PRACTICAL WIRELESS

PW

THE RADIO MAGAZINE

BUILD

- A DESK MICROPHONE

FEATURES

- THE DAYTON HAMFEST - An American Adventure
- ANTENNA CLINIC
- PACKET RADIO UPDATE
- VALVE CHARACTERISTICS & TECHNOLOGY
- COMPETITION
- AND LOTS MORE!

Reviewed This Month

- The Wavecom W 4010 High Performance Decoder/Analyser

AUGUST 1990
£1.60

ISSN 0141-0857

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A high-performance HF rig . . . with a great receiver and full-power transmitter. Light in weight and low in price.

This is Yaesu's FT-747GX.

Whether you're a beginner or a veteran, it's a great way to start. And a great way to go.

DX ready. The 747 packs a full 100-watt RF punch on 160 to 10 meters, with continuous receive from 100 kHz to 30MHz.

And its control panel is refreshingly simple. So you can hop around the band *fast* to nail those DX stations. While other guys are warming up their amplifiers, you can be working the DX!

Multimode versatility. The FT-747GX is ready to go on LSB, USB, CW, and AM. With provision for the FM-747 FM unit.

You get 20 memories to store frequency and mode. Dual VFOs with split frequency operation for DX-pedition work. And manual band scan plus auto-resume memory scan via the microphone up/down buttons.

Great receiver. Utilizing a directly-driven mixer, the FT-747GX receiver features superb overload protection. You also get factory-installed narrow CW *and* AM filters. A one-touch noise blanker. All-mode squelch. RIT. And a 20-dB attenuator for local QSOs.

Lightweight construction. Housed in a metallized high-impact plastic case, the FT-747GX weighs in at about 7¼ pounds! With the loud-speaker mounted on the front panel for maximum audio transfer. And internal heatsinking for the transmitter, rated at full power for FM, packet, RTTY, SSTV, and AMTOR when used with a heavy-duty power supply.

Available options. FC-1000 or FC-757AT Automatic Antenna Tuners. FL-7000 500-watt Automatic, Solid-State Linear Amplifier. TCXO-747 Temperature-Compensated Crystal Oscillator. FAS 1 4R Remote Antenna Selector. FRB-757 Amplifier Relay Box. FP-700 Standard Power Supply. FP-757HD Heavy-Duty Power Supply. MMB-38 Mobile Mounting Bracket. MH-1B8 & MD-1B8 Microphones.

Discover the price/performance leader. Check out Yaesu's low-cost FT-747GX at your Yaesu dealer today. Because now, Yaesu puts priceless DX into *your* price range.

South Midlands Communications Ltd
S.M. House, School Close,
Chandlers Ford Industrial Estate,
Eastleigh, Hants SO5 3BY
Tel: (0703) 255111
UK Sole Distributor

YAESU

Fill your logbook. Without emptying your pocket.

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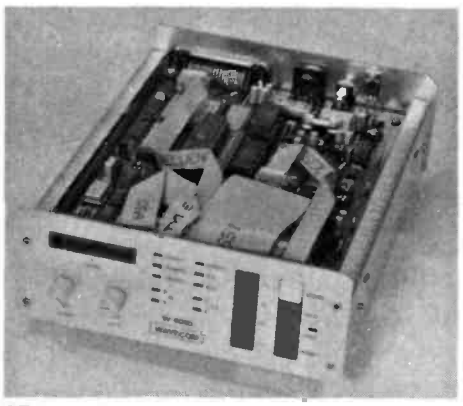

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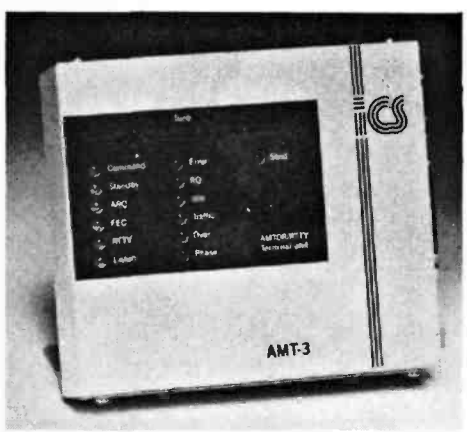

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Regular Features

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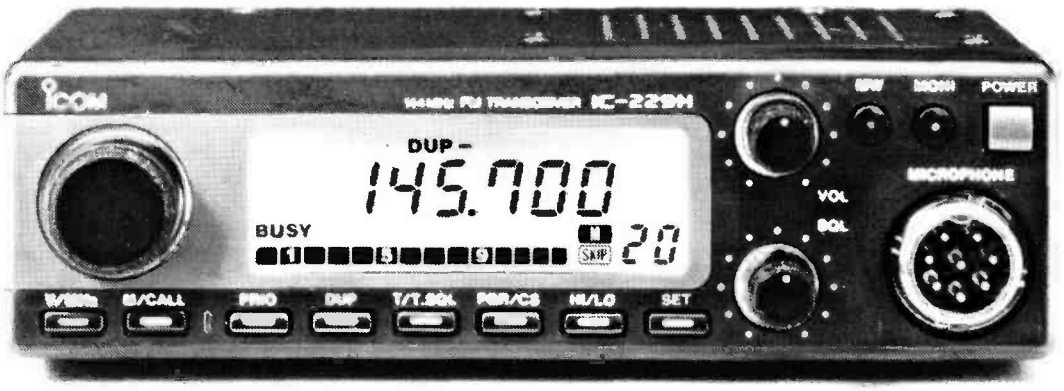
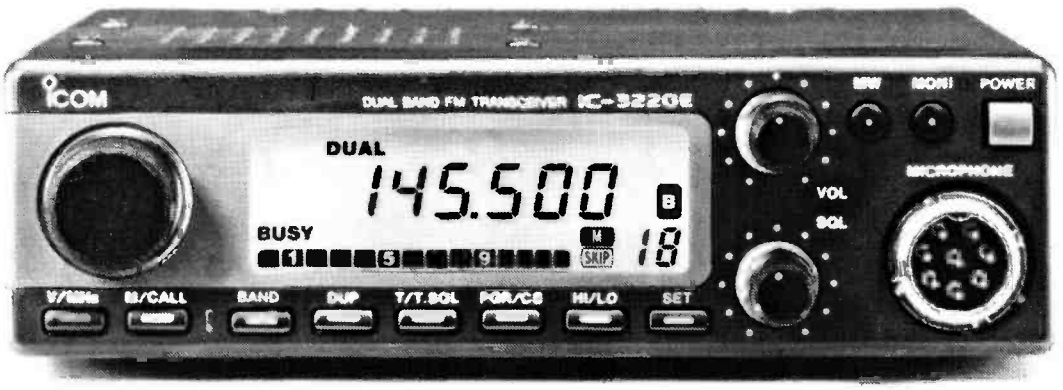
Count on us!

NEW MOBILES



IC-229E/449E
2M, FM Mobiles



IC-3220E
Dual-Band
Mobile

Icom have built a range of ultra compact FM mobile transceivers. Similar in style, easy to operate and perfect for driving safety. Advanced features include a variety of tuning steps, memories, scan functions, adjustable R.F. power, optional pager and tone squelch units for selective calling. All these models include the HM-59 hand microphone with up/down and 1750Hz tone call for repeater operation. The unique simple operation enables each function to be operated with one switch. Illuminated switches and controls give complete night time operation.

IC-229E VHF Mobile. This VHF 25 watt transceiver measure just 140(w) x 40(h) x 105(d) mm. No need to worry about installation, its small enough to fit most vehicles. Also available the IC-229H 50 watt version where extra high power is required.

IC-449E UHF Mobile. High sensitivity with GaAs FET's and 35w output power provide optimum performance with this UHF transceiver. 20 Memory channels and a programmable call channel can be used to store most used frequencies.

IC-3220E Dual Band Mobile. Enjoy complete dual-band operation. In addition to cross band duplex operation this transceiver can receive both MAIN and SUB bands simultaneously. One of the smallest dual-band mobile transceivers available, the IC-3220E has a 25 Watt output on both bands. Where higher power is required the IC-3220H offers 45 watts on the 144MHz band and 35 watts on the 430MHz band.

Helpline: Telephone us free of charge on **0800 521145** Mon-Fri 0900-13.00 and 14.00-17.30. This service is strictly for obtaining information about or ordering Icom equipment. We regret this cannot be used by dealers or for repair enquiries and parts orders, thank you.
Datapost: Despatch on same day whenever possible.
Visa & Mastercards: Telephone orders taken by our mail order dept. instant credit & interest-free HP.

SMC South Midlands Co

SCHOOL CLOSE, CHANDLERS FORD IND. EST., EASTLEIGH, HA

NEW FROM YAESU THE FT650

The FT650 is the latest in a long line of acclaimed 6m transceivers from the Yaesu factory. Designed and built using the latest modular construction techniques and components to give great performance in a compact, easy to use package.
The transceiver covers from 24-60MHz continuous on receive and 12, 10 and 6m bands on transmit, with a full 100W output, ideal for all DX operators.

MAIN SPECIFICATIONS/FEATURES

- ★ 24-60MHz Receive Coverage
- ★ 10, 12 and 6m Transmit Coverage
- ★ 100W PEP output (25W Carrier, AM)
- ★ LSB, USB, AM, FM, & CW Operation as standard
- ★ Optional internal 240V AC Power Supply
- ★ DVS-2 Digital message storage option
- ★ 99 memories
- ★ Programmable TX Offset

OPTIONS

FP-22 Internal 240V AC P.S.U.
DVS-2 Digital Message Storage Unit
XF455m CW Filter 600Hz

AROUND £995

The Best of The Best — the FT1000

Designed with no spared effort or expense for optimum performance and operability, the FT-1000 is the fruit of over 25,000 man-hours of intensive research and development by Yaesu's top design engineers. Instead of merely offering incremental improvements on existing designs or adding bells and whistles to an old model, the FT-1000 project involves a wholly new approach to the application of the latest digital and RF technologies to today's most demanding needs on the hf bands. Extensive surface-mount component technology allowed six microprocessors and five Direct Digital Synthesizers to be harmoniously integrated with a simple operator interface into a highly reliable full-featured transceiver optimized for serious hf applications.

ADDITIONAL FEATURES

Other features include adjustable IF width, IF shift, IF notch and APF controls. AGC presentable for fast, medium and slow + defeat, on/off selectable, preamp + adjustable attenuator −6dB, −12dB, −18dB, Adjustable — mic gain, RF power o/p, processor and drive controls. Built in electronic keyer with adjustable speed control. Twin independent frequency displays with mode indication + much more.

BRIEF SPECIFICATIONS

- ★ General Coverage Receiver 100kHz-30MHz
- ★ Ham bands TX 160-10m
- ★ Modes CW, USB, LSB, AM, FM, RTTY and Packet
- ★ VFO steps 10Hz CW, SSB, RTTY, 100Hz, AM, FM, PKT
- ★ Auto antenna impedance range 16.7 to 150 ohms
- ★ Selectable receiver band widths 2.4kHz, 2kHz, 500Hz, 250Hz
- ★ Dual band receiver tuning and monitoring with balance control
- ★ Power output up to 200 watts P.E.P. 50W AM
- ★ Sensitivity preamp on SSB/CW 0.25 micro volts 10dB S/N
- ★ D.D.S. Direct Digital Synthesiser
- ★ Dual Selectable noise blankers with adjustable threshold
- ★ 99 memories

OPTIONS

SP5	external L/S with audio filter
DVS-2	Digital Voice message storage system
BPF-1	Sub VFO filter unit
YH-77ST	Headphone for stereo or mono dual receive
TCXO-1	High Stability oscillator unit

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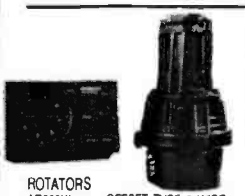
VISA

SOUTHAMPTON SHOWROOM open 9.00-5.00 Monday to Friday, 9.00-1.00 Saturday. Service Dept open Mon-Fri 9.00-5.00.

SMC South Midlands Communications Ltd.

ROTATORS



Superb engineering standards combined with pin sharp setting accuracy means new technology from Yaesu create Kenpro Hygain.

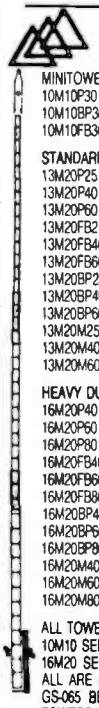
ROTATORS		
AR200XL	OFFSET TYPE 3 WIRE	£49.50
G-250	BELL TYPE TWIST/SWITCH CONTROL	£78.00
G-400	BELL TYPE METER CONTROLLER	£139.00
G-400RC	BELL TYPE ROUND CONTROLLER	£169.00
G-600RC	BELL TYPE ROUND CONTROLLER	£219.00
T2X	BELL TYPE METER CONTROLLER	£499.00
G-800SDX	BELL TYPE 450 DEG VAR. SPD	£325.00
G-1000SDX	BELL TYPE 450 DEG VAR. SPEED	£368.00
G-2000RC	BELL TYPE ROUND CONTROLLER	£445.00
G-500	ELEVATION METER CONTROLLER	£149.95
G-5400B	AZIMUTH/ELEV DUAL CONTROL	£375.00
G-5600B	AZIMUTH/ELEV DUAL CONTROL	£435.00
RC5-3	BELL TYPE PRESET	£275.00
RC5-1	BELL TYPE ROUND CONTROLLER	£219.00
RC5A-3	BELL TYPE VAR. SPEED AND PRESET	£425.00
RC5B-3	BELL TYPE VAR. SPEED AND PRESET	£675.00

ROTATOR HARDWARE		
AR200AB	ALIGNMENT BEARING AR200XL	£17.50
KS505	ROTARY BEARING 1½" MAST	£19.95
GS-065	ROTARY BEARING 2" MAST	£29.95
GC-038	LOWER MAST CLAMP G-400, 600 etc	£16.95
9523	CHANNEL MASTER BEARING	£19.95
CK46	ROTARY BEARING 1.5–2.5 MAST	£34.95
MC1	LOWER MAST CLAMP RC5 SERIES	£25.00

ROTATOR CONTROL CABLE		
RC5W	5 WAY G-400RC, 800, 1000SDX PER MTR	£0.48
RC6W	6 WAY G-250, 400, 600, RC KR500 PER MTR	£0.66
RC8W	8 WAY HAMIV, T2X 2000RC RC SERIES PER MTR	£0.72

CARRIAGE:
ROTATORS FREE, ROTATOR HARDWARE £2.85, ROTATOR CABLE £3.50 UP TO OVER 20 MTS, OVER 20 MTS £5.00.

STRUMECH VERSATOWER



MINITOWER 10M10 Series		
10M10P30	30FT POST MOUNT	£530.76
10M10BP30	30FT BASE PLATE MOUNT	£562.11
10M10FB30	30FT FIXED BASE MOUNT	£522.49

STANDARD 13M20 SERIES		
13M20P25	25FT POST MOUNT	£458.85
13M20P40	40FT POST MOUNT	£646.30
13M20P60	60FT POST MOUNT	£761.30
13M20FB25	25FT FIXED BASE MOUNT	£317.40
13M20FB40	40FT FIXED BASE MOUNT	£481.85
13M20FB60	60FT FIXED BASE MOUNT	£596.85
13M20BP25	25FT BASE PLATE MOUNT	£541.65
13M20BP40	40FT BASE PLATE MOUNT	£750.95
13M20BP60	60FT BASE PLATE MOUNT	£845.25
13M20M25	25FT MOBILE TOWER	£2179.25
13M20M40	40FT MOBILE TOWER	£2387.40
13M20M60	60FT MOBILE TOWER	£2557.60

HEAVY DUTY 16M20 SERIES		
16M20P40	40FT POST MOUNT	£802.70
16M20P60	60FT POST MOUNT	£910.80
16M20P80	80FT POST MOUNT	£1426.00
16M20FB40	40FT FIXED BASE MOUNT	£644.00
16M20FB60	60FT FIXED BASE MOUNT	£763.60
16M20FB80	80FT FIXED BASE MOUNT	£1219.00
16M20BP40	40FT BASE PLATE MOUNT	£851.00
16M20BP60	60FT BASE PLATE MOUNT	£952.20
16M20BP80	80FT BASE PLATE MOUNT	£1530.65
16M20M40	40FT MOBILE TOWER	£2847.40
16M20M60	60FT MOBILE TOWER	£2967.00
16M20M80	80FT MOBILE TOWER	£3680.00

ALL TOWERS EXCEPT MOBILES ARE AVAILABLE FROM STOCK. 10M10 SERIES SUPPLIED WITH STANDARD WINCHES. 13M20 & 16M20 SERIES ALL SUPPLIED WITH AUTO BRAKE WINCHES. ALL ARE SUPPLIED WITH H2R HEAD UNIT DRILLED TO TAKE GS-065 BEARING. HOLDING DOWN BOLTS FOR BP AND FB TOWERS ARE AVAILABLE AT £28.75 PER SET EXTRA.

ALTERNATIVE WINCHES AND HEAD UNITS ARE AVAILABLE AT EXTRA COST.
DELIVERY IS BY QUOTATION DEPENDENT UPON DISTANCE.

MORSE KEYS

MORSE KEYS			p.p.
HK702	STRAIGHT KEY	£42.75	£1.75
HK703	STRAIGHT KEY	£49.69	£1.75
HK704	STRAIGHT KEY	£26.35	£1.75
HK705	STRAIGHT KEY	£26.25	£1.75
HK706	STRAIGHT KEY	£28.95	£1.75
HK707	STRAIGHT KEY	£25.49	£1.75
HK708	STRAIGHT KEY	£26.45	£1.75
HK710	STRAIGHT KEY	£41.75	£1.75
HK711	STRAIGHT KEY KNEE MOUNTING	£41.75	£1.75
BK100	MECHANICAL BUG	£41.45	£2.00
MK701	SINGLE LEVER PADDLE	£38.35	£1.75
MK702	SINGLE LEVER PADDLE	£41.50	£1.75
MK703	SQUEEZE KEY	£37.00	£1.75
MK704	SQUEEZE KEY	£24.99	£1.75
MK705	SQUEEZE KEY	£32.78	£1.75
MK706	SQUEEZE KEY	£35.00	£1.75
HK802	DELUXE BRASS KEY	£99.95	£2.50
HK803	DELUXE BRASS KEY	£89.95	£2.50
HK804	DELUXE BRASS KEY	£95.00	£2.50

MORSE EQUIPMENT			
KP100	SQUEEZE KEYER	£109.25	£2.50
DEWSKEYSTD	STAR MASTER KEYER	£54.69	£2.50
DEWSKEY M	STAR MASTERKEY MEMORY	£94.99	£2.75
D70	MORSE TUTOR	£63.40	FOC

DATA TERMINAL		
PK232/MAIL	MULTIMODE DATA TERMINAL C/W Mail Drop	£319.95
PK88	HIGH GRADE PACKET TU	£129.95

COMET & HOKUSHIN ANTENNAS

New from Hokuskin, an exciting range of high performance antennas, the WX1 has been a best seller for some time now, available are its bigger brothers the WX2 and WX4. Both are multi section 2m/70cm colinears and the mechanical construction the best we have seen yet. On the mobile front a new mini dual band mobile, the HS-727SS, very similar to the Comet CHL21J, and tests with our network analyser confirm its compatibility with our existing range of gutter and mag mounts. Also available a low profile hatchback mount and cable, the SS-B1, two new dual band antennas, the very slim VM-720SKR and the compact HS-727VMS. Both are suitable replacements for the 70N2M. For the HF enthusiasts a compact 10m HB9CV dual driven element antenna that is extremely light and very cleverly constructed.

WX2	WX4	HS-727SS	28HS-2HB
VHF/UHF Base	VHF/UHF Base	VHF/UHF Mobile	10m 2 ele HB9CV
144/432MHz	144/432MHz	144/432 mini	Dual driven element
6/8dB gain	7.8/10.8dB gain	1/4 5/8 wave	6dBi gain
200W max	200W max	100W max	500W PEP max
£75.00	£99.00	£16.95	£65.00

MOBILE ANTENNAS

2QW	2m 1/2 wave	£4.95
2NE	2m 5/8 wave folding	£13.25
78B	2m 7/8 wave	£15.00
78F	2m 7/8 wave folding	£21.50
88F	2m 8/8 wave	£24.10
258	70cm 2 x 5/8	£29.37
358	70cm 3 x 5/8	£33.73
268E	70cm 2 section colinear	£32.80

DUAL BAND MOBILE

CHL21J	Mini dual band mobile	£14.95
CHL23J	Small dual band mobile	£16.90
CA2X4KG	2m 2 x 5/8 70cm 4 x 5/8	£39.95
CA2X4MB	2m 4.5dB 70cm 7.4dB	£37.75
HS-727SS	Dual band mini antenna NEW	£16.95
HS-727VMS	2m 1/2 70cm 2 x 5/8 NEW	£25.95
VM-720SKR	2m 1/2 70cm 2 x 5/8 NEW	£24.95

DUAL BAND BASE ANTENNAS

WX1	2m/70cm colinear	£54.99
WX2	2m/70cm colinear	£75.00
WX4	2m/70cm colinear, high gain	£99.00
CA2X4WX	2m/70cm colinear	£79.00
CA2X4MAX	2m/70cm colinear, high gain	£99.95
CF416MN	Duplexer 1.3-500/400-540MHz	£25.50
HS7900N	Duplexer Mess 1.6-150/410-460MHz	£25.50

ANTENNA MOUNTS

GCCA	Gutter mount and cable	£14.25
HDTMCA	S/S trunk mount and cable	£19.50
SOMM	Mag mount and cable	£12.75
TBR	S/S hatch back mount NEW	£11.25
RS17	Mini hatch back mount NEW	£12.50
RS16	Mini gutter mount NEW	£12.50
SS-B1	Mini back mount & cable NEW	£26.50
CK-3LX	Cable assembly for RS16, 17, TBR	£19.95

CARRIAGE BASE ANTENNA £7.50, MOBILE ANTENNAS £4.00, CABLES AND MOUNTS £3.50

SUMMER SPECIALS

70CMS HANDHELD BARGAIN OFFER

BRAND NEW EX COMMERCIAL HANDHELDS FOR USE ON 70CMS 6 CHANNEL CRYSTAL CONTROLLED

ONLY £99 inc. NICAD (Charger & Crystals Extra)

Carriage on Transceiver £2.75

88F	8/8 wave 2m antenna	£18.00	144/17T	2m 7 ELE YAGI	£23.68
SQ144	2m Swiss quad	£65.00		2m 14 ELE YAGI	£46.20
78B	7/8 wave 2m Ball Mount Ant	£15.00	144/19T	2m 19 ELE YAGI	£55.28
GP23	3 x 5/8 wave 2m Base Ant	£45.00	432/17X	70cms 17 ELE CROSS YAGI	£48.64
50/5	5 ELE 6m YAGI	£51.52	50/2	2 ELE 6m YAGI	£27.52
JO110	PWR METER 1.5-150	£12.50	50/3	3 ELE 6m YAGI	£34.36

Carriage on antennas £5.50

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LEEDS (0532) 350606
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21-400

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Tel: 0922 710000

JUPITER RANGE

MVT5000	25-1300Mhz handy	275.00
JUP1	Case & belt hook	9.95
JUP2	DC cigar lead	4.95
JUP3	Set of 4 nicads	6.00
JUP4	Mains adapter	14.50
DA900	Flexible antenna	9.00
MVT6000	Base/Mobile Rx	345.00

ALINCO

DR110E	2m fm 45W mobile	269.00
DR410E	70cms fm 35W mobile	299.00
DR510E	2m/70cm mobile	399.00
ALX2E	2m micro handy	149.00
EBP3N	NiCad 450 mAh7.2V	28.95
EBP2N	NiCad 160 mAh7.2V	23.00
EDH10	DC to DC ALX2E	16.95
ESC5	Case/belt clip	14.00
DJ120E	2m handy tevr	179.00
DJ160E	Extended rx	219.00
DJ500E	Dualband hand	315.00
EBP9NAZ	Nicad 7.2V 500mAh	35.95
EBP6NAZ	Nicad 9.6V 450mAh	29.95

AZDEN

PCS6000	2m mobile	299.00

DIAMOND/REVEX

L20	15-50w load PL259	15.95
L20N	15-50w load "N"	22.95
SX100	Vswr 1.6-60 MHz	95.00
SX200	Vswr 1.8-200 MHz	65.00
SX400	Vswr 140-525 MHz	79.00
SX600	Vswr 1.8-525 MHz	119.00
SX1000	Vswr 1.8-1300 MHz	159.00
P300	30 Amp psu	149.00
W510	Vswr 1.6-30 MHz	79.00
W520	Vswr 1.8-200 MHz	59.95
W540	Vswr 140-525 MHz	63.00
W544	Vswr 140-460 MHz	119.00
W570	Vswr 1.8-1300	119.00
S20	Switch 1kW SO239	26.95
S20N	Switch 1kW "N"	45.00
rodD24N	With "N" & PL259	26.95

DIAMOND ANTENNAS

CP4	10-40m vert	149.00
CP5	10-80m vert	189.00
D130N	Disc. 25-1300 MHz	82.00
X50	2m/70cm base	59.95
X500	2m/70cm base	129.00
CP22J	2m 6.5dB	49.95
EL770H	2m/70cm whip	30.00
NR72M	70cm 5.5dB pL259	24.00
M285	2m 5/8th PL259	14.95
EL2E	2m 7/8th PL259	32.95
RH702B	70cms gain BNC	26.00
DP-GL	Gutter mount	10.00
EC-H	PL259 cable kit	8.00
SPM	Mag. mount	23.95
TRA	Boot mount	26.95
D505	Mobile 1.5-1300 MHz	69.00
D707	Base 1.5-1300 MHz	99.00
MB100A	Low pro. mt. TNC	39.00
MA1100	2m/70cm whip TNC	26.00
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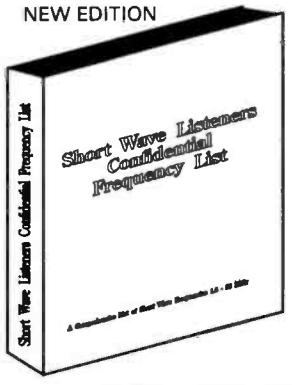

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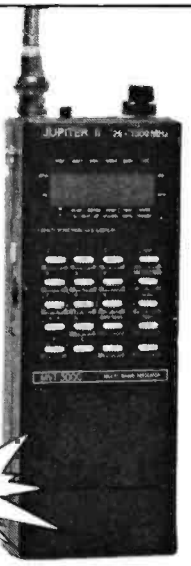

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150 Watts. Rated up to 150 watts, the IsoLoop transmits and receives on any frequency between 14 to 30 MHz. When mounted with the loop in the horizontal plane, the radiation pattern is omni-directional and horizontally polarized, with the gain of a dipole. Maximum radiation is at low angles which is ideal for DX operation. The IsoLoop may also be mounted with the loop in the vertical plane to provide a null in a desired direction. Tuning is provided by a precision stepper-motor and a small remote control box, the LC-1.

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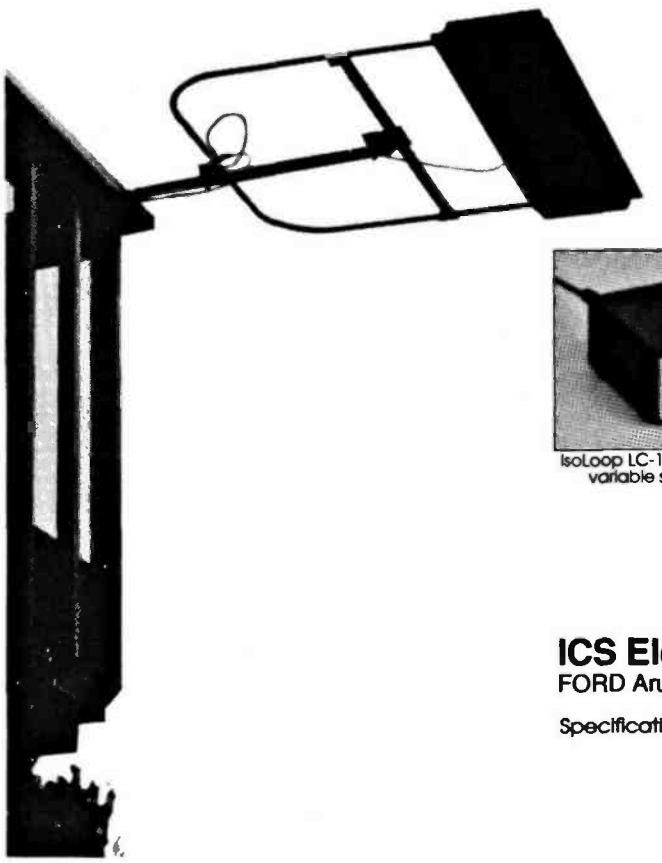
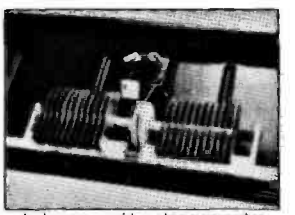


Compact. The IsoLoop is square, with rounded corners, and measures 32 inches on a side and weighs only 12 pounds. It packs down to only half this size for transportation. Because of the IsoLoop's small size, it makes a perfect attic or balcony antenna. It's also excellent for portable operation, recreational vehicles or camp-site use. A rotator is not necessary when used in the omni-directional, horizontally polarized mode.



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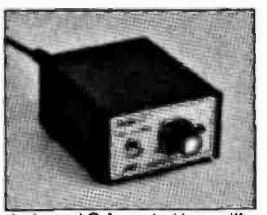

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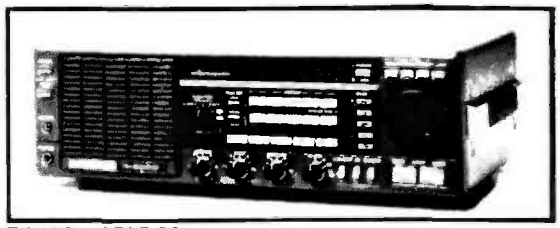

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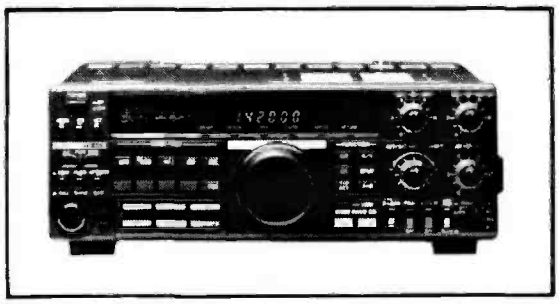

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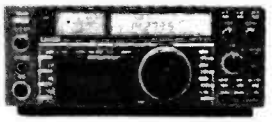

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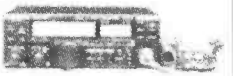

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Keylines

The modern radio enthusiast faces many hazards when enjoying the hobby. In my opinion the worst hazard has got to be the old problem of interference, or to use modern terminology, electromagnetic compatibility (e.m.c.).

When I was first licenced the most troublesome area for interference was television. Band I 405 line television was still very much with us.

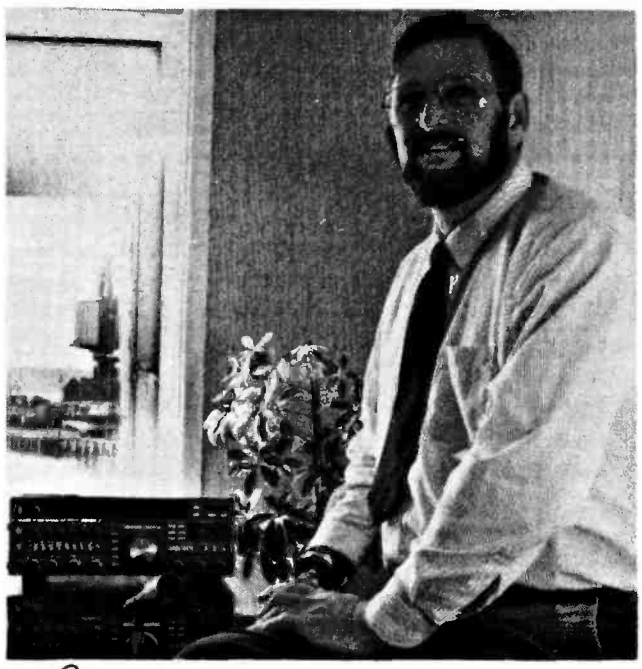
The presence of many old television receivers - 'looking' through my antennas, limited my radio activities. Fortunately, in those days television hours were strictly limited and I could get 'on air' during the day when I was at home.

Listeners' Reaction

Interference is not a recent problem. In the early days of the BBC radio service, their chief engineer pleaded with listeners not to advance the reaction control so that the receiver would oscillate. The simple receivers of those days were quite capable of re-radiating on the frequency they were tuned. When you bear in mind that they were usually connected to a large external antenna, you can imagine the amount of interference that could be generated by only half a dozen receivers!

The problem became so bad that the BBC Chief Engineer, Captain Ekersley, became known as "Please don't do it" Ekersley because of his plaintiff and often repeated requests!

The problem is still with us but it has (in my mind) turned a full circle! Nowadays the radio enthusiast faces a barrage of interference from other sources. Computers, television receivers, radio telephones, cordless 'phones, microwave cookers and a host of other domestic appliances all seem to provide interference to reception and transmission.



Rob Mannion G3XFD

There was a time when neighbours would knock on your door at the first sign of TVI. Nowadays the problem now works the other way round. Radio enthusiasts as a group now seem to suffer from more interference than they have ever produced.

I've no doubt that many readers experience the same reception problems as I do. Wherever you are, you cannot (so it seems!) avoid the problem of interference, especially from computers. Even while living in the north-west of Scotland we still had r.f. interference from computers. The computer 'hash' carried for miles via the overhead 11kV power lines.

At my present QTH the biggest problem is definitely r.f. noise from computers. The family home is in an older development - almost in the countryside - and the houses are well spaced - but the 'hash' is still there. Even with a good quality Band II externally mounted v.h.f. antenna, radio reception is often spoilt by the multitude of signals being radiated in the area.

Another, comparatively recent problem has arisen with the introduction of car cellular radio-telephones. The equipment fitted in cars to provide the service does not (as far as I'm aware) usually cause interference, but can, so I've just discovered, be affected by transmissions from a nearby amateur radio station.

It was while I was parked in a roadside lay-by deep in the Dorset countryside, busily chatting away on 144MHz that I inadvertently caused interference to a cellular-'phone user. He was parked within 100m and my transmissions caused disconnections. The driver quickly related his lost calls to my activity and we were soon discussing the problem in an amicable way.

Despite the friendly conversation I left my favourite location (it always seems to provide a good take-off for QSOs down into the West Country and to the north) with many doubts in my mind. The chief worry on my mind as I drove away was, have we lost yet another area where the possibility of interference becomes of less concern?

What can we do about the interference? In a devilish moment I thought perhaps it might be a good idea for sufferers to approach the source of the interference and suggest they switch off!

To be serious again, I've no doubt that my humorous suggestion would not go down very well with computer enthusiasts. Radio amateurs are well and truly outnumbered by the computer fraternity - and I'm not forgetting that many of us have a foot in both camps!

We can tackle part of the problem ourselves. Recently for example, Peter Rouse GU1DKD, provided a lot of useful information in his article 'Taming Computer Hash' (July 90 *PW*) to reduce interference.

Difficulties Next Door

Unfortunately, although we can tackle radiation problems on computers and other digital equipment in our home and shack, it's difficult when the problem lies next door. People don't seem too keen to cover their brand new, expensive, computing equipment with bonded aluminium or copper foil for some reason!

Perhaps the answer lies in the return to metal rather than plastics housing for computing gear. Many of the more expensive and 'professional' designs are leading the way in this respect. Fortunately, where some lead - the majority will follow sooner or later.

It's also a sad fact that many synthesised receivers 'deafen' themselves with their own noise. This designer's headache is compounded by the very compact equipment we prefer today. It takes a very competent engineer to design and build an efficient receiver and screen it from internally generated r.f. noise. Maybe we're shooting ourselves in the foot by making receivers that are very 'clever', but which then suffer from internally generated interference.

Environmental Concern

I look forward to the day when TV sets, and the multitude of other equipment in domestic and industrial use does not pollute the radio environment. And thinking along those lines, is it not time that the enormous profits of the various 'public' utility companies should be re-invested to 'clean' up the environment? This could be started by reducing the number of overhead (a potent source of 'hash') medium-voltage power lines in urban areas.

Our environment - and I'm thinking specifically about the radio version now, must be cleaned up. If we don't act now, there'll be so much that our transmissions will be lost under a blanket of noise. Apathy must not rule!

73s DE G3XFD

Receiving You...

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

Dear Sir

Your July editorial touched on the subject of packet radio and the comments that you made prompt me to ask if the mode is sometimes misunderstood.

Packet radio's forte is as a messaging system. Using the packet radio Bulletin Board network it is possible to leave messages for other amateurs to read at their leisure. Messages may be addressed to an individual amateur, or to all amateurs country-wide (even throughout Europe, or the world). It is the fact that the receiving amateurs do not have to be on the air at the moment of transmission that gives packet it's strength. How many times have you called a friend over the air, only to receive no reply because he is elsewhere? With packet you can 'post' a message to him, or leave a message suggesting a 'phone' sked when you'll next be on.

There may be some novelty value to be found in two local amateurs communicating directly via packet, but this is analogous to two people in the same room conducting a conversation by passing scribbled notes to each other - direct verbal contact using s.s.b. or f.m. has far more immediacy and intimacy for such two-way contacts. But, with packet, you can leave messages on a bulletin board for another amateur to read when he comes on the air, you can put out a general plea for help with information or a technical problem, you can circulate a newly discovered mod or tip to others, you can publicise your club meet or special event station, you can put forward your views on aspects of amateur radio, and you can read the wide variety of messages from other amateurs on subjects ranging from DX news to jokes.

"Is it amateur radio?", you asked. Of course it is. Just as RTTY, AMTOR and ATV are all part of the rich variety available to us in the world of amateur radio, so packet has its place. The packet radio message network is a facility that does not exist with other modes of amateur radio and, as such, it complements the existing modes of communication but does not replace them. Many amateurs may feel that they have no need for such a service, or that they do not wish to become involved with computers. Fair enough, then all they need to do is to ignore packet - it won't harm them and apprehensive suggestions that "we shall all return from work to see what DX has been worked by our automated radio station" are amusing but rather unlikely.

Later in your editorial you suggest that packet might be moved to frequencies outside of the amateur bands, and that access would be allowed to all computer users who could afford to buy the equipment. But would you seriously suggest in the pages of *PW* that ATV be moved to frequencies outside the amateur bands and that access should be granted to all Camcorder enthusiasts who could afford it. Of course not! Anyway, I have serious doubts as to whether any non-amateur packet radio service would be allowed but if it were, I am sure that the amateur radio packet radio network would remain to serve the needs of us amateurs.

Through misunderstandings can sometimes come fear. The rapid growth of packet radio in the past few years coupled with an apparent reduction in activity on other modes (particularly on 2m and 70cm) may have caused alarm in those who want nothing whatsoever to do with packet or 'computerised radio'. Such alarm would be further fuelled by new convertees to the packet medium apparently giving up 'normal' amateur radio in order to concentrate on their new-found passion. But this is typical behaviour for amateurs discovering a new mode and many will return to using the more direct modes of communication, whilst still retaining their packet station, when the initial novelty has worn off. Both AMTOR and RTTY have aroused similar passions in the past but, unless we are to allow the discussion to degenerate into a childish "my mode is best" argument, we must recognise the strengths and weaknesses of each different mode and each of us use the ones we enjoy the most.

Packet is not *the* future, but a *part* of the future of our hobby. It may not be everybody's cup to tea, but packet radio has much to offer amateur radio, not just for fun, but also as a useful adjunct to the existing modes. However, packet radio will never replace the excitement of winkling out a piece of choice DX with the key, nor can it ever become a substitute for the intimacy and pleasure of a two-way 'phone conversation with an amateur at the other side of the world.

Phil Spooner G4HFU
South Ruislip
Middlesex

★★★★★STAR LETTER★★★★★

Dear Sir

First of all, congratulations upon a greatly-improved magazine. I find it refreshing to pick up a radio publication which is not obsessed with contests, DX-mania and building high-power linears.

May I also comment on two of your recent editorials. First, last month you were discussing rallies and mentioned that these provided an opportunity of meeting people and also seeing what is on offer at the trade stands. This may be true, but I have found both points to be counter-productive. This is due to the lack of seating accomodation at most of them, and the habit of many amateurs to block the gangways and stand talking in front of the stands, thus preventing others from seeing anything.

I recently visited a large Midlands rally, being in the market for a couple of small items. Due to the points mentioned above however, I found it impossible to see everything on show. Having tired myself out walking round I eventually left earlier than I had intended because the only vacant seats were outside the exhibition hall.

Would it not be a good idea if the organisers arranged chairs around the periphery of the hall for the 'natterers', then those of us who do not know anyone could keep on the move, which those in the body of the hall should do anyway. I am sure the traders would welcome the extra business which might well accrue.

My other point is concerning packet radio. This may well be technical progress, but then so are nuclear missiles, and many of us feel that if we are not careful amateur radio will degenerate into

just another TV game.

Fears are now being expressed over the fact that the number of young people entering our hobby is decreasing, and a similar state of affairs in the USA (I think it was their national chess organisation) prompted a survey, the results of which suggested that youngsters were more interested in computers. Since most classrooms have one of these, I am wondering whether they find nothing attractive in just another keyboard and screen, as opposed to **real** amateur radio.

E. G. Allen G3DRN
London SW20

Editors' reply:

While I still consider that mobile rallies are THE place to find bargains and meet friends, Mr Allen has a valid complaint! Some rallies are so crowded that you feel as if you're in a rugby scrum and extra seating would certainly help you rest after each foray to the most popular stalls. One or two of the bigger rallies and other outdoor events could also benefit from improved toilets as their present facilities are - to say the least - inconvenient!

Rob Mannion G3XFD

Dear Sir

As a sixteen year old 'wireless' enthusiast in 1936, I was an avid reader of *Practical & Amateur Wireless*, which was eventually docked to *Practical Wireless*. I never heard it referred to 'Camms Comic', perhaps that title never got north of Watford.

I do recollect they used to run a weekly competition where there was a blue print (circuit) printed and a fault described. The idea was that you found the fault and sent in your entry. I entered this competition and won on my first attempt. The prize was *sixty tested wireless circuits* by F. J. Camm, but to me seeing my name printed in *Practical Wireless* was a bonus prize.

I always claim that I was born with Wireless 1922. My father was one of the early pioneers of wireless in Sheffield and such was his enthusiasm he had a pedigree wire haired terrier and its show name was 'Grid Bias' and I don't think many of today's readers would have heard that.

I could write reams of the early recollections of wireless, perhaps you may be interested.

P. F. Milton
Stocksbridge, Sheffield

Competition Corner

How many English words of four or more letters can you make up using only the letters in the phrase

RADIATION PROBLEMS

You score one point for words of four to seven letters, two points for words with eight to twelve letters and three points for words containing thirteen or more letters. Plurals do not count as separate words. Words having a radio connotation will score double points. Only words to be found in the *Chambers Concise Dictionary (1989)* will be allowed.

List the words on a separate sheet of paper, complete the form below, including the points total claimed and send **both the list and the form** to: **Practical Wireless Magazine, How Many Words Competition August, Enefco House, The Quay, Poole, Dorset BH15 1PP** to arrive not later than Thursday 9 August 1990. The entry with the highest points total will win a 1 year subscription to Practical Wireless or £20 in vouchers for the book service. The **two runners-up** can choose from either a six month subscription or £10 in book vouchers. The Editor's decision is final and no correspondence will be entered into.

☐ Subscription
☐ Voucher
(Please tick choice of prize)

*My total number of **points**, using the formula above, from words made up from the letters in 'RADIATION PROBLEMS' is:*

Name .....
Address .....
.....
.....
Post Code
.....

Services

Queries
We will always try to help readers having dificulties with a *Practical Wireless* project, but please note the following simple rules:
1: We cannot give advice on modifications to our designs, nor on commercial radio, TV or electronic equipment.
2: We cannot deal with technical queries over the telephone.
3: All letters asking for advice must be accompanied by a stamped, self-addressed envelope (or envelope plus IRCs for overseas readers).
4: Make sure you describe the query adequately.
5: Only one query per letter please.

Back Numbers & Binders
Limited stocks of many issues of *PW* for the past years are available at £1.65 each including post and packing.
Binders, each holding one volume of *PW*, are available price £4.50 each (£1 P&P for one, £2 for two or more).
Send all orders to the Post Sales Department.

Subscriptions
Subscriptions are available both for the UK and overseas. Please see current issues for the latest prices.

Constructional Projects
Each constructional project is 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.
Intermediate: A fair degree of experience in building electronic or radio projects is assumed, but only basic test equipment is needed to complete any tests and adjustments.
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. Definitely not recommended for a beginner to tackle on their own.
Components for our projects are usually available from advertisers. For more difficult items a source will be suggested in the article. Kits for many of our recent projects are available from CPL Electronics and FJP kits, both of who advertise in the magazine.
The printed circuit boards are available, mail order, from the Post Sales Department.

Mail Order
All *PW* services are available Mail Order, either by post or using the 24hr Mail Order Hotline (0202) 665524. Payment should be by cheque (overseas orders must be drawn on a London Clearing Bank), Access, Mastercard or Visa please.

Wireless Line
This is an information service for the radio enthusiast, updated each Friday. Calls cost 38p per minutes peak time and 25p per minute off-peak. The number to ring is: (0898) 654632.

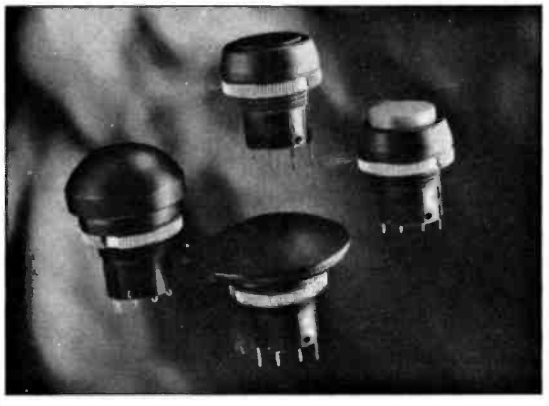
Newsdesk '90

Super Tough Switches

ITW Switches has announced several new additions to their range of options for the company's Series 76-94 range of robust, sealed, heavy-duty push-button switches. The new additions take the form of large mushroom shaped momentary and maintained emergency stop style switches and a domed version which is suitable for hand or foot operation.

They are available in red, green and black as standard with other colours available as non-standard options. These switches are designed for use in harsh environmental conditions and their impact resistance rating of 9 is the highest specified and they are also capable of withstanding 50g shock.

ITW Switches
Norway Road
Portsmouth
Hants
PO3 5HT
Tel: (0705) 6949971



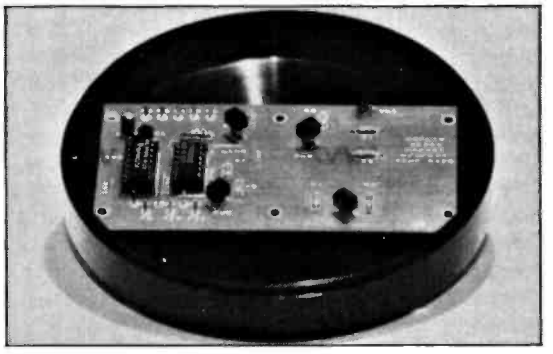
UK Spec CB

The TSM404UK will be of particular interest to car owners since it has the speaker mounted on the front of the radio. The radio incoporates a sophisticated volume squelch system that eliminates unwanted interference from car or truck ignition systems - only allowing the squelch circuit to work when an f.m. transmission is present.

With selectable roger beep and tone controls built in the radio will retail for £79.95.

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

Weather Kit



The new Maplin Electronics Weather Monitoring System accurately measures wind direction and speed from the comfort of your own home, or workplace. The project is in two halves, an outside unit which gathers data on wind speed and wind direction and an indoor unit which displays the data gathered.

An analogue meter shows the wind speed in m.p.h. and knots. A 16 point l.e.d. compass display shows the wind direction. Additionally, an optional digital temperature module gives a read-out of inside and outside temperatures.

The wind direction kit costs £16.95, the wind speed kit costs £7.45, the wind hardware kit costs £34.95. In addition, a kit of parts is available for the indoor display/read-out unit at £33.95

Maplin Electronics
PO Box 3
Rayleigh
Essex
SS6 8LR
Tel: (0702) 554161

On The Move

Garex Electronics, with its long established reputation for the supply of reconditioned commercial radiotelephone equipment and spares, mobile antennas, scanning receivers and weather satellite systems is moving to new and larger premises at South Brent, Devon on August 6.

Very conveniently located just off the main A38 road between Exeter and Plymouth, visitors will be made particularly welcome to their reatil counter between 10am and 5pm Monday to Friday.

Unusual Uses

Radio equipment gets used in the oddest of places. Bulgin's tough, water-proof, Buccaneer cable connectors are playing a vital part in the Shearwater Project, Dyfed Wildlife Trust's attempt to reintroduce a colony of Manx Shearwaters to Cardigan Island. The products are being used to connect up a solar-powered sound system, broadcasting the birds' calls, which experts hope will attract the species back to the island

The committee have initiated a new phase of the project, the experimental use of sound recordings to create an audible impression of an established colony. Following an intial £600 donation from Crest Holdings - whose logo is a stylised shearwater - a wide range of industries not normally involved in conservation became interested in the project, supplying equipment and carrying out research and development on the Trust's behalf.

The resulting sound broadcasting equipment package comprised a sophisticated stand-alone solar-powered static-RAM recorder capable of broadcasting up to 55W of bird call, switching itself on and off automatically. It was designed to operate unattended even in severe maritime weather for up to five years with minimal maintenance. Its ETI amplifier is installed in a die-cast aluminium case and the Trust, recognising that the connections from the case to the rest of the equipment would have to be waterproof and rugged enough to withstand the hostile marine environment for up to five years, asked the advice of A F Bulgin & C plc.

Bulgin's Buccaneer cable connectors are manufactured in the UK to specification IP68 of BS5490, making them suitable for extended continuous use in wet or hostile environments. The flex-mounted half of each unit locks to its partner with a specially designed threaded 'collar' which prevents accidental disconnection, while their virtually indestructable black glass-filled nylon bodies combined with their wide operating temperature range (-20°C to +70°C) ensure total reliability even under the most rogourous conditions.

The equipment was airlifted out to Cardigan Island by Sea King helicopter and was activated at the end of February - the start of the Shearwaters' 1990 breeding season.

Newsdesk '90

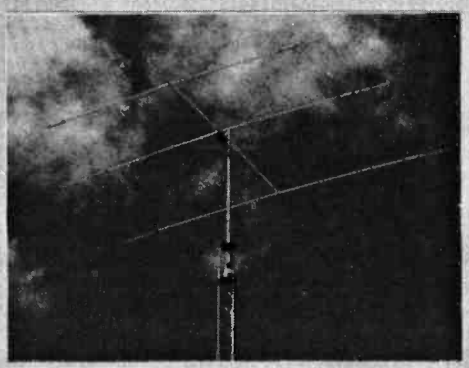
Cushcraft

The A3WS is a 3-element 12, 17 and 30m beam (the new WARC bands). It has a sturdy all-aluminium design with pinned boom sections, heavy duty element mounts and all stainless steel clamps. The A3WS is a high performance Yagi on 12 and 17m offering 8dB forward gain, with the addition of the A103 add-on kit it will also cover 30m.

The A3WS has a 4.25m boom and takes a mast size of 1.5 - 2in. The antenna is rated for 2000W p.e.p. and takes standard 50Ω coaxial cable.

All tubing is heavy wall hard drawn, bring finish aluminium for long life and pleasant appearance. Assembly is quick and easy from detailed instructions and precision manufactured components.

For fulldetails of this and other Cushcraft antennas, contact your local Cushcraft agent. Many advertisers in *PW* carry the Cushcraft range, check their advertisements for details.



RAE Courses

Clacton-on-Sea: Green Lodge Education Centre, Old Road, Clacton-on-Sea. RAE classes start September 1990. Enrolment is during the week commencing September 10. Reg Taylor G0NIP. Tel: (0255)430466.

London: City of Westminster College (formerly Paddington College), 25 Paddington Green, London W2. RAE and Morse classes start September 1990. Ann James. Tel: 071-723 8826.

Leeds: Joseph Priestley Institute, Morley, Nr Leeds. RAE classes on Wednesday evenings from 7 - 9pm. Morse classes on Tuesday evenings from 7 - 9pm. Electronics classes on Thursday evenigs from 7 - 9pm. Enrolment starts September 3. Contact the college on Leeds 532782.

Harrow: Weald College, Brookshill, Harrow, Middlesex. RAE classes start Wednesday September 26 at 6.45pm. Enrolment details on 081-954 9571.

Nottingham: Arnold & Carlton College of Further Education, Digby Avenue, Mapperley, Nottingham. Full RAE course starts Wednesday September 12 at 6.30pm. Short RAE course starts Thursday Spetember 13 at 6.30pm. Morse classes start Wednesday September 12 at 7pm. Construction classes start Tuesday September 11 at 7pm. Ron Wilson. Tel: (0602) 876503.

Cardiff: British Telecom HQ, 25 Pendwyallt Road, Coryton, Cardiff. RAE classes start Tuesday September 25 from 7 - 9pm. C.G. Barry GW3BUT. Tel: (0222) 628430 daytime

Brentford: Brentford Community Education Centre, Brentford School, Clifden Road, Brentford, RAE classes on Wednesdays from 7 - 9pm. Morse classes start on Thursday September 27 from 7 - 9pm. G1ZRY. Tel: 081-876 3183.

Stockport: Avondale Adult Education centre, Heathbank Road, Cheadle Heath, Stockport. Morse classes on Monday evenings from 7 - 9pm, RAe classes Tuesday evenings from 7 - 9pm. Rik Whittaker G4WAU. Tel: 061-427 4730 evenings and weekends.

Romford: Havering College of Further and Higher Education, Quarles Campus, Tring Gardens, Harold Hill, Romford. RAE classes on Tuesdays evenings, Morse classes on Thursday evenings. Contact Stuart Woosnam G0NKP or Chris Potarzycki G0NJR via the college.

Bristol: Brunel College of Technology, Ashley Down, Bristol. RAE classes om Monday evenings from September 10, Morse classes on Tuesday evenings from September 11, Practical classes on Thursay evenings. Enrolment on September 4 or 5. David Heald. Tel: (0272) 241241 ext 2190.

Hounslow: Science and Technology Department, The Henley College, Deanfield Avenue, Henley-on-Thames. RAE classes on Wednesday evenings from 7 - 9.30pm. Bob Humphreys. Tel: (0491) 579988 ext 298.

Newsdesk '90

Six DMMs

Six new multimeters have been introduced by Quiller of Bournemouth. The QI Range comprises low-cost, quality instruments with 'realistic specifications' to meet today's standards.

From a modest 10A d.m.m., at around £15, the range progresses through analogue units to two high specification d.m.m.s.

The first of three analogue meters is a 500V insulation tester, also offering a 300VAC measurement scale. The remaining two offer large displays, dB ranges, semiconductor test and are ideal for general purpose and desk intrument work.

The range's penultimate d.m.m. is compact, autoranging and features a bargraph display. Top of the range is a powerful and rugged d.m.m. with a comprehensive selection of facilities including temperature, capacitance, frequency ranges and semiconductor test.

All the units are fuse protected (not 10/20A ranges) and supplied with lead sets full specifications and operating manuals.

A fully-compatible range of high-specification lead sets is also available. The QL Range lead sets offer enhancments such as spring-loaded shrouded connectors, fusing, wide selection of probes, corcodile clips and flame-retardant leads.

Quiller Ltd
2 Paisley Road, Bournemouth BH6 5EU
Tel: (0202) 417744

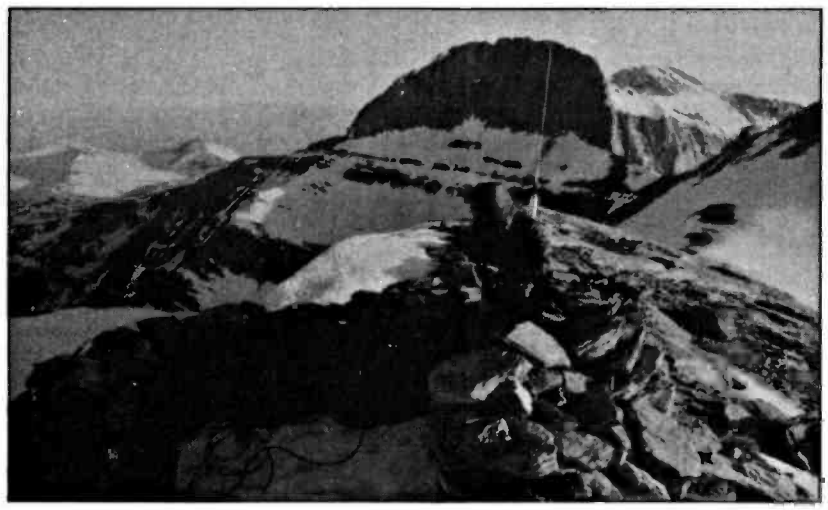
Greek Mountaineers Club

The Greek Mountaineers' Club recently told us of a QSO on the 144MHz band, using a large vertical limestone cliff as a reflecting surface.

The transmitting station was located near the top of Mount Olympus (Greece) at an altitude of approximately 2700m a.s.l. It was manned by SV2AHT and SV2AGY (Zafeiris Trompakas - Giannis Floros). The equipment used was an Icom IC-02E portable transceiver at power settings of up to 5W with a 3-element beam directional antenna and a 2 5/8 mobile antenna. The receiving station was manned by SV2AHJ (Nikos Kosmaras) using a Yaesu FT-227 and a 2 5/8 antenna.

The station was located in Thessaloniki, Greece at sea level about 80km from the transmitting station. Line of sight contact is not possible between the two stations.

The QSO was carried out in May 1989 in the course of a mountaineering expedition of Mount Olympus. All the radio amateurs manning the stations are members of the Greek Mountaineer's Club of Tehessaloniki, Greece.



The cliff in question was the Stefani cliff, located near the top of the mountain. It is approximately 800m high and 600m wide. When the transmitting antennas were turned directly on the receving station the signal was received weakly with noise. When the antennas were turned around to face the cliff a S4 signal was received.

Construction

Desk-Top Microphone

Desk microphones capable of providing good quality speech are fairly expensive. Allan Lester-Rands describes an easy-to-build design that you can build for approximately a quarter of the price of a commercial model.

Free-standing, or desk-type microphones complete with controls allowing adjustment of bass and treble, cut or lift, don't come cheap nowadays. But by building this project you'll end up with a very reasonable looking microphone and save money at the same time.

The primary component is the microphone itself. This may be any miniature loudspeaker of approximately 40 to 60mm diameter. Alternatively, you could use a balanced-armature type insert (of the type found in telephone handsets and freely available on the surplus market). With a suitable housing, including some acoustic treatment within, and with a 'tailored' pre-amplifier response, I found that speech quality and an overall smooth response, equal to that from a good class moving-coil microphone could be obtained. 'On air' tests carried out on h.f. and v.h.f. resulted in favourable reports for speech clarity and smooth response.

Performance

Acoustic and electrical performance may also be of interest. First, the microphone was compared with others of known make by using a professional tape recorder with replay via a high fidelity amplifier system. These tests proved that the 'home-brewed' prototype described here, had a wide overall frequency response, no 'resonances' and a near cardioid polar response which reduced reverberation effect from the rear and sides of the instrument.

In order to reduce natural resonances produced by the microphone, the frequency response of the matching and pre-amplifier circuit is 'tailored' as shown in Fig. 1 curve A. This is in addition to the acoustic treatment within the microphone case. The bass and treble, lift and cut, is produced by the use of an active (negative feedback) Baxandall tone control network (shown in the dotted curves).

The noise level from the pre-amplifier is practically nil as only the grounded base amplifier (TR1) provides actual gain. Total harmonic distortion from the pre-amplifier was measured at less than 0.5% at 1kHz.

Very few people realise that the audio frequency response with a narrow band f.m. transmission is somewhat narrower than one might imagine. The response shown in Fig. 2 was obtained with an audio frequency sweep generator that covered 10Hz to 100kHz. The sweep generator's output level was to within plus or minus 0.1dB and the diagram clearly shows just how narrow the response really is.

It is therefore desirable that the microphone used with narrow band f.m. transmitters has not only a smooth response, but also a facility for increasing the treble to compensate for reduction of the higher voice frequencies. This also applies to bass response to a lesser extent.

Matching and Pre-Amplifier Circuit

The matching and pre-amplifying circuit is shown in Fig. 3. To obtain a very low impedance input, compatible with the microphone impedance of 8Ω, a grounded-base transistor is employed (TR1 , BC109).

This stage produces a small amount of gain which is reduced slightly by TR2, which is operated as an emitter follower to provide a low impedance feed to TR3 which incorporates the active Baxandall tone control network. This stage has a gain of less than 1, supplying a maximum audio voltage to R18 of approximately 50mV r.m.s.

With the bass and treble controls, neutral frequency response dips to -3dB at 400Hz and increases by about 3dB at 4kHz (with reference to 1kHz) which nullifies the major resonances produced by the microphone itself.

The acoustic treatment of loosely packed cotton wool within the screen around the microphone helps to further smooth the response. *Note: The values of the circuit components are critical and must not be changed except for reasons to be dealt with later.*

Additional Circuitry

The additional circuitry is simply an extra switch integral with the battery switch S1, a double-pole double-throw switch (see Fig. 6). This can be used as the 'transmitter on' switch by connection to the appropriate contacts on the transmitter which are often brought out to the 'auxiliary socket'. One lead is 'live' and the other is 'earthed' but this can be changed as required.

The object of this exercise, if this is possible

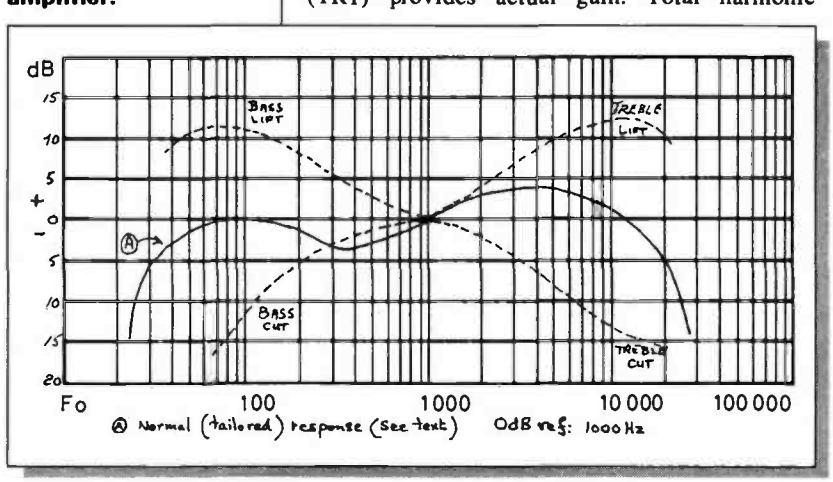


Fig. 1: Frequency response of the matching and pre-amplifier.

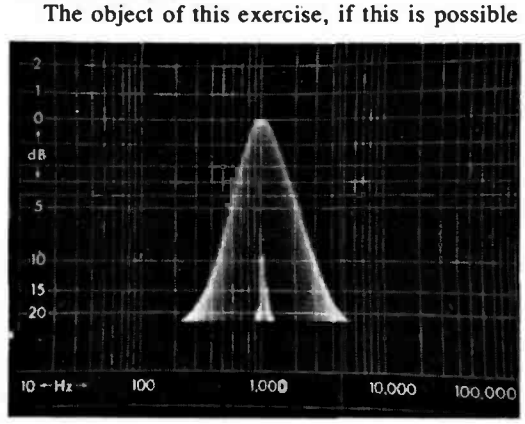


Fig. 2: The narrow response obtained from narrow band f.m. transmissions.

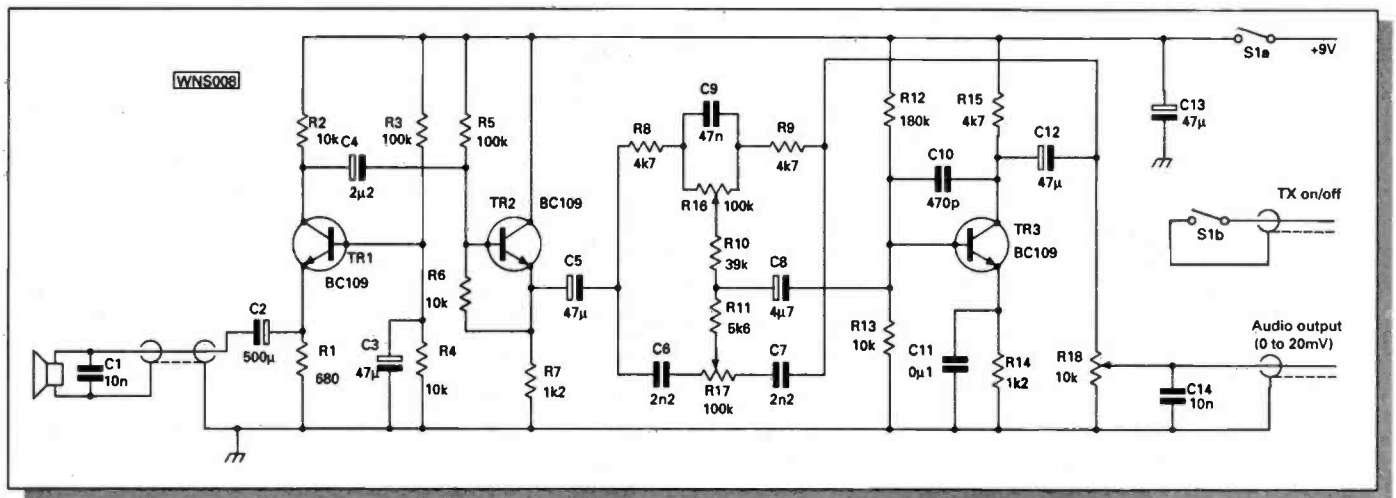


Fig. 3: The microphone matching and pre-amplifying circuit.

with the transmitter , is that when the transmitter is switched 'off', the microphone battery is also switched off. This removes the possibility of the pre-amplifier being left on when transmitting is finished and running the battery down. Total current drawn from the battery should in any case, only be approximately 3mA.

If such facilities are not available, then this switch is not used. On the other hand if there is an auxiliary socket on the transmitter, a suitable d.c. voltage (9 or 12 volts) may be available and could be used instead of the 9V PP3 type battery to power the pre-amplifier. **Note however, that any additional cables between the microphone unit and the transmitter must be double-screened to prevent r.f. interference entering the pre-amplifier.**

Construction Details

Details concerned with the microphone, its case, circuit connections, screening, cotton-wool packing, mounting pillar, etc. are shown in Fig. 4.

The thin, earthed aluminium screen is important. Apart from keeping r.f. out, it also serves to form a smaller enclosure for the moving coil speaker unit which forms the microphone transducer.

The moving-coil speaker itself is actually secured in the housing with a rapid-setting epoxy resin adhesive. But whatever you use for the job...make sure none gets onto the speaker cone!

After the various connecting wires with double shielding (made from outer screening braiding from short lengths of coaxial cable) have been soldered and secured, cotton-wool is loosely packed around and over the microphone unit. The screen is then fitted into place.

The cable to the pre-amplifier is then brought out from the bottom of the case and is taken through the square aluminium pillar into the metal base box.

The main pre-amplifier board is shown in Fig. 5. The prototype was built using perforated matrix board with the components on one side with the interconnecting wires on the other side.

The finished board is supported within the base on stand-off pillars with the components mounted side facing downwards.

Tone Controls

The bass and treble controls should operate in a clockwise direction. In other words they should provide full bass with the control fully clockwise, full bass-cut with the control fully anti-clockwise. The same applies to the treble control.

With the controls centred, the tone circuit response is flat but the overall response of the whole pre-amplifier will be as curve A in Fig. 1. If either control operates opposite to the way I've described, you only need to reverse the outer connections to the appropriate potentiometer.

Using The Microphone

Unless your transmitted signals (using a dummy

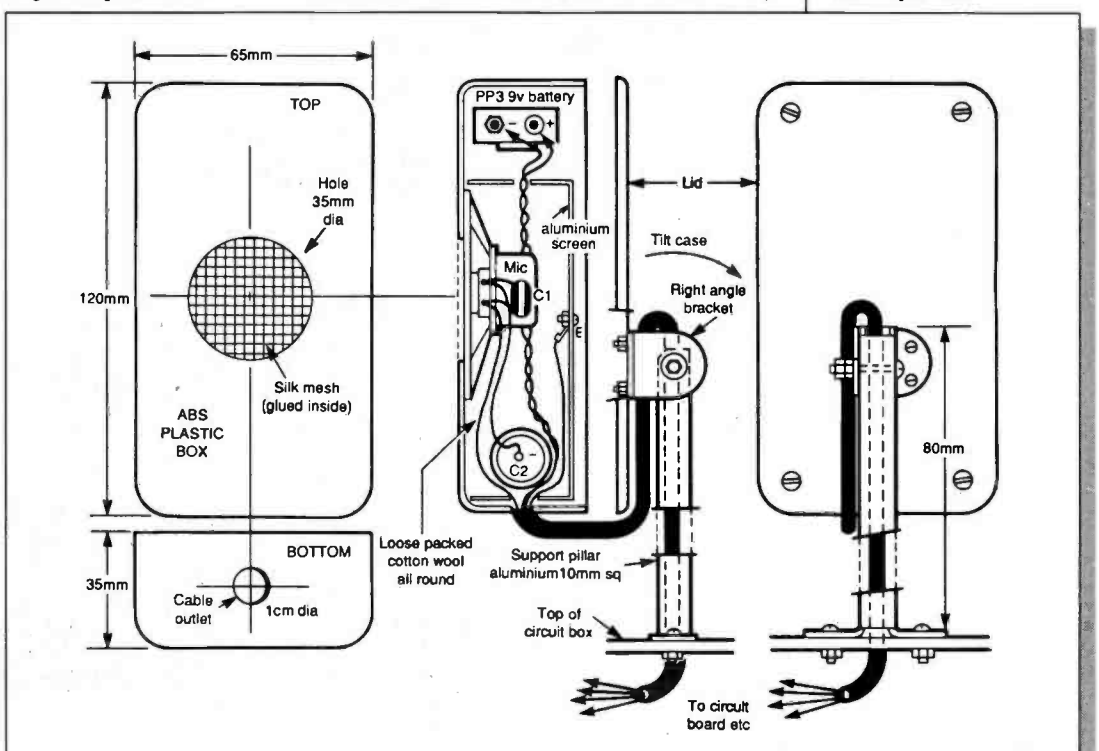


Fig.4. Diagram of recommended design and layout of microphone and battery housing. Note this version uses a moving-coil speaker as the microphone.

Shopping List

Resistors
5% 0.4W carbon film.

680Ω	1	R1
1kΩ	2	R7, 14
4.7kΩ	3	R8, 9, 15
5.6kΩ	1	R11
10kΩ	4	R2, 4, 6, 13
39kΩ	1	R10
100kΩ	2	R3, 5
180kΩ	1	R12

Rotary Potentiometers (linear)

10kΩ	1	R18
100kΩ	2	R16, 17

Capacitors (Polyester)

2.2nF	2	C6, 7
10nF	2	C1, 14
47nF	1	C9
0.1µF	1	C11

Silver Mica 5% tolerance

470pF	1	C10

Electrolytic

2.2µF	1	C4
4.7µF	1	C8
47µF	4	C3, 5, 12, 13
500µF	1	C2

Transistors

BC109	3	TR1, 2, 3

Miscellaneous

Moving coil speaker or balanced-armature telephone insert (see text); PP3 type battery and connector (if required); die-cast aluminium boxes; switches; knobs; rubber feet; screened wiring; silk or other suitable fabric material for microphone 'fret'; Matrix board for assembly; various connecting wire; Double-pole double-throw switch; rapid-hardening epoxy resin adhesive.

HOW MUCH?
£20.00
HOWDIFFICULT
INTERMEDIATE

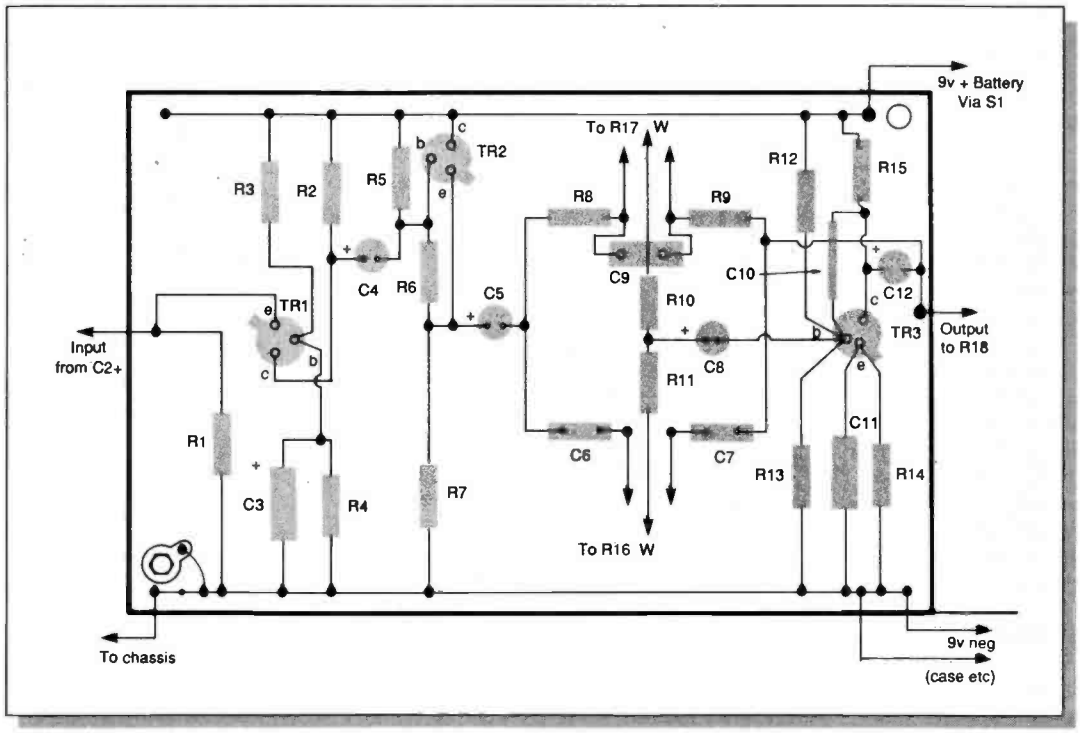


Fig. 5. The recommended wiring layout using a matrix (perforated) board.

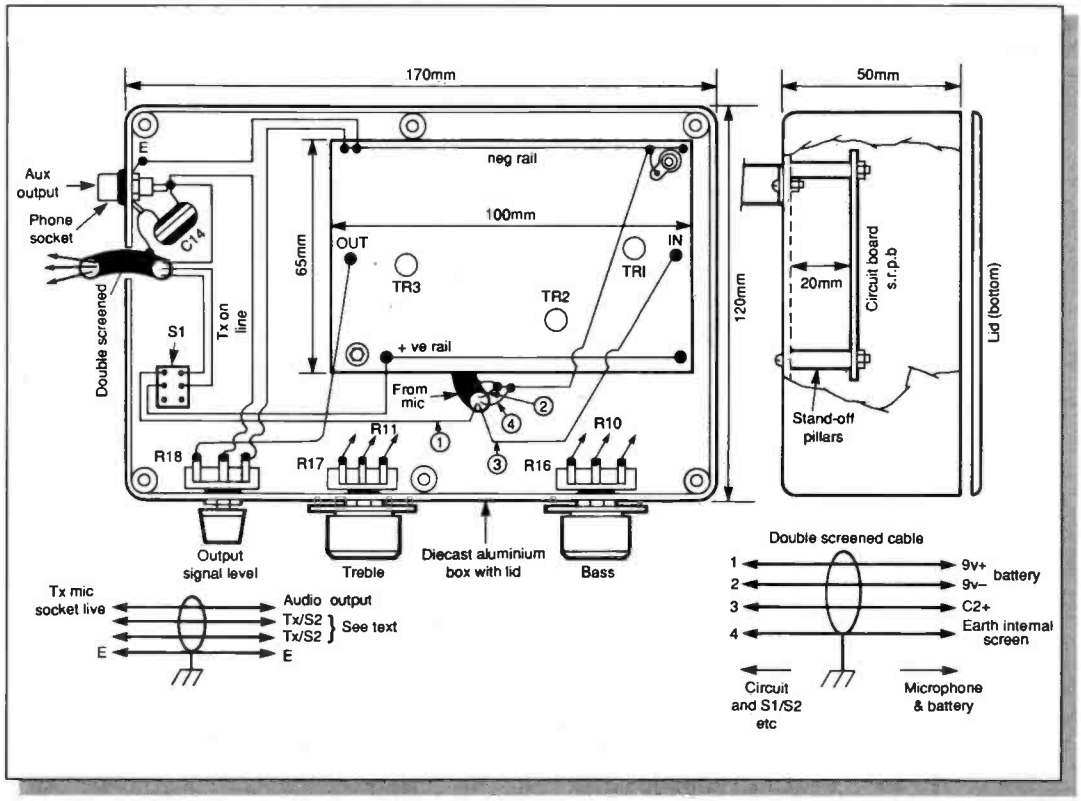


Fig. 6: Interconnection wiring diagram of the desk-top microphone.

load) can be monitored with another receiver, you must rely on observations from other people listening as you adjust the controls.

Start the adjustments with the bass and treble controls and the output level control R18 set to mid-range. Adjust R18 for optimum modulation level with a speaking distance of approximately 300mm.

You should then set the tone controls for a response that best suits your own voice and the frequency response of the transmitter internal audio amplifier. Initial tests are best carried out with the help of a few different operators who know how your voice should sound.

If the mid-treble needs to be increased a little to provide a little more 'top' - don't try to force it with the treble control at maximum. Instead, you should change the value of C11, the emitter bias resistor by-pass capacitor to about 47nF or 0.1µF which will increase the response at around 4kHz but reduce the overall gain slightly.

This shortfall can be overcome by adjusting R18 and increasing the output of the pre-amplifier slightly. Apart from this no other changes to the pre-amplifier circuit should be necessary.

Battery Operation

If the microphone unit is operated from a battery supply, the following comment applies. Owing to capacitor C12 charging up when the unit is switched on, there is a voltage rise of approximately 4V at the output of R18 in the form of a very rounded pulse which may be conveyed to the microphone input of the transmitter.

This charge decays fairly quickly and no d.c. potential is left at R18. The problem can be overcome by using a small, low voltage working 2µF capacitor in place of the 47µF capacitor.

The modification will produce a slight loss at very low audio frequencies, although it is barely noticeable. There is more than enough bass lift available to compensate if required. The modification was checked on my prototype and another which was built by a friend.

PW

THE MARLAND SSB TRANSMITTER

Construction

A simple practical s.s.b. transmitter for 3.5 and 14MHz

The VFO

The v.f.o circuit is shown in Fig. 2.1, experienced constructors will know it as THE v.f.o circuit! Over the years I have come to use this circuit as my standard for a variable frequency oscillator. The last example in *PW* was in the Irwell Transmitter (*PW* January 1990). A fuller description of this circuit can be found in that article. The tuned circuit inductor, L13, is wound on a former with an iron dust core. Some purists eschew the use of cores in v.f.o inductors but this example is arranged so that the minimum of core need to inserted into the former to provide the required frequency. The use of a core does make the adjustment of the v.f.o coverage much easier.

The Carrier Oscillator

The circuit for the Carrier Oscillator is shown in Fig. 2.3. It is a simple one stage crystal oscillator in the Colpitts configuration. Two crystals, XL1 and XL2 chosen by switch S1 determine the sideband chosen. These are 8998.5kHz for the upper sideband and 9001.5kHz for generating the lower sideband. The two trimmer capacitors, C1 and C2, allow the associated crystal to be shifted onto the required frequencies. The output appears across the r.f choke in the source of TR1. This oscillator is supplied from a 12 volt line which only appears from the change-over board when the Marland is in the 'transmit' state.

The Microphone Amplifier

Like all the circuits in the Marland, the microphone amplifier, shown in Fig. 2.2, is very simple. I tried several circuits, some with audio tailoring, but this simple circuit seems to give a pleasing sound from a cheap communications microphone ; a Maplin WF05 in the prototype. Again I opted to place this circuit in its own screened enclosure.

The circuit is a two stage bipolar transistor audio amplifier with a rudimentary gain control on the microphone input. This is a preset control although it could be brought out as a front panel control. The supply is again from the 12 volt (TX) line controlled by the change-over board. The circuit has more than adequate gain but the gain was made variable to allow for the use of less efficient microphones.

Balanced Modulator

This is the mixer which produces the d.s.b.s.c. signal from the carrier and the amplified microphone signals. The circuit is a simple passive mixer based upon two diodes (D1 and D2) and a balanced input transformer formed from L1, L2 and L3. The diodes are Schottky diodes, type BAR28 from Maplins, although any similar type of diode

In this second part of the Marland, The Reverend George Dobbs G3RJV presents the full circuit diagrams.

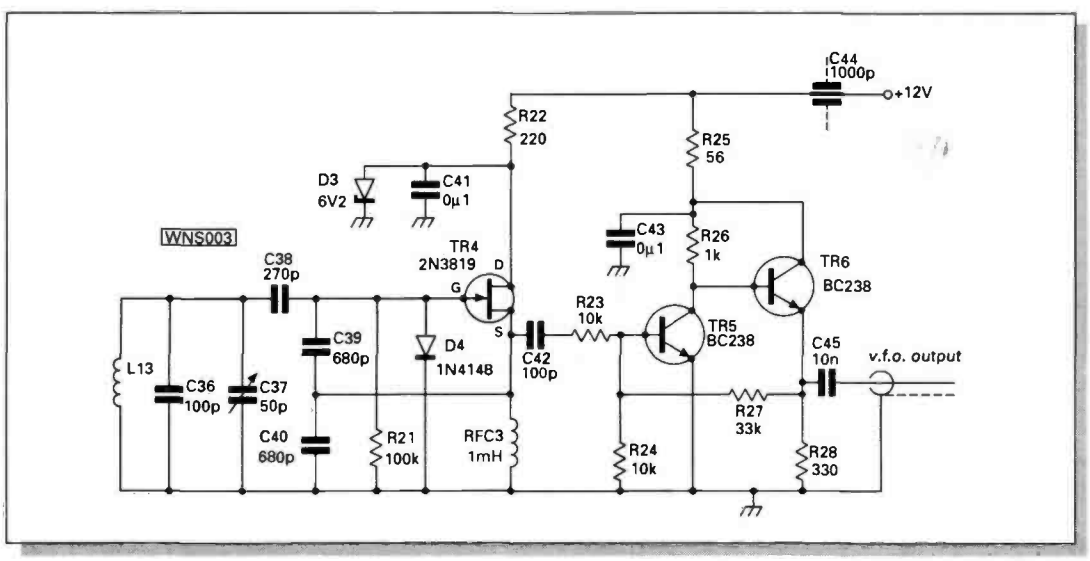


Fig. 2.1 The v.f.o. circuit has the same layout to the *PW* Irwell (published *PW* January 90)

would serve the purpose. A preset resistor (R3) is the main balance control with additional balancing provided by two trimmers (C10 and C11). The r.f amplifier (TR2) increases the signal level prior to filtering. The circuit, which was suggested to me by G3ROO, uses a dual-gate m.o.s.f.e.t. with a preset gain control on gate 2. The input is tuned with a single tuned circuit, L5/C14, which also provides some impedance matching between the balanced modulator and the amplifier. The output is also tuned with L6/C17. Both tuned circuits resonated at 9MHz. Resistor R12 provides an impedance load to match the filter input impedance.

Fig. 2.2

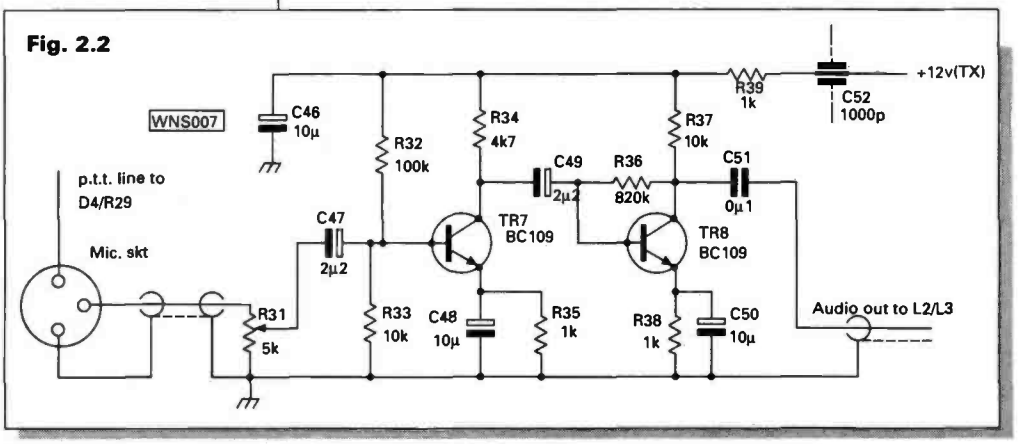
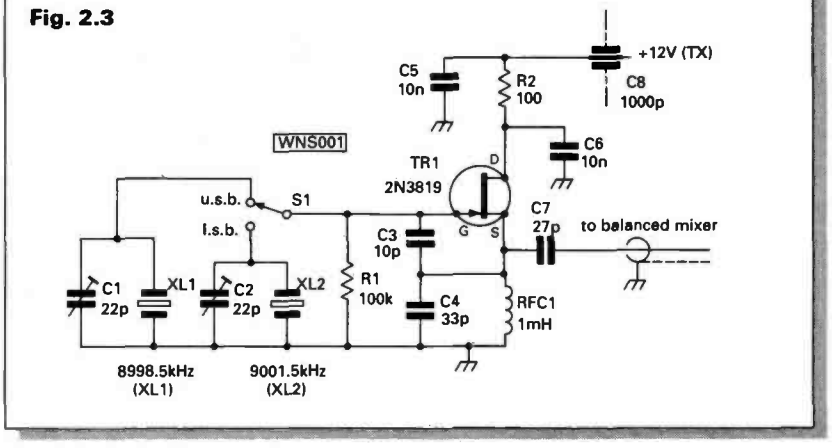


Fig. 2.3



The 9MHz Filter

This is a 6-pole crystal filter based on a centre frequency of 9.00MHz and a working bandwidth of 2.2kHz. This filter allows the required sideband to be passed on to the buffer transistor TR3. This m.o.s.f.e.t. isolates the filter from any change of loading presented by the bandpass filters consisting of L7, L8 and L9 with C25-27 for 3.5MHz, or L10, L11 and L12 with C28-30. The coils L9 and L12 in conjunction with the L8 or L11 form matching transformers. The inductors used in this part of the circuit are standard Toko coils in the 10K series.

Driver Amplifier

The Driver Amplifier shown in Fig. 2.5 is yet another dual gate m.o.s.f.e.t. with a gain control on gate 2, as the r.f amplifier on the s.s.b. generator board. The input and output are coupled to the driver through simple r.f transformers wound on ferrite beads (L14/15 input and L16/17 output). The gain

Fig. 2.4

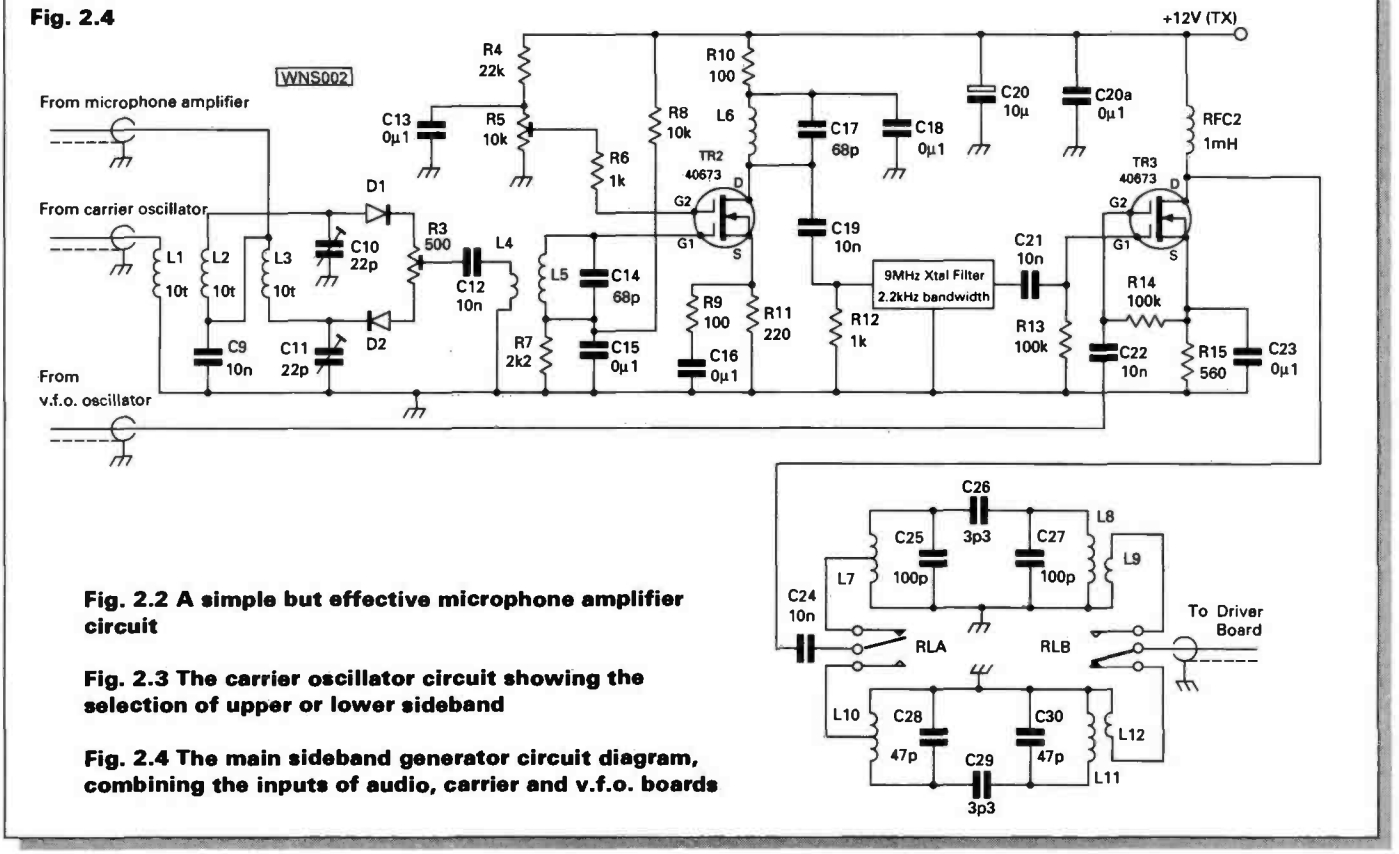


Fig. 2.2 A simple but effective microphone amplifier circuit

Fig. 2.3 The carrier oscillator circuit showing the selection of upper or lower sideband

Fig. 2.4 The main sideband generator circuit diagram, combining the inputs of audio, carrier and v.f.o. boards

control is the front panel 'DRIVE' control for the transmitter output. The amplifier is shown separate as it is built on its own small printed circuit board which can be placed close to the input of the Power Amplifier.

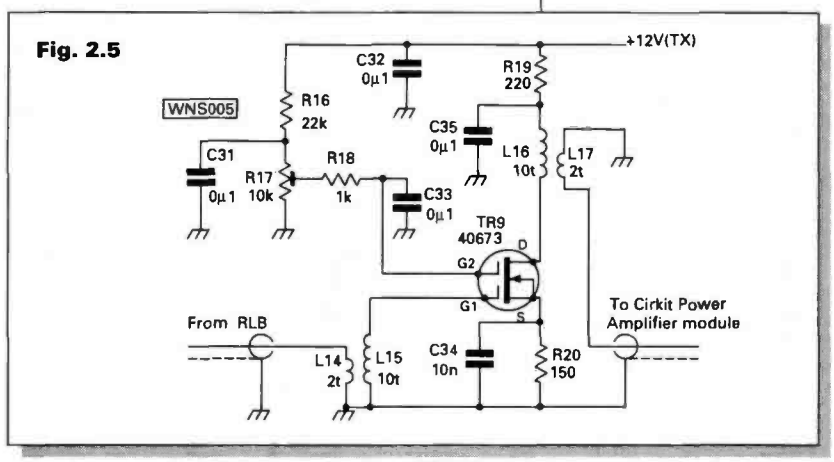
Power RF Amplifier

The power amplifier is an 'easy option' in that a readily available and proven kit is used in the project. The Cirkit HF LINEAR AMPLIFIER has become a popular constructors item by virtue of its high gain coupled with excellent stability. Good linear amplifiers are not easy to build but this module, if built with care, will reward the constructor with a clean and stable signal. It has a bandwidth from 1.6 to 30MHz and 40dB gain which gives at least 10 watts out for some 0.8mW input. The output of this amplifier is passed to one of two low-pass filters, required to clean up any harmonic content of the output signal. The circuit for these filters is shown in Fig. 2.6. The filter components follow the values for the W3NQN standard capacitance seven element filters, which have become popular amongst constructors of QRP equipment. Although these filters contain an extra inductor and capacitor against the commoner five element filters, the characteristics are so much better.

Change-over Board

The change-over board is the final circuit to be described and controls the transmit/receive function allowing the power to reach the appropriate boards at the right time. *PW* readers may recognise it as the board used in the Irwell Transmitter. It uses simple principles and works well. The press-to-talk switch on the microphone controls a p.n.p. transistor which operates a relay to perform the change-over action. This action of the circuit is 'slugged' with capacitor C55 to allow the relay to hold in for a short period after the p.t.t. switch is released. The relay changing the antenna from the receiver to the transmitter when the switch is depressed. As a transmit/receive indication diodes D9, D10 may be added as shown in the circuit diagram.

The slightly peculiar look about the change over relays RLA-D in Figs 2.4 and 2.6 is to keep power needs down to the minimum. Either RLA and RLC for 14MHz operation or relays RLB/D are energised for the 3.5MHz band operation. This looks somewhat peculiar but works well and simplifies the p.c.b. layout. PW



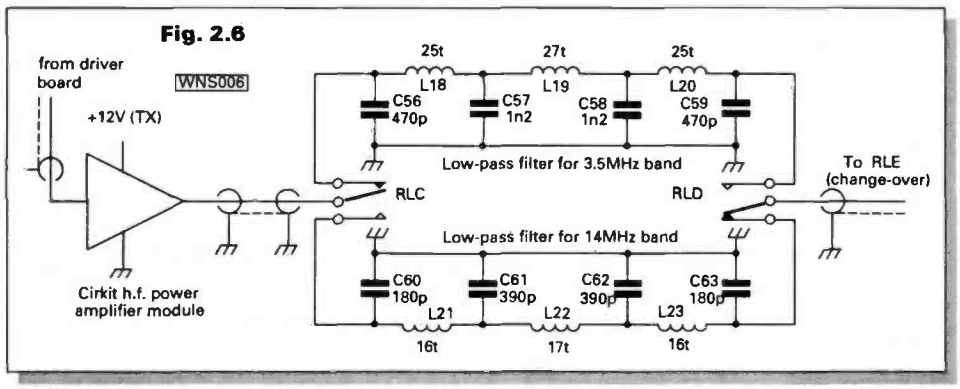
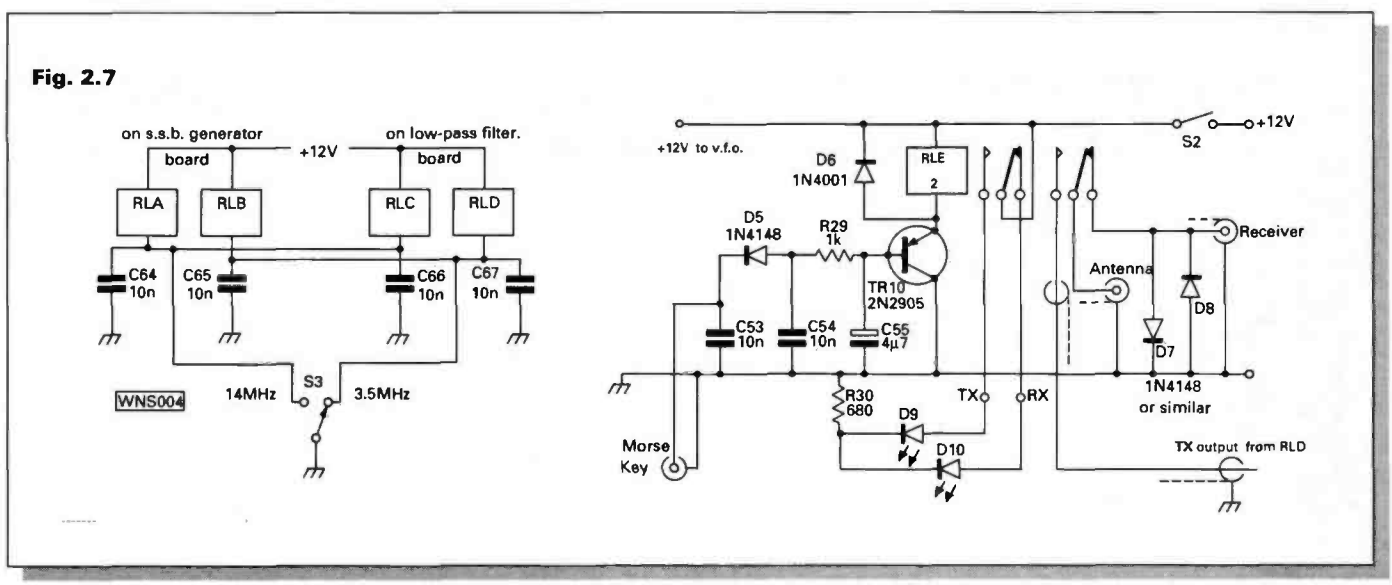


Fig. 2.5 The driver amplifier. Resistor R17 is the 'Drive' control on the front panel

Fig. 2.6 Power and low-pass filter stages. See the text for operation of relays RLC and D

Fig. 2.7 Transmit/Receive change-over board based on the board for the *PW* Irwell

That completes the circuit descriptions, in the following part we will give the full shopping list and the track and component overlays for the boards.



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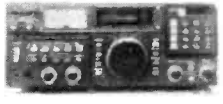

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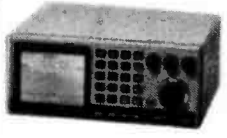

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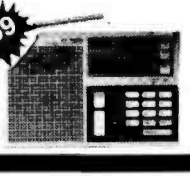
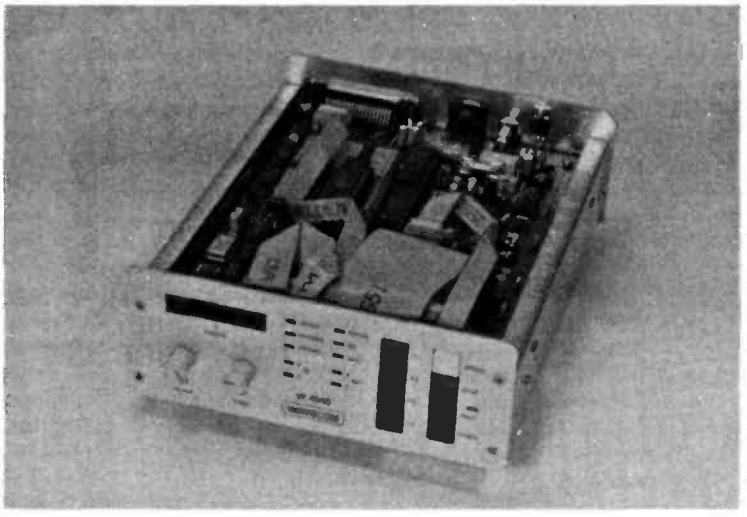


Wavecom W 4010 Data Decoder



The Wavecom W 4010 is a "all mode" data communications unit that has been designed to satisfy the needs of the utility enthusiast. One of its many attractions is that does not require the use of a computer. This makes for a much neater and quieter installation which should appeal to many says Mike Richards G4WNC.

REVIEW

In keeping with its neat appearance, all the external connections to the W 4010 were made via the rear panel. The power requirements of the Wavecom necessitated the use of an external 12V power supply, that connected via a 2.1mm coaxial power jack on the rear panel. The current consumption was a modest 600mA, but the supply should be well regulated. The in-built supply fuse provided protection against reverse polarity as well as conventional over-current.

The W 4010 made very modest demands of the receiver requiring simply an audio signal in the range 100mV to 5V maximum. The ideal feed being that from a tape recorder or similar fixed level auxiliary output. This is preferred as the feed to the W 4010 is then independent of the volume control setting. The connection to the W 4010 was made using two phono sockets on the rear panel. One of these sockets was used for v.h.f. packet radio reception only, while the other socket was used for all other modes.

Connection to the video monitor was made via a phono socket again on the rear panel. The composite video signal level provided was 1.5V p-p into 75Ω, which should suit the majority of monitors. There was no u.h.f. output for feeding a TV because they do not perform well when displaying 80 column text.

Hard copy could be taken in any of the modes and was in fact essential for FAX reception. The printer connection was via a standard Centronics 36-way connector. For those with serial printers there was a separate five-pin DIN socket that carried basic RS-232 signals but at t.t.l. levels. This could also be used for connection to a computer or terminal for further processing or storage of data. One point to note though is that the serial printer couldn't be used for FAX reception.The data format and speed of the serial port could be varied over a standard range of options and should suit most applications.

In addition to the basic interfacing there was a facility to use an external demodulator. This required moving an internal jumper to disable the internal demodulator. The signal from the external demodulator is fed into the five-pin DIN serial port.

Reception Modes

One of the main attractions of this type of decoder is that it can handle a wide variety of reception modes. An additional advantage of processor controlled units such as this is that new modes can be added by changing software. The Wavecom's reception modes are contained in a number of ROMs known as modules. A maximum of six of these modules could be installed. Incidentally the review model was fitted with Modules A to D.

The modes provided by each of the modules is listed here:

Module A
- Baudrate Check.
- Baudot (RTTY).
- ASCII.
- SITOR.
- Morse.
- Packet Radio.
- FAX (option).

Module B
- Baudrate check.
- ARQ-E.
- ARQ-E3.
- ARQ-M2.
- ARQ-M4.
- Synchronous bit analyse.
- Asynchronous bit analyse.
- Length analyse.

Module C
- FEC-A.
- SI-ARQ.
- SI-FEC.
- SWED-ARQ.
- AUTOSPEC.

Module D
- Economic News 300 baud.
- Press News, 300 baud.
- Press News, 200 baud.
- Economic News, 75 baud.
- Economic News, 50 baud.

All the facilities of the W 4010 were controlled by the eight touch buttons on the front panel. These buttons had a very positive "click" action and were

REVIEW

easy to use. A single press of the power button brought the unit to life. This was rather different to a conventional on/off switch which has a clear locking action. I suspected that there may have been some electronics left permanently powered up but the quiescent current with the unit in the off condition was below the measurement threshold of my instruments!

The next operation was to select Module A and enter the set-up mode. It was necessary to configure the W 4010 to operate with the connected peripherals. This is where you can alter such things as the baud rate and data format of the RS-232 port and the type of printer in use. In most cases the default settings will probably suffice. One plus point here was that all the set-up parameters were held in non-volatile RAM, so you should only have to configure it once.

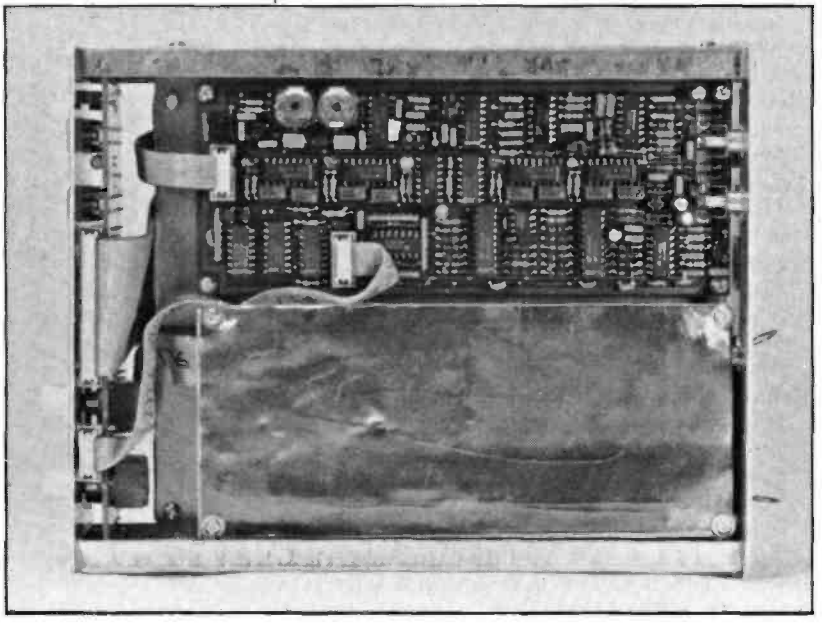
The following stage was to select the appropriate module for the intended reception mode. Pressing the module selection button caused the W 4010 to step through all the installed modules. The screen showed a summary of the modes available for each module as you stepped through. This was a useful time-saver and made selection of the appropriate mode very quick.

Throughout the operation, the screen was used as the main form of communication between the W 4010 and the operator. Because of this it is important to use a good quality monitor. However if you eyes are not too good with 24 lines of 80 column text you could set the W 4010 to display 18 lines of 40 column text which was much easier on the eyes!

Hard copy from the printer could be obtained at any time simply by pressing the Print button. As this has a toggle effect, a red l.e.d. adjacent to the button lit to show when the printer was active.

The remaining four function buttons on the front panel were under software control so their action varied according to the selected receive mode.

In addition to the push buttons there were two rotary controls on the front panel. These were used to control how the W 4010 responded to the incoming audio signal. The first of these was a variable bandwidth filter which had a bandwidth adjustable from 10Hz to 2300Hz on all modes except c.w. where this changed to 10Hz to 800Hz.



This filter was designed to enhance the filtering of the receiver and can be very useful in todays crowded bands. For those interested in the technicalities, the filter comprised a pair of four pole elliptic types - one high pass and one low pass.

The second rotary control was only functional on c.w., ARQ and packet radio and provided an adjustable squelch facility. This is particularly relevant to modes where the transmission is not continuous and was used to stop the W 4010 trying to decode the noise between the bursts of signal.

The Manual

With any item of equipment as complex and sophisticated as the W 4010 a good user manual is essential if operators are to get the best from the equipment.

The manual supplied with the W 4010 comprised twenty A4 pages which were bound in a two hole floppy binder. Although this was perhaps not as slick as some forms of manual it did have the advantage that extra pages and software update information could easily be inserted in the manual. In fact the paperwork for the FAX option was supplied as a separate four-page supplement, which I was able to insert in the main manual.

The manual was divided into five sections covering installation, operation, technical data, miscellaneous and illustrations. The main sections of interest being the first two.

The installation was covered in adequate detail with a few diagrams to show the wiring connections. With this type of decoder the operational instructions are obviously critical if its capabilities are to be fully exploited

All the main reception modes were covered quite well, with Module A getting rather better coverage than the others. In fact the supplement covering FAX reception was very comprehensive and even included a tutorial on the mode which was very good.

The exception to this was the analysis modes provided in Module B. These are useful tools that require some guidance before they can be useful. Unfortunately the manual contained only an outline description of their use. In fact one mode - length analysis-had no mention at all in the manual.

The 'Miscellaneous' section of the manual was in fact a very useful help section covering not only the basic operation of the W 4010, but some helpful advice on the elimination of r.f. interference.

Although the manual was quite comprehensive, a certain amount of technical knowledge was assumed and I think newcomers that are turning to sophisticated decoders such as this would probably need some additional information.

Air Tests

'The proof of the pudding is in the eating' - this being particularly true of data decoders. For the air tests I interfaced the W 4010 to my Icom IC-720A and nest of dipoles which give me good coverage of the spectrum for l.f. through to 30MHz. For the display I used a standard BMC 12in green screen monitor.

CW

I started with what is the simplest of the data modes - c.w. Although the mode is simple in terms of the transmission equipment, it is in fact one of the most difficult to decode reliably. This applies

mainly to hand sent c.w. where the character and element spacings can be somewhat erratic.

One very good point about the way the W 4010 handled c.w. was that the centre frequency of the decoder changed from its normal 1750Hz to 800Hz. This aligned with the standard used for most receivers and meant that the very narrow c.w. filters available on some receivers could be fully utilised. In fact a narrow receiver filter combined with the internal audio filtering of the W 4010 was a very powerful combination for reducing interference from adjacent stations. It was when receiving c.w. that the squelch control came into play and this proved to be very easy to use. It was just a matter of setting the level so that the noise between elements of a character were just suppressed.

With all the controls set I started by attempting to decode some commercial machine sent c.w. The W 4010 was able to handle this very well which is very much as I would expect. This simple test complete I set about testing its abilities on amateur hand sent c.w. which is probably the most demanding test because of the variable quality of the c.w. The W 4010, not unexpectedly, had some difficulty here and required some patience on the part of the operator to achieve the best results.

However, when asked to decode good quality amateur or commercial hand sent c.w. the performance was fine. The setting of the speed was simply a matter of a couple of button presses to see if a speed increase or decrease effected an improvement in reception.

RTTY

Moving on to RTTY there were two modes - Baudot Variable and Baudot Auto. The easiest of these was the auto mode where the W 4010 automatically selected the appropriate shift and baud rate from a number of standard pre-sets. This proved to be very fast and an extremely convenient way of receiving this type of signal. The details of the selection made by the W 4010 were displayed on the screen so they could be entered in the log.

The Baudot Variable mode was provided for the reception of signals that are either encrypted using bit inversion or use a non-standard shift.

When using this mode the first task was to measure the baud rate which was achieved by pressing the F1 button. The measurement system was quite sophisticated and had two stages. The first was a quick calculation of the rate and was often adequate. However if a more accurate reading was required the IAS (Iso-Asynchron and Synchron) analysis could be enabled by a second press on the button. As with all baud rate measurement systems it could be followed by some signal types.

Once the speed had been selected the W 4010 then established the shift and started to display the text. If the signal was not an asynchronous RTTY signal then the message "data format error" was displayed. Incidentally this speed check facility was available on all the RTTY and ARQ type data modes.

Another useful feature of the W 4010 was that different alphabets could be displayed on the screen. In addition to English both Cyrillic and Greek alphabets were available. Of course the usefulness of this rather depends on your ability to understand the Cyrillic and Greek alphabets!

Bit inversion is a crude technique used to encrypt some RTTY transmissions and simply involves reversing one or more of the data bits in the transmitted signal. In order to make sense of the received signal the inversion needs to be reversed at the receiving end. The W 4010 can handle this type of transmission as the operator has the option to manually reverse any of the data bits. In practice this is a very time consuming and rarely rewarding task.

Error Correction

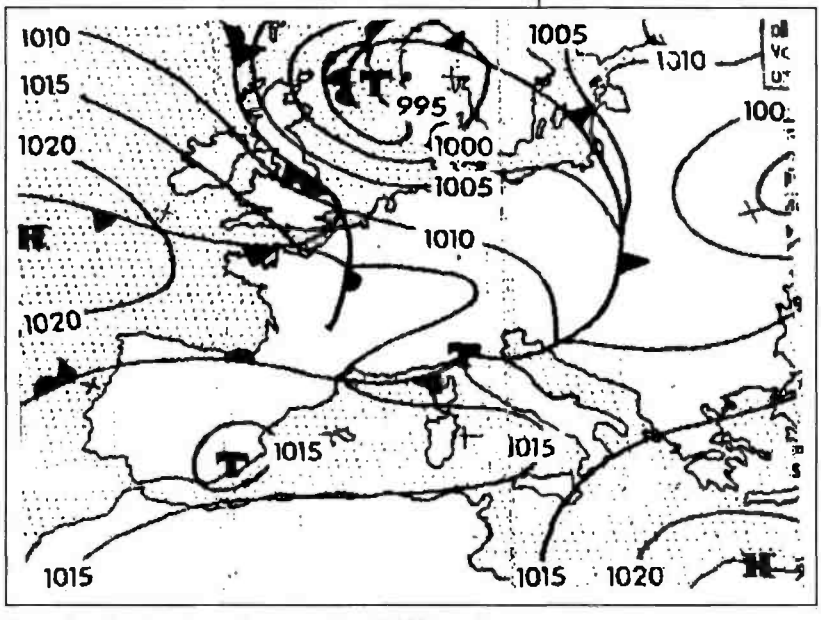
Of the error correcting systems the SITOR ARQ and FEC are probably the most common.

The W 4010 handled these mode very easily with its Auto mode where synchronisation with both of these modes was automatic and fast. Both the filter and level controls on the front panel were operative and the secret was to start with these backed right off and then slowly decrease the filter bandwidth until the tuning display was just showing signs of clipping. The level control was then adjusted to suppress the noise in the transmission pauses. You could also force the W 4010 to receive either ARQ or FEC if required, which was useful on some bands were there are a mixture of signals.

As with the RTTY mode you could change the alphabet to Cyrillic or Greek if required.

Packet Radio

Packet radio is an amateur only mode and this was included in Module A. The actual implementation was very good and had been set up with the listener very much in mind. One of the most useful points was the ability to emulate a particular callsign so that you received only messages destined for that call. This overcame one of the major problems facing listeners who used a standard TNC for packet reception. In these cases your screen quickly fills with all manner of messages and it's very difficult to identify one particular conversation. The W 4010 overcomes that problem very effectively. The operator also had the option to set the baud rate to 300, 600 or 1200 baud and to choose to ignore U and S frames. The only problem I encountered on this mode was the occasional overwriting of screen text when a carriage return without a line feed was received.



Sample chart using the weather FAX mode of the Wavecom 4010

REVIEW

FAX

This option was included as part of Module A and worked slightly differently to the other modes. Rather than send the FAX image to the screen it could only be seen by connecting a printer. The reason for this is quite simple and is all to do with resolution. The resolution obtainable from a modern printer far exceeds that available from the screen driver in the Wavecom. An example of the high quality of the printed image is shown in this review. The connection to the printer is a standard Centronics parallel type. It was also good to see that the software included drivers for both 9-pin and 24-pin printers. The sample image shown in this review was made with a Panasonic KX-P1124 24-pin printer.

The W 4010 FAX implementation included all the basic controls necessary for successful reception. These included user or automatically selected drum speeds of 60/90/120 r.p.m. and the common IOCs 288 and 576.

For manipulation of the received image there was the facility to shift the image left or right in small steps. The image could also be inverted to take account of occasions when l.s.b. is used for reception. Finally the drum speed could be trimmed to correct images with a diagonal drift. Although designed primarily for the reception of charts the W 4010 could be used to receive press and rebroadcast satellite images. Because there were no grey scales the result was a very high contrast image but still quite recognisable. The only area where I had a little difficulty was when receiving FAX stations on l.f. This was because these stations use a shift of 150Hz as opposed to the more conventional 400Hz, so the tuning was very much more critical.

Duplex ARQ

The full duplex ARQ modes, ARQ-E and ARQ-E3 were made very easy to decode and the W 4010 could handle baud rates between 30 and 300. The lock-in speed on these modes was very fast being generally less than five seconds. Once locked-in the cycle rate and status was displayed on the screen which was useful.

The two multi-channel modes ARQ-M2 and M4 again performed very well with fast lock-in times. Both of these modes featured auto channel selection where the W 4010 displayed text from any channel that was active. This was particularly appropriate for these modes as commercial stations are often left idling for long periods of time. If you wanted to monitor a particular channel, the auto selection could be overridden. Because the signal format of the multi-channel modes is that much more complicated the W 4010 needed a good strong signal for successful decoding.

The remaining ARQ and FEC variants all performed well with similar characteristics to the basic ARQ modes. Of course some of the modes covered by the W 4010 are in practice quite difficult to find unless you have a good up-to-date frequency list.

Software Module D was very specialist in it coverage of modes specific to the German Press and Economic news agencies. I must admit that due to very weak signals and local interference I was unable to decode any of these transmissions.

Throughout the on-air tests the bar-graph tuning display proved itself to be extremely effective. This is a vital point as a good tuning aid is essential for success with the data modes. This applies particularly to the more complicated modes such as multi-channel ARQ.

Summary

I was very impressed with the performance of the W 4010. Not only was it a very competent data decoder but it looked good too!

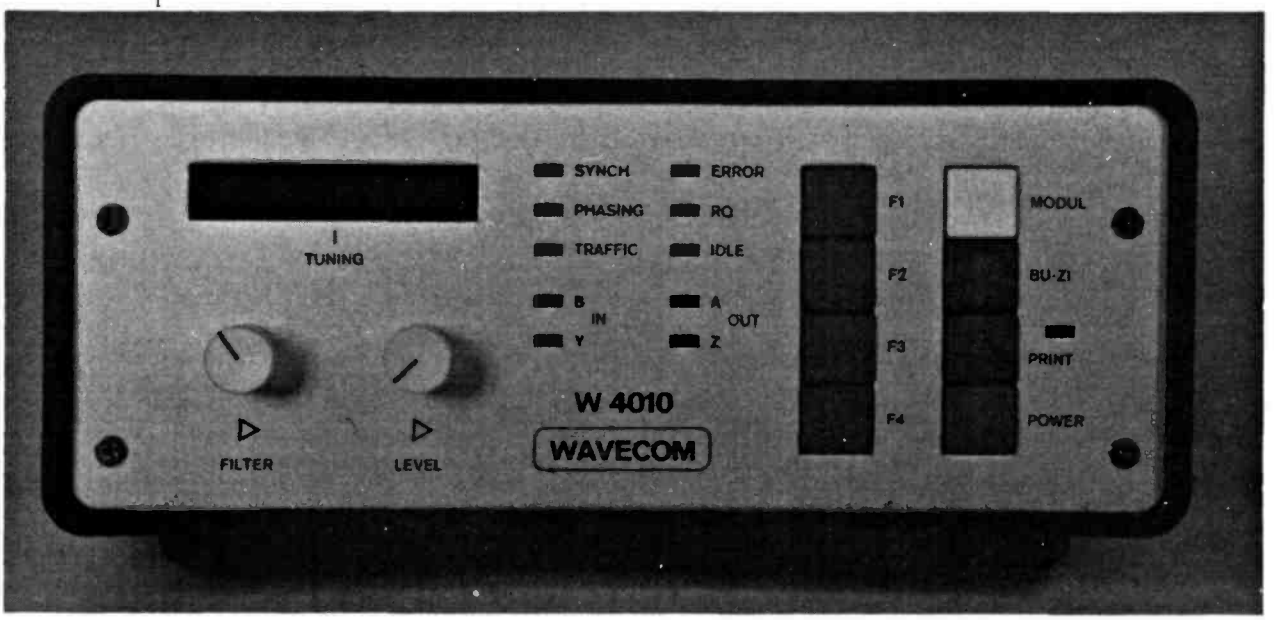
The range of reception modes covered a large proportion of those in common use. I would have liked to have seen some more effective and user friendly analysis modes but am aware that this is no easy task.

The good looks of the W 4010 will obviously increase its appeal to those operators without the advantage of a separate shack.

I am sure that the W 4010 will continue to be a popular choice for listeners with a serious interest in utility communications.

The Wavecom W 4010 costs £942 and is available from **Dewsbury Electronics, 176 Lower High Street, Stourbridge, West Midlands. Tel: (0384) 390063.**

My thanks to Dewsbury Electronics for the loan of the review model.



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FT211RH	2m 45W FM Mobile	309.00	(—)
FT212RH	New 2m 45W FM Mobile	349.00	(—)
YHA15	2m Helical	7.80	(2.00)
YHA44D	70cm ¼ wave	12.50	(2.00)
MMB16	Mobile Bracket	14.06	(2.00)
FT411	New 2m H/H Keyboard	228.00	(3.00)
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NC9C	Charger	11.80	(2.00)
PA3	Car Adaptor/Charger	21.85	(2.00)
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8810	PTT Switch Box 270/2700	22.00	(2.00)
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Jaybeam	TB3 Mkll 3e HF Tribander	348.45	(8.00)
Creative	CD318 JR 4e HF Tribander	299.00	(8.00)
Creative	CD318 4e HF Tribander	349.00	(8.00)
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WX1	2m/70cm Base Fibre Glass	54.99	(5.00)
WX2	2/70cm Base Fibre Glass	79.50	(8.00)
CF416Max	2/70cm Duplexer	26.50	(3.50)
CA2X4Max	2m/70cm Base Fibre Glass	99.95	(5.00)
TDHP	10/80m trapped dipole	49.00	(6.50)

ICOM

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IC781A	HF Transceiver	1500.00	(—)
IC735	New HF Transceiver	979.00	(—)
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IC725	HF Bass Transceiver	769.00	(—)
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AT180	150W ATA (735)	319.00	(4.00)
PS55	Ext PSU (735)	185.00	(4.00)
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IC290D	2m 25W M/Mode	569.00	(—)
IC228E	2m 25W FM Mobile	365.00	(—)
IC25E	2E New Mini Hi-Fi	275.00	(—)
IC275E	New 2m 25W Base Stn IC75E	1069.00	(—)
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IC24ET NEW	2m/70cm Dual Band H/Held	385.00	(4.00)
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IC240	2m/70cm FM Dual Band Mobile	535.00	(4.00)
ICR71	Gen Cov RX	969.00	(—)
IC7000	VHF/UHF Scanner	989.00	(—)
AH7000	25-1300MHz Discone	82.00	(4.20)
BP3	Ext Speaker	61.00	(4.00)
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EX257	FM Board (R70/R71)	41.00	(2.00)
GC8	World Clock	43.00	(3.00)
AC2	Waterproof Bag all Icom H/H	14.38	(2.00)
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HKB03	Straight key (Brass)	89.95	(3.50)
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E810F	23.00	EZ80	1.00	QOV02-6	19.50	6B7	3.25
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EBF80	1.50	GZ32	4.00	QOV03-10 Mull	15.00	6BA7	5.00
EBF89	1.80	GZ33	4.75	QOV03-20A	25.00	6BE6	1.50
EC91	6.50	GZ34 Mull/GE	7.00	QOV06-40A	27.50	6BH6	2.80
EC33	7.50	GZ37	4.75	QOV06-40A Mull	39.50	6BJ6	2.25
EC35	7.50	KT81	7.00	R18	3.00	6BN6	2.00
EC81	1.75	KT88	15.00	R19	7.50	6BQ7A	3.50
EC82	1.75	KT88 GEC	28.00	SP41	6.00	6BR7	6.00
ECC83 Siemens	2.25	KT77 Gold Lion	15.00	SP61	4.00	6BR8A	3.80
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ECH42	3.50	OD3	2.00	UBF89	1.50	6C6	3.50
ECH81	3.00	PC86	2.50	UCH42	4.00	6C86A	2.50
ECL80	1.50	PC88	2.50	UCH81	2.50	6CD6GA	5.00
ECL82	1.80	PC92	1.75	UCL82	1.75	6CL6	3.75
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EF41	3.50	PCF86	2.50	UY41	4.00	6DQ5 GE	12.00
EF42	4.50	PCF801	2.00	UY85	2.25	6DQ6B	4.75
EF50	2.50	PCF802	2.50	VR105/30	2.50	6EA8	3.00
EF54	5.00	PCF805	1.70	VR150/30	2.50	6EH5	1.95
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Valve Technology & Characteristics - Part 2

Theory

In this issue, Peter Buchan G3INR continues this series by looking at triodes and their characteriestics. He also details how the valve user can make use of manufacturers data for their own experiments

Power transfer becomes more important as we move on to the multi-electrode valve as we shall see when we look at triodes in this issue and pentode output valves at a later date. For the moment we stay with the simple triode (three electrode) valve which is a developement of the diode as mentioned in Part 1and was introduced by Lee de Forest in the early part of this century.

What de Forest did was to introduce a third electrode which he placed between the cathode and the anode. This extra electrode acts as a controlling electrode which is available to the circuit designer and enables them to regulate the flow of current through the valve. It does this by being connected to a negative voltage supply, the supply may be varied and as a result the anode current varies in sympathy with it. The degree to which the anode current follows faithfully the varying negative voltage is a measure of the linearity of the device.

To put it another way it indicates how well the valve can amplify without introducing distortion. One important feature is that the third electrode does not take any current from its voltage supply (unless operated as a power amplifier). This fact should indicate to you that it offers a very high impedance to any source of voltage or signal.

Triode Characteristics

Characteristics of a triode valve follow very closely those of a diode in shape, especially when the grid (third electrode) voltage is zero.The third electrode is given the title 'grid' mainly because the appearance of the electrode looked like a grid or mesh of wire. For the purposes of small signal amplification, only negative voltage is placed upon the grid and is of the order of a few volts, say up to -10V.

To plot a triode characteristic, a circuit such as that shown in Fig. 2.1(a) is set up. In the first instance a curve is plotted with zero volts on the grid. To obtain zero volts on the grid the grid is connected to earth (ground, 0V, etc.). The Ia/Va plot will look the same as for the diode. Next a voltage of -1.0V (minus one) is placed on the grid and the Ia/Va plotted again. The curve will have a similar appearance to the first but it will be moved a little to the right on the graph. The grid voltage is now increased to -2.0V (minus two), and the curve plotted again. Once more the curve is similar and moved to the right. To complete the characteristic the grid voltage is increased in steps of one volt to the maximum recommended figure and the results becomes a 'family' of curves. See Fig. 2.2(b).

This family of curves describes the static characteristic of the triode and is a very useful

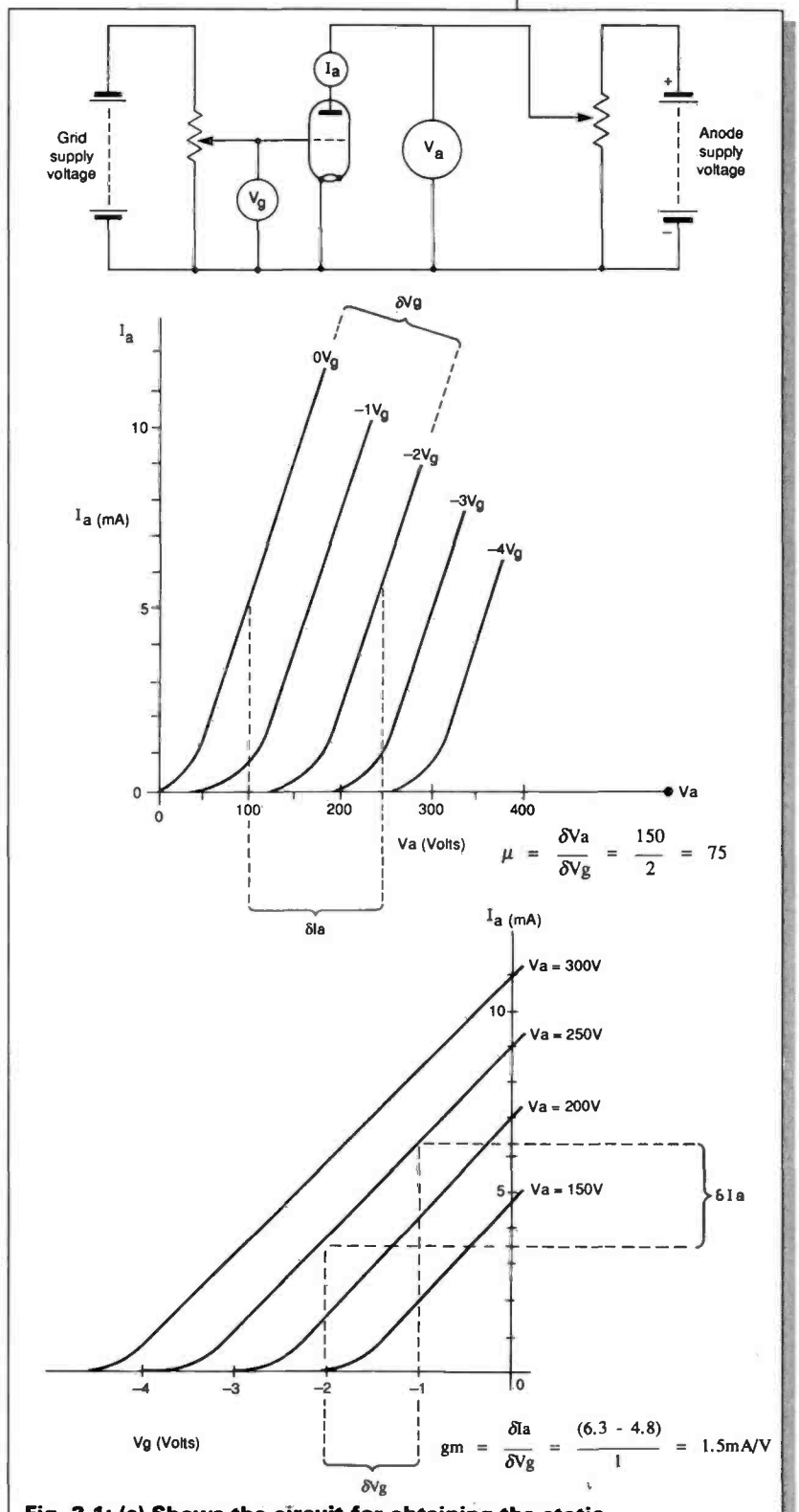


Fig. 2.1: (a) Shows the circuit for obtaining the static characteristics of a triode valve. (b) A family of curves taken at a series of fixed grid bias voltages, and an indication how to derive the amplification factor μ.(see text). (c) A family of curves taken with fixed anode voltages, and an indication how to obtain the mutual conductance gm for the triode.(see text).

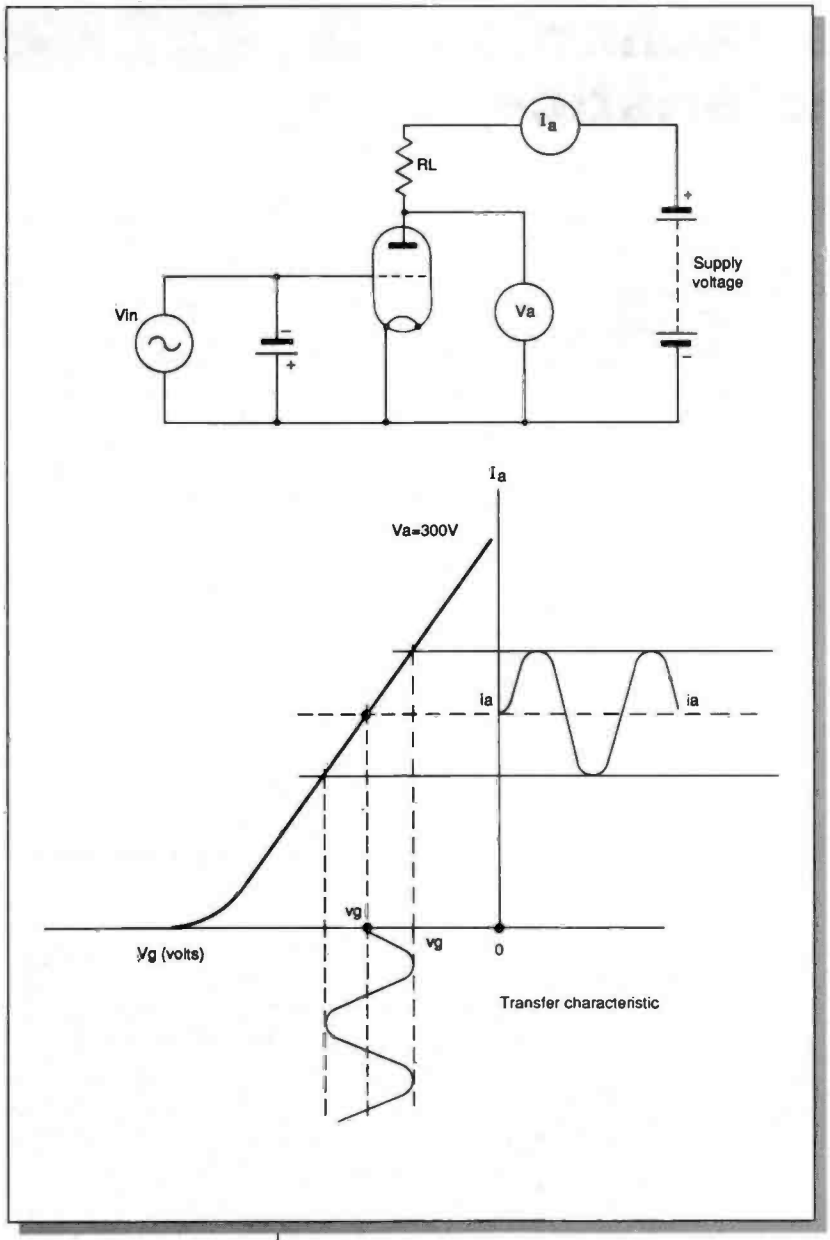


Fig. 2.2: (a) Shows the circuit for obtaining the voltage amplification characteristics of the triode. (b) Graphical representation of the valve in action, In other words the "transfer characteristics".

design aid in the evolution of a simple valve amplifier. The grid voltage was changed in steps of one volt for convenience only, it is possible to make infinitely small changes in grid voltage and detect the corresponding change in anode current and voltage, and it is this relationship which enables the valve to amplify signals.

There is an analogue of this behavior in the mechanical world that is made use of in the aneroid barometer. The very small changes in volume that take place in the corrugated vacuum chambers is coupled to levers and gears which transform the tiny changes to a circular movement on a relatively large dial.

In a similar way small changes in grid voltage cause changes in anode current which has to be drawn through a resistor. The voltage that is dropped across this resistor will be greater in amplitude than the grid voltage that caused it to change, therefore amplification has taken place.

Let us make a start by looking at Fig. 2.1 again, the graph in Fig. 2.1(b) describes the Ia/Va characteristic with a series of fixed grid voltages, the anode voltage being varied from zero to maximum for each new grid voltage setting. The graph in Fig. 2.1(c) however, describes the Ia/Vg characteristic with a fixed anode voltage, the grid voltage being varied from zero to maximum. This in fact is much more like the way the triode is used in practice but an anode load resistor is needed in the circuit before use can be made of the valve's amplifying characteristics.

Staying with Fig. 2.1(b) let us take a look at the triode's fundamental constants. These are the amplification factor (μ), the anode a.c. resistance (ra), and the mutual conductance (gm). Amplification factor, μ, is a measure of the triode as a voltage amplifier and can be derived from the graph in Fig. 2.1(b). Let us assume that the grid voltage Vg is changed from -3V to -1V, the anode current (Ia) will rise. To return the anode current to its original value suppose that the anode voltage (Va) has to be reduced from 100V to say 70V. For a change of 1V on the grid we make a change of 30V on the anode. Dividing the small change in anode voltage, δVa, by the small change in grid voltage, δVg, (where δ means a small change) we obtain the amplification factor μ, i.e., δVa/δVg= 30. More on that later.

In a similar way to the diode we could establish the anode resistance of the valve, but of more importance is the anode a.c. resistance or ra, because we expect to be using the valve on the linear part of its characteristic, and it is on the linear portion that we establish the ra of the valve. With a fixed grid voltage Vg, let us say that for a change of 30V on the anode we see a change of 2mA in anode current, and these changes are made on the linear portion of the curve, all we now do is to divide δVa by δIa, ie δVa/δIa= 15 000Ω. So ra=15kΩ.

Turning now to Fig. 2.1(c) and to the curve where Va is fixed at 150V. Once more let us assume some figures and that they are, a change in grid voltage Vg of 1V, causes a change in anode current Ia of 2mA. What we see here is a mutual change in current for a change in voltage. From these figures we can obtain the mutual conductance (gm) of the valve by simply dividing the small change in anode current, by the small change in grid voltage. ie δIa/δVg= 2mA/volt. (gm=2mA per volt). The word conductance is used because a current is divided by a voltage, conductance is the reciprocal of resistance.

It is now time to turn to Fig 2.2, and note that the circuit includes a resistor in series with the anode Fig. 2.2(a). What we want to move toward now is the triode voltage amplification A, and to introduce the idea, study Fig. 2.2(b). The grid voltage (now to be known as the grid bias voltage) is chosen so that the anode current is set midway along the linear portion of the Ia/Va curve.

The d.c. conditions of the valve are now established, that is to say the grid bias voltage has been set, the anode current is steady at some value and the anode voltage is also steady at some value, which will have been determined by the choice of anode load resistor.

Now these voltages are the ones you would measure using a moving coil voltmeter, or nowadays perhaps a d.v.m., whichever one, would be switched to read d.c. volts.

The circuit in Fig. 2.3(a) includes a signal generator Vin. This generator supplies an alternating voltage which will be impressed upon the grid bias voltage. The net result is that the grid voltage varies about its mean set point by an amount and at a frequency chosen for the generator output. Certainly, the generator output will be very much

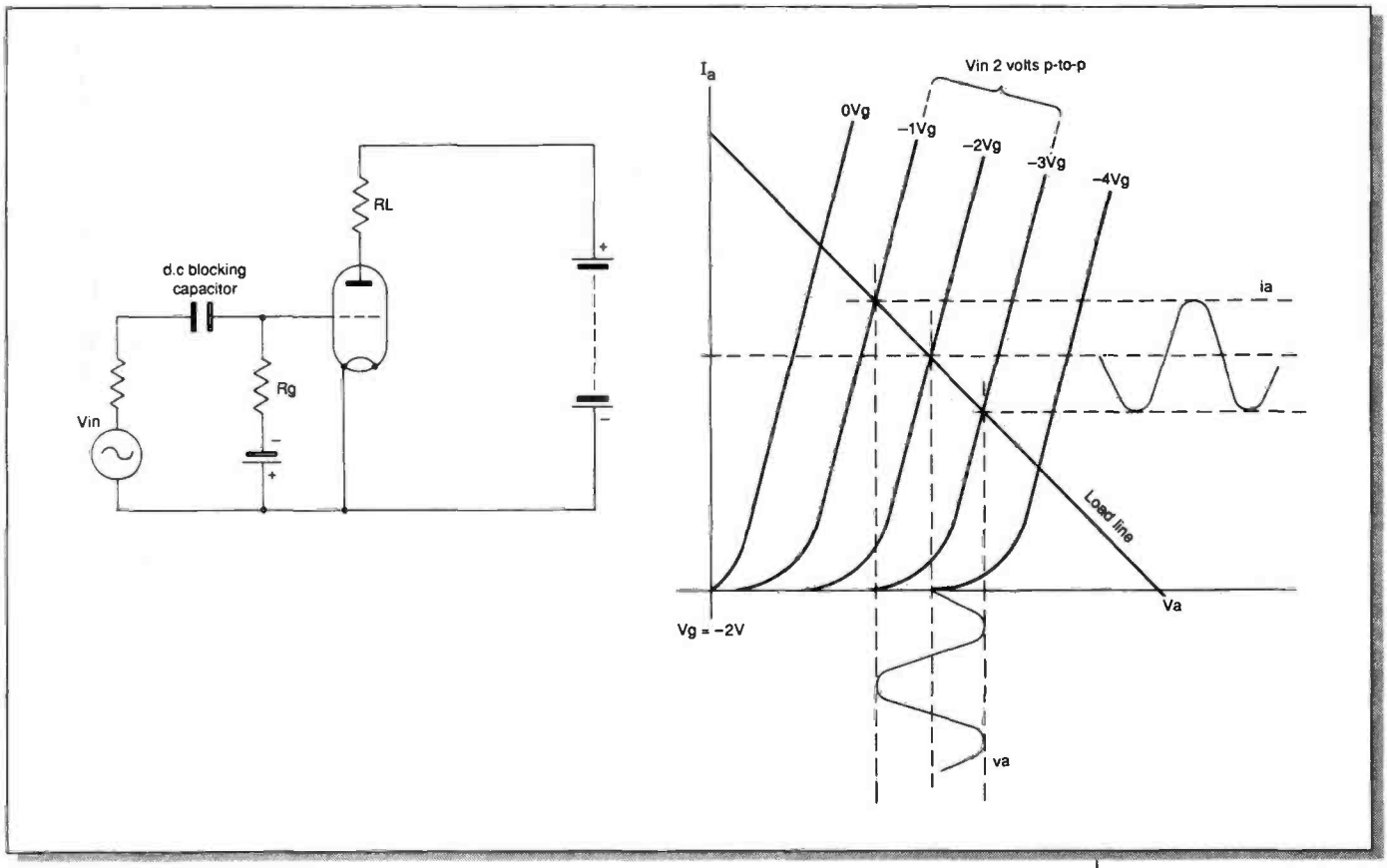


Fig. 2.3: (a) Amplifier circuit. (b) transfer characteristics with load line (see text).

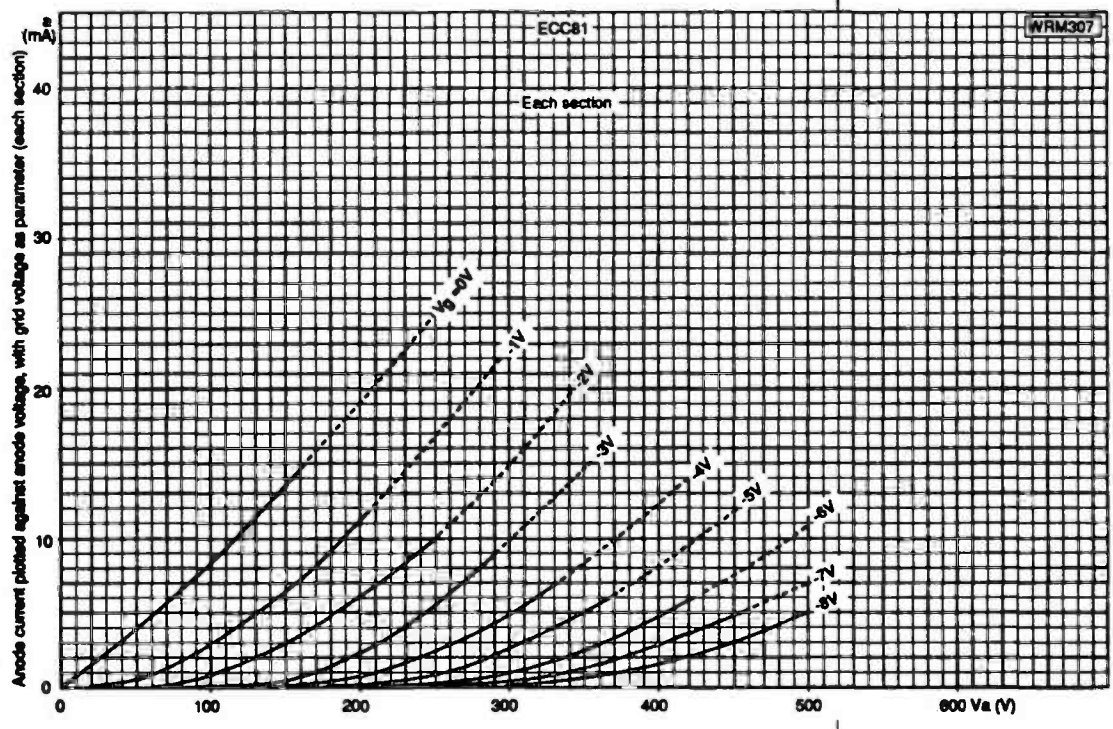
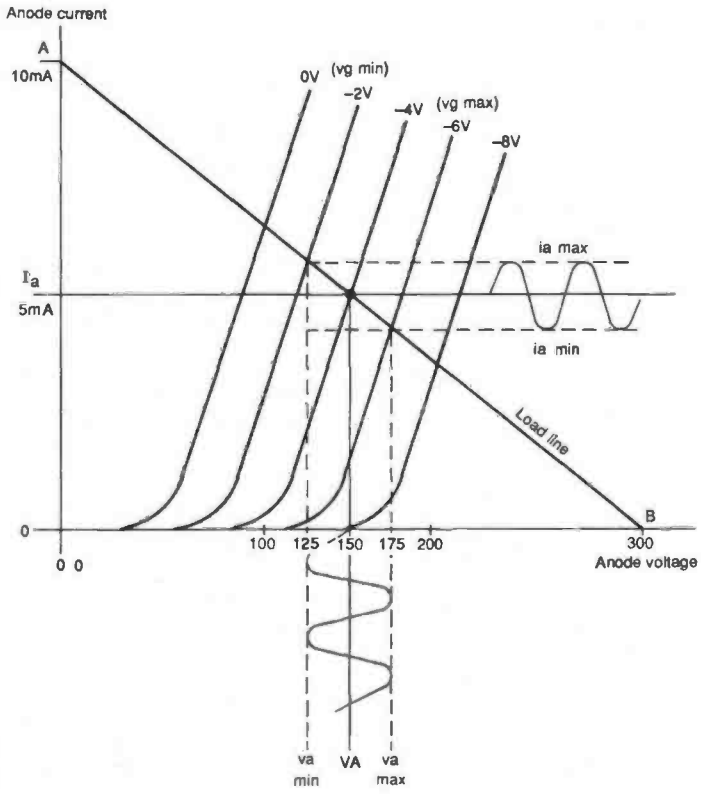


Fig. 2.4: Characteristic curves for a 6SL7 double triode (one section only) from which it is hoped the reader will derive the constants.

less in amplitude than the bias voltage. It is clear in Fig. 2.3(b) that the anode current ia follows the signal voltage vin, up and down the straight portion of the Ia/Va curve. Please note that upper case letters are used to denote the d.c. voltages and currents, and that in general, lower case letters for the signal voltages and currents. Note also that the anode current ia, is in phase with the signal voltage vin.

A word now about the anode load resistor RL. This resistor will have been chosen to provide a predetermined amplification, and its value will depend upon a number of factors, but for the moment make a note that the amplification obtainable, will never exceed the amplification factor μ. We will look into this later. Remember now that we established that the ra of our triode was 15kΩ.



$$Av = \frac{va\ max - va\ min}{vg\ max - vg\ min}$$

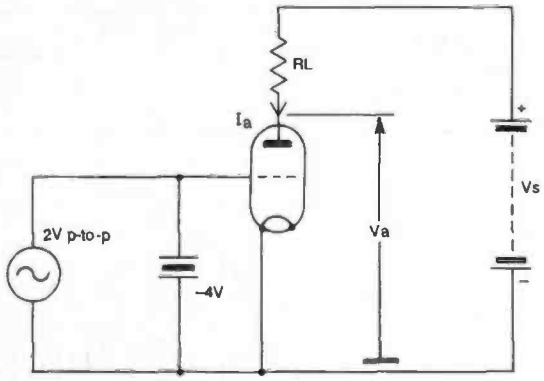


Fig. 2.5: A graphical example of how a valve amplifies

It can be shown that:

$$\text{Voltage amplification } A = \frac{\mu}{1 + ra/RL}$$

So for our particular triode

$$A = \frac{30}{1 + 15k/10k} = 12$$

where RL = 10kΩ

Therefore if we put a 10kΩ anode load resistor in the circuit we shall be able to amplify signals twelve times. Try other values of anode load and you will find that if RL = ra, then, A = 0.5μ, or if RL = 6ra, say, then A = 25.7, or about 0.86μ. Perhaps you can now see that voltage amplification A, can never exceed the amplification factor μ. A graphical picture of the triode characteristic with the voltage and current waveforms can been seen in Fig. 2.3(b). It was mentioned earlier that a d.v.m. would be used to measure the d.c. conditions of the amplifier, well a c.r.o. is the instrument which would be used to measure the signal waveforms in an amplifier. Later we shall determine the voltage amplification A, from a set of characteristic curves.

Whilst we are talking about measurments, it would be a good idea to mention r.m.s., and peak to peak a.c. signals. The figures we have been looking at show alternating voltages and currents which take the form of sine waves. These are the waveforms that we would see on a c.r.o., and they are displayed as peak to peak values. Now signal generator output attenuators are calibrated using r.m.s. values. There is a substantial difference between r.m.s. and peak-to-peak voltages, don't mix them up.

To add a little interest a family of Ia/Va curves for a ECC81 has been included, Fig. 2.4, and the idea behind this is to get the reader to derive from the curves the constants for this particular triode valve. You should be able to find the amplification factor μ, the a.c. resistance ra, and the mutual conductance gm. Draw a tangent at 250 Va, for -2V Vg. Obtain the constants at this point. In addition obtain the voltage amplification for an anode load of 16kΩ both by calculation and from the curves. You will need to draw a load line when you use the curves. Assume the supply voltage to be 400V.

Those readers who obtained the fixed parameters for the ECC81 triode by using the graph (Fig. 2.4), will no doubt be interested to know what the manufacturers figures are. For a single triode section of the ECC81 valve the ra is 11kΩ, the gm is 5.5V and the amplification factor μ is 60, so how did you get on?

Moving on to Fig. 2.5, you should be able to deduce the voltage gain Va, from the graph. A sinusoidal signal voltage is assumed of 4V peak-to-Peak, which is applied to the grid. The grid is biassed a, which sets the anode current Ia at 5mA, and the anode voltage at 150V. The graph indicates how the sinusoidal signal voltage swings the anode current ia, (note the use of lower case letters to represent signal voltages) and the anode voltage va, about the present values. A simple arithmetical deduction gives Av as (175 - 125)/4 = 12.5. This type of 'small signal amplifier', is known as a Class A amplifier, because it uses the linear portion of the characteristic. Hence, the output voltage waveform, follows faithfully the input voltage waveform. Technically, the transfer function of the valve is linear. **PW**

The next part will give more practical advice on triodes and then will move onto pentodes

The RB10 Antenna Part 2

In the second part of his article on the RB10 antenna, Fred Judd G2BCX provides detailed constructional information to help you build this versatile project.

The first item is the mounting plate, as in Fig. 2.1, which carries the ring base and the housing for the radiator series inductance and the coaxial input socket. The mounting plate may be constructed from either aluminium or mild steel, thickness and drilled as shown in the diagram.

Note that the holes marked a are slotted to allow for alignment of the radiating element mounting blocks. The holes at the centre marked b are for the fixing bolts that hold the batten on which the ring and the plastics box are mounted.

Holes marked c are for securing the mast 'stub' while those marked d are for attaching thin rope or nylon cord guy-lines (if required). The hole at b, upper left-hand corner, is for the insulating wire used to connect the radiating element stub to the loading inductance, which are clearly illustrated in the photographs of the antenna.

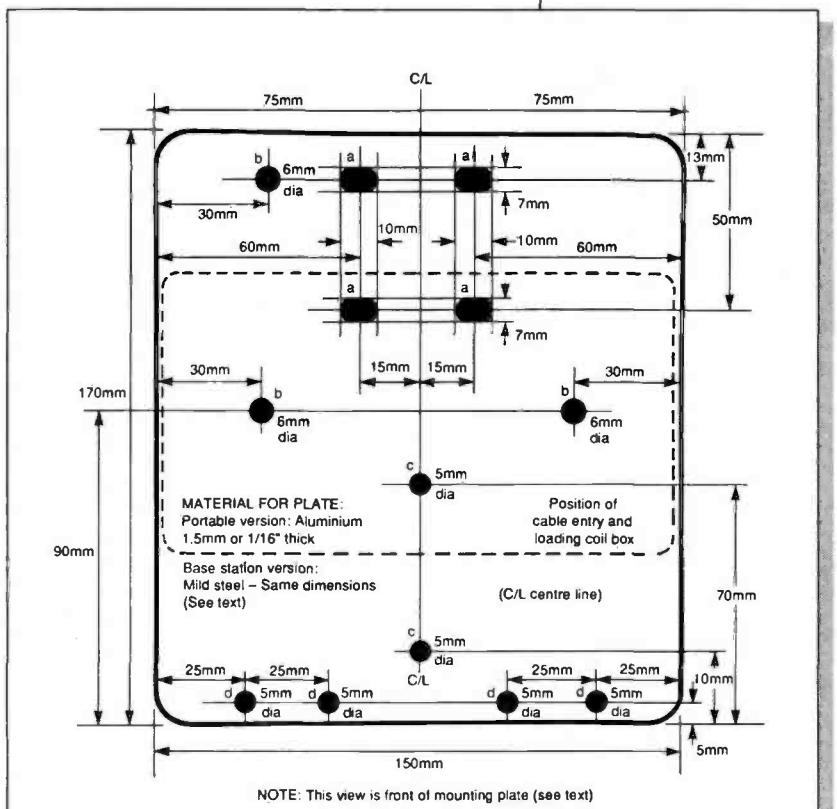
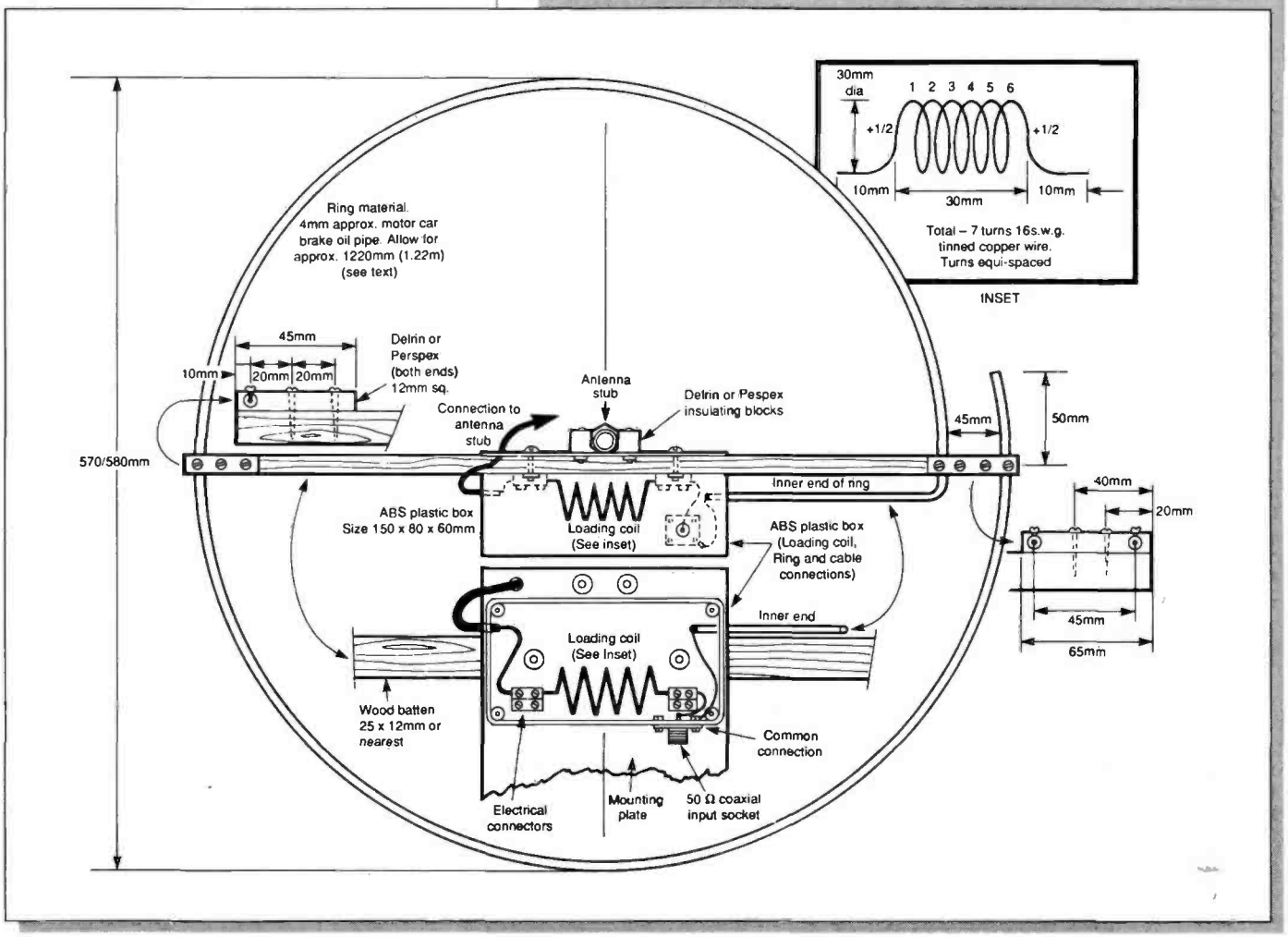
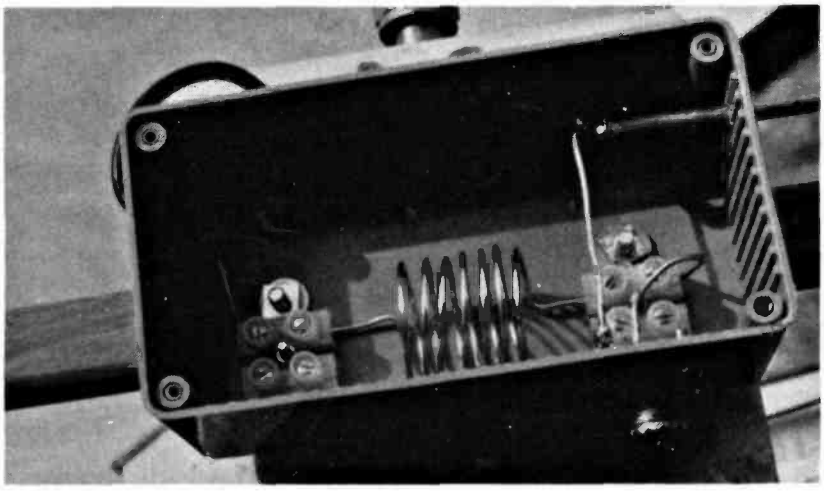


Fig. 2.1: The drilling details for the mounting plate.

Fig. 2.2: Assembly details of the antenna.





The Ring Base Unit

Assembly details and dimensions, etc., are given in Fig. 2.2. The 'ring' is best made from copper/nickel motor car hydraulic brake pipe tubing which is approximately 4mm in diameter. The length required is 1.22 metres and this form of piping is obtainable from any garage that carries out car repairs. They will usually sell short lengths.

The brake pipe material is readily formed into a ring without kinking or splitting and can be soldered easily. The support blocks at each end of the wood batten may be cut from Delrin or Perspex. Other insulating material may be used, but it must be an efficient insulator as there will be high r.f. voltages on the ring. (Don't touch it when transmitting!) The completed assembly is shown in the photograph, Fig. 2.7.

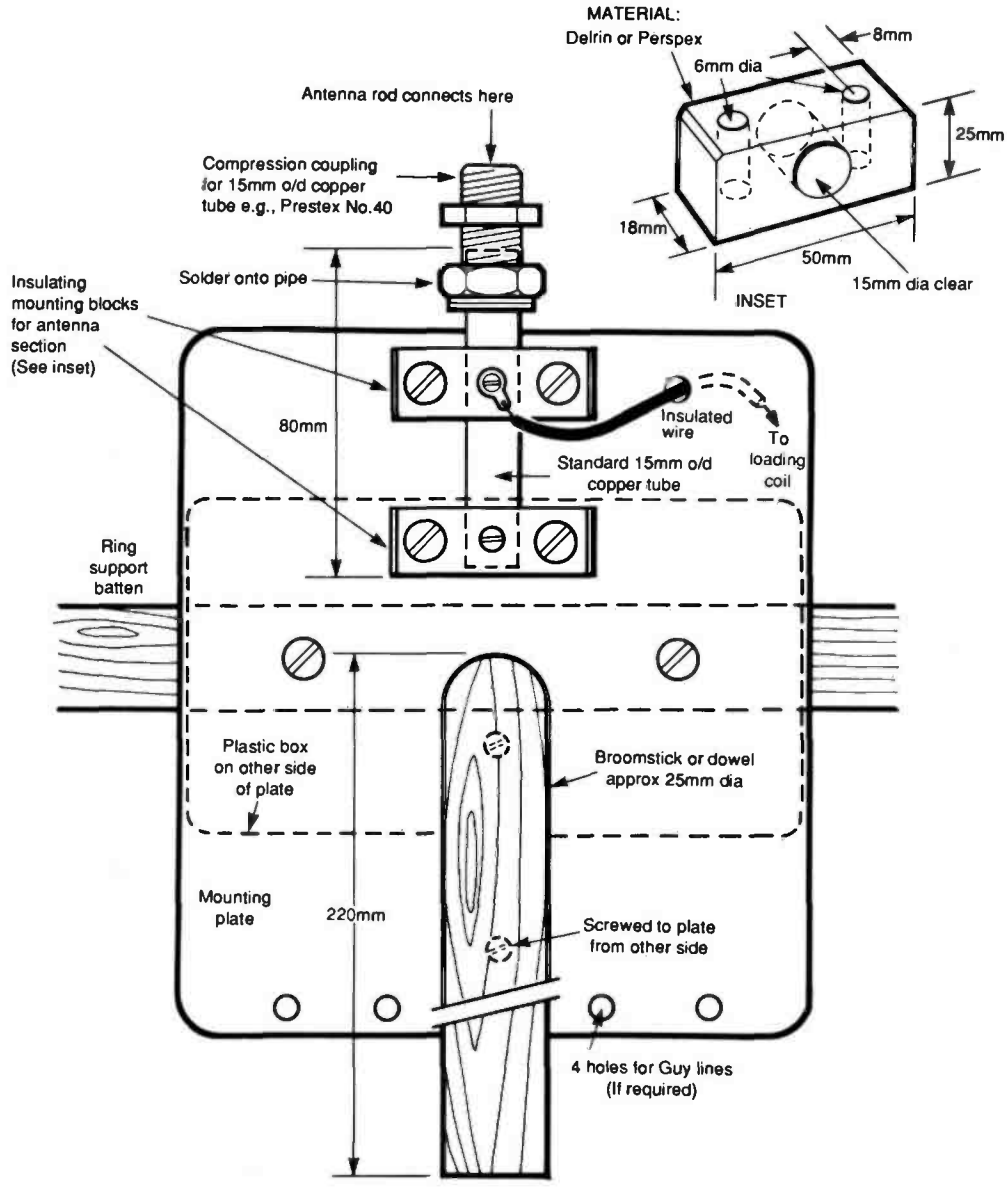


Fig. 2.4: Details of the radiating element mounting stub and its insulating blocks. Inset details the insulating blocks.

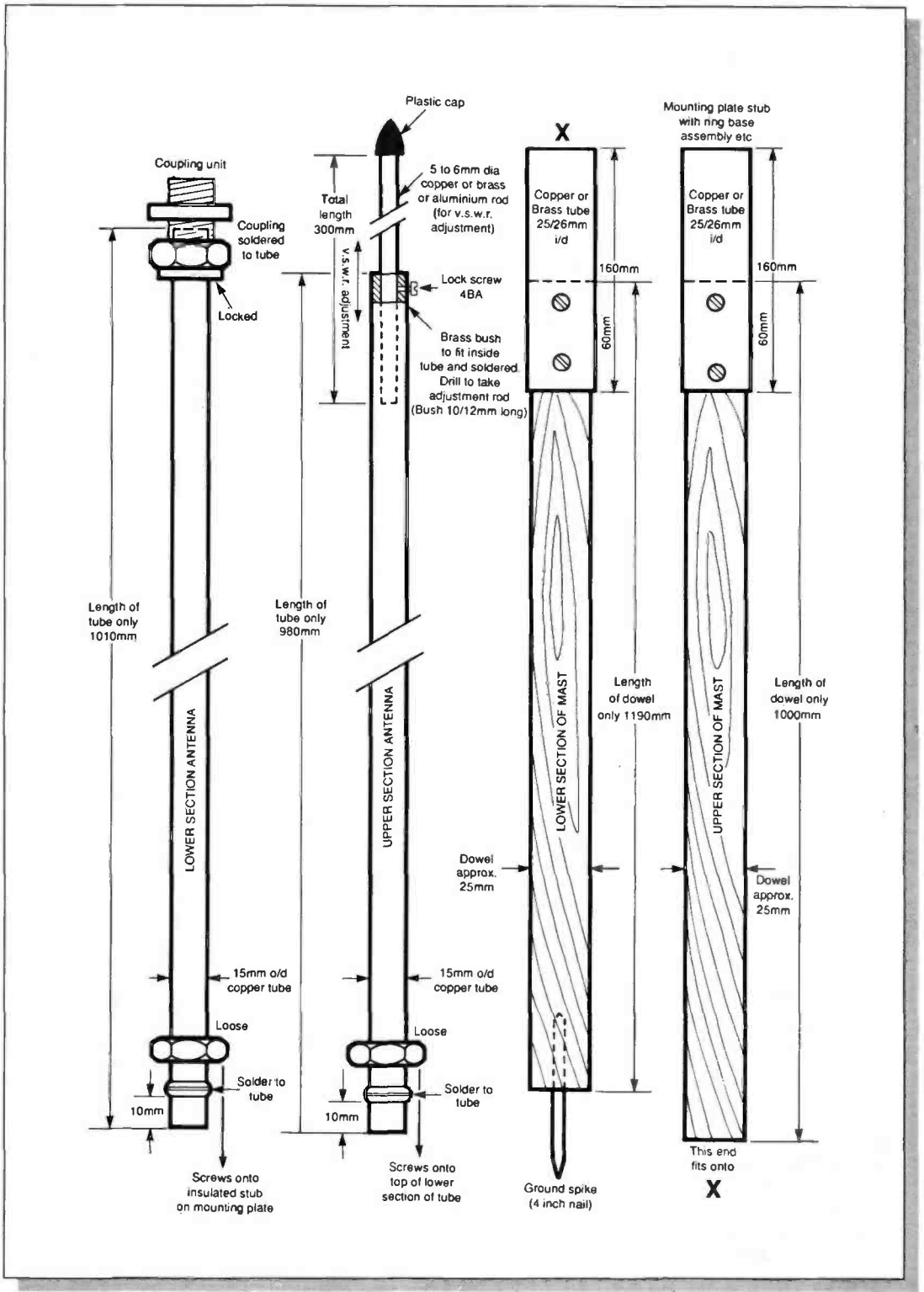


Fig. 2.5: (Left). Details of the radiating element sections for the portable RB10. (Right). The portable mast sections fitted with brass or copper ferrules.

Radiating Element Stub

The radiating element stub is secured on the reverse side of the mounting plate on insulating blocks as shown in Fig. 2.4. A 'compression' type plumbing fitting to suit the copper water pipe size is 'sweated' (soldered) to the top of the short stub to take the lower section of the radiating element. A small blow-torch will be needed to 'sweat' the couplers to the tubes.

Details for the construction of the two insulating blocks are given in the 'inset' of Fig. 2.4. The insulating material **MUST** be Delrin, Perspex, or similar, as high r.f. voltages will be present during transmission.

The wire from the solder tag (fix with a self-tapping screw through to the pipe) which connects to the loading inductance, must be well insulated for the same reason. I recommend that you use bolts of at least 4mm diameter to secure the blocks. Gutter bolts and nuts are ideal for this purpose.

The Radiating Element

For the portable version this consists of two sections of 15mm copper water pipe (as used in

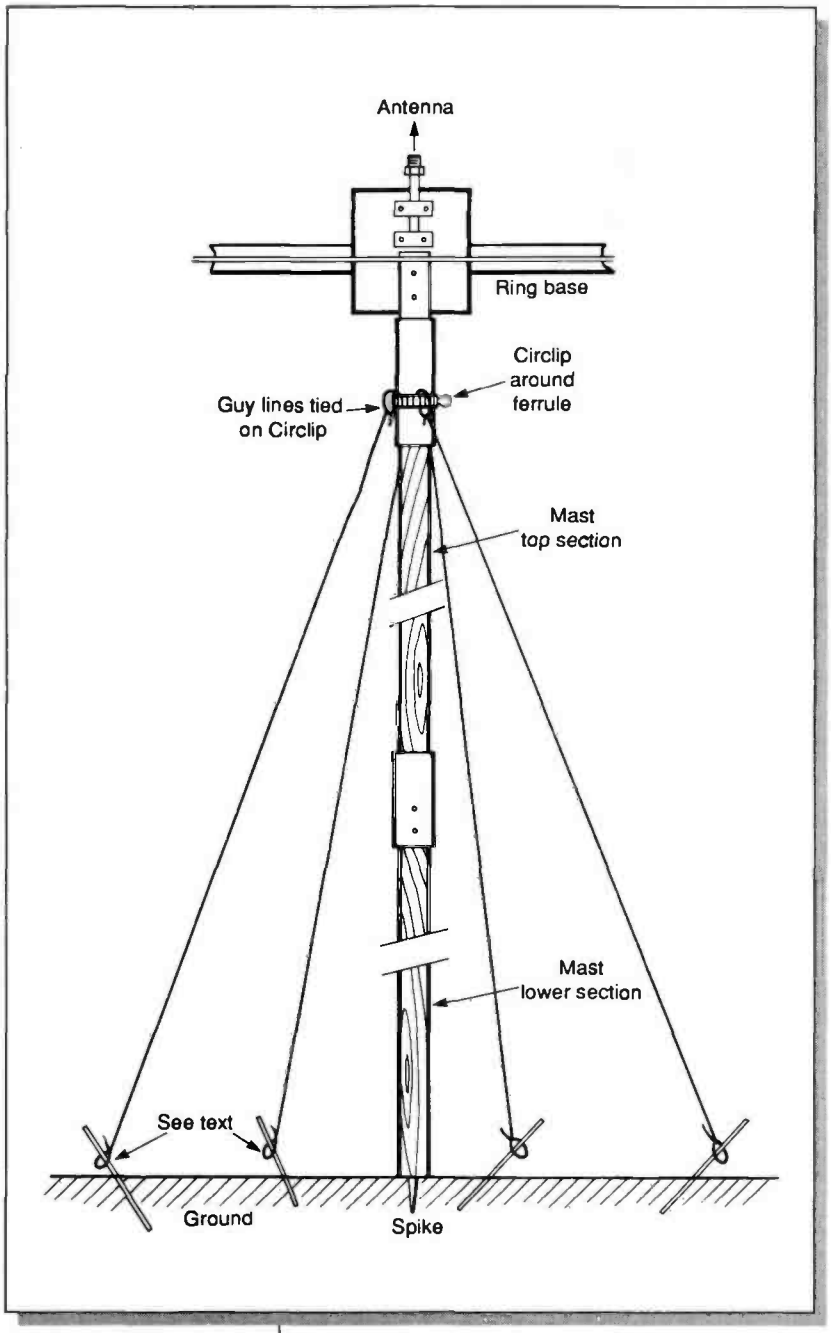


Fig. 2.6: How the portable RB10 can be set up with light guy lines attatched to the upper section of the portable mast with a circlip.

central heating and plumbing systems), fitted with couplers as illustrated in Figs. 2.4 and 2.5. Note that the upper section has an adjustable portion at the top. This is for obtaining resonance and optimum v.s.w.r.

The joined sections are fitted to the insulated stub coupler on the mounting plate. For fixed station operation, the radiating element may be a single length of aluminium tube of 12mm diameter (length equal to the two copper pipe sections plus the short stub section i.e., 2070mm. The whole element is secured directly in the insulating blocks on the mounting plate. The top of the element has an adjusting portion as described above.

The Mast Stub and Portable Mast

The stub itself is a short piece of dowel, or broomstick, 220 to 250mm long, secured to the plate with large self-tapping screws or gutter bolts and nuts (Fig. 2.4). The assembly fits into the ferrule of the top section of the mast which consists of two sections of dowel (or broomstick) as in Fig. 2.5,

Fig. 2.7: The completed ringbase with radiating element fitted and mounted on mast.

each fitted with a ferrule made from copper or brass tube.

The short spike in the bottom section is made from a 100mm nail hammered in. You should first drill a small diameter hole to prevent the wood splitting. Then cut the nail head off and file the end to a point.

Both sections of the mast are used for maximum height and thin guy lines can be secured to the ferrule of the top section by means of screw-type hose-clip as illustrated in Fig. 2.6. Four ground pegs are required and I recommend that you use mild steel or aluminium rod 30mm long, filed to a point at one end. For fixed station operation it would be advisable to have at least three insulated guy-lines from near the top of the driven element as well as four lower down, for example, from the bottom of the mounting plate.

Tuning and VSWR

The coaxial cable may be UR43, of any convenient length (I used approximately 10m of cable during the tests). Little more than 4m would be needed for portable operation.To use the antenna, set the adjustable portion at the top of the radiating element approximately half-way out. Resonance at band centre may be checked with a grid-dip meter or you can otherwise measure the v.s.w.r. at the band centre (29MHz for the 10 metre band).

If it is not more than 1.1 to 1, you should check at each end of the band. The v.s.w.r. will rise a little more at the 30MHz end, as shown in Fig. 1.2 last month. If the measurement is still not satisfactory, you should then try further adjustments of the element length in conjunction with opening out, or squeezing in the loading coil turns.

Similar adjustments are required to resonate the antenna for operation in the 27MHz CB radio band to obtain minimum v.s.w.r. at the band centre frequency.

To adjust the antenna to work on these channels you should extend the top portion and squeeze the loading coils in a little to increase the inductance, making sure that none of the turns touch. If this adjustment is insufficient it may be necessary to use an eight turn coil. **PW**

The Dayton Hamvention - An American Adventure!

Feature

The Dayton amateur radio convention is billed as the largest such event in the world. George Dobbs G3RJV, ventured across the Atlantic again and shares the experience with us.

What ever way you look at it, the annual Hamvention in Dayton, Ohio, is quite a show. It lays claim to being the largest amateur radio event in the world and it may be with its vast size and huge attendance.

The inside display area has space for 657 stands and the outside flea market has 4464 spaces for hire. The last available attendance figures are for 1989, when over 30 000 people attended. It is certainly big, it is also a long way from home and the whole experience can be very tiring although enjoyable!

Having already attended Dayton in 1987, I returned this year with Ian Keyser G3ROO and Dick Pascoe G0BPS, as the G QRP Club contribution to the Hamvention. After the previous visit, I shared my experiences with the readers of *Short Wave Magazine*. I now offer an update on the Dayton experience to *PW* readers who may wish to experience Dayton for themselves.

The Dayton Day

A Roman Catholic priest friend of mine once described hearing confessions from nuns was like "being pecked by a duck, a curiously pleasant but wearying experience". When attending Dayton, expect to keep long hours, do miles of walking, hours of talking and feel exhausted.

The hours are impressive. On the main two days the 'Flea Market' opens at 6am and the indoor main exhibition at 8am. Take it from me that it is a good idea to be there at the beginning to take full advantage of the available time!

You have miles to walk to see all the stands (the Americans call them 'booths') and it is possible to collect sheaves of paper handouts and impossible not to make purchases! I wear open sandals and carry a shoulder bag: looking like a displaced hippy is fair compensation for not having aching feet and arms.

Remember to eat and drink and take rests from time to time, Dayton demands plenty of fuel and reserves of energy for the evening social events and there are plenty of them to attend!

The Trade Stands

Like British amateur radio rallies, Dayton revolves around the trade stands. The traders make it possible for those who attend often to go with definite requirements and shopping lists.

It is worth going to Dayton from the UK to buy major items, the prices are considerably cheaper than ours.

The commercial trade divides into two sections : the Exhibitor Booths, which are inside, and the Flea Market, which is outside.

The Exhibitor Booth section is filled with major and minor amateur radio traders. It is possible to buy everything from the most expensive transceivers to a nut and bolt. Dayton is also a good place for looking at the latest trends in the hobby.

Manufacturers often save the launch of a new product or idea for the Dayton Hamvention and many companies arrange special price deals for the event. Commercial trade wars take place in the halls at

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Dayton and there appears to be little agreement between traders on price fixing. If you want a specific item, it pays to shop around and even discuss relative prices with traders.

Delightful Flea Market

The Flea Market is a real delight, for me it is the whole point of going to Dayton. Row after row of stalls, from large marquees to single car boots (trunks?) overflowing with second-hand equipment, cheap components, commercial surplus and general junk. I could spend the whole time simply strolling through the Flea Market and still think the journey was worth it. The price of good second-hand equipment is generally cheap and most market traders, will, and even expect, to haggle over the price.

It would be possible, I think, to recover the air fare to Dayton by careful buying and re-selling in the UK. It would also be possible to set up a complete station, using only slightly dated equipment, for a fraction of its value in terms of performance.

This year, for example, I saw a number of Drake TR4 transceivers selling for $300, with power supplies and in fine condition. One surprisingly expensive item in the flea market are 144MHz metre hand-held transceivers (handi-talkies as they call them) which seem to be in demand and attract prices at least as high as in the UK.

Vintage Field Day

The vintage collectors can have a field day, as can collectors of most items to do with the hobby. I usually manage to find another Morse key or two at a reasonable price for my collection. Constructors may find unusual or bargain priced items and collectors of the unusual, radio or scientific items can be pleasantly surprised. Expect to pick up more items than planned. The more astute Dayton visitor takes an empty suitcase or posts items back home!

The Forums

The Dayton Hamvention is a true amateur radio convention in that the commercial trade forms the backdrop for a whole range of other activities. The programme of forum and lectures is an important part of the event.

In 1990 there were 53 lectures or forums, offered over three days. Everything from lectures on the latest digital techniques to 'The Bicycle Mobile Hams of America', 'Designing Computers' to 'Canadian Hams of Hungarian Origin'.

There is something for most interests, it is a question of choice and planning to take full advantage of the programme. The 'Alternative Activities', as the ladies programme is called, offers a wide range of activities and talks for women not impressed by amateur radio.

Also on offer in 1990 were 34 alternative activities ranging from Chiropractic to Creative Twist Flowers, and Womens' Nutritional Needs to 'Tin Punch Pie Pan'(?).

Improved Facilities

This year I lectured as part of the QRP forum, as I did in 1987. It was pleasant to note a huge improvement in the facilities for the forums. This time I had a well set out lecture room with good audio visual aid facilities.

My 1987 lecture was done in a large hall, with three forums separated by curtains with the acoustic properties of a black hole! This time it was a pleasure to speak and a pleasure to listen. I was also impressed by the overall improvements of the Hara Arena site where it takes place. Extra halls had been added and the catering and 'people flow' was vastly improved.

The Social Side

The Dayton Hamvention is a very sociable event. People talk to you, the banter in the flea market is amazing. I intended to, but did not, tape portions of it this year. In addition to the general chatter and exchanges of the main events, people meet up after the arena closes. Most visitors are from out of town and stay in hotels in or around Dayton.

Special interest groups tend to hold additional meetings. These are often in a hotel which has been block booked by the group and of course I was part of the QRP interest gathering.

Most people sharing our interest stayed in the same Hotel. Within the Hotel there was a hospitality suite, which was a large social room.

The hospitality suite had plenty of seating space, a bar, two h.f. radio stations and a lot of like minded people. Most special interest groups seem to offer this facility, with perhaps an organised meal.

Some people move from group to group during the three days of the event. It is rumoured that the contest groups have the best bars and the v.h.f. group know where to find the best food!

Even without being part of a special interest group it is usual to find plenty of amateur radio socialising in all the hotels, the town is full of radio amateurs.

Bumper Banquet

One of the major organised social events is the Hamvention Banquet. This is a huge event with live music, Master of Ceremonies, Guest Speaker and a whole series of award presentations. I did attend it in 1987 and found it....an interesting event. It is certainly big, perhaps too big for my liking. "Like a school dinner in a Zeppelin hanger" was one comment.

A Worthwhile Trip

A trip to Dayton is certainly worthwhile. Some people do it as part of a longer visit to the United States. It's not far south of the Great Lakes with easy access to Canada via the Detroit tunnel or bridge.

UK radio amateurs 'regulars' have their favourite ways to get to Dayton. The air fare will cost something over £300, return, and a hire car around £120 a week. Another popular route to Dayton is via Chicago but

Only a corner of the 'Flea Market'.

One of the more unusual 'booths'!

this involves about another 160km of driving.

Accommodation can be a problem at Dayton, a lot of people want to be in one place at one time and it pays to book ahead!

Some people go 'on spec' but usually find themselves staying in hotels a long way from the Hara Arena, the central point of the Hamvention. An excellent bus service is provided from the main hotels to the arena, which is some way out from the centre of Dayton. My hotel this year, which was in the centre of Dayton, was 20km from the arena.

Visitors must allow time before the event to time adjust. I find the east to west time change easier to cope with than the west to east return home journey. It's best not to eat in hotels as there are plenty of good, cheap eating places often open from 6am onwards.

Interesting Weather

The weather at Dayton is notorious...for anything. It is centrally placed in the continent and the event is in the spring, during a weather change time. It can be in the 90s, it can even freeze and it can certainly rain!

This year the event began in the mid 90s and the flea market was a trial by heat. However, by the last day I needed a sweater in the Flea Market.

I take a minimum stock of light-weight clothes and one good sweater. Clothes can be washed in the evening, as most hotels have a laundry and all have hand basins.

You must save space to bring those bargain items home! It is not unknown,(and I could name names), for overseas visitors to throw away clothes to fill their cases with take-home goodies.

Other items to be taken depend upon personal taste. It is worth taking a 144MHz hand-held transceiver with an easy to mount quarter wave whip for a car. Ensure it can transmit above 145MHz and try to get an American repeater handbook, a mighty volume.

The reciprocal licence is free and can be obtained via a form from the RSGB and should take only a few weeks to arrive. I wish I had taken a sun hat this year and again I regret having taken a pair of 'decent trousers': no one dresses formally at Dayton - unless they have something expensive to sell.

If you want to try Dayton next year, do plan ahead. Any keen radio amateur will certainly enjoy it - I may see you there next year! **PW**

Radio Diary

***July 14**: The Cornish Radio Amateur Club Rally will be held in the Richard Lander Scholl, Truro. There will be the usual trade stands, Bring & Buy, a computer display/demo and a weather satellite demo. There will be refreshments, good free parking and the doors open at 10am (9.30am for the disabled). **Rolf Little G7FKR. Tel: (0872) 72554**.

***July 15**: The Sussex Amateur Radio and Computer Fair will be held at Brighton Racecourse. All the usual traders and other attractions will be there. Doors open from 10.30am to 4.30pm, with entrance at £1. **Ron Bray G8VEH (QTHR). Tel: (0273) 415654 office hourse or (0903) 763978 other times**.

July 22: The Burnham Beeches and the Maidenhead & District Amateur Radio Clubs are staging the 7th McMicheal Rally at the Haymill Centre, Burnham, near Slough. Doors open to the public at 10.30am (10.15am for the disabled). Admission is £1, the car boot sale pitches cost £5.There will be the usual trade stands, packet radio demo, refreshments, (tea and coffee on the RAIBC stand this year - honestly!), bar as well as the GB4MR special event station.

***July 29**: The Scarborough ARS Rally will be held at the Spa, Scarborough. Doors open at 11am. Many trade stands, large Bring & Buy, Morse exam and demonstration for the Morse examiners, refreshments and bar. Details from **Ian G4UQP (QTHR). Tel: (0723) 376847**.

July 29: The Rugby ATS will be holding their Car Boot Sale at Lodge Farm, Walcote, near Lutterworth, Leicestershire. Talk-in will be provided by GB8CBS on S22. Pitches are £5 for the whole day, entrance for visitors is 50p per car. Gates open at 10am. **David G4DDW. Tel: (0455) 552599**.

***August 12**: Hamfest '90 will be held at the Flight Refuelling Sports Grounds, Wimborne, Dorset. The event will feature Radio and Electronics Trade Stands, Craft and Gift Fair, Bring & Buy, a vintage wireless exhibition and full family entertainment. Talk-in on S22. The event opens at 10am. Free parking and overnight camping on the Saturday night by prior arrangement. **John G0API. Tel: (0202) 691649 or Rob G6DUN. Tel: (0202) 479038**.

August 12: The 1990 Derby Mobile Rally will take place once again at Lower Bemrose School, St Albans Road, Derby, just off the A511 Derby Ring Road. Gates open at 10.30am with all the usual attractions including the Giant Junk Sale. **Kevin Jones G4FPY, 20 Pinecroft Court, Oakwood, Derby DE2 2LL. Tel: (0332) 669157**.

August 19: The West Manchester Radio Clubs Red Rose Summer Rally will be held at the Bolton Sports and Exhibition Centre, Silverwell Street, Bolton.

August 26: The Three C's Rally will be held at the Tiddenfoot Leisure Centre, Linslade, Leighton Buzzard, Beds. Entrance fee is £1, children free. **A Perkins. Tel: (0582) 33885**.

August 26: The Open Day of the Galashiels & District ARS will be held at the Focus Centre, Livingstone Place, Galashiels. There will be trade stands, a Bring & Buy, catering and all the usual activities. Talk-in on S22.

August 27: The Huntingdon Junk Sale & Auction will be held at the Medway Centre, Coneygear Road, Huntingdon, Cambs. The doors open from 10am to 4pm, food and drink will be available all day. **G1YVS. Tel: (0836) 611025 or (0487) 830212 (eves)**.

September 9: The Vange ARS will be moving the rally this year to The Laindon Community Centre, Aston Road, Laindon, Basildon, Essex. Doors open from 10am to 4.30pm wth admission at 50p. The rally will include many traders, a Bring & Buy, refreshments and free raffle. Talk-in on S22. **Doris Thompson. Tel: (0268) 552606**.

***September 9**: The Lincoln Hamfest will be held in the Exhibition Centre, Lincolnshire Showground. Gates open at 10.30am (10am for the disabled) and the rally closes at 5pm. All the usual trade stands will be there, along with the real ale bar. There will be lots of attractions for the whole family too. Caravans welcome by prior arrangement. Talk-in on S22 by the West Lincs RAYNET Group. **Sue Middleton. Tel: (0522) 531788**.

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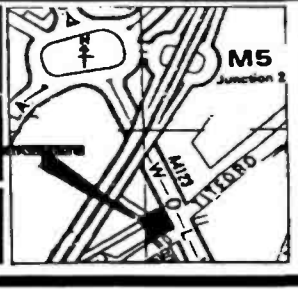

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Feature

Packet Update 12

In this part, Roger J Cooke G3LDI takes a look at Packet in Cyprus.

Packet radio in Cyprus seems to be on the increase. I received a very interesting letter from Costis 5B4TX. He also enclosed a couple of photographs, one of his home station, with himself at the operating position, see Fig. 1, and another of the BBS that he runs from his shop in Limassol, Fig. 2. Two years ago, Costis bought himself a TNC and spent some time just listening on the h.f. bands. He became very interested in what he saw, which was mainly BBS traffic, so started operating and chatting to PA3EAE, who gave him lots of advice. John PA3EAE, runs a BBS on h.f. with the call PA3EAE-6, so Costis adopted the call 5B4TX as his BBS call as a compliment to John for all his help. Obviously this proves the old adage, "imitation is the sincerest form of flattery"!

Costis now forwards mail and bulletins with Jim 4X1RU, in the summer months and Claudio I1HUH in the winter, accounting for propagation changes. Interest has increased over the last year and there are four other stations active, 5B4DV, 5B4MD, 5B4QA and 5B4SF. Discussions are under way regarding the installation of a node in order to pass traffic from Cyprus, through Rhodes and on into Greece ending up with Manos SV1IW.

With his letter, Costis sent me a copy of a BBS program written by Spiros SV7AIZ. This looks a very interesting program with some novel features. One, which is already in use by Manos SV1IW, is the inclusion of his autoQSY facility. This enables a user to command the BBS to move to another channel, thus avoiding the QRM (if that is at all possible!). Obviously the rig has to have a computer interface for this feature to work. However, this does enable a user to select a channel which is relatively QRM-free first and then command the BBS to move there. The only problem encountered so far has been from my own point of view. I have an Icom 751 which has not got the computer interface as yet, so I have to search for Manos if I am at home, otherwise forwarding can present a problem. Jim 4X1RU also uses the same AutoQSY system on his BBS. Some of the features used by this software:

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For:TNC-2 and clones, with WA8DED or Nord Link; Host Mode Firmwares; PC*PA drsi card; AEA PK-232; Kiss TNCs under BPQ code
Supported: Binary transfers with YAPP protocol; Automatic fwd system; Private mail fwd priority; Bulletin path check; 24 users max, plus 1 operator window; 25 tasks total; DOS task option; Gateway, Node(built in); Export and text to mail procedures; Built in text editor for small files; Remote sysop,full access; Manual memory allocation; Bid Level 1; Servers; Manual binary,ASCII files Up-dnload; Asynchronous com port attach; Remote QSY driver

Introduction

This BBS is based on a user friendly service.The most popular BBS commands have been used, to avoid confusion of learning.

Requirements:

Computer: IBM PC-XT/AT and true compatibles (under DOS 3.2 or later), with at least 512K memory.

TNCS:

1: TNC-2 or clones with WA8DED or NORD><LINK firmwares. (This disk includes NORD><LINK's code,for those who want to burn an EPROM. Transfer the file 'NORDLINK.BIN' to a 27256 EPROM.) (Any TNC which will work with these firmwares installed,will do the job !!)

2: PC*PA (DRSI) card.

3: AEA's PK-232.

4: Kiss TNCs (KAM, TNC-2,etc) under BPQ internet switch s/w.

An interesting innovation which Spiros has included is an automatic virus check whilst running the program. He has tested it with 15 know 'strains' and has had complete success so far. The software will also run in conjunction with a DRSI card or any combination of cards and TNCs. Status windows are

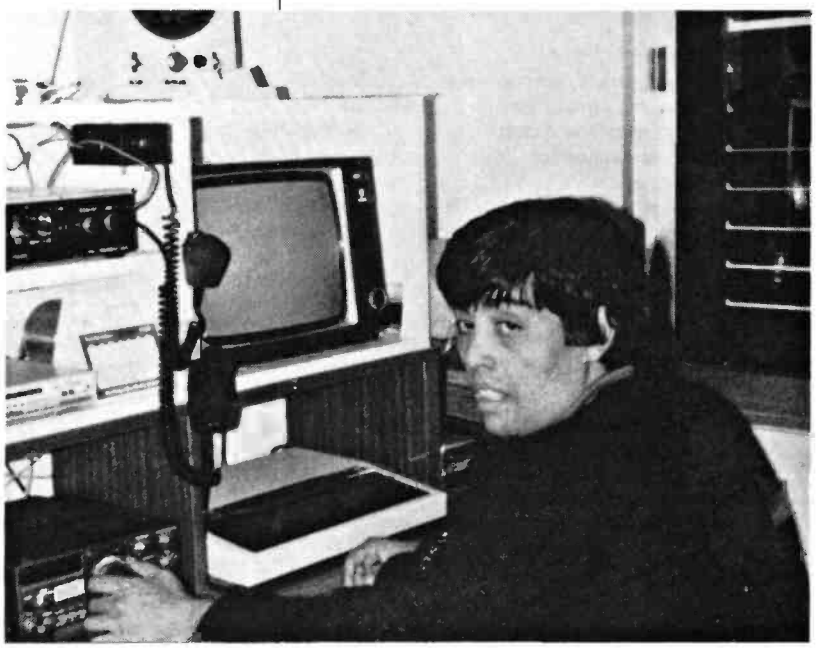


Fig. 1.

Fig. 2.

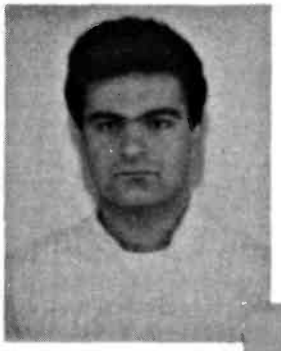
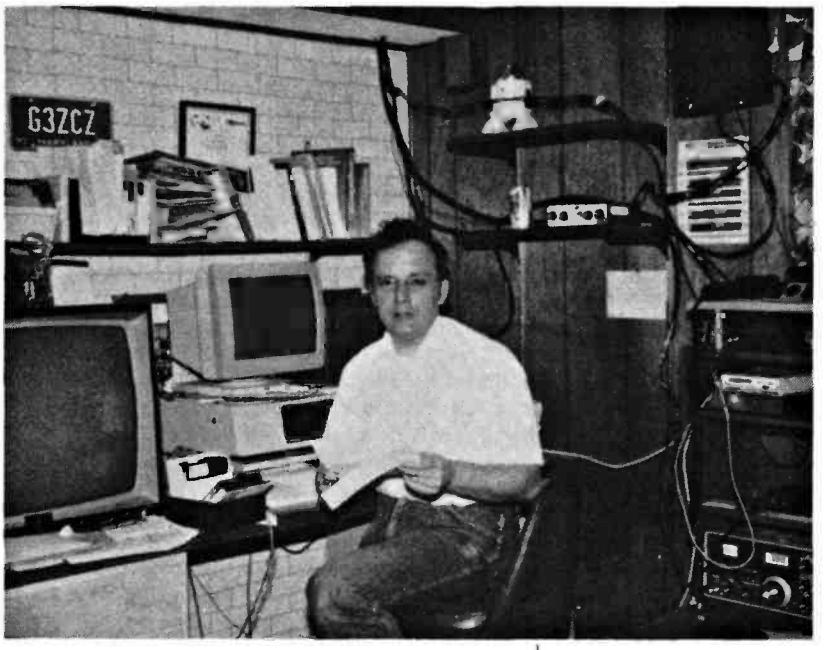


Fig. 3.

Fig. 4.

Fig. 5.



used for each port and the layout is somewhat unconventional, although very straightforward. Multi-connect, multi-user software seems to be the order of the day with an ever-increasing packet population. Remote sysop operation is possible and there is a provision for password access. There is also an on-board editor, which has several commands. This can be a very useful time-saver when editing the BBS. From the user point of view, the standard command structure is employed but with quite a few additions, especially with the K and L commands, allowing a more selective killing and listing operation. It is also possible to automatically kill bulletins of certain types, addresses, dates or callsigns. If you want a copy of the software, Costis, 5B4TX is the only distributor. A photograph of Spiros is in Fig. 3.

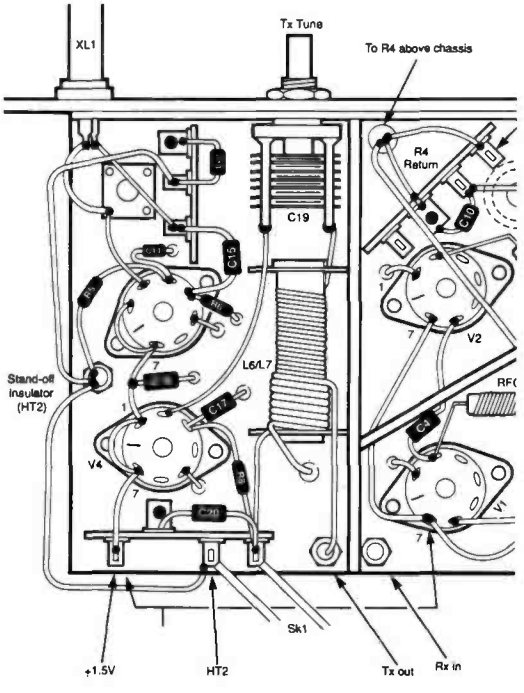
Last month a full description of Packet-cluster was given by Pete Smith N4ZR. His photograph is in Fig. 4. The Cluster software is available from Pavillion Software, address given in Packet Update 11. The other software package described was Lan-link, by Joe Kasser G3ZCZ. Joe has found a suitable photograph and this is now reproduced in Fig. 5. If you have any queries regarding this program, Joe can be contacted @ N4QQ.

73 and happy packeting.

Errors and Updates

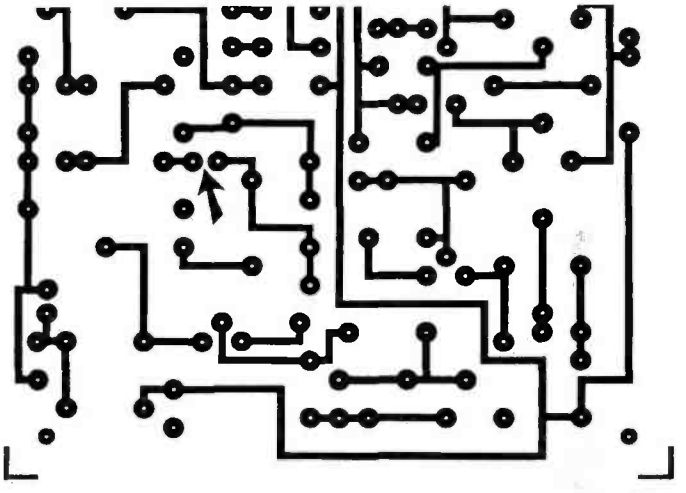
***PW* Empire Transceiver, Supplement July 1990.**

We apologise for the poor reproduction of some of the components in Fig. 4 of the Empire interconnection diagram.
Here is a clearer drawing for those who have had difficulties with the construction.



***PW* Badger Cub, April 1990.**

Track Pattern Fig. 2.1.
Break track at the position marked by the arrow. This was bridging capacitor C35.



Antenna Clinic

Session 12

Before purchase it is desirable to know as much as possible about the performance of any manufactured antenna. The maker (or dealer) should be able to supply full performance specification. For v.h.f./u.h.f. these should include such items as true directivity gain factors in both vertical and horizontal planes, regardless of whether the antenna is intended for horizontal or vertical polarisation. Also v.s.w.r. and bandwidth relative to band centre frequency, r.f. power rating and most important, actual radiation patterns. For v.h.f./u.h.f. antennas these should prove easy for the manufacturer to produce. Whether this is done from an actual 'measuring site' or, in these days by use of a computer.

When an antenna is set up in its intended location, the presence of a building or other conductors can affect the overall performance. Only when sited in a fairly clear area will the actual results vary little from the specified performance. Antennas should ideally be mounted a whole number of wavelengths (at operational frequency) above ground to ensure that they operate in a near 'free space' environment. This will leave the radiation patterns virtually unaffected. This is clearly illustrated by the horizontal pattern, shown in Fig. 12.1, of a 16-element Tonna 144MHz beam. This was plotted at a distance of 19 km over a more or less flat ground path.

However the overall performance of antennas for the h.f. band is largely affected by the nature of the earth beneath. A further contributing factor is the generally low operating height (in terms of wavelengths) of the antenna. The calculated or theoretical (textbook) radiation pattern may be changed considerably.

Antenna Performance

The IEC recommended 'standards' and measurements for the performance of antennas designed for operation between 30MHz and 1GHz are laid down in publications and supplements issued by the International Electrotechnical Commission. There are also recommendations for the performance of transmitting/receiving antennas, compiled by the Institute of Electrical and Electronic Engineers (UK) based on the original IEC 138 and later regulations. Measurements cover all electrical and mechanical characteristics and are adopted by all component manufacturers and independent designers. The IEC publications also covers measuring equipment and especially the 'measuring site'. This is perhaps the most important factor when making actual measurements.

It would be extremely difficult, if not impossible, in some cases to measure every aspect of the performance of antennas below 30MHz. For example, the calculated radiation magnitudes of an h.f. band antenna, including so called 'long wire' antennas, may be greatly affected by proximity to and the conductivity of the ground (Fig. 12.2). The presence of other conductors such as overhead telephone and power lines may also distort the normal radiation pattern(s).

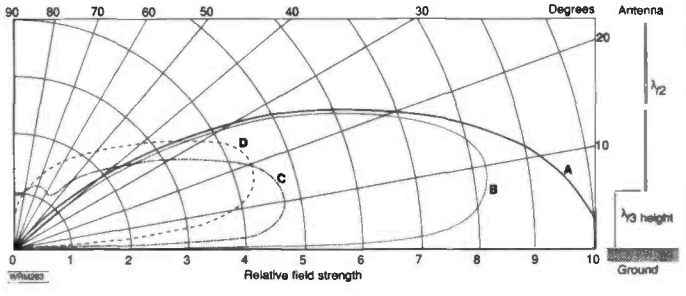


Fig. 12.2: Effect on the vertical angle radiation from a vertical h.f. bands dipole by the conductivity of the 'ground' beneath:
a) Perfect conductivity
b) Sea water (very good conductivity)
c) Earth with a good conductivity, Approximately $1x10^{-14}$ e.m.u. such as marshland, clay or deep dark soil.
d) Earth with poor conductivity, i.e. dry sand, gravel rocks etc.

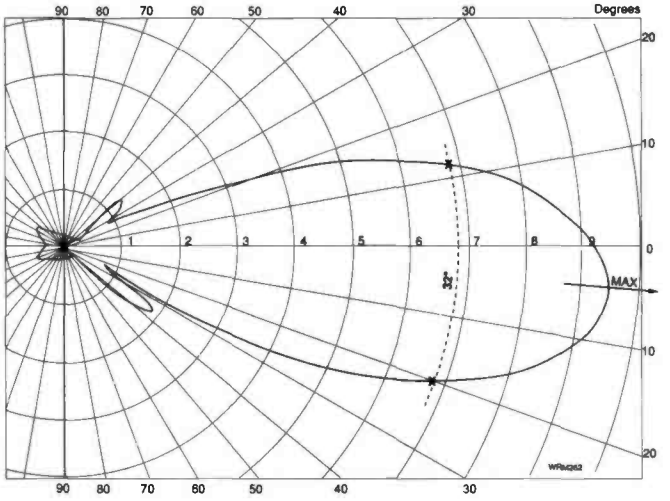


Fig. 12.1: Horizontal radiation pattern of a Tonna 16-element 144MHz antenna, measured at a distance of 19km.

Specifications; What to Look For

The following specification factors should apply to, and be quoted for, virtually all v.h.f./u.h.f. beam antennas and some h.f. band antennas, whether of Yagi or quad construction.

1: Frequency band coverage (see 8 below).
2: Input impedance in ohms.
3: Maximum (peak) r.f. power rating.
4: Intended orientation, vertical or horizontal.
5: Radiation patterns for both vertical and horizontal modes.
6: Main lobe beamwidth at -3dB from maximum for both vertical and horizontal polarisation.
7: Maximum FORWARD directivity gain in dB with reference to a dipole, or isotropic radiator. (0dBd is approximately 2.5dBi).
8: The v.s.w.r. and frequency bandwidth in respect to band centre (usually in the form of a graph as in Fig. 12.3). Directivity gain-v-frequency is often given in graphic form.
9: Front-to-back radiation ratio (-dB) with reference to maximum forward gain.
10: Side lobes (if any), magnitudes on the same basis as 9 above.
11: For antennas designed for use on more than one band, the above information should be available for each of the designed bands.
12: Wind loading, usually given in Kgf, the maximum wind speed also is often quoted.

Other details included should be the physical measurements of the antenna, its overall weight and turning circle if designed for rotatation.

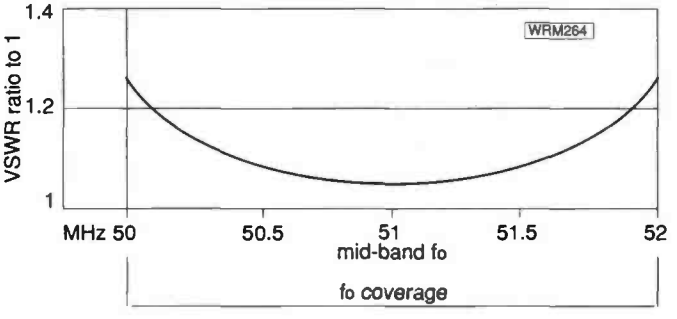


Fig. 12.3: Typical v.s.w.r./ bandwidth for a small Yagi type beam antenna.

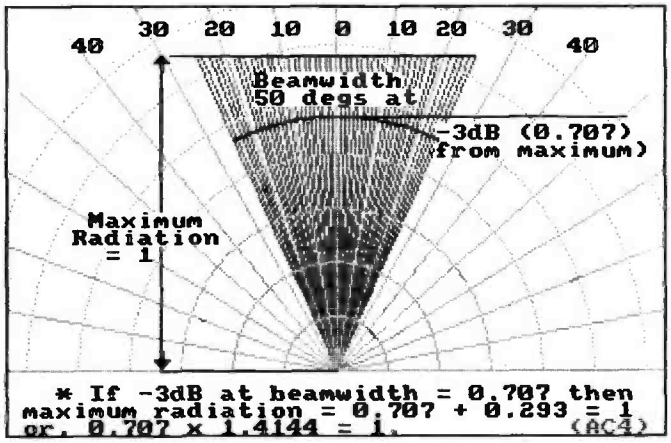


Fig. 12.4: How to obtain an approximation of beam antenna coverage, when only the beam width (-3dB) is known

If no radiation pattern is available an approximation of the coverage provided by a parasitic (Yagi or other type of beam antenna) can be obtained from the beam width (-3dB) in degrees for either horizontal or vertical mode operation as illustrated in Fig. 12.4. A close approximation of maximum forward directivity gain may be obtained if the beam width at -3dB is known, by the formula:

$$\text{Gain dBd} = 10 \log_{10} \frac{32027}{(\text{Beamwidth at -3dB in degrees})^2}$$

Other Antennas

There are of course the vertical and horizontal multi-band inductively loaded h.f. types which have more or less 'unity' gain for each band, but this may be less than for a single full length dipole,

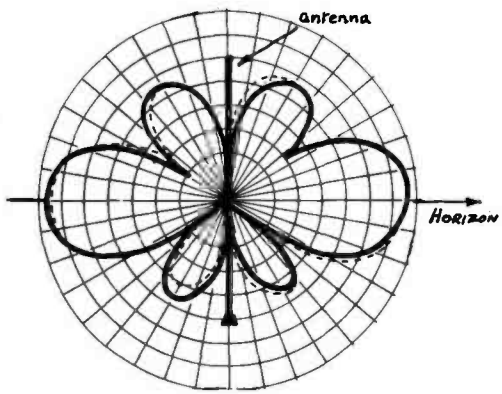
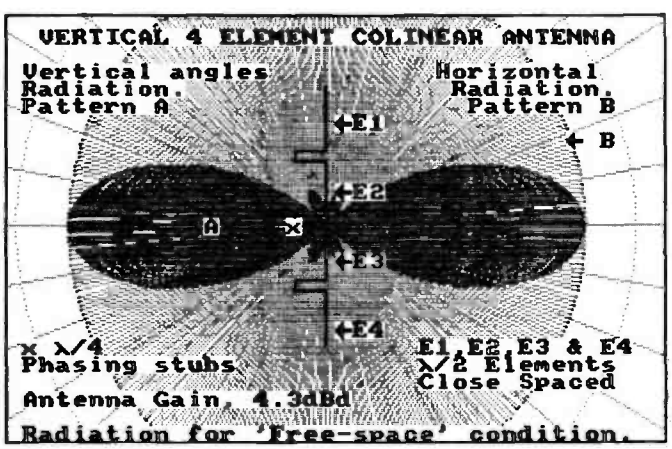


Fig. 12.5: Vertical radiation pattern distortion from a manufactured four-element v.h.f. collinear antenna with mis-phased currents in the elements. (Figure courtesy of Geartest)



Whilst it's satisfying to receive letters from readers praising the performance of antennas they have constructed from details given in *Practical Wireless*, these often contain a query as to whether the performance of this or that antenna could be further improved. If the original design work and measurements, etc., were carried out competently and proved satisfactory, then the designer must have concluded that performance was optimum and could not be further improved. An antenna re-design to obtain a higher degree of performance may well become a different antenna entirely. This session has been about the general aspects of specifications in answer to several letters received asking about comparisons of antennas.

owing to inductive and other losses. Remember that such antennas are a compromise, but may be designed to operate with a reasonably high efficiency.

Collinear antennas for u.h.f./v.h.f. operation, and those with two or more elements driven in phase will perform well if properly designed. Alas this is not always the case. The vertical radiation pattern may be distorted due to inaccurate phasing as shown in the example (Fig. 12.5) a manufactured 4-element collinear. This can also cause considerable reduction in directivity gain, which should be a maximum at right angles to the antenna. Collinear antennas with more than two close-spaced elements normally have four very small secondary lobes. This is shown in Fig. 12.6, the vertical radiation pattern for a 4-element v.h.f. collinear.

Antennas intended for special applications, i.e. satellite operation, or wide-band v.h.f./u.h.f. use should also perform within specification parameters. For example v.s.w.r. / bandwidth for discone antennas is most important, particularly if intended for transmitting. If no radiation patterns are available then information about any antenna should indicate whether it is omni-directional (collinear), uni-directional (beams) or bi-directional (single or multi-band dipoles). It is also useful to know if mast fitting hardware are supplied or is freely available.

Finally complete assembly instructions for the antenna and for its mounting on pole or mast should be supplied with the antenna. Information as to obtaining the best possible performance would also be very useful along with the other instructions.

Test Reports

This refers to so called 'reviews' and 'test reports' published in magazines. A mere description of a manufactured antenna along with a few notes on how it functioned generally do NOT constitute a test report. This would only inform a potential purchaser that an antenna actually functioned. The fact that some DX was worked is virtually meaningless. This would also apply to a comparison with a second antenna. A test report should be based on the results of accurate measurements made on the antenna, compared to the specifications given by the manufacturer. If the makers specifications are inadequate then test should be made according to the IEC recommendations. **PW**

Fig. 12.6: Radiation pattern of collinear antenna as in Fig. 5. This pattern is computer generated

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WR259	10MHz RECEIVER	OCT 89	5.00
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WR249	"MARLBOROUGH" MF CONVERTER	DEC 88	4.60
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WR247	ZENER DIODE TESTER	AUG 88	3.56
WR246	"PORTLAND" RF VOLTMETER	JULY 88	3.59
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WR240	.. ..	..	9.10
WR239	.. ..	..	
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WR225	"WOODSTOCK" SW CONVERTER	MAR 87	4.10
WR219	MASTHEAD PRE-AMP PSU	FEB 87	2.50
WR218	MASTHEAD PRE-AMP FOR 144MHz	FEB 87	4.20
WR224	"WESTBURY"BASIC WOBBULATOR	JAN 87	3.50
WR214	MOD SRX-30D (AUDIO)	DEC 86	3.00
WR223	HIGH-IMP MOSFET VOLTMETER	DEC 86	2.90
WR222	"TAW" VLF CONVERTER	NOV 86	2.80
WR216	LF BANDS ACTIVE ANTENNA	NOV 86	2.40
WR220	GET STARTED LOW-COST CONVERTER	OCT 86	2.40
WR217	AUTOMATIC NICAD CHARGER	OCT 86	2.40
WR215	SIMPLE 50MHz CONVERTER	SEP 86	3.60
WR213	MOD FRG-7 (CARRIER Osc)	JUN 86	2.70
WR210	"ARUN" PARAMETRIC FILTER	MAY 86	8.10
WR211	"MEON" FILTER (SMALL)	APR 86	3.10
WR209	SIMPLE AUDIO OSCILATOR	MAR 86	4.30
WR208	RF SPEECH PROCESSOR	MAR 86	4.10
WR207	CRYSTAL CALIBRATOR	JAN 86	2.10
WR206	RTTY/MORSE MODEM (Plug-in)	JAN 86	2.80
WR205	RTTY/MORSE MODEM	JAN 86	5.40
WR204	WQ MEDIUM WAVE LOOP	NOV 85	3.00
WR203	SIMPLE CAPACITANCE METER	OCT 85	2.80
WR199	"MEON" 50MHz TRANSVERTER	OCT 85	6.70
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WR200	LOW-COST CRYSTAL TESTER	JUL 85	2.50
WAD302	BATTERY CHARGER CONTROLLER	JUN 85	3.00
WR197	"COLNE" (Osc/Converter)	JUN 85	3.90
WR198	"COLNE" (Product Det/Audio)	MAY 85	3.90
A005	"COLNE (VFO)	APR 85	3.10
A004	"COLNE" 3.5/114MHz RX (RF Amp)	APR 85	3.10
WAD249	MOD FRG-7 (BFO)	FEB 85	3.00
WAD280**	TRIAMBIC KEYER	FEB 85	7.10
WA002	"TEME" (RECEIVER)	JAN 85	4.30
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WR177	DART (p.a.)	NOV 83	3.00
WR176	DART (v.f.o.)	NOV 83	3.00
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WR196	"TEME" 7/14MHz WRP (TX)	NOV 84	3.70
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WR194	MOD FRG-7 (FM/SQUELCH)	NOV 84	4.50
WR189/92 Pair	BUG KEY WITH 528-BIT MEMORY	OCT 84	8.50
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WR187	MORSE SENDING TRAINER	JUL 84	4.50
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WR183	TOP-BAND DF RECEIVER	APR 84	6.50
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WR161	"MARCHWOOD" 12V 30A PSU	JUL 83	4.20
WR165 ect set	"SEVERN" 7MHz QRP TX/RX	-	14.90
WR169	"SEVERN" (TRANSMITTER)	JUL 83	6.50
WR168	"SEVERN" (CH.OVER/SIDETONE)	JUL 83	6.50
WR166	"SEVERN" (RECEIVER/AUDIO)	JUN 83	6.50
WR165	"SEVERN" (VFO)	JUN 83	5.20
WR167	RTTY TERMINAL UNIT FOR ZX81	JUN 83	7.80
WR160	LMS REGENERATIVE RECEIVER	FEB 83	5.20
WR156	REPEATER TIME-OUT ALARM	NOV 82	5.20
WR143	ATV CONVERTER	APR 82	7.10
WR144	IAMBIC KEYER	MAR 82	6.50
WR126	"EXE" 10GHz TRANSCEIVER	AUG 81	7.70
WR095	TRANSCEIVER POWER SUPPLY	SEP 80	3.85
WR068	AF SPEECH PROCESSOR	JAN 80	5.20

Feature

What is Propagation?

In the June PW, *I promised to talk about some of the openings from the past and, if space permits, I hope to make this a small, but regular, feature of this column. Apart from having a good stock of records, which need another airing, I do believe that we can all learn something by taking another look at previous events. It also gives new readers some idea of what to expect when abnormal conditions prevail, says Ron Ham.*

Close Relations

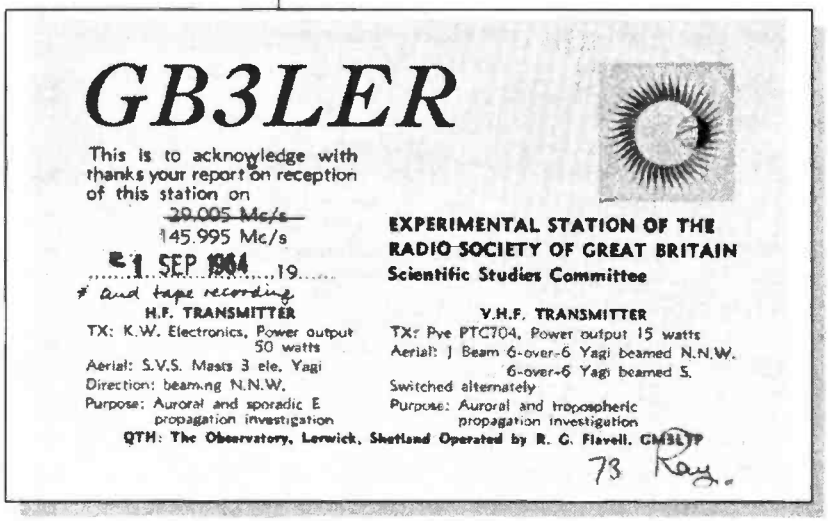
Many of the natural disturbances would not be known about if there were no radio signals travelling within the earth's atmosphere. We owe a lot to all those scientifically minded radio enthusiasts who insist on knowing why normal transmissions will suddenly change at certain times of the year, or after a spell of fine weather.

However, because there is a close relationship between the amateur 50, 70, 144, 432 and 1296MHz bands, the broadcast allocations such as Band I (48-68MHz), the East European f.m. band (66-73MHz), Band III (175-230MHz), Band IV (401-607MHz), Band V (615-855MHz) and the u.h.f. Citizens' Band (934MHz), all interested parties can report on propagation. For example, a tropospheric-opening casting its influence over the 100-300MHz region can offer much continental and Scandinavian DX to the amateurs on 144MHz and the television DXers in Band III.

The Beacon Service

Since the late 1950s, growing numbers of radio amateurs have established a world-wide network of strategically sited radio-beacons. These provide a 24-hour daily signal on specific frequencies within most of the amateur bands. This was achieved with the support and co-operation of the IARU, the RSGB, the BBC, IBA and sections of industry and the military.

Apart from giving auroral warnings and aiding the general study of propagation, these tiny transmitters furnish a consistent signal suitable for antenna adjustment, frequency checking and giving that final 'tweak' to the receiver front-end. In my view, no one can measure the value that this 'amateur' service has given to the entire world of radio communication. I leave you to imagine the thrill I had in September 1964 when my home-made equipment in southern England received a 569 signal on 145.995MHz from GB3LER, Fig. 1, transmitting from The Observatory, in Lerwick. This solitary signal, in an otherwise quiet band, was more than welcome because it told me that a tropo had opened up the v.h.f. bands and proved that my rotatable antenna was peaking as it should.



GB3LER

This is to acknowledge with thanks your report on reception of this station on

~~29.005 Mc/s~~
145.995 Mc/s

21 SEP 1964 19.....

* and tape recording

H.F. TRANSMITTER
TX: K.W. Electronics, Power output 50 watts
Aerial: S.V.S. Masts 3 ele. Yagi
Direction: beaming N.N.W.
Purpose: Auroral and sporadic E propagation investigation

EXPERIMENTAL STATION OF THE RADIO SOCIETY OF GREAT BRITAIN
Scientific Studies Committee

V.H.F. TRANSMITTER
TX: Pye PTC704, Power output 15 watts
Aerial: 1 Beam 6-over-6 Yagi beamed N.N.W.
6-over-6 Yagi beamed S.
Switched alternately
Purpose: Auroral and tropospheric propagation investigation

QTH: The Observatory, Lerwick, Shetland Operated by R. G. Flavell. GM5LTP

73 Ray.

Fig. 1: QSL from the Lerwick Beacon keeper.

The Sunspot Cycle

Consistent astronomical observations have shown that there is a definite pattern, measured in years, between the minimum and maximum numbers of sunspots appearing on the sun's disc and since records began, over 200 years ago, each of these periods, called a cycle, has a number between 1 to 22.

The question now is, have we reached the peak of cycle 22 or not? Let's think about it. If we accept the argument that there is an approximate 11.5 year rhythm between the maximum and minimum numbers of sunspots seen on the solar disc then, based on the knowledge that 1986 was a minimum, we should expect a peak somewhere in 1992, but we have already had one in the summer of 1989, so what are the chances of another before the current cycle ends. Personally, I don't think anyone can forecast this accurately because records of sunspot numbers since the mid 18th century indicates a cycle of between 9 and 13 years.

Radio enthusiasts know that the propagation of terrestial radio signals in the short wave bands, can completely change when sunspots are present because the radiations associated with them upset the normal state of the ionosphere. Do keep in mind, that although there is more chance of DX when the

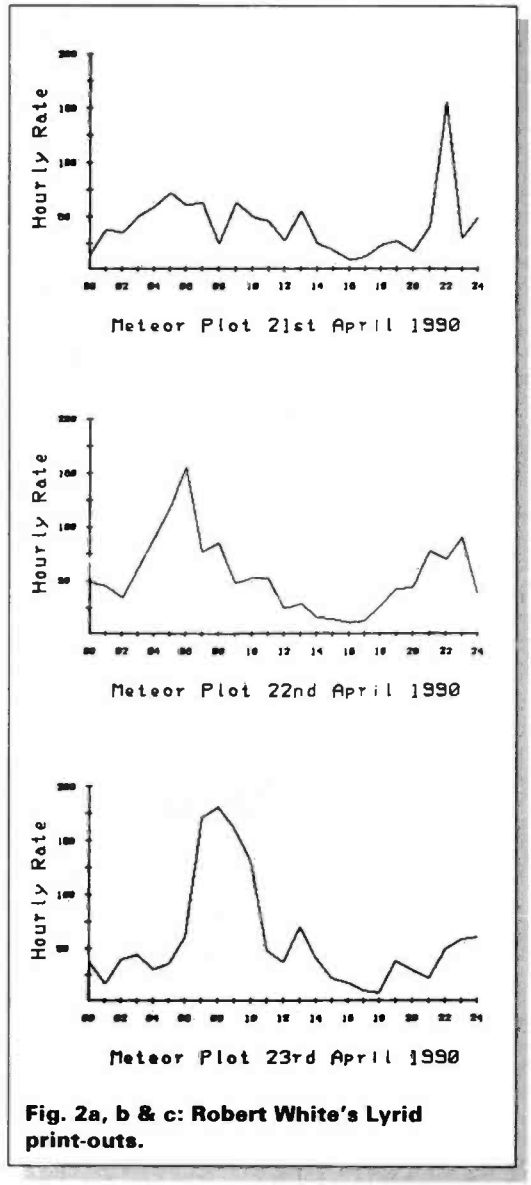


Fig. 2a, b & c: Robert White's Lyrid print-outs.

sunspot count is high, it only takes one angry group of spots to create chaos on these bands. Briefly, the reason is simple, sunspots are regions of activity on the sun and while these are present an 'explosion' (flare) can occur and eject streams of charged particles into space. Should the mechanics between the earth's rotation and position on its orbital path line up with the output from a solar flare then areas of the short-waves can be blacked out or an aurora may manifest and distort signals in the v.h.f. bands.

Meteors

I commenced this series with an explanation of how, in the early 1970s, I counted random meteor particles entering the earth's atmosphere by recording the number of times that 'pings' of signals from the broadcast station at Gdansk, on 70.31MHz, were reflected from their decaying ionised trails.

Recently I received an interesting letter from Robert White (Worthing) who is currently active in this field of astronomical observation. Robert sends his results to the meteor section of the British Astronomical Association and to the British Meteor Society and among the stations he monitors to provide him with 24-hour coverage are Bratislavia on 67.76MHz and Budapest on 66.62MHz. His antenna, which feeds a Bearcat 175XL scanner, is a 3-element home-brew beam cut to 70MHz, faces due east and mounted on a pole some 5m a.g.l. Briefly, the audio from the Bearcat enters a sound operated unit (VOX unit) which in turn can drive an electronic counter or supply information to his Dragon 64 computer.

The computer print-outs of Robert's observations of the Lyrids meteor shower show sharp peaks around midday on April 19 and 20, 2200 on the 21st, 0600 on the 22nd, 0900 on the 23rd, 0800 on the 24th, 1600 on the 26th, 0900 on the 27th and 0400 on the 28th and 29th. According to the *BAA Handbook* the normal limits for the Lyrids are April 19-25 and the predicted peak was around 0800 on the 22nd. The graphs in Figs. 2a, b, and c, show the hourly rate of 'pings' recorded by Robert on days 21, 22 and 23. "The printer is a Tandy CGP-115 printer-plotter which I find most useful for printing out graphs etc., as well as recording the counts," said Robert in an article he wrote for the BMS. He added, "It is not essential to have a printer, as the counts could be stored in the computer's memory, then saved to disk or cassette tape. I will probably use this method eventually in order to economise on paper." I will look forward to hearing more, **PW**

Wanna Swap!

Have Durst M302 colour enlarger as new, Jobo CPE2 processor with film and paper tanks, measures and bottles, plus Johnson motorised orbital processor. Would exchange for a good 144MHz rig. H. Barber Giner, 330 Bradford Road, Otley LS21 3LT. Tel: (0943) 466493.

Have 934MHz NPR Commtel rig and antennas. Would exchange for a 27MHz homebase with cash adjustment. Peter Mudge, 344 North Road, Gabalfa, Cardiff CF4 3BP.

Have 2 Shure microphones, model 444D in excellent condition and model 526T in good condition. Would exchange for an open wire a.t.u. Johnson or KW etc., must be in working condition. M. P. Evans G0GQK, 'St Bega' Shay Lane, Forton, Newport, Shropshire.

Have Racal RA17 plus TX/OSC MA79G in working order with manuals, Would exchange for a 50MHz multi-mode, an FT-707 or Nikon s.l.r. camera. Philip G0KYQ. Tel: 081-304 6148 evenings or weekend.

Have Bendix radio type RA10DA, r.f. units type 24 and 25, receiver unit 1132A, US Dynamotor PE94C, antenna relay unit BC-442-A, cabinet for G2DAF valve receiver. Gunsight altitude airspeed unit, L6-S6-S7 of 1154 transmitter. Would exchange for w.h.y? A. Humphriss, 'Polperro' 21 Gould Road, Hampton Magna, Warwick CV35 8TU.

Have Heathkit HR-1680 solid-state amateur bands receiver in mint condition plus Beckman digital capacitance meter. Would exchange for solid state g.d.o./dip meter or w.h.y? N. Cameron, 16 St. Mary's Crescent, West Port, Co. Mayo, Eire.

Have Sony DZ-555 Discman brand new with NiCads and charger, p.s.u. and headphones. Built-in graphic equaliser, superb sound, unwanted gift. Would exchange for Trio R-2000, ICR-70, 430MHz gear, w.h.y? Ian. Tel: (0509) 502989 evenings.

Have valves EL85, EM81, EZ81, ECC85, EC91,PL504, PY801, PCL82/86 PCL805. Would exchange for two EF86s. S. Darwood G4SBZ. Tel: (050) 785591.

Have muTek 50MHz transverter 10W output with 28MHz i.f. also Pye A200 25W amplifier and 'home-brew' 5-element Yagi or 50-500MHz log periodic antenna. Would exchange for an oscilloscope with 20-30MHz bandwidth, an FT-290 or any useful or interesting 10/24GHz microwave gear to similar value (£200 approx). Bill James G6XM, 56 Fern Meadow, Okehampton, Devon EX20 1PB. Tel: (0837) 52923

Have Yaesu FRG-7 with NiCad battery pack, National HRO with full coil set, squeeze key with 528 bit memory (*PW* design) with input for second key. Plus Prakticamat 35mm s.l.r. camera with Zeiss Tessar lens. Would exchange for 20MHz bandwidth solid state oscilloscope. J. Hooper. Tel: Ringwood 479226.

Have heavy-duty three-section tower, 20m, with large spare winch and new steel rope. Would exchange for square mono tube (telescopic mast), rotator and ATV, or w.h.y? G6XMY. Tel: (0773) 604965 or (0827) 56020.

Have complete computer set-up. Commodore C64 and data recorder, printer, Sharp 12in b/w TV, power supplies and software including word processor. Would exchange for Yaesu FT-290 or Standard C-58 portable rig. Rick G8NDN. Tel: Southampton 872138 after 8pm.

Have AR800 hand-held scanner, v.h.f., u.h.f., airband, a.m./f.m. Would exchange for a Philips D2935, Realistic 440 or Philips D2999. Tel: (0443) 755876.

Have TS-830M h.f. transceiver complete with AT-230 a.t.u., SP230 speaker unit with filters. Would exchange for TS-440S with or without auto a.t.u. Terry G4OXD. Tel: (0462) 435248.

Have 10GHz wavemeter, micrometer tunes by BTH Co. Ltd in WG16. Would exchange for portable 144MHz transceiver. Mann. Tel: Cambridge 860150.

Have Sony ICF-2001D, as new. Would exchange for antique mercury barometer. Mr S Cartwright, 53 Hambledon Road, Boscombe East, Bournemouth, Dorset BH7 6PL.

Have ERA MkII Microreader with Morse tutor and 232 socket new and boxed. Would exchange for second-hand 934MHz transceiver. Bill. Tel: (0924) 471226.

Have JVC RK-IIL stereo tuner amplifier, mint condition. Would exchange for FRG-7, Atari mono monitor, or w.h.y? Seon Smyth. Tel: (0436) 71181.

Have Sony ICF-2001D with p.s.u., 2 manuals, original packing. Would exchange for Trio 600 or similar or Signal 537, w.h.y? Tel: (0253) 811648.

Back-Scatter

HF Bands

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

After the rains and gales of winter, the past few weeks have been somewhat eventful; last month I was QRT with equipment problems, and within the last few days, when I was able to get back on the band, Lo! - I had a problem up aloft. However, that is now resolved, and the beam once again beams, but alas, conditions are at the moment of writing best defined as 'punk.' There just ain't any justice in life!

So for this month again, I am totally reliant on the devoted souls who provide me with the input - thank you all for your letters, not to mention *The DX Magazine*, *CQ*'s Contest Calendar, the *Canadian Amateur*, *DX News Sheet*, and *The DX Bulletin*.

Top Band

The sad news recently reached me of the passing of Stewart Perry W1BB, on May 5, at the age of 86. To those of us who were Top Band addicts in the years from the early thirties to the late seventies, W1BB was in fact 'Mister Top Band'. For the DX addicts on the band he had a DXCC score to try and approach; for the novices at transatlantic working on 160m Stew was almost invariably a first contact. For the benefit of the active DX Top Band operators the W1BB Bulletins kept us up with everything the others were doing in the way of scoring, rig changes, antenna arrangements and so on. For those who regarded Top Band as the premier 'natter band' (yes it most certainly was that before the v.h.f. black-box era) there was the club meeting which could be filled with the W1BB tape-and-slide talk, thanks to, if memory serves aright, the Northern Heights club, of which W1BB was an Honorary Member.

W1BB it was who first realised the advantage of split-frequency working on Top Band, and thus invented the concept of a 'DX Window' where the US stations would transmit in a part of the band that was relatively clear of QRM in Europe, while Europe would transmit in a portion which was relatively free of QRM to the US group. W1BB it was who arranged things such that Europe (or 'DX') would call in one period of minutes, and the USA in the next period, alternately so that 'local QRM' was less likely to be a barrier to a completed contact.

The sudden absence of the W1BB signal from the band when his health first gave way a decade ago surprised *all* the Top Band group of that time; but although it was always hoped Stew would be able to come back on the air, it was alas not to be, and his last years were all to be spent in nursing care. Those older ones among us who recall W1BB and his doings on Top Band will regret his death deeply. It is probably true to say that but for W1BB's continual spark-plugging to bring more countries on to the band, we would not have seen the 1990 position where the majority of countries have at least a token piece of the band. Truly W1BB was a giant among radio amateurs.

Events

The high summer period is always a little slow in the way of DXpeditions and new countries, if only because it is well understood that propagation is not as good in summer or winter as it is around the spring or autumn equinoxes. However, let's look and see what is known to be around, always bearing in mind that between the completion of the copy for this offering and the moment you get to see it, an expedition may well have put out it's first announcement, burst upon our ears and gone, alas.

Solomon Is. activity by ZL1AMO will be over by the time you get this, but H44AP is around, often 14.200, with his QSL address being Box 418, Honiara, Guadalcanal, Solomon Is.

J calls are running out in the Kanto area, I understand; JARL News, via *DXNS* indicates that when this happens, the new applicants will be receiving calls in the series 7K1, 7L1, 7M1 and 7N1.

VR6 will become somewhat tough for a while; I understand that VR6JR leaves in June, while VR6KY, VR6TC and VR6YL will all be on vacation; the equipment normally operated by the Christians will be driven in their absence by a couple of ZLs, both of whom are understood to be licensed.

Now to the Soviet DXpedition; they closed the Spratly log with some 40000 calls entered using 1S0XV and 1S0RR, and then moved on to Vietnam, where they have again been signing 3W1PZ, 3W6PY, 3W9CZ, 3W100HCM, XV100HCM. Naturally there had to be a Slim around, and I noted 1S5IJ. Be that as it may, the Russians certainly made a lot of people happy with this effort.

The 70 group surfaced on May 26, and these lads are doing a good job despite some lousy operating among the pile-up. This one is undoubtedly quite a turn-up for the book - I and many others just didn't believe it could come off!

On to something which would really rip the bands apart if it were to come to pass: there are various rumours that the HA DXpedition team are seeking permission to operate from ZA, and on top of that there is PY2PE, who has said she would try for permission during her current visit with a group of Brazilian businessmen. One doubts whether any thing will come of it, but the motto is as always, Work 'em first, worry later! It must be a couple of decades since the last ZA effort, although of course there have been umpteen piratical ones.

Finally in this section, a letter from G4ZVJ, who notes that all his contacts for operation from ZD7VJ and ZD8VJ should all be QSLed to him at his home address: Andy Chadwick G4ZVJ, 3 Park Villas, Monkhouse, Cheadle, Stoke-on-Trent ST10 1HZ. It seems many folk have QSLed to G4ZVT by mistake or to an old address.

After this had been written into the computer, I received a second letter for ZD8 enthusiasts....this time Steve Hodgson ZD8LII who notes that his new QSL route is: Steve Hodgson ZD8LII, Box 2, Ascension Island, S. Atlantic.

Bandscan

First, let's see if anyone found anything of interest on the 3.5MHz band; **G0KRT** (Welling) has just 1.5W to a Lake DTR3; this has so far netted G0IOU, G3YHO, G0FGW, G3MCK, G0ETV, ON4KAR, G4INM, G0HUK, G0IYY, G4TPB, G0AQP, all two-way QRP, plus F6BWF and GW0FPG for a first Welsh QSO ever. Eric uses a 25m end-fed wire, at five metres high at the home end, sloping away to just two metres high at the far end; it is fed against a quarter-wave counterpoise and an a.t.u.

Mr Sheppard (Earls Shilton) has an AR88D and an inverted-V of 40m; Dennis gave up listening some years ago but has recently regained interest; On this band he logged T77C, TL8WD, YB0BWP, VK6LK, HZ1AB, ZL1CCR, VK2AVA, VK4YB, VE1KQS, ZL2ANR, ZL4AP and K4JOY.

Now to **Mike GW0HWK** in Wrexham; Mike managed 1A0KM, EA1IF, EA7CWA, G0LCU/M, the latter being a mobile SSTV contact.

ON7PQ (Kortrijk) has just one contact for mention on 3.5MHz this time, this being with 5H1HK.

Which is almost the state of affairs with **GM3JDR** too, up there in Aukengill; Don says all he managed was W and VE; but comments that at the peak of summer there is just too much daylight for l.f.

As for my activity, one way and another there's not been a lot; but at least I have established that I can once again radiate a signal in the band, as during the absence of the rig I managed to find time to modify the a.t.u. to cover this band and Top Band more usefully.

The 7MHz Band

Now here's a band! The DX-artists who haunt this part of the spectrum have always been a canny lot, and largely keep the good news to themselves; and this is aided by the way some people take a peep on the band, hear the 'noises off' shudder and go some place else! But of course the trick is the ownership of an attenuator in the receive side.

G3BDQ (Hastings) hasn't been on the band much, but he did have a contact with ZB2B.

For **G0HGA** (Stevenage) 30W to a 20m wire yielded LX/PA3DKC/P, OY3QN, RA1AOM, EU0YL, DL/UA9XAB, IK2ISW/IU2, UA9SAW, V01TK, K1SS, AB3VM and VK1BAQ who came back to a CQ but disappeared under the QRM.

GW0HWK (Wrexham) starts with a word of thanks to all those he worked during the Rhyl ARC Members HF contest; to that can be added EI2WW, GB2SDD, EI7M and GB00BD. Otherwise activity has been rather limited thanks to the heavy workload.

Turning to ON7PQ, Pat as always stuck to c.w., on which mode he notes 1A0KM, N7OF/NH2, 5H1HK, ZL1AZE, 3W6PY, CX5BW, LU1DOW, HJ6NNY and VK8AV.

Another key-basher is GM3JDR (Wick) who mentions FH5EJ, UJ8JI, ES0ZA, ER4L, RL5D/UW9YY, TR8JLD and 4K20IL.

GM0DEQ (Hurlford) managed to find some new ones, but on 7MHz there were EA3GCO, HA8LKM, RB8I and OZ2E, all raised on c.w.

WARC Bands

Let's have a peep at the correspondence covering these; and starting with GW0HWK who only used 18MHz, where he raised JR5JAQ, NW7E, ON6DP and N8IJR.

Quite a long letter from **Charles G4ZZG** (Mansfield) who mentions that for some time now he has been chasing the oblasts; in this context Charles mentions a QSO with RW3DR who took the trouble to ring Krenkel Central Radio Club for him to obtain confirmation that as yet, WARC contacts have not been made acceptable for the Oblast Awards; and RW3DR also confirmed that the new Russian Call Book is in Russian and English.

Details from Ben UC2AA, Box 41, Minsk 220050, USSR. Back to G4ZZG, Charles says he finds 18MHz much like 28 used to be - you think its dead and put out a call and see what rises to the bait! Anyway, 18MHz c.w. produced UB5IKN, SK0CC, EA1GVB, UA9AQN/UH7Y, K1QZW, RD70DC/UH7Y for Oblast 001, PY2EYE, OK1FER, OZ4ACF, UG7GWC, NU4G, KL7CYL, HB9DLY, RA2FB, UA3SHR, UB5LDU, JA6PA, SP2DX, WZ6C/ST4 (QSL via W4FRU), and KB0CDS; on the s.s.b. side, PJ6/KV4AD, RW3DR, W2FJ (Charles says this one beams Europe twice daily, has QRO and vertical beams - if you can't hear him, there's not much doing!), CR7DNP celebrating 500 years of Portuguese Navigators, QSL to CT1DNP), UG6GCC, EA9LZ (Box 530, Ceuta) and RW3AH.

Back-Scatter

For **G2HKU** (Sheppey), the lack of activity was accounted for by work and chain-sawing; but a few forays on c.w. produced 4U5ITU and U0AG on 10MHz.

Another 18MHz addict is **G0IMA** (Clevedon), who notes that CU2GE, W2FJ, W1HHY, SV1ANW, VK3AHJ and W4PEL are all regularly on the band; in addition, SV1AWH, JA7JH, JA6GIJ, LU9EHR, KP2BH and YV1CLM were all worked.

Next we have **9H1IP** (M'Scala, Malta); Vincent notes on 18MHz AA2U on QRP with 4 watts, C31LBB, 4N3KW, UA9CBO, EA6VE, VE2RP, ZP5JCY, 7X2AK/3, CO2GB, 9Y4KS, JA3EMU, TA2AK, RA2FF, ZL1BMV and PY5B.

On 24MHz there were JG2TUQ, UA9CBO, LA4XFA, GJ3RAX, GJ3YHU, 7X2AK/3, CN8ST, VK6AKG, RA9UZ, CO5DD and VU2NUD; in the way of 24MHz Gotaways, we must add IS0XV, V51BG, T77T, 9X5NP; while on 18MHz 1A0KM, HC2NI and OY9JD were also lost.

G3NOF (Yeovil) notes that he has no proper antenna for this band while the dipole is down, but one day he heard 3W100HCM calling CQ at S9 with no takers, so he loaded up his HF2V 3.5/7MHz vertical cautiously, with about 20W, and he came back with an S9 report!

The 14MHz Band

Where it all happens, traditionally. Let G3NDF have first knock here; Don reckons the band was rather as in previous months but with periods when solar flares disrupted things. On the other hand there is noticeably a lack of Pacific activity as compared with previous cycles. In s.s.b. contacts made G3NOF offers A43KM/0 (Kuria Muria), HL9HH, HL9KL, HS1BV, S79FT, TJ1SR, XV100HCM, V85GA, VKs, VU2SMN, ZF2ME,/ZF8, ZL2VS, ZS9S, 1A0KM, 3B8FU and 3D2AM (Conway Reef).

Next we have the log from GM0DEQ. Bob mentions VE2GNW, K4SU, WA4IUT, RW9HRW, GM0GUJ, W5HE, N1AM,WA4D, VK2XH, NT0B, WC2C, PY2DY, W3KQJ, W9ALC, WA3IVV, N4LUN, VE2GNW, VE3PZI, WA1WQC, KB2ARU, VE2ABO, KA1SFJ for a 13-year old Novice in Seekonk, Mass, N8FUC, VE3DUE, K3SWM, UZ0ZWA, VE2FLE, W4LRE, W4LRE, WN2B, W4PTH, KP2BL (St Croix), K5KDG, N3DEQ, UA9CM, UA9FLA, KA1SYE, UA9MEK, RA9JW, FY5FQ, KP4GC, VP5P, UL7DK, WK3SEW, VE2AGM, RA9YY, UL7BO, LLU6ENY, 4S7WP, PY2APZ, ZL2VS, UM9MWB, JA0DIN, VK1UD,VK5JH, ZM2TX and of course the smaller fry.

For G0HGA, the c.w. and 20 watts managed to find UA9JH, UA9FHK, YL0/RW4WR, UB5LM and DL7AEJ.

Turning to the report from ON7PQ, Pat mentions K1RH/1JS, JG6CVO/JD1, TG9/KP2Z, 1S0XV, 4K4PDL, FK0BM, JT1CD, S79FT and 3D2AM.

Now we turn to GM3JDR. Here we see the effect of being further North; Don's contacts included VK2CCP, LU1HDC, ZL2GQ, TU2JB, 4J0QWJ, PY3AWF, ZL2BLF, ZL1AH, VK6ASD, VK3EGN, EK0AAC/4K4, RH8AA, KL7KJ, AH6JF, VK3VJ, EK0DJC, 4K2OIL, 9N1FOC, 9M2AX, R3MIR/7, 4Z8C, 4K4AFM, EX9A, EX9S, UA0ALE, ER4L, UL1V/UL7LT, ZK2KK, AH3C/KH5J, UA0/GB4ICE, UA0/GB4MSS, UA0/G3GWA, EK0DAP/4K4, ZL3GR, UI1D/UI8IAY, 1S0XV, V73AS and 4K3BB.

Now to G3BDQ where the activity included such as UA1ZO, 3B9FR, TK/PA3DQW, TK5GT, UA0/GB4ICE, EX1A, VK3EGN, UI1D/UI8IAY and VU2GR.

Unusually, G2HKU seems to have been quite active on 14MHz this time; Ted mentions G4WYG/ST2, VK5ALG, N6EA, K2VUI/VP9, EO4AIS, EO5BGH, RZ8T/UA4FDS, TI2PZ, VK6RU, VK3MJ, VK2PP, VK2QL, PZ1DY, RA9URC, JA7AS, ZC4RF, 9H1BB, VK5GZ, PY2GCW/PS8, TA5KA, and VK5AL.

14MHz for GW0HWK was livened by contacts with SV5TS, KA4NRZ, LY2BRP, CT1AF, 9H1GO and UA3/G3JYW.

The 21MHz Band

Starting with G3BDQ, we find John exchanging reports with VP5P, UA9LAC, JAs, YC2NFD, 4Z4UW, ER4L, KB6DDV/DU3, ZD8GT and 5N0SKO.

Just a couple of c.w. QSOs on the band for G2HKU, who worked FY5FO and TA5KA.

With all his other activities crowding in upon him GW0HWK notes that he worked nothing on 21MHz or above.

Turning to GM3JDR, Don mentions UL8AWA, HK0EHM, 8P6AU, LU2EPN, PY2CQM, VU2SU, HL0ORC, ZM2AGY, ZL1AW, VK8AV, BV2DA, LU7WAH, CF3YRU, LU6ENY, EX9S, UA0TO, S79FT and JAs.

G3NOF found the long path open to VK and ZL up to 0800, changing then to long path until noon Zulu. the JAs were heard on long and short path among the VKs and ZLs, and again around 1600-1800 and 2200-2300 on the short path. On the other hand, not a lot from N. America, or Africa, but YB/YC were strong around 1700/1800. Solar flares doubtless caused the patchy conditions, but s.s.b. QSOs were made with A22AA, A22MH, A43KM/0 (Kuria Muria), CM5CB, CO7IC, CP5HI, ED1RSO, EO3AVK, ER2Q, HL1KIB, HL1KII, HL9HH, HR1LW, HZ1AB, JA6IEF/6 (Koshiki Is), JT1BG, JT1BJ, LS9F, N2DRM/M, P29KRB, RA0AD/JT, RL5D/UW9YY, RL0M/RA9SB, S79FT, S92LB, SV7BAY, SV9ANK, TR8AHO, TU2QQ, TZ6CX, UA0FF (Zone 19), UF6FKW, UW0LAP (Z. 19 again), VKs, V47KTG, VP8BXK (S. Orkney), VR200PI/JR, VR6JR, W5IJU (Amelia Is), YC1YMN, YC0FEO, YJ8MB, Z21HD, ZV7AZ (PY7AZ), 3X1SG, 4G3CI, 4U5ITU, 7J1AGW, 8J90XPO, 9K2KS, 9L1US and 9N1MM.

From an all-s.s.b. list to an all-c.w. one; ON7PQ mentions FS/K2BS, 1S0XV, V73AS, 3B8FK, 9M2JP, HV3SJ, AH6JF, FH5EJ and AH3C.

Just 10/15 watts to the 20m wire had to serve G0HGA, and this combination yielded UB5HX, EW8A, RC0/UC2WO, R9MW, SV9BAI, NZ1EV and K1ZQC for a ragchew.

Having cleaned-up on 14MHz, GM0DEQ didn't really have too much time left for 21MHz, so Bob's list mentions OH9MSB, GM3UWD, UA1WCF, UM9MWB, I2CZQ, UA1ALN, ZL0AIC, N1EPU, N6JJL/1, UA1ZA, UA4YG, HA8KDN, PY4MNF, WA8DJR and VE3AR.

The 28MHz Band

Definitely a touch of the summer doldrums here! G0HGA used ten watts to a half-wave end-fed vertical; EM6AAK and SV1ABA were raised thus.

Now we turn to ON7PQ who mentioned CO6DD, 4U5ITU, S79FT, 3C1EA, ZD8GT and TR8XX.

SWL Sheppard and his AR88D logged s.s.b. signals from CX1BBC, CX4PA, PY1AQT, PY2GR, ZP5RG, 9J2FR, 9Q5SK, D68KB, J28DN, OD5SK, WD4OXT, VP8CDR, XT2BW, ZV7AZ, TA2EZ, JY4ZM, JY9VE, OD5RL, VP8ML, 5T5SR, 9K2DR, 9V1WW, 9V1YE, WZ6C/ST4, JA3APU, JA4DLP, JA6RCH, JH4UHW, JJ3YBB, JR1MTS, EL7X, EL2WK, TJ1PD, VU2NTA, VU2OHZ and JI6KVR.

G3NOF analyses the conditions as seen from Yeovil; just a few East Coast Ws, but the long path to JA was open in early May between 0700-1000Z; Africans often heard 1600-1800. A few VKs came in, short path during the mornings. Contacts using s.s.b. were made with BY8AC, CR6RP, EM6AAK, FT5XH, G0KFX/MM, HL0B, JA1XXY, JA7DWD, JA9LJS, JH4UHW, JI6KVR, JJ3TTH, JR3MTO, S79FT, TU2PA, TU2QQ, TZ6VV, V51SW, VK, VP8CDR (Falklands), RL1M/RA9SFT, RL3M/UA9SAB, RZ8T/UA4FDS, ZD9BV, ZP5XHM/ZP8, ZS4AE, ZS60PTA, 3B9FR, 3W6PY, 3W9CZ, 5H1HK, 5Z4FM and 9L1US.

Back to c.w., GM3JDR found PY2TN, HK0EMN, 8P6AU, LU2EPN, PY2CQM, VU2SU, HL0ORC, ZM2AGY, ZL1AW, VK8AV, BV2DA, LU7WAH, CF3YRU, LU6ENY, EX9S, UA0TO, S79FT and JAs.

Just one for G2HKU, namely VP2EXK.

Finis

That's it for another month. Meanwhile, the deadlines are: July 30, August 24 and September 24, to arrive at the address above. I could use more s.s.b. reports, and some hints as to what's what on Top Band too - don't forget, if we don't use the bands we could LOSE them at the next WARC!

Come on you 160m fans! Let's hear what you're up to - Editor

Back-Scatter

VHF Up

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

During the first week of May the quiet side of the sun was looking our way and therefore solar activity was very low. The solar flux dropped to 121 units on May 4, its lowest level since September 1988. On May 8, an M3 type flare was reported but apart from this both the solar and magnetic states were quiet.. The more active side of the sun came into view from May 9 and the sun spot and solar flux figures rose considerably.

Flares occurred almost daily during the period up to May 24. Major storm levels were encountered during May 9-11, possibly due to the disappearance of a moderately large filament. A large event on May 10 was caused by an X3 type flare lasting for over an hour. With all this activity it was hardly surprising that auroras were reported on May 10-11 & 17. The period May 20-24 was also very active with flares of various types being reported on May 20, 21 & 24. Auroral activity, on May 21, was recorded on the 50MHz band in central England commencing from 2130UTC. On May 22 there was a sudden ionospheric disturbance and magnetic storm and, from 1300UTC, another

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aurora which, although weak, reached to the 144MHz band. Solar flux levels rose, reaching 236 units on May 21. As the noisy side of the sun disappeared and the quiet side started to emerge so the conditions declined with the solar flux dropping to 136 units by June 2. This is approximately 100 units down from the levels of the active side of the sun.

Geophysically the month of May was very quiet and although the background radio and X-ray fluxes were the lowest since September 1988 the levels are beginning to climb again as the active longitudes become visible from earth. The prediction for sunspot maximum for Solar Cycle 22 using statistical methods remains at March 1990 with a smoothed sunspot number of 167.6. All is not gloom and doom for the 50MHz enthusiast however, as Cycle 22 is expected to have an extended maximum, with periods of high activity as well as low levels through to 1992.

VHF Operation Modes

I have received a letter from **Bernard Whitford G3ZNF** who although essentially an h.f. c.w. operator feels that he is missing out on some of the action occurring on 50 and 144MHz. Bernard thinks there may be a number of c.w. operators who might like to be operational on v.h.f. but are a little hesitant at investing in equipment if they have no knowledge of c.w. occupancy on these bands. He also requests that indication is given as to what modes are being used for the QSOs reported in this column.

To answer the latter point, 99% are on s.s.b. with a very small percentage of reported contacts being made on c.w. On the other hand it should be recognised that most reports are from Class B licensees who in the main do not use c.w. As a generalisation it can be said that the run of the mill v.h.f. contacts are made with telephony and the real DX contacts are made with Morse, especially via aurora or e.m.e.

Sporadic-E

The RSGB Sporadic-E information line is still operational and can be contacted by telephoning 0426 952211. The recorded message gives details of possible Sp-E locations within Europe and although it is not a forecast it can give some useful pointers as to when conditions look likely. The service is run by Jim Bacon G3YLA who is the IARU Region 1 Sporadic-E Co-ordinator. Jim would welcome logs of Sp-E openings, especially 144MHz. These can be sent to me for forwarding to the RSGB Propagation Studies Committee.

As I am writing this column during the first week of June, reports of 144MHz Sp-E openings are very sparse. The first opening I have details of occurred on May 29 at 1642UTC when **Collin Morris G0CUZ** (WMD) worked EA7ZM (IM76) and heard an EB5 station near Valencia.

Stations in Germany enjoyed an opening, on June 1 between 1825-1835UTC, to the USSR. Hartmut DL3SAS (JN48) worked on s.s.b. RB5VD (KN68), RB5EII (KN78), RB4IYF (KN98) and UA6LJV (KN98). On June 4 there was an opening to Southern Spain, Portugal and Gibraltar lasting 30 minutes. I worked EA7GAA (IM67) and EB7BQI (IM67) at 1805 and 1809UTC respectively. Collin G0CUZ worked the same stations but additionally worked EA7AH (IM67) at 1750UTC and EA7TL (IM76) at 1800UTC. During the same opening stations in the London area were working into Portugal whilst stations in northern England and Northern Ireland had the fortune to work ZB0T.

Tim Crawford GI4OPH was one of the lucky ones to work the Gibraltar station as was Dave Brown GD4XTT who reported him being in for 30 minutes at S9. Dave also worked two EA7 stations in the same opening. On the following day, June 5, it was the turn of operators in Germany to work ZB0T, who incidentally, is Mark Salorskis GM6TKS. I previously made mention of this station in the April issue of *PW*. Although conditions, on June 6, were not favourable from the UK, a number of German operators worked EA6VQ and other stations in the EA3 area, around 1615UTC.

The 50MHz Band

With Sporadic-E propagation prevalent, fevered activity has returned again to 50MHz. With the release of the band to many countries in Europe, this year marks the start of an upsurge in activity. Contacts could be made almost daily up to 2000km and for those prepared to dig down a layer or two, contacts could be made considerably further than this, into southern Africa or South America.

Paul Feldhahn G7CFK (MCH) made his first Sporadic-E contact of the season, on April 20, when F1JGA (JN05) was worked at 1439UTC. Contacts were made almost daily through April and May with stations in DL, F, I, OE, OH, ZB and 9H.

I have not heard any HB9 stations yet, reports **John Heys G3BDQ** (SXW). Unfortunately, unless you are really dedicated, most of you will not hear HB9, HB0 or 4U1ITU as these countries are restricted to out of TV hours operation. In practice this means that they can only be active from 0030 to 0400UTC, a most unlikely time for Sporadic-E or auroral activity. Operation must therefore be via meteor scatter but even this has its problems because a lack of enthusiasm from operators in other European countries to stay up late has meant that very few operators in Switzerland now make the effort. And who can blame them! The easiest way to contact HB9 is to arrange a schedule on 14.345MHz.

G3BDQ has been working other countries however. In an auroral opening on April 10, John worked GD, OZ, PA and SM. Just like the previous report, G3BDQ also made his first Sp-E contact on April 20, working PA0LSB and ON4PS. On May 4, the first Italians stations were worked, contacts being made with I0AMU (JN61), IK5EHR (JN53) and I0SSW (JN61).

Ela Martyr G6HKM (ESX) worked ZB0T (IM76) on May 2, GJ4ICD (IN89) on May 7 and 9H1FL on the 12th. On the same day, for a new country, I0DLP (JN61) and again, two days later, another opening to Italy, contacts on s.s.b. with IK0FEC (JN63) and IK6HMG (JN72). A very good day, May 15, Ela working her first Austrian station, OE9ERC (JN47), followed by OE6DGG (JN87), OE6HBD (JN77) and OE5EYM (JN68). Other stations worked during the day included SM7AED, SM7FJE, OZ7IS, I0UZF, I2CSB, IK3HMA, I4RHP, I5MXX and IK8DYD.

In addition to the normal European theatre I managed to work a number of interesting stations. On May 14 between 1720-1740UTC, contacts were made with ZS6AXT (KG33), ZS6BMS (KG44), ZS6WB (KG44), V51E (JG89) and at 1823UTC, IS0SZU (JM49). There was a good opening to Greece on May 26. Between 0940-1050UTC, contacts were made with SV1OE and SV1EN, both in KM18. Other stations heard during the opening included SV1AB (KM18), SV1SIX (50.039) and SZ2OH/B (50.0145) which runs 10W e.r.p. from locator KM27. Kosie V51E was heard at 1706UTC and a contact was made with V51KC (JG77) at 1733UTC. Counting as Sardinia, IK2GSO/IM0, on the Island of Asinara (JN41) was worked at 1538UTC on June 2.

Meteor scatter was needed to work HB9SNR (JN36) between 0100-0120UTC on June 3. The contact, on s.s.b. had been arranged earlier in the day on the European v.h.f. net on 14.345MHz. At 0157UTC, HB0/HB9QQ was heard calling CQ and although he got my callsign I could not complete the QSO in the three minutes before his next schedule! Pierre HB9QQ will be going back to Lichtenstein in August during the Perseids meteor shower so if you are prepared to stay up into the middle of the night you should be able to work him easily.

The expedition to Aaland Island, OH0BT (KO09) by the Vileen's Bargain v.h.f. Group was worked at 1334UTC via Sporadic-E. Although not worked, LX1SI was heard via meteors at midday on June 4. Later on in the day, at 1859UTC, TF3EJ (HP94) was contacted on s.s.b. for a new square. A contact was made with IT9SGC (JM77) on June 6 at 1845UTC but unfortunately Sicily does not count as a separate DXCC country on h.f. or 50MHz, but strangely does count separately on 144MHz. Perhaps someone would care to explain why? A late evening opening to Greece on June 7, gave a contact with SV1DH (KM18). I had to use meteor scatter to work Chris Gare G3WOS operating the 4U1ITU club station in Geneva. The contact, on June 8, took 30 minutes to complete, starting at 0035UTC. Another new country, Faroe Islands, with OY3QN (IP62) being worked at 1650UTC on June 9 via Sp-E.

Ted Collins G4UPS (DVN), an experienced operator of the band found much to interest him during May. An opening to Scandinavia on May 1 gave c.w. QSOs with LA2AB (JO59), LA3UU (JO59), OH3MF (KP20), OH3XA (KP20) and SM3JGG (JP71). There was an opening into Africa on May 2, with ZS6LN being heard at 1616UTC. The 9L1US and V51E beacons were heard from 1700UTC, both at immense strength. Ted reports that Dave Newman G4GLT worked FE1JKK/FY at the same time and that at 1915UTC ZP6XDW, in Paraguay, was working into Malta and stations in Brazil (PP5) and Chile (CE) were working into Holland. Most of this activity going over our heads!

Another opening to Africa, on May 3 at 1805UTC, found 5H1HK on Zanzibar Island. The Ascension Island beacon, ZD8VHF, was heard peaking 559, from 1915UTC for about 20 minutes. On May 13 & 14, the TF3SIX beacon (HP94) was heard at 599 but no other activity was heard. An early evening opening to South Africa, was heard by Ted on the 14th, with ZS6BMS, ZS6CE, ZS6PW/B and ZS6WB all putting in very good signals. On the following day, at 1733UTC, Kosie V51E was heard at 56. Openings continued into Africa with the FR5SIX beacon being heard on May 18 at 1530UTC and also on May 19 at 1544UTC. A little later FR5EL was heard working G4AHN and GJ4ICD. During a Sp-E opening on May 20, OY9JD (IP61) was worked for a new country.

The 70MHz Band

Des Walsh EI5CD passes on the news that at a recent Dinner Dance of the Irish Society IRTS, a spokesman for the Department of Communications stated that Class B licence holders can now apply for permits for 50MHz, 70MHz and ATV. Des mentions that in Eire the 70MHz band is from 70.125-70.450MHz, considerably less than the UK allocation. He has noticed p.m.r. stations encroaching into the bottom end of the band, very close to the beacon EI4RF on 70.130MHz and thinks this situation can only be eradicated if more amateur stations occupy the band.

Following a visit to the Drayton Manor Rally, **Ian Wright GW1MVL** (CWD) came away with a Pye Europa which he is modifying for the band. He is expected to be on 70.450MHz very soon.

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With the aid of Sporadic-E propagation I was able to make s.s.b. contacts with DL9RM (JN69), crossband 50/70MHz and direct with ZB0W (IM76) for his first QSO on the band. Both contacts were made on June 4 prior to the Sp-E opening on 144MHz.

The 144MHz Band

Conditions during May were neither good nor bad. Auroral activity was reported on May 10, 11, 17 & 21 but little seemed to have come of them. There were a number of tropo openings but none were extensive or of lasting duration. The first of a number of Sporadic-E openings from the UK occurred on May 29 with an opening into southern Spain. Throughout the period the sporadic meteor rate was noticeably improving and a number of showers which occurred in May ensured that the dedicated ms enthusiast was well catered for.

First, I would like to welcome a new reader, **Gary Nicholas GW7EVG** (CWD) to the column. Gary is very new to v.h.f. and at present is only operational on 144MHz s.s.b. with an Icom IC-202 into a loft mounted 5-element Yagi, fixed to the north. On f.m. he uses a Navico AMR1000 running 25W into a G-Whip colinear mounted on a chimney at 10m above ground. Recent contacts have included EI6ARB/P, GD4XTT, GI4EIZ and GI4KSO. Gary was also successful in working GM8VBX/M (DGL), on f.m. for his first contact with that country.

Dave Brown GD4XTT (IOM) has been quite active now that he has increased his power to 100W. On April 25, he worked GM1EHK (FFE) for a new county, following that up a few days later by contacting GW0KZG/MM in JO03 and JO04. On the WAB front, G1YIY/M provided Dave with 15 new areas on April 28. A rare area, Denny Island (ST48) provided by G0LAK/P, was contacted but only just. GD4XTT heard the station as the tide was advancing fast, the QSO being completed before G0LAK got his feet wet! There were good tropo conditions on April 30, contacts being made into DL, EI, F, G, GI, GW, PA & Y2, the best of the bunch being Y32IN/P (JO60). A contact with DK9OY (JO52) gave that station his 47th country on 144MHz. He had been looking for GD for 10 years. During May, Dave worked G3DDK (SFK), G8LNC/P (IOW), GM4ZUK/P (GRN) and GW8TBG (GNW) for his last Welsh county.

Joice Brown GD0ELY (IOM) has stayed almost exclusively on the up and downer mode working G0NCT (ESX), ON4KBE & ON6CP (JO20) on May 1, and G6NSY at New Scotland Yard on May 6. Joice worked G3ABS (YSW) on May 17, nothing significant in that, other than it was his first contact with GD on 144MHz since 1947!

Vince Shirley G7ENF mentions the good tropo on May 1 but nothing exceptional was worked, however he did manage to contact FF6KSL (JN28) for a new square in the contest on May 6. He also competed in the 144MHz contest on May 19-20, working G0JDL/MM (JO13), GM3WGV/P (IO76) on Ben Nevis and GM4TMS/P (IO86).

Stewart Howarth GM0GTU/MM sends in details of his 144MHz activity from the drill rig *Ocean Victory* located approximately midway between the Scottish mainland and Norway in locator square JO09SO. He commenced operation on May 21, a delay of more than one week due to his 5-element Yagi getting lost in transit. A makeshift 5.5 wavelength centre fed dipole was quickly made from 14g wire and fed with coaxial cable, the v.s.w.r. being under 1.5:1 across the band. Unfortunately due to the position of the accommodation block the dipole antenna was shielded to the south and west. Apart from antenna limitations, Stewart also had to put up with dreadful electrical noise from the drill rig. Equipment in use was a TS-751E driving a Microwave Modules 100W amplifier. All operation has been mainly on c.w. during auroras, no replies being obtained at any other time. Despite the severe operational problems, results have been quite encouraging. Contacts in an aurora, between 2050-2310UTC on May 21, included LA3BO (JO59), LA6HL (JO38), LA7KK (JP50), SM7GWV (JO78), G3BW (IO84) and GW4VEQ (IO73). Another event on May 22, between 1300-2300UTC, gave contacts into DL, LA, PA, SM and the UK in the form of G3LQR (JO02), G3UTS (IO94), G4KUX (IO94), GM0CLN (IO85), GM0JIN (IO85), GM4IPK (IO99), GW4FRX (IO82) and GW4VEQ (IO73). Yet another aurora, this one on May 25 between 1240-1640UTC, being restricted to Scandinavia, produced 23 c.w. contacts with stations in LA, OH, OZ, and SM. An event on May 26, from 2206UTC through to 0010UTC on the 27th gave 25 contacts with DL, LA, OZ, PA, SM, Y2, G8MBI (JO02) and GM0GMD (IO86). An afternoon phase gave QSOs with DK1KO (JO53), LA2DH (JO49) and GM0HBK (IO77). Stewart was expecting to remain at the JO09 location until July 6 when the rig will be moved to a location in the southern area of the North Sea. By the time this move is completed he will hopefully have received the 5-element Yagi and will be putting out a much better signal on tropo.

Collin Mister G0DAZ (HWR) has just completed a major re-structuring of his 144MHz system. The antenna setup now consists of four 15-element Cue-Dee Yagis with full azimuth and elevation control. To support the antennas an H frame was constructed from HE9 aluminium, this material having much much better elasticity than normal grade aluminium. To take the weight off the KR500B heavy duty elevation rotator, two thrust bearings are used to support the frame. The antenna array is balanced with a glassfibre pole filled with sand sticking out like a probe from the frame centre to counterbalance the considerable weight of the heliax at the rear end of each Yagi. The antenna harness consists of four lengths of LDF4-50 heliax, each being cut to the same electrical size, into a Tonna power splitter. Flexible cable, FSJ4-50 is used around the azimuth rotator to a mast mounted control box consisting of coaxial relays and a muTek GFBA low noise amplifier. Sequential control of the l.n.a. and h.p.a. is designed into this system so that the receiver front end is protected. Separate feed lines, both LDF5-50, are used for transmit and receive, the total cable loss from shack to antenna being under 1dB. A considerable time was spent in getting a very low v.s.w.r. and ensuring that each antenna shared the power equally. This is a very important parameter that unfortunately most operators overlook. It took 3 dry days to set up the antennas, the end result being a return loss of approximately 32dB between 144.000-144.400MHz. In the shack, the trusty FT-225RD has been replaced by an FT-980 and muTek transverter, which Collin finds is much better on both transmit and receive. The FT-980 has the advantages of the necessary narrow filters for c.w. and variable notch and noise blanker filtering. By shorting a pin in a 28-way plug on the back of the 980, the set displays 144MHz when transverting from 28MHz. Readouts for all the other v.h.f or u.h.f. bands are also available. To check out the system, Collin arranged a test with GM4IPK and was pleased to be able to hear Andy running only 10W, especially as he had been unable to previously complete a QSO with him. During the aurora on May 17, Collin took time out from setting up the antennas to work GM4IPK, GM4UFD, GM0CLN and GM0EWX.

144MHz QRB Table
Distance in kilometres

Station	Tropo	Aurora	Meteors	Es
G0CUZ	2943	1758	1996	2943
G0DAZ	2923	1780	2026	2923
G0DKM	2811	1488	——	2203
G0EVT	3080	1640	1808	3080
G0FYD	1315	1624	——	2019
G0ISW	1059	566	——	2057
G0LBK	3060	1755	1876	2350
G1DWQ	1454	1812	——	1836
G1EZF	1730	1757	1920	2375
G1KDF	3023	1421	——	2386
G1LSB	1319	733	1732	2723
G1SWH	3035	1429	——	2372
G3FPK	1835	1686	——	2337
G3LTF	1824	1846	2021	2174
G3SEK	1560	1681	1872	2154
G4ASR	2848	2029	2107	2853
G4DHF	1498	1530	2000	2448
G4JCC	1334	1158	1018	2173
G4MUT	1163	684	1533	2068
G4RGK	1466	1757	1920	2375
G4VXE	2862	1446	1501	2880
G4YTL	1404	1774	2025	2172
G4ZTR	935	1535	——	2130
G6DER	1834	997	1957	2068
G6DZH	2924	711	——	2233
G6HCV	2880	1450	1912	2880
G6HKM	1304	1555	——	2265
G6LEU	2620	910	——	2430
G8HHI	1742	——	——	2058
G8JDX	2667	1368	——	2663
G8LHT	3070	1780	1868	2510
G8MFJ	1209	1210	1329	2168
G8PYP	1083	1451	——	2318
GD4XTT	3053	——	——	1700
GI1JUS	3067	1614	1507	2216
GI8YDZ	1216	1809	1901	2562
GJ4ICD	1620	1100	2050	2090
GM4CXM	1428	1750	2100	2023
GM4YXI	3160	1881	2048	2513
GW4VVX	2823	1391	1313	1910
GW6VZW	2830	1473	——	2236
ON1CAK	1420	1166	1948	2725
ON1CDQ	1420	1166	1948	2124

Annual v.h.f./u.h.f. table
January to December 1990

Station	50MHz Counties	50MHz Countries	70MHz Counties	70MHz Countries	144MHz Counties	144MHz Countries	430MHz Counties	430MHz Countries	1296MHz Counties	1296MHz Countries	Points
G6HKM	46	20	—	—	56	12	21	6	14	5	180
G1SWH	31	14	24	4	54	9	17	5	—	—	158
G0IMG	24	18	20	2	34	7	20	2	—	—	127
GD4XTT	23	6	—	—	67	13	5	2	—	—	116
G4ASR	7	25	15	4	31	16	—	—	—	—	98
GW1MVL	2	2	—	—	43	10	11	2	—	—	70
G8PYP	12	7	1	1	28	8	9	2	—	—	68
G7CLY	—	—	—	—	50	6	—	—	—	—	56
G4ZTR	—	—	—	—	36	12	—	—	—	—	48
GW4HBK	—	—	24	6	—	—	14	3	—	—	47
G4SEU	—	—	42	3	—	—	—	—	—	—	45
G7CFK	18	12	—	—	—	—	—	—	—	—	30
GW7EVG	—	—	—	—	12	6	—	—	—	—	18

Annual c.w. ladder

Station	Band (MHz) 50	70	144	430	Points
GD0ELY	5	-	79	—	84
G4ASR	18	1	64	—	83
G4DUT	-	2	49	—	51
GW4VVX	3	-	9	—	12

Number of different stations worked since 1 January 1990

The 430MHz and Microwave Bands

The contest in early May gave Ian GW1MVL the opportunity to work two new squares on 430MHz when contacts were made with GW4BVY/P (IO81) and G0MTV/P (IO94).

Ela G6HKM has now got the 1.3GHz antennas up on the tower again, recent contacts being made into south-east England and the Midlands. The contest on May 5-6 resulted in 30 QSOs with stations in DL, G, GW, ON and PA. The only DX of note on the 430MHz band was a contact with GI4EIZ (ANT) on May 3.

Gordon Emmerson G8PNN (NLD) reports that he heard, at great strength, the Danish 1.3GHz beacon on April 24. A CQ call in that direction was answered by Carl SM6HYG at 59+ but despite the beacon remaining in for many hours afterwards no other contacts were made. Activity was a little better on May 1 when s.s.b. contacts on 1.3GHz were made with G1YFG (IO92), G3XDY (JO02), G8GDZ (IO92), (PA3BAS (JO21), PA3BBA (JO22) and PE1GHG (JO21). Gordon also made s.s.b. contacts on the 2.3GHz band with G3XDY and PA3BBA.

Kevin Church G8XIR (KNT) mentions that at present he is only active on 1.3GHz but that he will shortly

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be QRV on 2.3GHz and 430MHz. On the latter band he hopes to put up four 22-element DL6WU Yagis for listening off the moon.

Bob Nixon G1KDF (LNH) is again active on 1.3 and 2.3GHz. He is looking for schedules on Wednesday, Thursday or Friday evenings and at weekends. Contact Bob on 0695 574 868.

John Tye G4BYV (NOR) found conditions good on May 4 with Norwegian 2.3GHz beacons being heard. The only contact reported was SM6HYG on 2.3GHz, an attempt on 3.4GHz being unsuccessful. During the contest on May 5-6, John worked GOEMG/P, G4EZP/P, PA0EZ, PA0WWM, PE0AGO and PE0MAR on 3.4GHz as well as PA0EZ and PE0MAR on 5.7GHz.

Ray Jones G3NKL has been getting excellent results on the 24GHz band. During the April cumulative contest, operating from Fairsnape Fell, he worked GW3FNQ/P on Anglesey over a 127km path. The same path had been worked one week earlier but with much weaker signals. On the following day another attempt produced almost noise free signals. Ray then moved to a location near Whernside, in the Yorkshire Dales, attempting the 150km path to Anglesey. Tones were exchanged both ways and speech heard by GW3FNQ but no two-way contact was made.

Beacon and Repeater News

A new beacon situated on Sicily (JM77) has recently appeared on the 50MHz band. Signing **IT9LCY** on 50.163MHz, it also sends the operators telephone number so that he may be alerted to any openings.

Three new beacons, all located in JN87GG, have been installed recently by HG1YA. Listen out for HG1BVA on 144.985MHz, HG1BUA on 432.975MHz and HG1BSA on 1296.975MHz.

Ian Shepherd G4LJF, instigator of the first UK DX Packet Cluster is now licensed as **GB7DXI** on a temporary frequency of 144.675MHz. The cluster, located in Wokingham is expected to change frequency to 70.325MHz very soon.

A 430MHz repeater in Cork, Eire is now operational on channel RB10 from a very good location.

The 430MHz repeater **GB3LT**, located near Luton, is temporarily off the air because of equipment failure. Contact Mark Chadwick G6HCN for further information.

Expeditions

There is still time to work **SV/OE6WIG** (KM19) on 50MHz and 144MHz. He will there until August 18. Although most activity will be on the 144MHz band, Walter hopes to operate on 50.100MHz, if permission can be obtained. He will be looking for tropo and Sporadic-E contacts, around 144.300MHz, for most of the time but will operate via meteor scatter during the period August 8-14. Walter will be active between 0300 to 0700UTC on 144.027MHz, transmitting during the first 2.5 minute period, at a speed of 1200 letters per minute.

Want Greenland on 50MHz? **OX3LX** will be active from locator squares GP35, GP60, GQ12 and HP15 until September.

Commencing from July 11 till the end of the month, Uffe OZ1DOQ will be active from either TA or SV9 on the 144MHz band with 300W and two 9-element Yagis. He will be QRV on the v.h.f. net in the late afternoons.

Both ON1AOI and ON1CDQ plan to operate from wet squares within the vicinity of the Balearic Islands. They will be active on 50MHz with an FT-690 and dipole entenna from JN10 and JM19, between July 15-30.

If you are interested in working unusual prefixes listen out for **OG9SCL**, a special event station operating from Santa Claus Land, Finland. They will be active on 50MHz between July 19-22 from locetor KP27.

Members of the Telford ARS, including Martyn G3UKV will operate from the Scottish island of Jura on most v.h.f. bands between July 24-31. Interestingly, the island covers locator squares IO65, IO66, IO75 and IO76.

If you need the Island of Sark on 50, 70 or 144MHz, keep an ear out for G8BFL, G8UUR and G4ZUR, operating from there between July 21-28. They also plan to operate on the h.f. bands as well.

Svalbard is a country that doesn't feature very much on v.h.f. However, PE1MIS, PA3DCO and PA3FMK will operate with the call sign **JW5E** from locator JQ78 between July 27 to August 5 with 100W and a 6-element Yagi.

If you missed the OH2AP/OH0M expedition to Market Reef last year on 50MHz you might be luckier this year. This DXCC country will be activated between July 28 to August 4 on various v.h.f. bands.

The Five Bells Group will this year be mounting a major expedition to Iceland in August on 144MHz and 430MHz. A cottage has been rented in IP03 square from where the main activity will take place. They will have e.m.e. capability on both bands with a 3CX800 p.a. and four 16-element Yagis on 144MHz and a similar p.a. on 430MHz into four 21-element Yagis. A separate 144MHz station using a 4CX250 p.a. and four 9-element Yagis will be taken to enable portable operation from other squares and, if needed, a second station from IP03 square. The main station will operate on 144.028MHz for c.w. and 144.215MHz for s.s.b. The second station will be on 144.128MHz. Frequencies on u.h.f. will be 432.028MHz on c.w. and 432.215MHz on s.s.b. The v.h.f. net will be used for obtaining schedules for either band. All c.w. skeds, both m.s. and e.m.e. will use 2.5 minute periods with the TF station taking the second period. The callsign will be one of the UK calls/TF. The portable station will be a UK call/TF/P. Any station heard signing without the /P will be in IP03. Please do not call again if you hear a different UK call sign, unless they are signing /P. Operators are likely to be G4DHF, G4NPH, G4ODA, G4PIQ, G4YTL, G4ZHI and G8IJC. QSLs go via G4DHF or G4ODA.

The Derbyshire Hills Contest Group will be operating from the same site as used in their 1984 expedition to Eire between August 5-16. Activity from IO61DW will be on 70, 144, 430, 1296MHz and possibly 50MHz if permission can be obtained. Exact call signs are uncertain but **EI2VPX/P** will most likely be used on 144MHz. Frequencies in use will be .220 on all bands for tropo and 144.144 & 144.444MHz for meteor scatter working. Operators will be G1WBZ, G4VVZ, G6ABU, G6HKS and G8ROU. Skeds are available for all bands, especially 430MHz, from Nigel Wilson G4VVZ, 9 Greythorn Drive, West Bridgford, Nottingham NG2 7GG.

Clive O'Hennessy GW4VVX will be active between August 12-27 from locator IO78WA, some 60km north of Inverness. Operation will be on 50MHz and 144MHz, using the callsign **GB2XS**. The preferred frequency on 2m will be 144.222MHz. Equipment will be a TR751E driving a 160W amplifier and a 9-element Yagi. Last year, operating from the same site, Clive caught 4 auroras covering all of the UK except Cornwall and Dorset. He will be especially looking out for stations situated in southern and western England as he knows how difficult it is to work into the north of Scotland from these areas.

Meteor Showers

The following data, concerning meteor showers occurring in the next few weeks, will help you determine in which direction to beam at specific times and when the shower is below the horizon. If you are a newcomer to this mode it is advisable to obtain an up to date guide on operating procedures from myself rather than follow the practice of a number of operators heard on various ms calling frequencies.

The **Delta Aquarids** occur between July 12 to August 18, with the best activity being on Saturday July 28. Unfortunately it is below the horizon from 0500 to 2200UTC but does produce very good results on the east-west path between 0000 to 0300UTC.

The big event of the year, but not necessarily the best, is the **Perseids** shower encountered between July 20 to August 23. Most activity will occur during the weekend of August 11-12, the theoretical peak being on Sunday 12th. The shower is circumpolar, which means that it does not set and is therefore usable, in particular directions, throughout the 24 hours. Between 0900 to 1300UTC beam north-east or south-west, 1300 to 2100UTC beam east or west, 2100 to 0100UTC beam south-east or north-west. There is no well defined peak for the north-

QTH Locator Squares Table

Station	50	70	144	430	1296	Total
G3IMV	228	—	430	125	51	834
GJ4ICD	360	—	263	119	59	801
G3JXN	204	22	187	134	88	635
G6HKM	217	—	218	109	46	590
G1KDF	258	—	183	104	37	582
G0DAZ	146	—	221	137	39	543
EI5FK	300	—	184	58	—	542
G4KUX	—	—	372	120	—	492
G3UVR	—	—	257	140	83	480
G4RGK	—	—	284	124	50	458
G3XDY	—	—	206	148	91	445
G4DEZ	55	—	249	49	49	402
G6DER	—	22	183	110	78	393
ON1CAK	48	—	280	53	11	392
G0LBK	—	—	257	89	46	392
G8LHT	79	19	185	93	14	390
G1SWH	153	25	153	58	—	389
G1EZF	—	—	263	93	—	388
G4XEN	—	—	274	111	—	385
G4MUT	82	22	153	93	31	381
ON1CDQ	43	—	255	56	7	361
G1LSB	44	—	172	143	—	359
G0EVT	88	—	209	57	—	354
G4RRA	—	—	255	80	—	335
G3COJ	—	—	186	103	44	333
G8PNN	7	24	129	99	64	323
G4SSO	—	—	229	93	—	322
G4FRE	—	—	102	146	72	320
G1DWQ	171	—	142	—	—	313
G4TIF	—	—	200	110	—	310
G4DHF	—	—	307	—	—	307
G1EGC	—	—	198	80	23	302
G8HHI	—	—	148	110	38	296
G4ZTR	78	28	104	50	30	290
G6MGL	—	—	141	89	59	289
G4NBS	—	—	119	105	63	287
DL8FBD	—	—	280	—	—	280
G8ATK	—	—	143	91	45	279
GW6VZW	118	—	143	6	—	267
G8PYP	122	2	106	32	—	262
G4PCS	—	—	258	3	—	261
G1GEY	—	—	168	77	11	256
G3NAQ	—	—	175	80	—	255
G6STI	—	—	152	69	24	245
G6DZH	—	—	154	87	—	241
G3FPK	—	—	241	—	—	241
G4IGO	—	—	238	—	—	238
G0EHV	—	—	160	75	—	235
GM4CXP	—	—	198	31	—	229
G1SMD	115	—	106	—	—	221
G4DOL	—	—	216	—	—	216
G4MEJ	—	—	213	—	—	213
G8LFB	—	—	209	—	—	209
GW4FRX	—	—	204	—	—	204
G8MKD	—	—	150	49	—	199
GJ6TMM	—	—	151	48	—	199
G4YCD	—	—	197	—	—	197
G1TCH	94	—	95	6	—	195
GI1JUS	—	—	192	—	—	192
G8XIR	—	—	123	—	62	185
G0NFH	54	26	73	16	8	177
G7ENF	59	—	89	24	—	172
G6DZH	—	—	156	—	—	156
G7ANV	—	—	153	—	—	153
G6MXL	—	—	91	45	16	152
G4FVK	—	—	78	49	21	148
G4AGQ	—	—	104	42	1	147
G8XTJ	29	—	116	—	—	145
G0FYD	1	—	142	1	—	144
G6MEN	41	2	63	26	4	136
GW4VVX	10	—	117	—	—	127
G1WPF	—	—	97	29	—	126
G0FEH	—	—	101	24	—	125
G0ISW	45	—	59	17	—	121
GW1MVL	—	—	109	7	—	116
G1IMM	—	—	98	17	—	115
G7CFK	109	—	—	—	—	109
G1CEI	11	—	77	18	—	106
GM0HBK	—	—	107	—	—	107
GI4OWA	—	—	103	—	—	103
GM0GDL	—	—	81	22	—	103
G7CLY	—	—	100	2	—	102
G1SWH	—	—	148	53	—	101
G4WHZ	—	—	76	—	7	83
G0GTF	76	—	—	—	—	76
G0HEE	—	—	73	—	—	73
GU4HUY	—	—	73	—	—	73
G1NVB	—	—	73	—	—	73
G0HDZ	—	—	64	—	—	64
GM1ZVJ	6	—	48	—	—	54
GM0JOL	—	—	47	—	—	47
G2DHV	—	—	33	7	2	42
G7AHQ	—	—	34	—	—	34

No satellite or repeater QSOs
Starting date 1 January 1975

Back-Scatter

south path, it generally being good at all times except between 0400-0800UTC and 1600-2000UTC.

QRZ Contest!

The Scandinavian activity contests will be run on the following dates. Microwave activity on August 2, 144MHz on August 6 and 430MHz activity on August 7.

The CQ-WW-VHF-WPX Contest, on all bands from 50MHz to 1.3GHz, takes place on July 21-22. More details were given in last months column.

The July session of the microwave cumulative contest will be held on July 22. Activity will be on all bands above 3.4GHz.

If you are interested in monitoring the activity listen on 144.175 or 144.330MHz s.s.b. and 144.525MHz f.m.

Results of the Derby & District Amateur Radio Society 144MHz contest held on March 11 have recently been received from Mike Sharp G4XPE. The winners and runner-up in each section were: Section 1: Full Legal Power, Multi-op, **G0KYW/P** and G7FXY/P;

Section 2: Full Legal Power, Single-op, **G4PIQ** and G4LU;

Section 3: Low Power, Multi-op, **G4RLF/P** and G1NUS/P;

Section 4: Low Power, Single-op, **G0CLP/P** and G1PJM/P.

Full results can be obtained from the Derby Radio Society at 119 Green Lane, Derby DE1 1RZ. Don't forget to include an s.a.e.

Deadlines

Please send your letters to reach me by July 30 at the very latest. The dates for the following two issues are August 24 and September 24. I can also receive messages via packet radio at my mailbox GB7TCM. If you wish to send photographs of your shack or antenna system for inclusion in the column I would be most pleased to receive them but they must be good quality prints.

Back-Scatter

RTTY

Reports to
Mike Richards G4WNC
200 Christchurch Road,
Ringwood, Hants BH24 3AS

My recent plea for help with Amiga software has resulted in a response from **Bob Brevitt** of Walsall. He is in much the same predicament as Stuart Rison, i.e. no data decoding software for the Amiga. However he has at least made one discovery that should help readers who may be using or contemplating using the Amiga with a PK-232 intelligent terminal unit. He has discovered an American PK-232 driver program that is in the public domain. From the information Bob has sent it looks to be very comprehensive so should be worth a look. It is probably available from several sources but Bob obtained his from: NOVA PD Software, 30 Parsons St. Banbury, Oxon OX16 8LY. My thanks to Bob for this information. If anyone has any further news on radio software for the Amiga, please drop me a line.

Still on the subject of computer software, **Trevor Rowell** of Catterick Garrison has sent me two programs for the IBM PC that he is releasing as shareware. The first is logging program that has been designed with the utility listener in mind. This features a form type data entry screen set out with all the essential details such as mode, speed, shift, etc. Once the list has been created the data can be retrieved in a number of different ways to produce lists in date, frequency or many other orders. In fact the program is so versatile it probably justifies a review in its own right. For anyone interested a registered version of the program can be obtained by sending £5.00 to Trevor at 10 Albermarle Drive, Catterick Garrison, North Yorks DL9 4DT.

The second program on offer is a rather interesting Morse tutor that can be configured in a number of different ways. I have tried the program and found it to be very good. Trevor has not as yet decided on the distribution arrangements for this program but I'm sure an s.a.e. will secure more details.

ICS AMT-3

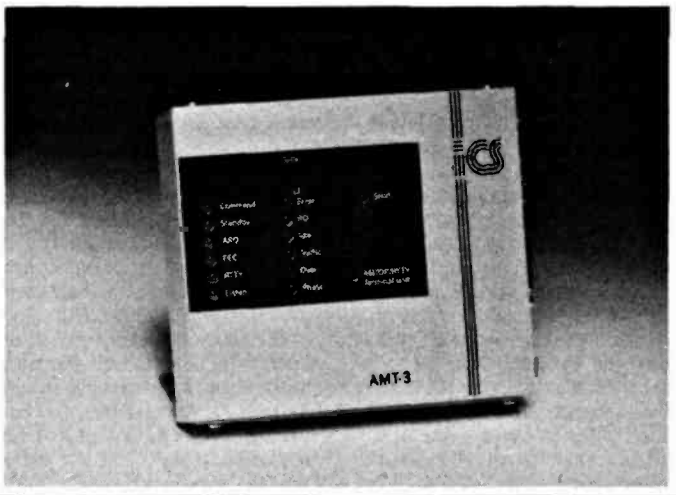
This month's review is a slightly unusual data unit from ICS Electronics. The AMT-3 follows in a line of AMTOR terminal units stretching right back to the original AMTOR Mk 1 boards that were available in the early days of this mode.

Because of their background in this mode, ICS have been able to produce some very effective AMTOR implementations. I can speak from experience here as my introduction to this mode was with an AMTOR Mk2 board. This unit was connected between the terminal unit and the computer and converted the standard RTTY signal from the computer into AMTOR and vice-versa. In fact I only recently sold my Mk2 unit and as far as I know it's still working well.

Getting back to the question in hand, the AMT-3 is substantially different to the original units and includes many very useful features.

The basic operation of the AMT3 can be likened to a Packet radio TNC It interfaces between a computer and a radio using standard ASCII serial data on the computer side. Whilst sending and receiving audio tones to and from the radio.

The first thing that you notice is the unusual and refreshing design. With so many units being supplied in the standard rectangular box, it was good to see some lateral thinking! The front panel contained only indicator l.e.d.s, while all the connections were made on the side panel.



The AMT-3 needed an external 12 volt power source with a current demand of approximately 500mA. The voltage tolerance was quite wide and the AMT3 was specified for operation between 11V and 16V. The power connector was of the now standard 5mm coaxial type.

The computer connections were made with a 25-way 'D' connector which is an established standard for RS-232 serial data transfer between computers. Anyone familiar with RS-232 will no doubt be aware that there are many different implementations. The one used in the AMT3 includes the CTS, DSR and DCD lines, in addition to the basic data transfer lines. In practice this means that computer interfacing should be very easy. One important point made in the instructions was that all the connecting leads should be screened to reduce r.f. interference to a minimum. The data format of the RS-232 port was fixed at seven data bits and one stop bit with no parity. As to the transmission speed, this was factory set at 1200 baud but could be altered to 300 baud by moving an internal link.

The connections to the radio were handled by another 'D' connector on the side panel, but in this case it was nine way. Although this type of connector was not originally designed for audio use it is in fact very effective, as a large number of connections can be made in a small physical space.

In addition to the p.t.t., audio input and output there was a scan and f.s.k. output. The scan was designed for those who need automatic operation on a number of bands. An example would be a mailbox where the transceiver is left scanning a number of frequencies waiting for a call. In this case the scan line is pulled low to stop the scan when the AMT3 detects a call to the mailbox Selcal. This is a powerful feature that I'm sure will appeal to those with an interest in mailboxes.

The f.s.k. line is another useful extra that allows the AMT3 to use f.s.k. on transceivers where this facility is

available. The use of true f.s.k. as opposed to a.f.s.k. via an s.s.b. transceiver usually produces a much cleaner and hence more easily decoded signal.

The SCAN, p.t.t. and FSK lines were all rated as being able to stand 30V and sink a maximum of 100mA. This should prove adequate for the majority of modern stations.

Turning to the audio side, the input required a minimum signal level of 10mV r.m.s. This was a useful sensitivity that meant the fixed level auxiliary output available from most transceivers could be used. The advantage of this is that the decoder works independently of the volume control which can then be adjusted to suit the operator. The a.f.s.k. output from the AMT3 was adjustable between approximately 20mV to 400mV. Again this should suit most transceivers.

One point that will please many operators is that the AMT3 uses 'High Tones' i.e. 2295Hz and 2125Hz which aligns with standard practice on Japanese equipment. The great advantage being that the RTTY option on the transceiver and f.s.k. modulation can be employed without modification to the transceiver. This is not usually possible if the European 'Low Tones' are used.

User Manual

The manual supplied was very well presented and comprised a spiral bound, 40-page, A5 book.

The information was presented in a logical manner, though it could have been improved with the addition of a few diagrams to aid some of the explanations.

I was pleased to see that there were a number of operating hints designed to help new operators familiarise themselves with AMTOR. This was supplemented by a short but useful tutorial on the operation of AMTOR.

Also, the more advanced features of the AMT3 were covered in a separate section, which helps to avoid confusing the newcomer.

The final section of the manual comprised a full set of circuit diagrams, which I was quite surprised to see.

The only point I would make about the manual was that throughout the text was rather small and I would imagine that some may have difficulty.

Operation

With no controls on the AMT3 all the operational parameters are under software control from the host computer. By far the easiest way to control the AMT3 is to use one of the driver programs that ICS supply. The review model came suppled with a driver for the IBM PC and its clones.

The general operation of the AMT3 was similar to a Packet TNC as it used a command mode to receive instructions from the computer.

The command mode was activated by pressing the 'Escape' key on the computer and was indicated by the COMMAND l.e.d. on the AMT3.

The first set of commands to be used are the SET-UP options which allow the basic operating parameters to be adjusted. This covers basic areas such as how the AMT3 responds carriage returns, linefeeds and whether text is echoed back to the computer. You could also use this mode to set the flow control on the serial port for either hardware or software control.

In addition the transmit delay could be adjusted to suit your transceiver. This is necessary to ensure that data is not sent until the transceiver is actually ready to send it.

It was also possible to to set the receive polarity to suit that of the transceiver.

There were in fact a total of sixteen set-up commands, all of which could be saved to the non-volatile RAM.

This meant that the basic set-up should only need to be carried out once.

If you needed to check the current set-up parameters, the AMT3 would respond with a full list if the DISPLAY command was used. I found this to be very helpful.

The operating mode commands were used, as the name implies, to select the desired mode. The modes available were:

STANDBY: This was the default mode and left the AMT3 ready to decode any FEC transmission or an ARQ call to its own Selcal.

ARQ:This was used to initiate an ARQ call and was followed by a prompt for the operator to enter the Selcal of the distant station.

LISTEN: This is a mode exclusive to amateur ARQ systems and allows the unit to monitor any ARQ contact.

FEC:This put the AMT3 into FEC transmit sending idles.

RTTY: This is self explanatory and simply started the RTTY mode with the unit in receive. The baud rate was set to the default value which could be altered by re-entering the command mode and using the baud command.

I was very pleased to see that ICS had included a very useful set of test commands in the AMT3. These tests were all designed to check specific elements of the AMT3 and could prove very useful for fault localisation.

Once a particular mode had been started, functions such as transmit/receive switching and the ARQ +? combination could be sent by typing control characters from the computer. This was a useful time-saver and was used extensively by the dedicated driver programs.

On Air

I interfaced the AMT3 with my existing station which comprises an Icom IC-720A transceiver and an Amstrad PC-2086 computer. I had no problems at all with the interfacing and used a standard RS-232 connecting cable. I generally prefer to use software flow control if available, so the AMT3 fitted in very well.

The radio interfacing also proved to be trouble free.

I decide to start operation using the IBM PC driver program, which loaded onto the PC-2086 without any problems.

The program was very well presented and included a range of features designed to obtain maximum performance from the AMT3. All the commands and facilities were accessed via pull down menus which seems to be the norm for PC comms programs. An on-line help facility was also included which meant that the program was very easy to learn.

To aid the preparation of transmitted text there was a type-ahead buffer included as part of the split screen display.

The program included a very powerful range of file handling options that allowed the transmission, printing and editing of any text file. The editor was particularly good and included a useful selection of word processing facilities that were controlled by Wordstar style commands. There were also four message buffers which could be used to hold short standard messages such as CQ calls.

As you can see the driver program was extremely effective and made operating the AMT3 a real pleasure.

For the benefit of readers who may not be able to obtain a specialised driver, I did try using the AMT3 with the Amstrad configured as a dumb terminal.

This obviously proved to be a little less convenient, but was nevertheless still quite straightforward.

While operating in this mode I discovered that all the commands could be invoked by just typing the first three characters of the command rather than having to type the whole word. This was a great time saver.

The actual decoding performance of the AMT3 was very good on all modes. This was very much as I expected, based on the performance of previous units from ICS.

One area worthy of particular comment was the l.e.d. bargraph tuning display. This sixteen l.e.d. unit worked extremely well and gave a very clear display of both steady state RTTY and FEC signals as well as the more demanding ARQ mode. In fact when running ARQ the display pulsed in synchronisation with the received signal.

On RTTY, the range of baud rate adjustment was broad enough to cope with the majority of signals, both amateur and commercial.

Summary

The AMT3 is clearly targeted at the AMTOR enthusiast. It has particular appeal to anyone interested in mailbox or other modes that require automated scanning of a number of channels. The inclusion of RTTY was a useful extra, that I'm sure many will appreciate.

Being so compact and well developed, it's not surprising to hear that the AMT3 has found favour in commercial operations.

So overall the AMT3 is the result of a long period of development and this shows in its performance. The market for this type of unit is quite small, but the AMT3 must be one of the leaders.

The AMT3 costs £182.45 inclusive of VAT and UK carriage and is available from **ICS Electronics Ltd, Rudford Industrial Estate, Ford, Arundel, West Sussex BN18 0BD**.

My thanks to ICS for the loan of the review model.

If you have any software worth a mention, drop Mike a line

DO YOU READ AND ENJOY 'BACKSCATTER'? IF YOU DO, PLEASE WRITE AND LET US KNOW. WHAT DO YOU FIND MOST INTERESTING? DO YOU FEEL THAT THE INFORMATION THAT YOU NEED IS THERE? OUR CONTRIBUTORS AND PW STAFF NEED TO KNOW YOUR NEEDS.

WRITE OR PHONE (0202) 678558 (OUR ANSWERING MACHINE) TONIGHT!

Back-Scatter

Amateur Satellites

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

Wednesday May 23 ten years ago, was a date long to be remembered by all involved with the AMSAT and OSCAR programme. It was the day of the death of an OSCAR, the very first intended Phase III AMSAT satellite, an OSCAR which had all the potential of being a great spacecraft. On 23 May 1980, Phase 3A sat at the top of the Ariane launch vehicle LO-2, attached to the huge Max Planck Institute's Firewheel experiment which was to inject Barium, Strontium, Lithium vapour to ionise and give brightly coloured solar stimulated photons to show the solar wind manifestations on the magnetosphere field of our planet.

On that day optimism was running high at the European Space Agency's Kourou, French Guiana launch centre because of the previous LO-1 initial Ariane launch success, and there was no reason whatsoever to think other than that LO-2 would not be equally successful. For those among you who are straining to remember the details of the launch net, recall that AMSAT President Tom Clark W3IWI was giving the 'play-by-play' action from the Goddard Space Flight Centre (GSFC) radio club station, WA3NAN, to radio amateurs around the world through the AMSAT Launch Information Net Service (ALINS). The launch window opened at 1130UTC; because of intermittent rain showers and minor equipment malfunctions 'holds' were common during the first hours of the launch window.

Finally, at 14:29:40UTC, the LO-2 vehicle lifted off. At this point thousands of amateurs listening around the world were holding their breath as FY7KRU and WA3NAN provided the commentary on the last few moments. Phase 3A had a short life, because at 14:32:57UTC French controllers were heard saying things like: "..non-nominal flying...problem in one engine...the rocket is going down...Kourou radar still tracking.." and finally, the worst shock of all, the word "splashdown" was uttered. Phase 3A never reached orbit and the greatness it was destined for. Jan King W3GEY, AMSAT's Vice President of Engineering, holding back tears, summed it up shortly after the launch failure when he said that "..the radio amateur community will never know what they lost today!..."

Jan, Tom and many of the volunteers who had helped build Phase 3A listened with great sadness as they realised that the focus of many thousands of hours of effort (Jan estimated 30 man years!) was now sitting at the bottom of the Atlantic. Jan recently related the events of that day to Dave WD0HHU, saying that upon realising what had happened he flung a very large book across the room and shouted something appropriate at the top of his lungs. Now, however, he says he doesn't recall what he said "It is all a blurr..." (This is just as well, as we would not have dared to have printed it in this column!). It should be noted that Jan and the other volunteers were not very far from the tiny little building on the GSFC grounds where Phase 3A was built, integrated and tested.

According to AMSAT President Tom Clark W3IWI "..the gloom, despair, and depression lasted for about a day.." when Jan King W3GEY and Karl Meinzer DJ4ZC were heard saying: "Darn it! We worked too hard to quit now. Lets try again. Lightning can't strike twice!" At that point Tom wrote to all the AMSAT members requesting their moral and financial support in order to start Phase 3B. The response was immediate: over $30 000 was raised in a few months to start the construction of Phase 3B. This unequivocal show of support proved that radio amateurs from around the world wanted to see the AMSAT OSCAR satellite program continue. Recovering quickly from this disaster, AMSAT volunteers realised they still had the stamina, knowledge and know-how to build another OSCAR satellite and another: Phase 3B flew to become AO-10, and later, Phase 3C became the current AO-13, and soon now we shall have yet another.

One decade later, take a moment to think about Phase 3A, at 14:36:38UTC when mission controllers in Kourou announced a "splashdown", and AMSAT, but for the unabated support of it's devotees could have gone down with it.

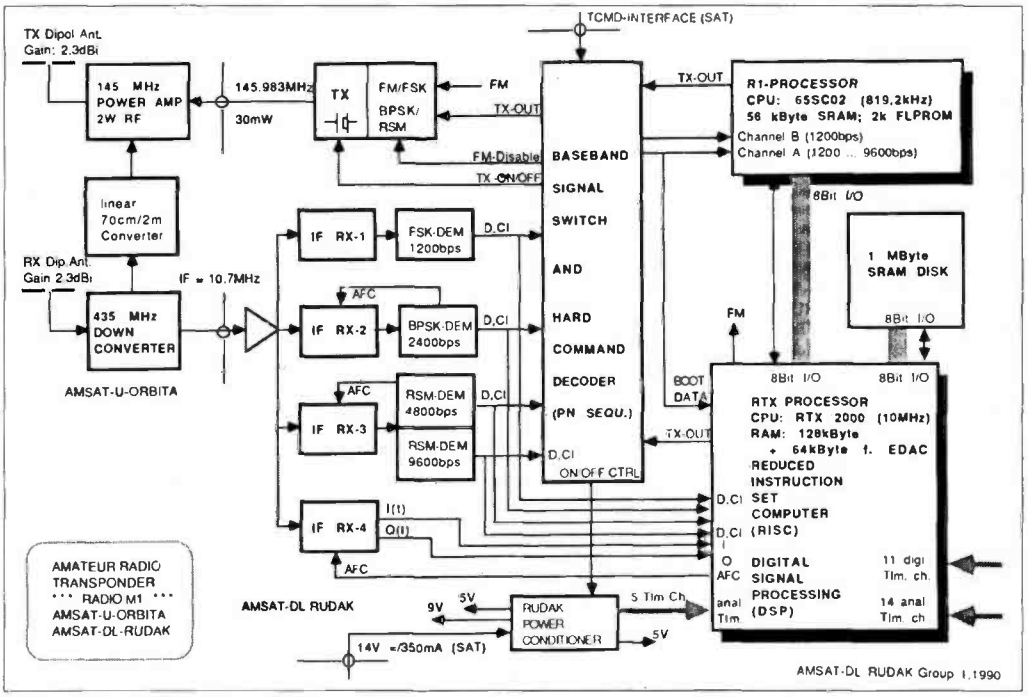


Fig. 1

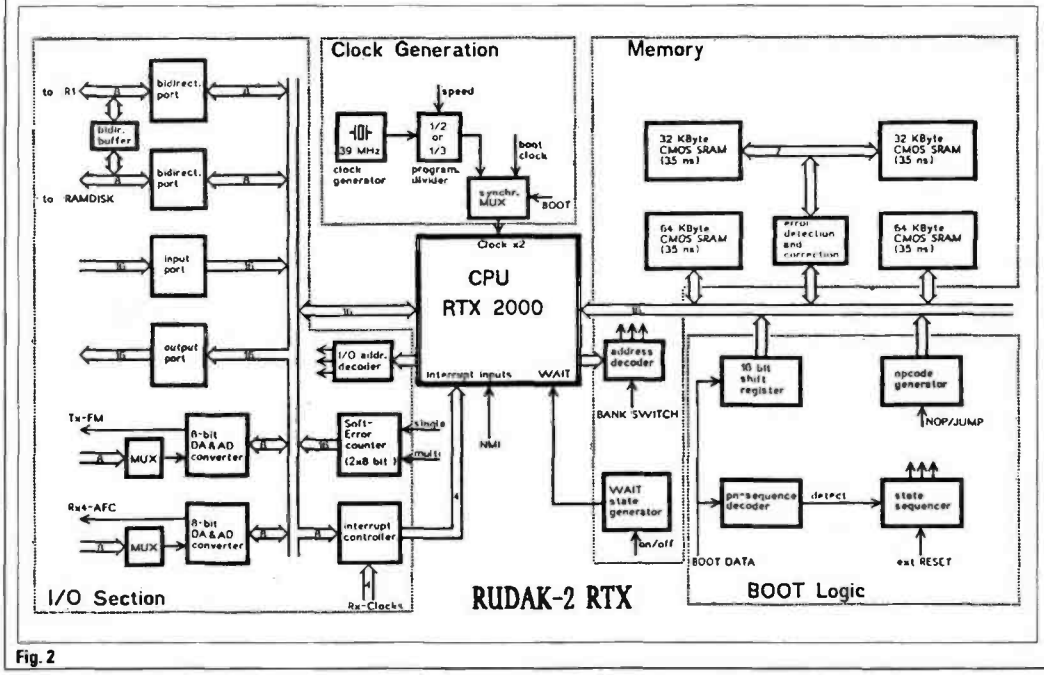


Fig. 2

OSCAR-DX

Dave Rowan G4CUO, has now worked and has QSL confirmed his one hundred and fiftieth DXCC country by satellite. Recent QSOs include

Back-Scatter

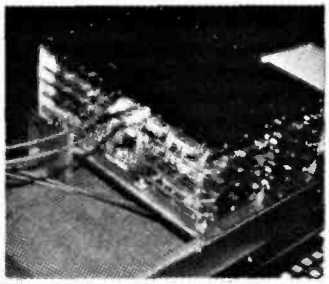


Fig. 3

Fig. 4

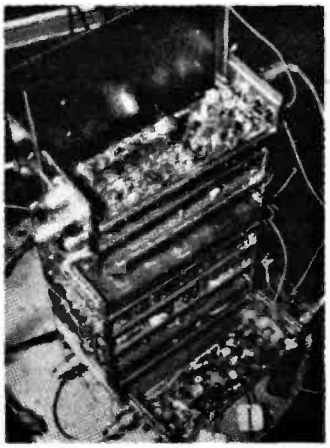


Fig. 5

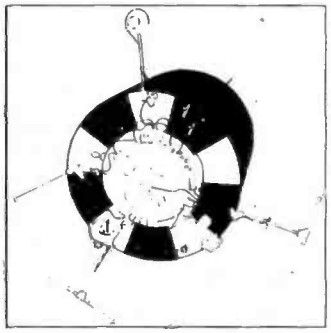


Fig. 6

JR6JSK on Okinawa, VY1AU in the Yukon and TA1D for Turkey.

Dave has heard from Toshi JH8PKI, that the FO-20 'JA' mode activists in Japan will be looking for QSOs in Western Europe when the satellite comes to it's northern hemisphere apogee again, a 10 - 11 day period around August 10. The preferred frequency will be a 435.830MHz downlink. Remember, if you hear one of the JA enthusiasts, please make your report exchange snappy, and your QSO very brief, as the mutual window will rarely exceed 30 - 90 seconds, with even less for the more south westerly located UK stations!

ULTRA-DX

NASA, after much pressure over the past five years, have finally allocated $100M to fund 'SETI' - the Search for Extra-Terrestrial Intelligence. It will enable world-wide ten-year programme of linkage of many of earth's major radio telescopes that will be simultaneously monitoring over four million radio channels for signs of transmissions emanated by intelligent species. It makes an interesting concept to consider how this might be defined if an alien life form was to monitor some of the transmissions made from earth!

Estimates, based on the possibilities and indeed probabilities of habited planets orbiting around 'G' type suns, likelihood of silicon based life, findings of totally destructive comet impacts, and many other little understood variables give figures of between zero and up to 100 000 planets capable of life support systems limited by our own concepts of biology within our own Milky Way Galaxy alone. As to how many of these might have evolved or degenerated to the average level of intelligence displayed by earthlings and the possibilities of a continuing life support system when exploitive technology is so far ahead of philosophy is quite another guess. Most certainly, when pulsars were first found, the regularly timed on/off radio transmissions were thought to be a sign of habitation of distant worlds, but it was not to be. It would be nice to know that we were not alone in the Universe, and the planned research over the next five years may provide qualification of many wonderings.

Do any of our keen satellite listeners out there know of any unexplained signals of possible extra-terrestrial origin? It seems to me to be fair comment that if only any such signals were strong enough, a not impossible feat for a technologically advanced life form, it would be the scanning amateurs and short wave listeners that would be the most likely recipients!

OSCAR-10

The latest message via the AO-13 beacons received from **Graham Ratcliff VK5AGR**, confirms that the A-O-10 Mode 'B' transponder is now available for use again, until the next period of poor solar illumination or extended eclipses. Graham tells us that AMSAT-OSCAR-10 now appears to be receiving sufficient solar panel illumination to continuously support it's Mode 'B' only transponder operations, therefore, the transponder is available for general use whenever AO-10 is in view at your location. Please **DO NOT** use the transponder if the beacon or transponded signals are f.m.ing, this symptom indicating a poor regulation with the power supply insufficient to support the current demand.

Signals heard in early June tended to be generally superior of those of A-O-13, and using just a mast strapped 'Slim Jim' vertical to my muTek headed IC-251 on a boat on the north sea, good readable signals could be copied from this faithful satellite. The estimate of AO-10's attitude then was A.LON 24 deg A.LAT -9 deg. July will place the attitude at A.LON 17 and A.LON -5.

OSCAR-13

Rod Clewes G3CDK reports that his good friend 9H1EY is now active on 'L' mode from Malta. Rod feels that whilst 'L' mode has been excellent on A-O-13, 'B' mode has been very disappointing of late.

EN1AM has been on A-O-13 CW, using 50 watts to a 5.7 metre dish for the uplink, and 16 x 9 element Yagis for the downlink! He is 'near Murmansk', and asks for QSLs via UA1ZX. FY0EK, the club station of the Kourou, French Guiana ESA Ariane launch site is also active on s.s.b.

The following transponder schedule for AO-13 first activated by the command network on 5 May, given in last month's column, continues until further notice.

Mode 'B': from MA 000 to MA 100.
Mode 'JL': from MA 100 to MA 125
Mode 'LS': from MA 125 to MA 130 (:S: Beacon only)
Mode 'S': from MA 130 to MA 135 ('S' Transponder only)
Mode 'BS': from MA 135 to MA 140 ('S' Beacon off now)
Mode 'B': from MA 140 to MA 256

Only the Mode-L transponder and the Mode-S beacon will be on from MA 125 to MA 130, the 'S' transponder with no beacon from MA 130 to 135, but cross Mode 'B' and 'S' QSOs are possible from Mean Anomaly 135 to 140. The omni-directional antennas will be used from MA 220, through perigee, to MA 040. The best estimate of the A-O-13 attitude as of May 5 was BLON 180 and BLAT +3, with more exact values to be announced soon via the AMSAT nets. The next transponder schedule change will be introduced around 17 - 21 July.

JO-20

The JARL report that FUJI-2 is in good condition, and operation of both transponders continues in the main. This is in some contradiction to many expert mailbox users, who report that the problems evidenced on FUJI-1 (FO-12) have not been overcome, and are just as problematical on the new FO-20 digital 'JD' mode.

JARL have voiced one problem, when, according to the telemetry, a slow variation of the satellite's attitude relative to the sun means that on occasions the base of the bird is exposed to sunlight, when the power decreases, and one of the transponders is then commanded off. It has also been reported that sometimes the tone of the digital system is unclear, resulting in demodulation difficulties. JARL report that this effect is due to the passage of the downlink through the 'F' ionospheric layers of irregular density, resulting in scintillation, with the phase fluctuation of the radio wave causing the problems noted. Geomagnetic disturbances are the basic cause, and the effects can even be noted when the satellite is at low and middle latitude. This being a natural event, nothing can be done about it, and we have to wait until our currently high solar flux declines in some four years time to resolve the situation.

Bert DF5DP, in common with many others, has pointed out that the published Keplerian element set data of FO-20 has been seen to be wrong for some time. Bert found a note about this constant error problem in the 8J1JBS mailbox, which is reproduced below.

```
JAS>r 383
NO.   DATE  UTC   FROM   TO    SUBJECT
0383  05/12 0145  W9FMW  ALL   JARL
                                 Keps OK -
                                 Please
                                 Reed.
```

The Kepelerian Elements distributed by JARL are completely correct and accurate. The problem arises from the manner and form in which they are presented which is considerably different from the NORAD or AMSAT format. When you use the JARL element sets the Decay Rate MUST be set to '0.00000000' (zero) and the Orbit Number MUST be set to '0' also. The Epoch Day always refers back to the launch date. The current JARL set is as follows:

Epoch Year: 1990
Epoch Day: 038.1065162
Inclination: 99.0589
R.A.A.N.: 109.0728
Eccentricity: 0.05377150
Arg of Perigee: 344.1206
Mean Anomaly: 4.3526
Mean Motion: 12.831498
Decay: 0.0000000
Orbit Number: 0

The NORAD Kepelerian Elements and any element sets derived from them (such as the AMSAT format) are in error and will produce errors in tracking of 2 to 3 minutes. Therefore any element sets for FO20 which are

Back-Scatter

based on the NORAD elements are incorrect. JARL speculates that NORAD is tracking the wrong object and has notified them accordingly.

Jack W9FMW produced the following mailbox message:

```
JAS>r 322
NO.  DATE  UTC   FROM   TO   SUBJECT
0322 05/11 03:22 W9FMW  ALL  JARL
                             Element
                             Sets
```

The JARL element sets are very good **IF** you set the decay rate to zero (0.00000000). If you leave any value in the decay rate they can be way off the mark. I have compared their sets with my doctored sets and they are within 2 or 3 second of mine **IF YOU SET THE DECAY RATE AT ZERO!**

A listing of the mailbox users followed:

```
JAS>u
EA8IC-0   AL7JM-0   W7XS-0    SM5BVF-0  JR4BRS-0
KC4EBR-0  IW1BMJ-0  JJ2RYW-0  LU1EXC-0  OF5DP -0
JA5DTP-0  DL1SBY-0  KS8 -0    JH1QQN-0  G2BFO-0
K8OYY -0
```

FO-12

Despite the switching off of FUJI-1 by the Japanese command station, regular appearances have been noted by G3CAG and G4CUO. It is assumed that the solar cells are still producing some power to the depleted battery, which is still capable of some storage, particularly when the satellite is in solar illumination, and that on commands sent to FO-20, an identical system, have switched FUJI-OSCAR-12 into life again. That the FO-12 activity is very intermittent, and the transponder is seen to switch off again as soon as high powered FO-20 intended uplinks are transponded by it, all indicate that the charge is minimal, and unable to support sustained communications.

RM-1

Following last months description of the new USSR/DL joint satellite, that is planned to be up and active by the time you read these words, we now reproduce, thanks to AMSAT-DL, Fig. 1, which shows the block schematic diagram of the satellite, and Fig. 2 which shows the RUDAK-II system.

AMSAT-DL have also produced some excellent photographs of the joint assembly, Fig. 3 shows the digital 'RUDAK' unit in it's closed flying position, whilst Fig. 4 shows DL2MDL working upon the opened up console, Fig. 5 is the AMSAT-U side of the satellite, with the sectionalised analog transponder on show, Fig. 6 is the big USSR 'GEOS' satellite that the AMSAT-U and DL systems will be incorporated with to give a joint multi-function satellite with a common shared power supply.

UoSAT-'D'-OSCAR-14

Mike Willis G0MJW, one of the University of Surrey team, reports that an ever increasing number of stations are now digipeating via the 9600b.p.s. UoSAT mode. The MHEARD command listed JA6FTL, ZL1TRE, G3WGM, DG3LAE, DJ0NJ, DL1YDD, DF3LZ, JH3FDA, DF3DP, W7KRC, LU1BEE, LU8DYF, G0BDD, G4WFQ, DF5DU, DG3LV, KF4WQ, two unknown stations signing 'Test' and 'Test 1' plus his own callsign all in the space of two days.

Mike has performed a 'first' by being the initial station using the system mobile. He uses a 3 x 5/8λ whip on 70cm and runs 50W to a 5/8λ whip on 2m. The receiver is a converted (up to the 10.7MHz i.f.) Pye Pocket-Phone, an ex-p.m.r. modified a.m. to f.m. transmitter with a Varactor, and the G3RUH modem. Pedestrians and cyclists in the UoS vicinity will be pleased to know that he uses the system when static, signing G0MJW/M from the University car park.

Osculation Problems!

Jeff Ward G0/K8KA and other members of the University of Surrey Engineering Team have further been experimenting with 9600-baud operation using KISS software on TNC-2 clones. The clones used are a Pac-Com TINY-2 and an MFJ 1270. Initially, a version of KISS dated '26 Mar 87' was used but it was found that this version did not work very well for near-full-duplex 9600-baud KISS operation.

When Jeff and his colleagues upgraded the firmware in the TNCs to a version of KISS dated '20 Mar 88' they found that operating on either the Pac-Com or the MFJ TNC with the updated KISS firmware correctly received a continuous stream of 9600 baud packets and relay them to the host computer at 9600 baud. The TNC did not seem to drop packets, even when operating at the 2MHz standard clock speed. It is believed that this is the version of KISS which was shipped with the current TAPR firmware version 1.1.7.

Jeff reports that unfortunately with a 9600 baud synchronous input stream and a 9600 baud asynchronous output stream, the TNC's buffers begin to fill up. When the buffer fills (after a minute or so), the TNC crashes. An extra long packet is passed to the host, and operation (on the async side) ceases. You can cure this by turning the async link up to 19.2kbps - **IF** your host hardware and software can keep up!

More recently, the UoS Engineering Team received a version of KISS firmware dated 11 Dec 89. This version seems not to crash when presented with a continuous 9600 baud input stream and 9600 baud async speed. A set up running this code ran successfully for a number of hours. Unfortunately, this version of the firmware cannot keep up with the input stream unless the TNC clock rate is increased to 4MHz. If a 2MHz clock is used, approximately 50% of the packets on a BTTW 9600 baud downlink will be missed.

Jeff concludes: "Get KISS dated 11 Dec 89 or later, jump your TNC-2 clock rate up (using JMP2), and wait for further entertainment as we try full-duplex, full-duty cycle 9600 baud connected mode in a month or so."

Keplerian Elements

Satellite	NOAA 9	NOAA 10	NOAA 11	METEOR 2/16	AJISAI	AO-17
Int. Design	84-123A	86-073A	88-089A	87-068A	86-061A	90-005E
Object No.	15427	16969	19531	18312	16908	20440
Element Set	572	422	273	392		70
Epoch Year	1990	1990	1990	1990	1990	1990
Epoch Day	121.23295781	119.56906254	122.09480767	105.99259182	39.33458006	115.07883103
Inclination	99.1685	98.6059	98.9789	82.5594	50.0103	98.7052
RAAN	119.9757	148.6005	70.3601	339.5995	292.1270	191.4048
Eccentricity	0.0015870	0.0014491	0.0013154	0.0014041	0.0010555	0.0011575
Arg of Perigee	137.6868	53.5189	57.0470	87.2744	226.9308	315.3624
Mean Anomaly	222.5520	306.7332	303.1958	292.9899	133.0642	44.6707
Mean Motion	14.12552273	14.28578942	14.11575827	13.83632168	12.44384985	14.28722990
Decay Rate	0.00000954	0.00001108	0.00000769	0.00000219	-0.00000015	0.00001036
Orbit Number	27735	18769	8248	13438	15881	1328
Nodal Period	101.999476	101.210968	102.070328	104.132622	115.653999	100.846872
P-drag	4.880e-08	5.537e-06	3.941e-06	1.192e-06	0	5.121e-06
Increment	25.497058	25.303099	25.516372	26.161855	29.239767	25.210650
I-Drag	1.228e-06	1.393e-06	9.917e-07	2.979e-07	0	1.289e-06
Beacon-ORG	137.620=APT 1707.0=HRPT	137.500=APT 1698.0=HRPT	137.620=APT 1707.0=HRPT	137.850=APT		145.82516 2401.2205 145.82438
Ref. EQX	06 May 1990	04 May 1990	05 May 1990	15 Apr 1990		30 Apr 1990
Orbit	27803	18833	8287	13438		1399
HHMM.MM	0111.40UTC	0136.92UTC	0001.11UTC	2349.28UTC		0113.59UTC
Degrees W	116.59	92.91	149.61	221.59		39.76

Satellite	SPOT 2	METEOR3/02	METEOR 2/18	METEOR 3/03	AO-18	UO-15
Int. Design	90-005A	88-064A	89-018A	89-086A	90-005F	90-005C
Object No.	20436	19336	19851	20305	20441	20438
Element Set	177	472	220	122	71	74
Epoch Year	1990	1990	1990	1990	1990	1990
Epoch Day	121.87446891	119.94533655	118.04253281	119.40317399	117.24249471	118.25430872
Inclination	98.7351	82.5316	82.5181	82.5458	98.7072	98.7023
RAAN	196.7629	311.5507	270.0003	252.3905	193.5804	194.4966
Eccentricity	0.0001163	0.0018615	0.0014740	0.0017278	0.0012118	0.0009890
Arg of Perigee	106.7644	89.6952	144.9776	89.0980	309.0161	304.3345
Mean Anomaly	253.3539	290.6156	215.2369	271.2129	50.9981	55.6898
Mean Motion	14.20021653	13.16890144	13.83959365	13.15856018	14.28831720	14.28346276
Decay Rate	0.00000684	0.00000391	0.00000190	0.00000063	0.00000964	0.00000866
Orbit Number	1414	8460	5835	2453	1359	1373
Nodal Period	101.464102	109.486249	104.107964	109.492191	100.839000	100.873254
P-Drag	3.444e-06	2.468e-06	1.033e-06	1.986e-07	4.764e-06	4.284e-06
Increment	25.365762	27.480406	26.156008	27.501791	25.208704	25.217362
I-Drag	8.664e-07	8.171e-07	2.583e-07	9.966e-08	1.199e-06	1.078e-06
Beacon-ORG		137.300=APT	137.300=APT	137.300=APT	437.0751/.102	435.120
Ref EQX	04 May 1990	03 May 1990	04 May 1990	23 Mar 1990	04 May 1990	04 May 1990
Orbit	1448	8501	5946	1962	1456	1456
HHMM.MM	0141.01UTC	0126.93UTC	0137.22UTC	0139.78UTC	0050.51UTC	0138.64UTC
Degrees W	47.81	293.08	342.39	288.49	33.92	46.05

Satellite	OSCAR 10	OSCAR 11	RS10/11	OSCAR 13	AO-19	AO-18
Int. Design	83-058B	84-021B	87-054A	88-051B	90-005G	90-005D
Object No.	14129	14781	18129	19216	20442	20439
Element Set	521	723	176	120	72	72
Epoch Year	1990	1990	1990	1990	1990	1990
Epoch Day	120.68709021	118.58093432	121.78848629	109.13433940	117.23796689	121.10404277
Inclination	25.9692	97.9601	82.9288	57.0521	98.7071	98.7069
RAAN	206.5754	172.7558	2.8111	159.0302	193.5885	197.4151
Eccentricity	0.5971987	0.0014397	0.0010286	0.6933645	0.0012301	0.0010917
Arg of Perigee	139.0605	46.9965	248.67378	225.4144	308.7903	295.2526
Mean Anomaly	286.0148	313.2452	113.3323	51.3435	51.2208	64.7508
Mean Motion	2.05882182	14.65266252	13.72084129	2.09703082	14.28900552	14.28697205
Decay Rate	-0.00000069	0.00003438	0.00000013	-0.0000118	0.00001005	0.00001025
Orbit Number	5175	32870	14308	1414	1359	1414
Nodal Period	698.984	98.334724	105.008907	686.605	100.834148	100.848487
P-Drag	-	1.576e-05	7.255e-08	-	4.966e-06	5.067e-06
Increment	175.302	24.584702	26.378083	172.192	25.207484	25.211094
I-Drag	-	3.964e-06	1.814e-08	-	1.250e-06	1.275e-06
Beacon-ORG	145.810/.987	145.826 2401.5 435.025	29.357/.408 145.857/.903 29.407/.453 145.907/.953	145.812 435.651 2400.664	437.15355 437.1258 437.125	437.02625 2401.143 437.05130
Ref EQX	07 May 1990	06 May 1990	04 May 1990	03 May 1990	04 May 1990	04 May 1990
Orbit	5189	32979	14339	1444	1456	1456
HHMM.MM	1135.21UTC	0034.82UTC	0110.70UTC	1031.36UTC	0043.52UTC	0105.44UTC
Degrees W	193.36	52.36	238.20	222.06	32.18	37.67

Satellite	SALYUT 7	MIR	MOS-1B	OKEAN 2	FO-20	UO-14
Int. Design	82-033A	86-017A	90-013A	90-018A	90-013C	90-005B
Object No.	13136	16609	20478	20510	20480	20437
Element Set	234	632		36	70	123
Epoch Year	1990	1990	1990	1990	1990	1990
Epoch Day	122.32222918	121.58443815	53.75691501	85.25406192	110.07837252	118.44928423
Inclination	51.6020	51.6187	99.0783	82.5304	99.0469	98.7008
RAAN	175.8952	205.3058	124.4428	174.0686	167.5457	194.7011
Eccentricity	0.0001844	0.0011172	0.0001392	0.0020031	0.0541608	0.0010609
Arg of Perigee	33.4052	232.7588	105.8840	178.8390	108.0821	304.1566
Mean Anomaly	326.6677	127.2136	254.2514	181.2867	180.0272	55.8587
Mean Motion	15.60824230	15.58203149	13.94896401	14.72805655	12.83127487	14.28585124
Decay Rate	0.00030786	0.00034245	-0.00001487	0.00006022	0.00000107	0.00000731
Orbit Number	45768	24082	218	386	929	1376
Nodal Period	92.208867	92.241394	103.289741	97.8324913	112.28564	100.856406
P-Drag	1.165e-04	1.510e-04	0	2.718e-05	-	3.615e-06
Increment	23.438302	23.448189	25.822410	24.587741	28.08487	25.213135
I-Drag	2.865e-05	3.715e-05	0	6.790e-06	-	9.095e-07
Beacon-ORG	19.953/142.417 925.240	143.625=voice 166.130=data+ ranging 247.5+KVANT	136.112	137.400=VIS+ 2xradar	435.796/.910	435.070
Ref EQX	07 May 1990	04 May 1990		29 Mar 1990	05 May 1990	04 May 1990
Orbit	45842	24120		427	1121	1458
HHMM.MM	0126.84UTC	0030.80UTC		0058.94UTC	0111.86UTC	0115.45UTC
Degrees W	94.32	36.27		28.90	60.92	40.24

Back-Scatter

UoSAT 'F'

Whilst efforts continue to get the missing OSCAR-15 UoSAT 'E' back and active, the University of Surrey AMSAT team already have yet another satellite now on the design board. It is hoped that the new one 'UoSAT-F' will be completed in time for a launch by Ariane from the ESA French Guiana pad in early 1991. UoS are looking for an engineer with software and hardware experience for the task, who should contact Dr. Martin Sweeting at the University of Surrey on Guildford (0483) 509141.

MIR

Still no reports have come in on anyone having even heard, let alone worked, the MIR cosmonauts. We do know that they have their hands full with a few problems, which although not near so serious as portrayed by the tabloid press, will take time and effort to resolve. Far from being '..marooned in space..' the crew have numerous alternative strategies, and have tackled situations at least as critical in the past with total success.

If you hear the call on RS-10/11, the new 'RM-1' or HF, R3MIR/7 is the club station at the Baikonur Cosmodrome in UL7. The operator most active at the present time is Valery Agabekov UA6HZ, who was the amateur credited with providing the FT-290R for the first MIR amateur radio operation two years ago. Should you contact him, he should be able to provide the latest updated information about the plans for MIR activities and the latest status.

A MIR replacement is now being planned that will carry nine to ten cosmonauts as a crew, the actual development being dependant upon economic and political decisions.

Keplerian Elements

Again, our element sets are provided by **Birger Lindholm**. Birger invites any readers with comments and suggestions to write to him at Hasselbacken 305, SF 25900 Dalsbruk, Finland. If you need the latest Keplerian elements of any of the many satellites that we are unable to cover in these pages, Birger may well be able to help you. Those of you who may have tried to use the last set of NORAD/NASA derived elements for FUJI OSCAR-20 may have noticed that they were a continuing two minutes adrift. Whilst this is well within the confines of our needs, it may cause those scrupulous with precision a few worries. Please note the comments made under 'JO-20'. It may not come as a surprise that NORAD/NASA come to AMSAT to help sort out the discrepancies found between closely aligned satellites such as the microsats and the early stages of satellites and the associated rocketry when the fine RADAR is unable to discriminate which object is which.

AMSAT-UK Colloquium at UoS

There may still be a few tickets to spare for this years AMSAT-UK colloquium which is to be held at the University of Surrey from 26 - 29 July 26 - 29 this year, this time without the intervening data space symposium, although satellite data activities will be well covered. Contact Ron Broadbent G3AAJ, Secretary of AMSAT-UK on 081-989-3430, or FAX him on 01-989-3430, or write with s.a.s.e. to him at AMSAT-UK, London E12 5EQ in hope.

It is to be recommended to the expert, novice and newcomer alike, with a wealth of topical and informative lectures on all satellite topics at all levels of interest. You will also meet the owners of many of those voices that you hear coming down at you from space, and I will be there on the Sunday talking with Ray Soifer W2RS, on the easy route to EME Moonbounce communication.

AMSAT has announced that the 1990 AMSAT Space Symposium will be held at the NASA Johnson Space Centre near Houston, Texas over the weekend of October 19, 20 and 21. All satellite enthusiasts are welcome, with details available from AMSAT, over the 14.282MHz 1900UTC International net, or via the satellite nets given earlier.

Back-Scatter

Propagation

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

In order for us to learn more about the strange behaviour of terrestrial radio waves after or during a solar event or while Sporadic-E or tropospheric openings are in progress we need to publish as much information about each particular disturbance as is possible.

Solar

"The mean mean solar flux for April 1990 was 186. The month started at 159 s.f.u., climbed only to 168 by the 12th, but in that period there were two daily highs of 189 on the 6th and 188 on the 10th, which were probably solar flare enhanced," wrote **Neil Clarke G0CAS** (Ferrybridge). His computer print-out showing the large 'hump' of solar flux over the following 10 days is the subject of Fig. 1.

During April, **Ron Livesey** (Edinburgh), using a refractor telescope with projection apparatus, identified 5 active areas on the sun's surface on days 4, 7, 17, 18, 19, 20, 23 and 26, 6 on days 3, 8, 14, 15 and 16, 7 on the 2nd and 22nd and 8 on the 24th.

During May, **Cmdr Henry Hatfield** (Sevenoaks), using his spectrohelioscope, observed 1 double sunspot, 13 filiaments and 11 small quiescent prominences at 1050 on the 1st, 4 spots, 23f, 10qps, many spicles and a very small flare on the east limb at 1145 on the 2nd, 2 double spots, 13f, 10 small qps and many spicles at 1347 on the 4th, 2 sunspot groups, 10f, 10qps and a small pillar prominence at 1137 on the 6th, 2grps, 9fs, 5qps, many spicles and a low loop prominence on the east-limb at 1355 on the 8th, 2 declining ribbon flares at 1415 on the 15th, 3grps at 1340 on the 16th, 5grps, 21f, 9qps and 2 small "hot spots" almost flaring at 1140 on the 22nd and at 1143 on the 23rd, in addition to the previous days findings, he saw a large loop filament with a bandwidth of 1.25 Angstroms. Unfortunately, Henry's observations on days 8, 15 and 16 were hampered by cloud.

The value of combining readers reports can be seen in this paragraph for example, **Ted Waring** (Bristol) counted 30 sunspots on May 8 and 59 on the 22nd which tells us that the sun should be really active. Not surprisingly, **Fred Pallant G3RNM** (Storrington) added weight to this when he reported a high level of solar noise on 28MHz around 0720 on the 8th and on the 21st he remarked, "very little activity, except from Sun! **Ern Warwick** (Plymouth) entered in his log, "ionospheric disturbance - noise - surging and fading" on May 8, "background noise surging" on the 19th, "background bursts" and "28MHz dropping out" on the 20th and "still dead" on the 22nd. Henry Hatfield,

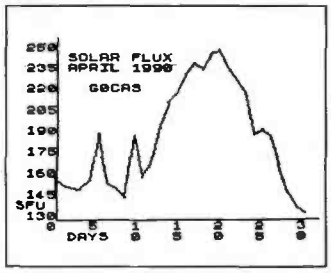


Fig .1

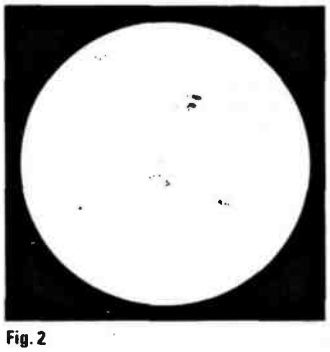


Fig. 2

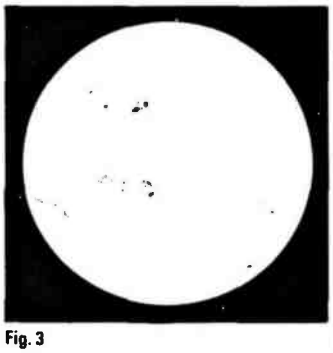


Fig. 3

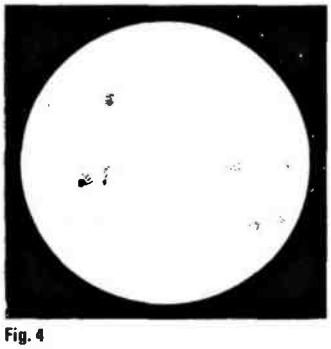


Fig. 4

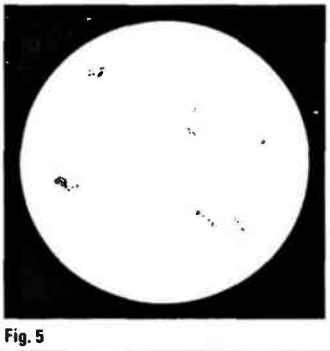


Fig. 5

Back-Scatter

using his 136MHz radio telescope recorded "gentle solar noise all day" on the 8th and 9th, a large burst lasting about 8 minutes at 1130 on the 12th, smalls bursts on 136MHz from 1610 to 1627 and a "violent burst" on 1297MHz at 1641 on the 14th, a medium burst at 136MHz and a high noise level at 1297MHz around 1310 on the 15th and a medium burst on 1297MHz at 1300 on the 20th. I learnt that the solar activity had caused a blackout or something horrible on the 22nd after reading "Even quieter, only GB3RAL all day!" and "nothing heard all day," in the logs of Fred Pallant and **Greg Lovelock G3III** (Shipston-on-Stour) respectively. Then **Mark Appleby G4XII** (Scarborough) wrote on his 28MHz beacon log, "Quiet conditions again this month, three days with nil heard," and when I checked his dates they were days 20, 21 and 22. "Strange conditions on 20th May," commented **Ted Owen** (Maldon) and continued, "The normal beacons silent and an unusual crop SK5TEN, OK0EG, LA5TEN and EA6AU." Also for the 22nd, **Chris van den Berg** (The Hague) said, "no beacons? frequency dead?". As usual **Patrick Moore** sent me a number of sunspot drawings which he made during his routine solar observations with projection apparatus at his observatory in Sussex. Because of the high level of solar flux shown by Neil Clarke in Fig. 1 and the ionospheric disturbance reported around May 22, I have selected Patrick's drawings for April 19 and 20, Figs. 2 and 3 and May 20 and 22, Figs. 4 and 5, to show the state of the sun on those days.

Aurora

There is no doubt that an auroral manifestation, in any of its forms, is a beautiful sight and both amateur and professional astronomers keep a regular watch on the night sky for these temporary and colourful regions of ionisation which often appear in the earth's polar atmosphere when the sun is active. Ron Livesey, the auroral coordinator for the British Astronomical Association, received reports from various observers of 'glow, unspecified form' from observers in Denmark and all parts of Scotland for the overnight period on April 11, 14, 15, 19, 24 and 30, 'homogenious arc or band' from Orkney, South Scotland and Winnipeg on the 12th, 28th and 29th respectively, 'rayed arc or band or veil' from Denmark, North Dakota and South Scotland on the 17th, 20th, 22nd and 30th, 'Rays' from North Dakota, Northern England and all Scotland on nights 2, 3, 13, 14, 17, 19, 25 and 28, 'active or pulsating' from IOM, North Dakota, all Scotland, on nights 10, 11, 12, 13, 16, 17, 19, 20 and 29 and 'coronal rays or bands or veils' from North Dakota, North Scotland, Shetland, North Wales and Winnipeg on nights 10, 11, 16, 23 and 29.

Although such displays are not visible during the hours of daylight, or if the moon is too bright or when the night sky is overcast, then the presence of aurora can still be detected by the strange effect it has on terrestrial radio signals. **Garry Hawkins** (Bristol) and **Doug Smillie** (Wishaw) both notified Ron about the strong auroral reflected signals that they detected from many countries on the 10th and Doug reported weak radio-aurorae on the 12th, 14th, 17th, 18th and 23rd. Ern Warick noted weak auroral tones on the signals from the German beacon DK0WCY (10.144MHz) at 1700 on May 18 and 1610 on the 22nd. During the evening of May 11, **Angie Sitton G0HGA** thought that c.w. signals on 7MHz sounded 'hollow' and next day between 1130 and 1150 she observed the effect of a fadeout resulting from a sudden ionospheric disturbance (s.i.d.). "I had just finished a 7MHz QSO where one station in the group (QRP) had been barely readable, but he came right up. A minute later, looking for someone to call, I could find absolutely nothing." Later the band sprang into life, "just as if someone had lifted a curtain," explained Angie, adding "Some occassions the signals return gradually and weakly but not today, the band was in full swing and seemed better than the dismal pre-fadeout conditions and rapid QSB." Whenever she recognises a disturbance Angie has a tune around and then puts her gear into beacon-mode and sends, three times at 20 w.p.m., "de G0HGA QRK? AR" which gives other band users a warning that unusual

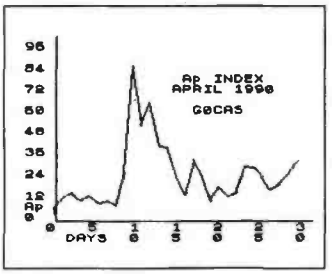


Fig. 6

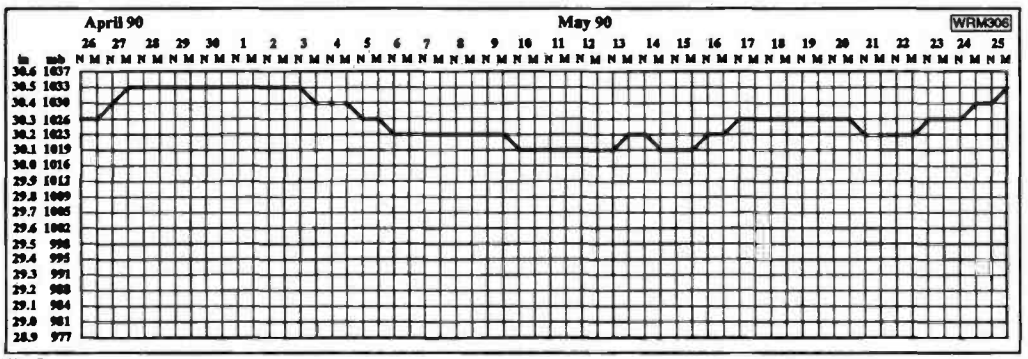


Fig. 7

Beacon	April 26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
DF0AAB						X	X									X			X	X				X		X		X	
DF0THD																								X	X				X	
DK0TEN																X				X										
DL0IGI			X		X	X	X	X	X				X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
EA2HB							X												X		X			X	X	X				
EA3JA			X		X		X	X	X	X		X				X	X	X	X	X	X	X	X	X	X	X		X	X	
EA6AU							X												X	X	X			X	X			X		
HG5GEW																													X	
IY4M	X					X	X	X	X							X	X	X	X	X	X	X	X	X	X	X		X	X	
KD4EC	X	X					X														X									
KE2DI																					X									
KF4MS		X				X	X																							
LA5TEN				X		X									X	X	X			X				X	X	X	X		X	
LU1UG					X	X	X		X			X						X			X	X	X					X	X	
NX20																					X	X								
OK0EG																X			X	X		X		X	X			X	X	
OH2TEN			X	X		X	X	X			X	X	X		X	X			X	X	X	X		X	X			X	X	
PT8AA																								X						
PY2AMI				X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X	X				X	X	
SK5TEN				X		X					X					X			X	X				X	X	X	X	X	X	
VE1MUF																										X				
VE3TEN																					X									
VK2RSY			X		X			X	X					X						X		X	X						X	
VK4RTL			X											X																
VK5WI			X		X								X	X		X						X	X					X	X	
VK6RWA			X		X	X		X	X	X				X	X		X					X							X	
WA4DJS	X	X				X	X	X												X	X	X	X							
W3SV																					X									
W3VD																						X								
W8UR																				X	X	X	X							
ZD8HF																														
ZL2MHF										X											X	X	X	X		X		X	X	
ZS1LA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X										
ZS5VHF											X					X					X	X	X	X	X	X	X	X	X	X
ZS6PW	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X			X	X	X
Z21ANB	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X
5B4CY	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X				X	X	X
5Z4ERR																	X	X	X		X	X	X		X					
																					X			X					

Fig. 8

Back-Scatter

conditions prevail and a signal to work on. Well done Angie, a lot can be learnt by immediate actions like that. Outside of c.w. and propagation her other interests are antennas and low-power (QRP), for instance she has a wooden frame loop antenna wound with 40.3m of wire and at one time, while it was on the floor and using just 5W on 7MHz, Angie received a RST-569 report from a fellow amateur in Wales.

Magnetic

The variations in the Ap index for April with that predominant peak on the 10th can be seen on Neil Clarke's chart in Fig. 6. Neil pointed out that on the 9th the field became a major storm with the index gradually falling through 87, 83, 66, 41 and 40 from the 10th to the 14th respectively. The general magnetic conditions, recorded by the various magnetometers used by Garry Hawkins (Fluxgate), **Tony Hopwood** (Upton on Severn), **Karl Lewis** (Saltash), Ron Livesey (Jamjar) and Doug Smillie (Hall Effect), were descibed as 'active' on April 6, 8, 9, 12, 13, 15, 16, 17, 18, 22, 23, 25, 26, 29 and 30 and 'storms' on days 10, 11, 12, 14, 19, 20, 21 and 22.

Sporadic-E

During Sporadic-E openings on May 14 and 15, the likely start of the 1990 Sporadic-E season, I received pictures from transmitters in Iceland, Spain, Sweden and the USSR in Band I and several f.m. signals from the East European broadcast stations which operate between 66 and 73MHz. While parked in Chichester at midday on the 21st, I used my Plustron TVR5D, with its own rod antenna to check Band I and found a weak test-card from the USSR on Ch. R1 (49.75MHz) and test-cards, fading between weak to very strong from a Norwegian regional (Bagn) and Sweden (Kanal 1 Sverige) on Ch. E3 (55.25MHz). Ted Owen's beacon report, mentioned earlier, suggest that the 'E' region of the ionosphere was active on May 20 and **John Levesley G0HJL** (Bransgore) reports "very strong" signals from the German (DL0IGI) and Italian (IY4M) beacons on 28MHz on the 26th. During another event at 1917 on the 28th, I received pictures from the USSR on Chs. R1 and R2 (59.25MHz), heard fluctuating television synchronising-pulses on Chs. R3 (77.25MHz) and R4 (85.25MHz) and counted about 40 broadcast stations, at typical Sporadic-E strength, between 66 and 73MHz.

Propagation Beacons

As usual my thanks are due to Mark Appleby, Chris van den Berg, Henry Hatfield, John Levesley, Greg Lovelock, Ted Owen, Fred Pallant, Ted Waring and Ern Warwick, for their detailed 28MHz beacon logs from which I gathered the information to compile this months chart of beacons heard, Fig. 8. I wonder how many of you heard Chris van den Berg's news reports to the BBC and IBA about a Soviet spacecraft on May 18 and 20? Ern Warwick also received signals consistently throughout the same period from the beacons ZS6DN/B and 4X6TU/B on 14.100MHz and DK0WCY on 10.144MHz and less frequently from IK6BAK on 24.915MHz, PY2AMI on 24.931 and 18.100MHz and JA2IGY, KH6O/B and OH2B on 14.100MHz.

Tropospheric

The generally high atmospherc pressure readings for the period April 26 to May 25, Fig. 7, were taken at noon and midnight from my own barograph which shows a peak of 30.5in (1032mb) from April 27 to May 3 and a 'low' of 30.1in (1019mb) from May 10 to 13.

During the tropospheric openings between April 29 and May 3, radio and television DXers like **George Garden** (Edinburgh), **David Glenday** (Arbroath), **Simon Hamer** (New Radnor), **Andrew Jackson** (Birkenhead), **Jeremy Morley** (Nottingham) and **Brian Renforth** (Newcastle) between them received radio stations in Band II (88.5-106MHz) and television pictures in Bands III (175-230MHz), IV (471-607MHz) and V (615-855MHz) from Belgium, Denmark, France, Germany, Holland and Ireland and relatively distant transmissions from BBC and ILR stations within the UK. Similar conditions prevailed betweem May 20 and 23.

934MHz

"Early May, high pressure peaking at 1032mb on the first brought a tropospheric path from Lincolnshire in the north-east through to Sussex in the south making a considerable number of contacts possible," wrote **Terry Wyatt UK-845** (Walton on Thames) on May 10. I had the pleasure of meeting Terry, Fig. 9. and his wife Betty when

Fig .9

they visited the vintage wireless exhibition at The Chalk Pits Museum (Amberley, Sussex,) on April 29, when he showed me his very smart looking 934MHz hand-held transceiver. On May 1, he made contacts, using his base-equipment, with stations in Leicester (UK-355 and 417), Lincolnshire (NL-1), Norfolk (JD-25), Northants (MK-03 and 405) and Suffolk (UK-390 and 392) at distances between 120 and 176km. Terry tells me that south-coast station DX-2 (Hastings) had a good haul of 69 contacts on that day and on the 23rd, BH-172 in Weybridge made a 150km contact with UK-392 in Ipswich. John Levesley UK-627 (Bransgore) worked into the Channel Islands (GY-186 and JY-604), at 165km, on May 4 and 5 and to Haytor on Dartmoor (GM-148) at 145km on the 7th. He contacted GY-186 again on the 17th and 20th.

Back-Scatter

Broadcast Round-up

Reports to
Peter Shore

Changes to BBC World Service hours and services have been announced as part of a major review of World Service for its next three year funding period. World Service is financed by the Foreign and Commonwealth Office, which prescribes the languages and hours broadcast, although editorial control of programme content rests entirely with the BBC. The changes involve the cessation of broadcasts in Malay and Japanese, increases in Russian, Chinese and Vietnamese, increases in English language broadcasting to Western Europe, Asia and the Far East as well as the start of a new daily one hour stream (directed at first to South and East Asia) to encourage the learning of English. Russian and Mandarin broadcasts increase by 3 and a half hours a week, Vietnamese increases by 1 hour 45 minutes, English to Western Europe by 3 hours 30 minutes and to the Indian sub-continent and to East Asia by 1 hour a week. Latin American broadcasts are to be reduced by 10 and a half hours a week in Spanish. These alterations result in an overall reduction in weekly broadcasting by 1 hour 45 minutes, which means that BBC World Service retains its position as the fifth largest international broadcaster.

Audience figures released shortly after the announcement of the changes to World Service broadcasting showed that the total global audience for Bush House is greater than the combined audiences of Radio Moscow, Radio Deutsche Welle and the Voice of America.

One can at least be thankful that the swingeing cuts recently imposed at stations such as Radio RSA have not affected BBC World Service.

If you are interested in radio stations within the United Kingdom, the new edition of the British DX Club's annual guide to *Radio Stations in the United Kingdom* will be of interest. The publication covers all national, regional and local domestic radio services in the United Kingdom, and the guide has a complete m.f. and v.h.f.-f.m. listing of all stations currently operating, and those planned for the near future. The book is available from BDXC, 54 Birkhall Road, London SE6 1TE for £1.50 including postage.

Mr F H Goddard has written from Doncaster saying that he has 'enjoyed reading it, and following up on your detailed information for some time now.' Mr Goddard goes on to say that he has been monitoring the World Service of the Christian Science Monitor with the transmitter site in Scotts Corner, Maine offering best reception. The frequencies for WCSN were given in this column in the April edition, but I thought that you might be interested to see one of the current QSL cards issued by the station. There are three different cards, one issued for reports of each transmitter site. Mr Goddard rounds off his letter saying that this station is really to be recommended. Thanks for bringing it to my attention.

You may recall that this column brought you news of a planned radio service from a ship called the Goddess of Democracy which intended to broadcast to the Chinese mainland. After a number of problems, including how to get a transmitter on board, the project foundered at the end of May,

Back-Scatter

and press reports suggested that the ship was to be sold for scrap.

A relay agreement between Radiobras in Brazil and Radio Beijing seems to be about to be signed, which will give Radio Beijing access to Radiobras transmitters to cover Latin America which is currently poorly served by its transmissions from the People's Republic. The plan has been criticised by newspapers in the country, and further details including when this arrangement might start are not presently known.

European Stations

all times UTC(=GMT)

Radio Albania in Tirana has been changing frequencies once more, and the English language transmissions are now :

0530 on 9.50, 7.30
0800 on 11.835, 9.50 (Asian service)
1030 on 11.855, 9.48 (Asian service)
1400 on 11.855, 9.50 (Asian service)
1530 on 11.83, 9.50 (African service)
1730 on 9.48, 7.155, 1.395
2030 on 11.835 (African service)
2130 on 9.48, 7.245, 1.395

West German stations Deutschlandfunk and Deutsche Welle are entering the satellite age, with programmes carried on the Astra satellite. DLF's service can be received from Astra at 19.2 degrees West on transponder at 11.288 GHz, in stereo on subcarriers at 7.38 and 7.56 MHz. DW, meanwhile, is hiring two subcarriers on transponder number 2 at 11.229 GHz with German programmes on 7.38 MHz and English on 7.56 MHz.

The summer schedule for Radio Berlin International in English to Europe is:

0545 on 5.965, 6.155, 7.185
0745 on 6.04*, 6.115, 7.185*, 9.73*
0945 on 6.115
1145 on 6.115
1345 on 6.115, 9.73
1545 on 6.08, 7.26, 7.295, 9.73
1745 on 9.665, 9.73
1945 on 1.359, 7.185, 9.665, 9.73
2145 on 5.965, 7.295
[* indicates weekend transmissions only]

It will be most interesting to listen to both Radio Berlin and the two present West German broadcasters around the time of currency unification and the following months as total unification occurs, and to compare the output and comments heard on the stations...

Radio Finland is reinstating French language news bulletins which were stopped during the 1950s, although French language programmes did recommence in 1987. The new French service schedule is:

0645-0700 on 11.755, 9.56, 6.12 MHz and 963, 558 and 252kHz
2045-2100 on 15.40, 11.755, 9.55, 6.12 MHz and 963, 558 and 252kHz
2225-2240 on 15.185, 11.755 and 963, 558 and 252kHz

RAI in Rome broadcasts to Europe in English during the summer :

0425-0440 on 9.575, 7.275
1935-1955 on 11.80, 9.71, 7.275
2025-2045 on 11.80, 9.575, 7.235 (Middle East)

RAI is one of the few broadcasters with an Esperanto service, heard each Sunday at 2000 for twenty minutes on 11.80, 9.71 and 7.275MHz.

The English service from Radio Portugal to Europe is heard during weekdays at 1900 on 11.74 MHz, with the African service at 2000 on 15.25MHz.

New transmissions are beamed from Radio Exterior de Espana. The present schedule for Europe is :

1700-1800 on 9.875, 11.79, 15.28 in German and Russian
1800-2000 on 11.79, 15.28 in French and English

The new transmissions in German and Russian to Europe are heard on weekdays only, and last for thirty minutes each. The existing English and French programmes are 60 minutes long and broadcast seven days a week.

Red Cross Broadcasting Service will be heard to Europe on July 29 and August 26 on 7.21MHz at 1100 until 1240 with its multilingual programmes, and at 1700 until 1840 on July 30 and August 27 on the same channel.

Programmes from Moscow to the British Isles at 1900 are currently on 17.695, 15.185, 11.89, 11.63, 7.33 and 1.143 MHz. Radio Peace and Progress continues to have a daily transmission to Europe, although for what purpose I do not know, at 2100 for sixty minutes on 15.26, 11.98, 11.88, 11.83, 9.82, 9.47 and 1.386MHz.

African & Middle Eastern Stations

Congo is on the air, with programmes from the Voice of the Congolese Revolution:

Friday to Sunday
0700-1100 on 9.715, 7.175
1100-1700 on 15.190, 9.715
1700-2100 on 4.765, 3.265
Tuesday-Thursday
0700-1100 on 9.610, 7.105
1100-1700 on 11.71, 9.610
1700-2100 on 4.765, 3.265

Reports on reception should be sent to Congolese Radio, PO Box 2241, Brazzaville, People's Republic of the Congo.

The Voice of the Islamic Republic of Iran, VOIRI, lists a new 49 metre band frequency for its 1930 transmission to Europe. 6.035 is now in parallel with 9.022 MHz, whilst the Middle East and Asian service at 1130 is on 11.94, 11.79, 11.715, 9.705 and 9.575MHz.

Radio Jordan appears to have started a new Arabic service for overseas heard at 1000 on 13.655 followed by English at 1100 on the same frequency. The English programme appears to be a relay of the domestic English service of Radio Jordan. At around 1315, the frequency changes to 9.56 MHz.

Al-Quds Radio with programmes in Arabic to the Occupied Territories has been heard in the morning between around 0600 and 1100 on 15.05 MHz in upper sideband. The Voice of Turkey has English broadcasts :

0300-0350 on 17.88, 17.76, 9.445 (Australasia and Americas)
1230-1300 on 17.785 (Asia)
2000-2050 on 9.795 (Europe)
2200-2250 on 17.88, 9.795, 9.685, 9.665, 9.445 (Europe)

Radio Yerevan has a ten minute bulletin for North America in English on 11.79 and 11.675 at the uncomfortable hour of 0250, with French at 2050 on 17.68, 12.05 and 11.92 and on Sundays only at 0750 on 17.68, 17.625 and 15.51MHz.

Asian & Pacific Stations

Radio Australia's schedule has now arrived, and I am therefore able to expand on the information which was published in last month's edition. The frequencies suggested by the station for listeners in Europe are:

0100-1100 on 21.775
0700-0830 on 15.240
1100-1330 on 15.465
1430-1700 on 13.745, 12.00, 9.710

These services beamed to Asia and the Pacific offer on the whole reasonable reception, although the 12MHz channel is also used by Radio Moscow and so suffers severe interference. No suggestions have been made by the station for evening time listening in the UK, and my research shows that at 2130, 15.2 MHz gives reasonable reception and from 2200, 17.715, 13.605 and 15.24 are audible here. This new schedule is the first time that Radio Australia has moved into the 1 MHz band, and with reasonable success, too, although the 13.605MHz channel is also used by UAE Radio Abu Dhabi for its English service at this hour.

Radio Pakistan's summer schedule has English :

0230-0245 on 21.49, 17.725, 17.66, 15.115, 9.545 (Dictation speed news)
0715-1105 on 21.575, 17.555 (includes Urdu)
1105-1120 on 21.575, 17.555 (Dictation speed news)
1600-1630 on 21.74, 21.48, 17.65, 17.555, 15.605, 13.665
1718-1800 on 15.605, 11.57

From the Soviet Union, English is still broadcast by a number of the Republics which are suffering from inter-ethnic violence. Radio Tashkent has an English service during the day beamed to Asia, which might be worth a try. The frequencies for the broadcast at 1200 and 1330 are 17.74, 15.46, 11.785, 9.715 and 7.325.

Radio Ulan Bator has a new English service schedule operating on Monday, Wednesday, Thursday, Saturday, Sunday at 0910-0940 on 12.015 and 11.85; from 1200 until 1230 on 12.025 and 11.85; 1445-1515 on 13.78 and 9.795 and from 1940 until 2010 on 12.05 and 11.85. If you hear this station, please do drop me a line at *PW*.

N, S & C American Stations

RAE Argentina now has one evening broadcast in English at 1900 for 60 minutes on 15.435 with the North American service at 0200 on 11.71. The station broadcasts on weekdays only. From HCJB in Quito comes news of major programme changes. All Quito-produced programme are now consolidated into a one hour block entitled Studio 9. This has resulted in the dropping of the *Passport* and *Happiness Is* programmes. Each weekday edition of Studio 9 opens with five minutes of Latin American news followed by a fifteen minute segment of news and current affairs, then a thirty minute feature follows. On Saturday, the Latin American newscast is followed by a 15 minute science programme and then the *DX Partyline*, whilst on Sundays sports fans have Get Set, followed by *Saludos Amigo*. Topics to be covered on the DX Partyline during July and August include on July 8 a review of the Icom IC-R9000 receiver; July 15 Pacific DX news from Arthur Cushen and a look at the world's largest communications museum in Dallas; July 22 reports from ANARC, SPARC and EDXC; and on August 12 a review of the Grundig Yacht Boy 230. Current frequencies and times for HCJB are:

0700-0830 on 15.27, 11.835 and 9.61 (Europe)
0730-1130 on 11.925, 9.745 (South Pacific)
1900-2000 on 21.47, 17.79, 15.27
2130-2200 on 21.47, 17.79

XERMX in Mexico City is on the air 1300-1700 on 17.765 and 11.77, and during the night from 2000 until 0500 on 15.43 and 9.705 MHz.

Back-Scatter

ATV

Reports to
Andy Emmerson G8PTH
71 Falcutt Way
Northampton NN28PH

GB3TG on the air

10GHz television is here! Well, in fact it has been around for a long time but the first step towards its becoming the predominant band has been taken. Yes, our first amateur television gateway is on the air, currently in test beacon mode. The long-term intention is to provide crossband facilities to enable people with 10GHz equipment to transmit into, and receive signals from, the existing 23/24cm ATV repeater GB3TV located on Dunstable Downs.

The output frequency of GB3TG (TG standing for television gateway or ten gigs, whichever you prefer!) is 10.150GHz and the location is a 6m pole at the highest point of Great Brickhill, a village overlooking Bletchley and Milton Keynes in Buckinghamshire. The eventual input frequency, by the way, will be 10.250GHz, the same as is used for simplex ATV in X Band. The r.f. equipment is a 10mW Gunn head running into a 20-slot waveguide antenna, and this is producing perfect P5 pictures at locations up to 4 or 5km away where *Practical Wireless* dishes or 20dB gain horns are used for receiving. The estimated e.r.p. from this system is 0dBW or 1 watt, but this is due to be raised when a 100mW power module is added.

In charge of the project is **Dave McQue G4NJU**, who has written a detailed article on the project in the February 1990 issue of the RSGB's *Microwave Newsletter*. Dave has been helped by Nigel G8IFF, Mark G6XEG and Colin G1YEB and has also supplied technical assistance - and similar 20-slot antennas - to Bob G8OZP (near Burton, Staffs.) and to Steve G8JMJ (Malvern, Worcs.). We hope to see similar ATV beacons going up there in due course. Mark my words, 10GHz is the cheapest way of getting onto ATV now. With further fallout of satellite TV equipment for reception and Solfan burglar alarm heads for transmitting, I am convinced that 10GHz will become 'the' ATV band, with repeaters in most big towns. The complete set-up for going on the air will cost well under £100, less than you'd pay for any other amateur radio mode bar QRP c.w!

More 10GHz news

The RSGB's Microwave Committee has proposed three channels for ATV repeaters, no doubt in the expectation that these will enjoy a rapid surge in growth. The recommended frequencies are as follows:

designation	input	output (GHz)
TV0	10.200	10.040
TV1	10.225	10.065
TV2	10 250	10 150

TV2 is already used by GB3TG. It is said that the apparently 'odd' choices were made with due regard to existing band users, both amateur and professional. Presumably the final decision was taken by a computer with no fingers - we humans normally count from 1!

SSTV on the Atari

Recent talk about the AVT package from AEA may have made Atari ST owners feel a little green with envy. Well, they can get their own back now and probably end up paying a whole load less into the bargain. As before, I print the details as I get them without any implied approval - it's up to you to check out the goods and let me know if they're good - or bad.

The software in question provides Robot, Wraase SC-1 and AVT modes. The screen has two images of 128 x 120 pixels in 256 colours, with a menu of available commands. A test pattern generator provides chequerboard, colour bars and more, while image manipulation possibilities run to mirroring, zooming, shrinking and rotating. Image file formats to load and save include Neochrome and Degas. Ten images can be kept in active memory for instant access, while you can print in up to 17 levels of greyscale on a dot-matrix printer. A low cost ($7) interface connects to the modem and printer ports.

The price of this little wonder is not given but you can obtain a free demo version of the software (with nearly all of the user features working) from numerous user groups. The nearest one to us is ASTUR in Belgium: send two disks and three IRCs to Michael Geeraert, W. Elsschotlaan 21, B-8460 Koksijde, Belgium. You will receive one disk back, with the software on it. In North America the deal is one formatted disk and $2, to John Adams KC5FW, 17106 Happy Hollow, San Antonio, TX 78232.

VSB on ATV

Most people who have taken the trouble to borrow a library book on television theory will know that the 'real' TV broadcasters (i.e. the BBC and ITV) use a transmission technique called vestigial sideband modulation or VSB for short. We amateurs (or nearly all of us), however, put out double sideband signals when we transmit a.m. TV on 70cm. Why?

The broadcasters reduce (filter away) nearly half the modulated signal because it reduces the bandwidth of the signal and hence the RF spectrum occupied. In this way they can squeeze in more channels with reduced risk of interference. I guess they save some power as well. Amateurs don't normally bother because it's not at all easy to produce genuine VSB signals and up to now there have been few cases of interference to other users. In fact ATVers have been more interfered with (by packet, s.s.b. and f.m. voice transmissions) and the crossed polarisation and distributed nature of the TV signal have meant that ATVers seldom cause QRM to other 70cm band users.

This may change as the pressure on 70cm builds up and in the USA an enterprising manufacturer has seen fit to introduce a VSB transmitter for amateur television. The company was AEA (who else?) and the product was launched at this year's Dayton Hamvention. The basic product is a 1.5 watt transceiver and it is matched by a masthead-mounted broadband power amplifier/pre-amp, a suitable power supply and a 16-element, 14.3dB gain plain Yagi antenna. So far product tests have been only of pre-production samples, but it looks as if the prime mover is very good, with a genuine VSB signal. For the p.a. to maintain this characteristic is going to be a real test: you need ultra-linear devices to avoid re-creating the suppressed lower sideband. AEA have tackled this by using professional transistors and a 28 volt power supply for better linearity, but the proof of the pudding will be in the eating.

The idea of a masthead-mounted p.a. is a good one, avoiding feeder losses in the coaxial cable. As the manufacturers say, 50 watts at the antenna is equivalent to 100 watts in the shack assuming 3dB feeder loss, which is not unreasonable. On the other hand, their idea of feeding lots of amps of d.c. up the feeder will inevitably lead to severe electrolytic problems, however well users tape up the connectors.

Since the peak load (on sync tips) will coincide with peak voltage drop, there may be some odd modulation effects on the r.f. as well. We'll have to see how the production units turn out in use. Prices were not confirmed at time of writing.

Other Commercial News

I'm a little late to suggest the solid-state surveillance camera outfit sold by Uniden, Tandy and others is new but it indicates an interesting trend in TV cameras.

It looks as if it's the ideal thing for ATV and is being sold as such at some rallies but be warned - it's for 525 lines and not convertible! This is why it's always sold with a companion monitor here, though in the States it is now on sale alone for $125.

To quote an advertisement, 'this camera was made for home security applications where low cost, ease of installation and use were more important than high resolution, colour or low light level capability'.

Depth of field is less than 1 foot to infinity and it has auto iris, the viewing angle being 40 degrees. Horizontal resolution is a mere 120 lines with 19440 pixels, which is why the picture is frankly so poor.

For its intended purpose it is no doubt more or less adequate, but don't think that all c.c.d. cameras give such poor results. If you have £400 to spare you will find some pretty tasty devices on the market (try Crofton Electronics of Kington for instance) and I have seen a professional c.c.d. camera at a rally this year complete for £75. The real beauty of the Uniden camera though is its light weight (7 ounces) and low power consumption (200mA at 12V).

In the States it has already been used in a radio-controlled model helicopter by KC6CCC and on a large kite by WM8W - now there's a novel idea!

Finally, for the guy who has to have the most expensive toys, here is the ultimate - a 180 watt solid state amplifier for 70cm.

Price is a mere $503 and oh yes, you'll need a power supply capable of putting out 13.8 volts at 39 amps. The shack bench will probably need rebuilding to take the weight of the p.s.u. Manufacturer is TE Systems in the USA. I'm taking orders now ...

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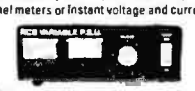
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ICOM's communication receivers have a reputation for reliability and quality. Building on this reputation the IC-R72 HF receiver is one of a new line of wideband receivers to satisfy listeners everywhere.

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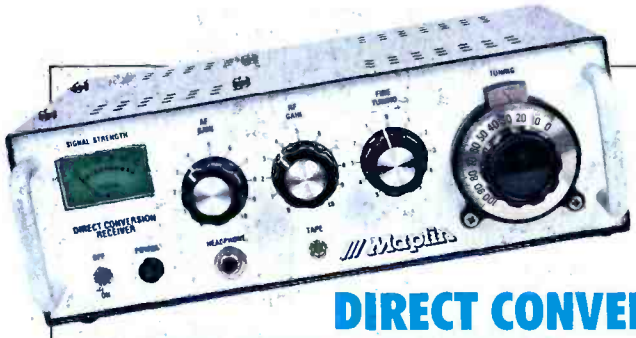


DIRECT CONVERSION SHORT WAVE RECEIVER

- ★ **Receives speech (SSB, DSB, AM) and morse (CW)**
- ★ **Choice of amateur band, 160 – 10 metre**
- ★ **On-board voltage regulator and audio power amplifier**

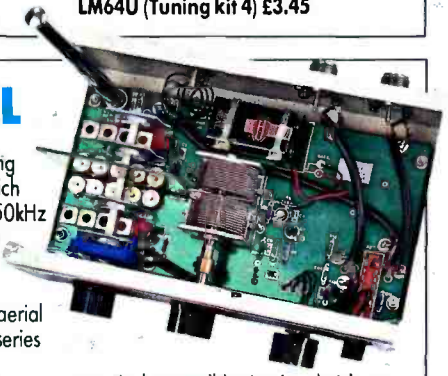
Sophisticated ready-made short wave receivers, often cost hundreds of pounds. Now, you can build a receiver of the direct conversion design that has the advantage of simplicity of construction and ease of alignment, with the minimum of test gear, for a fraction of the cost of a ready-made model. The amateur bands are: 160m, 80m, 40m, 20m, 15m & 10m. To include all these bands on one receiver would present switching & tracking difficulties, for this reason the receiver covers only one band (which needs to be decided upon before construction). The choice is up to you, but do not forget to order your tuning pack when ordering your receiver kit.

AMATEUR BAND	RECEIVER TUNING RANGE	TUNING PACK
160m		
1.810–2.000MHz	1.800–2.010MHz	1
80m		
3.500–3.800MHz	3.490–3.810MHz	1
40m		
7.000–7.100MHz	6.690–7.150MHz	2
10.100–10.150MHz	10.000–10.500MHz	2
20m		
14.000–14.350MHz	13.990–14.400MHz	3
18.068–18.168MHz	18.000–18.500MHz	3
15m		
21.000–21.450MHz	20.990–21.500MHz	3
24.890–24.990MHz	24.540–25.000MHz	4
10m	A, 27.975–28.525MHz	4
28.000–29.700MHz	B, 28.475–29.025MHz	4
	C, 28.975–29.525MHz	4
	D, 29.475–30.025MHz	4

A kit excluding the optional items, Box and Chassis, Pot Mounting Bracket, Front and Rear Panels and Tuning Kits is available. For full list of optionol extras see Maplin Catalogue.

LM60Q (Dir Conv Rx Kit) £64.95
LM61R (Tuning kit 1) £3.45
LM62S (Tuning kit 2) £3.45
LM63T (Tuning kit 3) £3.45
LM64U (Tuning kit 4) £3.45

ACTIVE AERIAL



An active aerial pre-amplifier having five selectable tuned RF ranges which cover a total frequency range of 150kHz to 30MHz. The unit includes a gain control operating on the MOSFET amplifier, and a low battery LED warning indicator. Connections to aerial and receiver are made using UHF series connectors, with a direct, straight through or 'by-pass' mode operative when the unit is switched off.
A telescopic aerial is included for use where a proper outdoor aerial is not practical or possible. A printed stick-on front panel for the active aerial project is available as an optional extra.

LM05F (Active Aerial Kit) £52.95
Optional items:
FA99H (Active Aerial f/panel) £3.95
XY45Y (Case 222) £6.45

Photo shows Kit with some optional extras, see Maplin Catalogue for further details.

THE MAPLIN CATALOGUE

Further details and specifications on all the items shown on this page are to be found in the Maplin Catalogue. Over 580 pages of electronics ideas from Projects and Modules, Tools, Components, Books, Connectors, Batteries and Power Supplies to Test Gear, Audio, Video and Computers and much, much more.
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DXer's AUDIO PROCESSOR

- ★ **No modifications to receiver**
- ★ **High filter attenuation rate** ★ **Easy construction**

The processor features a low-pass filter giving a 36dB per octave attenuation under 150Hz and an expander which severely attenuates noise during pauses in the received speech. The unit is especially suited for SSB & FM CB reception and simply fits between the receiver's audio output and the headphones, thus no modification is necessary to the receiver. The single PCB makes construction very simple.

LK05F (DXer's Processor Kit) £11.95
Optional items: **HB26D (Knob (3 off required)) 68p each**
XY45Y (Case 222) £6.45 **FM03D (9V PP6 Battery) £1.98**

SW/MW AERIAL TUNING KIT

Given that the aerial impedance of most communications receivers is 50, unless the impedance of the aerial matches this exactly all of the RF energy will not be efficiently transferred from the aerial to the receiver. The greater the mismatch, then the weaker the signal will appear, and under adverse conditions it could vanish completely into background noise. This aerial tuning unit comprises two variable tuning capacitors and a tapped inductor in a passive 'T' configuration. This arrangement covers approximately 600kHz to 30MHz, and matches the aerial load impedance to the input impedance of the receiver. The ATU can also be used for transmitter aerial matching in the same frequency range, including the 27MHz citizen band, up to a power rating of 10 Watts. A printed stick-on front panel is available as an optional extra for the aerial tuner unit.

LM06G (Aerial Tuner Kit) £36.95
Optional items: **FD11M (Aerial Tuner f/panel) £3.95**
XY45Y (Case 222) £6.45 **FW38R (Pkt Stick-on Feet) 24p**

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