUTOS 240V Cable I/P

VA	Price	P&P
20	7.21	1.50
80	9.35	1.60
150	12.10	1.90
250	14.73	2.00
500	24.14	2.20
1000	33.74	2.80
2000	60.47	4.50
3000	86.80	6.50

BRIDGE RECTIFIERS

115V USA Skts O/P		
1A	400V	.29
2A	200V	.52
12.5A	500V	3.83
35A	100V	2.30
50A	100V	3.20

INVERTERS 12/24V DC in 240V AC out (13A skt)

100W	£64.90
250W	£172.00
500W	£239.50
1000W	£396.72

CONSTANT VOLTAGE TRANSFORMERS 1% Spike-free stable emins

120VA	£148.80
250VA	£179.69
500VA	£215.91
1kVA	£338.40
2kVA	£584.50
6kVA	£1587.00

AVOS & MEGGERS

8 Mk.6 (latest)	£138.70
73	£78.90
MM5 Minor	£52.00
DA211 LCD	£88.40
DA116 LCD	£140.30
DA117 Autorange	£157.00
2000 LCD	£72.80
Megger crank	£114.40
Megger Batt.	£85.50

P&P £2.00 VAT 15%

WIRELESS WORLD
MODEM project 600Ω line isolator + mains transformers £6.90 inc. V.A.T.

METAL OXIDE ¼W 5% ELECTROSIL TR4 RESISTORS £1/100
12, 33, 47, 390, 430, 510, 560, 1K, 1K1, 1K3, 1K6, 1K8, 2K, 3K, 3K9, 15K, 16K, 24K, 27K, 39K, 56K, 82K, 100K, 110K, 120K, 130K, 150K, 200K, 220K, 270K, 300K. p&p 20p

EDUCATIONAL METERS
Finger screw front terminals 0-10A, or 0-30V DC 78×96mm
£3.98 + 50p P&P

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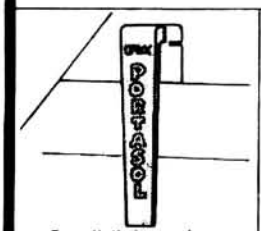
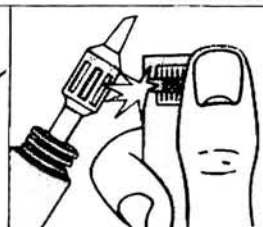
New from ORYX-PORTASOL Portable Gas Soldering Iron

ORYX – market leaders in soldering irons and accessories introduce the revolutionary PORTASOL. This new approach to catalylic soldering iron technology is truly pocket portable (173 mm) and independent of any external energy source. PORTASOL is powered by ordinary cigarette fuel and one filling lasts for 60 minutes continuous use.

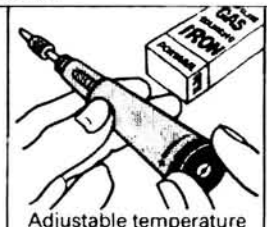


Small, light and can be carried in the top pocket.

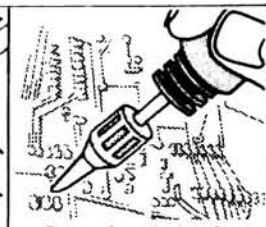
Powered by ordinary cigarette lighter fuel.



Flint ignition system built into the cap.



Adjustable temperature equivalent to electric soldering irons 10 to 60 Watt.



Ease of soldering for engineers, hobbyists, repair men etc.

- ★ Portasol makes an ideal and handy present.
- ★ Immediately available for use anytime anywhere.
- ★ Portasol meets all safety standards.
- ★ No problem with statics.
- ★ Adjustable temperature for sensitive components.

ONLY £17.25 INCLUDING VAT, P&P

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Please send.....(qty.) PORTASOL at £17.25. I enclose cheque/P.O./cash for £..... or debit my Barclaycard no. .....Access no. ..... Expiry date .....

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Communications Terminal New Tonno 777 Tx/Rx, use it with any Micro with RS232. AMTOR/RTTY/CW. For £399. Also Tonno Q5000 AMTOR/RTTY/CW/ Keyboard + 5" Monitor. P.O.A.
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TS 711E
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ONE OF THE MOST POWERFUL, NEATEST AND SMALLEST 2M PORTABLES.
£175

TR2600
INCLUDING DIGITAL CODE SQUELCH
£270

dressler – ara 30 – active antenna
200 kHz . . . 40 MHz

Professional electronic circuitry with very wide dynamic range. Meets professional demands both in electronics and mechanical ruggedness. 120 cm long glassfibre rod. Circuit is built into waterproof 2,5 mm thick aluminium tube. Ideal for commercial and swl-receiving systems.

£90

KENWOOD TRIO TM201A SPECIAL OFFER
£295.19
FOR ONE MONTH ONLY **£265.00**

VHF POWER AMP.

D200 2MTR. 300w F.M. 550w SSB	£675
D200S 2MTR. 400-500w 1Kw. D.C. in	£799
D70 70cms 325w F.M. 500w SSB	£799

NEW MODEL DUE TO ARRIVE
1296 MWZ. 1w-in-10w out.

MAST HEAD PRE-AMPS GAAS FET
POWER HANDLING UP TO 1KW
·7 to ·9dB NOISE
15 to 19dB GAIN
0·2dB INSERTION LOSS

EVV200 GAAS 2MTR. 750W SSB	£80
EVV2000 GAAS 2MTR. 1KW SSB	£90
EVRPS receive 2MTR. only	£50
EVRPS receive 70cm.	£49
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EVV2 GAAS 2MTR. 100W	£60
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INTERFACE	£21
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1Hz-1GHz 1KW. PEP 0.15dB Insertion Loss	£45

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HIGH QUALITY MODULES FOR STEREO, MONO & OTHER AUDIO EQUIPMENT

Audio Amplifiers

O/No.	POWER O/P R.M.S.	MAX SUP. VOLTAGE	PRICE
AL 30A	10 Watts	30V	£4.95
AL 60	25 Watts	30-50V	£5.92
AL 80	35 Watts	40-60V	£8.75
AL 120	50 Watts	50-70V	£15.22
AL 250	125 Watts	50-80V	£20.60

Stabilised Power Supplies —

Output current 2.5 Amps

O/No.	AC Input	Price
SPM 120/45	40-48V	£8.05
SPM 120/55	50-55V	£8.05
SPM 120/65	60-65V	£8.05

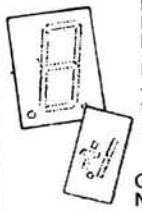
Mono Pre-Amplifiers – Operating Vtg. 40-65V

O/No.		Price
MM 100	Suitable for Disco Mixer	£14.75
MM 100G	Suitable for Guitar Pre-Amp Mixer	£14.75

Magnetic Cartridge Pre-Amplifier
O/No. MPA30. Sup Vtg. 20-30V. Price £4.29

Monographic Equaliser
GE 100 MKII 10 Channel OUR PRICE ONLY £20.00

Full Specifications and Data available on request.
Please send self-addressed envelope.



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Red, Green, Yellow – .3/.5/.6 inch Mixed types and colours NUMERIC & OVER-FLOW Common Anode/Cathode. GaAsP/GaP. Brand New. Full Data incl.

10 pieces (our mix) . . . £4.00
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A selection of large and small sized LED's in various shapes, sizes & colours, together with 7 Segment Displays both anode & cathode plus photo transistors emitters and detectors. Cadmium Cell ORP12 and Germ. photo transistor OCP71 included. In all a total of 25 Opto pieces valued over £12 Normal Price

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Our Super Value Price Just £5.00

SEMICONDUCTORS FROM AROUND THE WORLD

100 A collection of Transistors, Diodes, Rectifiers & Bridges SCR's, Triacs, I.C.'s & Opto's all of which are current every-day useable devices.

Guaranteed Value Over £10 Normal Retail Price.

Data etc in every pack. Order No. VP56

Our Price £4.00

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2 × 5 way .1 Pitch Edge Connector (Gold) (O/No. AMP163279 2) **£1.20 each. £50 per 50 off**

PICK-UP COIL

Large telephone pick-up coil for high sensitivity. Suction pad to stick to telephone. 90cm lead to 3.5 jack plug. Connects direct to cassette recorder. Dims: 32mm(dia) × 17mm(body) 36mm(dia) sucker. O/No. YP87 **£1.00**

VALUE PACKS

Pak No	Qty	Description	Price
VP1	300	Assorted Resistors Mixed Types	£1.00
VP2	300	Carbon Resistors ¼-½ Watt Pre-Formed	£1.00
VP3	200	⅛ Watt Min Carbon Resistors Mixed	£1.00
VP4	150	½ Watt Resistors 100 ohm-1M Mixed	£1.00
VP5	200	Assorted Capacitors All Types	£1.00
VP6	200	Ceramic Caps Miniature – Mixed	£1.00
VP7	100	Mixed Ceramics Disc 1pf – 56pf	£1.00
VP8	100	Mixed Ceramic Disc. 68pf – .015pf	£1.00
VP9	100	Assorted Polyester/Polystyrene Caps	£1.00
VP10	60	C280 Type Caps Metal Foil Mixed	£1.00
VP11	50	Electrolytics – All Sorts	£1.00
VP12	60	Bead Type Polystyrene Min Caps	£1.00
VP13	50	Silver Mica Caps Ass. 5.6pf – 150pf	£1.00
VP14	50	Silver Mica Caps Ass. 180pf – 4700pf	£1.00
VP15	25	.01uF 250v Min. layer metallised Polyester Capacitors	£1.00
VP16	50	Wirewound Res. 9W (avg) Ass. 1 ohm – 12K	£1.00
VP17	50	Metres PVC Covered Single Strand Wire Mixed Colours	£1.00
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VP19	40	Metres PVC Single/Multi Strand Hook-Up Wire Mixed	£1.00
VP20	6	Rocker Switches 5 Amp 240v	£1.00
VP21	15	2in. high bright RED LEDs in plastic encapsulation–Large area light source	£1.00
VP22	200	Sq. Inches Total, Copper Clad Board Mixed Sizes	£1.00
VP23	20	Assorted Slider Pots. Mixed Values	£1.00
VP24	10	Slider Pots. 40 mm 22K 5 × Log. 5 × Lin	£1.00
VP25	10	Slider Pots. 40 mm 47K 5 × Log. 5 × Lin	£1.00
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VP28	10	Rectangular .2" RED LED'S	£1.00
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VP30	10	Ass. 10W Zener Diodes Mixed Vlts. Coded	£1.00
VP31	10	5 Amp SCR's TO-66 50-400v Coded	£1.00
VP32	20	3 Amp SCR's TO-66 Up To 400v Uncoded	£1.00
VP33	200	Sil. Diodes Switching Like IN4148 DO-35	£1.00
VP34	200	Sil. Diodes Gen. Purpose Like OA200/BAX13/16	£1.00
VP35	50	1 Amp IN4000 Series Sil. Diodes Uncoded All Good	£1.00
VP37	8	Black Instrument Type Knobs With Pointer ¼" Std	£1.00
VP42	10	Black Heatsinks To Fit TO-3, TO-220 Ready Drilled	£1.00
VP43	4	Power-Fin Heatsinks 2 × 10-3 2 × TO-66 Size	£1.00
VP45	50	BC107/8 Type NPN Transistors Good Gen. Purpose Uncoded	£1.00
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VP141	40	1N4002 Sil. Rects. 1A 100v preformed pitch	£1.00
VP142	4	40A Power Rectifiers Silicon TO48 300PIV	£1.00
VP143	5	BY187 12KV Sil. Diodes in carriers 2.5mA	£1.00
VP144	4	100K 1in. Multi-turn pots ideal van cap tuning	£1.00
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BI-PAK Price ONLY £0.60 pr.

LED DISPLAYS

VP130	6	RED 7 Seg. CC 14mm × 7.5mm RDP FND353	£2.00
VP131	4	GREEN 7 Seg. CA .6" LDP XAN6520	£2.00
VP132	5	RED 7 Seg. CC .6" LDP XAN6940	£2.00
VP133	6	RED Over-flow .6" 3 × CA 3 × CC 6630/50	£2.00
VP134	5	GREEN Over-flow .6" CA XAN6530	£2.00
VP135	5	RED 7 Seg. CA .3" XAN3061	£2.00
VP136	3	DUAL RED 7 Seg. .5" CA DL527 DPR	£2.00
VP137	3	DUAL RED 7 Seg. .51" CA DL727 DPR	£2.00
VP138	20	Assorted LED Displays – Our mix with Data	£5.00

RDP = Right Hand Decimal Point CC = Common Cathode
LDP = Left Hand Decimal Point CA = Common Anode

ANTENNA SWITCH 2 and 3 WAY

Co-axial switch for one transceiver to two antennae or one antenna to two transceivers. Dims: 86 × 55 × 32mm (Body).
O/No. VP 113 **£4.50**

As above but 3-way.
O/No. VP 114 **£4.75**

HIGH PASS FILTER/SUPPRESSOR

CB/TV. High pass filter. Reduces unwanted signals picked up by antenna. Dims: 45 × 25 × 17mm.
O/No. VP 115 **45p**

Designed to reduce harmonics on the VHS and TV band.
Cut-off frequency: 30MHz.
V.S.W.R.: Less than 1.2 to 1.
Insertion loss: –0.2dB @ 27MHz.
Impedance: 50 ohms.
Dims: 80 × 55 × 40mm.
O/No. VP 116 **£2.75**

LOW PASS FILTER

IC BARGAINS

40 Assorted TTL CMOS INTEGRATED CIRCUITS 74 Series & CD4000 Series – All new Gates, Flip-Flops – MSI etc GREAT VALUE Data Book & Sheets included. 40 Pieces (Our Mix) **£4.00** O/No. UP40

TRANSISTOR PACKS

VP150	20	BC183B Sil. Trans. NPN 30v 200mA Hfe240+ TO92	£1.00
VP151	25	BC171B Sil. Trans. NPN 45v 100mA Hfe240+ TO92	£1.00
VP152	15	TIS90 Sil. Trans. NPN 40v 400mA Hfe100+ TO92	£1.00
VP153	15	TIS91 Sil. Trans. PNP 40v 400mA Hfe100+ TO92	£1.00
VP154	15	MPSA56 Sil. Trans. PNP 80v 800mA Hfe50+ TO92	£1.00
VP155	20	BF595 Sil. Trans. NPN eqvt. BF184 H.F. TO92	£1.00
VP156	20	BF495 Sil. Trans. NPN eqvt. BF173 H F. TO92	£1.00
VP157	15	ZTX500 Series Sil. Trans. PNP Plastic	£1.00
VP158	15	ZTX107 Sil. Trans. NPN eqvt. BC107 Plastic	£1.00
VP159	15	ZTX108 Sil. Trans. NPN eqvt. BC108 Plastic	£1.00
VP160	20	E5024 Sil. Trans. PNP eqvt. BC214L TO92	£1.00
VP161	25	BC183L Sil. Trans. NPN 30v 200mA TO92	£1.00
VP162	5	SJE5451 Sil. Power Trans. NPN 80v 4A Hfe20+	£1.00
VP163	2	NPN/PNP pairs Sil. Power Trans. like SJE5451	£1.00
VP164	4	2N6289 Sil. Power Trans. NPN 40v 40w 7A Hfe30+	£1.00
VP165	6	BFT33 NPN Sil. Trans. 80v 5A Hfe50-200 TO39	£1.00
VP166	5	BFT34 NPN Sil. Trans. 100v 5A Hfe50-200 TO39	£1.00
VP167	1	BUY69C NPN TO3 VCB 500 10A 100w Hfe15+	£1.00
VP168	10	BC478 eqvt. BCY71 PNP Sil. Trans. TO18	£1.00
VP169	10	BXS21 eqvt. BC394 NPN Sil. Trans. 80v 50mA TO18	£1.00
VP170	10	Assorted Power Trans. NPN/PNP Coded & Data	£1.00
VP171	10	BF355 NPN TO-39 Sil. Trans. eqvt. BF258 225v 100mA	£1.00
VP172	10	SM1502 PNP TO39 Sil. Trans. 100v 100mA Hfe100+	£1.00

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100 Silicon NPN Transistors. All Perfect. Coded Mixed. Types With Data And Eqvt. Sheet No Rejects. Fantastic Value. O/No. BP38 **£3.00**

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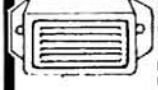

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Confusion Reigns!

OUR READERS sometimes query why we use "foreign" terms such as antenna instead of aerial, or kilohertz instead of kilocycles per second (or even why we don't just quote wavelengths in metres!).

The following item from the Institution of Electrical Engineers' Antennas and Propagation Group Newsletter explains rather well the reasons behind the preference for antenna, but spoils it all by saying that aerial is acceptable for domestic antennas. Is an amateur's antenna professional or domestic? I don't know, but to try to reduce the confusion we use antenna for all types.

"British antenna engineers have to work under the yoke of being antenna engineers at work but understood as aerial designers in the home. After a long period of change, the term ANTENNA is now used for professional receiving or radiating devices and the term AERIAL for domestic antennas. Unfortunately, there are still some professional organisations who persist in describing their products as aerials when the rest of the world and most of their professional colleagues know them to be antennas. In the official definitions of antenna terms (IEC and IEEE), the use of the term aerial is 'deprecated', which, at least in the rest of the world, recognises reality.

Both ANTENNA and AERIAL are technical terms whose original meanings were quite different. Antenna is a noun and comes from its original meaning of a biological sensor. Aerial is strictly an adjective and means in or belonging to the air. It was originally used as the prefix for wire (i.e. aerial-wire) but the term has through usage become a noun and been extended to cover other than wire antennas. Both antenna and aerial appear to have been conceived at about the same time. Marconi, writing in the *IEE Journal* in 1899 said '. . . a vertical conductor wire which I shall call the aerial conductor . .', whilst J. A. Fleming wrote a piece for *Encyclopaedia Brittanica* in 1902 which said 'the great improvement introduced by Marconi was the employment of this vertical air-wire, aerial, antenna or elevated conductor'.

One other point of confusion among the semi-professionals is the correct plural for antenna. On this point the dictionaries are largely agreed, the plural of the biological antenna is ANTENNAE, the plural of radio antenna is ANTENNAS."

Geoff Arnold

QUERIES

While we will always try to assist readers in difficulties with a *Practical Wireless* project, we cannot offer advice on modifications to our designs, nor on commercial radio, TV or electronic equipment. Please address your letters to the **Editor, "Practical Wireless", Westover House, West Quay Road, Poole, Dorset BH15 1JG,** giving a clear description of the problem and enclosing a stamped self-addressed envelope. Only one project per letter please.

Components for our projects are usually available from advertisers. For more difficult items, a source will be suggested in the "Buying Guide" box included in each constructional article.

PROJECT COST

The approximate cost quoted in each constructional article includes the box or case used for the prototype. For some projects the type of case may be critical; if so this will be mentioned in the Buying Guide.

INSURANCE

Turn to the "News" pages for details of the PW Radio Users Insurance Scheme, exclusive to our readers.

CONSTRUCTION RATING

Each constructional project will in future be given a rating, to guide readers as to its complexity:

Beginner

A project that can be tackled by a beginner who is able to identify components and handle a soldering iron fairly competently. Generally this category will be used for simple projects, but sometimes for more complicated ones of wide appeal. In this case, construction and wiring will be dealt with in some detail.

Intermediate

A project likely to appeal to a wide range of constructors, and requiring only basic test equipment to complete any tests and adjustments. A fair degree of experience in building electronic or radio projects is assumed

Advanced

A project likely to appeal to an experienced constructor, and often requiring access to workshop facilities and test equipment for construction, testing and alignment. Constructional information will generally be limited to the more critical aspects of the project. Definitely not recommended for a beginner to tackle on his own.

SUBSCRIPTIONS

Subscriptions are available at £13 per annum to UK addresses and £14 overseas, from **"Practical Wireless" Subscription Department, Room 2816, King's Reach Tower, Stamford Street, London SE1 9LS.** Airmail rates for overseas subscriptions can be quoted on request.

BACK NUMBERS AND BINDERS

Limited stocks of some recent issues of *PW* are available at £1 each, including post and packing to addresses at home and overseas.

Binders are available (Price £5.50 to UK addresses, £5.75 overseas, including post and packing) each accommodating one volume of *PW*. Please state the year and volume number for which the binder is required.

Send your orders to **Post Sales Department, IPC Magazines Ltd., Lavington House, 25 Lavington Street, London SE1 0PF.** All prices include VAT where appropriate.

Please make cheques, postal orders, etc., payable to IPC Magazines Limited.

Satellite News

OSCAR–10 News Schedule: Table 1 shows the broadcast times of the GB2RS/AMSAT-UK news bulletins for the next three months, transmitted on Sundays, via OSCAR–10.

The frequency of the news transmissions is 145·962MHz at all times on all dates.

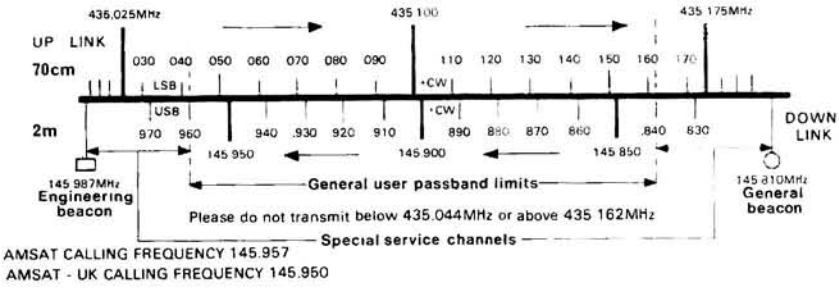
Table 1

Date Times (Corrected to 51°N 00°E/W)			
1985	**GMT/UTC**	**El**	**Az**
3 Mar	0630	29	123
10 Mar	1330	13	259
17 Mar	0830	42	182
24 Mar	0400	14	106
31 Mar	1030	26	238
7 Apr	0630	34	157
14 Apr	No transmission (NEC weekend)		
21 Apr	0900	27	216
28 Apr	0130	33	125
5 May	1000	8	257
12 May	0600	32	188
19 May	2200	13	97
26 May	0830	12	238

OSCAR–10 Bandplan: Table 2 shows the OSCAR–10 transponder bandplan. To maximise use of OSCAR–10, it is essential that the bandplan is complied with. It is of particular importance that the frequencies shown for the Special Services Channels (SSCs) are left clear, as these are used, amongst other things, by the ground control stations to maintain the satellite in correct orientation.

We thank Ron Broadbent G3AAJ for the bandplan details, and advise readers that all information concerning amateur radio satellites may be obtained through membership of AMSAT-UK. Full details are available, in return for an sae, from: *AMSAT-UK, 94 Herongate Road, Wanstead Park, London E12 5EQ.*

Table 2 OSCAR TEN UP/DOWN FREQUENCIES



Trio for Arrow

Arrow Electronics Ltd. announce that they have been appointed official Trio dealers.

The company are really delighted with the co-operation they have received from the Trio distributors who were able to meet all of Arrow's stock requirements off-the-shelf.

Adding Trio to their franchise list gives Arrow a complete range of major amateur radio manufacturers, all of whose products can be seen at Arrow's showrooms at: *5 The Street, Hatfield Peverel, Near Chelmsford, Essex CM8 3YL. Tel: (0245) 381673/381626.*

Congratulations

What do you give the amateur radio couple who've everything – including each other? When Brenda and Bernie of Amateur Radio Exchange added a marriage certificate to their other qualifications (the happy day was 16 December 1984) even the wedding cake entered into the spirit – featuring a pair of Icom handheld transceivers in place of the conventional 3-tiered edifice.

The happy couple, now officially Mr and Mrs Godfrey, will still be Brenda G4VXL and Bernie G4AOG to their many customers and friends!

We at *Practical Wireless* would like to send our congratulations to Brenda and Bernie and wish them every happiness for the future.

Readers living in the general area of West London may like to know that the company's offices are located at: *373 Uxbridge Road, Acton, London W3 9RH. Tel: 01-992 5765/6.*

Ant Shop Open

Ant Products, manufacturers of the well established Silver 70 and Tiger range of amateur radio antennas, inform us that as from 7 January 1985, they have opened a trade counter and factory shop at their Pontefract premises.

Besides being manufacturers of antennas and other specialist equipment, Ant Products also carry products from many other manufacturers, embracing a wide range, from plugs and cables to complete receivers, from nuts and bolts to aluminium tubing.

Situated less than one mile east of Pontefract town centre and within 3 kilometres of both the A1 and M62 motorway, the premises offer ample free parking adjacent to the factory, and opening times are 10.00am to 5.00pm Tuesday to Friday and 10.00am to 12.00noon on Saturday.

Ant Products, All Saints Industrial Estate, Baghill Lane, Pontefract, West Yorkshire WF8 2HA. Tel: (0977) 700949.

CAST '85

The International Cable and Satellite Television Exhibition and Conference, returns to a UK venue this year.

CAST '85 will run from Tuesday 16 April to Thursday 18 April (inclusive), at the National Exhibition Centre, Birmingham, and *Practical Wireless* will have a stand where we look forward to meeting our readers and friends.

Fuller details will be published nearer the date.

Insurance

Readers who are interested in applying to the *PW Radio Users Insurance Scheme* are advised to use the coupon published on page 18 of a previous issue.

HF Packet Radio Tests

The Westmorland Packet Radio Group are mounting a 3 month series of tests to evaluate the requirements for a revised version of the AMTEXT packet system using the BBC microcomputer, with receiver interface via the cassette port. Tests are scheduled to commence on Sunday 3 February, running from 1000 to 1100 hrs GMT and on each subsequent Sunday at this time until May using lower sideband on 3·655MHz ± QRM.

It is hoped that this experiment will provide valuable design information for future updated AMTEXT software, by determination of optimum protocol parameters/packet size and at the same time allow examination of the feasibility of an h.f. Search and Tuning routine utilising the BBC micro, in conjunction with the Yaesu FT757GX and similar transceivers equipped with remote incremental tuning facilities. In addition a prototype h.f. s.s.b. Tuning Routine and 300 baud packet mailbox will be examined, with a view to obtaining eventual approval from the DTI to establish a store and forward system.

Each packet frame will be composed as shown in Fig. 1, terminating in a listening period of 10 to 20 seconds before repeat transmission.

Anyone with a BBC micro and suitable h.f. receiver who would like to take part in this experiment should either load the AMTEXT protocol 1 programme and select GENERAL RX MODE or contact the group for a copy of the simple listing. Interconnection details are shown in Fig. 2.

Following reception of the test data the group would like to hear from you with details of: a) strength of signal and details of any QRM/N and its level; b) ease of tuning, i.e. ease of displaying the TUNE data bursts after first locating the AMTEXT signals via the MCW ident prefix/suffix; c) The number of error free packets received as a percentage of total detected; d) Problems encountered with drift/tuning of signals; e) Type of equipment used together with method of sampling the audio for the cassette interface.

All results will be welcomed by the group and should be addressed to Paul A. Brown G3WRI at 30 Applerigg, Kendal, Cumbria LA9 6EA from whom the listing is available by sending an s.a.e. and two 15p stamps to cover duplication costs. The AMTEXT Packet Radio Program is available on cassette, price £2.50, from: *Radio Amateur Microcomputer Techniques Operations and Programs Group (RAMTOP), Great Billing Rectory, Northampton NN3 4EI).*

This is your chance to directly contribute to the ongoing experimentation in this state of the art amateur mode.

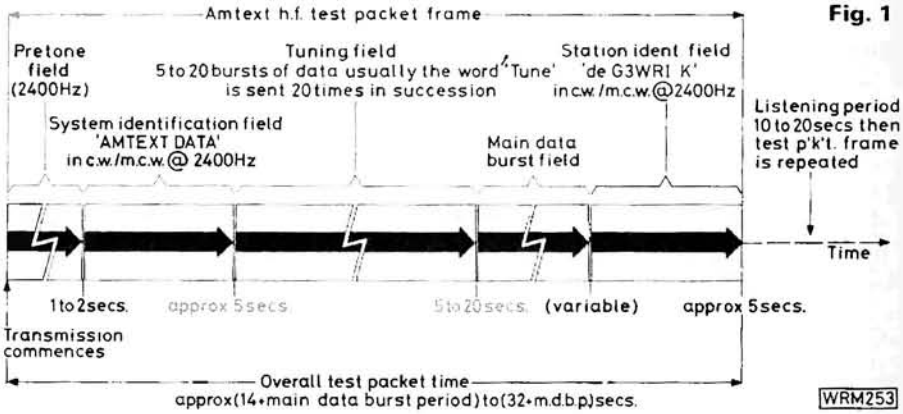


Fig. 1

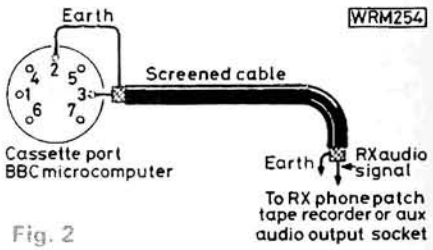


Fig. 2

Bye-bye CR-2021?

We were surprised to read, in the December 1984 issue of the US magazine *Monitoring Times*, a news item claiming that stocks of the Uniden CR-2021, in the USA at least, were now depleted, and no replacement is expected!

"B" to "A" at NEC

Arrangements have been made by British Telecom International, in co-operation with the RSGB, to carry out Morse Tests for aspiring Class A Licensees during the 1985 RSGB National Convention at the Birmingham National Exhibition Centre. Mr. G. H. Williams G3YCP will represent BTI.

The tests will be available on a pre-booking basis for the duration of the exhibition on Saturday 13 April and Sunday 14 April. A limited number of places will be reserved for RAIBC members, should they wish to apply.

To book a test, please contact: *Mr. C. V. Astley, BTI Radio Station, Worston Road, Highbridge, Somerset TA9 3JY.* Early application is advisable.

RMG Open Meeting—Scottish Borders

There will be an Open Meeting of the Repeater Management Group, in the Scottish Borders, on Sunday, 31 March 1985, starting at 1400hrs. The venue is at Lilliardsedge Caravan Park, which is on the A68 road between Jedburgh and St. Boswells.

All repeater users and builders are invited to attend, and further information is available from: *Bruce McCartney GM4BDJ, QTHR, of the Scottish Borders R. G. or from Colin Dalziel G8LBC and Chris Young G4CCC, both QTHR or via RSGB HQ.*

Diary Date

Amateur TV enthusiasts are asked to note that following last year's successful convention, the British Amateur Television Club's annual rally/exhibition will again be held at the Post House Hotel, Crick, Northamptonshire, near Rugby.

The date for the event is Sunday, 5 May 1985, and further details are available from: *Trevor Brown G8CJS, tel: Leeds (0532) 670115 or Norrie Macdonald GM4BVU, tel: Hamilton (0698) 423121.*

DIGITAL SPEECH PROCESSING

by Brian Dance

Workers at the University College of Swansea in Wales have claimed a novel breakthrough in the use of the microprocessor controlled digital-sampling technique for improving the intelligibility of speech signals. The new technique offers many advantages over the simpler analogue speech processing methods used previously.

Basic Requirements

The intelligibility of speech signals can vary greatly with many factors, such as the orientation and distance of the speaker's mouth relative to the microphone, the signal and noise levels and the amount of noise added at various points in the transmission link.

Speech circuits must be able to handle the peak waveform levels without appreciable distortion, yet the peak/r.m.s. signal power ratio is typically of the order of 15dB under adverse conditions. Intelligibility can thus be improved by circuitry which compresses the speech levels into a more limited range of amplitudes. This provides an increase in the mean power level and a corresponding improvement in the signal-to-noise ratio without any need for the power handling ability of the equipment to be raised.

The simplest type of speech processor merely clips the waveform peaks; this not only introduces much distortion, but also raises the background noise level. Another type of speech processor uses part of a rectified output signal to control the gain applied to the signal and in some such "dynamic" speech processors the output voltage is proportional to the square root of the input voltage. Analogue circuits having a high degree of compression have also been designed.[1] These generally suffer from the disadvantage that the filter time constants prevent the gain from changing rapidly enough to avoid overloading during peak signal transients. In addition, the signal-to-noise ratio is severely degraded (e.g. from 20dB to 10dB in the case of the square root circuit). An "expander" circuit may be used at the receiving end to restore the original speech characteristics.

Digital Technique

In the digital system developed at Swansea, the signal is delayed by 8ms and is then fed through a gain control circuit as shown in Fig. 1.[2] The feedforward function develops the gain controlling signal in the following way.

In each half-cycle of the input waveform between each two zero cross-over points, the waveform is sampled and the maximum value of the signal level used to determine the gain factor by which every sample measurement taken in that particular half-cycle is amplified. It can be seen from Fig. 2 that in any half-cycle in which the peak value of the input waveform exceeds a certain threshold value, the gain during that half-cycle is automatically adjusted so that the instantaneous output voltage at that peak will be increased to a specific value, V_{max}, which is the same for each half-cycle.

A unique advantage of this system is that the changes in the gain occur only at the zero crossing points of the signal waveform and therefore there is no possibility of any sharp discontinuity in the output waveform arising as a result of the gain changes. It can be seen from Fig. 2 that the waveform of the sampled and processed output signal is very similar to the input waveform, so it is not necessary to use an amplitude expanding circuit at the receiving end of the communications link.

Signals which do not reach a certain threshold level are not amplified, since it is clearly undesirable that any small noise peaks present in the signal between spoken words should generate an output signal of the same amplitude as that of the speech peaks. Signals of an amplitude less than the threshold value are passed through the system with a gain of unity.

The output signal is generated by taking the logarithms of the sampled values, adding a gain factor followed by the generation of the antilogarithm value. The process has been implemented by the use of a compressing analogue-to-digital converter (or "companding a.d.c.") to provide the logarithmic signal and a complementary digital to analogue converter for the antilogarithms, the system being based on the Precision Monolithics DAD-76 device.

The operation of the system from a software viewpoint is illustrated in Figs. 3 and 4.[2] Two RAMs are used to store the sample values and the gain values in the form of memory queues; the sample queue has fixed lengths, while the gain-function queue forms a first in-first out memory (f.i.f.o.), the contents of which depend on the number of peaks in the sample queue. The sample queue is accessed by a memory pointer with a read command being followed directly by a write command at the same address. The gain function queue has input and output memory pointers.

Sampled values from the a.d.c. are placed in the sample queue. The sign bit of each sample is tested to detect zero crossings and is also compared with the value of the previous sample to detect the peaks. When a zero crossing is detected, the peak value for the past half-cycle is compared with the threshold value and, if greater than the latter, a gain value is selected and placed in the gain function queue.

The processor of an ideal system should be capable of self-recovery from noise from any register, port or RAM location. In such a system every sample would have to be labelled unambiguously with the appropriate gain function value and would require considerable processing power. The system used by the Swansea workers shown in Fig. 4

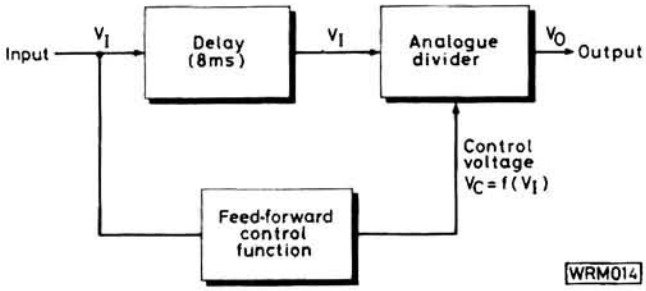


Fig. 1: The feedforward/delay system used in the processor system

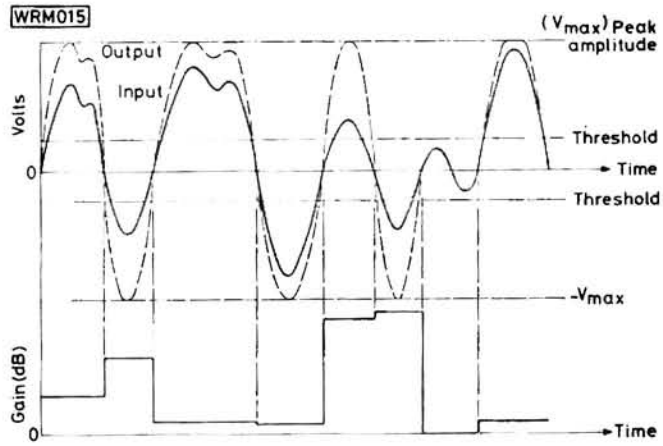


Fig. 2: The input signal is sampled at 16kHz, amplified by the appropriate factor so as to produce an output signal of constant peak levels ▶

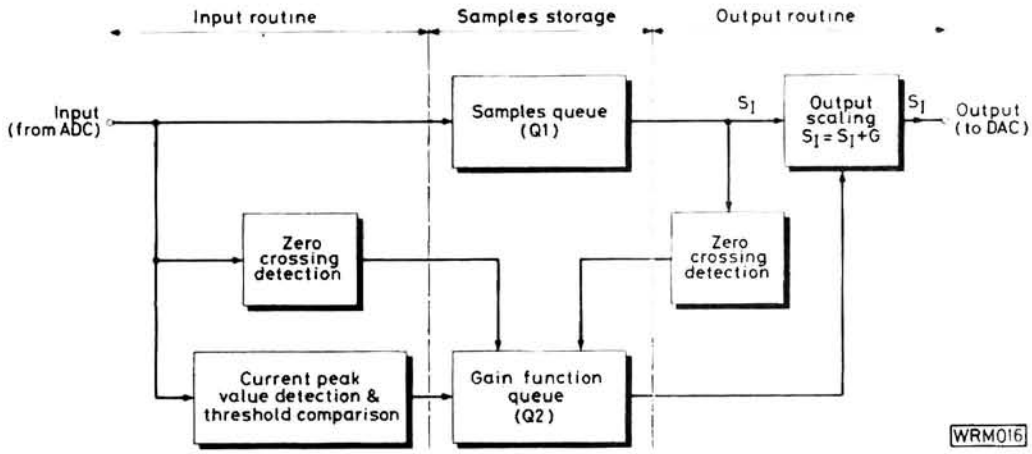


Fig. 3: Operational block diagram of feedforward level controller

does not have such a high level of security and relies upon the correct start-up procedure for its continued operations. However, no noise problems have been encountered with the system which employs a power-on reset procedure.

Listening Tests

Careful informal listening tests carried out by the Swansea workers showed that the best performance was obtained when the peak of each half-cycle exceeding the threshold level was brought up to a constant output level as already described. Other systems tested included the adjustment of the gain during each half-cycle according to the mean signal sample level during that half-cycle and the adjustment of the gain according to the mean power level during each input half-cycle. Tests were also carried out in which the gain was kept constant for a number of half-cycles at a value which produced a constant peak output level during that number of half-cycles.

The processed signal sounds subjectively louder than similar unprocessed speech of the same peak amplitude, as would be expected. Although the quality of the processed speech is not quite the same as that of natural speech, it is pleasant to the listener and no expanding circuit is needed at the receiving end of the speech link. The peak/r.m.s. ratio is reduced to about 6dB typical.

The processed speech has a constant peak amplitude and thus enables the system to operate at the optimum signal level as the input level changes. The waveform compression of 9dB at the sending end provides a 9dB increase in the transmitted power level and a corresponding improvement in the signal-to-noise ratio. As all speech sounds are raised to the same peak amplitude level, the consonant sounds in the speech are raised so that their signal-to-noise ratio approaches that of the vowels.

Harmonic distortion tests at 500Hz showed a maximum of −31dB third harmonic and −34dB fifth harmonic at the maximum output level, other harmonics being at lower levels. At a level of −20dB relative to the peak output, third harmonic distortion was −26dB. Intermodulation distortion with test frequencies of 1kHz and 1·2kHz did not exceed −10dB.

The −3dB points in the frequency response characteristic of the system are at 300Hz and 3200Hz with a maximum in band ripple of ±0·3dB.

Applications

The digital processor was designed mainly as a precision modulator for high frequency radio systems, but it can be employed to improve the transmission performance of any speech system. Applications include public address equipment and loud-hailers, intercomm systems, carrier and inductive loop paging systems, etc. It is especially useful when noise is a difficult problem. It will certainly be very valuable when listening to lecturers who have a "bad microphone technique".

DIGITAL SPEECH PROCESSING

WRM017

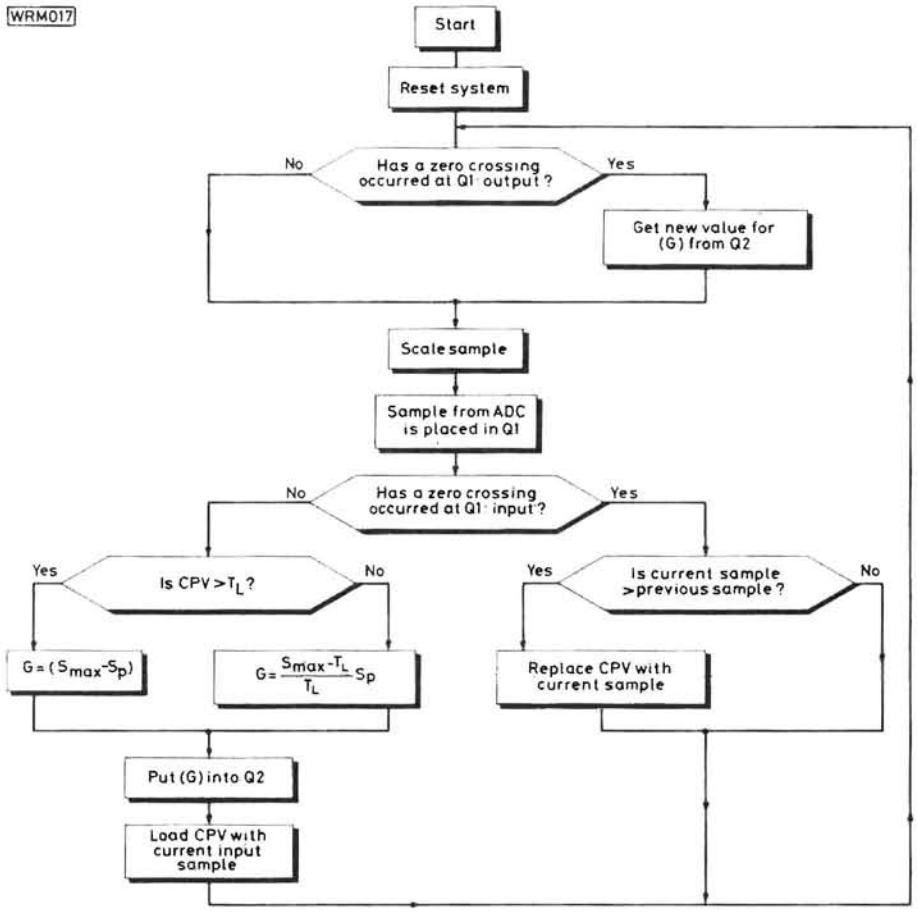


Fig. 4: Flow diagram of the controller

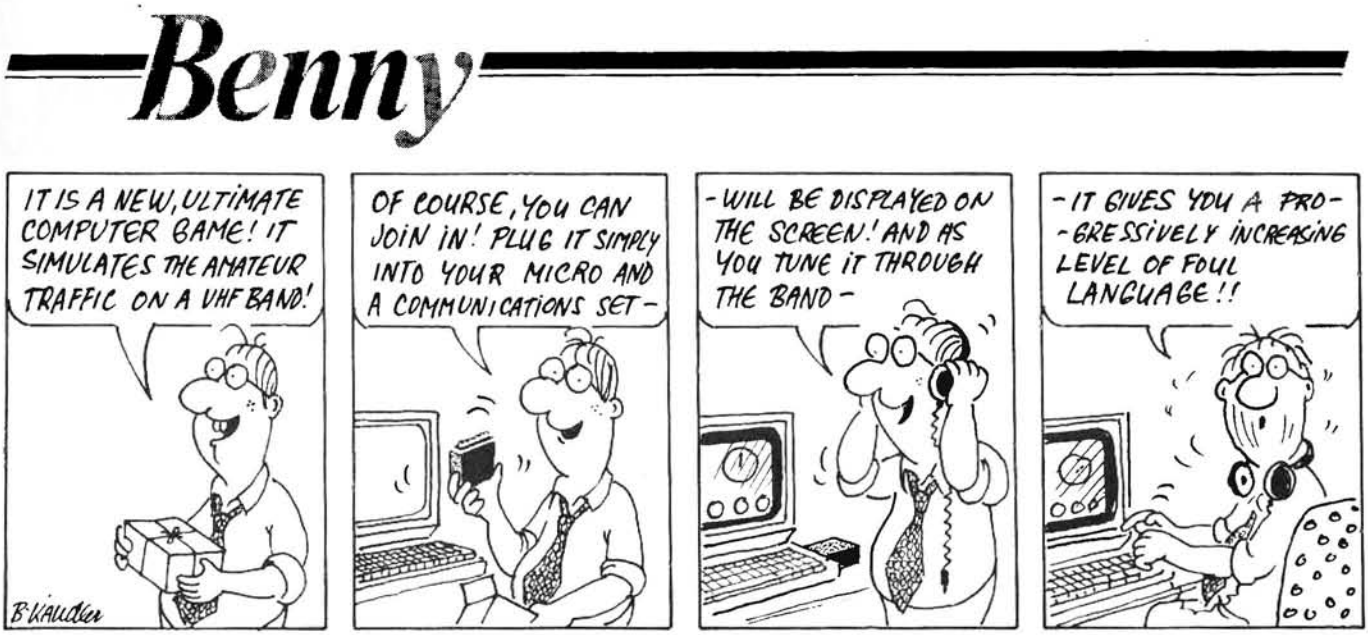
An interesting application currently under investigation concerns its use to help partially deaf people to hear the all-important low-level consonant sounds. If they increase the gain of a hearing aid to the point where such sounds are clearly heard, the vowel sounds can become unpleasantly loud.

The work was backed by Britain's National Research and Development Council and is the subject of British Patent No. 12050/77. ●

References

1) P. J. Greefkes et al, *Companders with a high degree of compression of speech level variations*. Philips Technical Review, 26, 819, 1965.

2) V. J. Phillips and L. D. Thomas, *A feedforward level controller for speech signals*. Report of the Dept. of Electrical and Electronic Engineering, University College of Swansea, University of Wales.



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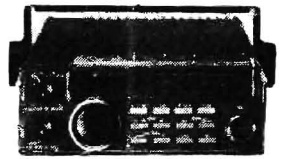

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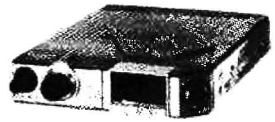

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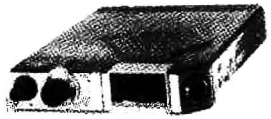

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Part 1

PW 'COLNE'

Direct Conversion Receiver

Since its appearance in its modern, transistorised form, the direct-conversion receiver has enjoyed great popularity as a beginner's project. It may be this reason that has tended to keep designs simple and somewhat experimental in nature. The aim of the *PW* Colne is to take the direct-conversion receiver a little further, particularly by providing two-band operation and audio a.g.c. (automatic gain control), while keeping construction simple. This simplicity of construction is achieved by using four printed circuit boards, which can be etched at home, and by using only pre-wound inductors.

The major features of this receiver are:

1. Two-band operation (3·5MHz and 14MHz)
2. Audio a.g.c. system
3. High quality passive audio bandpass filter
4. High stability v.f.o. design
5. Slow tuning rate, obviating the need for a fine tuning control
6. One watt audio output
7. Construction on p.c.b.s in commercially available case
8. All inductors pre-wound, all other components easily available
9. Inter-board connections using plugs and sockets (optional)
10. Output available for providing digital readout

Interconnection and alignment details for the *PW* Colne will be given in the final part of the series.

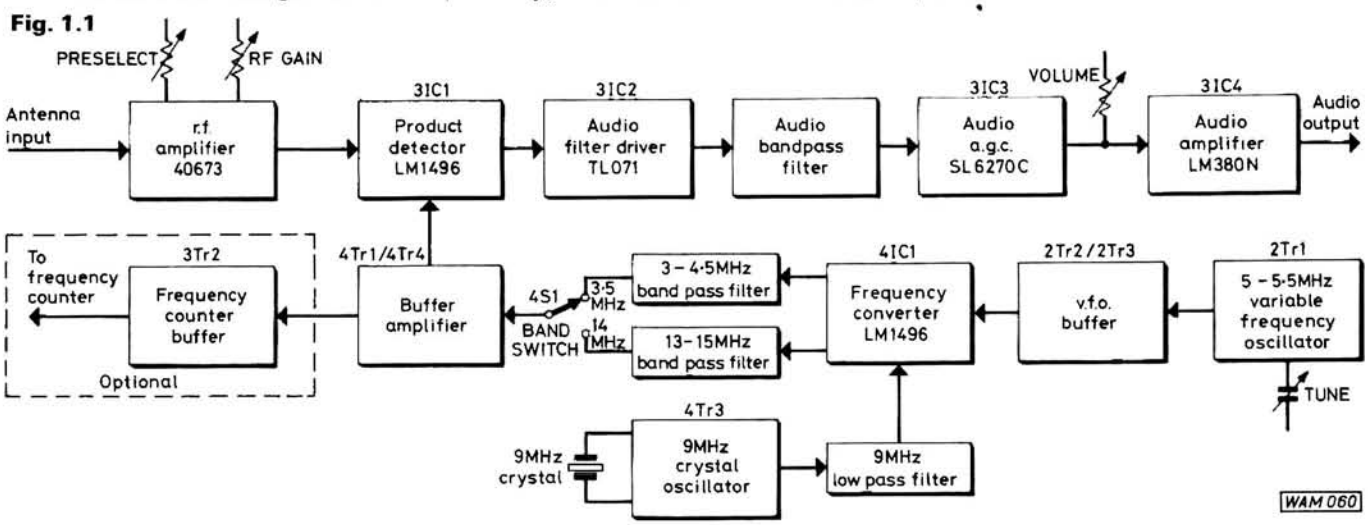
Some details will also be given at the end of the series as to how the design can be adapted to other bands, simplified and reduced in cost.

Direct Conversion

The principles of operation of direct conversion receivers have been explained many times in amateur literature, and I do not intend to go into them again here in great detail. Briefly, a direct-conversion receiver achieves in one signal conversion stage what a superhet achieves in two or more. By mixing an s.s.b. signal in a non-linear device with its original carrier frequency, one of the resulting products is the audio modulating frequency. This audio signal is filtered out from the other unwanted mixer products and amplified, forming the audio output of the receiver. Since most of the amplification and filtering takes place at audio frequencies, the performance of a direct-conversion receiver depends on high audio amplification and a selective audio filter.

To recover the modulating frequency exactly, the oscillator used for detection must be at exactly the original carrier frequency, otherwise, the received audio will be shifted in frequency, and may be completely unintelligible. Shifts of a few tens of hertz for s.s.b. are unimportant and when receiving a c.w. signal, the audio frequency can be set to whatever the listener finds easiest to read.

Fig. 1.1



Shopping List

Items needed for the complete project

Resistors

¼W 5% Carbon film

2·7Ω	1
51Ω	1
100Ω	8
150Ω	1
220Ω	1
390Ω	1
470Ω	2
680Ω	1
820Ω	2
1kΩ	16
1·5kΩ	3
2·2kΩ	3
2·7kΩ	2
4·7kΩ	1
10kΩ	10
47kΩ	1
68kΩ	1
100kΩ	7
1MΩ	1

Potentiometers

Min. horizontal preset

470Ω	1
47kΩ	2

Carbon track

10kΩ log	1
47kΩ lin	1
100kΩ lin	1

Inductors

[2][4]KALSA4520A	1
[2][4]KANK3337R	1
[2][4]154FN8A6439	2
[2][4]6·8µH 7BS	1
[2][4]8·2µH 7BS	2
[2][4]27µH 7BS	1
[2][4]33µH 7BS	1
[2][4]39µH 7BS	1
[2][4]47mH 10RB	2
[2][4]470mH 10RBH	2

Semiconductors

Diodes

[2]BA244	2
BZY88C9V1	1
BZY88C6V2	3
[2]KV1236	1 (pair)
1N4148	2
Red l.e.d. 0·2in	1

Transistors

[2][3]BF241	5
[3]BF245	3
[1][2][3]40673	1

Integrated circuits

[1][2][3]LM380N	1
[3]LM1496	2
[2]SL6270C	1
[3]TL071	1

Capacitors

Disc ceramic

10nF	12
0·1µF	23

Sub-min. plate ceramic

5·6pF	1
8·2pF	1
10pF	2
15pF	3
33pF	2
47pF	2
68pF	1
82pF	1
100pF	1
150pF	1
330pF	2
470pF	3
680pF	1
4·7nF	6

Polyester

10nF	1
27nF	1
0·1µF	2
0·12µF	1
0·18µF	1
0·22µF	2

Tantalum Bead

2·2µF	35V	1
4·7µF	16V	1
47µF	6·3V	1

Electrolytic p.c.b. mounting

100µF	16V	4

Variable

Air-spaced Jackson C804

50pF	1

Min. film dielectric trimmer

5-60pF	2

Miscellaneous

9MHz HC18U crystal (1); s.p.c.o. switch (1); 0·25in mono headphones socket (1); 4mm insulated terminals—various colours (4); chassis mounting BNC socket (1); Veropins; 6:1 Jackson reduction drives—one must have dial flange (2); brass bushes (2); 6BA studding (approx 20); 6BA nuts (approx 55); 8-pin i.c. sockets (2); 14-pin i.c. sockets (3); front panel knobs (4); J14 Instrument Case (Minffordd[5]); rubber feet (4); RG174; connecting wire.

(1) Maplin Electronic Supplies Ltd., P.O. Box 3, Rayleigh, Essex SS6 8LR. Tel: 0702 554155.

(2) Cirkit Holdings plc., Park Lane, Broxbourne, Hertfordshire EN10 7NQ. Tel: 0992 444111.

(3) Cricklewood Electronics Ltd., 40 Cricklewood Broadway, London NW2 3ET. Tel: 01-450 0995.

(4) Bonex, 102 Churchfield Road, London W3 6DH. Tel: 01-992 7748.

(5) Minffordd Engineering, Sun Street, Ffestiniog, Gwynedd LL41 4NE. Tel: 076676 2572.

Contrary to common belief, a direct-conversion receiver can be used for a.m. Amplitude modulation (a.m.) differs from s.s.b. in that it has a carrier and an extra sideband present. If the oscillator at the receiver can be set to exactly the signal carrier frequency, then a zero beat with the carrier will be produced along with equal frequencies from each sideband. This will give intelligible speech. The problem is of course that any slight shift in frequency (at the receiver or the transmitter) will result in a beat from the carrier and different frequencies from the sidebands. Tuning a.m. signals with a non-synthesised v.f.o. is therefore extremely critical and is impossible to achieve over any reasonable length of time. Possibilities exist here for phase-locked loop techniques to lock the receiver oscillator to the a.m. carrier—experimenters please note!

Block Diagram

The basic outline of the receiver is shown in Fig. 1.1, the block diagram.

The antenna input is buffered and amplified by an r.f. amplifier stage which contains two tuned circuits giving a degree of pre-selection. The required signal is mixed with the output of a buffer amplifier in the product detector stage. A low-noise operational amplifier provides initial audio amplification and drives a passive (*LC*) audio bandpass filter. Further amplification is obtained from 3IC3 which also acts as the audio a.g.c. system. The audio path is completed by 3IC4, an LM380N, which can be used to drive an external loudspeaker or headphones.

The input to the buffer amplifier which supplies the carrier insertion signal to the product detector is selec-

★ components BOARD 1 RF AMPLIFIER

Resistors
¼W 5% Carbon film

100Ω	1	R6
220Ω	1	R5
680Ω	1	R7
68kΩ	1	R2
100kΩ	3	R3, 4, 8

Potentiometers
Carbon track

47kΩ lin	1	R1
100kΩ lin	1	R9

Miscellaneous
Veropins, p.c.b., 6BA screws and nuts, insulated terminals (2).

Capacitors
Disc ceramic

0·1µF	8	C2, 3, 5–10

Sub-min. plate ceramic

470pF	2	C1, 4

Inductors

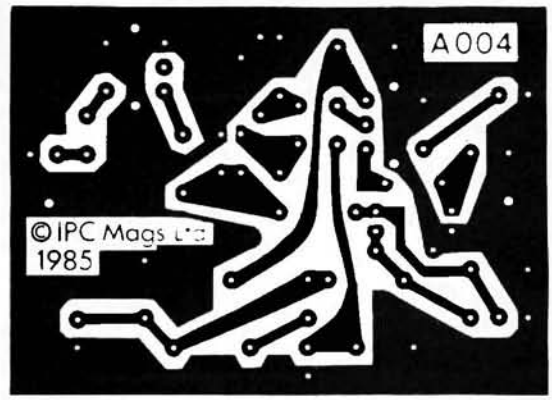
154FN8A6439	2	T1, T2 (Toko)

Semiconductors
Diodes

BZY88C9V1	1	D3
KV1236	1	D1, 2 (single package)

Transistors

40673	1	Tr1



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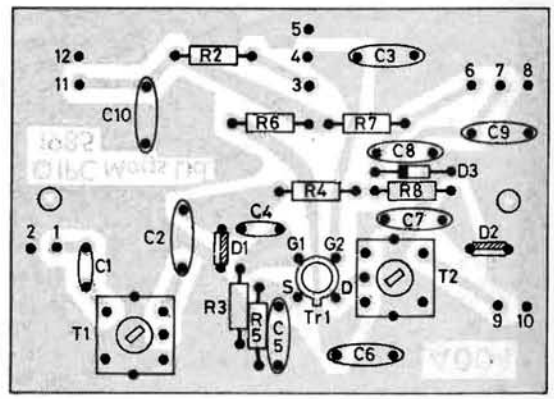
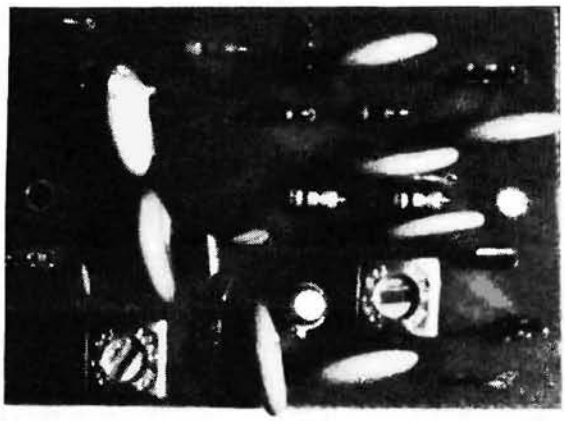


Fig. 1.2: Full-size p.c.b. track pattern and component placement of the r.f. amplifier board, Board 1

The author's prototype of Board 1, the r.f. amplifier



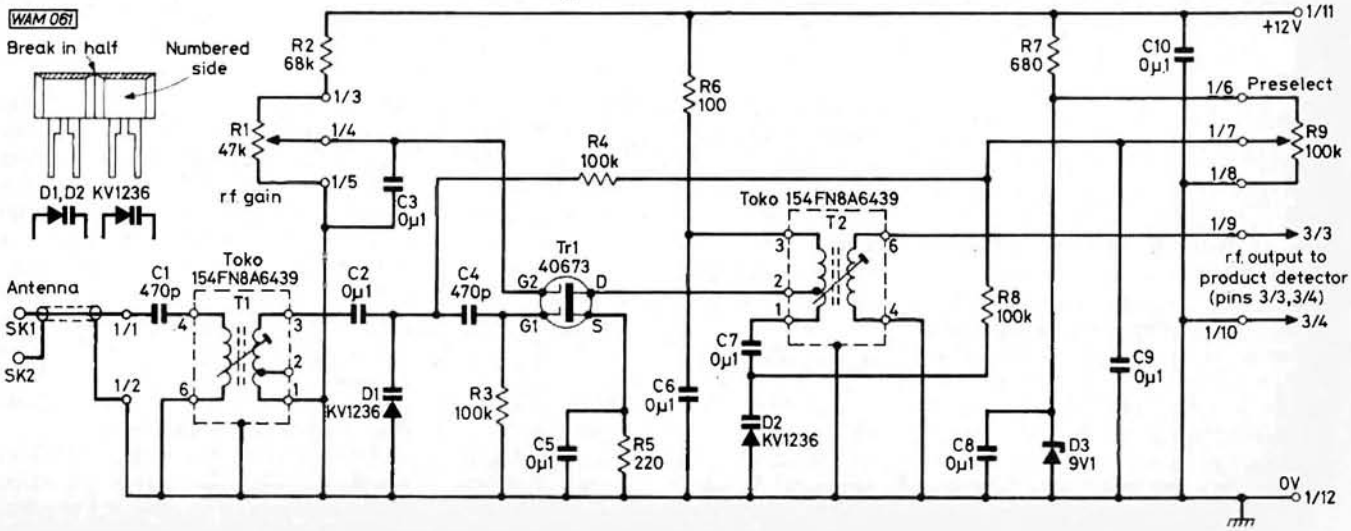
BUYING GUIDE

Constructors of this project should have no difficulty in obtaining components, a guide to suppliers is shown at the end of the shopping list

Approximate Cost £70

Construction Rating Intermediate

Fig. 1.3: Board 1



★ components BOARD 2 5–5·5MHz VFO

Resistors
¼W 5% Carbon film

100Ω	2	R2, 8
150Ω	1	R3
470Ω	1	R5
1kΩ	2	R7, 10
10kΩ	2	R4, 6
100kΩ	1	R1

Potentiometers
Min. horizontal preset

47kΩ	1	R9

Capacitors
Disc ceramic

10nF	2	C7, 10
0·1µF	3	C5, 6, 9

Sub-min. plate ceramic

100pF	1	C4
150pF	1	C3
4·7nF	1	C8

Min. film dielectric trimmer

5–60pF	1	C2

Airspaced Jackson C804

50pF	1	C1

Inductors

KANK3337R	1	L1 (Toko)

Semiconductors
Diodes

BZY88C6V2	1	D2
1N4148	1	D1

Transistors

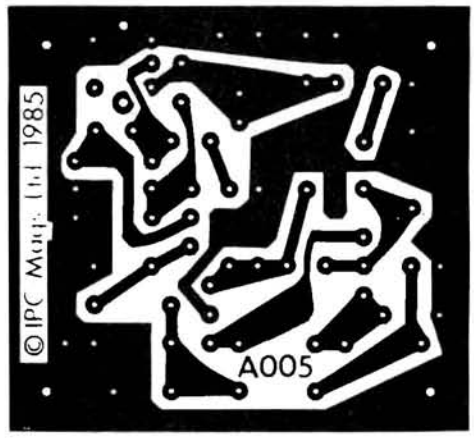
BF241	2	Tr2, 3
BF245	1	Tr1

Miscellaneous
Veropins, p.c.b., 6BA screws and nuts, 6:1 reduction drives—one with dial flange (2). Insulated terminals (2).

To avoid confusion between the four p.c.b.s making up the *PW* Colne project, each has been numbered as follows:

RF amplifier	Board 1
5–5·5MHz v.f.o.	Board 2
Product detector and audio stages	Board 3
Crystal oscillator and frequency converter	Board 4

Each drawing and components list will state which board number it refers to. In the text, component references will be prefixed by the board number. For example, resistor R5 on the r.f. amplifier board would be called 1R5, while R5 on the v.f.o. board would be 2R5.



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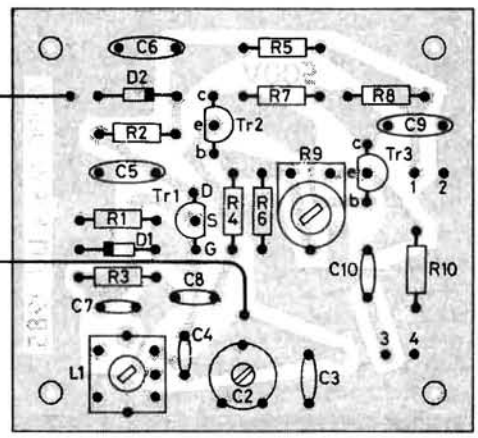
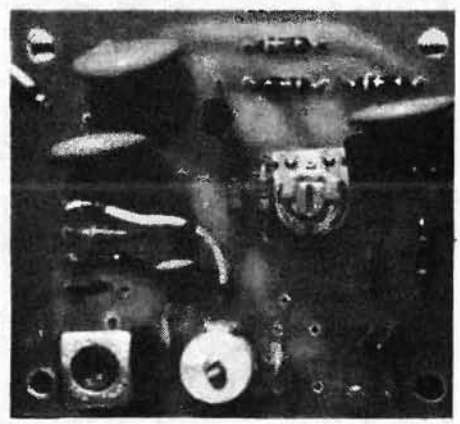


Fig. 1.4: Full-size p.c.b. track pattern and components placement of the v.f.o. board, Board 2



The author's prototype of Board 2, the 5–5·5MHz v.f.o. board

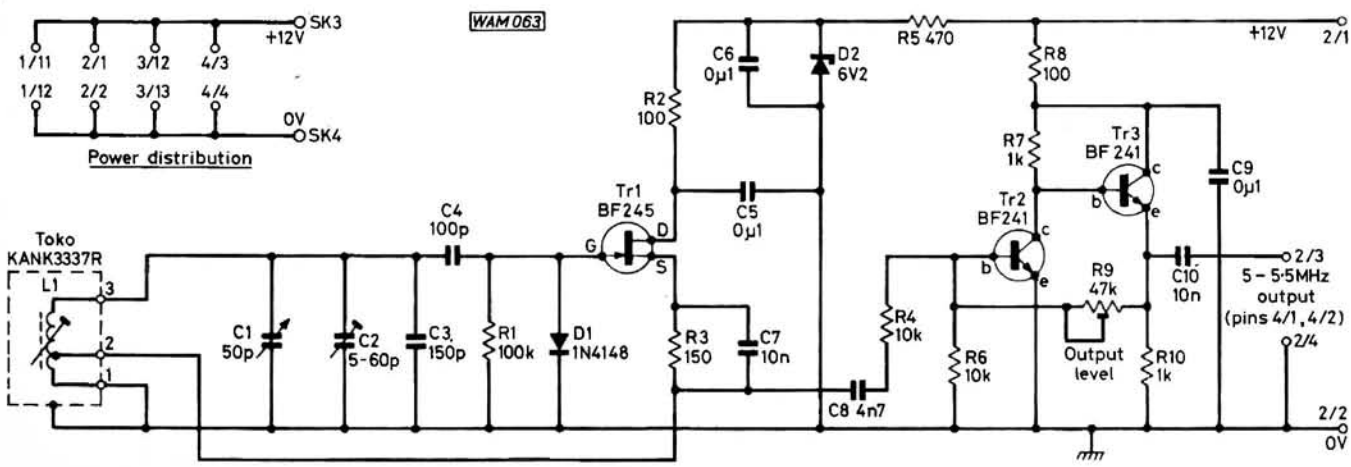


Fig. 1.5: Circuit diagram of the 5–5·5MHz v.f.o. board, Board 2

ted from either a 3–4·5MHz or a 13–15MHz bandpass filter, depending on the setting of the bandswitch, 4S1. These filters are driven by 4IC1, the frequency converter, which produces the sum and difference frequencies of a 9MHz crystal oscillator and a variable frequency oscillator tuning 5–5·5MHz. This frequency scheme is based on one that was popular some years ago for amateur receivers where an i.f. of 9MHz was derived from 3·5MHz and 14MHz signals by mixing with a v.f.o. tuning 5–5·5MHz. The scheme was also used in s.s.b. transmitters where s.s.b. was generated at 9MHz and then converted to the 3·5MHz and 14MHz bands, again by a v.f.o. tuning 5–5·5MHz. One advantage of this method of deriving signals for the 3·5MHz and 14MHz bands is that the v.f.o. tuned circuit does not have to be bandswitched. This greatly aids construction of a stable v.f.o.

A buffer is also provided for driving an external frequency counter to indicate the tuned frequency. This may be omitted if it is not required.

RF Amplifier (Fig. 1.3)

The antenna input is coupled into the primary of transformer 1T1 whose secondary is tuned to the desired frequency by Varicap diode 1D1. Capacitors 1C2 and 1C4 prevent the d.c. tuning bias of 1D1 from flowing through the secondary of 1T1 or affecting the bias on gate 1 of the dual gate m.o.s.f.e.t. 1Tr1. Gate 2 of 1Tr1 has its d.c. bias point varied by the r.f. gain control 1R1 and any noise on the connecting lead from 1R1 wiper to 1Tr1 is eliminated by 1C3. The drain of 1Tr1 drives the tap on transformer 1T2 and again a tuned circuit is formed by 1T2 and Varicap diode 1D2. The d.c. blocking capacitor in this case is 1C7.

Tuning of the input and output circuits is achieved by varying 1R9 which has a 9·1V stabilised supply connected across it. This supply is generated by Zener diode 1D3 and 1R7. The Varicap diodes used (KV1236) require less than a 9V variation in bias to give a capacitance swing of almost 450pF. This allows the 3·5MHz and 14MHz bands to be tuned without the need for bandswitching, considerably simplifying this part of the receiver. The amplified and pre-selected output from the r.f. amplifier is taken from the low impedance winding of 1T2 to the product detector stage.

5–5·5MHz VFO (Fig. 1.5)

The v.f.o. circuit is formed around a j.f.e.t., 2Tr1. This oscillator design is based on E. Duncan's circuit in the January 1983 issue of *PW*. It has been found to be very stable even when using a pre-wound coil and is easy to adjust for the desired frequency coverage. The tuning capacitor, 2C1, sets the frequency in conjunction with trimmer 2C2 and capacitor 2C3. No attempt was made to compensate for temperature effects as my receiver was intended to operate under fairly constant temperature conditions. The p.c.b. for this circuit has provision to fit a combination of two capacitors for 2C3. These can be chosen for minimum variation of frequency over the operating temperature if desired. A stabilised supply is generated for the oscillator by 2R5 and Zener diode 2D2.

Transistors 2Tr2 and 2Tr3 form a buffer amplifier whose output level is set by adjusting the feedback resistor 2R9. Transistor 2Tr3 is an emitter follower which drives the input of 4IC1.

Construction

With the exception of the controls 1R1, 1R9 and 2C1, sockets 1SK1 and 1SK2 and the +12V sockets, all the components are mounted on printed circuit boards. The p.c.b. track patterns and component placement drawings for each board are shown in Figs. 1.2 and 1.4. The use of p.c.b.s makes construction simple and straightforward, but the circuits were prototyped and developed on either Veroboard or plain copper-clad boards. Although these other methods are not very easy to use, especially when mounting transformers, they are a viable alternative to the p.c.b.s.

My p.c.b.s were made by drawing the required layout on paper, full size, and then sticking the completed layout onto the correct size piece of single-sided board. Each hole was then marked onto the board with a centre punch and hammer and the paper layout removed. The board was then cleaned of glue and the track pattern drawn using an etch resist pen (e.g. Dalo marker). Ferric chloride solution was used for etching and the pen marking removed with a suitable solvent. Next, the holes were drilled and the board tinned with a hot, clean soldering iron. This tinning is well worthwhile as it makes soldering the components into the board easy and prevents the boards from becoming discoloured and tarnished with time.

Mounting the components on each board should be done methodically, starting at one corner of each board and working to the opposite corner mounting each component as it occurs. This is to be preferred to mounting all the resistors first, then all the capacitors, and so on as it results in less errors. Take the normal handling precautions with the f.e.t.s, ensuring that your soldering iron is earthed.

If plug and socket interconnections between boards are to be used, the correct size plugs will need to be cut down from the rows of 10 or 12 as supplied, as can be seen from the photographs of the prototype.

In part two of this project we will deal with Board 3, the product detector and audio stages and Board 5, the crystal oscillator and frequency converter.

Mods

No.31 Roger Hall G4TNT(Sam)

IMPORTANT—The ideas presented here are suggestions only, and as they are untried by this magazine, we cannot accept responsibility for any resultant damage, however caused. Before alterations are attempted, care should be taken to ensure that any guarantee is not invalidated, and it should also be borne in mind that modifications usually have an adverse effect on resale prices. In cases where specialist skills or equipment are needed, most dealers will undertake the work for a reasonable fee.

This month's first mod was supplied by Peter G3ZVI of Garex Electronics, distributors of the **SX-400**. It's not really a mod, more of a useful tip. He has had potential customers who have said that it's all very well the SX-400 having switchable a.m./f.m. across its range, but what about receiving those sideband transmissions that appear from time to time?

The answer is so very simple that I am ashamed at not having thought of it for myself. The SX-400 has two i.f. outputs on the rear of the case, one of 455kHz and one of 10·7MHz and, as most avid listeners also own an h.f. receiver, it is the work of a few moments to make up a patch lead to connect the two radios together. The h.f. set can then be tuned to 10·7MHz and whatever the frequency of the signal that is being picked up by the SX-400, it will be fed to the h.f. set at 10·7MHz where it can be resolved in a.m., f.m. or s.s.b. Isn't that a neat little trick? Thanks for passing it on, Peter.

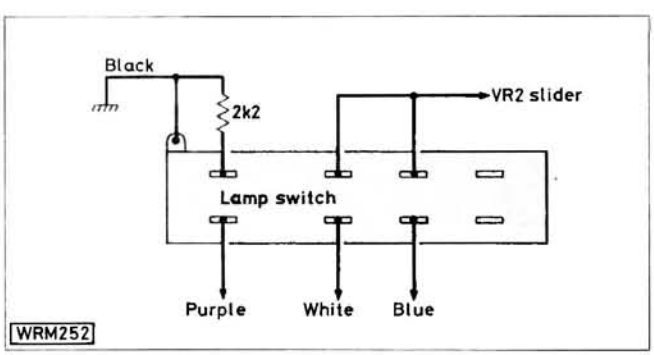
Steve G4MSV has written in from Cornwall with a useful mod for the **Trio TR2300**. He has found a simple way of having the option of low power on this model.

The normal output power is about 1 watt with a resulting NiCad life of approximately 1 hour at 33 per cent duty cycle. This mod gives an output of roughly 200mW, reduces the current drawn by about 40 per cent and should give a corresponding increase in battery life.

The modification is based on a change to the bias resistor in the base of Q8 which is in the driver stage. This is achieved by attaching a switchable resistor in parallel with the earthy side of the slider of VR2. Switching is achieved by making use of the connections to the two-pole three-way lamp switch. When the modification has been carried out, the options available are: high power with lamps on, high power with lamps off or low power with the lamps off.

The very first step is to remove the cover that contains the speaker—taking care not to break the speaker leads. Then find the rear of the lamp switch. Disconnect the orange wire from the top of the switch, insulate its end and then tape it down somewhere out of the way.

Next, reconnect the purple, white and blue wires as shown in the diagram (note that if the spare l.e.d. is used as a TONE BURST ON indicator, then the blue wire will be absent).



Now find VR2. It's a vertical 5kΩ skeleton potentiometer that is adjacent to the p.a. transistor that has the heat sink. Turn this pot. fully clockwise. This pot. will eventually be used to set the low power level. **Very carefully** and **quickly** using a **very hot** soldering iron, solder one end of a lead to the slider of VR2. The other end of this piece of wire should then be connected to the two joined switch connections as shown in the diagram.

Now solder a 2·2kΩ 1/8 watt resistor between the centre pole of the switch and the earth contact that is just to its right. The mod is now complete.

Steve says that he has used VR2 to set his own radio for approximately 200mW output and this corresponds to a battery drain of just 273mA. The normal (high power) setting of 1 watt draws 455mA from a 13·8V supply so the output powers and voltages will be slightly less when the internal NiCads are used.

Thanks, Steve.

Wanted

This column was originally intended to appear every month, but unfortunately it has not worked out that way. Space is always at a premium in this magazine and we always have more editorial than there is room for. This has meant that "Mods" tends to appear intermittently and this has caused a massive backlog of letters. If you have written in with a mod, or a request for one, please be patient. As you can see, there is only enough space for two or three mods a month. Even if this column were to appear every month, then I would still only be able to publish less than forty mods a year. When that is compared to the enormous number of letters that I receive, you can see why some letters take more than a year to be published.

As for requests for mods, this tail-end section of the column is where I pass on requests that I have received. Please do not enclose a stamped addressed envelope or any other form of pre-paid reply when writing in as it is unlikely that I will be able to reply personally, all correspondence will usually be carried out through these pages.

I often receive requests from readers who would like me to send them a photo-copy of a previous "Mods" page. The way that it should be done is for the reader to contact our Post Sales Department—their address is on page 17 of this magazine—and they will, for the sum of £1, send you the entire issue. It is, however, necessary to tell them which issue it is that you want. It's no good saying "The one with the mods for the 2E".

Kris G8AUU has given me several mods in the past, now he has asked me to pass on a request for help. He has found that Icom equipment has three tuning speeds, 5kHz and 1kHz on f.m. and 1kHz and 100Hz on s.s.b. Kris would like to be able to use all of the tuning rates on both bands, i.e. 5kHz, 1kHz and 100Hz on both s.s.b. and f.m. Does anyone know if this is possible, and if so, how?

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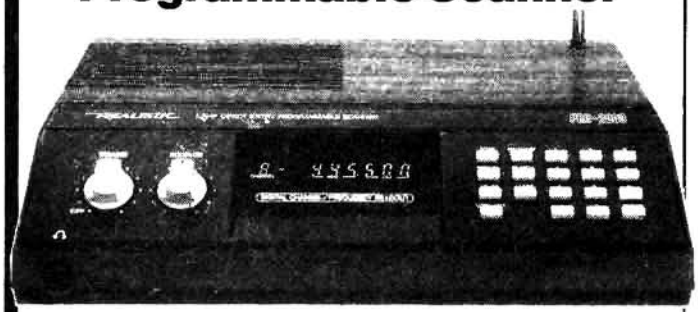

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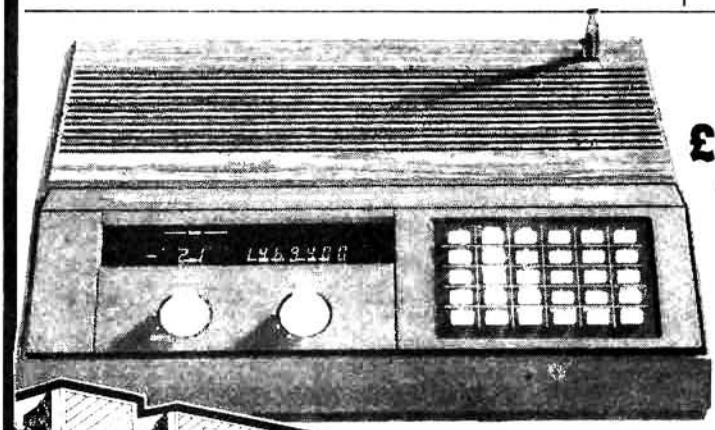

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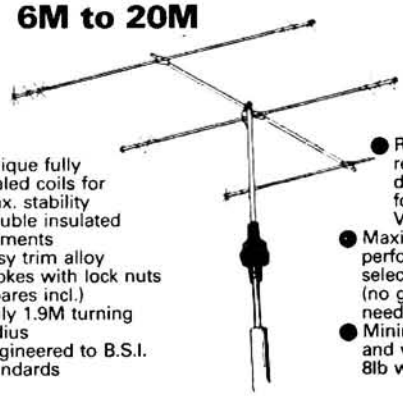

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Introducing Short-wave Listening

Part 3 by Charles Molloy

It was in the year 1901, as Marconi sent a radio signal from Poldhu in Cornwall to St John's in Newfoundland, that the ionosphere made its debut. This transatlantic signal presented a problem. How did it get to Newfoundland? Radio waves travel in straight lines. Even those going off at a low angle to the horizon should leave our planet unless of course there is some mechanism to turn them back.

Scientists of the day suggested that rarified gas surrounding the earth and maintained in an electrified state (ionised) by radiation from the sun, would do the trick. The ionosphere was the name given to this region but it was not until 6 December 1924 that Sir Edward Appleton demonstrated its existence. He used the BBC transmitter at Bournemouth on 780kHz, after the programmes had finished for the evening, and a receiver equipped with a signal strength meter located at Oxford. The frequency of the transmitter was slowly changed and the reading on the signal strength meter at Oxford changed in sympathy with it. The signal was travelling over two paths. One followed the ground while the other took a longer one via the ionosphere (Fig. 1). At the receiver the two signals moved in and out of step (phase) as the wavelength changed.

The height of the reflecting region was about 120km above the surface of the earth. It was the Heavyside or E layer, beloved of medium wave DXers, that was reflecting the signal from Bournemouth. The Appleton or F layer was soon discovered. This is the region that enables long-distance reception on the short waves to take place. In winter the F layer is at 200km. To complete the picture the D layer at 80km which exists during the daytime only, absorbs signals at the low frequency end of the spectrum.

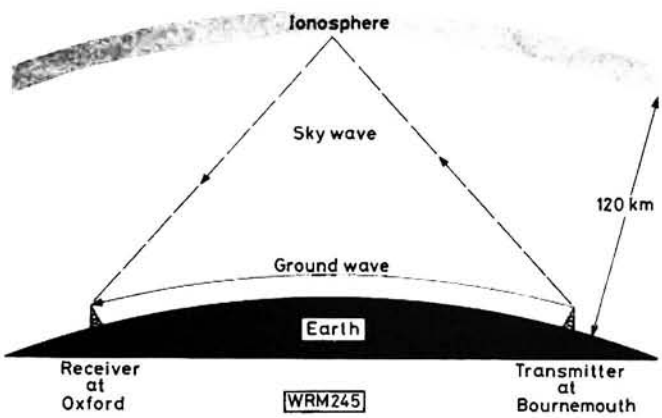


Fig. 1: Appleton's original experiment to demonstrate the presence of the ionosphere used the BBC Bournemouth transmitter and a receiver sited at Oxford

Sky Wave

Without the ionosphere long-distance communication on the short waves would be impossible. The range of the ground wave depends on the frequency. Low frequency equates with long distance, high frequency, short distance. A long wave transmitter has a larger service area than a medium wave equivalent, while at the high frequency end of the short waves the range is reduced, literally, to single figures in kilometres.

Since the ionosphere is maintained by radiation from the sun then clearly the propagation of radio waves will depend on the direction and strength of that radiation. Propagation on the sunlit side of the earth will be different from that on the dark side; it will be different in summer than in winter. These daily (diurnal) and seasonal changes are of great interest to broacaster and listener alike. Even when using the best equipment available you will not get perfect reception at all times.

Diurnal Changes

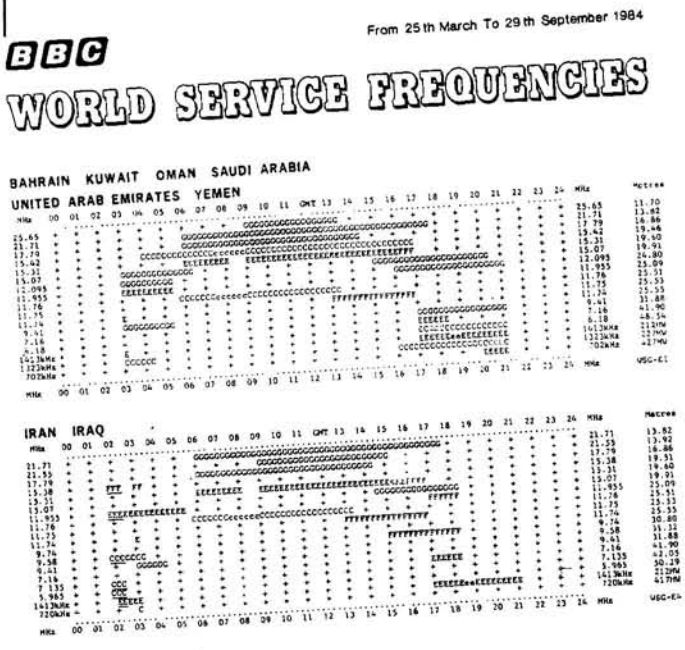
The daily change is more noticeable to the listener but fortunately there is a simple way to deal with it. Listen on the 18MHz band at midday. It should be full of strong signals. Listen again at midnight. The band will be dead. There is nothing wrong with your set. 18MHz has closed down for the night so try 11MHz (25m) or 9MHz (31m) instead. On any particular path, move to a lower frequency at night.

The 6MHz band can be a puzzle to newcomers. During the day it is full of short range signals from Belgium, Holland, West Germany, Sweden, at my QTH. After dark they will have disappeared or declined while DX such as Radio Australia on 6·05MHz and HCJB in Ecuador on 6·130MHz will appear. Apply the same rule. After dark move down to the medium waves for Western Europe. During the day Radio Australia will be found on the 9MHz band.

Seasonal Changes

Seasonal changes are looked after by the broadcaster who will use different frequencies as appropriate. In summer a broadcaster may use 15MHz (19m), 18MHz (16m) and 21MHz (13m) to Europe but in the winter the highest frequency will be dropped and the station will now be found on 11MHz, 15MHz and 18MHz. You choose the one that comes in best and a modern push-button receiver with a memory will be useful here.

The propagation seasons start in March, May, September and November. Publications like the *International*



Typical frequency schedules published by the broadcasters. Only a small part of the schedules are reproduced here to give an idea of their contents

Listening Guide also come out four times a year to keep up with the changes. Not every station changes on these dates and there is a move to reduce the number of seasons to two, which would simplify matters a lot. Your favourite station on the long, medium v.h.f. bands will be found at the same spot on the dial, day and night throughout the year. On the short waves your station will move about. It has to in order to keep up with changes in propagation. Consequently broadcasters supply listeners with a frequency schedule which indicates where and when they can be heard.

On The Spot

There is another change, less obvious in the short term than the diurnal and seasonal changes. This one follows the eleven year sunspot cycle. Over a period of approximately eleven years the number of sunspots increases to a maximum and then decreases to a minimum. The amount of radiation reaching the ionosphere from the sun follows a similar cycle the highest level of radiation occurring at sunspot maximum. Sunspots have been counted since the year 1749. The minimum of cycle number 1, the first to be counted, occurred in 1754. That cycle ended in 1765. Cycle number 21 began in 1976 and is expected to end with a minimum in 1986. Higher frequencies can be used at a maximum, so the highest frequency band 26MHz is only used for part of the cycle and even the 21MHz band is not available near sunspot minimum. As sunspot minimum approaches and higher frequencies become unusable, severe overcrowding occurs at the l.f. end of the spectrum on 6MHz and 7MHz.

Fading

Radio waves have peaks and troughs just like waves in the sea. When signals from a transmitter arrive by two different paths through the ionosphere, they will add when the peaks coincide and subtract when they do not. The relationship between the two signals will constantly change owing to movement, and changes in density in the ionosphere. The result is fading.

Modern receivers are equipped with automatic gain control (a.g.c.) which adjusts the gain of the receiver in sympathy with the incoming signal in order to obtain a constant, fade-free output to the loudspeaker. It does work, so it is only during disturbed conditions when fading is severe that the listener will be troubled. If you have two receivers and the station you are listening to is on two different bands then tune one receiver to one band and the second to the other band. Hopefully the fading pattern on the two bands will be different and at any instant the signal will be heard from one of the two sets. Frequency diversity reception of a sort is what we are attempting and if you really want to listen to a favourite programme you can just about manage in this way.

Disturbed Conditions

There are two quite different types of disturbance in the ionosphere that affect reception, and it may help if the listener can identify them.

The sudden ionospheric disturbance (s.i.d.), sometimes called the Dellinger Effect, is caused by a sudden increase in radiation from the sun, which travels at the speed of light and penetrates right through the ionosphere to the bottom or D layer. Absorption increases and fadeouts occur, principally at the low frequency end of the spectrum. There were several s.i.d.s in 1983. During one, I had been lining up my receiver with a signal generator. When I tried it out on 6MHz the band was dead and at first I thought my receiver was faulty. There was only one station on 9MHz, the BBC on 9·760MHz, there were a few stations on 15MHz and 21MHz.

A s.i.d. only occurs on the side of the earth facing the sun, i.e. during the day. It lasts for a short time only, perhaps an hour or so and you may get some reception if you try the highest frequency bands. Failing that take the dog for a walk and the trouble will have cleared up by the time you get back.

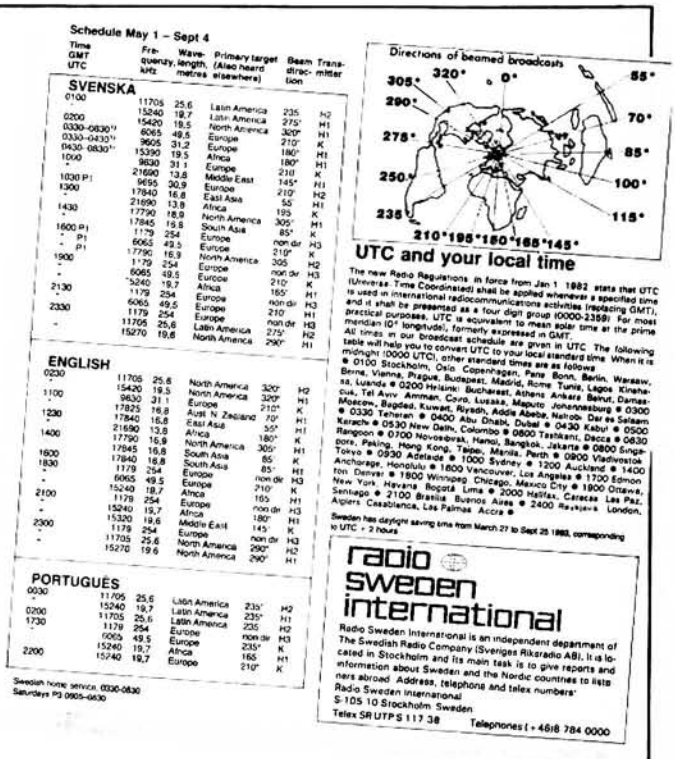
The Ionospheric Storm is caused by the arrival of charged particles from the sun and travelling slower than radiation, so if you have a s.i.d. one day you may have a storm a day or two later. On arrival at the earth the par-

ticles are trapped by the magnetic field and travel towards the magnetic poles, disturbing the upper part of the ionosphere on the way. The higher frequency bands are affected more than the lower ones, though a severe storm may affect reception right down to the medium waves. A storm can occur day or night and may even last several days before conditions come back to normal. It is always worth listening around the bands when conditions are poor as you never know what may turn up. Normally, reception is blocked, or poor, on tracks that pass over the magnetic poles but during a storm signals may get through.

Relay Stations

The propagation of radio waves through the ionosphere is an interesting and, dare I say it, absorbing subject. It can also become quite complicated over long mixed paths of daylight and darkness. It isn't necessary for the listener to dig into these difficulties, nor to understand terms such as the critical frequency, maximum usable frequency, etc. The purpose of this article is to show what effect propagation has on reception rather than to explain how it is done.

The modern trend in international broadcasting is to employ relay stations to provide more reliable reception over short distances. If this trend continues then broadcasting on these frequencies can only benefit, and it will be left to the DXer to ponder over what happens to long-distance radio waves as they pass through that unstable medium called the ionosphere.



3·5/7MHz Amateu

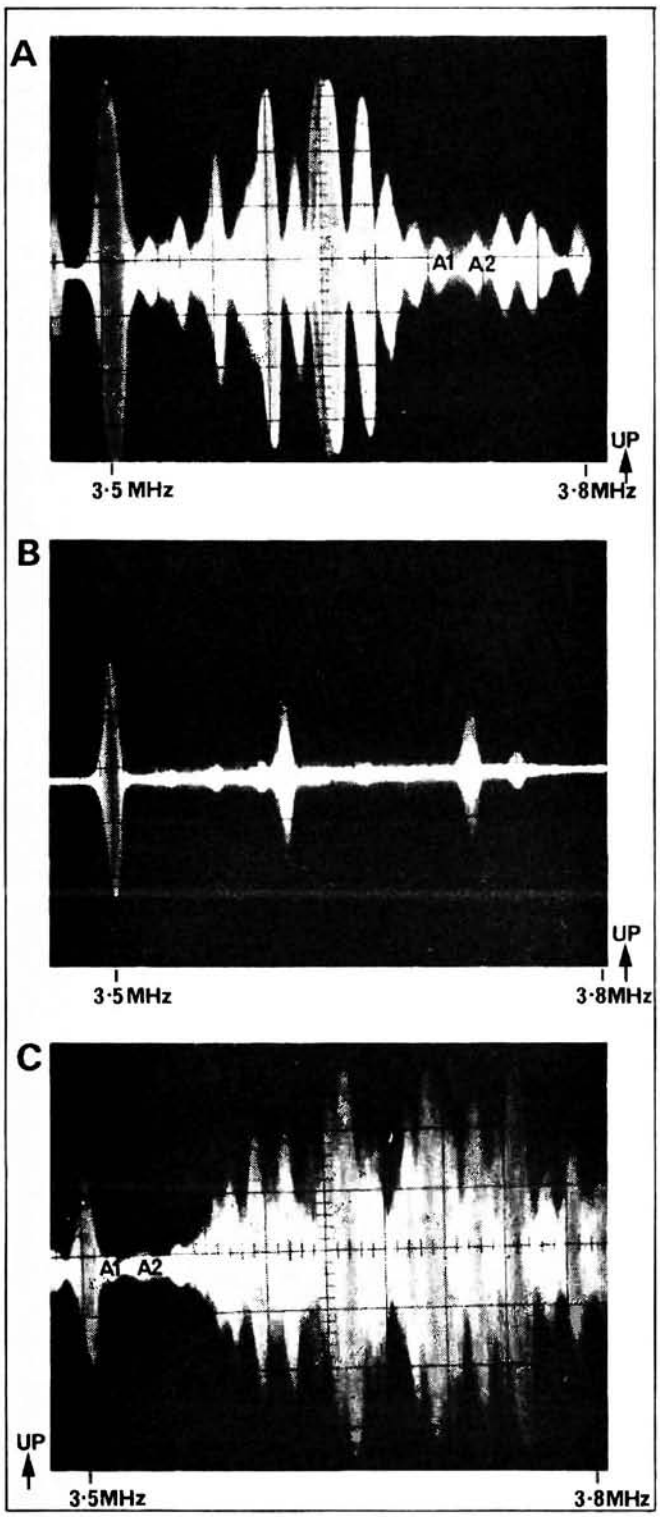


Fig. 1: Band scans taken at different times of the day showing the high-power Commercial and Services stations in the 3·5MHz band. The scans are described fully in the text

This report is concerned mainly with the, now so-called, *shared* amateur radio band 3·5 to 3·8MHz (80m), the "sharing" of which has amounted to *almost total occupation* by high powered Commercial and/or Services stations. *This has created a serious situation for all amateurs who operate on this band.* Occupation of the 7·0 to 7·1MHz (40m) band by high-powered broadcast stations is of course well known, but note[1] that neither band is exclusive to radio amateurs.

The 3·5MHz Band

In view of the increasing invasion by high powered Commercial and Services transmissions into the 3·5MHz band it was decided to analyse the amount of the band being used by them and the bandwidths and signal levels of these transmissions, by comparison with normal amateur s.s.b. and c.w. transmissions with average signal levels between S7 and S9+. The S9+ refers to reports given as S9+10, or S9+20dB etc, normally taken from typical S-meter readouts. These are not accurate enough to allow pure measurement because of the usual meter non-linearity and inertia. The "decibel" part of the calibration on S-meters can be totally misleading.

For the purpose of this analysis therefore, all measurements were made with independent linear-reading meters used in conjunction with a Gould Advance double-beam oscilloscope accurately calibrated in terms of millivolts to volts and special signal integrating circuitry used in conjunction with a pen chart recorder. All measurements are related to a given reference signal and any errors in readouts are not more than ±2 per cent in a total dynamic amplitude range of 0 to 100dB[2]. The most used reference signal is an r.f. carrier of 1μV at the antenna terminal of a specially modified communication receiver with facilities for continuously scanning the whole of each of the two bands. The scan time of 10ms allowed high-speed Polaroid photos to be taken of band occupation in terms of the number of stations operating and the amplitude of each related to the reference signal of 1μV from a Gould Advance signal generator. Also used in conjunction with the analysis was a digital readout frequency meter and a separate frequency market generator for identifying any signal within the scan which could be marked and received as normal on another receiver. The marker generator was also used to identify the beginning and end frequencies of the band to within 10Hz during band scan.

General Assessment of Conditions

The 3·5MHz Band. October–November '84

General opinions were obtained from numerous amateur stations in the UK as a whole and from amateurs in a number of continental and Scandinavian countries. All the stations questioned reported not only the excessive QRM from high powered Commercial and Service stations sending RTTY, c.w. and transmissions with unidentifiable forms of modulation but the fact that it is often extremely difficult to maintain a QSO, even if one was started on what was considered a clear frequency. The offending stations are not the least bit concerned about

r Band Occupancy

transmitting on a frequency already being used by amateur stations.

It is estimated that many of these stations are using power in excess of 50kW and possibly as high as 100kW or more. Some may be using lower power, around 10 to 20kW, but these also make it difficult to maintain reasonable amateur QSOs. There is less occupation by these stations at the low end of the band, near the c.w. end. The times of peak levels from such stations are of course effected by ionospheric conditions and many may well have come into the 3·5MHz band because low critical frequencies prevent them from operating in the higher frequency portion of the radio spectrum. Low critical frequencies are the result of the near end of the present sunspot cycle No. 21. The latter condition has also caused an influx of radio amateurs to the 3·5MHz band from the higher frequency bands, e.g. 21 and 28MHz, and there are many newly-licenced Class A amateurs coming onto the band as well, although this would not greatly effect operating generally as the band is 300kHz wide. However, the occupation of the band by high powered Commercial and Services stations has resulted in some Class A licenced amateurs operating outside the band with more power than they are licenced for. Between 1 and 3kW is not unusual. Operation by these stations is mainly outside the upper end of the band (above 3·8MHz) in order to attract DX contacts with USA stations whose 3·5MHz band allocation extends to 4MHz.

Band Occupation Analysis

One needs only to study the oscillograph photos of band scan to realise the enormous signal levels and amount of occupation by Commercial and Service stations. Fig. 1(a) shows a typical early morning condition and at the time the photo was taken only two amateur stations could be identified. These are marked A1 and A2 and their signals were well over S9! The enormous amplitude of the non-amateur stations is painfully obvious.

The next oscillogram Fig. 1(b) was taken during a quiet period, around midday, when most of the high powered invaders had disappeared, probably due to ionospheric conditions. The smallest signals (about S9) are radio amateurs, whilst the three larger ones are non-amateur. Next we come to Fig. 1(c) taken in the early evening when conditions have allowed the Commercial and Service stations to appear again at their usual high amplitudes, this time with the added QRM due to harmonics from nearby TV line timebase oscillators. A couple of amateur stations are just visible marked A1 and A2. These were S9 c.w. signals. The large signal at the beginning of the trace marks the beginning of the band at 3·5MHz.

The two separate graphs of Fig. 2 shows (A) the average level of amateur signals in the 3·5MHz band between the lines marked S7–8 to S9+, the levels being with reference to an r.f. potential of 1μV at the antenna terminal of the receiver. The next graph (B) is extended to cover the USA section up to 4MHz and shows the average levels of Commercial and Services stations at peak times. Only the c.w. end of the band remains reasonably clear. It should be noted that the various signal levels are *average* but result from hundreds of observations and careful measurements carried out continuously during the daytime over the range of hours to be seen in Fig. 2 and for a total period of over two months. On many occasions the signal levels of some of the Commercial or Services stations were much higher than 60dB above the reference level of 1μV.

Actual band occupation by these non-amateur stations can be clearly seen in the oscillogram Fig. 1(a). The estimate of occupation is at least 60 per cent and some of these stations have bandwidths of more than 20kHz. On occasions, during the two months or so of continuous daily observations, band occupation by these stations has been as high as 80 per cent.

Further analysis was carried out to verify the periods of maximum and minimum occupation as can be seen in Fig. 3. Readouts of all the signals within the band scan were integrated to provide a varying d.c. level according to the number and amplitude of all the signals. Readings were taken every hour for 15 minutes at the times stated on the lower portion of the graph. The lowest section of this graph represents the approximate integrated signal level that would be attained if the whole band was being simultaneously used only by amateur stations each occupying 10kHz, using the allowed maximum power and producing received signal levels in the region of S9 to S9+. The level shown is approximately 50mV.

As can be seen the quietest period is around 1100 to 1300 hours GMT, although ionospheric conditions prevailing at any time would of course determine the signal levels of all transmitting stations and distances worked. It must therefore be emphasised once more that the analysis as a whole is based on average conditions. Although there may be occasional quiet days free from high powered station QRM and with conditions otherwise good for amateur operation, there will be some when conditions will be quite the opposite.

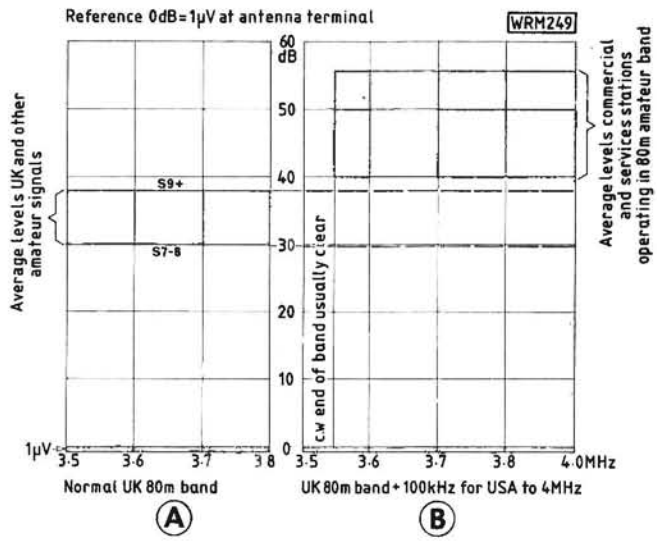


Fig. 2: Average levels of amateur signals (A) and Commercial and Services signals (B) in the 3·5MHz band

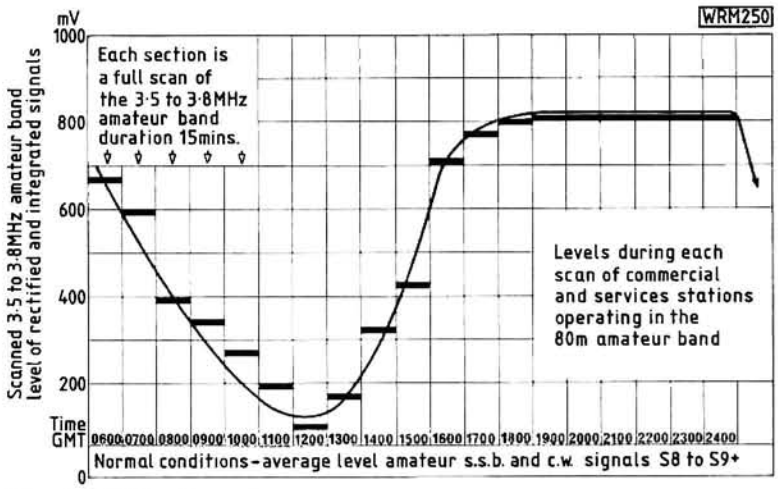


Fig. 3: (Left) Readout of integrated signal level of total number of high-powered Commercial and Services stations taken for a duration of 15 minutes, every hour on the hours shown. The band at the bottom of the graph represents the integrated signal level that would be achieved if the whole band was occupied by amateur stations only, at levels of S8 to S9+

Fig. 4: (Below) Band scans taken for the 7MHz band (7·0 to 7·1MHz) showing the wide bandwidth of the foreign broadcast stations. The large amplitude carrier at the end of the band is Radio Moscow

The 7MHz Band

We have of course grown accustomed to the QRM from broadcast stations operating on this band which a long time ago was narrowed down to its present 7·0 to 7·1MHz, or a total bandwidth of 100kHz. Some of the high powered broadcasters spread to 20kHz or more. However, there are periods when amateur operation is reasonable and at times, usually early mornings, some good DX can be worked. The oscilloscope photos Fig. 4(a) show peak occupation, generally toward the end of daylight hours, when it becomes virtually impossible for radio amateurs to operate.

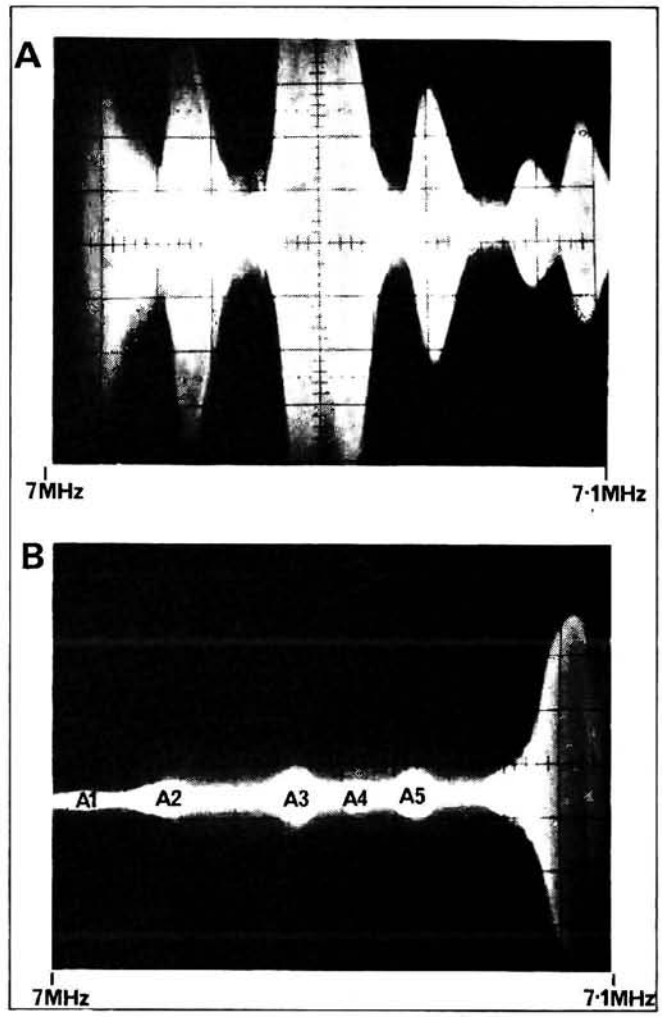
The signal amplitude from most of these broadcast stations is extremely high. Again the reference level is 1μV at the receiver antenna terminal. The lower oscillogram Fig. 4(b) shows the band during a quiet period, i.e. when most of the broadcasters are not audible because of ionospheric conditions, although in this case one broadcast station remains at the top of the band at very high level and was identified as Radio Moscow on 7·100MHz. The small carriers marked A1, 2, 3, 4 and 5 are amateur stations, these signals being S9 to S9+.

Analysis by integration of the scanned signals for periods of 15 minutes and taken every hour as shown in the graph (Fig. 5), indicate that the band is most usable from about 0800, or earlier, up to about 1300 to 1400 hours GMT. As long as ionospheric conditions are suitable, good QSOs are possible around the UK and Europe. In the early morning the writer has worked VK, ZL, VE and stations at similar distances whilst running normal power of 120 to 130 watts to a half-wave antenna on both 3·5 and 7MHz.

Summary

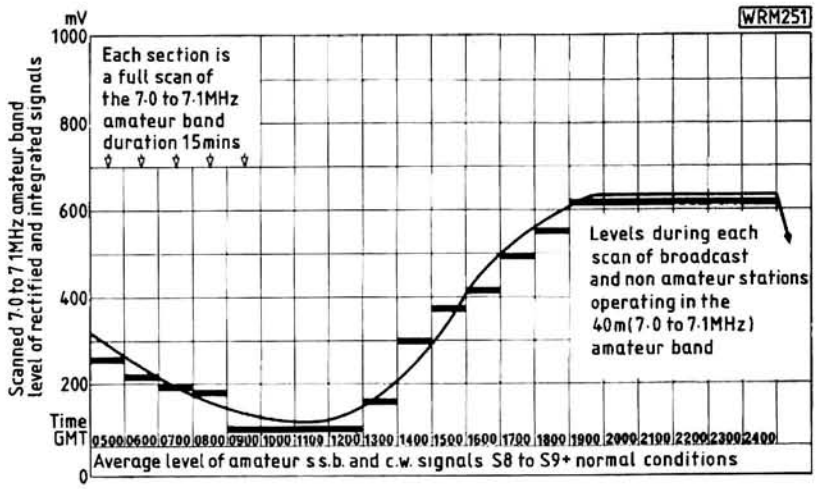
It is unlikely that the broadcast stations can be shifted from the 7MHz band, despite the fact that this band was originally designated as exclusive to amateur radio as was the 3·5MHz band at one time. As far as the 7MHz band is concerned, it is doubtful whether the Department of Trade and Industry, the IARU or the RSGB can do anything about the broadcast stations that have invaded this band.

Although we have accepted "sharing" the 3·5MHz band, this is now tantamount to almost total occupation by Commercial and Services stations for the greater part of every day, thus denying radio amateurs even a reasonable sharing. Quite obviously this was never the real object when the new *Amateur Radio Licence Schedule (Ref 481)* was issued in August 1984 by the Department of Trade and Industry and became mandatory on 16 September 1984. In the footnotes attached to the new schedule is a paragraph designated "H".



"PRIMARY PERMITTED AND SECONDARY SERVICES 'For the purpose of this licence bands are allocated to the amateur service and the amateur satellite service on a primary basis on the understanding that they cannot claim protection from harmful interference from any other authorised services. This applies equally to bands allocated on a secondary basis where stations of the amateur service and the amateur satellite service are also required not to cause harmful interference to stations of a primary or permitted service to which frequencies are already assigned or to which frequencies may be assigned at a later date'."

Fig. 5: Readout of integrated signal level of total number of high-powered broadcast stations occupying the 7MHz band during the hours shown. Sampling is on the same basis as Fig. 3. The band at the bottom of the graph represents the average integrated signal level if the whole band was occupied only by amateur stations at levels of S8 to S9+



Under the schedule, the status of allocations in the UK for the 3·5 to 3·8MHz band in the UK amateur service is classified as Primary and shared with other Primary services. The 7 to 7·1MHz band is designated only as Primary, i.e. it is not shared, but the above note clearly states that we have no protection from interference from other authorised services. It would appear that as far as the 7MHz band is concerned, there is no protection from interference by unauthorised services either.

Finally, it would not be deemed impertinent to remind the Department of Trade and Industry, the IARU, the RSGB and in fact all Authorities concerned with frequency allocation, that radio amateurs have to pass two exams for a Class A licence, at their cost, and pay a licence fee for the "privilege" of using our very small allocated bands. A privilege that seems to be nullified because of the occupation of amateur bands by any Broadcast, Commercial or Services Stations who choose to do so.

All the measurements, construction of special equipment, oscillogram photography of band scans and the compilation of the foregoing analysis was carried out by F. C. Judd G2BCX. Many other radio amateurs in the UK and on the continent have contributed valuable information concerned with the present state of affairs as outlined in this analysis. ●

(1) Notice by the Department of Trade and Industry, 16 August 1984, *New Amateur Radio Licence Schedule. Ref. 481*

(2) Decibels quoted in this report are dBV derived from voltage ratios by $20\text{Log}_{10}(V_2/V_1)$. Each oscillogram photo is amplitude related.

Swap Spot

Have Sinclair 48K Spectrum home computer, Data recorder and over £150 worth of software and books on machine code all under 4 months old! Cost over £300 would exchange for Yaesu FRG–7700M Trio R–2000 or Yaesu FT–730 or FT–790 430MHz Transceivers. Ian G1HQK. Tel: 01-385 2373 after 8 pm. *W869*

Have Hitachi hi-fi unit l.w., m.w., f.m. plus sensitive s.w. band, uses f.e.t.s with pair of Wharfedale 25W speakers. Would exchange for Yaesu FRG–7 or Racal RA17/117E with possible cash adjustment. Mr Jones, 45 Barrington Court, Cheltenham Place, London W3 *W847*

Have Marconi TF373D universal bridge c.1940, perfect order. Would exchange for Wobbulator. Also have 2 QY2–100's (new). Would exchange for 2 TY2–125's. Also have Pye TV22 TV and manual c.1952 needs work. Would exchange for 35MHz radio control gear, or kits. Tel: Burgess Hill 42766 (Sussex). *W846*

Have Mobylette moped L reg complete in good running order mechanically sound, needs rear brake shoes for MoT. Would exchange for general coverage receiver or Centronics compatible printer or w.h.y. Dave. Tel: 0865 67165 (Oxford). *W840*

Have CWR610E RTTY/c.w. converter. Baudot ASCII and c.w. into v.d.u. or TV. As new with instruction, value £120. Would exchange for w.h.y. Tel: Bacup 874928 after 7 pm. *W833*

Have Datong low noise pre-amplifier 5–200MHz transmit thru' when still in line, also Drae three way antenna switch. Both used very little as new. Would exchange for ZX Spectrum interface one, or ZX microdrive. Sid. Tel: 051-334 6859 after 5 pm. *W826*

PRACTICAL ATV TECHNIQUES

Part 2 by Allan Latham G8CMQ

The essence of this series is getting you onto the 1·3GHz band and so this second part of the series is going to describe how to start with a low-cost ATV receiving system. Obviously such a system will not perform as well as a more elaborate one but I have taken care that you can retain the components of this simple system. You add to it later rather than scrapping it and starting again. The costs involved will be about £55, including the antenna and Solent Scientific receive down-converter in kit form.

To show you how the converter works I will describe it in some detail. Although you could try to build one from this description I wouldn't advocate it. So much depends on the p.c.b. layout and the exact make of components that you risk failure and disappointment. The kit price is not greatly more than the cost of buying the components from manufacturers (not surplus ones, it isn't worth the risk at 1·3GHz) plus the p.c.b. and design costs. At the time of writing about 20 have been built by people of various constructional skill and they all work well. Ready built converters are of course available at somewhat higher prices from various suppliers.

Antennas and Feeders

There are two possibilities for inexpensive antennas. There is the one described in the *UHF Compendium* on page 358 and one designed by the Worthing Repeater Group and described in *CQ-TV* No. 127 page 15. This latter is available as a kit of parts from the group for about £10 and at this price it isn't worth the trouble of hunting around for the bits and pieces. The proceeds go to a good home, i.e. the Worthing ATV Repeater. Full details from the club secretary G6WOR, who is QTHR (s.a.e. please). Whichever antenna you use mount it for horizontal polarisation and get it as high as possible.

You will need a cable run from the antenna to the shack. When I was experimenting on 1·3GHz I used the 430MHz band run, temporarily disconnecting the 430MHz antenna. At this stage in your 1·3GHz ATV activities it's probably wise not to spend too much on the cable. There are two ways of doing things—most of the equipment at masthead, or most in the shack. If you decide to go "masthead" you will need two separate runs of TV type coaxial cable. If you go the "in the shack" route you will want at least one run of the best coaxial cable you can afford—more about this later. A good compromise for now would be URM67 or preferably H-100.

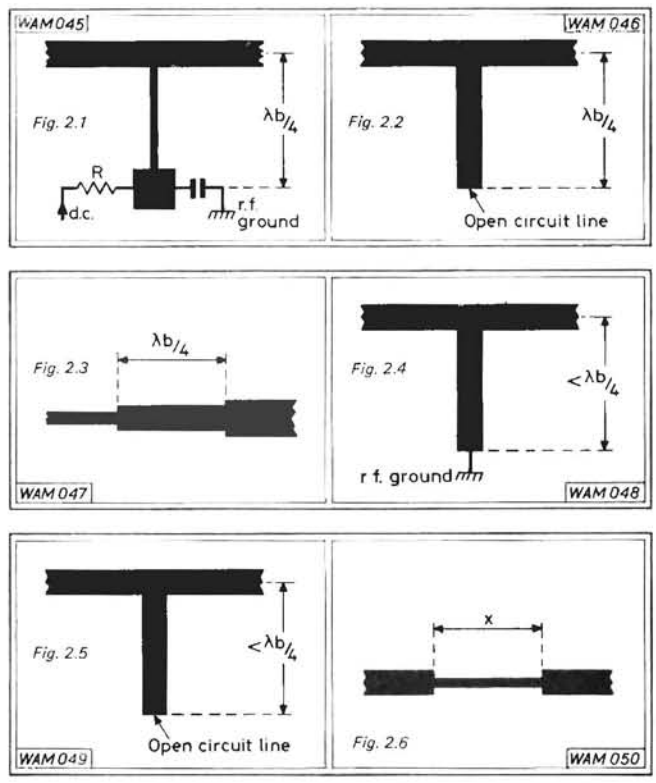
A word about these two cables wouldn't be out of place here. URM67 is rather more lossy at 1·3GHz than is H-100. The latter however is fairly rigid and doesn't like being flexed about too much. You should treat it as a rigid cable and secure it well to the mast, terminating it short of the rotator and using URM67 for the last bit. If you think you will make the cable run permanent use H-100. If you think you will get something better later on use URM67—then you can use the little antenna and its URM67 feeder for portable use later on. H-100 is simply not flexible enough for repeated coiling and uncoiling. Cables with poorer performance are definitely out, even for short runs. Whatever cable you use do **NOT** use PL259 connectors at any point in the system. BNC's are only just good enough at 1·3GHz and should be confined to stages where a little loss can be tolerated. High power amplifiers and the masthead low noise pre-amp should have N-types. Where small size is important SMA connectors are suitable.

The Converter

This explanation of the workings of the receive down-converter is intended as background information to help you learn something of the techniques employed. You could try to make a board from this information but you may well be disappointed with the results for the simple reason that "parasitic" components affect things at these frequencies.

For example, every capacitor has inductance associated with it by virtue of the fact that it has connecting wires; every resistor has capacitance and inductance, too.

Ideally the designer starts with the graphs of impedance against frequency for each component—in practice a good deal of experimentation is required. Active components have very complicated input and output impedance which depend on collector current as well as frequency. This should not deter anyone from building a well tried design using designer approved components, but it does go some way to explaining why apparently similar home made/designed converters and amplifiers do not behave in the same way.



Stripline Components

At these frequencies it is common practice to make certain components from the shape and size of the copper pattern etched in the p.c.b. Double-sided p.c.b. is used and the dielectric material selected depends on the losses which can be tolerated. Paxolin is out of the running at anything above 30MHz; g.r.p. is satisfactory for medium performance at 1·3GHz (i.e. noise figures in the 1 to 2dB region and power amplifiers less than 10W) and is even useful up to 4GHz in non-critical circuits (i.e. after the low noise pre-amp in receivers). For very high performance at 1·3GHz and above only ptfe is suitable.

What components can be made on the p.c.b. and how are their shapes and sizes determined? First we will take a transmission line, as this is the basis of all other components. The primary characteristic of a transmission line is its impedance. I hope all readers are familiar with coaxial cable transmission lines, which are the most common type in everyday use.

You will probably recall that the impedance of a coaxial cable is determined by the ratio of diameters of inner and outer conductors and by the dielectric constant of the insulating material between them. Similarly for a stripline transmission line on a p.c.b. the impedance depends on the ratio of the trackwidth to the board thickness and also the dielectric constant of the p.c.b. material. The usual g.r.p. material used for p.c.b.s has a dielectric constant of about five and for a nominal board thickness of 1·6mm the track width for 50Ω impedance is approximately 3mm. For 75Ω impedance the track width is 1·25mm. In the case of coaxial cable the available impedances are set by the manufacturer—on a p.c.b. the designer can use *any* impedance he wishes, although high impedance results in very narrow tracks and low impedances in unmanageably wide ones.

The secondary characteristic of a transmission line is its velocity factor, i.e. the ratio between the velocity of propagation of a signal along the line compared to free space. The main factor here is the dielectric constant (although there is a mirror dependence on the impedance, too—just to complicate things!). Velocity factor is important in p.c.b. design because it determines the wavelength on the board at the frequency of interest. The transmission line can be used to move r.f. from one part of the board to another, but often it is used to make other components.

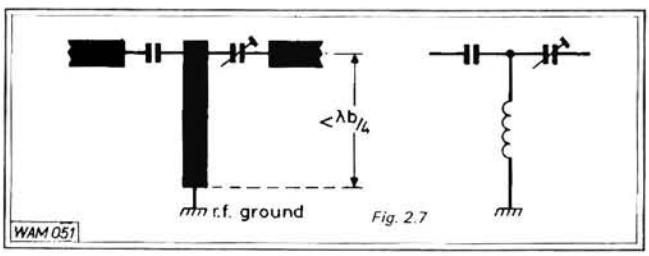
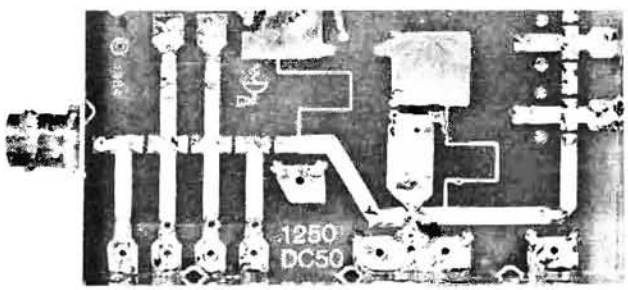


Fig. 2.7



Stripline bandpass filter and r.f. stage components used in the Wood and Douglas 1250 DC50 receive converter

The structure shown in Fig. 2.1 can be used to provide a d.c. bias to the transmission line. The r.f. ground (i.e. decoupling capacitor) has no effect on the transmission line. Compare this with a λ/4 short circuited coaxial stub, which is electrically the same thing.

The arrangement of Fig. 2.2 behaves just like an open circuit coaxial stub and will have the effect of shorting out the r.f. at the design frequency—i.e. it is a notch filter. Looking now at Fig. 2.3 we have an impedance transformer which behaves in exactly the same way as a coaxial transformer.

The structure shown in Fig. 2.4 appears as an inductance between the transmission line and ground whilst Fig. 2.5 appears to be a capacitor between the line and ground with Fig. 2.6 functioning as a series inductance element.

At the 1·3GHz region it is possible to mix discrete components and stripline components; Fig. 2.7 shows a T network high pass filter as used in the receive converter. There are many other components that can be fabricated in this way—bandpass filters, power dividers, balanced mixers, directional couplers to name but a few.

Before going much further a few words of caution are required: what applies at λ/4 generally applies at 3 λ/4 also—care must be taken that these unwanted resonances do not cause problems. Secondly, I have used the expression "r.f. ground" as if it were obvious what it means! By definition the etched back of the p.c.b. is the r.f. ground plane. You cannot assume that anything on the front of the p.c.b. is at r.f. ground unless you've gone to some trouble to ensure that it has a very low inductance path to the back—the true r.f. ground. The most effective way to do this is with plated through holes in the right places; rivets and Harwin pins if done well are OK—thin bits of wire, e.g. resistor lead clippings, are too inductive. Beware of dry joints!

To illustrate this, the 1·3GHz lines on the converter are approximately 15mm long and 3mm wide—if they were grounded at one end by a 1·6mm (the board thickness) piece of 26 s.w.g. wire this would be quite different from using a 1mm diameter rivet or plated through hole. To make matters worse the grounding point is at a current maximum and the inductance really does matter.

I hope that this explanation of some of the techniques has not deterred anyone from building good kits at these frequencies. I am only trying to emphasise that if you depart from a tried and tested design you have entered the R & D business in an Alice in Wonderland World, where nothing is quite what it seems at first sight! If you are an expert r.f. designer you don't need my advice.

The Converter Design

The design of any piece of electronics involves setting out what you are trying to achieve. Often the initial goals are self contradictory and some compromise has to be reached. Let's look at what we want from a 1·3GHz receive converter:

1. Capable of being built by amateur constructors with average ability and reasonable care.
2. Capable of easy testing and alignment with the minimum of experience and test gear.
3. Performance, in respect of all reasonable conditions to be found on the band, which can only be bettered by laboratory test gear and/or much more expensive components.
4. Capable of being used as a "starter" system using only a domestic TV set and 1·3GHz antenna.
5. Reasonable Price.

The first two points involve making sure that as much as possible is done on the p.c.b. and so is determined by the designer and not the constructor, also ensuring that

reasonable variations in construction technique are tolerable. The third point involves consideration of the likely reception problems; it is worth looking at these in more detail.

First, there are low signal levels—we must design for a fairly good system noise figure. Although the specification sheet for the converter says better than 3dB, typical noise figures of 1·5 to 2dB are usually obtained.

Second, there is the presence of very high field strengths from u.h.f. TV transmitters; this is important in two areas. If they reach the mixer via the front-end they can appear in the output as a result of quite complex mixer products, involving harmonics of the local oscillator and harmonics of the u.h.f. TV signal. If they break-in after the mixer the unwanted TV signal can be seen directly because we are using a u.h.f. output frequency from the converter to feed directly into the domestic TV set.

Having now covered the background design philosophy we are ready to look at the converter stage by stage.

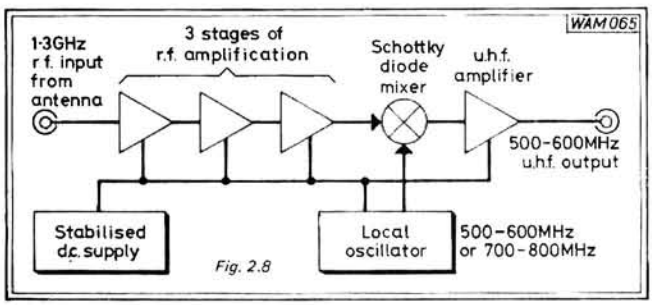
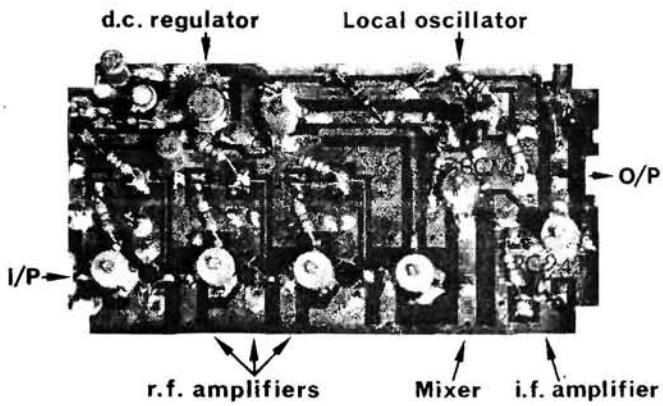


Fig. 2.8: Down-converter block schematic diagram and layout



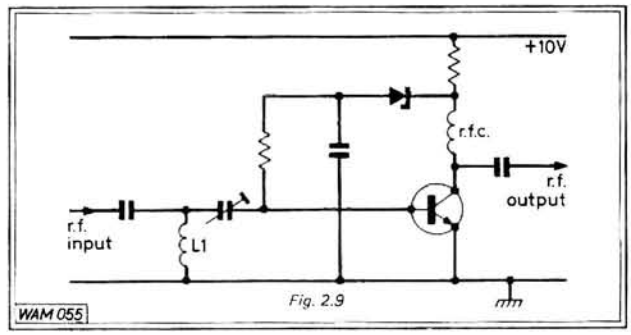
RF Amplifier

The r.f. amplifier consists of three stages each with basically the same circuit as shown in Fig. 2.9.

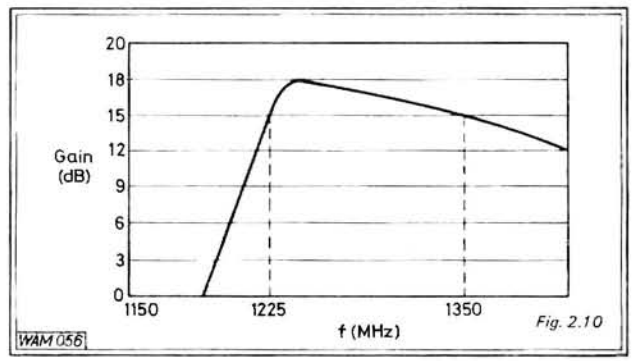
Both the r.f.c. and the inductor L1 are printed stripline components. The basic tuned elements form a high-pass circuit and there are a total of four of these in the converter. The net result is that the converter is extremely simple to align, Fig. 2.10.

Provided the initial settings of the four variable capacitors is such that the high-pass cut-off point is less than 1·3GHz there will be enough gain to see some signals through the converter—the capacitors are simply peaked on a received signal, tuning being very smooth and non-critical. There is of course a price to pay for this; it is not possible to achieve a perfect match between stages for power transfer, or at the antenna for optimum noise figure.

The first problem is simply overcome by using an extra r.f. stage using an inexpensive BFR91 to add to the pre-



mixer gain. The noise match into the first stage could really only be improved at the expense of making alignment much more difficult and necessitating laboratory equipment. The two front-end stages use NEC transistors, the 2SC3358 and the NE21936. This combination should be able to achieve noise figures in the 1·3 to 1·4dB region with laboratory equipment—the converter with "simple alignment" as described will achieve typically 1·5 to 2dB. In my opinion it is much better to have a simple to align converter, that can be home constructed (preceding it at a later date with a sub-1dB masthead amplifier), than be stuck with something needing laboratory equipment to set up.



The Mixer

The mixer device selected is a Schottky diode, the HP2835. The conventional circuit for this stage is as shown in Fig. 2.11.

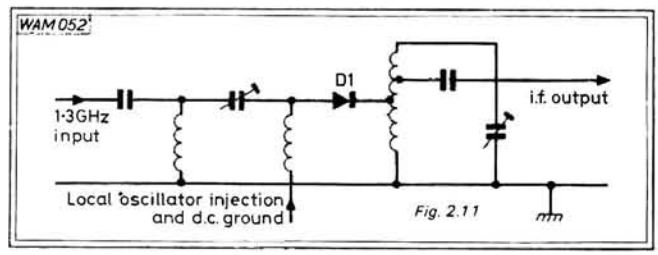
The capacitive feed for the r.f. and the inductive feed for the l.o. provide isolation between the oscillator and the r.f. amplifier. Isolation from the output of the mixer is achieved by the output circuit selectivity. This design is only possible because of the large frequency differences:

e.g. 1300MHz–800MHz=500MHz
or 1300MHz–500MHz=800MHz

There is a range of output frequencies where this cannot be achieved:

e.g. 1300MHz–645MHz=655MHz
or 1300MHz–655MHz=645MHz

The result is that local oscillator frequencies in the mid 600MHz region cannot be used. The practical conse-



quence is that the output u.h.f. i.f. cannot be in the region of the mid 40's in u.h.f. channel numbers. This is however a small compromise to make in order to achieve the design objectives.

Local Oscillator

This is fairly straightforward and a suitable circuit is shown in Fig. 2.12. We are fortunate that for TV purposes we can use a free running oscillator, without any further means of stabilisation. TV is a broadband mode, a drift of 1MHz in the local oscillator is not serious in the TV context, where bandwidths of 15MHz are typical. Satisfactory stability and reproducible performance are ensured by using a stripline for the frequency determining collector inductor.

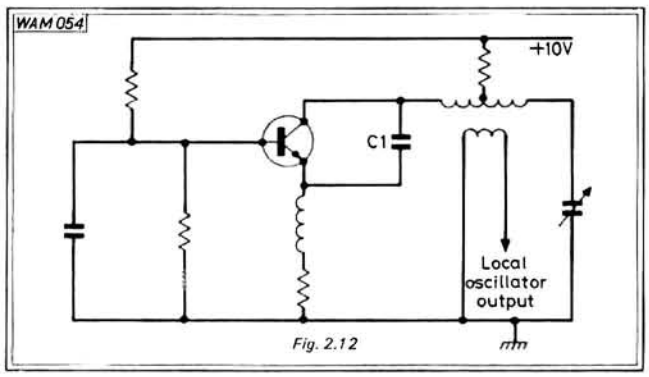


Fig. 2.12

The oscillator can be required to run in one of two ranges approx 500 to 600MHz (giving i.f.s in the 700 to 800MHz region) or 700 to 800MHz (giving i.f.s of approximately 500 to 600MHz). The reason for this is to give the user the chance to avoid strong local u.h.f. TV signals in the i.f. range. This choice of two oscillator ranges means that the value of C1 must be selected as appropriate for the range being used, in order to ensure adequate tuning range and l.o. output power.

UHF Amplifier

The output from the mixer is amplified by a BFR91 transistor in order to give some added protection against direct u.h.f. breakthrough, Fig. 2.13.

The bias network is probably worth a few words; it is also used on the r.f. amplifier transistor. The transistor must be operated with the emitter very firmly grounded to r.f. and the only way to do this properly is to d.c. ground it as well. Collector current is therefore controlled by using the transistor as a d.c. amplifier. The base current passes through the Zener diode D1, resistor R1 and the base emitter junction of the transistor. The base voltage will be at about 0·7V; voltage drop across R1 is very small, typically 0·1V, and the Zener will have 6·8V across it in our case. This makes a total voltage drop across this network of 7·6V. Because there is a d.c. short through the collector load inductance (actually a stripline) the collector voltage is stabilised at 7·6V also. The d.c. supply to the transistor is via resistor R2 from a stabilised +10V supply. Resistor R2 therefore determines the sum of collector and base currents. The base current can effectively be ignored in relation to the much larger collector current so we have:

$$Ic = \frac{10V - 7{\cdot}6V}{R2}$$

$$= \frac{2400\ mA}{R2} \text{ (if R2 is in ohms)}$$

Stabilising the collector current in this way removes a potentially "tweakable" item and contributes to making the circuit more reproducible, without laboratory test gear. Capacitor C1 and resistor R1 provide the r.f. decoupling at the base.

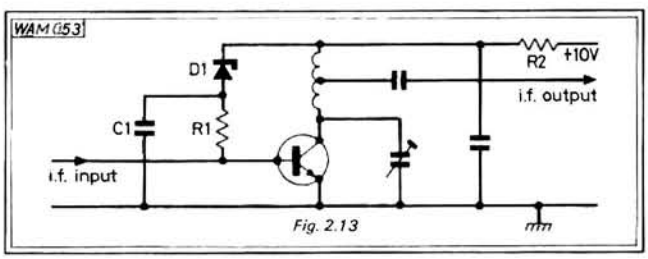


Fig. 2.13

Power Supply

Lastly, there is the +10V stabilised supply. This is very straightforward and generally works well down to about 11·5V input. The whole unit is protected by a series "idiot" diode to prevent damage if the supply is reversed.

Results

You will now have a simple antenna and an easily constructed high performance converter. How do you use it and what results can you expect? You will be feeding the output of the converter directly into the antenna socket of your domestic TV set and using "slope detection" for f.m. Domestic TV sets have a shaped i.f. response, Fig. 2.14.

If an f.m. signal is being received instead of the usual a.m. one a picture can still be obtained by off-tuning slightly either to x or y. The slope of the i.f. response converts the f.m. into a.m. which is detected by the a.m. detector of the TV set. Exactly how good this will be depends on the shape of your particular TV receiver's i.f. response curve. Note also that the slope is opposite at x and y and therefore a negative picture will be seen at one point and a positive one at the other.

This arrangement will certainly let you see the locals on 1·3GHz. Call in on 144·750MHz and ask the transmitting station to align his beam on you. Picture reports from receive only stations are very welcome.

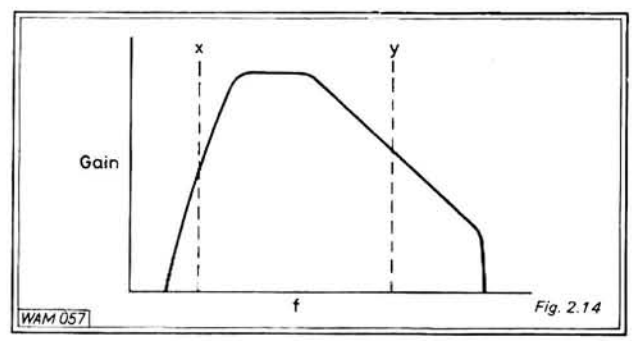


Fig. 2.14

There is of course room for a lot of improvement in your receive set up. By using a good f.m. receiver instead of slope detecting you can expect two picture grades improvement (up to the P5 maximum of course). By using a really good masthead pre-amplifier a further picture grade improvement can be expected (or more, depending on how long your cable run is). Changing to a high gain antenna should bring another picture grade improvement. Cumulatively it means that pictures that are just detectable on your simple set up can be received completely noise free by implementing all the improvements.

Next month picture grades, f.m. theory and signal processing.

Which Dry Battery?

Almost 500 million dry batteries, worth over £150 million, are sold in Great Britain every year, yet many people will probably admit that choosing a dry battery for a particular job is not as straight forward as it may seem. Extensive market research has confirmed that the British public is becoming more and more confused with the complexity of battery types currently on sale.

Exide, a subsidiary of the Chloride Group, has launched a new, simplified range of three types or grades, specifically to reduce the mounting confusion.

Their new approach to battery buying is called the "Good-Better-Best" policy and explains the merits (and demerits) of the different kinds of batteries available.

First, the "Good" is Exide's **Power** range, a low-priced, zinc-carbon, standard-power type, specifically for light current applications where use is intermittent, and can be easily recognised by its SP or PP type numbers and blue colour-code.

Second, the "Better, the **High Power Plus** range is a high-powered, zinc-carbon type for equipment that consumes comparatively heavy current for short periods, and is identified by its red colour-code and HP type markings.

Finally, the "Best", the **Gold** range is a heavy-duty, long-life, alkaline manganese type, that is higher priced, but has a life of up to five times that of traditional zinc-carbon types. It is particularly suited to equipment that requires either heavy and continuous use. Additionally, it is recommended for expensive equipment, like cameras, where its leak-resistant qualities are vital.

Exide point out that those people who buy heavy-duty types for light application, are often wasting their money. In intermittent use, they say, these batteries will often give only a little more life than a cheaper conventional type.

Battery Name	Exide 'Code'	Type No.	Colour	Description	Suitable Applications
Exide Power	"Good"	SP or PP	Blue	Zinc-carbon	Intermittent or light current applications such as torches, bicycle lamps, bells, electric fences, warning signals, etc.
Exide High Power Plus	"Better"	HP	Red	Zinc-carbon	Equipment taking comparatively heavy current for short periods such as shavers, cassette recorders, toys and radios
Exide Gold	"Best"	MN	Gold & Black	Alkaline Manganese	Top performance and life characteristics. Suitable for heavy and continuous use of electrical equipment.

The chart indicates suitable applications for all three types in Exide's "Good-Better-Best" policy.

Chloride Group PLC, Chequers Lane, Dagenham, Essex RM9 6PX. Tel: 01-592 4560.

10GHz Transceiver Module

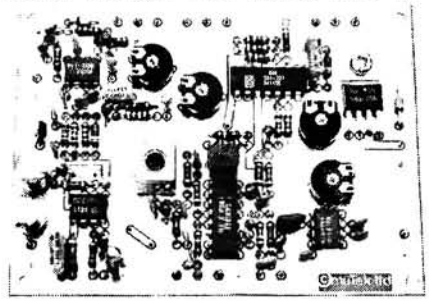
Interest in the 10GHz band has been fairly consistent over recent years with the bulk of activity being wide-band f.m.

Several home construction designs have been published, including the *Practical Wireless* "Exe" microwave transceiver (June 1981), which provided complete receive/transmit functions within a single enclosure.

Traditionally, 30 and 100MHz i.f s have been used, but with the ready availability of ceramic filtering/signal processing at 10·7MHz together with reduced sideband noise performance from Gunn diodes, this latter choice of i.f. is gaining popularity.

Now with muTek's introduction of the GDIF 107ub back-end processing system, a comprehensive w.b.f.m. transceiver can be easily realised, consisting of a commercial burglar alarm front-end (incorporating separate Schottky receive mixer and Gunn local oscillator diodes), horn or parabolic dish antenna, power source of 12V d.c., microphone/speaker, diecast case and a few low-cost potentiometers.

The printed circuit board contains all the essential processing elements from signal frequency to audio and back. Outputs are available to drive both signal strength and centre zero indicators, together with a.f.c. applied to the Gunn diode supply, resulting in very stable "locked" QSOs. A limited Gunn voltge shift facility is available for fine frequency variation, and with the recently adopted 10·37 to 10·40GHz w.b.f.m. portion of the band, this should negate the need for a means of continuously mechanically tuning the local oscillator.



Priced at £49.65 including VAT, plus £1.50 p&p, the GDIF 107ub is supplied complete as a ready-assembled, aligned and tested printed circuit board, backed-up with very full instructions and helpful hints on how to get the whole system together. Available from muTek agents and national distributors, or direct from the manufacturers: *muTek Ltd., Bradworthy, Holsworthy, Devon EX22 7TU. Tel: (040 924) 543.*

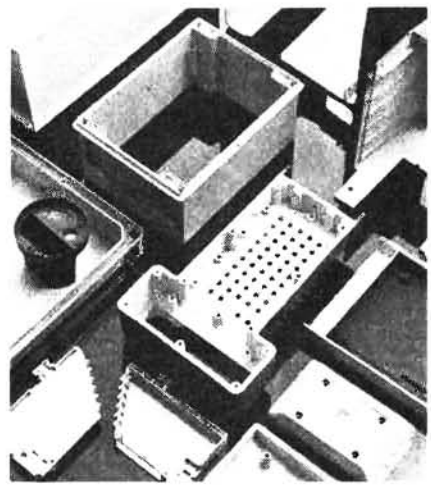
Products

Zinc Coating Process Beats r.f.i.

A new zinc coating process which eliminates radio frequency interference (r.f.i.) has been developed by Deccospray Ltd., a part of the Eltron group of companies.

The patented process involves the spraying of a molten pure zinc coating onto almost any type of plastics housing, effecting a complete screen to electromagnetic radiation.

Sensitive electronic circuits housed in enclosures treated by the process should, therefore, be unaffected by such things as: vehicle ignition, fluorescent lights, radio transmitters or welding equipment. Also, the converse applies—r.f.i. radiating from equipment thus treated should be exceptionally low. Additional advantages include permanent attachment of the screen coating without deforming, discolouring, or weakening of the base material.



The photograph shows a typical selection of enclosures suitable for processing. We understand the company will process individual items, home computer cases being an obvious example, provided all the electronics and hardware are removed and only the plastics case is sent.

For further information, contact: *Deccospray Ltd., Eastmore Street, Woolwich Road, Charlton, London SE7 8NA. Tel: 01-858 5128.*

If you please

Please mention this column when applying to manufacturers or suppliers featured on this page.

Crystals Galore

Readers will be interested to know that, despite the vagaries of the pound sterling on the foreign exchange markets, IQD Ltd. are able to offer a wide range of standard crystal products at greatly reduced prices.

Utilising their expert knowledge of market requirements and sources has enabled them to anticipate trends in usage, and purchase in very large quantities to effect economies of cost.

Whilst keeping in touch with the rapid changes in technology, it is the company's policy to offer new types of crystal products as soon as they are available. They believe that they can offer not only the largest stocks of standard items, but also the widest range of modern crystals, oscillators and filters.

For a copy of the new price list and further details, contact: *IQD Ltd., North Street, Crewkerne, Somerset TA18 7AR. Tel: (0460) 74433.*

Low-Cost Multimeter

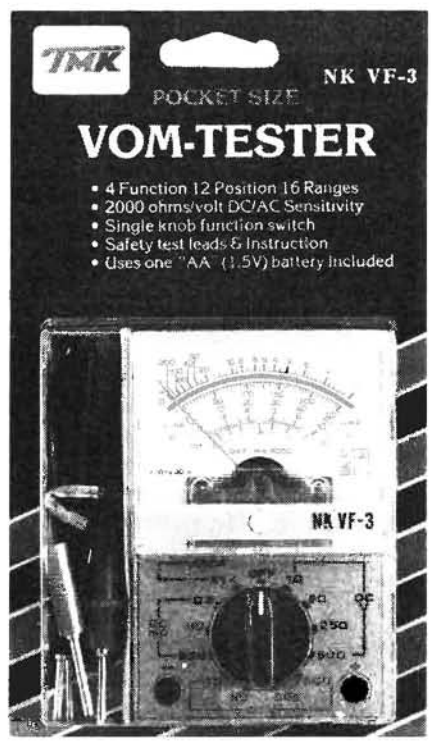
TMK Test Instruments announce the availability of a new, low-cost, pocket-size analogue multimeter called the NK VF-3.

The instrument includes in its range of functions d.c. and a.c. volts, d.c. current, ohms and decibels. Sensitivity is 2000 ohms/volt on d.c. and a.c. ranges.

Housed in a modern high-impact resistant case, measuring 90 × 60 × 29mm and weighing in total 90g, the measurement ranges are selected via a single rotary switch and displayed on a mirror arc scale to reduce parallax error, and the meter movement is protected against accidental overload.

Supplied through electrical/electronic dealers, shops or departments, the NK VF-3 comes complete with test leads and battery, and costs less than £8.00.

For details of suppliers in any area, contact: *TMK Test Instruments, 138 Gray's Inn Road, London WC1X 8AX. Tel: 01-837 7937.*



Please Note!

A number of our advertisers have asked us to advise readers that the prices of imported products are likely to change from month to month.

The reason behind these changes is fluctuating international exchange rates. So, readers are therefore advised that they would do well to check prices with suppliers prior to sending off orders.

Let us add our congratulations to those already showered upon **Frances Woolley G3LWY** for the honour bestowed on her in the New Year's Honours List, namely the British Empire Medal, for her outstanding services as secretary of the RAIBC (Radio Amateur Invalid and Blind Club) with which she has been associated for very many years.

Once again may I ask club committees to avoid giving meeting times as "every other Wednesday" or "Alternate Thursdays" which are meaningless on their own unless some reference date is given.

308 ARC Dave Davis G6YQD, 13 Maple Road, Surbiton, Surrey, for the time being until a sec is appointed. The club meets every Tuesday at 8pm, the Coach House, St Marks Church, Surbiton. On March 26 a surplus equipment sale is to be held, so now's the time to clear out the shack.

Acton, Brentford & Chiswick ARC G3IIU W. G. Dyer G3GEH, 188 Gunnersbury Avenue, London W3. The Chiswick Town Hall, High Road, Chiswick, London W4, will be the venue, as usual, for a talk on v.m.o.s. power m.o.s.f.e.t.s by G4GRM on Tuesday March 19. New members and visitors most welcome.

Antrim & District RC GI4SIW David Hutchinson GI4FUM on (08494) 64672. Afraid I have no information on where the club meets so you will have to contact Dave on this but the AGM will be held on Monday March 11.

Axe Vale ARC G8CA Bob Newland G3VW, on Lyme Regis 5282, acting as PRO for the moment. First Friday of the month at the Cavalier Inn, West Street, Axminster, with a talk by G4CFY of Spectrum Communications on March 1.

Aycliffe & Shildon ARC E. W. Bate on (0388) 774466 or (0325) 314638. Meets Tuesdays at 8pm at the Sunnydale Leisure Centre, Middridge Lane, Shildon, Co. Durham, with activities that include RAE and code classes.

Bangor & District ARS Stewart Mackay GI4OCK on Bangor 454049. First Friday of the month at the Sands Hotel, Bangor, at 8pm.

Biggin Hill ARC G4RQT G6TBH Ian Mitchell G4NSD available on (09598) 376. On March 19 a talk on the RAYNET set-up will be given by G4TAW. Normally meets on third Tuesday at the St Marks Church Hall, corner of Church Road and Main Road, Biggin Hill, Kent, at 8.30.

Blackmore Vale ARS Bill Bailey G1GRG on (0963) 70969. Second Tuesdays for main meetings with talks, lectures, demos etc. with fourth Tuesdays for general chat and constructional projects evening. All at the Bell & Crown at Zeals, Somerset. An RAE course is going on at the moment.

Braintree & District ARS G4JXC G6BRH Jeff Roberts G6OIX on (0376) 47525 daytime, 44857 evenings. A talk-in is available for the meetings on first and third Wednesdays at St Peters Church Hall, St Peters Close, Braintree, Essex, at 8pm, with programmes to suit everyone.

Brighton & District ARS Peter Turner G4IIL on Brighton 607737 evenings. Meets at the Seven Furlong Bar, Brighton Race Course "every other Wednesday" at 8pm so contact Peter for precise dates.

Bristol ARC G3TAD D. Gully G4YOC on Bitton 4116. Every Tuesday at the YMCA, 6 Park Road, Kingswood, Bristol, with RAE and Morse code tuition in addition to usual activities. On March 5 G8GFZ will deal with p.l.l.s and on the 12th G4TRN talks on a CB-to-10m f.m. conversion project, while the 19th is devoted to constructional work. A computer night is to be held on the 26th.

CLUB NEWS

Compiled by Eric Dowdeswell G4AR
Reports to: Eric Dowdeswell,
57 The Kingsway, Ewell Village,
Epsom, Surrey KT17 1NA
PLEASE MARK "CLUB NEWS"

North Bristol ARC G4GCT Ted Bidmead G4EUV, 4 Pine Grove, Northville, Bristol. A competition on homebrew equipment is slated for March 29. The club meets at the SHE, 7 Braemar Crescent, Northville, Bristol, on Fridays.

South Bristol ARC G4WAW Len Baker G4RZY on (0272) 834282. At 7.30pm every Wednesday at the Whitchurch Folk House, East Dundry Road, Whitchurch, Bristol. An h.f. activity night is down for March 13 with the accent on RTTY on the 27th. I forgot March 6 which has a lecture on air traffic control by G3HKA. Make a note of April 3 when G8MWR will lecture on 10GHz equipment.

Bromsgrove ARS G4TUI John Rowlands G4OJS on 021-445 3207. It's the second and fourth Tuesdays at 8pm, the British Legion Club, Birmingham Road, Bromsgrove, Worcs. The club has a wide range of AR interests with new members and visitors welcomed.

Bury RS G3BRS Brian Tyldsley G4TBT on Burnley 24254. Tuesday evenings at 8, the Mosses Centre, Cecil Street, Bury, Lancs, with the principal gathering on the second Tuesday. An interesting article by G4JAG in the latest issue of the club mag *Feedback* shows how the conventional 3·5MHz band trapped multiband dipole can be easily extended for use on Top Band.

Carmarthen ARS Milly Meredith, 50 Caecoed, Llandybie, Ammanford, Dyfed. Still meets at the Hospital Club, The Quay, Carmarthen, second and fourth Fridays. Hopefully, Milly should be a newly-fledged GW1 by now.

South Cheshire ARS G6TW G6TWB Nick Gutten G6IGW on Crewe 60062. Second and fourth Mondays of the month in the Victoria Club, Gatefield Street, Crewe, at 8pm. All amateur radio interests are covered including RTTY and ATV. Club net Sunday at 8pm on S14 (145·350MHz).

Cheshunt & District ARC G4ECT G6CRC Roger Frisby G4OAA on Hoddesdon 464795. On March 6 G4IJE will deliver a talk on meteor scatter operation, with a junk sale on the 20th, otherwise it's natter nights. Every Wednesday at 8pm, Church Room, Church Lane, Wormley, near Cheshunt, Herts. Diary note, in large letters, Jim Bacon G3YLA of the BBC's met team, on "A bit of a lift on", on April 3.

Chichester & District ARC C. Bryan G4EHG on Chichester 789587. It's the Fernleigh Centre, 40 North Street, C'chester, on first Tuesday and third Thursdays at 7.30pm. Club net is on S11 (145·275MHz) Wednesdays at 7pm. March 21 sees AGM plus the contest for homebrew equipment. April 2 note, G4BUE of the QRP Club will be holding forth on his favourite subject. A club dinner is being mooted for March, details from G4EHG.

Colchester Radio Amateurs F. R. Howe G3FIJ on (0206) 851189. The Colchester Institute, Sheepen Road, Colchester, Essex, at 7.30. On March 7 G3DPW deals with QRM matters and an official of the RNLI gives a talk on the 21st.

Cornish Radio AC N. Pascoe G4USB on Falmouth 40367. Meeting spot is the Church Hall, Treleigh, on the old Redruth bypass, at 7.30. On March 7 G4STB will deal with absorption wavemeters. The Computer Section has G3OCB speaking on graphics on the 11th. The main club meets for its AGM on April 4.

North Cornwall RC John West G6ICW on Bude 4976. It's the first Wednesday of the month at the RAOB Club, Camelford, at 7.30pm.

Coulsdon ATS G4PUR Alan Bartle G6HC on 01-684 0610. Second Monday and last Thursday of the month at St Swithins Church Hall, Grovelands Road, Purley, Surrey, at 8pm. A surplus equipment sale is scheduled for March 11 and on the 28th it's Morse code tuition time. Interesting club mag *CATS Whispers* shows how the Romans managed to multiply XLIV by CLXXVII, as if binary, duodecimal and hexadecimal were not enough!

Coventry ARS Robin Tew G4JDO on Coventry 73999. Fridays at 8, Baden Powell House, 121 St. Nicholas Street, Radford, Coventry, with visitors always welcome. March 15 sees a talk on 28MHz f.m. activity and there is a junk sale on March 29. Otherwise it's nights on the air from the club station. Note that there is no meeting on April 5. Morse code tuition and practice facilities are available.

Derwentside ARC (Consett) June Wallis GI1AAJ, 10 Middlewood Road, Lanchester, Durham. Every Monday at 7pm, the Consett AFC, Belle Vue Park, Consett.

North Devon RC George Hughes G4CG, "Crinnis", Highwall, Barnstaple, Devon. The Micro Chips, Castle Street, Barnstaple, first Wednesday of the month at 7.30pm.

Droitwich ARC Gordon Taylor G4HFP on Stourport-on-Severn 3818. Second and fourth Mondays at 8pm, the Scout HQ, Union Lane, Droitwich. G3HDQ will talk on weather forecasting using a computer, on March 11, while on the 25th the club will be hosting a Microwave Society open evening. Those attending are asked to notify G4HFP. A talk in on S22 will be operational.

Dudley ARC G4DAR John Tisdale G4NRA on Kingswinford 278300. Mondays at 7.45pm, the Allied Centre, Greenman Alley, off Tower Street, Dudley.

Dunfermline RS GM3IDS Ray Mackie on D'fermline 736401. Thursday evenings at 7.30pm at Outh Wireless Station, Knockhill, by Dunfermline, with possibility of transport from the town centre, but the last Thursday of the month is at Abott House, Maygate, Dunfermline. Club net S21 at 9pm Mondays.

Dunstable Downs RC G4DDC G8DDC Phil Morris G6EES on Dunstable 607623. Highlight for March is the talk by BBC weatherman Jim Bacon G3YLA on the 15th, and computer networks is the subject by G8AHS on the 29th. All at Chews House, High Street South, Dunstable, with gatherings every Friday.

Echelford ARS Bob Crane G4PHS on 01-977 4157. Nice to hear from this club again. Second Mondays and last Thursdays at 7.30pm, The Hall, St Martin's Court, Kingston Crescent, Ashford, Middx. Club nets are on 1920kHz Sundays at 10am and Wednesdays at 8pm on 144·575MHz f.m. with non-members welcome to join in. For March there is a talk on synthesisers by G4AWZ on the 11th and a talk and demo on radio control on the 28th.

Edgware & District RS G3ASR John Cobley G4RMD on Hatfield 64342. Counter poise systems form the subject for G4UBB on March 14 with transceivers the provisional subject for the 28th. Second and fourth Thursdays at 8pm, 145 Orange Hill Road, Burnt Oak, Edgware, Middx. Slow Morse on the air is transmitted by G3ASR with code practice at the club meetings.

Exeter ARS Roger Tipper G4KXR on (0392) 68065. At the Community Centre, St Davids Hill, Exeter, the talk on March 11 will be by G4BZE on the subject of weather satellites dealing with the equipment needed to receive and print weather maps.

Fareham & District ARC Brian Davey G4ITG on Fareham 234904. March 6/20 are on the air and natter nights with a talk by G3GVM on TVI and r.f.i. on the 13th. A junk sale takes place on the 27th. So it's each Wednesday at the Portchester Community Centre at 7 for Morse code classes with main meeting starting at 7.30pm.

Farnborough & District RS Peter Taylor G4MBZ on Farnborough 837581. The subject is QRP operating for G4BUE on Wednesday March 13 followed by meteor scatter operation by G8VR on the 27th. All this at the Railway Enthusiasts Club, Access Road, off Hawley Lane, F'boro, Hants, starting at 7.30, with talk-in on 144·775 f.m.

Fylde ARS H. Fenton G8GG on Lytham St Annes 725717. Homebrew transceivers will be dealt with by G3KEN on March 5 while the 19th is more informal with Morse code practice classes. The HQ is the Kite Club, Blackpool Airport, meeting on the first and third Tuesdays at 7.45pm.

Glossop & District AR Group Geoff Sims G4GNQ, 85 Surrey Street, Glossop. On March 28 there will be a lecture on fibre optics for transmission purposes, at 8pm. Normally meetings on last Thursday of the month at the Nags Head, Charlestown Road, Glossop.

Grimsby ARS G3CNX George Smith G4EBK on Grimsby 887720. Members will be bringing along their slides for a show on March 7 and there will be a video show. Packet radio should attract attention on the 21st. First and third Thursdays of the month at the Cromwell Social Club, Grimsby, starting at 8pm. For the computer fans there is a meeting on the first Monday of the month.

RS of Harrow G3EFX Dave Atkins G8XBZ on Rickmansworth 779942. On March 1 it's multi-channel networks described by G3YXZ, with John Nelson of the RSGB attending on the 15th. Every Friday at 8.15pm, Harrow Arts Centre, High Road, Harrow Weald, Middx, which is opposite the Alma pub if that is more informative. Other nights are usually devoted to operation on the h.f. bands.

Hilderstone RS Ken Smith G3JIX, Staple Farmhouse, Staple, Canterbury, Kent. Gatherings Fridays at 7.30pm, H'stone Adult Education Centre, St Peters, Broadstairs, Kent, with all the usual activities.

Ipswich RC G4IRC Jack Tootill G4IFF on (0473) 44047. The club is issuing a special award certificate for contacts with its members during 1985 to celebrate the club's Golden Jubilee. The award will also be available to s.w.l.s. Meetings second and last Wednesdays at 8pm, the Rose & Crown, 77 Norwich Road, Ipswich. On March 13 a constructional contest will be judged and on the 27th J. Stanley-Wood of the Marconi company will talk on the history of Marconi himself. Early warning now of the AGM on April 24.

West Kent ARS Brian Guinnesy G4MXL on (0892) 32877. Club meetings every Friday at 8pm, the Adult Centre Annex, Quarry Road, Tunbridge Wells.

East Lancashire ARC G3NTJ G1ELC Stuart Westall G6LXU on Great Harwood 887385. The Conservative Club, Cliffe Street, Rishton, on the first Tuesday of the month, which is a formal occasion, and the last Tuesday considered informal, both at 7.30pm. On other Tuesdays there is a club net on 145·4MHz at the same time. Feature for March is a junk sale on the 5th while on April 2 there will be talk on crime prevention by the local police.

Leighton Linslade RC G4LLR G6LRC Ian Jardine G1ACQ on (0525) 376741. First and third Mondays from 7.30pm in Room A64, Vandyke Community College, Vandyke Road, Leighton Buzzard, Beds. Monday March 18 is Community College week with the probability of a special event station operating to demonstrate AR to the public.

Loughborough ARC G3RAL Jim Smith G4DZL at the club. Located on the top floor of the Brush Sports & Social Club, 18 Fennel Street, L'boro, Leics. The constructor's group meets at 7pm on Tuesdays and the main meeting is on Fridays at 8pm with talks, visits and demonstrations. On March 8 the constructor's group will be modifying old m.w. portables for Top Band d.f. use. The club will be visiting Leicester for a lecture on March 15, with the 22nd being a v.h.f. night-on-the-air.

Lough Erne ARC Cliff Corderoy GI4CZW, 9 Tarmon Brae, Enniskillen, Northern Ireland. A mobile rally will be held at Killyhevlin Hotel, near Enniskillen, on April 21 with full hotel facilities, scenic trips plus talk-in on 144 and 430MHz. Cliff can be reached on (0365) 24500.

Loughton & District ARS G4NOP Clive Knowles G6FWT on 01-508 7190. Meets in Loughton Hall, Rectory Lane, Loughton, Essex "every other Friday" so contact Clive for precise details.

Mansfield ARS Keith Lawson G4AAH, 233 Southwell Road West, Mansfield, Notts. Meeting spot is the Victoria Social Club, Princess Street, M'field, first Friday and third Tuesday. Radio data transmission theory by G4LQP is on March 19. Note in the diary that Jack Hum G5UM will be a guest at the club on April 5 and he will judge the construction competition.

Maxwelltown ARC GM0AEE Trig Rodgers GM4NNC, 5 Elder Avenue, Lincluden, Dumfries. Twice a month, usually on a Wednesday is all I can tell you of the meeting times, held at the Tam O'Shanter Inn, Dumfries, at 8pm. A permanent site could be in use by now, so contact Trig for latest info.

Midland RS Norman Gutteridge G8BHE on 021-422 9787. Owing to ill-health "post boy" Tom G8GAZ has had to stand down. Thanks Tom for your excellent cooperation in the past years and get well soon. The club at 294a Broad Street, Birmingham, meets on every night of the week with contest operation over weekends so there are construction nights, RAE classes, Morse and natter evenings and nights on the air. RAYNET activity is also at a high level in the club.

ARC of Nottingham G3EKW G6CW G8IUT Jim Towle G4PJZ on N'ham 624764. On March 7 there will be a Forum evening, with G4SGU dealing with computers on the 14th. It's Constructor's Cup time on the 21st ending the month with a visit by a Lowe Electronics rep on the 28th. So, every Thursday at 7.30, the Sherwood Community Centre, Mansfield Road, N'ham. A timely warning of the AGM on April 4.

Oldham ARC Fiona Butterworth G4SPX on 061-652 8862. Foregathers on Mondays at 8.30 in the Wheatsheaf, Derker Street, Oldham.

Oswestry & District ARC Brian Goldsmith GW6YIY on (0691) 831023. The Bell Hotel is opposite the Parish Church, Oswestry, where the lads and lassies gather on the first Tuesday of the month, at 8pm.

Reading & District ARC Chris Young G4CCC, 18 Wincroft Road, Caversham, Reading, Berks. "Alternate Tuesdays" seems to be the 5th and 19th of March, in the clubroom of the White Horse, Peppard Road, Emmer Green, Reading, starting around 8pm.

Rhyl & District ARC GW4ARC GW1ARC Melfyn Allington GW1AKT on Nantglyn 469. Venue is opposite the Town Hall in the Mona Hotel, Market Street, Rhyl, first and third Mondays and on March 4 G3LEQ will deliver Part 3 of his talk on antennas and propagation. He will also be demonstrating equipment on April 1. March 18 will be an activity night with the club's rigs.

St Helens & District ARC Alan Riley G6MXT on 051-430 9227. A junk sale will enliven the evening of March 14, with a night-on-the-air on the 21st. Every Thursday evening at the Conservative Rooms, Boundary

Road, St Helens, at 7.30 with morse code class before the main feature at 8pm.

Salop ARS G3SRT John Orrells G6DQY, Perry Willows, Yeaton, Baschurch, Shrewsbury. Meetings every Thursday at 8pm, the Olde Bucks Head, Frankwell, Shrewsbury. G3IMP will be demonstrating Yaesu equipment on March 14 and the first d.f. fox-hunt of the year takes place on the 28th.

Sefton ARC G4RAQ Jim Hanratty G6PVQ on 051-523 3971. In March it will be the 6th and 20th of the month, at the Liverpool Prison Officers Club, Hornby Place, Walton, L'pool, with the Rice Lane railway station a couple of minutes away. Coming up are computer and RTTY demos plus constructional projects and quiz games.

Skelmersdale Radio, Electronics and Computer Club Joe Singleton G4WJR, 3 Willow Drive, Skelmersdale, Lancs. Still very wet behind the ears the club meets every Wednesday at 8pm, the Royal British Legion, Liverpool Road, S'dale. Visiting lecturers are very welcome.

Southdown ARS G1KAR G3WQK Peter Henley G8IQO on Eastbourne 763123. Considered to be one of the best nights of the year, a junk sale will be held on Monday March 4 at the Chaseley Home, South Cliff, Eastbourne, at 8pm. New club rooms of the society will be in the Wealden District Council Offices, Vicarage Field, Hailsham, opened by the RSGB's President Mrs Joan Heathershaw G4CHH in February.

Southend & District RS The club will be organising a mobile rally on Sunday April 28, at the Rocheway Centre, Essex, with talk-in on S22 f.m. (145-550MHz). Disabled visitors will be specially catered for including parking facilities on site. Bring-and-buy sale, refreshments and bar. More from **Brian Wood G4RDS on (03745) 50494.**

South Tyneside ARS Tony Adamson on (0632) 567305. Formed last September the society is looking for new members. It meets every Monday evening at the Martec Club in the grounds of the S. Tyneside College with access by the Grosvenor Road entrance.

Spen Valley ARS G3SVC Tim Clough G4PHR on Mirfield 499397. HQ is at the Old Bank WMC, Mirfield, with gatherings every Thursday at 8pm. Maths and the amateur is the subject of a talk by G4MLW and G4KGS on March 7 with the "preliminary AGM" on the 21st. The AGM proper is on April 11.

Stafford & District ARS Tony Bairstow G4RSW on Stafford 46306. Every Tuesday night with a talk or demo most weeks, at the Coach & Horses Motel, Weston on the A51, at 8pm.

Stanley ARC Ron Piper G6XCO on (0207) 235930. This is a new club so obviously new members will be very welcome as will be visitors. They meet every Tuesday at 7pm at the Kings Head Hotel, Stanley, Co Durham, with constructional projects and RAE tuition classes on the agenda.

Stowmarket & District ARS M. Goodrum G3ZQU on Stowmarket 676288. Don't forget the AGM on Monday March 4. All meetings now at the Maltings Entertainment Complex, opposite the railway station, first Monday of the month.

Stratford-upon-Avon & District ARC David Boocock G8OVC on S-upon-A 750584. The venue is the Control Tower, Bearley Radio Station, Bearley, near Stratford, second and fourth Mondays at 7.30pm. Things like s.w.r., a.t.u.s and matching form the subject for G3PGQ on March 11. The AGM on the 25th will be followed by an RSGB film. Highlight in April will be a visit to the Rugby Radio Station.

Sutton & Cheam RS Alan Keech G4BOX, 26 St Albans Road, Cheam, Surrey. The club's 36th annual dinner takes place at the Woodstock, Stonecot Hill, Morden, on Saturday March 30. The popular constructional contest judging is on March 15. Meetings third Friday of the month at the Downs Tennis Club, Holland Avenue, Cheam.

Swindon & District ARC Dave Ineson G4ZAZ on (0793) 37489. It's 7.30pm every Thursday at Oakfield School, Marlowe Avenue, Swindon. March 21 has a lecture by G3RZP on a.t.u.s and the 14/28th are natter and RAE course nights.

Taunton & District ARC G3XZW L. S. J. Ford G4ZLF, 23 Laburnum Road, Wellington, Somerset. Each Friday at 7.30, in the basement of the County Hall, The Crescent, Taunton, with new members and visitors most welcome.

Thornton Cleveleys ARS Jack Duddington G4BFH on (0253) 853554. RSGB Region 1 rep G3XSN visits the club on March 4. An advanced Morse class and activity evening is scheduled for the 11th and on the 18th G3AOW has further thoughts on antennas and a.t.u.s. The 25th is informal. So, Mondays at 7.45, at the 1st Norbreck Scout HQ, Carr Road, Bispham, Blackpool.

Tiverton (SW) RC G4TSW G. W. Draper G4ZNV on (03634) 235. Don't forget the new venue is the Half Moon Inn, Fore Street, Tiverton, Devon, at 7.30 every Tuesday.

Todmorden & District RS E. Tipping, 3 Cliffe Villas, Longfield Road, Todmorden, Lancs. Regular meetings first Monday of the month at the Queens Hotel, Todmorden, at 8pm with new members being sought.

Trowbridge & District ARC Gerry Callaghan G4SPE on (0373) 823584. The spot is Southwick Village Hall near Trowbridge, Wilts, on the third Thursday of the month, starting at 8pm.

Vale of White Horse ARS Ian White G3SEK on Abingdon 31559. New meeting spot is the upstairs meeting room of the Waterwitch, Cockroft Road, Didcot, Oxon, at 7.30pm. first and third Tuesdays of the month.

Verulam ARC Brian Pickford G4DUS on (0923) 720616. In memory of the club's late founder the G3PAO memorial lecture on March 26 will this year be given by Jim Bacon G3YLA of the London Weather Centre, entitled "There's a bit of a lift on". All visitors most welcome at 7.30 for an 8pm start. There will be a talk-in on S14 from 7pm.

Wakefield & District RS G3WRS W. Parkin G8PBE on W'field 378727. Gathers at the Community Centre, Prospect Road, Ossett, near Wakefield, on "alternate Tuesdays". There is a members' own project night on March 5 and a discussion of future club projects. The 19th is a natter occasion and on-the-air activity. Book Tuesday April 2 for the AGM.

North Wakefield RC G4NOK G6WRS Steve Thompson G4RCH on (0532) 536633. It's on-the-air time on March 7 with a question and answer session on the 14th with John Nelson of the RSGB in attendance. Quiz time on the 21st is a return match with the White Rose RC. Meetings every Thursday at 8pm, the Carr Gate WMC.

Mid-Warwickshire ARS Carol Finnis G4TIL on Southam 4765. Second and fourth Tuesdays at 8pm, 61 Emscote Road, Warwick. On March 12 it's junk sale time again and on the 26th members will be demonstrating their own computers.

West Bromwich Central RC John Bates G6ZLW on 021-553 0531. Don't forget the club has moved to the Hop & Barleycorn, Dartmouth Street, W. Bromwich, meeting every Sunday evening at 8pm with usual features plus RAE and Morse code tuition.

Wigtownshire ARC GM4RIV Gerry Maxwell GM4BAE on (0776) 2876. Classes for the RAE, code tuition, operating guidance, are among the activities of this club which meets every Thursday at 7.30pm at the Stranraer Community Centre and a warm welcome assured for visitors.

Willenhall & District ARS John Perkins G4LWI on Wolverhampton 782036. It's the Saracen's Head, Bloxwich Road South, Willenhall, W. Midlands, at 8pm every Wednesday.

Wimbledon & District ARS G3WIM G8WIM George Cripps G3DWW on 01-540 2180. Second and last Fridays of the month at 8pm and refreshments provided later in the evening. Venue is the St John Ambulance HQ, 124 Kingston Road, Wimbledon, London SW19. March 8 is devoted to a bazaar which could turn out to be a surplus equipment sale. On the 29th G3SJX will talk on the performance and measurement of h.f. receivers.

Wirral ARS G3NWR Cedric Cawthorne G4KPY on 051-625 7311. First and third Wednesdays at the Parish Hall, Heswall, which is behind the church, at 7.45pm. March 6 sees a slide show of past DX-peditions, by G3EGX, and it's problems night on the 20th. Time to tell you of the junk sale on April 3, and a reminder that the Rev. George Dobbs G3RJV talks on QRP matters on April 17.

Wirral & District ARC G4MGR G8WDC Gerry Scott G8TRY on 051-630 1393. The Irby Cricket Club, Irby, Wirral, second and fourth Wednesdays of the month and a welcome for visitors and new members.

Wolverhampton ARS Keith Jenkinson BRS84269 on (0902) 24870. Frequency synthesis will be discussed by G6UDX on March 5 and on Sunday 17 a 144MHz d.f. hunt is planned. G4WAS is due to talk on the principles of s.s.b. on the 26th. The seldom used third method of generating an s.s.b. signal will be dealt with by G6UDX on April 2. Meetings every Tuesday at 8pm, the W'hampton Electricity Sports and Social Club, St Marks Road, Chapel Ash, W'hampton.

Worcester & District ARC Derek Batchelor G4RBD on W'cester 641733. Formal meetings at the Oddfellows Club, New Street, Worcester, at 8pm, as on March 4, and informally at the Old Pheasant, also in New Street as on March 18. The construction contest will be judged there on April 1.

Yeovil ARC G3CMH G8YEO Eric Godfrey G3GC on (0935) 75533. Thursdays at 7.30pm, the Recreation Centre, Chilton Grove, Yeovil. On March 7 and 21 G3MYM deals with antenna radiation patterns while it's back to 1938/39 when G3GC demonstrates a transmitter of that era. April 4 will be dedicated to a junk sale.

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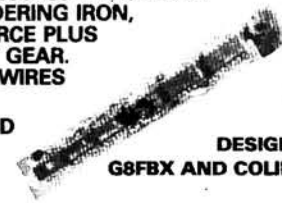

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73 from Dave, G4KQH Technical Manager.

ON THE AIR

AMATEUR BANDS

Reports to: Eric Dowdeswell G4AR, 57 The Kingsway, Ewell Village, Epsom, Surrey KT17 1NA.
Logs by bands in alphabetical order.

by Eric Dowdeswell G4AR

Naturally, there is a lot of excitement at the news that Class B licensees will be able to use the Morse code on the v.h.f./u.h.f. bands, at least for a year, in the first instance. This will tend to take away the pressure for a Novice licence which frequently demands c.w. facilities on the h.f. bands with low power. The new facility will be available as from April 1. The RSGB is to issue a leaflet entitled *Guidelines for Class B licensees using Morse,* but it was not available at the time this copy was being written.

Opinions differ about the way to learn Morse code, and methods vary student to student. For those learning the Morse code, whether over the air or with an audio oscillator (more of which later), a few hints and tips and do's and don'ts from my own experience would not come amiss at this time. For the youngster, learning the code sufficiently well to pass the test can be a piece of cake but the process gets harder as we get older. The International Morse code can be found in a wide variety of books, so it is not proposed to show it again here.

One writer, who should know better, recently suggested that the Class B bods will now be able to work each other in order to learn and use the code, but this is very bad advice. This is a case of the blind leading the blind and there is nothing worse. Always practice with a competent operator—remember that a recently licensed G4 or G0 may themselves still be in the process of learning. Unfortunately, the code test does not require any knowledge of operating procedures or of the several punctuations that are used when on the air. The inexperienced operator usually sends everything in plain language instead of using the many commonly accepted abbreviations.

Think of the Morse code as just another language and learn the letters a few at a time; and numbers, by simply saying out loud the various dits and dahs. Like "didah" for A (·–) and not "dit dah". The "didah" gives the right spacing between the elements of the character automatically. When out in the street, send the registration of any vehicle in sight, it's wonderful practice. Some people may think you're mad, but who cares! DO NOT under any circumstances learn the letters as "opposites" like A (·–) and N (–·) or you will for ever be wondering which letter it should be when copying code.

Get your competent operator friend to send each letter at, say, 10 words per minute (don't be frightened!) BUT with a big space between letters to enable you to identify the letters. Then, as you improve, the space between the letters is reduced until you are copying at a proper 10w.p.m. Easy, isn't it? Then go on to, say, 15w.p.m. using the same idea. It will not be long before your realise that you are hearing the letters not as dots and dashes but as individual sounds, and this is really the basic idea and once cultivated will not be forgotten.

Initially, short words like "and", "for", "the", "that" will be learned as sounds and later on longer common words will be assimilated the same way. Now for the real secret of learning the code the easy way! When copying DO NOT write down the letters as soon as you hear them. Initially, keep one in the memory and only write it down after the next letter is sent. In this way it is possible to hold short words in the memory even after only a short time learning. How do you think that experienced ops take down the code at high speeds straight on to a typewriter? They hear it just as though someone was speaking to them and that is the ultimate aim in learning the code. They hear words, not dots and dashes.

One more tip. Forget about writing the code down but close your eyes instead or, better still, put on a blindfold and read the code sent to you in your mind. The idea behind this is that the temporary loss of vision enhances the hearing, an experience usually found in blind people. This form of practice is particularly helpful if you have one of those Morse tutor devices grinding out endless random code groups.

When writing down the code do use "joined-up" writing and not block letters. If you keep one or more letters in your memory it is very easy to join one letter to the next. If you lose a letter FORGET IT! Get on with the next and fill in later. If you worry about it you will never get anywhere.

Now for a simple code practice oscillator, shown in Fig. 1, which is easily built on a piece of Veroboard which can fit into a simple plastics or metal box together with the 6 F22 9V battery, a small low impedance speaker, not forgetting to cut out a hole about the same size as the speaker cone. An alternative is to fit a jack so that a speaker or a pair of headphones can be plugged in.

General

Seeing the QSL card of G4GNQ, member of the British Railways ARS, in the January issue, Martin Michaelis DK1MM/G5BXV/F0XT wrote to say that he is a member of the German equivalent to the BRARS and that there are many such groups all belonging to the

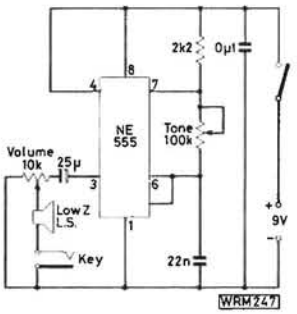


Fig. 1: Circuit of a simple audio oscillator using an NE555 IC

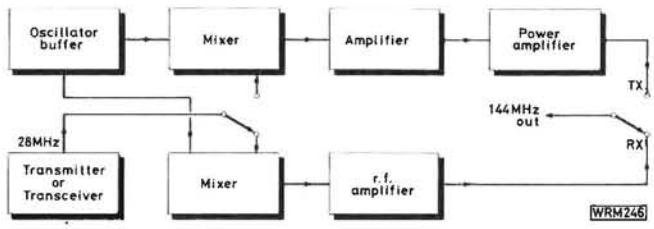


Fig. 2: Block diagram of the basic stages, comprising a transverter using a 28MHz input transverting to 144MHz output

Well-known visitor to the Echelford ARS was Jim Bacon G3YLA of the London Weather Centre. His subject? Weather and propagation. Jim is holding a radio-sonde transmitter

Fédération Internationale des Radio Amateurs Cheminots (FIRAC). Martin also kindly sent me a copy, in German, of a list of Russian oblasts and maps and other very useful information for anyone interested in collecting Russian awards and certificates. Martin can arrange to supply copies of the guide in English for three IRCs. His QTH is Birkenstrasse 6, D-8411 Waldetzenberg bei Laaber, West Germany.

From the *RSGB's Council Letter* it is noted that the DTI has found some confusion to exist over the issue of the Amateur Radio Validation document which is sent by the PO to all amateurs who have renewed their licence since 1 October 1984. The document provides a wallet-sized proof of current validity of the licence itself and provides a standard format for notifying changes of name or address. It is not made clear whether the document can be obtained on request ahead of renewal of the licence.

The Blackwood & District ARS celebrates its 25th anniversary this year and is offering a cup plus gold, silver and bronze awards to those working the greatest number of club members from April 1 to March 31, 1986. Full details from GW4VVX POB 21, Blackwood, Gwent. Considering that there are more than 60 members in the club there is every incentive to go for these awards. Any mode or band can be used and QSLs are not required.

DX Bands

According to **Roger Edwards G1IWZ** of Barnes, London SW13, the 14, 21 and 28MHz bands have been dead of late with much activity on the 7, 3·5 and 1·8MHz bands. He is busy swotting for the Morse code test in order to get his "A" licence. He heard C31YA, CN8CC, FM7WE, TK5BF, TL8CK, VU2GI, 3X4EX, 6Y5IC, J37AH and JA2RR, all between about 3·78 and 3·8MHz, on a FRG-7700 and Amtech 300 a.t.u. and a long wire. Catches of note on 7MHz were VK5VP, YV4DPO and 9M2DO, all around 7·09MHz.

Melwyn Dunn in Grimsby has a Realistic DX160 and an antenna 40m long. The short log, it seems, is due to studying for the RAE so we wish you well, OM. On or about 3·8MHz 7X2AX, VU2GO, TI5FRP, FM7WE and TI8ZWW were noted on s.s.b., with SV2XR and 9H1GP of interest on the 7MHz band.

From Gloucester, **Bill Williams** writes in to say that he has come back into s.w.l.ing after an absence of some 30 years! He now sports an FRG-7700 with FRT-7700 matching a.t.u. driven by a 10m-long antenna wire. His first log for 3·5MHz includes 9K2JF, 9K2SA, A71AD, VE1HF and YB3KK. Up to 14MHz with A4XYR, C31YF, VK3BCY, VK6LC, VQ9YR and YB7KY. On 21MHz, Bill logged EC9IO, HC1SK, LU1ACC and plenty of Russians.

A 20m-long wire in the attic serves **Marcus Walden BRS86996,** of

Martin Michaelis DK1MM is another railway enthusiast and his QSL card shows a German electric type 118 locomotive

Harrogate, feeding into a Realistic DX302 receiver. A good catch around 3·8MHz was VK6LK, plus JF1IST and XL1FG. Of interest on 7MHz was UA1OT in Franz Josef Land. On to 21MHz and A61AA, A4XND, C53FG, KP4ERJ (POB 3000, Isabella, PR 00662), VQ9DG, YC2BGZ, ZS60B, Z21GN, 5L2AK (Liberia) and 6W1AE. The only beacon heard by Marcus on the 28MHz band was LA5TEN around 1030Z.

A short log from **Dennis Norton BRS 87100,** of London W6, shows FM7CD on 3·5MHz, then S83H (Transkei), VQ9YR and 9Q5RX on 14MHz. The 21MHz band came alive with CX4HS, PY5NW (QSL POB 232, Curitiba South, Brazil), ZP5JAL (QSLs to K0ZA), and 6W1NQ with cards to DL1HH. All this on an FRDX500 plus a.t.u. and 20m-long wire antenna plus a 14AVQ vertical antenna.

John Hartin GI1DWM normally of Limavady, Co. Derry, writes in from his work location at Zueitina on the east coast of Libya where he has an old AR88, probably a relic of the last war, he surmises. The makeshift antenna is a 25m-long wire. As far as Top Band is concerned it is totally dead out there. On 14MHz John logged G4PUD, G4VPC, G4GKQ plus VE8RCS, XT2BU, 9K2BE and ZS6UL. The G's on 21MHz included G3AAE, G3KLL, GJ3MQR and YI1BGB, 6W8BG and a couple of VKs. Sole occupants of 28MHz were A92DZ and 3B8FP. We look forward to more logs from you in the future, OM.

Keep an ear open for GB2SWR/MM (maritime mobile) which will be the call of the amateur station aboard the *Sir Walter Raleigh,* the ship carrying a world-wide self-training expedition for young people, scheduled to take some four years. It is hoped that some rare spots and islands will be activated during the voyage.

Little activity on Top Band for **Bob Parsey** (New Malden, Sy) who only found T77V of any note, with his FRG-7700, homebrew a.t.u. and 40m-long antenna. A different story on and around 3·8MHz with CN2AQ, HI8IH, VU2GI (QSL to POB 6674, Bombay 50), ZB2HM, ZS6WD, 3A2HB, 3X4EX, 7X2LS and a cumbersome one in 9L1CISV at the Children's International Summer Village in Liberia. Only worth logging on 14MHz was JY5RBM of POB 7698 Amman. On 21MHz, Bob dug out 5X5GK with cards to JA1HGY, and 6W1CK with QSLs to DL1HH.

Preparation for exams has taken precedence over listening for **Dave Richardson,** of Oadby, Leics, where he has an FRG-7 and 20m of wire strung round the room. Nevertheless, he did copy J88AQ, KP4HC and YV5EF on 3·5MHz plus, on 14MHz, CN8NJ, XT2BR (QSL POB 56, Ouagadogou, Upper Volta) and 6Y5NR. On 21MHz only V2AS was mentioned, with cards via OE3ALW.

Several readers have been questioning the new prefixes emanating from France. There are now five classes of licence which are reflected in the callsign. The first leter is F followed by a letter from A to E (class of licence), a number from 0 to 9 with 7 being reserved for special event stations, followed by a suffix of two or three letters. French overseas territories will have a two letter prefix, a number from 1 to 5, and two or three letter suffix. Corsica, for example, has been using TK for a while now, and Antarctic territories are FT.

Readers are cordially invited to send in logs of the best of DX heard on the amateur bands with copy to me direct by the 15th of the month. Specimen log sheets are available for an SAE.

QRP Corner

Regular writer **Bill Stevenson G4KKI** of Swinton, Manchester, says he has been playing around with antennas and now has a half-size G5RV in the narrow confines of his garden with the coaxial feeder running to his shack under the stairs! He has worked YU3DXX on 7MHz and CT1AIZ on 3·5MHz using just 3W input on c.w. On Top Band he uses his *PW Dart* d.s.b. and c.w. rig giving about 2W output. However, he has now added a linear producing 10W p.e.p. from 1·8–14MHz and 8W on 21 and 28MHz, using a couple of 2SC1307 transistors. Best DX so far on c.w. has been DJ3AS on 1·8MHz.

On 1·8MHz the feeders of the G5RV are shorted together and the central heating system acts as earth. Bill has now started building the *PW Teme* QRP system, etching the p.c.b.s. himself. An electronic keyer is also planned, so our Bill is quite a busy lad! He has also sent off for a digital readout to add to his Lowe SRX30 receiver.

Phil Dykes G4XYX in Poole, Dorset, has kept busy with his 28MHz band f.m. modified CB rig used with a dipole antenna. Recent catches are CT1UP, DL6FF, EA4CEN, EA7EBA, F6BXQ, RA3DHW and YU3GL who came back to a CQ call. Domestic problem is the r.f.i. being generated by his eldest boy's computer Christmas present! Gotaways, heard but not worked, on 28MHz included 9H1AJ, FM7CL, IT9BEL, CT2DG, TA1AIC and ZS5ZD, so as Phil says, perhaps the band isn't so dead as it seems.

Phil has been working on 7MHz with his SB102 turned down for QRP use and

finds the c.w. contacts a bit more personal than on 'fone. Catch of note here was YO3RT.

If you want to hear what can be done with QRP, why not listen to, or indeed operate, in the QRP Club's Spring c.w. Activity Weekend, March 16/17. Times/frequencies are as follows:—(GMT/kHz) 0900/1100 and 1400/1700 on 14060, 21060 and 28060, 1100/1300 and 2100/2300 on 3560 and 7030, 1300/1400 on 10106, and 1900/2100 on 14060. You'll be surprised at what you can hear! All this courtesy of the Winter edition of the QRP Club's mag *SPRAT*. Incidentally, QRP in this instance means stations having an input of 5W d.c. or less.

VHF Forum

For the amateur who already has an h.f. bands transmitter or transceiver, getting on to the 144MHz band can be fairly cheap, compared to buying a transceiver for that band. A transverter takes the output of the h.f. rig and converts it to the v.h.f. band, generally a 28/144MHz conversion but other combinations are possible. The transverter also has an r.f. amplifier for 144MHz and a local conversion oscillator common to receive and transmit. Transverters for the higher frequency bands such as 432 and 1296MHz (70 and 23cm) are usually driven by 144MHz transceivers.

Changing from the receive mode to transmit can be achieved by r.f. sensing methods when the transverter automatically switches over when r.f. from the h.f. rig is sensed, or a normal p.t.t. facility may be provided, or both. For ease of operation, the p.t.t. connections of both units may be commoned.

The transverter may appear to be a simple solution to the problem of getting on to the v.h.f./u.h.f. bands, but there is more to it than that. The 28MHz input from the h.f. rig will contain harmonics and other spurii from the mixing processes involving at the very least two local oscillators, usually more. These harmonics will further mix with the local oscillator and mixing circuits of the transverter and can cause unacceptably high spurii in the output of the transverter.

Designers of transverters are well aware of these problems and every effort is made to reduce these spurii to a minimum by the use of suitable filters at various stages in the transverter. Nevertheless, transverters do have the reputation of having relatively high level harmonics and spurii in their output compared to conventional transceivers. In the end it all comes down to the old adage—you get what you pay for! I do not intend to stick my neck out and make recommendations on transverters, but just listen around the 144MHz band and you will soon get some ideas on the subject.

The very basic stages comprising a 28/144 transverter are shown in Fig. 2. In practice there would be a bandpass filter at the 28MHz output and further filtering plus a buffer stage after the local oscillator. Another filter at the output of the power amplifier stage would also be of the bandpass type with rapid attenuation at each end of the 144MHz band, thus assisting the attenuation of unwanted output signals. The mixer stages usually employ balanced devices with the inputs connected in parallel and the outputs in push-pull, an arrangement that reduces harmonic output quite considerably. Adequate screening between stages is another important factor.

It is essential that some form of drive level control be fitted to the 28MHz transmitter as over-driving of the transverter input beyond the recommended level will prove disastrous as far as spurii and unwanted harmonics are concerned. This practice is not entirely unknown in an effort to increase the output of the transverter.

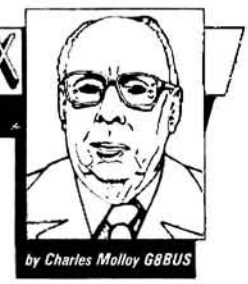
A note from **Kevin Keane EI8FI** of Ballybunion, Co. Kerry, says that his call is being pirated on the 144MHz band and he has QSL cards to prove it. He has no 144MHz gear and, at the moment, has no intention of using 144MHz. I should be delighted to work an EI at any time from way down here in darkest Surrey, but it would be very annoying if it turned out to be a pirate.

As well as reporting on the h.f. bands, **Roger Edwards G1IWZ** of Barnes, London SW13, has been active on the 430MHz band with, I think, an FT-790R giving about 1W output. He managed to work DK2KBB and ON4AQO apart from some G's. The trouble with such low power levels is that unless top-class coaxial feeder is used not much of the 1W of r.f. reaches the antenna. Hence the reason for keeping the feeder as short as possible.

Readers of this column, s.w.l. or licensed, are cordially invited to write in with details of their activities on the v.h.f./u.h.f. bands, together with a description of their gear, preferably with a good, clear photograph if possible.

MW BROADCAST BAND DX

Reports to: Charles Molloy G8BUS, 132 Segers Lane, Southport PR8 3JG.



by Charles Molloy G8BUS

In the early days of wireless, broadcasting was confined to the medium and long waves. There were few stations on the air in Europe so interference was light and it was possible, even with the unselective receivers of the day to pull in DX from the other side of the Atlantic. Think what could have been done with a modern receiver! DXers are inclined to shy away from the medium waves partly on account of the large number of high power broadcasters in Europe and partly because of the number of channels tied up with local broadcasting in the UK and Ireland.

Loop and Ferrite Rod Antennas

There is one tool though that the medium wave DXer possesses that cannot be used on the short waves. This is the highly directional antenna contained inside almost every domestic or portable receiver—the internal ferrite rod antenna. Try turning (rotating) a portable when listening to nearly any broadcast. If you are careful you will find a position when the signal strength is either reduced in strength dramatically or it disappears altogether. This occurs when the null, which is the direction of minimum pick up of the antenna, is pointing towards the station. The DXer's m.w. loop has the same properties as the ferrite rod antenna with the added advantage that it picks up weaker stations, but the loop cannot be used with a receiver that has an internal antenna, so it is only of use with a communications receiver, car radio or old valved receiver.

North African DX

Let's try out the directional effect of the antenna inside our portable or domestic table radio. Locate Radio

Eireann (RTE 1 at Tullamore) on 567kHz (529m) which is near the low frequency or high wavelength end of the band. Once you have located it, then tune slowly up-band, past the German station on 576kHz to 585kHz. You will probably hear two stations at the same time. Turn the receiver slowly and you will find you are able to make either of the two stations disappear. In one position Paris will be on its own, in the other Madrid in Spain will be in the clear. We can only do this because the two stations lie in different directions, one to the south east and the other to the south. A lot of European broadcasting does lie to the east so if we can suppress or reduce it we should be able to pick up stations to the south on the same frequency. DX from Spain, Portugal, Morocco, Algeria, Canary Islands, Madeira should then be a possibility.

Reader **Stewart Hinsley** of Coventry, who uses a Sony ICF 7600D with internal ferrite rod antenna, has sent an interesting log of DX from North Africa. On the long waves Azilal in Morocco was picked up on 209kHz and Tipaza in Algiers on 254kHz. The medium waves brought Ain Beida in Algiers on 531kHz and 1422kHz, Sidi Benoon in Morocco on 540, Les Trembles Algeria on 549, Bechar Algeria 576, Sebba Aioun Morocco on 612 and 1044, Tunis 630, Rabat Morocco 819, Algiers 891 and 981, El Beida on 1125 and Tripoli 1251 both in Libya. Some of these stations are easy while others are not. Tipaza on 254 is the dominant station on this channel with European style programming in French. It has a daily feature in English at 2000UTC. Algiers on 891 is generally a good signal too.

DXing with a Ferrite Rod Antenna

"Is it possible for me to hear these on a receiver with an internal antenna," writes reader **G. Powell** of Pontypridd who has been DXing on the medium waves with his Grundig Satellit 1400. Stations received were Dubai on 1481kHz, Jeddah in Saudi Arabia on 1512 and an unidentified English speaking broadcast on 1510kHz which may well have been WMRE in Boston USA. The latter usually comes in well in the UK.

Yes, it can be done, especially with a powerful set like the Satellit 1400. I have occasionally picked up CJYQ in St John's Newfoundland on 930kHz with my Vega 204 using the internal antenna but I knew where to look for it and the signal was strong at the time. Do not be deterred from trying the medium waves just because your receiver is unsuitable, as most portables are, for use with a medium wave loop antenna, and you cannot put up an outdoor antenna. Tune carefully over the band, search for weak signals and stay on the frequency for a minute or two on account of fading. You may get a surprise. Has anyone pulled in DX when using a receiver with an internal antenna?

Local Radio DXing After Dark

As darkness approaches and the D layer of the ionosphere which absorbs m.w. signals disappears, the sky waves appear. They come from the E layer higher up, which is still near its daytime level of ionisation, so a strong sky wave arrives to mix with the ground wave not too far from the transmitter. Deep fading occurs and the service area of the station is reduced as a result. The E layer now starts a slow decline towards its nighttime level of ionisation when more stable conditions occur. At sunset, QRM from distant stations including local radio stations from other parts of the UK puts in an appearance and this is the time when some interesting DX may be heard.

Some years ago the BBC produced interesting data including curves that one could use to calculate the time lapse before stable conditions at any particular frequency/distance are reached. They appeared in a booklet, now out of print, called *LW and MW Propagation* by Farrow. I have mislaid my copy and would be grateful if any reader could lend me one so that I can refresh my memory on the subject.

Tune to a semi-local station, one that you can hear well during the day but is not intended for reception in your area. As sunset approaches the signal will deteriorate. There will be deep fading as the ground and sky waves move in and out of step with each other. QRM from distant stations now appears. As the evening progresses more stable conditions occur and in the small hours you may be able to hear relatively strong signals, some local and others distant.

Reader Stewart Hinsley of Coventry remarks "stations heard during the summer but not since (in October) are Redruth 630kHz, Plymouth 1152, Portsmouth 1170, Teeside 1170. Plymouth has been replaced by Norwich, Redruth by Vigra in Norway." Our reader continues "my favourite time for local radio DXing is after dawn when most continental stations have faded out but sky wave propagation is still taking place north-south. Each time of the day has its advantage. Daytime allows reception of relatively close stations free of interference. Dusk is similar to dawn, late evening reception is limited by co-channel interference."

To sum up. Local radio DXing has a different face for different times of day and seasons of the year. You never know what you will hear and your domestic portable is quite adequate for most of this type of DXing.

DX Heard

An interesting and varied log has come from reader **Steve Whitt** of Ipswich whose North American DX included CBGY at Bonavista in Newfoundland with classical music at 0054 on 750kHz, WHDH in Boston with news at 0100 on 850kHz, CJYQ in St John's with a fair signal at 0044, WHN in New York City with country music at 0115, WMRE Boston with identification and commercials at 0135 on 1510kHz. The Caribbean produced ZDK in Antigua with the identification Magic Radio at 0030 on 1100, and out-of-band Caribbean Beacon in Anguilla was heard with identification at 0045 on 1610kHz. Steve reckons the best time for this one is between 0100 and 0115 when local news and commercials are aired. Two outlets in Brasil, Radio Globo in Sao Paulo on 1100 (loop needed to separate from ZDK) and Radio Globo in Rio de Janeiro on 1220 at 0100 with news, plus Radio Senegal on the west coast of Africa with news in French at midnight on 760kHz, completed the bag.

Chasing low power continentals can be an interesting and rewarding diversion. Stewart Hinsley picked up Augsburg (AFN) in West Germany with 1kW on 1485kHz, Trapani in Italy with 5kW on 936 and Lamego in Portugal with 1kW on 926 which is 1kHz off channel, which should help with identification. Steve Whitt reports hearing the 5kW transmitter of Radio Vatican on 526 while from my own log. piano music was heard on out of-band 520kHz at 2133. This was the same programme that was going out on 801kHz so I must have been listening to either Hof (200 watts) or Würzburg (200 watts) located in Bavaria in West Germany.

KOA QSL card. A fine catch by *PW* reader David Kenny

Back in 1966 Charles Molloy sent the first report to KEX from the UK

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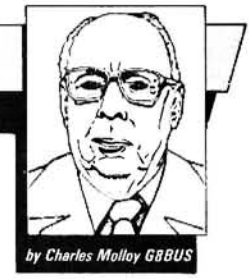
Access

SW BROADCAST BANDS

Reports: as for Medium Wave DX, but please keep separate.



by Charles Molloy G8BUS

While listening to the Swiss Radio International (SRI) at the turn of the year I was surprised to learn that 1985 will be their 50th anniversary year. The programme I heard is called *Swiss Short Wave Merrygoround* and they drew attention to Radio Canada International (RCI) who would be celebrating their 40th anniversary this year. There was a brief link up between the two broadcasters to mark the double event.

Perhaps I should not have been surprised as it was in the mid-1930s that short wave broadcasting made its first appearance and enjoyed a brief spell of popularity before the outbreak of war and the subsequent spread of television. Domestic receivers at that time had a single short wave band, many countries started up a short wave service, while the BBC produced its weekly *World Radio*, a sort of international *Radio Times* that carried details of programmes from continental Europe on the medium wave and further afield on the short wave bands. International broadcasting is having a revival today with some 200 million listeners in the developing countries and perhaps a million or two in United States.

Tropical Bands DXing

"I've been DXing for about a year now . . . I've never really DXed the Tropical Bands before, so when Christmas came and I had my holidays I decided to give it a bash" says **Eamon Crowe** of Stanstead Abbotts. Using a DX400 reciever along with a 13 metre random wire antenna our reader pulled in 34 different stations, the highlights being Windhoek in Namibia on 3·270MHz at 2315UTC, All India Radio in Delhi on 3·365 at 0100, Radio Mozambique 3·370 at 0345, Radio Malawi 3·380 at 0316, all in the 90m band which extends from 3·2MHz to 3·4MHz. The 5MHz band (60m) produced from Africa, Radio Benin on 4·870 at 0400, Radio Senegal 4.890 at 2300, Chad 4·905 at 0500, Republic of Guinea 4·910 at 0600, Radio Guinea Equatorial 4·925 at 0500, Radio Uganda 5·028 at 2100. Latin American DX included Venezuela with Radio Tachira on 4·830 at 0000, Radio Juventud 4·900 at 0300, Ecos del Torbes 4·980 at 0000, Colombia with Radio Neiva on 4·945 at 0130, Radio Sutatenza 5·095 at 0230, Brasil with Radio Nacional Manaus on 4·845 at 01000.

A useful log of DX comes from Pontypridd in Wales where **Graham Powell** connected a 10 metre random wire antenna to his Grundig Satellit 1400SL. Stations, pulled in with this rig included Liberia with news at 2304UTC on 3·255MHz in the 90m band, All India Radio in English on 3·925 at 1759 and the BBC relay (World Service) in Singapore on 3·915 at 1745 (sign off at 1800), both stations being in the non-European part of the 4MHz (75m) band. The 5MHz (60m) band produced ELWA in Liberia with religious programming on 4·760MHz at 2237, Kaduna in Nigeria on 4·770 at 2215, the Ghana Broadcasting Corporation on 4·915 at 0614 and Garoua in Cameroon on 5·010 at 2100. All these were in English but a French speaking outlet heard at 0556 on 4·783 turned out to be Radiodiffusion National du Mali which has an interval signal of a local harp followed by the national anthem and station identification, SINPO rating was 34433.

Acting on a tip from *Late DX News* on Sunday December 30 that 5MHz (60m) was open well after sunrise I picked up Ecos del Torbes in San Cristóbal Venezuela with a strong signal on 4·980 at 0927UTC. The station was still audible at 1000 though obviously deteriorating. Could this be a sign that the lower frequencies are opening up as we approach the sunspot minimum, expected in mid 1986?

World DX News

This is the title of a 15 minute broadcast in English by the Danish Short Wave Clubs International (DSWCI) that can be heard every Sunday at 0915 on 9·670MHz in the 31m band. The time may change after the introduction of summer time on March 31. Last year it was 0815UTC throughout the summer. The first part of this feature is usually a talk on a subject of interest to DXers. Then comes *Late DX News* which is phoned in by Club Member Finn Krone. You can sometimes hear the time pips so he must use a pay phone on occasion.

Late DX News must be the most up-to-date source of DX information available so it is well worth the effort to drag oneself out of bed on a Sunday morning to hear it. The DSWCI of course publishes annually the well known Tropical Bands Survey and details of this, and other publications including club membership, are obtainable by sending and IRC to the DSWCI, Tavleager 31, DK-2670, Denmark. The club has a large international membership and its bulletin is in English.

The DSWCI 15 minute slot is part of the Adventist World Radio (AWR) half hour *Voice of Hope* in English on a Sunday via the Radio Portugal transmitter at Sines on 9·670MHz. You can obtain a QSL card, pennant and schedule by sending your report to AWR, PO Box 2590, 1114 Lisbon, Portugal. AWR also broadcasts in German under the title Stimme der Hoffnung and in French as La Voix de l'Esperance.

QSL Survey

"I thought you might like to see a copy of the BDXC's latest QSL Survey which has just been printed" writes **David Kenny** of the British DX Club. "It's the fourth edition and basically summarises in 40 pages details of all verification reported by BDXC members to the club's bulletin in the ten years from 1974 to

Pennant from Radio Pyongyang sent in by Andrew Hill

QSL card from Voice of America sent in by Eamon Crowe

QSL card from Radio Jamahiriya sent in by Eamon Crowe

Pennant from Radio Beijung sent in by Andrew Hill

1984, split into two year intervals. Details of times taken for a reply, whether return postage is required, the type of QSL (card, letter, etc.) and other information sent out by each station is also included."

The survey which covers broadcasting on l.w., m.w., s.w. and v.h.f. bands plus television, has a section giving the names of station personnel who have signed QSLs and another giving advice on Reporting to Broadcasting stations. The list can be ordered from the British DX Club, 10 Hemdean Hill, Caversham, Reading, RG4 7SB for £1·00 or 5 IRCs worldwide.

International Mailing List

Judging from my mailbag, many new comers to the hobby who would like to write to a station on one of the international bands are deterred because they do not know the full postal address. A number of broadcasters invite their audience to write in and give an address over the air. Not everyone though will have pencil and paper or even a tape recorder at the ready. You can always use the station name, capital city if appropriate and then the country, as an address and this will suffice in many cases, though there may be some delay in delivery.

A new four page booklet titled *International Mailing List* should fill the gap. It contains the full postal addresses of some 300 stations or broadcasting organisations active on the short waves. Copies are available from the DX Listeners Service, c/o Bernd Friedewald, Merianstr 2, D-3588 Homberg, West Germany for two International Reply coupons (IRCs), which can be obtained from the stamp counter at main post offices for 35p each at the time of writing.

Reader's Letters

The ever popular B40 receiver has prompted two readers to write for information. **Lionel Owen,** Green Hayes, London Road, Hythe, Kent, CT21 4JH would like to fit an S meter to his set and he wonders if anyone has any information that would help him. Reader **C. Wrend,** 68 Wigan Road, Atherton, Lancs, M29 0JQ would like to find out the "ordinary" valve number of his B40 as the existing ones have CV numbers. CV stands for Common Valve which was used by the services in the last war. Can anyone supply a translation? There used to be a booklet, published by the RSGB I think that listed CV numbers against makers equivalents.

"Every first Sunday of the month the Voice of America broadcasts a live talk show at 1710 UTC," reports **Andrew Hill** who goes on to say "In October last year I phoned VOA and I submitted my question. As the programme was broadcast VOA rang me back and I went on the air and put my question to former US President Gerald Ford." Did you get an answer Andrew? The VOA transmits to Europe on 6·040, 9·760 and 15·205 at 1700 and it can probably be heard on other channels as well.

Three interesting items are reported by reader **Graham Powell.** At 1000hrs he picked up KTWR Guam on 11·840MHz who were carrying DX Listeners Log at the time. At 1700hrs FEBA in Seychelles was heard with a good signal on 9·600 while at 0830 FEBC Philippines was logged on 11·890 in English and a QSL was received within 29 days of sending the report.

VHF BANDS

Reports to: Ron Ham BRS15744, Faraday, Greyfriars, Storrington, West Sussex RH20 4HE.

by Ron Ham BRS15744

Deadlines are all important in the journalistic world, especially if you, our readers, are to get your magazine on time. Unfortunately the earth's atmosphere is no respecter of such dates and while, in mid December. I was putting the final touches on my manuscripts for our March issue (which you read early in February) a hefty great tropo took place and no way was there time to get all the details in that issue. However, it was such a memorable event that I have taken space this time, in the appropriate sections of my three columns, to take another look at the effect of this natural disturbance on v.h.f. and u.h.f. radio signals.

Solar

Although we are going through a period of minimal solar activity, there is always something happening on the sun that is worth writing about. Mind you, I have a wide variety of experienced and dedicated observers who keep me supplied with information and however small it may be, it is important that we place it on record for posterity. **Cmdr Henry Hatfield,** Sevenoaks, using his spectrohelioscope, located a group of 3 sunspots, a few filaments and small prominences at 1100 on December 14 and one filament, 4 prominences and a couple of weak plages at 1130 on the 29th. Henry also monitors Rugby MSF on 60kHz and recorded an increase in signal strength between 1500 and 2359 on the 22nd, a violent burst of signal, "on the stops" said Henry, at 1433 on the 28th and another during the first hour of the 30th.

Sandy Hood, Fraserburgh, told **Ron Livesey,** Glasgow, Auroral co-ordinator of the British Astronomical Association, that he observed arcs and rays in the evening of the 26th. Ron's magnetometer showed magnetic field disturbance during the evenings of the 26th and 28th and I see that in Maldon, **Ted Owen's** magnetometer was reading high on the 26th. "No spots at all", said **Patrick Moore,** Selsey, following his solar observations around midday on December 26 and 27 and January 1, 2, 4 and 6. Apart from a small burst of radio noise at 143MHz on the 22nd, my daily solar log for this period is empty.

50MHz (6m) Band

Dave Coggins, Knutsford, received signals on the 50MHz band via meteor trail reflection from G6XM at 0805 on December 11, GM3WOJ at 0825 on the 12th, G3IMW, G6XM and GM3WOJ at 0815 and G3LTF at 2345 on January 3, G4GLT and G6XM at 0750 on the 4th and G3LTF at 0800 on the 9th.

28MHz Band

"28MHz, at least at my QTH, seems to be at rock bottom", writes **Bill Kelly,** Belfast, and a similar comment was made to me by **Fred Pallant** G3RNM, in Storrington on January 8. However, looking back to November, **John Desmond,** Cork City, logged signals from stations in DL, EA, HB9, I, UB5 and ZS6 on the 18th, a lone LU on the 21st and a G station via meteor scatter on December 4. "December 8 was one of my best days for a long while", said John, who heard stations from north-east USA and, what pleased him most, NR5M from Texas. Although John also received signals from Argentina, the Azores, Norway and Portugal on the 9th, he says that the overall conditions on most days were dead.

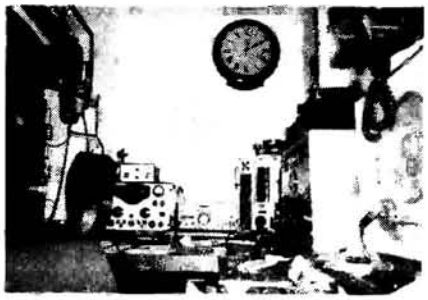


Fig. 1

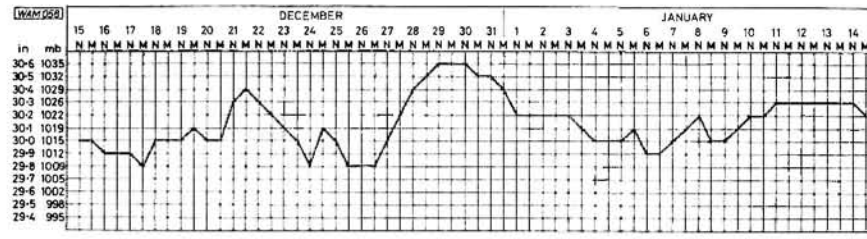


Fig. 2

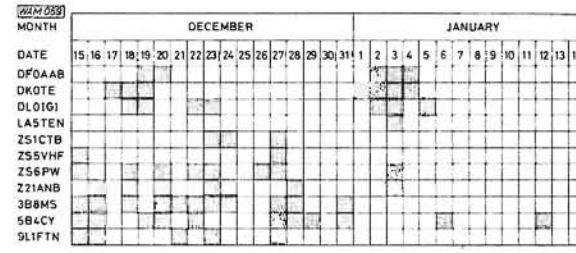


Fig. 3

"I made a point of monitoring the band for a winter sporadic-E this year, as I have found they occur most winters in early January coinciding with the Quadrantids meteor shower", writes **Gordon Pheasant** G4RBY, Walsall. He worked IK8CWB/IC8 on Capri at 1518, EA4CPX at 1757 and CT1CUF at 1812 on January 2 and G4SLX and HB9CIY at 0954 and 1040 respectively on the 3rd, exchanging 43 reports. "Both these contacts seemed to be by ionospheric scatter resulting from the meteor shower rather than true sporadic-E", said Gordon. This is most interesting Gordon, however, there was some sporadic-E about because at 1227, I logged strong signals, with both rapid and slow QSB, from 6 eastern European f.m. broadcast stations between 66 and 69MHz as well as a variety of television signals around 50MHz (see TV Section). Maybe readers will check their logs for that day Gordon and add more information to our findings. Both Dave Coggins and John Desmond report hearing stations from France, Germany, Hungary, Italy and Switzerland during sporadic-E disturbances between 2100 and midnight on December 18 and 19. Like Gordon, Dave heard EA4CPX and CT1UF on the 2nd plus DF2MG, HG5AAP and CT1TM under similar conditions at 1632 on the 6th. "I think that conditions have been at an all-time low, especially on January 8 and 9," writes Dave. He adds, "I usually receive Radio RSA and the BBC on the 26MHz (11m) broadcast band at lunch times, but not on those two days". This is an interesting observation Dave, because the known signal strengths of h.f. broadcast stations can be very useful for confirming general and band conditions. Up in Shetland **Cecil Duncan** is a keen h.f. bands listener and among the impressive range of communications receivers in his shack, Fig. 1, are the WS19 tank set, and the CR100 and R1155 receivers, used during WWII by the Army, Navy and Air Force respectively. Cecil is on the look-out for an R216 which he says would really be at home with all his early gear.

Propagation Beacons

This column had a mention in the Australian magazine *Amateur Radio Action*, which seems to keep an eye on our 28MHz beacon table. Their author said, "Rarely an issue passes my eyes that doesn't contain the calls VK2RSY, VK6RTW and VK6RWA. They also have reports of stations heard on the h.f. bands so you might be lucky enough to get your name in print and probably when you're calling into a so-called dead 10m band." Unfortunately we can't oblige this time, but it shows readers that we are giving a service to our friends in the southern hemisphere. Beacons are also extremely valuable for meteor scatter observations and despite their limited power, they do radiate signals on various fixed frequencies for 24 hours a day. During the evening of December 4. John Desmond received bursts or pings of the transmissions from the Sussex beacon GB3SX and Dave Coggins heard pings on the signals from the 50MHz beacons GB3NHQ and GB3SIX almost daily from December 15 to January 12.

Between December 8 and January 7, Henry Hatfield carried out his routine checks on the frequencies of the Canadian. European, Mediterranean, Norwegian, South American and South African 28MHz beacons and heard nothing from any of them. My contribu tion is almost the same this time Henry. "Very poor reception period, in fact worst so far", wrote Ted Owen, Maldon, on January 9. "I found 28MHz very quiet over the Christmas period, the band seemed very dead, indeed even quieter than in previous months", commented John Desmond. Despite **John Coulter,** Winchester, saying, "Herewith another lean report", his log, along with those from Dave Coggins, John Desmond, Ted Owen, Gordon Pheasant who heard the German and Norwegian beacons with weak and warbly signals on January 3, and **Chris van den Berg,** The Hague, have been used to compile our monthly beacon chart, Fig. 3.

During the v.h.f. opening on December 10 and 11, Dave Coggins received signals from the RSGB beacon in Cornwall, GB3CTC 144·915MHz and for the first time heard the French beacon, FX0THF on 144·895MHz. However, later in the month conditions were completely different and apart from an unexpected in crease in strength for a short period on December 26 (and despite the periods of high pressure) signals from the RSGB beacon at Wrotham, GB3VHF 144·925MHz remained a steady 539 at my QTH throughout the period of this month's report. In Holland, Chris van den Berg logged signals from the beacons in Angus GB3ANG 144·975MHz on the 12th, Belgium ON4VHF 144·985MHz and Cornwall on the 11th and Wrotham on days 11, 12, 14, 19, 20, 22, 23, 25, 28, 29 and 30 and January 3 and 9.

Tropospheric

When this reporting period began on December 15, the atmospheric pressure, measured at my QTH, was falling from 30·0in (1015mb), the lowest that v.h.f. operators like to see it, to 29·8 which it reached late on the 17th. Apart from another low over the Christmas holiday, the pressure was mainly above the magic figure with high peaks on the 21st, during the last week of 1984, and for the final days of this report. Our monthly pressure chart, Fig. 2 is compiled from the daily readings on my Short and Mason Barograph (figures slightly rounded). I see from the log sent in by Ted Owen that the pressure readings at his QTH are very similar to mine. As far as v.h.f. was concerned the latter should have produced a few good tropo lifts but alas, what came was hardly noticeable. However, a few weeks earlier it was a different story and during that mid-December opening, **Richard Rowlands** GW4HKX, Anglesey, using an FT-290R running barefoot with 2·5W into a 17-element Tonna at 7m a.g.l., worked DJ0XR/P and LX1JA on 144MHz (2m) s.s.b. on the 10th and PA3DFX and PD0NOO on f.m. on the 11th. "I believe that DX can be worked without high power as long as the antenna has sufficient gain", writes Richard.

Between the 7th and 12th, Bill Kelly heard stations from G, GI, GM and GW working through the Northern Ireland 144MHz band repeaters GB3LY on R0, GB3NI R5 and GB3WT on R7. While the conditions were so good Bill, who has a poor v.h.f. location, heard signals through the repeaters in Ayr GB3AY R2, Appleby GB3EV R4, Caldbeck GB3AS R1, Motherwell GB3CS R6 and from southern Ireland, for the first time, EI7CS at Sligo on R4. On the 11th, **Alan Taylor,** Coventry, logged Dutch and German sta-

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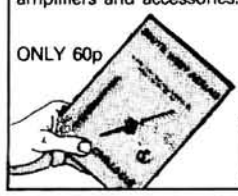

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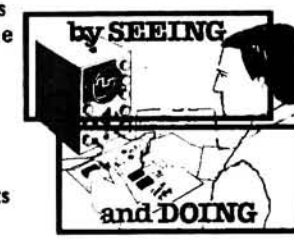

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tions on 144MHz. During the evening of the 12th, **Simon Hamer,** New Radnor, heard stations from London, Norwich and Stafford working through the Brecon Beacons repeater GB3BB on R4 and stations from Amsterdam and The Hague through the Buxton repeater GB3HH R4. Not content with the log so far, he also heard QSOs from Blackpool to Manchester via the North Powys repeater GB3PW R3, from Lincoln to Newton le Willows via the Birmingham repeater GB3BM R5, and he heard a Birmingham operator say that he was working the west coast of Ireland via a Paris repeater.

"I would like to further my knowledge of propagation", writes 14-year-old **Wayne Bevan** from Ammanford, who currently listens to v.h.f. signals via the 144MHz repeaters in Birmingham, Carmel GB3WW R7, Newport GB3BC R6 and West Devon GB3WD R4. Wayne's receiver is fed by an indoor 8-element Yagi and he is looking forward to com pleting his station when, after excellent tuition from GW4PYK and GW4JGU, he gets his own GW callsign. Listening to both the 144MHz and 430MHz (70cm) repeaters can tell you a lot about tropospheric propagation Wayne. **P. Burnett** G1DAT, Cleveland, is on 144MHz with an FT-480R and an 8 element Yagi antenna and is working on a variety of ways to plot and record the atmospheric pressure. Dave Coggins was also in on the action and logged stations on 144MHz s.s.b. from Belgium, France and Germany on the 10th and again on the 11th, with the addition of signals from Holland and Scotland.

From March 30 to April 3, George Haylock G2DHV plans to be in Guernsey using the callsign GU2DHV and from the 4th to the 7th in Jersey using GJ2DHV. During this period George hopes to be active on 144MHz c.w. and s.s.b. and will be looking for QSOs and will be delighted to receive reports afterwards at his home in Kent, QTHR. George is preparing a special QSL card for this expedition and he reminds me that 1985 is the 40th anniversary of the liberation of the Channel Islands from German occupation.

Band II

As far as propagation is concerned, the v.h.f. broadcast band, 87 to 104MHz can be disrupted, or provide DX, depending on your point of view, by an extensive sporadic-E or a mild plus tropo, and believe me, it was the plus that caused the chaos between December 8 and 13. As the opening brewed up on the 8th, **Harold Brodribb,** St Leonards-on-Sea, heard a variety of French stations with huge signal strengths between 90 and 100MHz in addition to a number of "warbles" behind the regular BBC stations that he normally receives at his QTH. At 0600 on the 12th, Simon Hamer received programmes mainly from Germany and he identified AFN Frankfurt, Bayerischer-Rundfunk III from Wendelstein, Hessischer-Rundfunk I Biedenkopf, Westdeutscher Rundfunk I and III from Nordhelle, WDR II Langenberg and now comes a super bit, Suddeutscher Rundfunk III in Heidelberg on 99·9MHz with QRM from Denmark Radio's Programme II from Southern Jutland, also on 99·9MHz.

Between the 9th and 12th, Bill Kelly logged signals from Radios City in Liverpool, Clyde, Cumbria, Cymru, Girvan, Merseyside and Red Rose and while I heard some "warbles" on BBC stations during the evening of the 28th, Bill received signals from RTE 2 on 99·3MHz for the first time. "Such a marvellous opening between December 9 and 12", said Harold Brodribb and added, "I have never known such a disturbance in Band II. The interference was so bad on BBC Radios 3 and 4 on my Bush VHF80, the only clear stations were from Belgium at each end of the band, from France Culture, Freqence Nord and RBL between 91 and 99MHz and from Holland around 90·2MHz on the 10th". On the 11th, Harold used the radio section of his Plustron TVR5D and received clear signals from BBC Radio 2 at Rowridge and Wrotham, Culture and Frequence Nord from Lille, RBL and a Belgian station around 100·7MHz. There was no way that our two Newport DXers, **Andrew Guy** and **Damien Read,** would be left out of the big event and between them, on the 10th and 11th, they received signals from Belgium BRT2 and RTBF, France Culture, Frequence Nord, Inter and Musique, Ireland RTE 2 and from the UK, BBC Radios Cornwall, London, Oxford and Sussex and ILRs Mercury, Southern Sound and 2CR.

In Southampton, **John Biles** uses a chimney-mounted 6-element Yagi to feed his tuner amplifier for Band II and can usually receive signals from the London ILR stations Capital and LBC and sometimes BBC and ILR stations from Kent and Sussex. It is well worth keeping a watch in Band II for brief outbreaks of sporadic-E as Simon Hamer found on December 26 when, for a short time, he received signals at good strength from Yugoslavia, JRT-1, Avala on 95·3MHz.

TELEVISION

Reports, as for VHF Bands, but please keep separate.

by Ron Ham BRS15744

Over the years, many *PW* readers have reported seeing a wide variety of the popular American and British films and programmes being transmitted by stations whose signals we only receive during an atmospheric disturbance. I was reminded of this when I read an article called "Programming", by Robin Williams, in the Christmas issue of *Teleradio News,* edited by our readers Keith Hamer and Garry Smith. "It can be quite frustrating to get a good tropo signal from Holland and find that all you're getting is last week's episode of *Dynasty*!" writes Robin, and points out that during one week's programmes he counted 121 UK/USA items being shown in Europe.

During the mid-December opening, **Simon Hamer,** New Radnor, saw an American film, in German, from ARD on Chs. E8 and E9, a cowboy film in French from Belgium on Ch. E3, the news broadcast *Heute* from ZDF with an item about Pope John Paul II and a list of programmes with pictures from *Chariots of Fire.*

One of the many aspects of DXTV is the picture content, and because we see a wide variety of test cards during most disturbances I feel that it is time we had a look at some of the people and captions that appear. For example, one of the announcers on Dubai TV, Fig. 1, received by **Asim Aziz** and **Rehan Mullich** in Lahore; lively introductions from France TF1, Figs. 2 and 3, by **Nicholas Wythe,** Folkestone; the animal character, Fig. 4, shown by NOS between commercials sent by **Keith Hamer** and **Garry Smith,** Derby; a picture of Hamburg, Fig. 5, from **Tony Palfreyman,** Stannington; and a caption, Fig. 6, and a young lady and a puppet, Fig. 7, received from Spain by **Iain Dunworth** G4SNL, Saltash, and **Len Eastman** G8UUE, Bristol, respectively. All of these should whet the appetites of the newcomers to the world of long-distance television reception. I think that I can fairly sum it up by saying we don't get much sound, but we sure see some interesting pictures.

Amateur TV (fast-scan)

"ATV activity in Liverpol and district is very much alive," writes **Eric Rowe** and continues, "My son, who is G1DIA, has facilities to receive ATV signals and I receive pictures each day from G3OSI, G3PDC, G4OHG, G6XUM, G8VQC and G8YFE in Liverpool, G1DDA in Stoke-on-Trent and G4IVD in Wigan." Eric uses a Yaesu FRG-7700 and a Microwave Modules converter fed by a 14-element parabeam antenna to further his interest in this fascinating aspect of amateur radio.

Tropospheric

Readers are still talking about that mid-December tropospheric opening, when, like many others, **Keith Chaplin,** Barrow upon Soar, had a good haul of DX from the stations that operate a 625-line system in Band III. During the evening of December 10, Keith received pictures from Ireland Radio Telefis Eireann

1 on their Ch. H 207·25MHz in Band III and on Ch. 23 in the u.h.f. band. Between 1800 and 2000 on the 11th, he watched pictures from Belgium BRT, including their clock, Fig. 8, their news programme *BRT Journal*, Fig. 9, and BRT Teletekst, Fig. 10, in addition to football from Germany in the programme *Monitour*, films mainly from ARD/ZDF, and the caption Sport Extra ARD 1, an episode of *Magnum* on ARD and a test card from Belgium's RTBF. Early in the event, on the 8th, **Harold Brodribb,** St. Leonards-on-Sea, received weak pictures from the Belgian stations at Liege on Ch. E3 and Wavre on Ch. E8 and towards the end of the opening, early on the 13th, Keith Chaplin saw a German caption Westdeutscher Rundfunk from Langenberg on Ch. E9. Up in Coventry, **Alan Taylor** reports strong signals from RTBF in Band III and in Derby, Keith Hamer and Garry Smith logged pictures from Holland and West Germany and report that they can receive the French station TDF Canal Plus almost daily on Ch. 5 from Lille. In Wales, Simon Hamer (no relation to Keith) watched pictures from RTBF 1 on E3 and RTBF 2 on Ch. 42, Canal Plus on Ch. 5, Germany ARD on Chs. E8 and 9, ZDF on Chs. E34, 35 and 37 and Holland NOS–1 from Lopik on Ch. E4, Roermond E5, Smilde E6, Markelo E7 and Goes E29, during the evening of the 11th.

At 1740 on the 10th, **Mike Bennett,** Slough, received poor-quality mono and colour pictures from France in Band III and good colour test cards from BRT TV1 and Teletekst from RTBF on the 11th. During the afternoon of the 12th, Mike logged a colour bar caption from France, with the inscription, "Reseau Specialise et Reseau FR3" on their Ch. L6. Later on the 12th, Simon found u.h.f. DX within the UK and tuning through Bands IV and V found strong signals from the IBA networks, Granada, Winter Hill on Ch. 59, London, Guildford Ch. 43. Tyne Tees, Bilsdale Ch. 29 and Yorkshire, Belmont Ch. 25.

Having moved to a new QTH in Edinburgh, **George Garden,** using an NEC colour set and a 48-element indoor antenna, received his first DX during the evening on the 12th when he logged Grampian TV from Durris, in good colour, on Ch. 25 at a distance of around 180km. Commenting on the close-down of the 405-line transmitters in Bands I and III at the beginning of this year. **George Pheasant** said, "It's great to take out the notch filters I had on Ch. B4 sound and vision and see PTT Nederlands surface on Ch. E4 from time to time by tropo. I had only ever seen it before the BBC came on at 0830." I wonder how many more readers are enjoying the clear bands, Gordon?

"Quite the best tropo on Band III that I have ever experienced," writes Harold Brodribb, in a later report, having received test cards and programmes from stations in Belgium BRT and RTBF, France FR3, Ireland RTE 2 and Luxembourg RTL on December 10 and 11. In Bands IV and V on the 11th he found French stations dominating many of the u.h.f. channels. At 0915 on the 13th, Harold was still getting a test card from RTL on Ch. E7 and then a few glimpses of signals from Belgium during the morning before the event finally died out.

Band I

Although sporadic-E is mainly a summer-time disturbance, it is always worth taking a daily tune through Band I, 40 to 68MHz, during the winter months as Keith Chaplin found between 1050 and 1220 on October 14 when he received pictures from Italy RAI, on their Chs. A 53·75MHz and B 62·25MHz. During the morning of December 14, I saw a map of the world behind the Polish "dt" caption followed by the letters TP for about 2 minutes on Ch. R1 49·75MHz and at midday on January 3, I received test cards from Czechoslovakia RSKH and Poland on Ch. R1 and Sweden, scribed TV1 Sverige, on Chs. E2 48·25MHz and E3 55·25MHz. Later the Czechoslovak and Swedish test cards, being close in frequency, were fighting for predominance on the screen around 49MHz all mixed up with a farming programme from an unidentified station. About 1140 on December 17, Harold Brodribb saw the RSKH test card from Czechoslovakia and at 1230 on the 18th. Simon Hamer watched children sledging in the snow by a lake in a forest, with Cyrillic captions, from the USSR on Ch. R2 59·25MHz. During the evening of the 3rd, Simon caught a glimpse of a film on Ch. E2 and lots of pings of picture, by meteor scatter, on Chs. R1 and 2 and at 1300 on the 5th, he saw skiing from Innsbruck on Ch. R1. Mike Bennett, Slough, watched skiing from Italy on their Chs. A and B at 1040 on the 19th and on Chs. E2 and 4, at 1351 on the 21st, he received flashes of an unidentified test card and a Union Jack with the words "Follow Me" printed on it which he believes came from Portugal. Gordon Pheasant G4BPY, Walsall, logged an unidentified picture which appeared briefly on Ch. R1 at 1630 on January 2, and Simon Hamer received a test card from Sweden on Ch. E2 at noon on the 6th. Like us all, **Neil Purling,** Hull, is looking forward to the coming Sporadic-E season and is currently trying new ways to improve his station, so don't forget Neil, it's worth having a tune around Band I in the early morning and again at midday.

"I am learning Russian with one of my school friends and Radio Moscow, so hopefully by the next DX season I'll be able to understand some of that strange writing we see on the screen," writes **Philip Hodgson,** Stamford, who, having sent a reception report to Hessischer Rundfunk, HR 1, TV, received a QSL card within a week or so, along with transmitter maps, a couple of stickers and a real metal key ring with frequency and transmitters impressed on it. Good stuff, Philip, it shows that quality reports are welcomed by overseas stations. My wife studied Russian a few years ago in conjunction with a television programme and found the book entitled *The Penguin Russian Course,* ISBN 0 14 051.020 6, a great help; so do I readers, hi.

SSTV

"This is SSTV frequency, please QSY," demanded a strong voice on 14·230MHz in the 20m band at 1145 on December 29, which emphasises the fact that other traffic on this SSTV calling channel can cause problems with the reception of pictures, especially the weaker ones.

My entry into the world of slow-scan television reception, with a Scarab Systems programme for my ZX Spectrum, has proved most interesting. I found most of the activity on Saturday and Sunday mornings around 14·230MHz and between December 14 and January 13, I received pictures from EA4BGP, EA4CHU, DJ6KQ, I3FWY, I3XQW, I6NAG, IC8POF, OH2KM, OH6ZS and parts of signals, broken up because they were weak or subject to QRM and/or QSB, from stations in Czechoslovakia, Germany and Greece. Please forgive any errors in the callsigns quoted because sometimes not all the letters are easy to read. Among the captions I saw were, "BYE BYE", "CQ SSTV", "GOOD MORNING RSV 577", "HAPPY 1985", "MERRY CHRISTMAS", "PLEASE KK" (Fig. 11), "SRI VY QRM", "TNX FER CALL", a full screen sized "73" and "NAME XAVIER QTH MADRID" (Fig. 12). I also found that while receiving the signals it is an advantage to record them on a standard tape recorder for later playback into the computer and then, by using the commands for border colour change, negate picture and scrolling, detailed study of the picture is relatively

Fg. 1

Fig. 2

Fig. 3

Fig. 4

Fg. 5

Fig. 6

Fig. 7

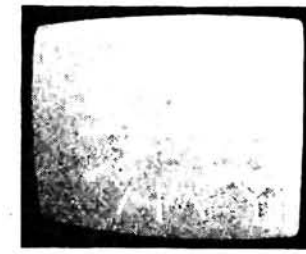


Fig.8

Fg. 9

Fig. 10

Fig. 11

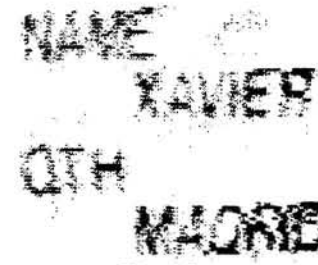


Fig. 12

easy. For hard copy I use an Alphacom 32 printer in conjunction with the Spectrum, which can be used when a wanted picture is selected from the tape. In short, I am very pleased with the computer system and looking forward to seeing some real DX.

"The only SSTV copied has been from Europe," writes **Peter Lincoln**, Aldershot, for the month prior to January 15 and adds, "most of the countries active in this mode showed up a few times, my best DX being SV. The advantage of SSTV is that it is still not over-active and DX does not seem that important, although pictures from other continents are very welcome."

"More and more Ws are appearing on 14MHz SSTV using the new Robot colour system and have been worked, two-way, using 12, 24, 36 and 72 seconds, single-frame colour," writes **Richard Thurlow** G3WW, March, who tells me that the latest two, using the Robot 1200C, with Tandy TRS-80 computers for control and graphics generation are N2WA and WA2WFF, both in Patterson, New Jersey. "Both G2BAR and G4UFV are equipped with 1200Cs," said Richard.

SATELLITES

Reports to Pat Gowen G3IOR 17 Heath Crescent, Hellesdon, Norwich Norfolk NR6 6XD

by Pat Gowen G3IOR

As OSCAR-10 is now heading for a more southerly apogee, with a decreased transponder "on-time" (switch-off now commanded at mean anomaly 201) and with poor sun-angles at times, we are not seeing the satellite at its best. Despite these problems, it effects superb communications when compared with the h.f. bands, with the ever lowering solar flux as we approach sunspot minima.

New DX regularly asserts its presence, with fresh activity from ZF1GC, ZD7SD, 4U1ITU, HZ1AB, KS6DY, W1BIH/PJ2. An expedition to 4S7 is now on from a Belgian group (QSL via Peter, ON7HP) and a W0 is active from H18.

The USSR "RADIO" satellites survived the eclipse period, and have been active full-time on a new schedule, with RS–5 and RS–8 on transponder mode, and with RS–7 taking the role of the ROBOT. A recent test by RS3A to verify charging and cell holding capacity on the batteries, showed RS–8 still to be in excellent health, with RS–7 in modest condition, but with RS–5 showing considerable signs of degradation, and unlikely to be with us for much longer. When heavily loaded, it will be likely to turn itself off automatically when "undervoltage" is sensed and can only be recommanded on again by one of the ground command stations. The moral is to use it gently, by keeping your uplink power to the minimum required for reliable communication.

News

Due to the need for finances to be directed toward new satellites, the last issue of *Orbit* magazine, number 19, has been issued. Although very popular and well designed, the complexities of production and printing meant a loss of topicality, and the cost of continuing the elegant format could not be equated by the advertising that it carried. AMSAT will now produce *AMSAT Satellite Journal* for members with similar but more updated material, minus the gloss and colour.

NASA has produced a booklet that is invaluable to the satellite enthusiast, called *Satellite Situation Report No. 4* which is free to the applicant. Write your request to: NASA, Public Affairs Department, Goddard Spaceflight Center, 130 Greenbelt, MD 20777, USA.

Supplementing the RSGB GB2RS H2 channel broadcasts, ARRL now have W1AW, the headquarters station at Newington Connecticut, using the OSCAR-10 satellite regularly for both

s.s.b. and c.w. bulletins on the H2 and L2 special channels. AMSAT will have regular broadcasts and bulletins on the H2 and ACNF (145·957MHz) channels, at 1800 Sundays, and later Sunday evenings when the satellite is in view.

Problems have been caused to the reception of essential bulletins over the past few months by a number of European stations not only running excessive power and with very wide signals, but also using frequencies well above the top downlink QSO frequency of 145·957MHz. If responsible users of the satellite would gently remind these "problem users" of the ethics, the band plan, and the power limits to be observed, it would help all concerned to maintain good communications for all. Really, with no skip differential, and with the full capability of self monitoring, there can be no excuse for bad operating on satellites!

UOSAT

Regular bulletins from the University of Surrey team indicate that all goes well with both of the UOSAT spacecraft, with UOSAT OSCAR–9 continuing to provide the bulletin with a regular experimental schedule, subject to some changes according to user feedback of interests.

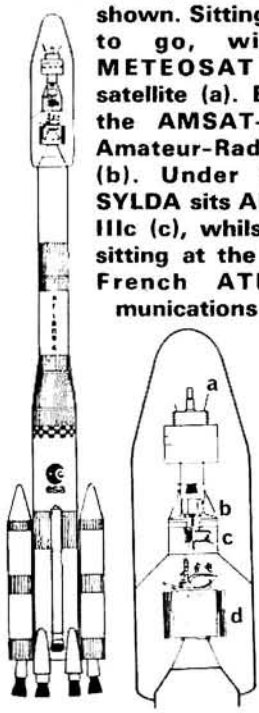
UOSAT OSCAR–11 was placed back into gravity gradient stabilisation by automatic attitude control manoeuvres (dictated by the on-board computer) within four days of commencement of operation. This operation followed several weeks of navigation analysis to determine the exact nature of the complex spin that had resulted. The satellite was accidentally destabilised during a planned despin session to prepare for an experiment requiring stability of axis, but is now under better gravity lock than before!

UO–11 has been engaged in carrying out particle-wave experiments in conjunction with the AMPTE spacecraft, and more tests are planned for April this year. The c.c.d. camera has been used to send back test images, and work is continuing on the UOS ground station to improve facilities for the image reception.

Coincident with a meteor shower, a number of "hits" were recorded by the piezo-electric microphone on the satellite chassis used for the space-dust experiment.

The digital communications experiment has been in use for many months aiding spacecraft operations, and will be activated on a limited experimental communications basis imminently. Batteries, power system, telecommand and telemetry are all performing excellently, and despite the intense effort required within the University of Surrey AMSAT Team in having two spacecraft to maintain, and now further to become involved in preparing for PACSAT and other missions, they are well pleased with results, as are we mere users.

The ARIANE-4 rocket of ESA, planned for the July 1986 launch of four satellites, with the positions shown. Sitting on top, first to go, will be the METEOSAT weather satellite (a). Below this is the AMSAT-F ARSENE Amateur-Radio Satellite (b). Under this in the SYLDA sits AMSAT Phase IIIc (c), whilst last to go, sitting at the base, is the French ATHOS communications satellite (d)



AMPTE

Those of you who remember the sad day of the launch of Phase IIIa will recall that it was accompanied to the bottom of the deep sea by FIREWHEEL, a satellite from the Max Planck Institute. This was to have released Barium, Strontium, Lithium and other discrete spectrum photo-emissive ions into the magnetosphere to produce what would have been a very spectacular multi-coloured Aurora.

AMPTE, an acronym for Active Magnetosphere Particle Tracer Experiment, is similar, and three such spacecraft were launched from Cape Canaveral on August 16 last year by NASA. It was the Lithium release of one of the set in September 1984 that UOSAT OSCAR–11 was working in conjunction with. (See earlier item on UOSAT). A Barium release was due at 0407 PST (1207 GMT) at 9 degrees South, 84 degrees West (the Eastern Pacific) on Christmas morning, that would have produced a splendid green comet-tail effect streaming in toward the earth's magnetic poles as the sun striking at that height ionised the metal, stimulating bright emission against the dark sky just before earth sunrise. It is just possible that some residual effect might have remained toward the north-north-west of Britain before our following dawn, or even coming over the magnetic pole after dusk on Christmas Day. If any enthusiast was awake and saw any effects of the phenomena, it might just not have been due to the blood alcohol level over the festive period!

Phase IIIc and Arsene

Dr. Karl Meinzer, DJ4ZC, father figure of OSCAR–10, has signed a contract with ESA, the European Space Agency, for the launch of the Phase IIIc satellite from Kourou, French Guiana on the new powerful ARIANE–4 rocket, for mid 1986.

Work on the new spacecraft is already well under way at the AMSAT–DL Marburg group, and with AMSAT in the United States at both Washington and Boulder, Colorado. With a sufficiency of financial income, it is to be hoped that the ideal orbit for a satellite fundamentally similar to the current OSCAR–10 will be achieved in July next year. If placed at some 67 degrees inclination, not only will spin-modulation be virtually eliminated and stronger signals result from earth being within the main-lobe direct beam for most of the time, but the satellite will stay at the inclination set whilst OSCAR–10 provides apogee optimum for the southern hemisphere stations.

At the satellite itself some exciting additions and improvements are envisaged, such as a high power version of the L Mode 1269 to 436MHz transponder that would reduce the overall link requirements by an increase of downlink power. This would permit a reduction of the ground system requirements for both the 436MHz downlink and the 1269MHz uplink, enabling simpler access and usage. Also planned is a Mode L digital transponder, plus a 2·3GHz (S Band) beacon built by DC9RK.

A number of possibilities for the on-board propulsion system used to place the satellite at the ideal inclination and into the optimum orbit from the initial launch vehicle transfer orbit are under consideration, all with their own merits. A solid fuel rocket, as with Phase IIIa, a hyperglycol (liquid fuel) propellant system, as with OSCAR–10 (Phase IIIb), an experimental plasma system, and a method of using water electrolytically decomposed to form hydrogen and oxygen fuel by solar cell power are all viable contendents.

Also aboard ARIANE–4 will be a METEOSAT weather satellite, ATHOS a French communications satellite, and ARSENE. (See diagram of launch configuration). ARSENE is being made by the French AMSAT group under the guidance of F8YY. The Bordeaux group are building the 145MHz r.f. amplifiers, F5EN (Paris) and F3VF (Rennes) the 2·4GHz chain, and F2MM the telemetry transmitter. Some twenty specialists form the group, who have met over one hundred times to plan the mission so far. Until now, no funding has been necessary, as time and materials have been freely donated. As the launch date draws closer, it will be imperative to find patrons for financing the project, and sponsors are urgently sought. If you are able to assist, please contact F6FHE. If you feel that you are able to contribute in the actual technical work, then let F3HK know of your particular expertise.

ACSB

In addition to the terms s.s.b., l.s.b., u.s.b., d.s.b., etc. we now have a.c.s.b.,

which stands for amplitude compandered sideband. If the term 'compandered' is not in your glossary, then this can be explained as a derivation of COMPressed and exPANDed, the method of function. Basically, a pilot tone at 3·1kHz is introduced at the transmitting source providing an index to the amount of compression employed. At the receiving end of things, compensation for changes in the level of the pilot tone detected asserts changes of the expansion function, thus overcoming much of the effect of poor signal to noise ratio and spin modulation. It also negates much of the effect of Doppler shift. On my normal IC720A and Microwave Modules 144-to-28MHz converter, it appeared to all intents and purposes to be normal s.s.b., and I could detect no difference on W1AW's usual signal during our QSO's. With the a.c.s.b. receiver, it is a very different case, as improvements in the signal to noise ratio of up to 15dB are claimed!

Unless one has a near to e.m.e. array and a good low noise GaAs-f.e.t. preamplifier at the antenna, OSCAR–10 QSO's are not what one might describe as "armchair" copy, particularly when the transponder is heavily loaded by high-power stations and the antennas on the spacecraft are at a poor angle to the user. This new system, now under test with ARRL and AMSAT, could provide an ideal answer to those equipped with modest antennas, as well as for general satellite, e.m.e., and low signal work. Nothing sounding so advantageous could be without snags, and one danger is the effect of the continuous loading of the satellite power system if the mode becomes as popular as it might be expected.

Finally this month, the explanation as to why it was that no signals whatsoever were heard from the 435·025MHz telemetry beacon of the GASCAN (Get-Away-Special Canister) on the last STS Shuttle mission. After much conjecture, calculation, theory and modelling, it was eventually agreed that the greatest probability was due indirectly t the problems of communications on that flight mission, as either the 435MHz antenna had been broken, or, due to the required angle of the shuttle that allowed directing its direct radio antennas to earth (the normal satellite system having failed), the GASCAN TLM antenna was continuously screened from earth by the spacecraft itself. The real reason was much more straightforward, as it transpired that the TLM transmitter had not been switched on! Even Astronauts and Cosmonauts, it would appear, are as fallible as we lesser mortals!

RTTY

Reports: as for VHF Bands, but please keep separate.

by Ron Ham BRS15744

"Welcome to RTTY," said OH3XI at 1055 on December 29 to a Belgian station who was making an RTTY QSO for the first time. This is a typical view of the RTTY fraternity toward newcomers and borne out in the UK by the fact that the British Amateur Radio Teleprinter Group began their jubilee year, 1984, with a membership of 1170 and ended with around 2600. Obviously, new computer technology has made it easier for both the licensed amateur and the s.w.l. to add this mode to their stations and BARTG are there to make sure they can enjoy it. "We are now looking forward to 1985," writes Ian Wade G3NRW, Publicity Officer, in the Winter '84 issue of the BARTG journal *Datacom* and adds, "Your committee has finally gone round the bend and over the hill, yes, next year our target is 5000 members and I am convinced that we can do it." So am I, Ian. and I hope that those readers who are not already members will get the details, by sending an s.a.e. to Pat and John Beedie, GW6MOJ/GW6MOK, at "Ffynnonlas", Salem, Llandeilo, Dyfed, Wales.

Alan Taylor, Coventry, has taken his first steps into RTTY with a home-brew terminal unit, ZX Spectrum computer and Scarab Systems interface and software. During December he copied signals from stations in Austria, Holland, Italy and the UK, USA and USSR and is really pleased with this way of receiving amateur radio transmissions. Over the festive season I copied a French station on 7MHz (40m) who ended his QSO with a Christmas tree made up of 13 zeros and printed beside it the words "JOYEUSES FETES, MERRY CHRISTMAS DE F6EZH" and the English operator who made an RTTY Christmas card with a screen-filling tree, made with the letter X, and 5 exclamation marks for candles which looked very good. Alongside the tree were the words, "A MERRY CHRISTMAS CUAGN G4MMQ" and I can imagine the pleasure this gave to the G station, new to RTTY, that he was working. Another finished his QSO at 0840 on December 25 with a giant 73, seven characters high made up of the computer hash sign. Such items show the dedication and skill, plus the human touch of the RTTY operators.

During the mid-December 1984 tropo, **Ted Double** G8CDW, Enfield, BARTG Awards Manager, made RTTY QSOs on 144MHz (2m) with stations in Antwerp, Brussels and Ghent. The high spot for Ted was making his first teleprinter contact with DL1EBQ in Solingen, just short of 500km. "It was his 3rd contact with a G station on RTTY so we were both happy with the outcome," said Ted. From Luxembourg, the signal of LX1JA was peaking 579 at Ted's QTH but each time he tried to call him, Ted's 20W signal was clobbered by the high power stations. Recently Ted changed his RTTY printer gear for a Commodore 64 computer and RTTY interface.

Between December 15 and January 14 the RTTY sections of the 3·5, 7 and 14MHz bands were reasonably active. Although 21MHz (15m) was dead for most of the time it did open suddenly at 0845 on December 23, and in about 10 minutes I copied TR8DX, ZS6APH and 9H4C, without which my score on that band for the month would have been 3 countries, G, LZ and 5N. The count on the other bands was much better as can be seen by the lists in Fig. 1.

"I did manage to copy LU1NH in RTTY, but very little of any other DX,

Country	Prefix	Band (MHz) 3·5	7	14	21
Andorra	C3			X	
Austria	OE		X	X	
Balearic Is	EA6			X	
Belgium	ON	X			
Bulgaria	LZ				X
Canary Is	EA8			X	
Ceuta & Melilla	EA9			X	
Channel Is	GJ/GU	X			
Czechoslovakia	OK			X	
Denmark	OZ	X			
England	G	X	X		X
Finland	OH			X	
France	F	X	X	X	
Gabon	TR				X
Germany	DJ	X	X	X	
Greece	SV			X	
Holland	PA	X	X	X	
Hungary	HA			X	
Ireland	GI/EI		X	X	
Italy	I		X	X	
Malta	9H4			X	X
Nigeria	5N				X
Norway	LA	X		X	
Poland	SP			X	
Portugal	CT1			X	
Rumania	YO			X	
Sardinia	IS			X	
Sicily	IT9			X	
South Africa	ZS				X
Spain	EA		X	X	
Switzerland	HB9		X	X	
Sweden	SM	X	X	X	
USA	W/N			X	X
USSR	UA/UB/UT			X	
Yugoslavia	YU			X	

Fig. 1

the best being DJ8YV/EA8 and N8EDI/4X," wrote **Peter Lincoln** BRS42979, Aldershot, on January 15 who also logged 9H1CD and HB0AWQ, which are fairly rare stations for him. Among the two-way local QSOs I copied were from France F2KA/F6EQU, Italy I2EOW/I5JXE, Northern Ireland GI4OCL/GI4VIV and in England, Bill Yeo G2CVY, taking part in a RAFARS contest, and Stan Chrees G3DZW.

On the subject of contests, we congratulate P. E. Whatton G4DCV and

C. Le Tissier GU4YMV and Erik Alderweireldt ON1UI/A and J. Perkins G4IVV/A, on taking the first and second places respectively in the single- and multi-operator sections of BARTG's Autumn RTTY Contest. The organisers received 22 entries from the single operators and 13 from multi-operators and one s.w.l., N. Henbrey BRS28198, who logged 36 QSOs with a PE his best DX. During the event 180 Gs, 7 GWs, 13 PAs, 16 Fs, 13 Ds, 1 GM, 10 ONs, 2 GUs, 1 LX and 1 GJ were known to be active. The best way to gain experience with RTTY is to take part in a BARTG contest, so keep a watch on all bands, 3·5 through 28MHz between 0200 on March 23 and 0200 on the 25th for activity during the Spring RTTY Contest. Then for v.h.f. enthusiasts, the Spring VHF/UHF RTTY Contest will be held on the 144, 430 and 1296MHz bands between 1800GMT on April 13 and 1200 on the 14th with a compulsory 4-hour rest period. This event is open to licensed amateurs within Zones 14 and 15 who are permitted to use RTTY as a mode of communication and of course s.w.l.s, whose logs are always welcome. Further details from BARTG contest manager, Peter Adams G6LZB, 464 Whippendell Rd., Watford, Herts, WD1 7PT, to whom completed logs should be sent by May 18.

Letters

Yaesu FT-980

Sir: Thank you for a very interesting review of the FT-980 (*PW*, May 1984). As an owner of an FT-980 for over a year, I can confirm the delight of the operating facilities and excellent performance of this rig. Reviewers, like yourself, have, however, criticised one feature of the FT-980, namely the apparent inconvenience that having selected operating conditions from memory (MR) it is not possible to change the mode, although it is possible to shift the frequency using SHIFT. Although this is strictly the state of affairs, I should like to point out a way which is in fact mentioned, albeit in passing, in the user manual in the last paragraph of page 31.

The procedure is simply this. When the TAB ON/OFF button is pressed, whether in VFO or memory mode, control is transferred to the VFO. Thus, the current operating frequency is not changed, but the mode immediately comes under the control of the front panel switch and can be changed. Of course, since the TAB function is designed to make sure that one does not operate outside the limits which one selects by the lower and upper TAB settings, to make this transfer of control to VFO work over the full frequency coverage of the set, it is necessary to set the lower and upper TAB values to the lowest and highest frequencies of the set on both HAM and GENERAL VFOS, say 10kHz to 29·9999MHz. Of course, if the need to transfer control to VFO is only in one band, then the TAB limits can be set just for that band. For ease of general use I set the TAB limits to the extreme range of the set.

I hope this description may be useful to other FT-980 users who may have missed this point and have felt frustrated, like yourself, by the apparent deficiency in the design.

David E. Bowyer G3NHB,
Trumpington, Cambridge.

Can You Help?

We regularly receive letters from readers seeking information, circuit diagrams, sources of spares etc. for a variety of electronic equipment, and where possible we reply direct to them. However, in some instances our search will prove fruitless, so we would like to ask fellow enthusiasts if they can help. Brief details of some of the requests are listed:

Heathkit Type V–7A/UK or 1M–18U Valve Volt Meter, require service manual. *F. Constance GM6KWG, 37 Riddochhill Road, Blackburn, Bathgate, West Lothian.*

Decca Colour TV—Serial No. CS 2032, require service manual or list of all valve types. *J. R. Cooper, 25 Lilac Lane, Great Wyrley, Walsall WS6 6HQ.*

CR100/B28, require service manual, circuit diagram or connector details. *R. Hughes, 43 Naylor Road, London N20 0HE. Tel: 01-445 7093.*

Heathkit GR–9900 12in TV, require IC101 type SN76544 (part No. 442/108) and IC102 type SN7600 (part No. 442/104). *R. C. Armstrong, 1 Chestnut Drive, Holme-on-Spalding-Moor, York YO4 4HW.*

Tektronix 502A Dual-beam Oscilloscope, require service manual or circuit diagram. *J. A. Skidmore, 19 Almondbank Terrace, Edinburgh EH11 1SS.*

Jason J2–10 Mk2 Amplifier, require service manual, circuit diagram or any help at all. *M. A. Eldin, 8 Sutcliffe Close, Stevenage, Herts. SG1 5PJ.*

Eddystone EC10, require handbook, circuit diagram and battery holder. *M. Mickels, 3 Gorlas, North Cornelly, Bridgend, Mid-Glam. Tel: (0656) 745527.*

Sinclair PDM 35 Digital Multimeter, require instruction book and some spares. *J. Ward, Ashfield, Bargates, Leominster, Herefordshire HR6 8QX.*

Taylor Model 45c Valve Tester, require operators manual. *K. Shambler VK2ZIQ, P.O. Box 916, Orange, N.S.W. 2800, Australia.*

Require circuit diagram or connection information on the a.m./n.b.f.m./s.s.b. i.f. unit type IF20 as advertised by ESE in *PW* in 1979. *W. Forsyth, Aldernaig, Avoch, Ross & Cromarty.*

Exhibition Operating

Sir: Members of the general public with minimum knowledge of amateur radio must be completely bemused by what they hear at exhibition stations holding special event callsigns. A combination of radio-ese and too frequent use of the Q-code must make it all sound so much gobbledegook. In any case, the kids today all rush round yacking into the mikes of their portable CB-rigs. To the man-in-the-street it's all very old-hat, but he is still intrigued with the use of Morse code. So why not use c.w. at GB stations in the future?

Douglas Byrne G3KPO
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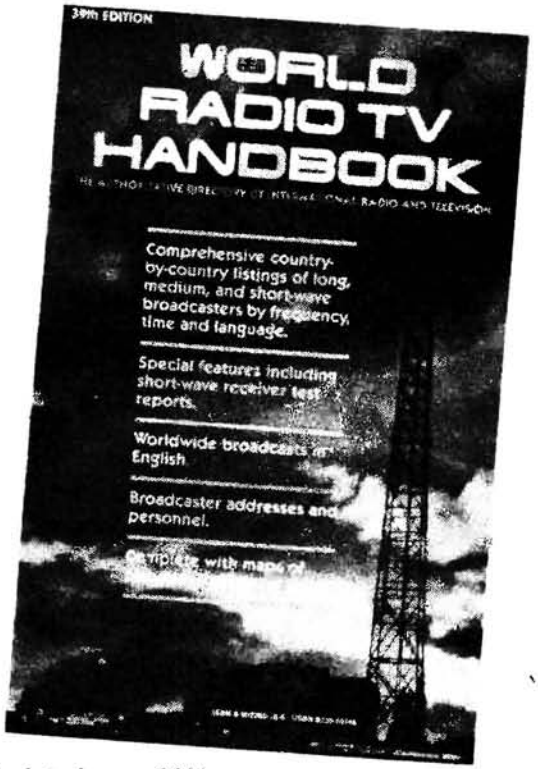

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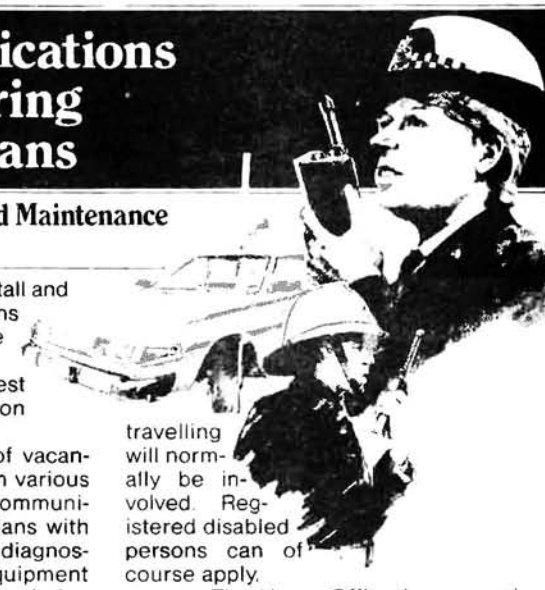

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