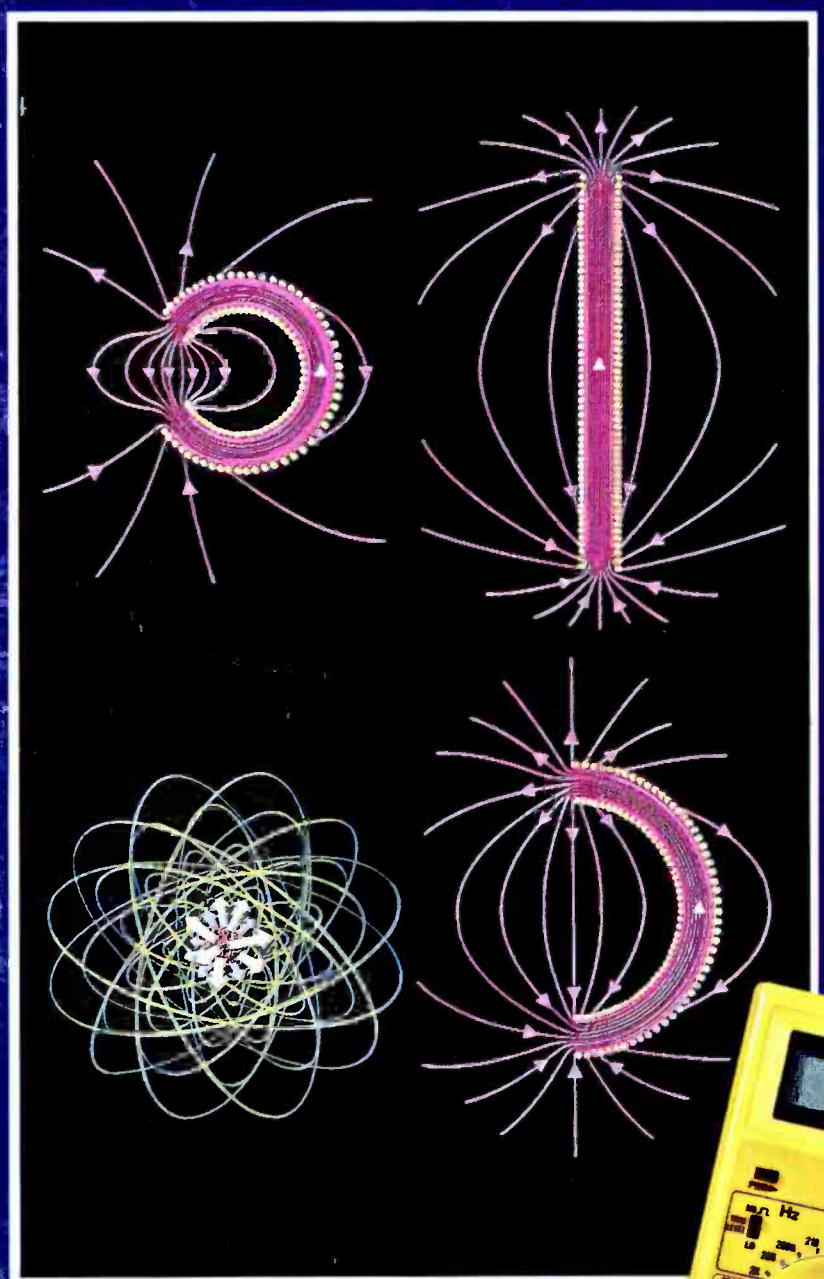
PRACTICAL WIRELESS

PW

THE RADIO MAGAZINE



FEATURES

- MAGNETIC DC LEAKAGE FROM CABLES
- BASIC RADIO CALCULATIONS
- CROSSWORD COMPETITION
- CB CORNER
- AND MUCH MORE!

REVIEWED THIS MONTH

- AKD FILTERS
- TWO CIRKIT MULTIMETERS

SEPTEMBER 1990
£1.60

ISSN 0141-0857

09

9 770141 085006

The affordable way to be heard on HF, VHF and UHF.

Listen for Yaesu's FT-767GX everywhere you might hear it: HF, 6 meters, 2 meters and 70 cms.

You'll hear operators calling it the ideal HF/VHF/UHF base station.

And they'll rave about its full-featured performance and highly attractive price.

You see, the FT-767GX continues the price/performance tradition of our popular FT-757GX. But with even more features.

When you're ready to expand beyond HF coverage, just plug in optional modules for 6-metre, 2-metre, and 70-cms operation.

As standard equipment, you get a built-in HF automatic antenna tuner, AC power supply, digital SWR meter, digital power output meter, electronic keyer, and CW filter.

And operation is smooth and intuitive with keyboard frequency entry. Dual VFOs that tune in 10-Hz steps. A digital display in 10-Hz steps. And ten memories that store mode, frequency, and CTCSS tone information.

The FT-767GX is ready to operate full duty cycle at full rated power output for up to 30 minutes. And it listens from 100 kHz to 30 MHz.

Plus your station is really complete with full CW break-in, our patented Audio Peak Filter for CW operation, a CW TX offset variable 500/600/700 Hz, IF shift, an IF notch filter, a Woodpecker noise blanker, a VFO tracking system for slaved A/B VFO tuning. And that's just a partial list!

But the best way to discover its full-featured performance is to visit your authorised Yaesu dealer today.

Yaesu's FT-767GX. The HF/VHF/UHF base station you'll hear about on the air.

YAESU

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

Prices and specifications subject to change without notice.

PRACTICAL WIRELESS PW

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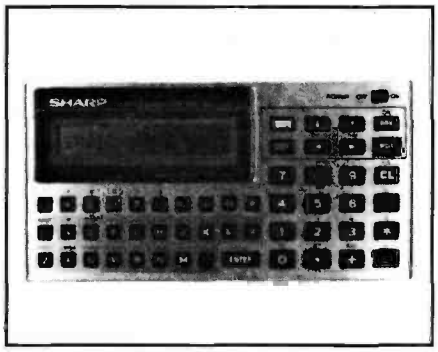

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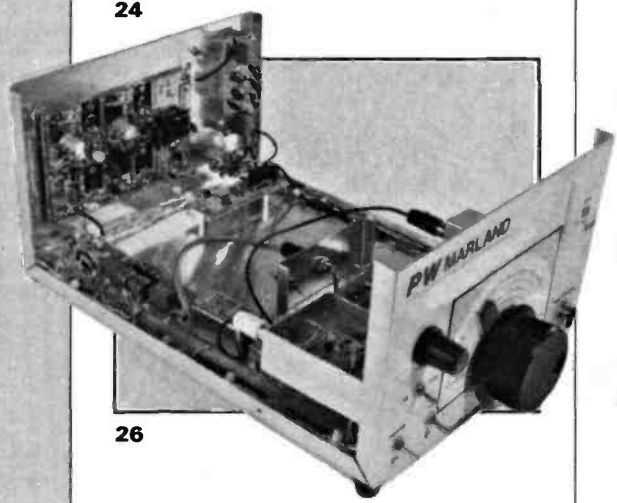


26

Regular Features

ICOM

NEW MULTIBAND IC-970E Base Station

Designed for the serious operator on the 144, 430 and 1200MHz bands, Icom's new IC-970E has up-to-date technology for DX, digital and satellite communications.

The IC-970E is supplied as an all mode dual-bander for 144 and 430MHz bands. Optional units expand its capabilities to 1200MHz or wideband receiving from 50-905MHz.

Communications via satellites has never been easier. The IC-970E automatically tracks uplink and downlink frequencies as the tuning control is rotated also, ten specific memory channels for satellite frequencies.

The dual-band watch allows you to receive both MAIN and SUB band audio simultaneously, multiple scanning systems on the MAIN and SUB bands plus 99 memories, an easy to read central display and Icom's DDS sytem make this one of the most comprehensive multi-band transceivers available.

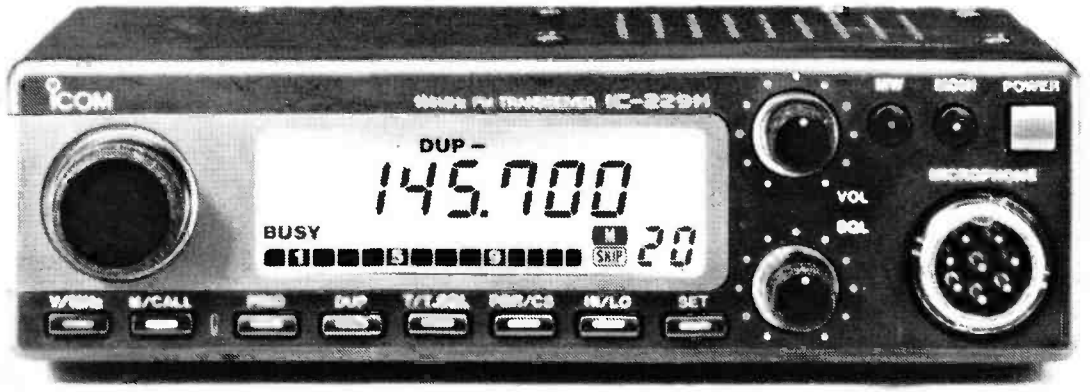
For more detailed information on the IC-970E Base Station or any other Icom radio equipment contact your local authorised dealer or call Icom (UK) Ltd.

Icom (UK) Ltd.

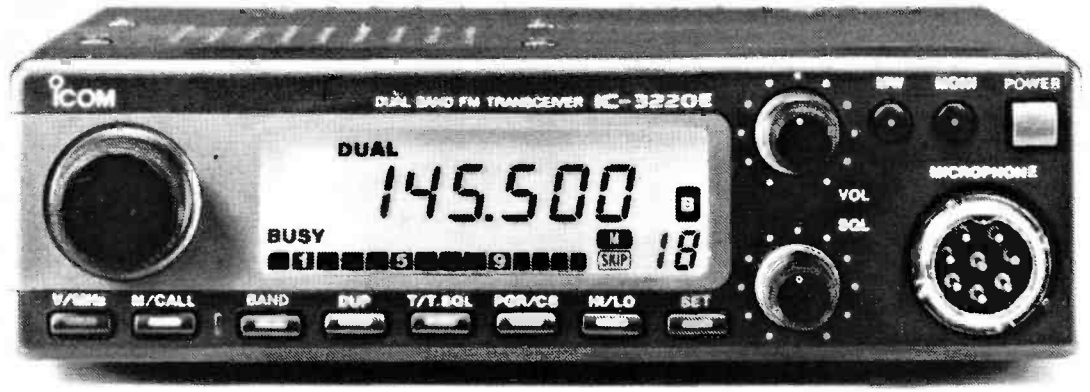
Dept. PW, Sea Street, Herne Bay, Kent CT6 8LD. Tel: 0227 363859. 24 Hour. As from 1st September our showroom opening times will be Mon–Fri 09.00–13.00 and 14.00–17.30.

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 Communications Ltd.

BARGAIN OFFER

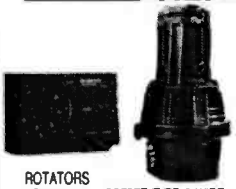
SMC 345L6 HAM

70CMS HANDHELD

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

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

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.

COMET & HOKUSHIN ANTENNAS

New from Hokushin, an exciting range of high performance antennas, the WX1 has been a best seller for some time, now available are the WX2 and WX4, its bigger brothers. Both are multi section 2m/70cm colinears with arguably the best mechanical construction we have seen to date. On the mobile front, the HS-727SS, a new mini dual band mobile, very similar to the Comet CHL21J, is proving very popular and network analyser tests have proved its compatibility with our existing range of gutter and magnetic mounts. Also available are the SSB1, a low profile hatchback mount complete with cable, two new dual band antennas, the HS-727VMS and the VM-720SKR as well as the 28HS-2HB a HB9CV for 10m.

MOBILE ANTENNAS

Monoband

2QW	2m 1/4 wave	0.0dB	£4.95
2NE	2m 5/8 wave fold over	3.0dB	£13.25
2VF	2m 1/2 wave	3.0dB	£21.51
78B	2m 7/8 wave ball mount	4.5dB	£15.00
88F	2m 8/8 wave fold over	5.2dB	£18.00
268E	70cm 2 x 5/8 wave	6.0dB	£32.80
358	70cm 3 x 5/8 wave	6.3dB	£33.73

Dualband

VM-720SKR	2m/70cm ½ + 2 x 5/8 wave	3/5.5dB	£24.95
HS-727VMS	2m/70cm ½ + 2 x 5/8 wave	2.6/4.9dB	£24.95
CA2X4MB	2m/70cm	4.5/7.4dB	£37.75
CA2X4KG	2m/70cm	6.0/8.4dB	£39.95
CHL21J	2m/70cm	0/2.15dB	£14.49
CHL23J	2m/70cm	2.15dBi/3.8dB	£16.95
HS-727SS	2m/70cm	0/2.8dB	£16.95

Mobile Mounts

GCCA	Gutter mount and cable. 4m	£14.25
SOCA	4m Cable Assembly	£6.90
SOCAL	6m Cable Assembly	£7.20
SOCALLR	5m Cable Assembly long reach	£8.60
HDTMCA	Trunk mount H/D. 5m cable	£18.50
SOMM	Magnetic Mount. 4m cable	£12.75
GCD	Gutter Mount only	£6.45
BSD	Bumper Strap de luxe	£11.50
RSM4M	Magnetic Mount. Yaesu	£25.88
TBR	Adjustable trunk mount	£11.25
RS17	Mini Trunk lip mount	£12.50
RS16	Mini gutter mount	£12.50
SS-B1	Mini trunk mount. 5m cable	£26.50
CK-3LX	Cable assembly RS16, RS17 & TBR	£15.95

BASE ANTENNAS

Monoband

28HS-2HB	10m 2ele HB9CV type	6.0dBi	£65.00
2HB6	6m 2ele HB9CV type		£35.00
ABC23	2m 3 x 5/8 wave	7.8dB	£63.97
GP23	2m 3 x 5/8 wave	7.8dB	£45.00
GPV5S	2m 2 x 5/8 wave	6.4dB	£45.49
SQ144	2m Swss Quad (Vert. Polarised)		£65.00
GP714	70cm 14 step Colinear	10.0dBi	£88.20

Dualband

WX1	2m/70cm Glassfibre	4.5/7.2dB	£54.95
WX2	2m/70cm Glassfibre	6.0/8.0dB	£75.00
WX4	2m/70cm Glassfibre.	7.8/10.8dB	£99.00
CA2X4WX	2m/70cm Glassfibre	6.5/9.0dB	£79.00
CA2X4MAX	2m/70cm Glassfibre	8.5/11.9dB	£99.95

DUPLEXERS

HS790DN	2m/70cm UHF/N Connectors	£25.50
CF416MN	2m/70cm UHF/N Connectors	£25.50
AD2	2m/70cm UHF/N Connectors	£29.90
CFX4310	2m/70cm/23cm	£38.00

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

SWR/PWR METERS

YS60

FS710V

FS710V	50-150MHz	15/150W	PEP	£107.80
FS300H	1.8-60MHz	20/200/1000W		£53.40
FS210	1.8-150MHz	20/200W	Auto SWR	£65.50
FS301M	2-30MHz	20/200W		£42.25
FS301MH	2-30MHz	200/2000W		£42.25
FS711H	2-30MHz	20/200W	Head/Display	£43.65
FS711V	50-150MHz	20/200W	Head/Display	£43.65
FS711U	430-440MHz	5/20W	Head/Display	£43.65
FS711C	26-30MHz	10/100W	Head/Display	£24.55
FS500V	50-150MHz	20/200W		£81.95
W720S	130-440MHz	20/200W	Head/Display	£52.75
SWR50B	3-5-150MHz			£36.75
FS20DL	3-150MHz	1/10W		£43.65
FS20D	3-150MHz	5/20W		£43.65
SWR3E	3.5-150MHz	20/200/1000W		£28.75
JD110	1.5-150MHz	10/100W		£16.50
T435	144/430MHz	20/200W		£65.00
YMIX	3.5-150MHz	Rel. Power/SWR Twin meter		£31.50
OSCAR-171B	3.5-150MHz	Rel. Power/SWR Twin meter		£26.85
SP425	140-524MHz	5/15/150W		£119.95
YS60	1.6-60MHz	20/200/2000W		£93.15
YS500	140-525MHz	4/20/200W		£81.65

Carriage on all power meters £4.00

SOUTHAMPTON (0703) 255111
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LEEDS (0532) 350606
BIRMINGHAM 021 327 1497
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Realistic TRC-501. Only 25.4mm thick and five ounces light! Call button tranmits a tone signal. Low-battery indicator, push-to-talk button, telescopic aerial. Includes belt clip. Requires one 9v battery.

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Realistic TRC-500. Voice-actuation gives you hands free communication. Dual-conversion superhets for high sensitivity and clear 2-way communication. Volume switch. With belt clips. Each headset requires 9v battery.

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Tel: 0922 710000

JUPITER RANGE

MVT5000	25-1300Mhz handy	275.00
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
DJ120E	2m handy tevr	179.00
DJ160E	Extended rx	219.00
DJ460E	Keypad handy	229.00

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
MSI	Monitor scope	269.00
P300	30 Amp psu	149.00
W510	Vswr 1.6-30 MHz	79.00
W520	Vswr 1.8-200 MHz	76.50
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
D24N	With "N" & PL259	26.95

DIAMOND ANTENNAS

CP5	10-80m vert	189.00
D130N	Disc. 25-1300 MHz	82.00
X50	2m/70cm base	59.95
X300	2m/70cm base	89.00
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
MA1000	2m/70cm whip TNC	29.00
MA200	2m whip TNC	26.00

CREATIVE DESIGN ANTENNAS

5130-1	50-1300 MHz 12dB	179.00
5130-2	105-1300 MHz 13dB	99.00
730V-1	40-10M Rigid dipole	149.00

MIZUHO QRP

MX3.5S	80m 2W SSB/CW	189.00
MX7S	40m version	189.00
MX14S	20m version	189.00
PL3.5S	80m 10W linear	129.00
PL7S	40m 10W linear	129.00
PL14S	20m 10W linear	129.00
PL1000	80-10m linear	189.00
CWS2	Sidetone CW	49.00
AN-7	40m 4ft whip	29.00
AN-14	20m whip (BNC)	29.00

HEATHKIT

1000W Valve Linear Kit	899.00
QRP 80-10m TCVP Kit	319.00

KENWOOD HF

TS950S	HF trevr. + ATU	2499.00
TS950SD	HF tevr. + +	3199.00
TS940S	HF all band tevr.	1995.00
AT940	Automatic atu	244.00
SP940	Ext. spkr. + filter	87.50
VS1	Voice synthesizer	32.25
TS440S	HF transceiver	1138.00
AT440	Internal auto atu	144.75
PS50	Heavy duty PSU	222.00
TS140S	HF transceiver	862.00
TS680S	TS140S + 6m module	985.00
PS430	Mains power supply	173.75
SP430	Matching speaker	40.75
AT250	Automatic atu	366.00
AT130	Mobile atu 80-10m	140.50
MB430	Mobile mount	15.80
AT230	9 band ATU etc	208.50
SM220	Station scope	343.50
TL922	9 band 2kW linear	1495.00
LF30A	HF Low pass filter	32.25

KENWOOD VHF/UHF

TS711E	2m Base SSB/CW/FM	898.00
TS811E	70cm Base station	998.00
TR751E	2m multimode mobile	599.00

Summer Madness!

Less Than Trade!

Dual Band-Dual Watch
ALINCO DR-570E

£349

Plus £3 Post & Ins.

We have purchased at a very favourable price, the ALINCO DR-570E. The catch? It has the American-repeater shift on 70cms. In all other respects it fully meets the UK spec. with 600kHz shift and 1750Hz tone. In any case, you can programme a 1.6MHz shift on 70cms by using the split transmit mode, so you can still work through 70cms repeaters.

45 Watts on 2 metres and 35 Watts on 70cms. You can have independent volume and squelch controls. Its ideal for packet! We have full colour brochures but only 30 pieces! The offer is genuine, the full warranty applies and our name is your guarantee.

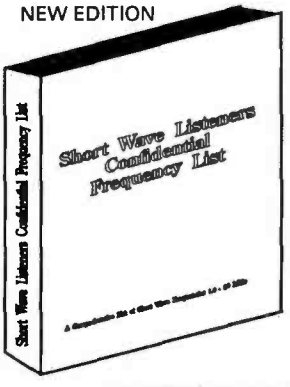
LAST FEW!
YAESU FT-4700RH

£499

2m & 70cms Full Duplex
Detachable Control Panel
OPTIONAL RX
(135-175, 395-470)

Just Published!

NEW EDITION



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- Marine Channel numbers
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26-1300MHz
"BEST BUY"
SCANNER

The Professional's Choice!

- 100 Memories
- 10 Memo Bands
- Programmable Steps
- High Speed Scan
- Audio/Carrier Search
- Battery Saver
- Ni-cads, Case, Whip
- 12v DC Charge Lead.

More Features
More Logical
More Reliable
More Sensitive
More VALUE!

£275

The Fabulous
ALINCO DJ-160E
2m 3 Watts + Full DTMF!
Receiver 136-174MHz

- 20 Memories
- 5 Steps inc 12.5kHz
- Battery Saver
- 700mAh Pack
- Fast Charger
- Rotary Selector

£219

ALINCO DR-510E
2m & 70cm

- **45 Watts**
- **14 Memories**
- **Full Duplex**
- **Extendable Receive**
- **4 Scanning Modes**
- **6 Steps**
- **Rotary Channel Knob**

OPTIONAL RECEIVE
(130-169, 420-469)

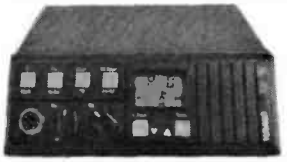
£399!

The Cost Effective Rig!

More Special Deals!

2 Metre Transceiver NAVICO AMR-1000

We have a few models of this rig that previously sold for £247. All brand new factory, fresh and guaranteed.



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AX 700E

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

As for the rest of the scanner, it covers 50 to 904.995MHz with AM and FM (wide & narrow), it is powered by 13.8V dc and it measures just 180mm W × 180mm D × 75mm D. Come into the shop and see for yourself. You can even play with our new active antenna which should be ideal for use with this set. Norman G4THJ

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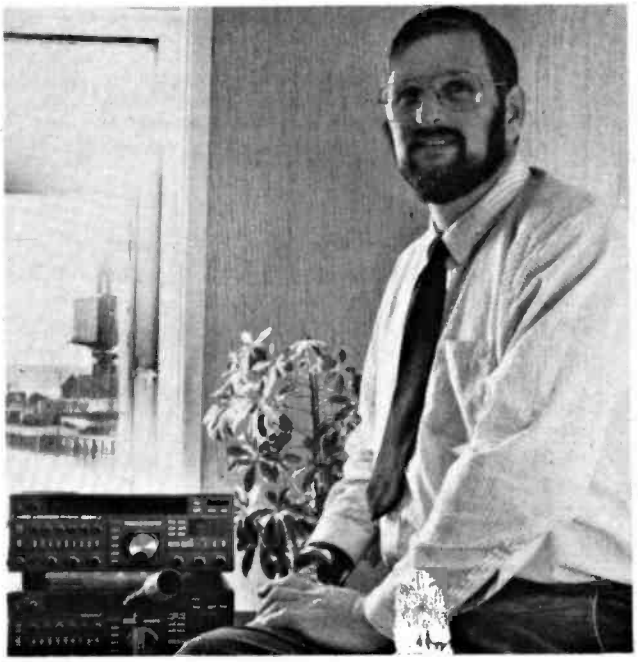


Rob Mannion G3XFD

I like a joke and anyone who knows me will gladly recount the pranks I've played and those that have come my way! Unfortunately however, some people do seem to go 'over the top', causing a great deal of trouble at the same time.

One of the worst types of 'sick' jokes is to use another radio amateur's callsign and provide misleading information. Someone - with a wicked sense of humour - has been heard using my callsign on phone and c.w. on 3.5, 7 and 28MHz and on 144MHz.

Fair enough, I did see the funny side when I first heard that the 'pirate' was active on 7MHz a few weeks ago - particularly as his c.w. was better than mine! But now the joke has worn thin, because I can't counter the nuisance as I am not active on h.f. at the moment due to an imminent house move.

If you work G3XFD on the h.f. bands or 144MHz and he offers you free subscriptions to *PW*, it won't be me! You'll be doing our hobby (and me) a service if you are able to locate the mischief-maker and co-operate with the authorities and stop the nuisance.

Name of the Game

Co-operation has always been the name of the game with amateur radio. Unless we work together the limited spectrum we have would be in utter chaos. On the whole, radio amateurs are a law abiding lot and go to great lengths to stay within their licence conditions and the law.

Recently, in an attempt to stay within the law I foolishly strayed 'over the boundary' and found myself facing bureaucracy and the possibility of being taken to court for being totally honest.

It all started with an innocent visit to a car-boot sale where I spotted a useful - but illegal - multi-mode CB transceiver for sale. As I wanted a rig that could be converted for 28MHz operation I bought the transceiver (thus removing the illegal equipment from the thriving 'black market') and took it home.

Size Fourteens In Trouble

Having bought the CB rig I immediately applied to the DTI for authorisation to enable me to have it converted for 28MHz.

I really 'put my foot in it' by being honest! My size fourteen shoes went ankle deep into the bureaucratic mire and I faced the possibility of prosecution for illegally buying an illegal item of CB equipment.

Of course, I knew that authorisations to hold such equipment could be obtained from the DTI, but what I did not understand (through misinterpretation of the press-release) was that the facility was only for equipment ALREADY held.

In other words, anyone holding such equipment had to be honest and admit the fact! Having experienced the DTI's original reaction to my inadvertent transgression I can understand why some amateurs are hesitant to declare ownership of CB transceivers that have been declared illegal.

Value For Money

Considering the value-for-money recoverable components in these (often extremely well built) transceivers, I feel sure that there are many thousands to be found in amateur radio shacks up and down the country.

I agree with the DTI and the Radiocommunication Agency that the illegal 27MHz multi-mode transceivers should be removed from circulation. However, having stated my support for the DTI and RA campaign against illegal CB equipment, I must strongly disagree with their method of tackling the problem.

Underground Market

Fortunately the Radiocommunications Agency relented and granted me an authority to have the multi-mode converted to 28MHz operation. Needless to say, I'm looking forward to using the rig on the band after all the effort involved!

Despite their change of heart my representations, and the concern of many other enthusiasts, the Radiocommunications Agency still intend to cease granting authorities for conversion of 27MHz multi-modes as from the end of 1990.

I pointed out that by withdrawing the facility, the law-abiding radio amateur will be barred from the scene although the equipment will still be openly sold at venues throughout the UK.

Unless the RA see fit to extend the authorisation procedure beyond 1990 or make it possible for amateurs to buy or sell the illegal transceivers (for modifications or for component break-down purposes) the problem will remain with us for a long time.

It might be that in their search for illegal equipment, the RA is planning to visit - in the same fashion as they have visited amateur radio shows - some of the many hundreds of 'car boot' sales held each weekend.

If they don't have the staff to spare, perhaps the agency could consider the vast army of radio amateurs who could assist, by being able to purchase the equipment legally, thus removing it from circulation. If need be, an individual amateur could apply for authorisation to buy such equipment beforehand.

In this day and age I am sure that we should have co-operation and not confrontation!

Confused Novice

To round off this month I feel that *PW* must voice some concern over the long-awaited Novice Licence. Readers will of course already realise from our approach and my editorials that everyone on the magazine is very much **FOR** the new licence.

When the time comes, *PW* will be ready with ideas and projects for the new, and intending licensee. It won't be long now before the licence is available and hopefully the various anomalies will be sorted out - especially in respect of where Class B Licensees stand in relation to the new novice facility.

Readers may recall the 'Keylines' which referred to the unfortunate discrimination shown by some A licensees to B licensee amateurs. Discrimination - this time of a bureaucratic nature - has now appeared to cause yet more confusion among the many 'Bs' who've written to me expressing concern over their interpretation of the new rules.

The RSGB assure me that negotiations with the Radiocommunications Agency are continuing. You can be sure that we shall be watching developments on this aspect of the Novice licence very carefully. Watch this space!

CB Page Vote

Finally, I thank all those of you who voted on the CB page issue. The 'Yes' (for the CB page) votes outnumbered the 'No' (against the CB page) votes by almost 6 to 1.

It was very interesting to learn just how many of you had a first 'taste' of radio communication via the 'instant' facility provided by CB. It shows - in my opinion - just how much we need the Novice licence!

The CB page will continue and we intend to carry the occasional equipment review. I hope that those of you who voted against the CB page will still enjoy the rest of the magazine as we boldly take the hobby towards the future.

73s from the genuine 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*.

★★★★★STAR LETTER★★★★★

Dear Sir

Many thanks for a super mag. In reply to your remarks in the editorial about no cellular interference, we of the 934MHz fraternity have endured colossal interference from the cellular system for some years now, many of our stations have sold up and closed down because of the cell phones. Our main body 'the 934MHz club UK' have taken our case to the DTI with little or no interest on their part. Those of us that still use the band are a very dedicated bunch. We, of course, understand that we have no protection on these freqs, as 934 is licenced as CB . It's a bit of a shame as quite a few amateurs use 934 in our area, but the cell phones really do cause lots of problems, in some cases the only way out is the use of horizontal beams. You must give it a try one day Rob - then say you know nothing of cellular interference!

Mick Miller G7EGX, Leigh-on-Sea, Essex

Dear Sir

In your 'Keylines' (May 1990) you asked for details of 70MHz conversions. To be brief, over the last two years I have converted three Pye W15 f.m. 'Westminsters' from low band v.h.f. (68-88MHz) to 4m. This is a straight forward re-crystal and re-tune job. The transmit Xtal is multiplied by 24. This means a crystal of around 2.9MHz is required. The receiver has a first i.f. of 10.7MHz and the RX oscillator runs on the low side of signal. The RX crystal is multiplied by only 2 to give this signal. This means about a 29MHz crystal is required.

Tuning up is logical, but the TX side can be quite critical at the 'beginning' of the multiplier chain, especially around the phase modulator section. Maladjustment here can give low or distorted TX audio or even no r.f. at all! RX is easy enough, but don't forget to peak the RX with the *Q* multiplier for best results.

TX output should be in the region of 10 to 15 watts, but I have found some sets get a bit 'dirty' if run at the top power limit.

RX sensitivity is quite good (0.5µV 12dB) but varies quite a lot from set to set.

I've had one in my works vehicle for about two years now and it takes a heck of a pasting from bumps and bangs, but never have I had to take the lid off.

By the way, in this area we all pile on 70.450, although recently, as the activity has increased signals have turned up on 70.400, 70.425, 70.470 and 70.475.

I hope this information is of some use, and encourages more people onto this excellent band, where home-brew and good manners are still the order of the day.

Andrew Howlett G1HBE
Dukinfield
Cheshire

Dear Sir

I read with great interest the letter from G4JQT regarding the construction of low-power a.m. gear for the quieter bands.

I started my amateur operating life on 2m, as a G8, with one crystal in an a.m. Pye rig. My receiver was a BC348 with a converter in front. I had many enjoyable contacts using this mode. Other stations tuned the band and listened for other amateurs not on their frequency. The fun stopped in 1974 when my crystal was too close to the input channel frequency of an early repeater.

I very much agree that it is easier to build a.m. gear than, say, f.m. With a.m., all that is required for 50 or 70MHz is a simple third overtone crystal oscillator on 25 or 35MHz, followed by a doubler/p.a. Two valves! Then simple plate/screen mod of the p.a. With f.m. a string of multipliers are usually used, from a much lower frequency oscillator, just to get enough deviation at the required output frequency. Top band is just as simple, likewise 10m.

I would be proud to be a member of a society which looked after the interests of amateurs desiring to re-kindle the spirit of bygone days with simple home-brew a.m./c.w. rigs for simple 'low-stress' contacts.

Thanks for an excellent magazine and I look forward to any designs that may appear for such simple equipment.

A. Daulman G4KQL
Wendover, Bucks

Dear Sir

Several letters in your magazine recently concerning the use of a.m. by amateurs and comments on the Novice licence have prompted me to write. It seems that most people writing on this first subject in particular are, quite understandably, amateurs who have been licenced for many years and I hope this letter gives views from a more silent minority of the radio community.

Although I've been fascinated by radio for the past five years it was only this May that I decided to sit the RAE and this was due to one reason in particular. Even though I had a great interest in radio there seemed to me very little point to come on the air and regard myself as a radio amateur rather than simply an up-market CBer.

This is because I still find it hard to understand where the 'amateurness' is in operating a set up such as an expensive black box, a commercial a.t.u. and a ready-made antenna.

What initially got me interested in radio was the prospect that you could build your own 'phone transmitter with two valves, an audio amp and a handful of other components. It was the thought of being able to speak to someone literally hundreds of miles away with a TX that could be built on a sheet of metal in an evening.

OK, so the transmitter wouldn't be spectrally efficient, it may be Xtal controlled and would mean manual antenna change-over, but so what? Surely that's what its all about. Transmitters (and receivers) that are ramshackle but effective.

And so I was somewhat disappointed that the new Novice licence seems to be nothing more than a mish-mash of frequency allocations and bureaucracy instead of being something that will encourage young people like myself to take up the hobby. Wouldn't a top band 10 watts a.m./c.w. only allocation have been a whole lot simpler? It's very easy to knock what is a very positive move in itself but things such as, for example, a 10GHz Novice allocation seem a bit ridiculous.

Perhaps there will be a day when real Ham radio returns to the airwaves, although you only have to listen to any of the bands to realise how unlikely this will be. Lots of old people talking about gardening and their Japanese transceiver are hardly going to produce a rush of new radio enthusiasts.

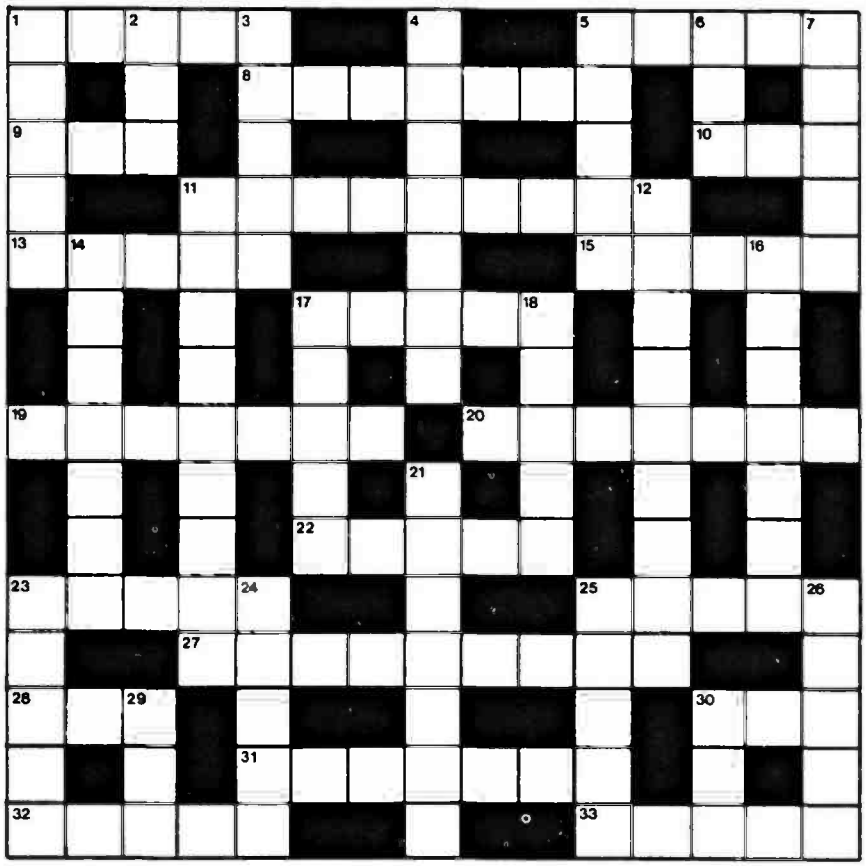
I just hope there will be a time when people can talk to one another using simple home-brew a.m. rigs on the short wave - with the obligatory 807 in the final of course!

To be honest with you, can you really ever expect this to happen?

How sad, wasn't there one place left on the short wave where real radio enthusiasts can enjoy themselves?

Stuart Hipkin (age 17)
Walton-on-the-Naze, Essex

Competition Corner



Across

1 Large piano worth a thousand (5)
5 Germanic invaders station (5)
8 Navy chief may be red (7)
9 Honey makers behive well (3)
10 Emergency Morse, commonly known (1, 1, 1)
11 Naked plane landing fields (9)
13 Throw out (5)
15 Tennis gradings give rise to plants (5)
17 Capital Japanese transverter (5)
19 Mineral set sounds clear (7)
20 Electronic, don't steal (7)
22 Rechargable batteries (5)
23 Security warning gives fright (5)
25 Damp (5)
27 Small sailor (9)
28 American bonnet, top (3)
30 Sprint through (3)
31 Unscrupulous cat fakes results (7)
32 Indent (5)
33 Hotel on The Strand (5)

Down

1 Triangular decoration for Clark (5)
2 Real beer sounds sick (3)
3 Anchor crane (5)
4 Error (7)
5 Falls over petticoat (5)
6 Model Jaguar (1, 1, 1)
7 Bird homes may hold monetary eggs (5)
11 Additional equipment helps with crime! (9)
12 Objects chosen, medley (9)
14 Periodical (7)
16 360 back Ross for university qualifications (7)
17 Locomotive follows dress (5)
18 Lubricated palms (5)
21 Disperse or run away, after back! (7)
23 Named L-shape keys (5)
24 Flaming pair (5)
25 Sums! (5)
26 Radio Shack shop (5)
29 Quality tape to replace CDs? (3)
30 Short revolutions (3)

Complete the crossword, fill in the form and send your entry to PW Publishing Ltd., September 1990 Crossword Competition, Enefco House, The Quay, Poole, Dorset BH15 1PP. Closing date Friday 14 September 1990. The Winner can choose either a years subscription to *PW* or a £20 voucher to spend on the Book Service or other *PW* services. The two runners-up can choose a six month subscription or a £10 voucher. The Editor's decision on the winner is final, no correspondence will be entered into.

❑ Subscription ❑ Voucher (Please tick choice of prize)

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Address .....

.....

.....

Postcode .....

Services

Queries
We will always try to help readers having difficulties 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 minute peak time and 25p per minute off-peak. The number to ring is: (0898) 654632.

Newsdesk '90

North Pole Expedition

South Midlands Communications Ltd. (SMC) has received an accolade from Laurence and Morag Howell, the two British radio operators who supported Ranulph Fiennes recent expedition to walk from Siberia to the North Pole.

SMC provided virtually all the radio communications equipment for the expedition and the British pair congratulated the company on the excellence and quality of transmission from all radios supplied.

The two-way radio link up with His Royal Highness the Prince of Wales and the expedition's base camp in Siberia was via their FT-747 and FT-757 radios. The quality of transmission was remarkable and the conversation was broadcast on ITN *News at Ten*.

SMC's hand-held v.h.f. transceivers were also a great benefit at the base camp where they received a great deal of attention from the Russian radio operators in the support team.

Laurence Howell said, " not only were the v.h.f. transceivers vital to base operations but the local Soviet Military kept borrowing them! The Russians were particularly impressed with the minute size of the transceivers and the ease of operation, especially as they worked perfectly in very difficult climatic conditions with temperatures down to -45°C.

"We can honestly say that radio conditions, due to the high geomagnetic activity, were the worst we have ever encountered in the last 15 years but because of the high powers available from SMC's linear amplifiers we stayed commercial far longer than in previous expeditions".

Tandy Modifications

Owners of the Tandy PRO2004 and PRO2005 scanners may be interested to know of a modification available that adds a search and remember facility. There are two modifications modules available. The PS-90 has two modes of operation, a simple mode where frequencies found during a search are stored in the ten monitor memories and a complex mode where the frequencies are stored directly in the scanners main memory. The SS-45 module has only one mode of operation and this stores the frequencies found in a search in the the monitor memories.

For full details on these modules and information on fitting them, contact:

B S Sutherland
336 Charlton Road
Bristol
BS10 6JZ.
Tel: (0272) 500742

Four In One

One instrument with four separate test and measuring systems is the latest from Alpha Electronics. DOA141 successfully combines a d.m.m., function generator, frequency counter and power supply into one easy-to-use compact instrument which really does save space.

An auto-ranging three and a half digit l.c.d. multimeter occupies the right hand side of the unit and features both a.c. and d.c. voltage and current. Other functions include ohms, diode test and continuity check with audible alarm.

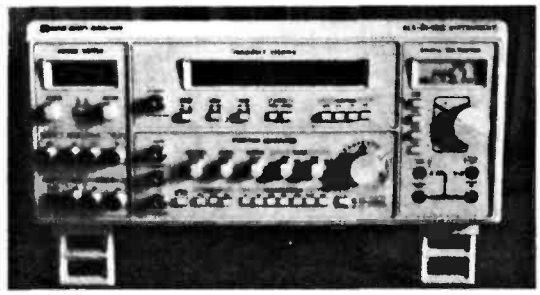
A basic d.c. accuracy of 0.5% is enhanced by Measured Data Hold and Memory Mode for relative measurements. The left-hand section contains the power supply which displays both voltage and current on a dedicated three and a half digit l.c.d. Triple output are a variable 0-5V at 0.5A, 15V at 1A and 5V at 2A, both fixed. Ripple and load regulation is less than 1mV and 0.01% +5mV on the variable output. Full over-current protection is provided.

Measuring from 1Hz to 100MHz, the 8-digit frequency counter is housed at the top of the centre section with a best resolution of 0.1Hz and a sensitivity of 15mV. The l.e.d. display also indicates units of measurement with annunciators and the 10MHz reference oscillator has a stability of less than 5p.p.m.

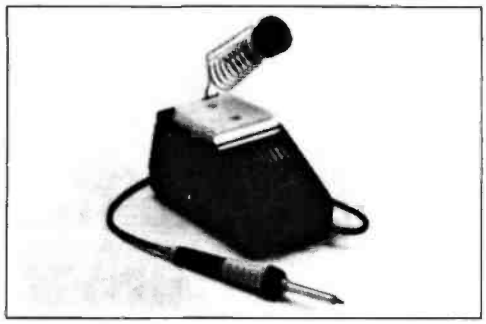
Bottom centre is the function generator covering from 0.02Hz to 2MHz with up to 20V p-p output. Waveforms include sine, square, triangle, ramp, pulse and t.t.l. This adaptable signal source also has both linear and log sweep modes.

The unit costs £395 (excluding VAT).

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



Newsdesk '90



New Concept Soldering

Ungar have launched a range of ESD safe high-specification soldering and de-soldering stations, starting at under £70.00. The range is being introduced by Ungar under the Concept 2100 banner, to reflect the high performance and value of their equipment, designed to last into the 21st century.

The first station to introduced is the 2110 soldering station. It features a soft-touch, cool-grip, 24V micro-sized handpiece rated at 60W. It has a long-life ceramic element (up to three times that of conventional nickel-chrome) that is user-replaceable at the bench in under a minute.

It also features a spike-free, zero-switching, closed-loop, variable-temperature control circuit with a range of 300 to 450°C (stability ±6°C) and an external temperature calibration port. Tip leakage is very low at less than 2mV which, along with the ESD-safe construction, makes the 2110 ideal for delicate circuits such as c.m.o.s. i.c.s.

The entire 2110 system, excluding the tip but including the heater, is covered by a one-year warranty.

Ungar Eldon Industries UK Ltd,
Unit 1 Clifton Road, Shefford, Beds SG17 5AB. Tel: (0462) 814914

Changes to the World Service

The BBC World Service is to make changes to some of the language services in which it broadcasts and the hours devoted to those broadcasts. The package of changes, the first part of a major review of World Service for its next three-year funding period, was agreed after details discussions with the Foreign and Commonwealth Office.

The changes in detail

Russian up by 3 hours 30 mins a week to 49 hours 30 mins.

Mandarin Chinese up by 3 hours 30 mins a week to 24 hours 30 mins.

Vietnamese up by 1 hour 45 mins a week to 10 hours 30 mins.

English to Western Europe up by 3 hours 30 mins a week.

English to the Subcontinent up by 1 hour a week (a special 15 minute programme every weekday instead of just once a week)

English to East Asia up by 1 hour a week (a special 15 minute programme every weekday instead of just once a week).

English to South and East Asia - a new service to encourage the learning of English of 5 hours a week

Malay, currently 1 hour 45 mins a week, to cease

Japanese, currently 7 hours a week, to cease.

Latin America - direct broadcasts are being decreased by 10 hours 30 mins a week in Spanish and 1 hour 45 mins in Brazilian but more resources are being put into rebroadcasts for local stations.

Newsdesk '90

RAE Courses

Wilmslow: North Cheshire Radio Club, Morley Green Club, Mobberley Road, Wilmslow. Classes start Sunday September 23 at 6pm. Peter Kirsop G4WCE. Tel: Lymm 5959.

Belfast: The College of Technology, Belfast. RAE classes on Tuesdays, 1730 to 2000. Enrolment week starts Monday September 3. Contact, Mr J E Wilson GI3NEB. Tel: 327244 ext 297.

Manchester: North Trafford College, Talbot Road, Stretford. RAE classes on Monday evenings or Wednesday mornings, Mourse Code on Tuesday evenings or Wednesday afternoons, Amateur TV on Wednesday mornings and Advanced Morse Code classes on Monday evenings. Lecturer is J T Beaumont G3NGD. Enrolment dates are September 5, 6 and 7.

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 Thirsday 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.

Cambridge: Chesterton Community College, Gilbert Road, Cambridge. RAE classes on Monday evenings 7 to 9pm. Lessons start on Monday September 24. Enrolment is on September 10 or 11, 7 to 9pm. Lecturer is Martin Mann G4FFO. Tel: (0223) 860150.

Swansea: Swansea RACC, South Dock Pumphouse, East Burrows Road, Swansea.. RAE classes start Friday September 7 from 7 to 9.30pm. Janet James GW0KPD. Tel: (0639) 892311 daytime.

Ifield: Ifield Adult Education Centre, near Crawley, West Sussex. RAE course starts September, lecturer B.J.R. Davies. Details from Marie Rice at the college on (0293) 26467.

Stockport: Reddish Vale Evening Centre, Reddish Vale Road, Stockport. Short course RAE class on Monday evenings, full RAE course on Tuesday evenings, both from 7 to 9pm. Morse classes on Thursday evenings from 7 to 9pm. Course tutor is Dave Wood. Tel: 061-480 9157.

Llwynypia: Rhondda College, Llwynypia. RAE on a night to be decided (possibly Monday). Enrolment is September 3-5. Lecturer John Howells GW4BUZ. Details from the college on (0443) 432187.

Robert Burns International Event

This event takes place over the weekend of August 18/19.

Scotland: GB2RB will be on the air from the Robert Burns memorial Tower, Mauchline, Ayrshire run by the Scottish Tourist Board (RA) Expedition Group. QSL manager is Paddy GM3MTH.

America: W1AW will be on the air from ARRL HQ, Newington, CT, USA run by Connecticut DX Association. QSL manager Eddie W6LC.

USSR: UZ3AWH will be on the air from the Moscow Technical College, run by the Moscow Telecomms Institute (MTI). QSL manager Harry RA3AUU.

A commemorative certificate will be awarded for this event, issued by the Scottish Tourist Board Group. You need to work any two locations.

Short wave listeners can claim the award on a heard basis.

The cost of the award is: UK - 50 plus 2-p; overseas - $1 or 2IRCs; USSR only - $1 or mint stamps to value of $1.

To claim, send a log extract only to:

Awards Manager
Robbie GM4UQG, PO Box 59, Hamilton, Scotland ML3 6QB.

Special Event Stations

GB50BOB: The Science Muesum Wroughton will be on the air,on August 12.

GB4RAF: The station will be manned at RAF Stanbridge on Spetember 1.

GB50RAF: This time, the callsign will be on the air from September 1 to 11 from RAF Coningsby.

GB0RAF: The station will be on the air from the Lincoln Hamfest over the weekend of September 8/11.

GB0COE: This station will be on the air providing talk-in to the Centre of England Radio Rally at the British Motorcycle Museum near the NEC as well as being on h.f. and v.h.f. for those wishing to contact the station on September 23.

GB50BOB: Also on the air over the weekend of September 8/11, this station will be at Hawkinge BOB Museum.

BARAS

The British Amateur Radio Astronomy Society was formed last year by a core of members with mainly astronomy background. Since that time they have almost 50 members throughout the UK. The membership, at present, consists of a mixture of amateur radio enthusiasts, astronomers and computer/electronics people.

They are very keen to hear from anyone with an interest in this field of study, especially anyone with amateur radio experience.

They publish a news letter (soon to be bi-monthly) in which they carry articles, letters, observationas and ideas/advice. More contributions from amateur radio enthusiats would provide the newsletter with the wider experience of theiur radio knowledge.

BARAS
c/o S A Newberry
19 Oakway
Kingsley Park
Birkenshaw
Bradford,West Yorks
BD11 2PG

Theory

Magnetic DC Leakage Fields From Cables

Anders Borgström takes a look at the effects of low frequency magnetic B-fields on an oscilloscope. Also a computer program that calculates the B-field from cables carrying currents is described. This is useful when estimating such fields in given electrical environments.

Electromagnetic disturbances from cables, motors, d.c.-d.c. converters, instruments, breakers, etc., is a subject that can be handled in different ways, depending on which type of problem that is to be solved. If, for example, the aim is to write a specification for procurement of system components intended to work in a system for military purposes, it may be appropriate to use the military standards MIL-STD 461-462.

These will give the requirements of susceptibility and emitted disturbance as well as the requirement for how to perform the tests. The aim is then to create a network where connected system components comply to each other with regards to disturbances, i.e. they should not affect each other in a negative way. This compatibility must also be present for the electromagnetic emitted disturbances in air.

For consumer products, in turn, the requirements on disturbance and susceptibility are different, most often less tight. There are different standards for the different countries, depending on where the product is to be sold. For example, a domestic appliance should neither deliver too much conducted disturbance to the mains network, nor should it disturb a closely located radio receiver. The manufacturer of the radio receiver can in his turn follow certain norms, combatting what kind of disturbance that may come in the air. After that, it is in his own interest to judge how much the buyer of the radio receiver will accept with regards to interference via the loudspeaker, before he decides to buy another type of radio.

Magnetic DC Fields

So far I have only mentioned relatively high frequency disturbances, they are often the most difficult ones to fight. In this article I want to highlight a special type of electromagnetic disturbance. One that is not so easy to find in issued standard specifications.

What it is all about is large magnetic fields (>100uT) with the frequency of 0 or just a few Hz. These can be found in areas containing electrical conductors carrying high levels of direct current. The magnetic fields can affect, in a negative way, closely located equipment. Examples of this can be seen by the distortion of pictures on an oscilloscope (c.r.t.) when changing of the content of magnetic storage medias (tape, discs, etc.).

The B-fields can also be created by intention, for example magnetising equipment, where you wish to give a ferromagnetic material an increased amout of magnetism, with help from current-carrying cables.

We will look at one of the mentioned examples more closely, that one concerning magnetic field effects on c.r.t.s.

It is worth mentioning that only the B-field is dealt with here, i.e. not the electrical E-field. The reason for this is the difference in difficulty to suppress disturbances from the fields respectively, using shielding. An E-field component of low frequency is rather easy to suppress with a shield of any conducting material. The only thing to keep in mind is to minimise openings in the shield. The size of these openings is related to the wavelength of the critical disturbance. The greater the wavelength, the larger openings required to let the disturbances through. The low frequencies give us long wavelengths for the electromagnetic waves which subsequently result in a small problem.

On the other hand, the magnetic field require expensive magnetic material for shielding. It is therefore easier to handle this with other means, for example good cable-routing, enough separation, etc.

Going back to the effect from B-field on electron-beam drawn pictures, we know that the deflection of electron beams get extra components if they are located in a magnetic field. A simple test is to place a strong permanent magnet close to a computer screen. In the monochrome case this will create a movement of the picture, this movement will however be the same for the whole picture if the magnetic field is homogeneous, and no information will be lost. The colour screen which is based on several electron beams, will have a distortion of the colour as a result.

You can mostly live with the first case because of the fact that the pictures content is preserved, The colour screens suffer more though, since the colours are there to carry information. A change of the colours can result in a erroneous interpretation of the pictures.

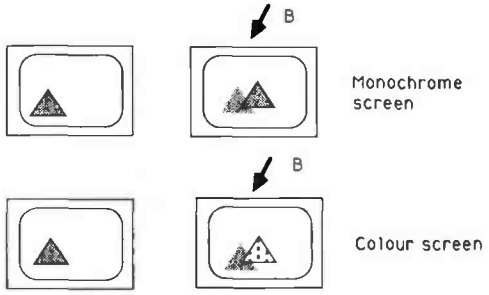


Fig. 1: B-field effects on monochrome and colour c.r.t.

The earth-magnetic field consists of one horizontal and one vertical component, varying depending on where on earth we are measuring. Provided that the screen is horizontally located, the vertical component is considered to be almost constant within large areas. The horizontal component will vary however, depending on the twisting of the screen.

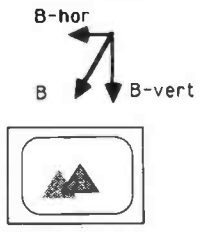


Fig. 2: Earth field related to a c.r.t.

The main problem to solve for a manufacturer of c.r.t.s will then be to suppress the horizontal component, since the vertical component can be compensated by the time of manufacturing or deliverance.

The earth field runs up to 60uT. The largest vertical components are situated at the south and northern hemispheres (opposite directions), while we will find the largest horizontal by the equator (north direction). You can of course expect local variations caused by the different ground and seabottom conditions anywhere.

Consequently one should only consider other B-fields effects on c.r.t.s to be a problem, when they are increasing a level of approximately 10uT horizontally and a bit less in a vertical direction.

Theory

To illustrate the problem with c.r.t. distortion, let us look at the following picture:

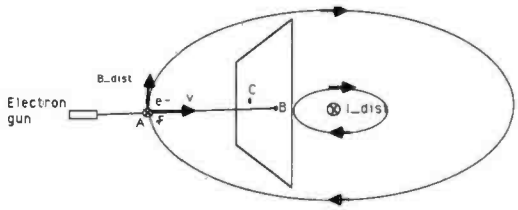


Fig. 3: Force from B-field on moving electron.

An electron in an electron-beam of a c.r.t. moves at point A with velocity v towards point **B** on the screen. In front of the screen there is a conductor carrying the direct current, I_{dist}. That generates a magnetic field that in A has the value $\mathbf{B}_{dist}$ and the direction straight up. On the electron this then acts as the force F, directed into the picture and with the value:

$\mathbf{F} = -e * \mathbf{v} \times \mathbf{B}$

where:

e = electron charge, '*' stands for ordinary multiplication and x for vector multiplication. Vectors are shown in bold letters.

The energy of the electron then gets the acceleration it achieves due to the force F. Through integration we can then decide the size of the deflection on that electron when it reaches the screen, i.e. the distance between B and C. This gives us the distortion in the picture.

Computer Calculations

With the previous text as a background, we can now describe a program that can be useful when considering the disturbance rising from magnetic fields. The program calculates, from Biot Savarts rule, the total B-field in given critical points from given current carrying conductors.

The fields of application can among others be:

Cable routing.

Design of coils for magnetising equipment.

Design of compensation coils in c.r.t.s.

The conductors as well as the critical points, from which the **B**-field is to be calculated, are described in a perpendicular co-ordinate system. In the same co-ordinate sytem is the result delivered, the **B**-disturbance vectors.

The operators work consists of describing the conductors, the currents and the critical points in a file which will be read by the program.

Some of the trigonometrical and vectorial derivations described may be a bit comprehensive, but are easy to follow with some patience.

The Biot Savarts rule states:

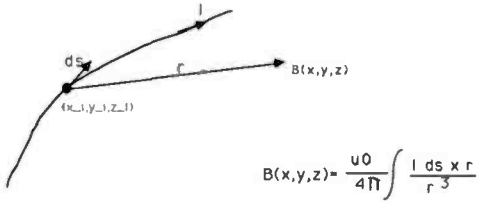


Fig. 4: Biot Savarts rule

Instead of performing an analytical integral calculation, an approximation is made by considering the conductor to be built up by straight segments. These segments can be sized arbitrarily, depending on the degree of accuracy wanted. The currents, breakpoints and B-fieldpoints are described in the infile. For every segment is calculated the vector product of **delta-s** and **r**, as well as the $\mathbf{B}_{RES}$-vector resulting from this.

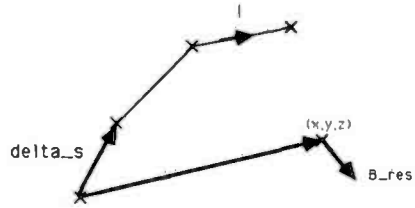


Fig. 5: B-field for approximated conductor.

After that, we sum the contribution from every segment in all conductors to all given **B**-fieldpoints.

The formulas needed to calculate the resulting field will shortly be derived. For this, we will only look at one conductor, Fig. 6.

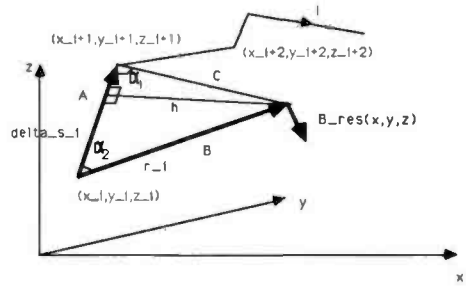


Fig. 6: Designations for conductor to be calculated.

$A = \sqrt{((x_{i+1}-x_i)^2 + (y_{i+1}-y_i)^2 + (z_{i+1}-z_i)^2)}$

$B = \sqrt{((x-x_{i+1})^2 + (y-y_{i+1})^2 + (z-z_{i+1})^2)}$

$C = \sqrt{((x-x_i)^2 + (y-y_i)^2 + (z-z_i)^2)}$

$h = c * \sqrt{(1-\cos^2(alfa))}$

Cosinusrule gives:

$C^2=B^2+A^2-2*A*B*\cos(alfa2)$; $\cos(alfa2)=(B^2+A^2-C^2)/2*A*B$

$B^2=C^2+A^2-2*A*C*\cos(alfa1)$; $\cos(alfa1)=(C^2+A^2-B^2)/2*A*C$

The value of $\mathbf{B}_{RES}$, which is not derivated here is:

$$|B_{RES}| = \frac{uu_0 I}{4 * \pi * h} * (\cos(alpha1) + \cos(alpha2))$$

The direction of $\mathbf{B}_{RES}$ is given by $\mathbf{delta\text{-}s}_i \times \mathbf{r}_i$. This is a vector that can be calculated with help from the following formula:

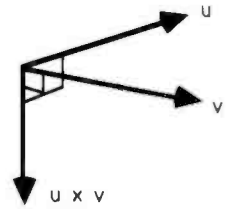


Fig. 7: Vector product

$\mathbf{u}=(x_1, y_1, z_1)$

$\mathbf{v}=(x_2, y_2, z_2)$

$\mathbf{u}\times\mathbf{v}=(y_1 z_2 - z_1 y_2, z_1 x_2 - x_1 z_2, x_1 y_2 - y_1 x_2)$

Using the designations in Fig. 6, the direction of $\mathbf{B}_{RES}$ is the same as the vector

$\mathbf{delta\text{-}s}_i \times \mathbf{r}_i = (x_{i+1}-x_i, y_{i+1}-y_i, z_{i+1}-z_i) \times (x-x_i, y-y_i, z-z_i) =$

$(s_x, s_y, s_z) \times (r_x, r_y, r_z) =$

$(s_y r_z - s_z r_y, s_z r_x - s_x r_z, s_x r_y - s_y r_x) =$

(sr_x, sr_y, sr_z)

To make this a vector of length 1, we divide its components with the absolute value of the vector. We will then achive the total expression of $\mathbf{B}_{RES}$:

$$B_{RES} = \frac{u u_0 I}{4 * \pi * h} * (\cos(alpha1) + \cos(alpha2)) * \frac{1}{\sqrt{(sr_x^2 + sr_y^2 + sr_z^2)}} (sr_x\ sr_y\ sr_z)$$

The expression gives the resulting field in point (x,y,z) from one segment **delta-s**$_i$ between the points (x_i,y_i,z_i) and $(x_{i+1},y_{i+1},z_{i+1})$, carrying the current I.

The computer can now work and calculate the contribution to an arbitrary number of B-fieldpoints from an arbitrary number of conductors.

The program is developed out from the following figure:

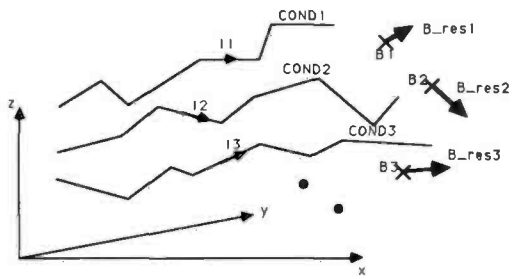


Fig. 8: Data to and from the program

The variables needed are:

NAME	TYPE	SIZE	DESCRIPTION
N_OF_COND	INTEGER	1	Number of conductors
I	REAL	50	Current in conductors
N_OF_SEGMENT	INTEGER	50	Number of segments in a conductor
BP	REAL	50x51x3	Breakpoints of the conductors
N_OF_B	INTEGER	1	Nr of fieldpoints
B_F	REAL	50x3	Fieldpoints
B_RES	REAL	50x3	Resulting field in fieldpoints
A,B,C,H	REAL	1x4	Triangles side and height
COSALFA1-2	REAL	1x2	Cos for angles in triangle
SX,SY,SZ	REAL	1x3	Coordinates for delta-s_i
RX,RY,RZ	REAL	1x3	Coordinates for r_i
MY,MY0,PI	REAL	1x3	u,u_0,pi
CONST,			
COSROOT	REAL	1	help constants
INFILE	FILE	8052	file describing the object

With this set of variables there is a capability to investigate up to 50 conductors, each consisting of 50 segments. This can of course be increased or decreased depending of computer capacity and need of calculation. As a comparison, I ran the program to calculate 99 B-fieldpoints from 798 conductors, each conductor consisting of between 6-12 segments. The calculation were performed on a VAX 780 and required approximately 1.2 minutes of CPU-time.

The program flow chart is shown in Fig. 9:

Format of the infile defining conductors, currents and fieldpoints is the following:

```
NUMBER OF CONDUCTORS

CONDUCTOR 1:
CURRENT                    NR OF SEGMENTS
BREAKPOINT 1
BREAKPOINT 2
.
.
CONDUCTOR 2:
CURRENT                    NR OF SEGMENTS
BREAKPOINT 1
BREAKPOINT 2
.
.
.
NR OF FIELDPOINTS

FIELDPOINT 1
FIELDPOINT 2
.
.
```

Example of program run:

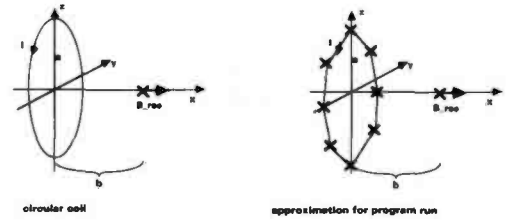


Fig. 10: Analytical and numerical calculation of field from circular coil

The theoretically calculated value of the B-field in the fieldpoint is given by the formula:

$$B\_res = \frac{u_0}{2} I \frac{a^2}{(a^2 b^2)^{1.5}}$$

With a = 2.5m, b=3.2m and I=12.7A , we get the resulting field

B_res analytically calculated to **0.745 uT.**

Result from the program run:

A circular conductor approximated with 8 straight segments gives:

0.710uT.

A more accurate approximation requires smaller segments.

Space does not allow us to include the computer program listing in with the article. Readers who would like a copy of the program listing should write to;

Computer listing offer (magnetic)
PW Publishing,
The Quay,
Poole Dorset,
BH15 1PP
and enclose an A5 sized stamped s.a.e.

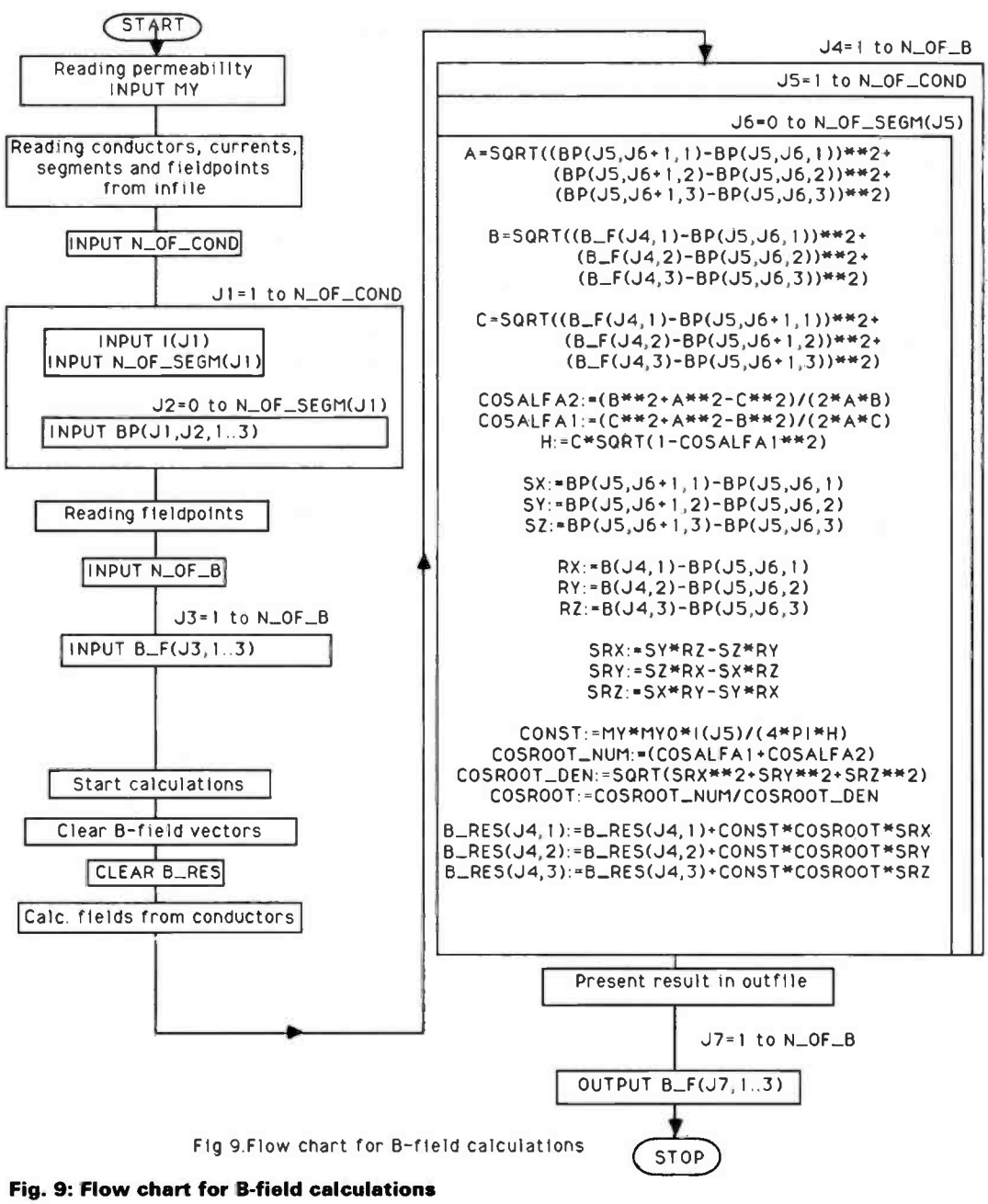


Fig. 9: Flow chart for B-field calculations

Wanna Swap!

Have FT-790RII, NiCads, charger plus 3 x 5/8 collinear, little used, mint. Would exchange for h.f. linear or tribander/rotator or anything interesting for h.f./c.w. Arthur. Tel: Halifax 368021.

Have R1155, HR0, WS19. All need repair. Would exchange for any of - TCS TX, TCS RX, B46, B47, 5AH, R1475, BC348, TR101, Canadian WS19. Must be unmodified. Barker. 29 St Andrews Court, Benton, Newcastle upon Tyne NE7 7UT

Have G2DAF type h.f. linear amplifier 2 x 813 valves adn 1 spare. Power unit for 1800V h.t., weighs 50kg! amplifier weighs 15kg. Would exchange for BBC-B computer with DFS. G R B Wilson G3APV. Tel: (09467) 28449.

Have Redifon R408 commsRX, 13kHz-28MHz continuous & Trio TX599 custom special. Both good condition, both with manuals. Would exchange for 144MHz multimode. Tom. 42 Albert Road, Cleethorpes DN35 8LX. Tel: (0472) 602335.

Have Realistic PRO2004 scanner with discone, mast and coaxial cable. Would exchange for 144MHz transceiver or w.h.y? Tony G0MQG. Tel: (0603) 611764.

Have Eddystone 770R Mk2 v.h.f. receiver, range 19 to 160MHz in six bands, very large tuning dial (require space). Would exchange for mains airband receiver, i.e. Hallicrafter or aircraft rx . F. Walker. Tel: (0221) 241088, Cambridge.

Have late '20s 4-valve 'portable' RX with built-in frame antenna and speaker, working well. Would exchange for h.f. receiver. Mann. Tel: (0223) 860150.

Have AOR2002, discone antenna and 1330MHz frequency counter and appropriate p.s.u.s and leads, second-hand value about £500. W.h.y?, cash adjustment considered. Tel: 961-748 9604.

Have Realistic PRO2004 scanner. Would exchange for good h.f. receiver. John. Tel: (0865) 774602 after 5pm.

Have ERA MkII Microreader. Would exchange for h.f. mobile equipment, w.h.y? Tel: (0283) 63667.

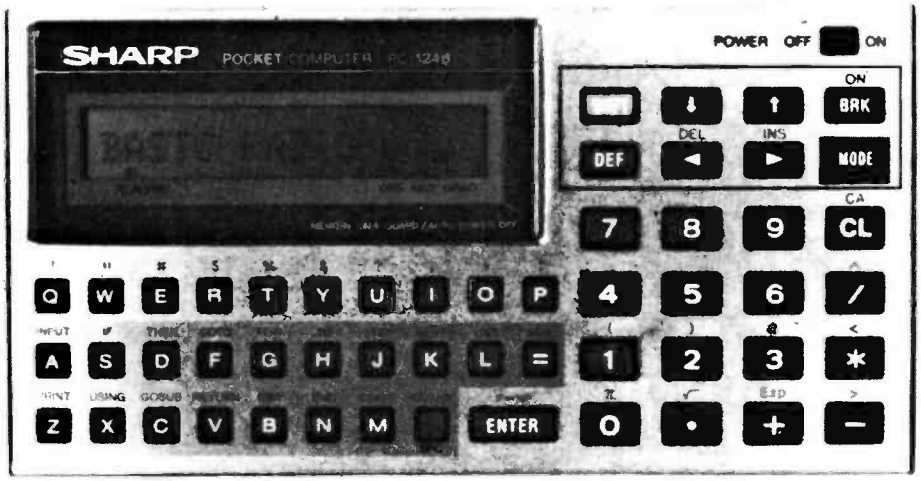
Have BBC computer and lots of extras, FT-902DM system, portable h.f. manpack, 40ft lattice mast, portable masts, Sony ICF-7600D, PK88, 4CX250Bs. Would exchange for PC1512/1640. Send s.a.e. for full list of bits. G4SOL, QTHR.

Have mains operated c.c.t.v. camera with video output. Would exchange for anything for an FT DX400 (i.e. outboard v.f.o.) or w.h.y. P. Mann Tel: 0572 812354 evenings.

Theory

Basic Radio Calculations With Pocket Computers

The popular series of Sharp PC8 pocket computers, along with its Tandy equivalent, have been available for a number of years and are useful aids for the mathematician and engineer alike. Many enthusiasts find radio mathematics daunting and to make life easier, Mike Hadley G4JXX shows how to turn the computer into a useful extra tool.



Professionals and 'dabblers' alike will find the following program very useful as it does away with remembering equations and gives easy-to-read answers without too many decimal places. The program is split into four sections with first section being a simple half-wave dipole calculation. Pressing DEF A will identify the program, and the computer will then ask for the frequency in MHz?, which when entered, provides the correct dipole length in feet and inches. After a short display period the program returns to the beginning ready for the next calculation.

The second section is used for determining the missing component in a tuned resonant circuit. Inductance, capacitance or frequency can be calculated, given the other two factors. Pressing DEF B will identify the program, which will then display L, C, or F ?

If you wish to calculate the inductance needed to resonate a tuned circuit, when you have a known capacitance and frequency, you then press L, before entering the values for C and F. Use a similar procedure if C or F is required. Entries must be L in mH, C in pF and F in MHz. After the two known values are entered, the required component value is displayed for a short period, after which the program returns to the beginning of section two.

Section three is a program to calculate the number of turns required for a single layer coil of known inductance and dimensions. Three values are needed, the inductance of the coils in mH, the length of the coil in inches and the diameter in inches. Pressing DEF C will cause the computer to display 'Coil Calc' before it requests that you enter inductance (mH), length (inches) and diameter (inches).

However, please note that the program has the limitation that the length must be equal or greater than 0.4 of the diameter. If incorrect values are entered, the program automatically returns to the start of section three after displaying 'wrong coil dimensions'. Correct entry will provide the number of turns required over the entered length and diameter for the entered inductance. Wire-size tables can be used to determine the diameter of wire to completely fill the length of the coil. For a coil having a low turns-per-inch ratio, the winding must be evenly stretched to the required length.

In section four, inductive and capacitive reactance can be determined from a given frequency and inductance or capicitance. Pressing DEF D on the computer will make the screen display 'Reactance Calc', before it requests that you key-in the frequency (in MHz). After you have entered the frequency, the inductance (in mH) or capacitance (pF) are then requested. Entering these values will produce the inductive or capacitive reactance for the given frequency in ohms. Where the answer equates to less than one ohm the display will show 'under 1 ohm'. **PW**

```
10:"A": CLEAR : WAIT 200: PRINT "DIPOLE CALC"
20:INPUT "FREQ IN MHZ ?"; A
30:B=468/A
40:WAIT 400: PRINT USING "#####"; INT B;"FT"; USING "###.##";(B-
INT B)*12;"INS": GOTO 20
50:"B": CLEAR : WAIT 200: PRINT "IND/CAP/FRQ CALC"
60:INPUT "L, C OR F ? ";F$
70:IF F$="F" INPUT "IND IN UH ? ";Z: INPUT "CAP IN PF ? ";Y: GOTO 150
80:INPUT "FREQ IN MHZ ? ";G
90:IF F$="C" INPUT "IND IN UH ? ";Y
100:IF F$="L" INPUT "CAP IN PF ? ";Y
110:H=1E6/((4*π^2)*(G^2)*Y)
120:IF F$="L" WAIT 400: PRINT USING "######.##";H;" UH"
130:IF F$="C" WAIT 400: PRINT USING "######.##";H;" PF"
140:CLEAR : GOTO 60
150:O=1E3/(√(Z*Y)*2*π)
160:WAIT 400: PRINT USING "#####.######";O;" MHZ": CLEAR : GOTO
60
170:"C": CLEAR : WAIT 200: PRINT "COIL CALC"
180:INPUT "IND IN UH ? ";J
190:INPUT "LENGTH IN INS ?";L
200:INPUT "DIAM IN INS ?";K
210:M=K/2
220:IF L<(K*.4) WAIT 200: PRINT "WRONG COIL DIMS": GOTO 180
230:N=√(J*(9*M+10*L)/(M*M))
240:WAIT 400: PRINT USING "####.##";N;" TURNS": GOTO 180
250:"D": CLEAR : WAIT 200: PRINT "REACTANCE CALC"
260:INPUT "L OR C ? ";G$
270:INPUT "FREQ IN MHZ ? ";P
280:IF G$="L" INPUT "IND IN UH ? ";Q: GOTO 300
290:IF G$+"C" INPUT "CAP IN PF ? ";R: GOTO 310
300:S=2*π*P*Q: GOTO 315
310:S=1E6/(2*π*P*R)
315:IF S=0 GOTO 250
320:IF S<1 PRINT "UNDER 1 OHM": CLEAR : GOTO 260
330:WAIT 400: PRINT "X";G$;"=";USING "#######";S;" OHMS": CLEAR:
GOTO 260
```

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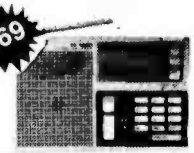


Construction

THE MARLAND SINGLE SIDEBAND TRANSMITTER

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

In this last part The Reverend George Dobbs G3RJV completes the construction of the PW *Marland*

Several errors crept into the circuit diagrams in the last issue. Diode D3 in Fig. 2.1 is shown with the wrong polarity, the cathode should be connected to R22/C41. Also shown with the wrong polarity is C49 (Fig. 2.2) the positive side should be connected to R34. In Fig. 2.3, TR3 acts as a mixer transistor and not just a buffer as described. In Fig. 2.4 the values of C25 and 27 are 47pF with C28 and 30 are 100pF. Resistor R13 in Fig. 2.4 should be 1kΩ.

Finally, in Fig. 2.7 the relays RLA to RLD should have their supply lines reversed. They are permanently connected to the zero volts line (chassis) and have +12V switched to them as required. Their logical working remains correct. For those worried that this project needs a Morse key as shown in Fig. 2.7, this is not so. This line should have been labelled 'to p.t.t. switch'. These errors are only on the circuit diagrams and do not effect the shopping list and overlays.

Testing In General

You can test all the circuits in the Marland using very simple equipment. All you need is a decent analogue multimeter, an r.f. probe and a receiver, but if you have a frequency counter and a decent 'scope these will be more than useful.

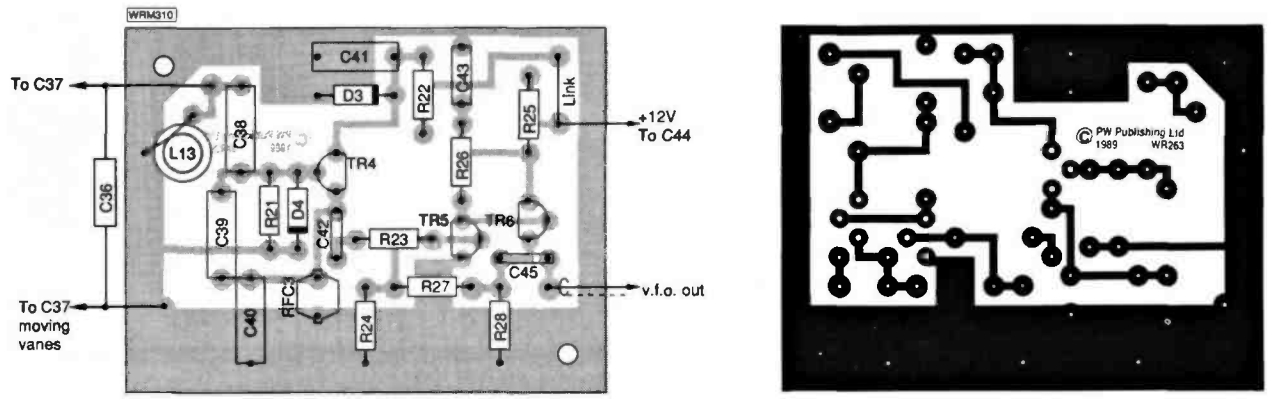


Fig. 3.1: Track pattern and overlay of the v.f.o. board.

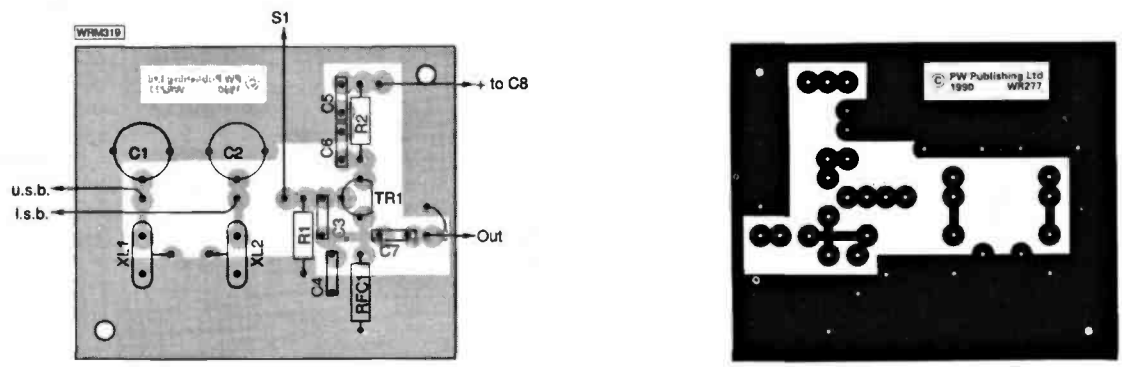


Fig. 3.2: Track pattern and overlay of the Carrier Crystal Oscillator.

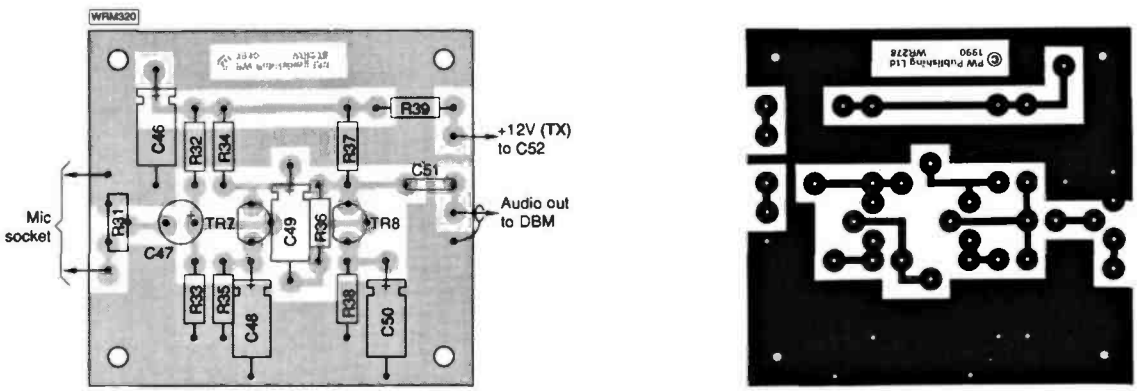


Fig. 3.3: Track pattern and overlay of the Microphone Amplifier.

The VFO

The layout of the v.f.o. is shown in Fig. 3.1. The p.c.b. contains all the components except for C37, the tuning capacitor, and C36 which is wired across C37. The output from the v.f.o. may be taken out of the v.f.o. enclosure by a non-capacitive feedthrough, although I used a phono socket to allow a plug-in ouput lead. The v.f.o. board is mounted in a box with C37 held on a small bracket inside the box coupled to an in-line epicyclic slow motion drive mounted on the front. The collar of the slow motion drive goes through the front panel of the transmitter outer case and has a tight fitting perspex cursor to indicate the frequency.

The output frequency and stability can be checked against a receiver. Before this test takes place the board is best mounted in the case with the variable capacitor and slow motion drive in place. Attach a small length of wire, say 200 to 300mm, to the output of the oscillator and place the v.f.o. beside a general coverage receiver set on 5MHz. With the vanes of C37 closed, adjust the core in L1 until the oscillator is heard on the receiver. The receiver and the v.f.o. can be tracked across the the range 5.0 to 5.5MHz. Some individual adjustment may be required of the number of turns or even the value of C36, although the stated values ought to put the v.f.o. onto the correct frequency range. The final adjustment of the coverage can be left until the whole transmitter is set up for operating. The oscillator should show good stability after some initial switch-on drift.

The Microphone Amplifier

The p.c.b. is shown in Fig. 3.3 and is mounted in its own screened box attached to the front panel. The 4-pin mic socket doubles as a clamp to hold this in place. Resistor R31 is on the p.c.b. but could be front panel mounted.

The Carrier Oscillator

The Carrier Oscillator is shown in Fig. 3.2. Each crystal housing is strapped to the 0V line with a wire soldered to the case. The amplifier is mounted in its own screened box attatched to the front panel of the Marland with S1 being the clamp.

To test the oscillator use either a digital counter and set the two frequencies to 8.9985MHz for u.s.b. and 9.0015MHz for l.s.b., or use a known accurate receiver to set them.

The Balanced Modulator

The Balanced Modulator is shown in Fig. 3.4. The critical component is the transformer which is trifilar wound on an FT37-61 ferrite toroidal core. The winding of this transformer is simple but if the connections are wrong the balanced modulator will not work.

Begin by taking three lengths, about 400mm each, of 28s.w.g. wire. The wires need to be twisted together at a pitch about around 3-4 twists per centimetre. Try to distribute the twists as evenly as possible along the total length of the wires.

The transformer is wound in the same manner as a single winding. Each pass through the hole represents one turn. The turns should be made as evenly as possible taking up some three-quarters of the total core space. When the winding is completed, trim off the sets of three leads at each end to about 15mm. Carefully scrape the enamelling from the ends, leaving about 5mm of enamel at the core end of the wires. The vital next stage is to correctly identify the wires. The 'L' of each name denotes the beginning of each winding. The position of beginning and ending of each winding determines the phase of the windings and is essential to the correct working of the circuit.

The windings are checked out using the ohms range of the multimeter to give a continuity test. Decide in advance which end of the winding is to be the beginning and which the finish, this is not important provided it is the same for all three wires.

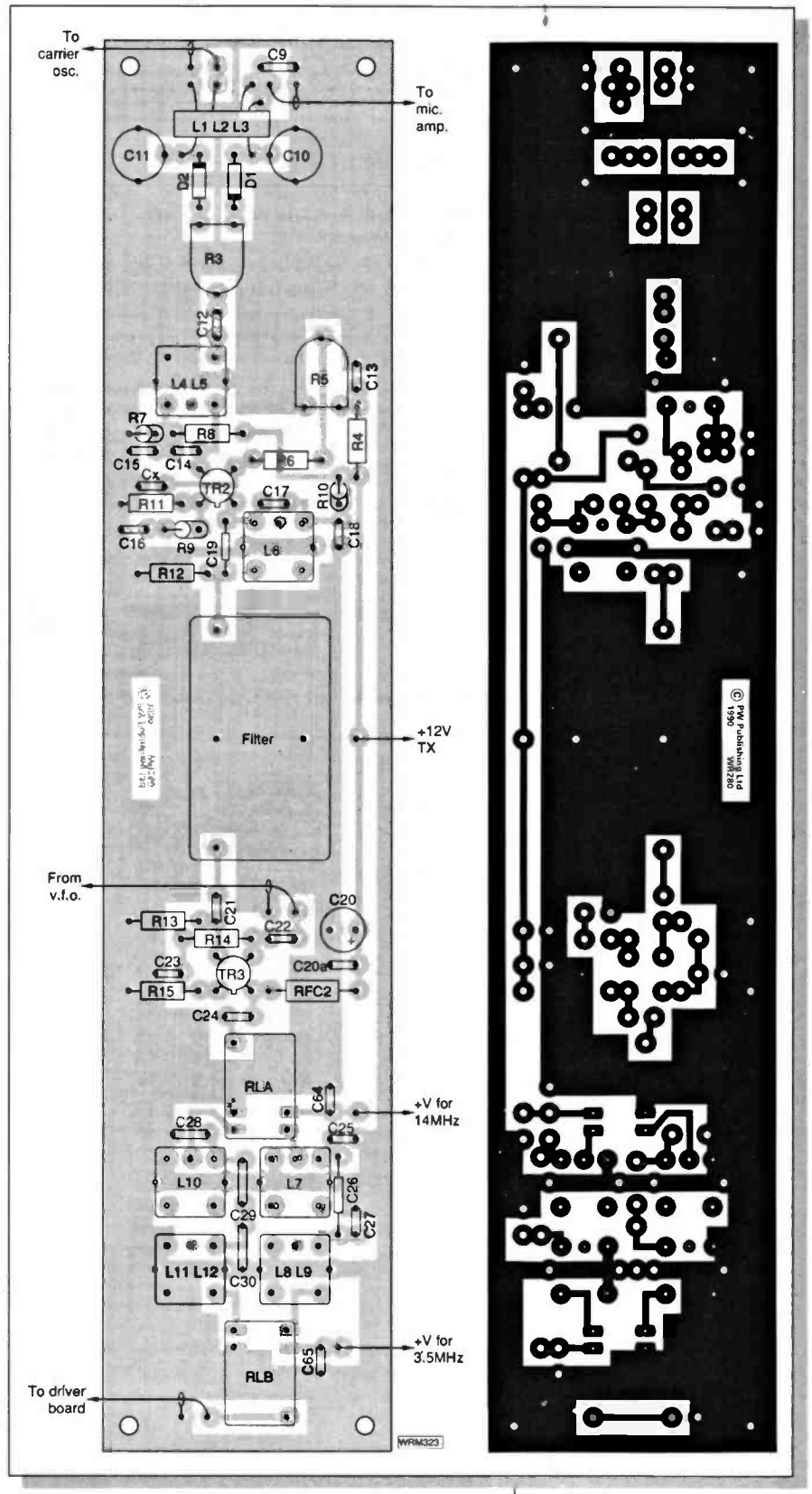


Fig. 3.4: Track pattern and overlay of the heart of the transmitter, track and overlay pattern of the Balanced Modulator.

Identify the end of L2 and connect it to the beginning of L3. This point is connected to C10. The beginning of L2 goes to C10 and the finish of L3 to C11. Be careful that the diodes D1 and 2 are correctly orientated on the board. Very few problems should occur with this board although care must be used when soldering the coaxial cables carrying the various signals into place. The coils L7 and L8/9 along with L10 and L11/12 are Toko types and need little work.

At this time the testing of the sideband generator board will be left until all other boards are completed.

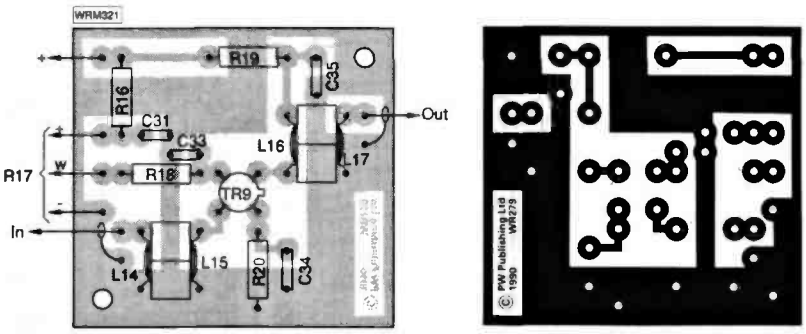


Fig. 3.5: Track pattern and overlay of the Driver Amplifier.

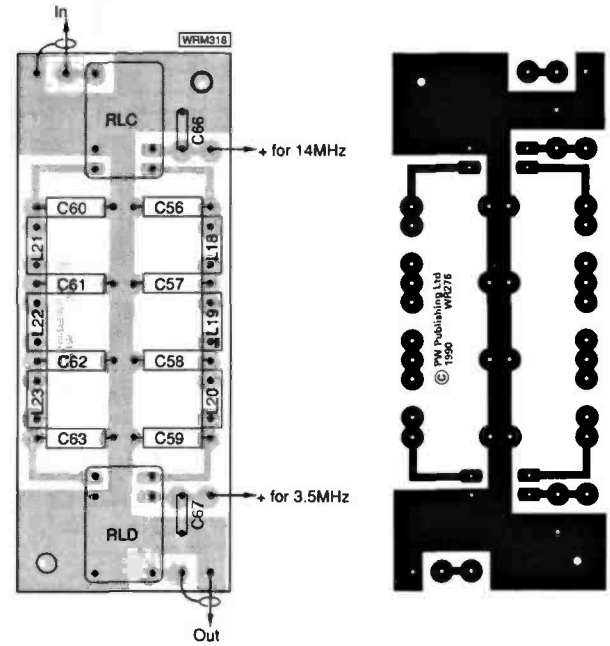
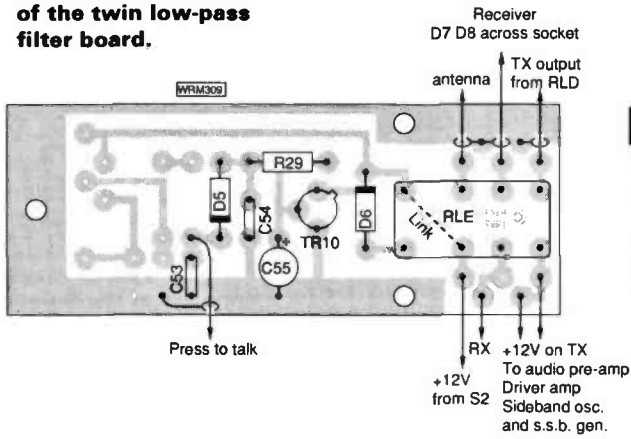


Fig. 3.6: Track pattern and overlay of the twin low-pass filter board.



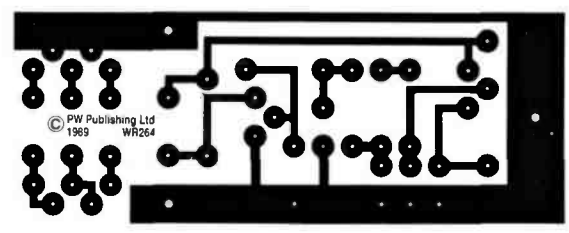


Fig. 3.7: Track pattern and overlay of the power and antenna changeover p.c.b.

The Driver Amplifier

The Driver Amplifier is shown in Fig. 3.5. Begin by winding the transformers L14/15 and L16/17 These are wound on a pair of ferrite beads placed side by side. This is easier if the beads are joined together. They may be glued with polystrene cement but I used a small piece of sticky tape. The winding is simple: 10 turns for L15 and L16, and 2 turns for L14 and L17. Remember which end is which or mark them. As with the Mic Amplifier there is little to go wrong as long as the components are orientated correctly.

The Power Amplifier

The kit comes complete with every item, except for a heat sink, and contains full instructions including how to mount the board. A word of warning. There are a number of throughboard connections on this doubled-sided board and they must all be added at the beginning. Check them: I missed one and it took me a half hour to find what was wrong when the amplifier failed to work.

Low Pass Filters

Low pass filters are required to clean up the harmonic content of the output signal. The circuit for these filters is shown in Fig. 3.6. 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 more usual five-element filters, the characteristics are so much better.

Change-Over Board

The change-over board is the final board to be built and readers may recognise it as the board used in the Irwell Transmitter (*PW* January 1990) with only part of it used, and for a fuller description see that article.

Overall Setting Up

The complete setting up is done when all the boards except the sideband generator board are fitted in the box. A gradual process of setting-up is used and a g.d.o. and known accurate receiver will be needed (using a similar technique to setting the v.f.o.). All the tests are done by injecting an audio tone into the mic socket, or whistling into the mic.

Place a wire on the junction of L5/C14 and adjust C10 C11 and R3 for minimum carrier leakage. Switch to the other crystal frequency and check that

HOW MUCH **£65**
HOW EASY **Intermediate**

Shopping List

Resistors
5% 0.4W Carbon film

56Ω	1	R25
100Ω	3	R2,9,10
150Ω	1	R20
220Ω	3	R11,19,22
330Ω	1	R28
560Ω	1	R15
680Ω	1	R30
1kΩ	9	R6,12,13,18,26,29,35,38,39
2.2kΩ	1	R7
4.7kΩ	1	R34
10kΩ	5	R8,23,24,33,37
22kΩ	2	R4,16
33kΩ	1	R27
100kΩ	4	R1,14,21,32
820kΩ	1	R36

Variable Trimmer (Horizontal)

500Ω	1	R3
10kΩ	3	R5,17,40

Variable Trimmer (Vertical)

5kΩ	1	R31

Capacitors
Monolithic ceramic (resin dipped)

10nF	16	C5,6,9,12,19,21,22,24,34,45,53,54,64-67
0.1µF	14	C13,15,16,18,20A,23,31-33,35,41,43,51,68

Ceramic Miniature plate

3.3pF	2	C26,29
10pF	1	C3
27pF	1	C7
33pF	1	C4
47pF	3	C25,27
68pF	2	C14,17
100pF	4	C28,30,36,42
180pF	2	C60,63
270pF	1	C38
390pF	2	C61,62
470pF	2	C56,59
680pF	2	C39,40
1.2nF	2	C57,58

Feed Through type

1000pF	3	C8,44,52

Electrolytic 16V working

2.2µF	2	C47,48
4.7µF	1	C55
10µF	4	C20,46,48,50

Miniature Trimmer (film dielectric)

2-22pF	4	C1,2,10,11

Coil Data

1mH	3	RFC1-3

L1-3 10 turns trifilar wound on an FT37-61 toroidal core
L4/5,6 Toko Kank33340 (2off)
L7,L8/9 Toko Kank33330 (2off)
L10,L11/12 Toko Kank33350 (2off)
L13 30 turns 0.28mm (32s.w.g.) enamelled copper wire close wound on a 4.8mm former with a ferrite core.
L14/15 0.28mm (32s.w.g.)enamelled coper wire, 2t(primary)+10t (secondary) on two ferrite (anti-parasitic) beads.
L16/17 as above (used in reverse)
L18,20 25 turns on toroidal core T37-2
L19 27 turns on toroidal core T37-2
L21,23 16 turns on toroidal core T37-6
L22 17 turns on toroidal core T37-6

Semiconductors
Diodes

BAR28	2	D1,2 Schottky barrier diodes
1N4001	1	D6
1N4148	5	D4,5,7,8,11
6.2V zener	1	D3
l.e.d.	2	D9,10

Transistors

BC109	2	TR7,8 (Plastics cased version used in prototype)
BC238	2	TR5,6
2N2905	1	TR10
2N3819	2	TR1,4
40673	3	TR2,3,9

Miscellaneous
Set of p.c.b.s from *PW* sevices, 9MHz 2.2kHz bandwidth s.s.b. filter†, 8.9985 and 9.0015MHz crystals†. Miniature relays (Maplin YX94C 4 off). Wire and coaxial cables as required, hardware for boxing the project (Minfordd types used on prototype). Microphone with p.t.t. switch, epicyclic reduction drive, switches as required, phono plugs and sockets, screws, washers, nuts and spacers as required.

† Available from the author for £15.50 the set.(St. Aidans Vicarage, 498 Manchester Rd., Rochdale, Lancs. OL11 3HE. Cheques made payable to G-QRP club)

these settings are still valid, if not find the setting which gives the best compromise between carrier frequencies. Move the wire to the junction of C21/R13 and check that the Xtal filter is working and that both sidebands are available on selection of the carrier frequency.

Move the wire to the junction of C24/RLA centre contact. Now there should be signals heard on the receiver as follows. The v.f.o. oscillates in the range of 5.0-5.5MHz, and s.s.b. signals in the bands 4.0-3.5MHz and 14-14.5MHz. Peak L4/5 and L6 for strongest signals. Remove the wire. An r.f. probe as described in the *PW* Irwell (p28 Jan'90 *PW*) will be needed to peak up the band-pass filters. Select the 3.5MHz band (+12V to RLB and RLD) and peak L7 and L8/9 for maximum output at the input to the driver board. Then check at the output of the driver board, verifying that variable R17 controls the level available at the output. Select 14MHz band and similarly peak L10 and L11/12.

Testing The PA Stage

The p.a. stage and low-pass filters need no setting-up, so after fixing the s.s.b. generator board in position the *PW* Marland is ready for dummy load testing. About 10W of power should be present when whistling into the mic and transmitting into a dummy load. The power amplifier must **not** be tested without the heatsink or without a terminating load. The r.f. probe will measure up to 75V on speech peaks.

The unit should is now ready for on air trials There is a small amount of v.f.o. leakage noticable on the 3.5MHz band so an a.t.u. should be used to reduce the level of this out-of-band signal. **PW**

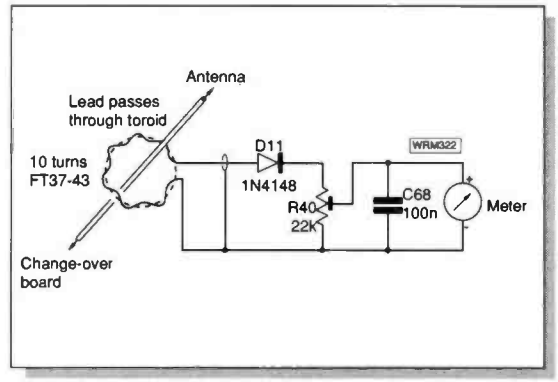
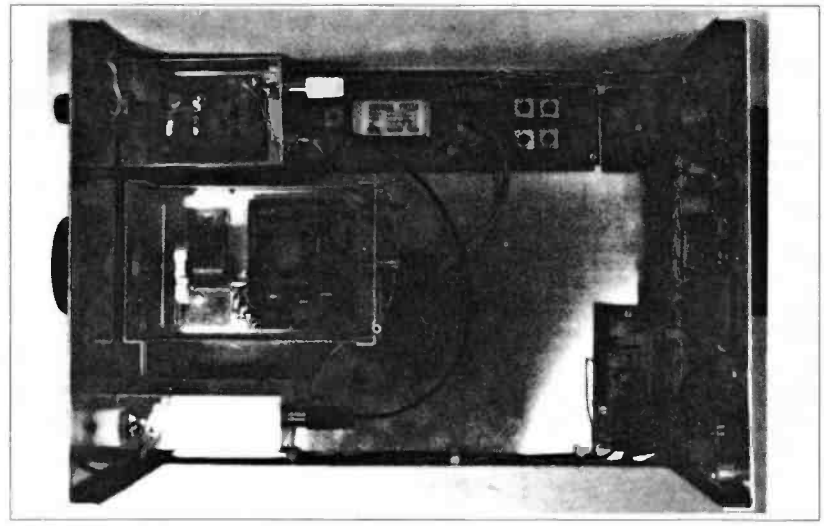


Fig. 3.8: A simple power monitor circuit. The meter shows relative r.f. power output levels.



Interconnection details and layout of the completed 'Marland'.

REVIEW

AKD Blackline Series Filters

Interference to domestic appliances from amateur equipment is usually a tricky problem that requires a high degree of tact as well as some appreciation of how the interference occurs. If the interference effects adjacent properties, it is also important that any 'cures' fitted both look good and work effectively. This is where quality commercial filters such as these from AKD can be so useful.

One of the first steps to curing interference problems is to establish whether a filter is likely to help. It is important to remember that the filters described here have been designed to handle antenna born interference. If you need help to decide whether the interference is antenna born, the DTI guide *How to Improve Television and Radio Reception* is a very good publication.

I was also pleased to see that AKD have included much useful information in their catalogue.

HPF-6 High Pass Filter

This six section filter has been designed to minimise the effects of a wide range of potential interfering signals.

The intended use of this filter is in the u.h.f. path of TVs and video cassette recorders. Because of this, the filter boasts a mere 2dB of insertion loss between 465MHz and 900MHz. The cut-off on the low frequency side was very sharp with -35dB at the 435MHz amateur band and a very creditable -80dB at and below 145MHz.

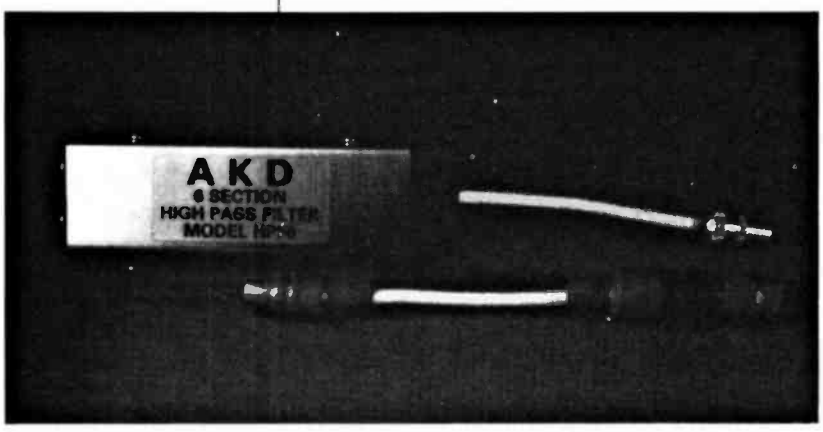
Physically the filter comprised an aluminium box measuring 120 x 40 x 25mm. Connections being made via a fully insulated Belling-Lee socket at one end and a flying lead plug at the other.

For best affect the filter needed to be connected between the antenna and the TV or video recorder. The only exception to this being when an r.f. pre-amplifier is in use, then the filter must be connected between the antenna and the pre-amplifier. As the HPF-6 is a purely passive device, there were no power supply problems to worry about.

HPFS

This is another low pass filter but one that includes a braid breaking transformer. Braid breaking is important when you are dealing with interference that has been induced into the outer conductor of the TV or video down-lead. As with the HPF-6 it was designed for u.h.f. operation and featured a 2dB insertion loss and a braid rejection ration of >25dB at 30MHz and below. The rejection on the centre conductor was specified as 60dB at 30MHz and below.

The physical construction of this filter was much more compact than the HPF-6 with the filter components being mounted on the rear of the coaxial line socket.



Interference with domestic equipment seems to be a problem that effects most amateurs at sometime. But relief is in sight in the form of a range of filters from AKD, reviewed here by John Bird

TNF-2

This was a notch filter that could be ordered with a wide range of centre frequencies. This one is likely to be of particular interest to the amateur who is suffering interference on one band. The review model was supplied tuned for 145MHz and featured a 2MHz bandwidth so covering the whole of the 145MHz band.

Besides filtering the inner conductor the screen was also filtered. The specified rejections were 35dB on the inner and 30dB for the outer. The construction of this model was again based around a coaxial line socket.

BB-1

The final filter in this selection was a simple braid breaker with no other processing. This was ideal for those situations where the interference mode is clearly identified to the braid and no other treatment is necessary. This filter could also be cascaded with others to help solve some more complex interference.

Air Tests

The ideal way to test these products is with real-life interference cases. Fortunately I didn't have a real problem at the time of the review so I had to invent some! I started with a popular portable TV which was fed by a poorly orientated loft antenna. Interference was then induced by running a 5W 144MHz portable close to the antenna to simulate high level r.f. interference. The interfering signal was adjusted so that the picture had almost collapsed.

I started by inserting the 145MHz notch filter, which was easy to connect and did not noticeably affect the signal strength. This filter had the desired effect and reduced the interference down to just a flick of the picture at the start and end of the transmission.

The next stage was to see how the braid breaker affected this type of interference. The results were, in fact, similar to with the notch filter.

The HPF-S was next on the list and this produced the best result by combining the low pass filter with a braid breaker. As with the other filters the insertion loss was not noticeable even on a very weak signal.

Final test was to try out the HPF-6 low pass filter. This produced a result much on a par with the notch and braid breaker. The only drawback was a just noticeable reduction in signal strength. So from this test it was clear that the best solution was to fit the HPFS low pass filter and braid breaker. I ought to stress however that every interference case usually has its own peculiarities that are almost impossible to simulate in a test like this.

Summary

I was impressed with the range of filters from AKD. Having experienced interference problems myself, I have seen the look of horror on people's faces as you approach their expensive TV or hi-fi with a birds nest of capacitors and inductors! This range from AKD gives the amateur a much more professional solution that should gain a favourable response from the 'public'.

I can also see that these filters should appeal to amateur radio clubs who could perhaps buy a full set of filters. These could then be made available on loan to club members. As the solution of interference problems tends to be a trial and error affair, this would allow selection of the appropriate filter that could then be purchased to solve the problem.

To conclude then, these filters from AKD will I'm sure prove to be very popular with both amateurs and professionals alike. I have no hesitation in recommending them.

The VAT inclusive price of the filters reviewed here is as follows:

HPF-6 - £17.00: HPFS - £7.50: TNF-2 - £7.95: BB1 - £6.95

These filters and details of the rest of the range can be obtained from **AKD, Unit 5, Parsons Green Estate, Boulton Road, Stevenage, Herts SG1 4QG.** My thanks to AKD for the loan of the review models. **PW**

Valve Technology & Characteristics - Part 3

Valve circuits that have so far been considered have had a separate supply for the grid-bias voltage. Now Peter Buchan G3INR takes us through tetrodes and pentodes to a one valve receiver.

In practice grid-bias voltage is derived automatically by making use of the anode current Ia which has to flow from the cathode of the valve. A resistor in the cathode circuit is all that is required. See Fig. 3.1. The value of the cathode resistor is dependant upon the bias voltage (Vg) required, coupled with the chosen anode current (Ia). For example, suppose the bias voltage for the valve characteristic shown in Fig. 2.5 were derived using a cathode resistor. With an anode current of 5mA, (the cathode current is also 5mA), and a bias voltage of -4V, the cathode resistor would have to be 800Ω, an 820Ω approved value resistor would suffice. In place of the grid-bias supply, a resistor is connected between grid and earth or zero volts. This in effect puts the grid at -4V below the cathode and creates the desired bias.

Note now that the signal current (i_a) has to flow through the cathode resistor. When the voltage on the grid rises above 4V the cathode voltage will have to follow, this increases the bias. We have **negative feedback**. For some applications this negative feedback is desired and is made use of. In other circumstances the feedback is not required. To dispose of the unwanted feedback the cathode resistor is by-passed with a capacitor whose impedance is negligible at the signal frequency, this leaves the bias voltage fixed at the pre-determined value. See Fig. 3.1.

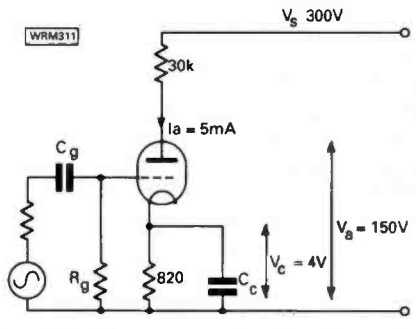
Staying for a little while longer with the triode, the editor suggested that it should be possible to run some of the battery valves on low voltages. Would they work for instance on only 12V? Selecting the once popular 1T4 with a 1.4V filament as a test item it was found that the valve did in fact work with only 12V supply. Naturally the filament voltage had to be the recommended value. A small family of curves with the valve connected as a triode is shown in Fig. 3.2.

This valve on 12V would provide some amplification in a simple audio amplifier stage of a battery receiver for example. However, the 1T4 with a supply voltage of 27V (three 9V batteries in series) works very well as a single valve receiver with regenerative feedback, Fig. 3.4. A coverage of say 5.5 to 10MHz, brings in two broadcast bands and the 7MHz amateur band and is surprisingly sensitive. A set of curves with a suply of 27V is shown in Fig. 3.3.

Although the receiver circuit works well with the valve connected as a triode, there is a disadvantage. Mechanical means have to be used in order to obtain the feedback regeneration. A small variable capacitor performs this task quite well but can be difficult to adjust at times. Therefore, to provide a surefire receiver circuit for experimenter the 1T4 was connected as a pentode. The pentode valve progressed from the tetrode valve which we will take a look at presently.

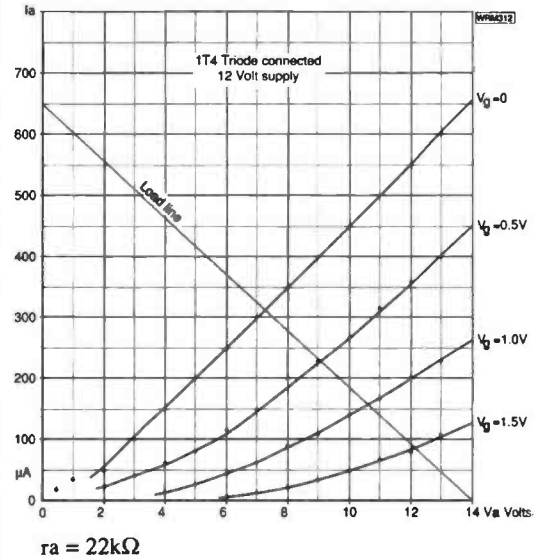
When it was decided to provide a simple circuit for the experimenter, the idea of a receiver seemed the best choice because it is something that is immediately useful and can provide hours of serious listening for a small outlay. But before we look at the circuit, let us take a look at the four electrode valve, (the tetrode) and a brief look at the reason for the introduction of this extra electrode.

As the art of radio, or rather wireless, progressed, more sensitivity and greater amplification were continually being sought. Because of this, it was not long before the limitations of the triode began to show. A fact that has not been mentioned so far is that the amplification factor (μ) of the



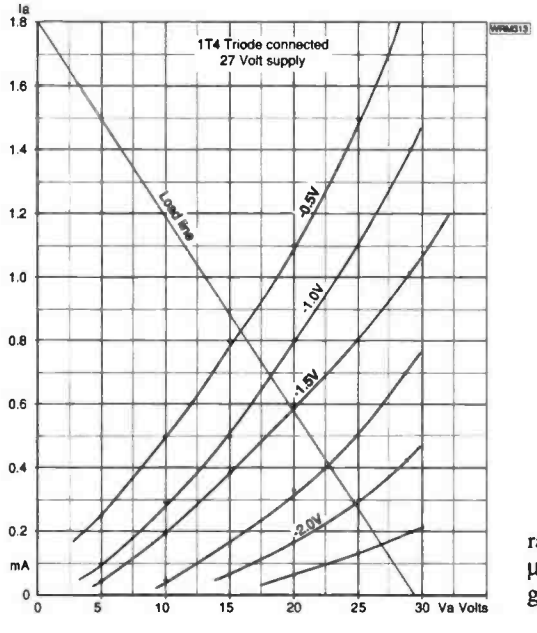
Rg and Cg chosen to meet bandwidth requirements for the amplifier Cc, the cathode resistor by-pass capacitor chosen to have a low reactance at the lowest frequency of interest

Fig. 3.1: Triode circuit with cathode bias. Capacitor Cc de-couples the signal voltage to earth thereby eliminating the negative feedback which would result if the cathode resistor were not by-passed.



ra = 22kΩ
μ = 8
gm = 0.3mA/V

Fig. 3.2: Characteristic curves of the 1T4 valve with a supply voltage of only 12V. These curves may be used to design circuits such as voltage amplifiers.



ra = 25kΩ
μ = 10
gm = 0.5mA/V

Fig. 3.3: Characteristic curves of the 1T4 valve with a supply of 27V. These are also useful as a design aid and it was 27V which was used to power the one valve receiver.

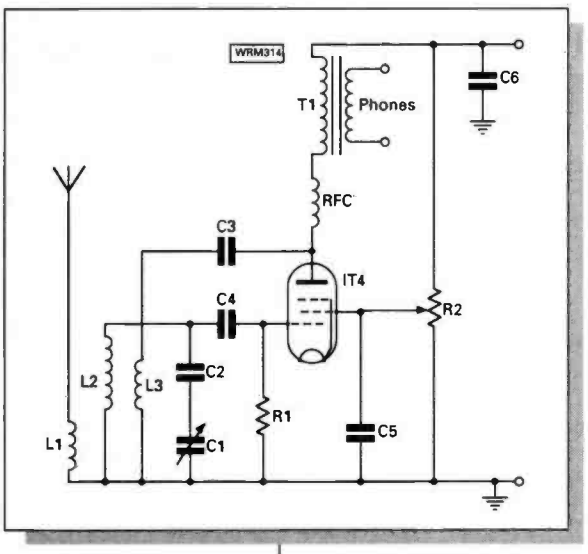


Fig. 3.4: The circuit of the one valve receiver. C1 100pF variable. C2 82pF mica. C3 68pF mica. C4 82pF mica. C5 and C6 0.01μF Disc ceramic. R1 1 MΩ. R2 25kΩ variable. RFC 1mH choke. T1 Output transformer or 240/6.3V transformer.

triode is governed by the mechanical construction of the valve. The closer the grid is to the cathode, the greater the influence it can have for example, but the greater the inter-electrode capacity.

Electrostatic coupling between the three electrodes limited the performance of the valve in a number of ways. This coupling is described in the characteristics as the inter-electrode capacities. These capacities exist between the grid and the anode (Cga), the grid and the cathode (Cgk) [note the use of the letter 'k' to denote the cathode thereby avoiding confusion with 'c' for capacity] and the anode and the cathode (Cak). They vary in value from 2 to 8pF (Cga), from 2.5 to 4.5pF (Cgk) and from 2.5 to 3.5pF (Cak).

The capacity Cga limits the gain that can be obtained, especially at the higher frequencies where the coupling between input, and output circuits, provided by Cga can easily cause instability. Cgk on the other hand loads the input circuit as the frequency is increased by shunting away the signal to the cathode. The effect of Cak is seen across the valve anode load and hence shunts the output voltage. Remember we are talking about a.c. signals, and also assuming that the power supply has little or no impedance. To reduce these capacities a further electrode was introduced and placed between the anode and the grid. This was called the screen grid because the screening effect it provides is very profound indeed. For example the Cga in a valve with a screen grid, falls to between 0.001 and 0.02pF. The reduction in capacity is achieved by holding the screen grid at earth potential for a.c. signals.

To achieve a useful performance with the tetrode, this screen grid has to be at some potential (d.c.) above that of the cathode, and because of this it does steal some of the current which is on its way to the anode. The characteristic of the tetrode together with the circuit used for obtaining this characteristic is shown in Fig. 3.5. Study the graph and note that the anode current Ia falls at one point as the anode voltage is increased. This fall of Ia is due to what is known as 'secondary emission'. Secondary emission is caused by the kinetic energy of the electrons emitted from the cathode, striking the anode with such force, that some electrons are dislodged from the anode material. These electrons are collected by the screen grid, and of course are subtracted from the anode current. Note that after the very non-linear part of the curve the anode current levels off to a steady value which remains almost constant, even though anode voltage is increased.

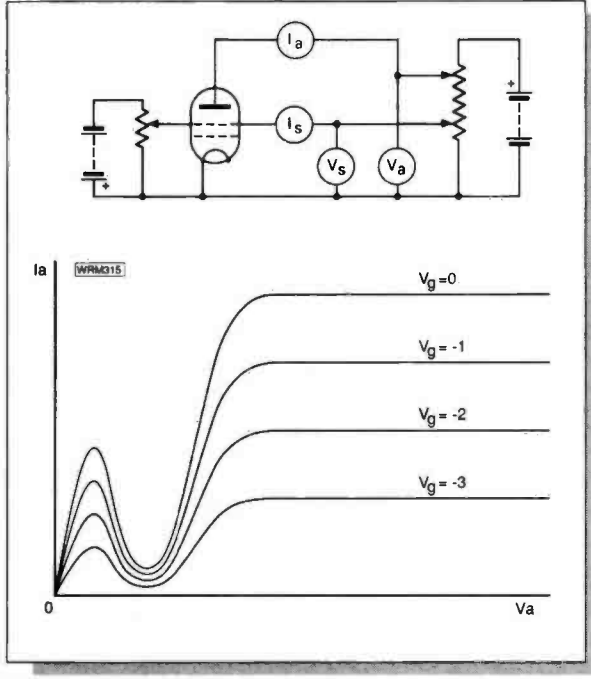


Fig. 3.5: The circuit used for deriving the characteristics of the Tetrode valve. Note the distinctive kink at the start of curve. See text.

At this point, the maximum flow of electrons from the space charge has been reached, the screen current having settled down to a relatively small value. The point at which the anode current levels off, is governed by the value of the screen grid voltage; choice of screen grid voltage is made by referring to the manufacturers information, and choosing a value to suite your requirements. There is much more that could be said about these three valves that have been so far described, but a limit must be kept for this type of article.

To round off the short look at the tetrode it should be mentioned that it is almost always used in power amplication. Special mechanical arrangements are made to beam the current to the anode in the valves used in the p.a.s of many s.s.b. transmitters. These are, of course, 'beam tetrodes', and have considerable amplifying capabilities.

The very low slope of the Ia/Va curve means that the tetrode has a very high r_a and hence a large amplification factor. A few years ago the valve had a revival in audio power amplification because, folk law had it, that the quality of sound obtainable from a valve amplifier was much better than that from a solid state amplifier. The truth in this may be realised, by the fact that a valve overloads much more gracefully than a solid state device. There is also clear evidence that a valve r.f. linear amplifier has lower distortion products than a solid state one, at least in equipment made for the amateur market.

It is important to move on to the pentode valve now, because this is the valve that most experimenters would be likely to choose, at least it certainly has been the most popular valve for r.f. circuits in the past. The disadvantage of the tetrode was that the characteristic has a very non-linear portion, and this limits the use of the valve.

Therefore, the next move in valve technology was to add yet another electrode. This electrode is placed between the screen grid and the anode and is kept at earth potenial,at least with respect to the anode. The purpose of the extra electrode, called the suppressor grid, is to repel the electrons emitted by the anode, caused by secondary emission, and drive them back to the anode thereby preventing them reaching the screen grid. This it does very effectively and completely irons out the non-linear portion of the tetrode's characteristic.

Generally the suppressor grid is connected to the cathode and therefore, in practice, some positive voltage will be present, but of course it will be negative with respect to the anode. So there we have a brief description of the five electrode valve, or the pentode valve as it is known. Let us now move on to the characteristic of this valve.

The general appearance of the characteristic for the pentode is shown in Fig. 3.6(a). You can see that the non-linear portion has been smoothed out by the addition of the suppressor grid. This enables the valve to be used over a greater part of the curve which in practice is an advantage. Deriving the constants is carried out in the same way as with the triode, more care must be taken when taking measurements off the graph because of the very gentle slope of the Ia/Va curve for example. For a valve of this type the constants are, r_a about 500kΩ, μ, about 70 and gm about 7mA/V.

Perhaps at this point a short re-cap might be in order to establish once more just what is going on inside these valves. You will remember that the emitter or cathode of the valve is heated to a temperature that allows copius emission of electrons.These electrons form a cloud in space around the cathode. A positive voltage applied to the anode will accelerate these electrons toward it, thereby drawing electrons from the space charge surrounding the cathode. This constitutes a flow of current, and in the diode will increase as the

anode voltage is increased, to a point where all the electrons emitted, will be drawn away from the space charge. Beyond this point the anode current will level off and remain constant despite further increase of anode voltage.(Diodes are not normally driven to this point of course). However, this describes the point of maximum emission of the cathode at that temperature.

Placing a control grid between the cathode and the anode regulates the flow of current, according to the wishes of the designer. The space charge forms, as it were, a reservoir of energy which is drawn upon as desired. To overcome the disadvantages of the inter-electrode capacities, a second grid is added to the valve, the screen grid, and this in its own way forms another barrier to the flow of electrons to the anode. In practice the screen grid voltage is set at a fixed, pre-determined value, and in conjunction with the control grid allows so much, and only so much. anode current to flow.

Unlike the diode the reservoir of energy is not emptied, leaving only the source to supply current, the reservoir remains, and is drawn upon as needed. Can you see therefore that at any particular setting of both control and screen voltages, that there is a virtual maximium current that will be allowed to flow. The operative word here is virtual, because there is an increase of anode current as the anode voltage is increased but it is relatively small, and the scale of the graph indicates this as a very gentle slope. From this fact comes the high ra, because the change of anode voltage is large compared the corresponding change in anode current.

Let us move on quickly to the single valve receiver. The circuit is shown in Fig. 3.4, and is entirely conventional. Construction is straight-forward, and some odd pieces of double sided copper clad board were used to form chassis and front panel. The parts list is included in the caption for Fig. 3.4, much of which might be found in the shack junk box. The coil former was cut from a tube which once formed the centre of a chart roll, it is 12mm in diameter, and the coils are wound as follows, L1 12 turns of 26s.w.g., L2 46 turns 26s.w.g. and L3 6 turns 26s.w.g., all are close wound.

The coils should be disposed on the former as per the circuit diagram, i.e. antenna coil at the earthy end, and displaced from the tuning coil, this avoids over-coupling, and the feedback coil wound over the tuning coil at the earthy end. The action of the screen grid is clearly evident, because the gain of the valve is controlled by increasing the screen grid voltage, bringing the circuit into near oscillation for the reception of a.m. broadcast stations, and just into oscillation for the reception of c.w. With an output transformer, if you can find one, or a 240V to 6.3V transformer the audio output is sufficient to provide good headphone listening.

From this simple receiver to a conventional voltage or Class A amplifier is a straightforward step. Pentodes are ideal for this purpose and it is proposed that a simple amplifier be designed for a specific amplification and frequency bandwith. First a look at the characteristic as seen in Fig. 3.6a.You will see that there is a note that the screen grid has been assigned a voltage of 150V. It is at that voltage that the curves were derived; with a different screen voltage the curves would have levelled off at a greater, or lesser anode current, depending on the value of the screen voltage. The limiting factor for choice of screen voltage is the maximum screen current. For this particular valve the maximum screen current would be about 2.5mA. Choosing this value of 2.5mA requires that a screen resistor of appropriate size be selected to drop the supply voltage and to limit the current to the screen grid. The value of resistance chosen will be governed by the magnitude of the supply voltage but is usually in the region of say 30kΩ to 100kΩ.

PW

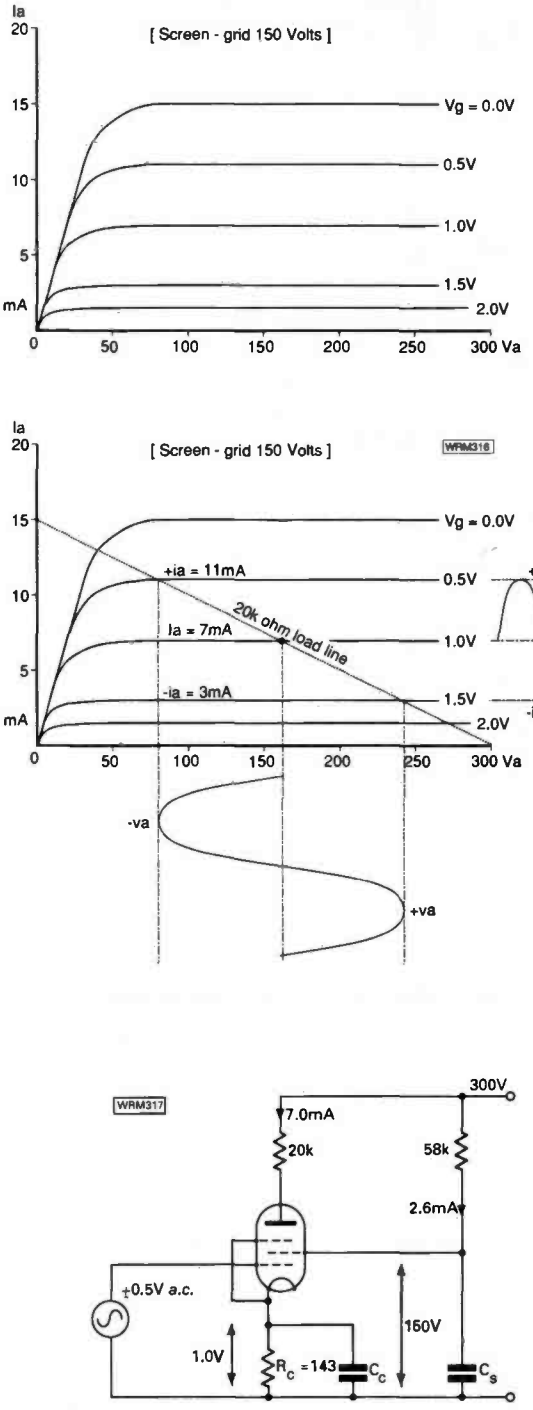


Fig. 3.6(a). Characteristic of the pentode. Note that the kink has now entirely gone, this is due to the addition of the suppressor grid. (b), Pentode curves with load line and showing how the valves amplifies in a similar way to the triode. The great difference being the magnitude of the valve ac anode resistance of the pentode. (c) Pentode valve complete with cathode bias and by-pass capacitor. Also shown is the screen resistor, note that this resistor is de-coupled to earth for signal voltages.

More details on the versatile pentode from Peter in part 4.

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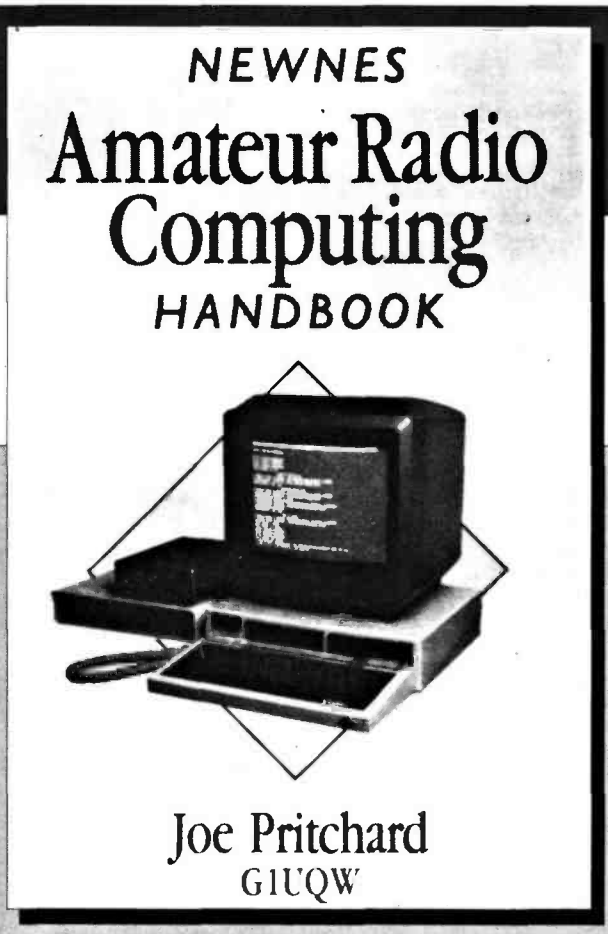

The *Newnes Amateur Radio Computing Handbook* shows radio amateurs and short wave listeners how they can 'listen' to signals by reading text on a computer screen.
Joe Pritchard G1UQW is a technical author and microcomputer consultant based in Sheffield.

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TT 285	6.3MHz 500Hz Filter	£60.00	£2.00
TT 288	6.3MHz 1800Hz Filter	£60.00	£2.00
TT 1140	Circuit Breaker	£18.00	£2.00
TT 217	9.0MHz 500Hz Filter	£60.00	£2.00
TT 218	9.0MHz 1800Hz Filter	£60.00	£2.00
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TT 238	Ten Tec ATU 2.0kW 'L' match 160m-10m	£361.69	–
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YAESU

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G400RC	Yaesu Round 360° metre	£169.00	£5.00
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CB CORNER

Patch from the Charlie Delta Radio Club in Nottingham

Rick Maybury brings you the latest on the fate of 934MHz and some advice on the purchase of second-hand equipment

The first item on the agenda this month is an update on the 934MHz CB saga, first outlined on this page a couple of months ago. You may recall that the Department of Trade and Industry issued an edict some two years ago, saying that the service was to be phased out. No new equipment could be imported, manufactured or sold in this country. Existing users could continue to use their rigs for as long as they remained operational. Needless to say it was the kiss of death for the fledgling service, and today it is used only by a few hundred dedicated souls lucky enough to get their hands on equipment.

It went quiet for a year or so and enquiries to the DTI earlier this year suggested that plans to allocate the band for commercial operations had been shelved, or at least, delayed indefinitely. Now a recent statement from the DTI once again confirms that the 934MHz band will be taken over, probably in 1992. The new occupier will be DSRR (digital short range radio to its friends).

As I write, draft specifications are being prepared by the ETSI (European Telecommunications Standards Institution) following a CEPT agreement on Europe-wide operating and licensing conditions (sorry about all the initials - blame it on the establishment love of acronyms and Euro-bureaucracy). The short respite for 934 CB is now over; it's likely that the band will become unusable quite quickly in some areas when field trials begin, probably within the next few months.

A sad end to what might once have become a very useful public communications facility. I mourn its passing but cannot complain too loudly because the ultimate cause of its demise was apathy. On now to lighter matters.

Lighter Matters

For the last few years buying new CB equipment has been a problem for anyone living outside the larger towns and cities. In the good old days, during the CB boom which lasted up to the mid 1980s it seemed as though there was a CB shop in just about every high street. Even chains like Halfords stocked a fair range of rigs and antennas, but these days the number of specialist dealers has dwindled and only Tandy keep the flag flying on a national basis.

Of course, it's still possible to purchase equipment by mail order but that's no substitute for a proper hands-on trial and the advice of a knowledgeable dealer, before you part with the readies. To be frank it's unlikely that the number of CB dealers will ever increase but there is now a healthy trade in second-hand equipment, much of it at bargain prices, up and down the country usually on Sunday mornings. I refer of course to car-boot sales, a growing institution in this country and a valuable source of all kinds of interesting and obscure technology, both new and old.

Equipment Sales

In the last few weeks I have spotted over a dozen rigs, some no more than a year or two old, selling for a fraction of their original price. Sceptics will say that this is a clear sign of the gradual decline in the popularity of CB, but quite often the seller was merely disposing of a second rig, surplus to requirements. The good thing about car boot sales is that equipment can normally be checked on the spot - if the seller won't back up their claim that the rig is in working order with a quick test in their vehicle, then don't buy it.

However, even duff rigs can be worth having, if only for spares. The relatively small number of manufacturers means that i.c.s, displays and other vital components are common, even to ostensibly unrelated makes. Antennas and mains power supplies may be a little more difficult to check but these are relatively hardy devices and even the most drastic faults shouldn't be too difficult to repair. As an interesting aside the organisers at two large local boot sales in South London use hand-held CB rigs for marshalling and keeping control of parking areas.

Finally this month my thanks to the Charlie Delta Radio Club in Nottingham for their DX card and patch. Thanks also to everyone who has taken the trouble to write in, it's good to know that someone out there is reading this. Constructive comments are always welcome.

Theory

What is Propagation?

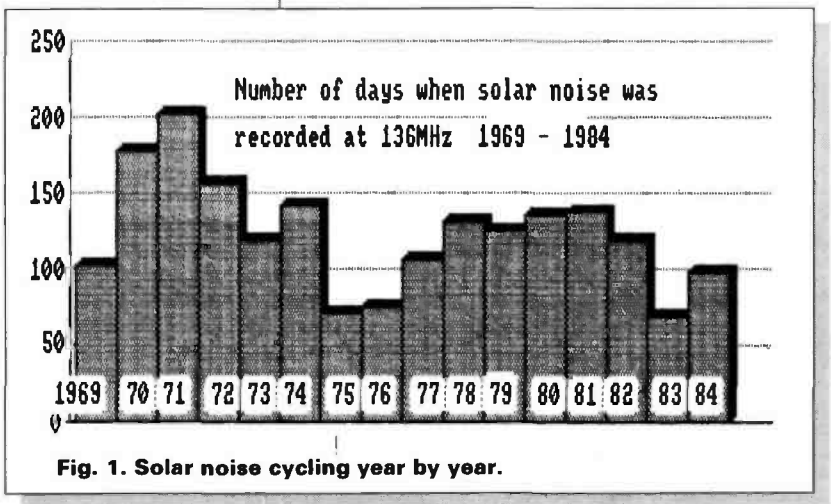


Fig. 1. Solar noise cycling year by year.

This month Ron Ham looks into the study of Solar activity and Sporadic-E effects.

The Sunspot Cycle

"Overall activity levels and solar indices increased this month," wrote Jim Knight in his March report published in the June issue of *Canopus*, the newsletter of the Transvaal Centre of the Astronomical Society of Southern Africa. He continued, "Cycle 22 is giving clear signs of being on a plateau. It is still unclear whether the sunspot 'Solar Max' has occurred and it will be interesting to see how long this period of almost constant activity will last. Latest thinking is that this period of high activity, characterised by 'pulses', will continue until the end of 1992! If this is the case, solar observers are in for a visual feast for the next couple of years."

Jim also included a list of 'max' and 'mins' from Cycle 1, which began in March 1755 to the start of Cycle 22 in September 1986. I was particularly interested in the details for Cycles 20 (October 1964 to May 1976) and 21 (June 1976 to August 1986). These include the period, January 1969 to December 1984, when my radio telescope observed the midday sun for approximately three hours each day. Although the optical maximums for Cycles 20 and 21 were November 1968 and December 1979 respectively, my chart showing the total number of days in each year that I recorded radio noise, Fig. 1, gives a different impression. This, I think, is because a high sunspot count does not mean that each one is 'active' and emitting radio noise.

I learnt from experience that, a couple of spots can 'shout' their heads off for approximately 13 days before going round the eastern limb and, if they survived and perhaps grew in size, show themselves again, still 'shouting', on the western limb some 14 days later. If the radiation from these spots had caused an aurora first time around then it is likely to repeat the performance, which accounts for those approximate 27 day intervals between some auroral displays.

A bit more weight was added in my mind to the unpredictable aspect of our sun's behaviour when I received a letter, on June 30, from Patrick Moore saying, "Sudden upsurge of sunspots... I thought we were past maximum!" He also enclosed the most impressive drawings of these spots which he made, using projection apparatus, at his observatory in Selsey at 0800 on the 28th and 1045 on the 30th, Figs. 2 and 3.

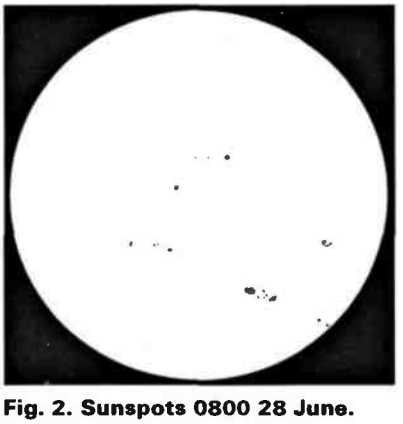


Fig. 2. Sunspots 0800 28 June.

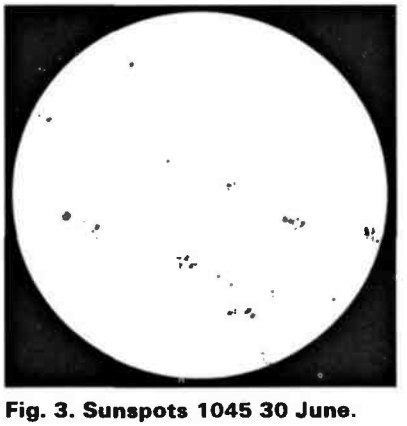


Fig. 3. Sunspots 1045 30 June.

Previous Events

The best way to find out if a particular signal path is open, or will open, is to monitor the frequency of a broadcast transmitter which cannot be heard at the receiving station under normal atmospheric conditions. However, if no such transmitter is suitable and the information is required, then one has to be installed! This was the case early in 1970 when a group of radio amateurs, who were studying propagation on the 70MHz (4m) band, built a 2.5W beacon-transmitter to operate on 70.275MHz and despatched it to Iceland. On arrival its antenna was attached to an official mast and the equipment put under the control of the late Einar Palsson TF3EA.

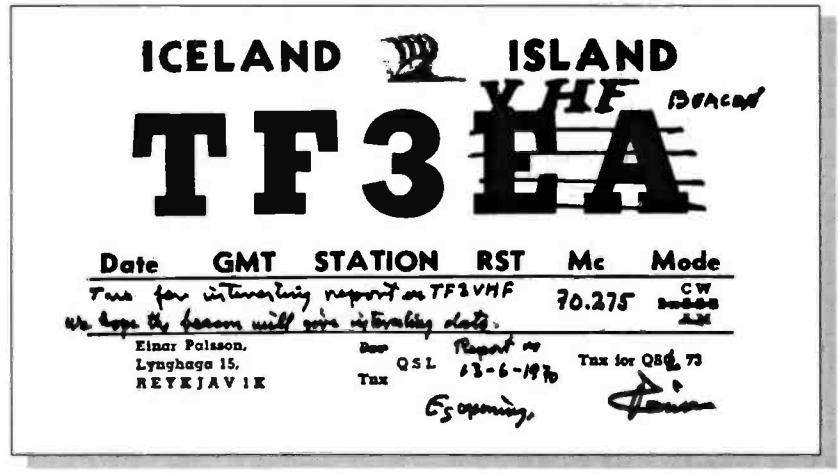
The beacon's callsign was TF3VHF and despite all the doubts, a number of us religiously monitored that frequency until our efforts were rewarded on 13 June 1970, when, between 1610 and 1630, a signal was heard in southern-England from this small transmitter during a Sporadic-E opening. The landlines were soon buzzing with excitement among those concerned and the scribes for the technical press. I witnessed a wonderful experiment first hand and for my part Einar modified one of his own QSL cards, Fig. 4, to confirm my report.

At the least hint of Sporadic-E after that the word went out and a watch was kept on 70.275MHz. It may well have been audible before June 13, but as many of you know, the 70MHz band is usually full of strong East European broadcast signals when Sporadic-E is present and these would have overpowered the 'voice' of this tiny beacon. I became more convinced of this during the evening of July 6, 1970, but let my log entry explain.

"1900-2045. BBC TV [Band I then] and BBC FM [Band II] interfered with by Continental stations. Four metre band [70MHz] carved up by FM broadcast signals from the south and east. Auto-sigs between 30 and 50MHz, plus strong television synchronising pulses on Chs. E2 (48.25MHz) and R1 (49.75MHz). At 2050 these stations faded away and up came TF3VHF at 599 (average 579) and died away after 1 hour and 9 minutes and up again at 2213 for 6 minutes at 539."

The question I also ask myself, "was it there all the time and we could not hear it, or did the influence of Sporadic-E suddenly swing north-south at 2050?" Obviously we will never know, but at least we have a record of what actually happened.

Fig. 4. QSL card received from a beacon report.



Let's Enjoy Using Our Instruments

Next time I plan to explain the workings of a barograph and how this instrument, primarily designed to aid weather forecasting, can serve as an early warning device for tropospheric openings on the v.h.f. and u.h.f. bands. Also, in the future, I hope to tell you about my latest 'toy', an Amstrad PC2086 computer with a high resolution colour display and the astronomy programs that I have purchased from The Public Domain Software Library, Winscombe House, Beacon Rd, Crowborough, East Sussex TN6 1UL. PW

Antenna Clinic

Session 13...and the last!

In the latter episodes of 'Antenna Clinic' I dealt with:

(a) some of the more important antenna performance specifications and how these can be unacceptable (performance wise) because of poor design and

(b) what could only be construed as false and/or misleading claims for performance made by not only some manufacturers, but often by contributors of antenna designs published in text books and magazines devoted to amateur radio.

It was decided therefore that, in addition to dealing with specific queries, 'Antenna Clinic' should include various data related to the use and performance of different types of antennas used by radio amateurs. It is hoped that such data will help provide a better insight as to what constitutes an optimum performance from either home constructed or manufactured antennas.

Coaxial Cable Length

The cable length is a singular, but nevertheless important, factor especially as 50Ω coaxial cable is now the most commonly used transmission line by radio amateurs. Questions that frequently arise are concerned with adjustment to the length of a 50Ω coaxial cable in order to obtain a satisfactory voltage standing wave ratio (v.s.w.r.) readout, even though the antenna has a 'specified' input impedance of 50Ω.

If the v.s.w.r. does not exceed an acceptable limit over the operational frequency bandwidth the antenna is required to cover (see Fig. 13.2) then the transmission line may be ANY length i.e. just long enough to run in a convenient manner from the transmitter to antenna.

It is sometimes stipulated that the length of the transmission line (50Ω coaxial cable) must consist of multiples of a half-wave, or some other fraction of a wavelength at operation frequency, even though the antenna input impedance is 50Ω.

Then there is the frequently recommended practice of adding or cutting of a short length, often a quarter-wave, to (or from) an otherwise chosen length of coaxial cable in order to obtain a satisfactory v.s.w.r. readout and transfer a maximum r.f. power to the antenna.

Another method used to achieve the same result, is the use of some form of 'tuner-cum-matching unit' between the transmitter output and the transmission line. (Not to be confused with tuners used in connection with antennas that have to be tuned to resonance for operation on more than one band).

If an antenna is well designed and has a purely resistive input, equal in value to the line impedance, then NONE of the practices described above should be necessary. Incidentally, this assumes that the transmitter output impedance is the same as that of the transmission line and the antenna.

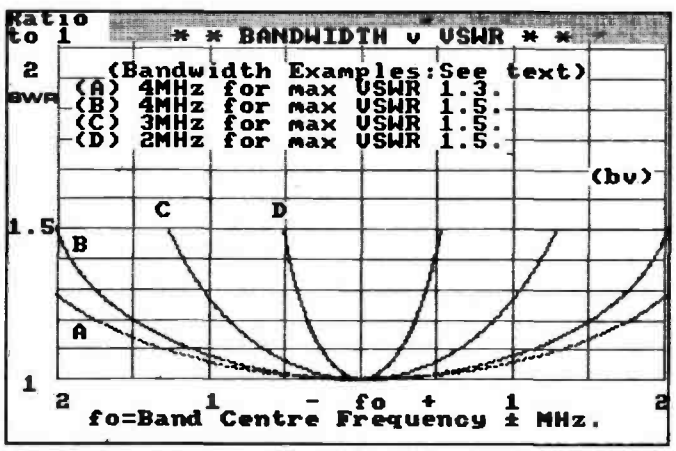


Fig. 13.2: Bandwidth v v.s.w.r. curves which are typical. See the text for an explanation

The Line, Antenna and VSWR

A perfectly resonant antenna has an input impedance that is purely 'resistive' and which represents a 'load' R into which r.f. power flows from the transmission line.

If a transmission line with an impedance Z_o is NOT matched with its load R (the antenna) or vice versa, then r.f. power is returned (reflected) back along the line to the transmitter with voltage and current (V and I) on the line in phase opposition.

If, for instance, the load 'R' is very much greater, or smaller, than the transmission line impedance Z_o, e.g. an open or short circuit, then a high amplitude 'standing wave' will be set up along the line as illustrated in Fig. 13.1a. If the load R is not much larger, or smaller,than Z_o, the amplitude of the standing wave will be smaller as in Fig. 13.1b. The closer the match between the transmission line and the antenna the smaller will be the v.s.w.r. If the antenna load contains no reactance, the v.s.w.r. is numerically equal to the ratio between the load resistance R and the characteristic impedance of the line where:

$$\text{v.s.w.r.} = \frac{R}{Zo}$$

or when R > Z then;

$$\text{v.s.w.r.} = \frac{Zo}{R}$$

If the load R is 'equal' to the line impedance Z_o then the transmission line carries a 'travelling wave' (Fig. 13.1c). In this case all the r.f. power is absorbed by the load, the voltage and current will be uniform and the measured ratio of forward to reflected power (v.s.w.r.) will be 1:1, sometimes referred to as unity.

However, any unwanted capacitive or inductive reactance in the system, due to the antenna being off resonance for example, a wrongly adjusted built-in low to high impedance matching system, or a transmission line impedance not equal to that of the antenna input etc., may also produce a totally unacceptable v.s.w.r. as well as loss of radiated r.f. power.

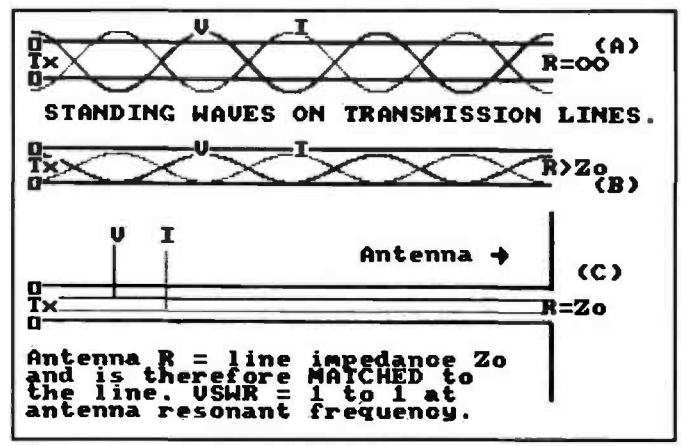


Fig. 13.1: Representation of v.s.w.r of three case of R and Z_o. If in A, R is 0Ω then the phases of V and I are reversed. This also applies in B if $R < Z_o$

Fred Judd G2BCX ends his series on antenna problems and solutions by discussing thoughts and misconceptions on v.s.w.r. and antennas

Antenna Bandwidth *v* VSWR

An antenna is normally tuned to resonance at the centre frequency of the operational band. This applies even if the antenna is an inductively loaded multi-band type or a harmonically tuned long-wire. The first requirement is to obtain the lowest possible v.s.w.r. ideally 1:1 at band centre. If at this stage the v.s.w.r. is high e.g 1.5:1, but a very low reading, or unity, is obtainable at some frequency, higher or lower than centre, then the antenna itself is not resonant in band. A high reading at band centre frequency can be due to other reasons, for example, a built-in matching system such as a quarter-wave stub, a gamma-match, balun etc., either poorly designed, wrongly connected, or mistuned.

The curves in Fig. 13.2 show bandwidth versus *v.s.w.r.* for four imaginary antennas but which are nevertheless typical. Curve A is most likely to be obtained from an antenna specially designed for a fairly wide bandwidth in this case covering 4MHz, (2MHz either side of band centre 'f_o') and with v.s.w.r. not higher than 1.3 at each end of the band. Curve B is very good but might also be regarded as an antenna with a fairly wide operational bandwidth. Curve C would be quite good for any band not greater than 2MHz wide since the v.s.w.r. rises to 1.3 at f_o plus or minus 1MHz. Narrow band curve C shows a bandwidth of 1MHz a maximum v.s.w.r. at each end of 1.5:1 and would be just acceptable. With a slightly narrower bandwidth, say 0.5MHz and maximum v.s.w.r. (at each end) of about 1.3:1, performance this antenna would be considered as adequate.

Multi-band Operation

The foregoing applies mainly to antennas where resonance is fixed at band centre frequency e.g, antennas tuned for one specific amateur band. If the antenna is one that really requires the use of a 'tuner' e.g, a long-wire (linear) antenna operated on a single band, or harmonically for 3 or 4 different bands, it can be re-tuned to resonance with a change in operating frequency, in order to maintain a low v.s.w.r. Inductively loaded single and multi-band antennas i.e. small beams and verticals operated via a common transmission line (usually 50Ω coaxial cable) tend to have narrow bandwidths, often narrower than the operational band itself, with v.s.w.r. sometimes rising to an unacceptable level at each end of the band, or bands.

Examples

The computer print-out Fig. 13.3 shows the 'measured' v.s.w.r. curves for two different antennas designed for operation on the 144MHz band with a bandwidth of 2MHz. (fo=145MHz). Measurements were made at 0.2MHz intervals and the data fed into the computer. Curve A for a 12 Element ZL Special, rebuilt after excessive damage by high wind and shows the antenna to be off resonance, as the lowest v.s.w.r. is at 146MHz. This was easily corrected although performance would in any case have been acceptable.

Curve B is for a 144MHz a prototype.Collinear antenna with wide spaced elements. The readout indicates a fairly flat response (i.e. low v.s.w.r. across the whole band). This response including that for the ZL Special when tuned to resonance is comparable with Fig. 13.2c.

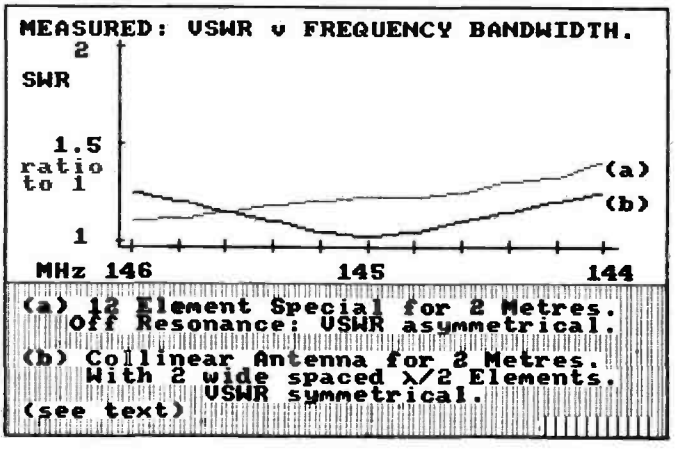


Fig. 13.3: Measured curves for two 144MHz antennas showing a symetrical curve a, and an asymetric curve b. Both antennas would be useful over the whole band. (Note reversed frequency scale)

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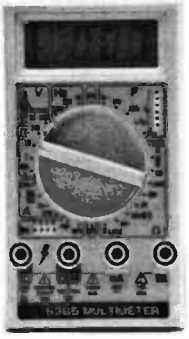

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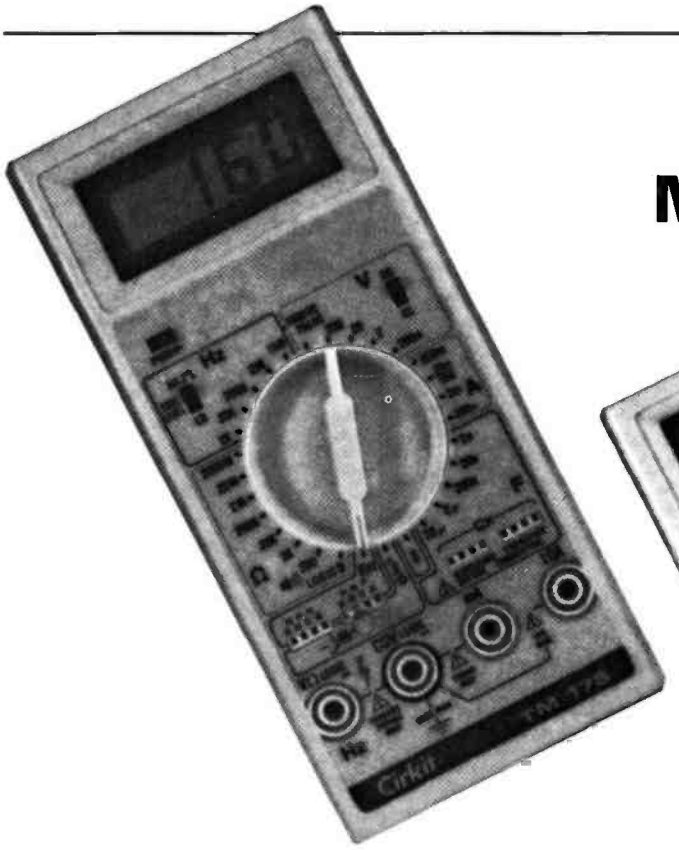
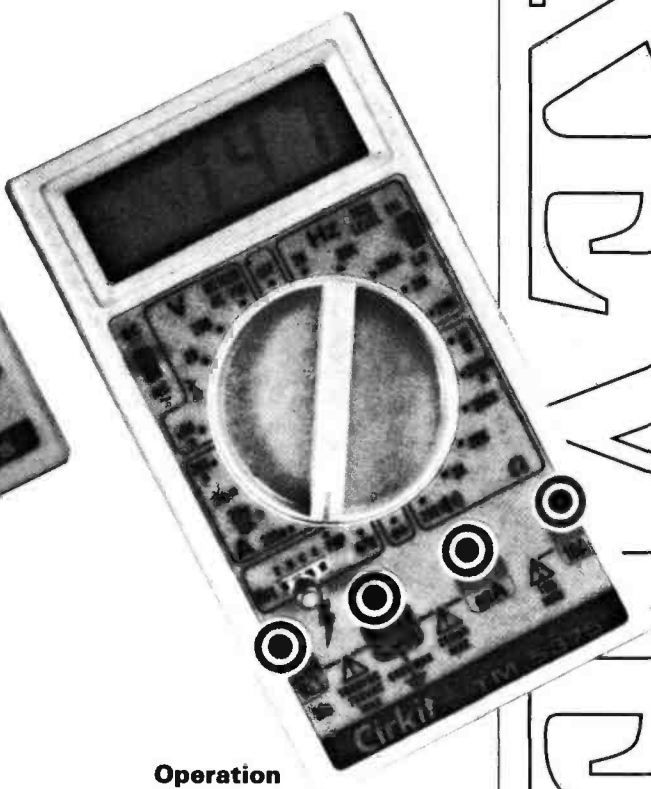
REVIEW

Cirkit Multimeters





The humble multimeter is probably the first item of test equipment to be bought when starting an interest in electronics. Mike Richards G4WNC examines two examples from Cirkit.

The multi-meter has come a long way since the early days of the moving coil instrument and the magic 20k per volt sensitivity of the AVO-8. The possibility of a digital multimeter for the amateur was unheard of just a few years ago. Nowadays the majority are digital and some, like the two covered here even throw in a frequency counter!

The two units reviewed here span a popular price range and it's interesting to see just what you get for your money.

TM-5375

The tiny TM-5375 boasts a full range of features that includes a frequency counter and transistor tester in addition to the normal voltage and current ranges.

The meter was supplied with instructions in the form of a small booklet. The first part of the instructions comprised a detailed performance specification with a separate section for each measurement type. Although at first this may seem a little over the top it is on occasions very useful to have this level of information available. An example was the Hfe transistor test where the specification gave details of the test current and the collector-emitter voltage. These are details that are essential if the test is to be used as more than just a go/no-go indication. The specifications also covered the maximum inputs and the degree of protection provided.

The operational instructions were set out very clearly with a separate section for each mode. The detail was very good and clearly aimed at the comparative newcomer to electronic test equipment. The final section dealt with potential problems and maintenance.

In addition to the manual the TM5375 was supplied with a pair of test leads which were the conventional red and black types with a pointed measurement probe. The connection to the meter was via 4mm banana plugs, that were very well insulated to protect against electric shock.

Power for the meter came from a standard PP3 type battery that was mounted in a compartment on the rear of the instrument.

Operation

One of the most important aspects of any measuring instrument must be the display and in the case of the TM5375 this comprised a three and a half digit liquid crystal display. The three and a half digits meaning the maximum display read-out was 1.999. The display also had a very wide viewing angle which is essential for this type of instrument.

The main measurement range selection was made via a large rotary switch that dominates the front panel. This switch also doubles as the power on/off with the vertical position being off.

One of the problems with multi-mode meter systems is the complications of switching from current to voltage measurements and the diametrically opposed requirements of the two modes. Voltage measurements require the highest possible input resistance whilst current demands the opposite. There is also a danger that if you include all the switching on the main switch you could accidentally select a current range instead of a voltage range. This would result in a short circuit being applied which would be likely to cause damage to the meter and or the circuit under test.

The solution adopted in the TM5375 and in many other modern instruments is to use a separate input socket for the current and voltage ranges. In fact the TM5375 has two current input sockets, one for up to 250mA and the other for the 10A range. The result of this is a total of four input sockets which were mounted on the front panel. In order to minimise the swapping of leads, the negative lead used a common socket for all measurement ranges and only the positive lead needed to be moved.

The only other socket on the meter was a miniature four pin unit used for the transistor Hfe tests. This was marked E-B-C-E representing the emitter, base and collector connections respectively. The layout off this connector was in fact quite clever as it allowed the majority of transistors to be

REVIEW

plugged directly into the socket without some of the lead twisting associated with some three point connections.

In addition to the main rotary switch there are two slide switches on the front panel. The first of these was used to switch between a.c. and d.c. for the voltage and current ranges. The second switch was related directly to the frequency counter and was used to set the input trigger level between high and low sensitivity.

With regard to the physical layout of the TM-5375, it was a very convenient size and a very snug fit in my hand at least. For use on the bench there was a handy flip down rest at the rear which set the meter at a convenient 40 degree angle.

In Use

One of the first questions that must be asked of a measuring instrument is its accuracy. The main specifications tell most of the story and I have not reproduced them here due to lack of space. However, I also took the time to make some comparative measurements with good quality test equipment.

I was pleased to see that the review TM-5375 was well within the specification on all measurements.

The frequency counter was a very useful extra and operated up to 17MHz on the review model. The input sensitivity for the HI and LO settings was 5V p-p and 200mV p-p respectively.

As is common with many modern meters the lowest resistance range doubled as a continuity tester with an audible beep to indicate continuity. The threshold for the beep was 50Ω, so all resistances less than this resulted in a beep. Although this is great for general continuity testing it's as well to be aware of the 50Ω threshold as there are many cases where 50Ω would represent a fault!

The operation of all the other facilities was fine with no problems encountered. The transistor test was a very useful extra, providing a valuable basic go/no go test.

The a.c. voltage range was only specified between 50Hz and 500Hz, but readings could be obtained at up to several kHz.

TM-175

This meter was very much the big brother of the TM-5375 both physically and in its operating modes.

Instructions were supplied in the form of a handy small booklet. The first part of which comprised a detailed performance specification with separate sections for each measurement type. Although at first this may also seem a little over the top, it is on occasions very useful to have this level of information available. An example was the Hfe transistor test where the specification gave details of the test current and the collector-emitter voltage. These are details that are essential if the test is to be used as more than just a go/no-go indication. The specifications also covered the maximum inputs and the degree of protection provided.

The operational instructions were set out very clearly with a separate section for each mode. The detail was very good and clearly aimed at the comparative newcomer to electronic test equipment.

The final section dealt with potential problems and maintenance, which is basically limited to fuse and battery changing.

Extra Features

One of the major additional features was the inclusion of a capacitance measurement range. This covered a very wide and useful range from 1pF through to 19.99μF. Connection of the capacitor under test was via two rows of four miniature sockets. These were well designed to take typical capacitor lead sizes and spacings.

Another interesting extra was the provision of a logic test position that allowed the meter to be used as a simple logic probe. The window used for the logic test was less than 0.6V for logic 0 and greater than 2.4V for logic 1. The visual indication of the logic state was shown by a down-arrow for 0 and conversely an up-arrow for 1. The down-arrow was accompanied by a beep, which again could be very useful when hands and eyes are needed to guide the test probes!

A very good l.e.d. test was provided on the TM-175 which lit the l.e.d. hence proving it worked but in addition gave an indication of the forward voltage drop. Whereas the TM-5375 used one transistor test socket for both n-p-n and p-n-p- types the TM-175 had separate four-way sockets.

The final point of difference concerned the power switching where the TM-175 used a separate slider switch mounted towards the top of the front panel.

Using The TM-175

As with the TM-5375, this meter exceeded its specification. I again carried out a few specific tests to see how the two meters compared. As you would expect the TM-175 came out best in all the tests. The frequency counter was slightly more sensitive requiring only 100mV p-p for reliable operation.

The frequency response on the a.c. voltage range was also much better controlled than the TM-5375. Although the specification only covered the frequency range 50Hz - 500Hz, it served as a useful indicator to beyond 30kHz the reading being 15% low at 30kHz.

Capacitance measurement was also very good, though I did notice that it took in the order of four to five seconds for the reading to stabilise. **PW**

Conclusion

Both of these meters certainly prove that the humble multi-meter has certainly come a long way over recent years and developed into a sophisticated multi-purpose instrument. As to which one you would choose, this depends on your need. If you are looking for a compact 'basic' instrument then the TM-5375 should fit the bill very well. However if you feel a need for a more advanced unit you need look no further than the TM-175. If I was going to make a criticism if would be the power switching arrangements on both meters. Being a forgetful sort of character I find the modern trend for equipment that automatically turns itself off a great boon. I did find that I kept forgetting to turn both of these meters off after use which of course dramatically shortens the battery life!

These are both very useful instruments with an accuracy which is perfectly adequate for the demands of the workshop.

The TM-5375 costs £36.75 (plus £1 post & packing) while the TM-175 costs £57.49 (plus £1 post & packing) and both meters are available from **Cirkit Holdings plc, Park Lane, Broxbourne, Herts EN10 7NQ. Tel: (0992) 444111.**

My thanks to Cirkit for the loan of the review models.

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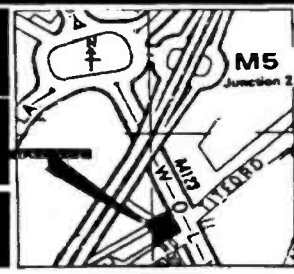

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Feature

Packet Update - 13

Roger Cooke G3LDI reflects and comments on the world-wide discussions taking place regarding suitable band-plans for packet radio.

HF Packet. IARU Meeting in Spain

Judging by the amount of private mail that is handled to all parts of the world by my BBS now, sometimes as many as 60 messages **per day**, it could be said that h.f. packet is catching on. This excludes the numerous bulletins which flow freely, given a chance, on the h.f. circuits. Of course, h.f. packet is subject to the vagaries of QRM and QSB, producing retries. That's what the retry parameter exists for, to cater for such conditions. But then, every mode is subject to the same QRM and QSB, so to state bluntly that packet is not suited for h.f. is naive to put it mildly. The official IARU line is still that, "AX25 and RTTY together with AMTOR should share the RTTY sub-band (note the definitive description) until it becomes clear how balance of usage emerges in the long term". No doubt I shall be trying to communicate from the 4th dimension (in the RTTY segment!) before any decision is taken.

This situation, having existed for the last five years, is getting perilously worse. A few comments from band users indicate that putting packet in with RTTY is tantamount to waving a red rag to a bull. Tom OD5NG, active on all digital modes says:

"Most of the adverse criticism seems to come from people who just do not understand the problem. I am worried that an all-out war will ensue on 20m, as I have read and been told that some RTTY operators are seriously considering putting up long beacon operating RTTY BBS which will serve no useful purpose to anybody. I subscribe to *RTTY Journal* and most of the articles are anti-packet below 14.100MHz. This sentiment is echoed around the world. I do think that Region 1 were in grave error in suggesting that packet expand downwards on 20m without all regions concurring at that time and they are really to blame for what has happened."

Tom goes on to say that 15m is being left alone at present with the exception of one (N4QQ-1 - I guess) station who forwards on 21.099 (with GB7LDI and 4X1RU). If we both kept rigidly to the 'suggested so-called plan' forwarding would not take place between the USA and the UK: QED. Tom also suggests that development of a new protocol called PACTOR, a cross between AMTOR and Packet will be the saviour of grace, if you know anything about this, perhaps you would mail me.

Notes from the IARU meeting in Spain

The following was received on my BBS and has been produced in its entirety:

"DJ6TJ (CHAIRMAN) - FELT THAT THERE WAS SUFFICIENT AGREEMENT ON THIS POINT AND CONFIRMED THAT THE FOLLOWING FREQUENCIES WERE TO BE SHARED BETWEEN SSTV AND FAX

A: 3.730 - 3.740MHz. - SSTV, FAX
B: 7.035 - 7.045MHz. - SSTV, FAX
C: 14.225 - 14.235MHz. - SSTV, FAX
D: 21.335 - 21.345MHz. - SSTV, FAX
E: 28.675 - 28.685MHz. - SSTV, FAX

"DJ6TJ (CHAIRMAN) - NOTED THAT ON 18 AND 24MHZ. THE RTTY ALLOCATION HAD BEEN MOVED DOWN TO THE PREFERRED FREQUENCIES.

"DJ6TJ (CHAIRMAN) - CALLED FOR A SHOW OF HANDS FROM SOCIETIES WHICH WERE IN FAVOUR OF EXTENDING (PACKET - RADIO) OPERATION ABOVE 14.100MHZ. THE VOTE PRODUCED: 9 COUNTRIES IN FAVOUR 18 COUNTRIES AGAINST WITH 7 ABSTENTIONS. THE CHAIRMAN SUGGESTED THAT THIS MATTER BE CONSIDERED AGAIN IN A YEAR'S TIME.

"IARU - BANDPLAN SHOULD COVER ALL TRANSMISSION MODES. REGARDING RTTY, PACKET RADIO PREFERRED OPERATING FREQ. AS SHOWN HERE:

14.070 - 14.099MHZ. RTTY.
14.089 - 14.099MHZ. PACKET RADIO.(+)
18.100 - 18.110MHZ. RTTY.
21.080 - 21.120MHZ. RTTY.
21.100 - 21.120MHZ. PACKET RADIO.(+)
24.920 - 24.930MHZ. RTTY.
28.050 - 28.150MHZ. RTTY.
28.120 - 28.150MHZ. PACKET RADIO.(+)
29.200 - 29.300MHZ. PACKET RADIO (NB FM) (+)

(+) = PREFERRED AREAS OF ACTIVITY.

"THOSE INFO ABOVE IS NEARLY WHAT WAS DISCUSSED REGARDING DIGITAL MODE, THERE IS A VERY BIG BOOK INFRONT ME ABOUT MANY THINGS WHICH WERE DISCUSSED LET ME KNOW IF YOU NEED TO KNOW ANYTHING ESPICAILY SO I WRITE IT TO YOU. OD-LAND GROUP WAS NOT IN THE MEETING NEITHER JY-LAND WAS NOT THERE.

"THIS ADDED...

"MORE ON THE CONFERENCE

"SARL. SOUTH AFRICA - WANTED TO HAVE PACKET SEGMENT ABOVE 14.100MHZ. BUT HAD NO PREFERENCE AS TO WHERE THE SEGMENT SHOULD BE LOCTED.

"OVSV. AUSTRIA - WISHED TO SECOND THE PROPOSAL AS IT STAND, IE, PACKET UP TO 14.130MHZ. BECAUSE WE HOPE NOT TO DISCUSS THE MATTER AGAIN IN THE FUTURE. OVSV NOTED THAT PACKET RADIO WAS GROWING.

"UBA BELGIUM - SAID THAT AS THERE WERE SIMILARITIES BETWEEN THE REGION 1 AND REGION 2 BANDPLAN IT WAS DIFFICULT FOR REGION 1 TO MAKE CONCESSIONS IN IT'S BANDPLAN.

"EDR DENMARK - SAID THAT THEY HAD A PROBLEM AS REGION 2 HAD PROPOSED ON FREQ. FOR PACKET RADIO REGION 1 WAS HAVING TO CONSIDER THE MATTER AS WELL. EDR FELT THAT COORDINATION SHOULD HAVE TAKEN PLACE WITHIN THE AC. IT WAS IMPOSSIBLE TO FIND A COMMON SOLUTION UNLESS AC CO-ORDINATION WAS POSSIBLE. EDR WISHED TO SUPPORT THE IDEA THAT ALL MODES SHOULD SHARE THE BURDEN OF PACKET RADIO, NOT JUST THE CW SEGMENT. THEY SUGGESTED PACKET ABOVE 14.100MHZ WITH A LIMIT TO BE DECIDED BY THE CONFERENCE, POSSIBLY 14.112MHZ.

"RSGB (UK) - WAS OPPOSED TO THE PROPOSAL FOR A NUMBER OF REASONS. IT UNDERSTAND THAT REGION 2 HAD RECENTLY TAKEN NOTE OF THE REGION 1 BANDPLAN, THEREFORE REGION 3 RATHER THAN REGION 1 AND 2 NEED TO ACT TOGETHER. THUS REGION 3 APPEARED TO BE ON IT'S OWN. RSGB FELT THAT IT WAS A MISTAKE TO LOOK AT OCCUPANCY. ALSO

MODULATION TECHNIQUES CURRENTLY USED WERE NOT SUFFICIENT AND MORE EFFORT SHOULD BE GIVEN TO THE REDUCTION OF BANDWIDTH. RSGB HAD YET TO BE CONVINCED THAT PACKET, IN IT'S PRESENT FORM WAS SUITABLE FOR HF ENVIRONMENT, RSGB FELT THAT AMTOR WAS FOR A MORE EFFICIENT SYSTEM AT PRESENT.

"HK3DEU (PRESIDENT REGION 2). - WISHED TO DRAW THE ATTENTION OF THE MEETING TO THE POSITION IN REGION 2. PACKET WAS NOT LOCATED IN THE IN CW SEGMENT BUT IN A DIGITAL SUB-BAND. HE AGREED THAT THE BANDPLAN MUST PROTECT THE 14.100MHZ. BEACON SUB-BAND BY AN ADDITIONAL 500HZ WHICH WAS DONE IN REGION 2. HE FELT THAT BECAUSE THERE WAS UTILISATION ABOVE 14.100MHZ REGION 2 COULD NOT ALLOCATE THAT PORTION OF THE BAND TO DIGITAL MODES. HE SAID THAT REGION 2 ALWAYS CONSIDERED SERIOUSLY THE REGION 1 BANDPLANS HE SUGGESTED THAT THE 20M PACKET BAND BE FROM 14.340MHZ. TO 14.350MHZ. HE CONSIDERED PACKET RADIO AS HAVING DEFINITIVE ADVANTAGE DURING EMERGENCIES. HK3DEU CONTINUED THAT THIS QUESTION HAD BEEN DISCUSSED AT THE FINAL PLENARYIN ORLANDO IN 1989 AT LENGTH. ALL DIGITAL SUB-BANDS WERE INCREASED TO ACCOMMODATE THE NEW DIGITAL MODES OF TRANSMISSION.

"REF (FRANCE) - SAID THAT WAS GOOD TO HAVE THIS EXCHANGE OF VIEWS. THEY REGARDED 14.100MHZ AS THE =CROSS-ROADS= IN AMATEUR RADIO AND SUGGESTED THAT THE 14.100MHZ BEACONS BE MOVED TO A QUIETER PLACE. REF SUPPORTED THE AUSTRIAN PROPOSAL TO PUT PACKET BETWEEN 14.100MHZ AND 14.120MHZ.

"NARS (NIGERIA) - SAID THERE WAS NO POINT IN MAKING A BANDPLAN IF IT COULD NOT FOLLOWED BY MAJORITY. HE SUGGESTED ADOPTING THE ITU SYSTEM AND TO PUT FOOTNOTES IN THE BANDPLAN. PACKET SHOULD BE GIVEN MORE ROOM.

"ALAN TAYLOR G3DME (IARU BEACON CO-ORDINATOR) - HAD LISTENED TO THE REF SUGGESTION TO MOVE THE 14.100MHZ. BEACONS AND THIS WOULD BE CONSIDERED. HE SAID THAT IF ALL REGIONS DETERMINED THEIR DIGITAL BANDPLANS SEPARATELY THERE WOULD BE AN INTOLERABLE SITUATION. HE WOULD PREFER TO MAKE A DECISION AS SOON AS POSSIBLE REGARDING THE 14.100MHZ BEACONS SO AS TO ADVISE NCDXF.

"SSA - (SWEDEN) - SUGGESTED SPLITTING THE DIGITAL MODES AS PACKET WAS A WIDE BAND MODE WITH THE OTHERS NARROW BAND MODES. ALSO MORE SPACE WAS REQUIRED ON 20M. FOR PACKET TO ALLOW FOR MORE MAILBOXES FORWARDING TRAFFIC, THERE WAS VERY LITTLE AMATEUR TO AMATEUR PACKET TRAFFIC. SSA SUPPORTED EXTENDING PACKET UP TO 14.120MHZ.

"DARC (FRG) - WERE AGAINST PACKET BETWEEN 14.100 AND 14.150MHZ AS THIS

"... FROM THE 4TH. DIMENSION..."

WAS A GOOD PART OF 20M FOR DX WORKING. THEY BELIEVED THAT HF BANDPLANNING WAS ONLY SENSIBLE IF BANDPLANS WERE ALIGNED ON A WORLWIDE BASIS. AGREED WITH THE RSGB THAT PACKET WAS NOT VERY EFFICIENT AT HF."

I would now like to present a few extracts from messages received at my BBS regarding the shambles that exists on the h.f. bands at present under the auspices of a 'Gentlemans' agreement'. It is becoming demonstratively apparent that the so-called Gentlemans' agreement is quickly deteriorating to not only a war of words, as I shall show, but a display of anger and frustration at the fruitless meetings of the IARU and the inability to arrive at a solution to the increasing problems on h.f. Region 1 and 2 cannot even agree on the most basic requirement of h.f. international packet frequencies. Indeed, some representatives, our own included, are still under the opinion that packet is not suited to h.f. at all.

This statement, after international forwarding of mail and bulletins have been going on for five years now, must surely qualify for the Ostrich in the Sand award. I wonder what qualities a mode must possess in order to gain a 'suitability to h.f.' credit? Is it a retry count in excess of 5? Or a PACLEN in excess of 25? Perhaps it's the fact that packet does not work when placed in the RTTY segment? Any packet operator worthy of his salt could have told our representatives this would be the case, long before any practical trial took place. Not only that, but the RTTY users of the RTTY segment would take offence at 'intruders' in **their** segment of the band.

Indeed, this is now the case. There are few GB7 stations actively trying to pass traffic, successfully I might add, on the h.f. bands, so therefore are we to be ignored, possibly until all traffic is sent via high-speed links on geostationary satellites? I would like to think not, because in my opinion, there will always be a need for h.f. links; sorted out, they could operate very smoothly, given propagation, lack of QRM and a lot of understanding and foresight of the problems, present and future. Remember, you might want to send mail to USA or South America or the USSR. Even if you do not operate on h.f., the mail gets there via an h.f. link. So, get your finger out now, pen a letter to G3ZAY and let's hear some voices of support. Send your support for a separate segment for packet common to both Region 1 and 2 to the address on the right.

The HF Committee Chairman,
Martin Atherton G3ZAY,
41 Enniskillen Road,
Cambridge CB4 1SQ.

Back-Scatter

HF Bands

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

Hello again! Since last reporting, I have had the pleasure of a visit from G3MWF, and then of meeting GM3JDR, GM4OFI and GM0EXN in person, and of exploring the far North of Scotland and Orkney. There is an interesting Wireless Museum on South Ronaldsay, and of course big eats at GM0EXN's restaurant in Dunnet at the end of the day. Incidentally, for the v.h.f. enthusiast from a big city, at the viewpoint by Dunnet Head Lighthouse one can work into GB3IG near Stornoway, GB3SS to the south and, of course, GB3OC, with nary a smell of deliberate QRM, as well as looking at the views!

However, I don't seem to have missed all that much on the h.f. bands, with conditions still doing their summer thing; and at least when I got back the beam and the l.f. wire were both still in place!

So - perhaps we should get on to the matter in hand!

Events

At the moment the hottest news around is of the first genuine ZA operation for a couple of decades; HA5WE is said to be definite but other sources have indicated that HA5PP will not be going. At the time of writing the operation has not yet been heard, but the Hungarian group are not in the habit of a busted flush, so I maintain hope. Donations are being solicited, and should go to Jacques F2YS/W2, Box 1384, Milbrook, NY 12545, USA - if the operation doesn't come off the donations will be returned. As for the PY operation, PY2PE is now said to have 'changed her mind' about going to ZA, and apparently would not confirm whether she had had operating permission. Also, G0FTD reports that PT7BZ says there is another Brazilian group who are negotiating for a ZA-permit, but don't hold out much real hope. Confusing, ain't it? (Later: the rumours postponed the start date to July 20 and ZA1R came on 7.003 with quick c.w.....Tirana Slim again!)

YU400 was noted operating in Honduras as HR0CRACH....imagine that on c.w., say, in a WPX contest!

Word of ZD9; it is understood ZD9BV is building a new home, and will be more active when this task is complete; and it is understood there has been some activity from ZD9CN on Gough Is.

When looking for JAs these days, don't forget they are now also appearing in the form of 7K1... - 7N1... callsigns.

The Russian team on Spratly ended up with over 43 000 calls in their logs, and although there were uncertainties before the actual start, the actual operation must go down in the records as a real five-star job. Still with the biggies, the Conway Reef gang made it back safely with 45 000 QSOs in the logs of which some 25% were in Europe.

On the black mark side though, the 70 team who rightly stopped working EU after bad behaviour; but of course it will probably take months before the DXCC status of this one can be resolved despite their satisfying a known need. A wonderful thing is politics!

A very special special station now....DA1WA, August 3-5 from Castle Frankenstein, Darmstadt. Blood-drinkers, to your posts!!

The Bands

As we have already said, summer conditions. The sunspot count is suggesting that we passed the peak in late 1989, but on the other hand there have been periods when the A-index has been nice and low, which is useful. So - let's see what everyone's been up to:

Top Band

G0FTD (Whitstable) says he thinks this will be his last report for a while as his 45 metres of antenna wire succumbed to gravity just before he wrote. However, he did manage GI0BDZ, GB0IVT and GM4PMC.

G4ITL (Harlow) mentions in a letter that he and G4AKY still have a rattle on the key on Top Band every now and again, and he reckons that when it gets a bit nearer the bottom of the cycle he may give it a serious whirl.

And, would you believe, no-one else gave it a mention!

The 3.5MHz Band

Here also is a band which suffers from a combination of too many sunspots and too much summer (although the latter has perhaps been visually lacking this year!). Be that as it may, G0FTD reports LY2BH, LY2ZO, YL3BKB and UC2LEG.

Turning to **G0KRT** (Welling) Eric is now knocking up a Heath HW9 kit. Meanwhile he still has his 1.5W of QRP, and with this and a key Eric has managed DL2ZG, GW4UYT and ON5AG, plus two-way QRP with G3KRR, G3XYO, G3UZU, G4ABV and G4ZPY.

At **G0HGA** (Stevenage) we find Angie has raised DJ8SW and F1LAW. **GW0HWK** (Wrexham) worked GU2FRO in Sark on this band. **ON7PQ** (Kortrijk) managed to complete c.w. contacts with SV/DL6RAI and SV/DJ2GM/P, before sending in his report and nipping away to LX for a holiday.

The 7MHz Band

This is where, this time at least, things begin to be interesting. G0HGA offers 4U5ITU, TA5KA, SO5IWG, OM3CSA, IY2RLX a special for the XYL of I2RLX, 4U1ITU, K1SS, K1PZJ, UB5LCJ, UA2FAT, UZ9XWV, UA1AQF, UA4FDI, RA1OEM, LY2BNZ, RA1AOM, LY2PAQ. An interesting one was Y2/DF2XR/M, a West German operating mobile in East Germany is something we wouldn't have thought possible a few years ago!

Alas for this column, **G3BDQ** (Hastings) has been spending his time in pursuit of the DX on 6m - a defector, no less! However, on 7MHz, John did manage to key with TR8XX.

Now to GW0HWK who notes contacts with 4U5ITU, HB0/DK3TE/P, YU7AJM, UB5SDC not to mention quite a bunch of UK stations.

At ON7PQ, the activity is all-c.w., so the list includes such as ZS6AOM, ZB2/DK6AS, SV9/DL6RAI, UJ8JKK, AG1JV, 9M2AX, 5Z4FP, CX9AV and ZD8Z.

On to G0FTD who says that on 7MHz his contacts added to UA6ECU and LA7QK on North Cape.

Finally for this band, **GM3JDR** (Aukengill) who managed J49BDX and 3D2AM, the latter incidentally at 1915UTC.

Silent Key

Only this morning I heard of the passing of V31BB. He is understood to have been working on a high-voltage p.s.u. at the time of his death. More details are awaited, but at the least it points out one of the dangers of our hobby.

WARC Bands

G3BDQ has a 10m sloping arrangement, centre-fed at about 7.5m and running E-W - hardly a promising set-up for DX! However, a couple of sessions on 18MHz brought in RA3AET, HA0HW, K2ANR, JJ3WPF, JA3NLT, and a couple of stations in Sakhalin, UA0FD and UA0FDD. A session on June 16 for an hour netted JA7FEZ/6 (Okinawa), JE2URF, JF2QGL, JA2OLJ, JA3QJJ, JA4MES, JA5AJQ, JA7JI, JF7XKY, plus NJ3S and LY2AU for good measure - all from one CQ and a QRZ? at the end of each QSO.

Also on 18MHz, GW0HWK found 3X1AU, 3X1SG, 7X5ELK, D44BS, ON6DP, W3GQT, and W2YD. Mike also used 24MHz, where ZP5JCY, W2FLK, OE1NY, and GW0DFY were all booked in.

Now for **G4ZZG** (Mansfield), who used c.w. on 18MHz to raise 5B30SA, LY2AU, F, SP, DJ, EA, UI, UG, RB, IG, UO, HA, UV, LA, JH5AVM, WA2SPL/1, JA1QXY, K1AAG/MM off Sicily, WB1GZC, CU2AR, JA6GIJ, N5VV, VE1BY, W8DZ, K2KPF and a Gotaway in FM5DJ. As for real DX how about a 24MHz CQ one morning which found a dead band, but a call from G4TQK at 19km.... a small world!

G0JBA (Sittingbourne) says that as he wrote his letter at 2330, he was listening to 18MHz and found it rather noisy with not much activity or DX; but on a single foray on 24MHz, YB0USJ was worked.

Down to Bath now, and G3VWC who stuck to his c.w., and managed WA6UDR, W6HKY, JA8BWU, JA2OLJ, K6EID, KX9M, W6OZ, K9APW, W6VD, K5ONF, W8EGB, K8CIT, KL7CYL, K0WKT, W4BMO and East coast Ws and VEs.

9H1IP (M'Scala, Malta) now: Vincent found 24MHz rather unprofitable, but he did manage RA2FF, UF7FWR, W1DW, OH3AC/OH0, and GD4OEL, with gotaways EL2B, EL7X, 9M2MU and FR5CN. Turning to 18MHz, Vincent raised CT0B, PJ4/HB9TL, A92BE, EN1AM, YL1XX, 5N8ZHN, HC2NI, VR6JR, 5B30SA, OX3CS, VR200PI/JR, UQ2GC, OH3AC/OH0, VK2EYI and SV5FD; Gotaways included IS0XBS, KC4GEC/HR5, NH6C, WZ6C/ST4, VP8CBL, HL1IUA, HH2PK and 6Y5IC.

G3NOF says he is still 'getting the hang of' the 18MHz band, but finds USA audible from 0800Z through to midnight; he QSOed A92BE, A92DQ, HC8GR, JA8BMU, KE5KJ/YV5, KK6KO, KW6J, OM2BTI, RA2FF, RO4OR, RW9FW, SV5FD, SV9AKI, T5RR, TK/DL7HZ, TU2QQ, UQ2GC, V63AY (Micronesia), VR6JR, VK3AHJ, YB0BAG, YL2AG, YV5DEH, YV5HNI, ZP5JCY, 3X1SG, 5N8ZHN, 7X5VRK and 9H4L. Don has now also put up a dipole for 24MHz and here the band conditions are strange since often they are near the m.u.f., characterised by deep fades from S9 to inaudibility; however, he connected with A92BE, ES1QD, EI6GY, EA8BWG, K1ZFE, KP4A, LX2KQ, OM2BTI, SV1AAW, TU2QQ, UQ2BT, VE2LER, W1DW, ZS6GG, 4X4FR/M and 5B30SA.

Enter **G2HKU** (Sheppey) who used 10MHz to raise ZM4HB, DF4ZU, and DF9FM, while on 24MHz HA0HW was mopped up.

For GM3JDR 10MHz yielded 6W1QB; but on 18MHz Don raised UA9XDU, VE7WH, W6OKX, W6ERS, RV0YF, UM8MBI, RA9ABD, YB5QZ, JE2QEV, JR2RVC, JA1MVR, JA1CHN, RL7GA, JA1UQP, JJ1FSK, JA1CXC, JR1REZ, UW0SQ, UA9OKT, ZS6AL, UI8BIE and 6W1QB.

Now for a mention of 10MHz; G0FTD found FE6MFU, FD1NUO, OM1FRR, F6EZH, and OM2BTI; on 18MHz, SSB brought in HZ1AB, CU1AC, RW3AH, JI2KXK, EI6GV, 7X5VRK, WW4H, K3LGC, PT7BZ, JH5AVM, WA3KEU, GM2BUD and OM5BTI. As for 24MHz, we find him contacting A92BE, OM2BTI again, YB0WR, EA6AAJ, N0XA, PT7BZ and 4X1UN.

Finance

A press release from the North California DX Foundation indicates they have supported DX-peditions to the tune of $80 000 in the year to June 13; among these were 0QA51JS, 3Y5X, VK9EW/VK9WB, 3D2CR/3D2AM, 3C1AG, AH3C/KH5J, XU8CW/XU8DX, XW8CW/XW8DX, ZS8MI, 3C0GD, XF4L, S9AGD, ZY0SS/ZY0SW/ZY0SY, PA3CXC/ST0, 1S0XV and ZS1IS, not to mention $3000 in support of the World Radiosport Team Championship in connection with the Goodwill Games in Seattle; we hear that this event has teams from 22 countries taking part now. If you feel like supporting them in their efforts, a donation can be sent to W6OSP, Treasurer, Box 2368, Stanford CA, 94309, USA.

The 28MHz Band

Worst of all, in terms of the effect of summer-time conditions. Not surprising really; but it IS surprising that G3NOF's letter omits all mention of the band for the first time the column can recall in 24 years!

However, G2HKU steps into the breech and offers his c.w. to ZZ5IW/PY8, OY7ML, UI8DAE, I1YRL/I9O, LU1AO and HK3RQ.

Back-Scatter

For G0FTD the band yielded, on s.s.b., CX3FJ, 4X6RL, WP8CLZ, OM1DVN, UD70GF, DJ1PB/MM, Y28UN, and a lot of assorted EUs. Trying out the 29MHz f.m. produced QSOs with AG2MN/1, DH6CAJ, SM7RME, LA0EM and again other Europeans. Andy notes the OM prefix reported by so many people this time is to commemorate 60 years of amateur radio in Czechoslovakia.

Now we turn to the all-c.w. log of ON7PQ; Pat notes contacts on 28MHz with J28JG, 3W1PZ, 3W6PY, ZB2JC, 9Q5SL, HK0BKX, ZS10JUN and 7P8EN.

G0JBA says that allthough his list is all 'phone, he keeps his straight key fist going by a regular session with G3AFV on a regular sked. The mic-bashing, then yielded A92EV, CX1BBC, EL2WK, G0JFX/MM in the S Atlantic en route for Costa Rica, IK8JVU, PY1DC, TA5L, VP2VE, VP8CDK, 3B8FQ, 5B4SA, 5T5SR, and W1, 2, 3, 5, 8, 0 call areas. A flight of f.m. in turn gave K3DI, N1GR and RA6LBB.

G4ZZG notes the reply from a dead band effect so noticeable on this band; he called CQ on a dead band and got a bite from OA2AM, around noon zulu. Other contacts were with ZS6BUD, CX4GL, PY2SHT and, of course, the usual short-skip stuff.

Even GM3JDR doesn't seem to have had much time for 28MHz this month; Don mentions RH0E, PY2OE, 3W6PY and VK9WB.

The 21MHz Band

G2HKU back again; Ted raised IT9BCG/I90 and SV9/DJ2GM/P.

Now to G3NOF. Don says conditions here have not been very good but at the time of writing things were picking up; for the first time G3NOF's sked with K2IJ was successful; in the mornings the band has opened over the N. Pole to the Pacific, all of which added to contacts on s.s.b. with CP7ET, ED9CI, EL2WK, FO0IGS, FR5ZU/T, H44RW, HL5FKN, HS1BV, HY6JUN, HZ1AB, IK7FFX/I90, IZ0MR/90, JAs, JY9SR, KL7QR, KL7TC, KL7XD, LA9QCA/OD5, OH2AP/OH0, PJ2MI, RH0E, RW9USA, TA5C, UL8DWD, UM8MCW, UZ0LWC (Zone 19), UZ0SXC, UZ ZWA/UA X (Z. 19 again) V51BI, VP5E, V29AN, YB3CN, ZK3EKY, 3C1EA, 3D2AG, 3D2XV (Rotuma), 4K3SS, 4U1ITU, 4U5ITU, 5V7RF, 5Z4BP, 8J0XPO, 9K2DB, 9M2FL and 9L1US.

Over the water to ON7PQ; Pat spent more time on 221MHz than the others and the effort paid off by way of c.w. contacts with 3D2AM (Conway), TZ0MAR twice, UK4/UA6WCG. A35KY, 9V1XR, VP2EXX, ZB2JC, ZD8LII, H44RW, F1LZH/TR8, JA9IAX/JD1 (Minami Torishima).

At G0FTD we find OM2BTI on s.s.b., followed by CW to TZ0MAR, JA2YKA, JA0ZRY, UZ9XWH, JF1SEK, JG3KIV, UA0TO, UL7OB, UL7ACI and LU3DOV.

On 21MHz, G3BDQs c.w. went out to RV9CFP, LU1ICX and S79VD.

Looking at GM3JDRs list, 21MHz c.w. was the mode for FP5DX, IS0XV, JT1T, 4K4AFM, 4K3BB, 4K4/UZ9KWJ, 8J90XPO, 3W1PZ, FR4FD, Y90ANT, TA5KA, 8J9ARL, FR9A, 8P9AQ, LU6EBY, LU6ENY, P43GR, US1A, PQ4OD, LR5A, ZW5B, 4J5FV, ZS6BCR, J49BDX, SM0OIG/YN, VS6WV and ZY0TW.

Just a single one of note for GW0HWK, by way of a QSO with 9L1US.

Now we come to the list from **GM0DEQ** (Hurlford, Ayrshire) who mentions UT5UJY, K2QIL, EV9AX, WD4AIY, RA9LE, LY2PAP, YT2LM Y49QM, UA9KED, 4K4BAN, VP8BXK, NI3A, W4UUM, UA0ZDA, W2HUG, EA8BTU, UW0FP, VE3NXB, WT2N, AB2N, VO1BE, NK3W, WA2DED, AB4RI, OA4ZU1, KG4O, FY5FO and RV9UV.

Puzzle!

Those of you who own a copy of the RSGB World Prefix Map can look in Square BH and find a group, marked in right by the 'e' of 'Polynesia' called Scilly Is. No other map or atlas known to the column shows this group, so does it have any existence? If not, one wonders who was the joker who put them there instead of the usual place off Land's End - we are sure neither G0AEA nor G3RPC is aware of being translated to the South Pacific!

The 14MHz Band

First, G3VWC, who mentions just a couple by way of N7AOO and VE7FNP.

As for G2HKU Ted seems to have put most of his effort into 14MHz, so the list refers to VK5AL, VK5GZ, KA3GTM, 9J2AL, 9H1BB, EG8RCT, UA9AFS, ZL1VV and IK2IQC/I90.

G3NOF found this the most consistent band, open when others are closed, but plagued by a lot of short-skip. He racked up s.s.b. log entries with C30CAG, J28AG, PY0FF, TA1AR, TA3G, TA5C, TJ1SR, TZ6PS, US1A, V31BB, YB0JVT, ZS6WPX, ZY0TK, 3B9FR, 4K4/UZ9KWJ, 4X6DW, 5T5SR, 7O1AA and 9M8FH.

For G0HGA it was either the quarter-wave vertical, or the end-fed and around 20W; this it to K8XF/MM, DL6ZBA, HA7PF and RB1N/UB5AEM.

ON7PQ managed Y90ANT, 8P9AP, 4K4/UZ9KWJ, 3W6PY, UA9HAE/UA0, 4K4POL, XF1C and TR8JLD/QRP. It is interesting to note that Pat notes the IOTA reference of new ones he works; is 'Islands on the Air' originally devised by Geoff Watts of the useful Lists, going to become the 'in' thing to do after you have knocked off all the DXCC countries available to you??

G0FTD tried s.s.b. on 14MHz, and hooked OM2BTI, UA0WX, WB4SIL, 9K2HA, W2RWE, GM0IST/MM/TA, UL8LYA, UA9FM, JG3KIV, UZ9XWX and JH4NMT.

It was all late evening or small hours for G0JBA; A43KM/P0 for Kuria Muria (QSL via the Omani Bureau, Muscat), ER2Q and W1, W2, W3, W4, W8.

Just one for G3BDQ, by way of RK4WAR.

On the other hand, GM3JDR puts up a list including JV0AA, UA0OFC, 4U5ITU, EX0CA, GB150PP, UA0WY, 4K4BEU, 4K4QQ, 4K3BB, 4K2/UZ9KWJ, 4J5FV, 8J90XPO, JR9YRL, UZ0ZWA, UA0SEW, 3D2AM, A43KM/0, US1A, FG5BP, 3W1PZ, JW9UDA, ZF2PF, FR9A, VU2NBI, 9V1YB, UM8DX, CO8LY, UA0ZDA, F1LZN/TR8 and IZ0MR/90.

The clip from G0HWX, includes VU2JX, DF3IF, OH2AP/OJ0, OM7LA, LU2FYU, UA3/G3JWY, 9H1GO and YV7AJM (Laroco Island). 701AA was heard working split but not raised.

The list from GM0DEQ is too long so alas we have pruned the lesser fry from it, to leave c.w. with PZ1DY, W2BIV/4, OA1AJ who, though in Hamburg is based only a few miles from GM0DEQ (the Scots brogue doesn't come through on the key, though!), NN0F, UZ7RER, VE2GDI, U0FP, VE3AR, AE4X, W2OKM, VE3PZI, VE3NRB, K3DMG, WA2SYB, N3HCS, PY2RJE, PY1BVY, SL7DS, VE1DLT, PP7IK, VE3ANB, K3KD, FM5FP, VE1ZR, VE1AUU, VE2FLE, RH8AA, N8JQ, K4RZ, K2FS, W8UMA, UV9CBT, N2BTO, KC1PX, TI2MUL, NT8S, NY3M, VE2EXP, WA5YYQ, NQ2Q and VE3AHB.

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

Back-Scatter

VHF Up

Reports to
David Butler G4ASR
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During the first week of June the quiet side of the sun was looking our way and therefore solar activity was very low. The solar flux on June 2 was down to 136 units. As expected, the return of the sun's active hemisphere, from June 7, provided a sharp increase in solar activity. There was an M type flare on June 9 and a small flare of 530 units on June 10. During this period some small ionospheric disturbances occurred but nothing came of them. In contrast, the period from June 11-17 saw some very disturbed conditions and some moderately good auroral activity.

On June 12, a major flare, commencing at 0541UTC, produced a severe sudden ionospheric disturbance (SID). At 0820UTC a major geomagnetic storm commenced, followed by a satellite proton event of 79 flux particles at 1140UTC and a polar cap absorption (PCA) at 1545UTC. The geomagnetic A index was recorded as 34 units, the solar flux being 219. This activity caused some very interesting radio conditions on the bands between 50MHz to 430MHz. Auroral propagation, between 1400 to 1800UTC, was noted on all v.h.f. bands, peaking to 430MHz at times. Later in the evening, between 2045-2140UTC, there was an Auroral-Es opening to LA, OH, OZ and SM on 50MHz. All signals in this opening being T9 with no hint of auroral tone. This was followed by another auroral phase, on all bands up to 144MHz.

When the aurora faded out, at approximately 2300UTC, it was noted that stations in Norway and Sweden could be heard, on the correct great-circle beamheading, perfectly readable T9. Surprisingly this was via tropo and not Auroral-Es as some operators thought. The band was in fact open via the tropo mode earlier in the evening but few stations recognised this, it being masked by the other propagation modes. For a few days following the major flare, the geomagnetic A indices were up to storm levels, reaching 41 on June 13 and 47 on the 14th. From June 18, the quiet side of the sun rotated into view, the solar activity reducing considerably to average 155 units. The geomagnetic A index also dropped to low levels, being down to 2 units on June 20 and 21. Remarkably, the last week of June saw a major restructuring on the sun. The sunspot count leapt from 153 on June 25 up to 370 on June 30. Solar flux levels rose correspondingly, reaching a level of 235 units on July 1. All this activity has thrown into question whether sunspot maximum has indeed been reached. Without a doubt, the autumnal period on 50MHz has exciting possibilities.

The 50MHz Band

Sporadic-E, the mainstay of propagation during the summer months, certainly increased the activity on the band during June and July. We are particularly fortunate that there are now 39 DXCC countries within Europe that have been

Back-Scatter

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
DN1CAK	1420	1166	1948	2725
ON1CDQ	1420	1166	1948	2124

granted access to 50MHz. It's a far cry from a few years ago when the UK was the only country active in Europe. We knew then that the band was always open to somewhere in the summer but we've had to wait until 1990 to find out precisely where to! Contacts could be made almost daily to countries up to 2000km away. If you were prepared to ignore the local Europeans and go hunting for DX you may have been able to work 5 continents, as indeed some operators did.

In last month's column I incorrectly gave the QTH of IK2GSO/IM0 (JN41) as the Island of Asinara. He was, as many readers have told me, on Maddalena Island. It still counts as Sardinia though.

I don't think there could have been any part of the UK untouched by Sp-E propagation. **John Hilton GM1ZVJ** (LTH) running an FT-690R with about 2W into a 3-element Yagi worked a number of new countries. On June 16, he contacted DK1KH (JN58) and I4RSH (JN64) followed the next day by OE9MDI (JN47). June 18 produced 5 new ones in the form of LX1JX (JO30), ON4KST (JO20), OZ6OL (JO65), PE1ISP (JO30) and SM7FJE (JO65).

Paul Feldhahn G7CFK (MCH) found much to occupy himself with. Apart from the more normal QSOs with CT, DL, F, GD, I, OE, OH, ON, OZ, PA, SM and 9H, contacts on s.s.b. were also made with IK2GSO/IM0 (JN41), OH0BT (KO09), TF3EJ (HP94) and LX1JX. Pierre HB0/HB9QQ was heard via meteor scatter on June 2 but not worked.

A very comprehensive listing of stations worked was received from **Dave Gray G8YYB** (LDN). June started off well with Dave hearing, on the 6th between 1840-1900UTC, IS0SZU (JM49) and IK2GSO/IM0. There was a terrific amount of activity on June 8, the band being open virtually all day to somewhere in Europe. Dave worked 12 countries, the highlights being OH0BT at 0815UTC, SV1AB (KM18) and SV1OE (KM17) both heard between 0910-1045UTC, OH5BM (KP41) at 1600UTC and GM1SMI/P (IO89) & GM0DRU (IO68) both via short skip Sp-E. The Icelandic beacon TF3SIX was heard between 1730-1816UTC, on June 9, but no other amateur activity was detected. IK8DYD/I90 (JN71) was heard sporting the world cup suffix on June 13. Later in the day, at 1825UTC, ZB0W (IM76) was worked for a new country. Conditions for the following week were really tremendous. The SVs were in again on June 16 with SV1ADG (KM18), SV1DH, SV1EN and SV1OE being recorded between 1540-1620UTC. Another station QRV from Sardinia, IS0AGY (JM49), was worked on June 18. In the early evening there was short skip propagation to Scotland, with GM1LKD, GM3XOQ (IO99), GM4GPP (IP90), GM4ILS (IO87), GM4UFD (IO97), GM8MBP (IO87), GM0DRU and GM0EWX (IO67) all being available. June 19 found IS0VCY (JM49), OH7AXB (KP32), OH8MT (KP24), GM1KHU (IO87), GM1YZW (IO68), GM3KBS/P (IO78) and GM0ILB (IP90). On June 20, the first DX station of the month was heard when ZS6BMS (KG44) popped out of the noise at 1637UTC, presumably a t.e.p. path extended by Sp-E at the European end. Activity, other than the beacon, was eventually heard from Iceland on June 22. PA3DWB/TF/P (IP03) was worked at 1832UTC, Dave getting him on the first call.

In addition to the normal European contacts I managed to work HB9SNR (JN36) via meteor scatter on June 3, OH0BT (KO09) via Sp- E, also on June 3, TF3EJ on June 4, 4U1ITU (JN36) via meteor scatter on June 8, OY3QN (IP62) on June 9, ZC4MK (KM64) Asia via double hop Sp-E on June 11, SM7s via Aurora and SM6s via Auroral-Es on June 12, T77C (JN63) on June 17 and LX1JX on June 18. Kosie V51E (JG89) was heard on June 6 at 1818UTC and again, on June 28 at 1701UTC. Another African country, A22BE, was heard briefly at 1635UTC on June 20. CU1EZ (HM76) was copied on a number of occasions, June 16 at 1556UTC, June 19 at 1920UTC and June 26 at 1813UTC but was never strong enough to work. More frustrating was to hear the YV5ZZ beacon (FK70) 50.043MHz, between 1700-1715UTC on June 19, but no other amateur activity.

John Heys G3BDQ (SXW) mentions that he was on holiday for some time during May and June but after reading through his list of stations worked I don't think he was particularly disadvantaged. Some of the more unusual contacts made included TF3EJ on May 24 and LA8WF/M, OH0BT, GM0DRU, GM0ILB and GM1SMI/P on June 8. If you want to work the continent of Asia, there is usually only two choices, either Japan or Cyprus. John was fortunate to find the latter, ZC4MK (KM64), at 1810UTC on June 11. Contacts were made with SV1OE on June 14 and two days later with SV1AB. A number of Sicilian stations, IT9LCY, IT9NAN and IT9SGC, were worked in an opening between 1830-1930UTC on June 17.

Jim Smith G1DWQ (DOR) reckons that the large increase in 50MHz European activity has made the band much more interesting this year and that it has partly compensated for the poor 144MHz Sp-E season. He thinks that the best period was June 16-19, with 50MHz open all day on the 16th and incredibly short skip, much less than 500km, on the 18th. Jim mentions a number of openings, the following being notable. On May 25, the path opened up to Namibia, with V51E and V51KC being heard between 1615-1745UTC. The same path was open the next day between 1650-1750UTC, with the V51E beacon being heard at S9 for extended periods. There was an opening to Israel on May 28, 4X1IF being worked crossband to 28MHz at 1748UTC. Between 2100-2130UTC, 9Q5EE was heard on c.w. peaking 439 working other G stations. The days following saw much of the same with V51E & Z23JO being in between 1630-1730UTC on May 29 and Z23JO again on the 31st but with the addition of a few weak ZS6 stations around 1720UTC. The aurora on June 12 must have come as a shock to Jim's rotator, having been fixed almost permanently to the south for some weeks! A number of stations in Norway and Sweden were heard in the event, lasting from 1530- 1900UTC. Later in the evening, 2015-2200UTC, the propagation mode changed to Auroral-Es, Jim hearing stations in LA, OH and SM. The aurora on June 14 was also detected, with Irish TV on 53.757MHz peaking 58A

Annual c.w. ladder

	Band (MHz)				
Station	50	70	144	430	Points
GD0ELY	7	-	111	—	118
G4ASR	28	2	82	—	112
G0FYD	27	—	44	—	71
G4OUT	-	2	49	—	51
G0DJA	17	-	10	—	27
GW4VVX	3	-	9	—	12

Number of different stations worked since 1 January 1990

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

	50MHz		70MHz		144MHz		430MHz		1296MHz		
Station	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	Counties	Countries	Points
G1SWH	36	30	27	6	70	13	34	8	—	—	224
G6HKM	48	27	—	—	59	14	21	6	14	5	194
G4ASR	10	30	21	5	45	24	—	—	—	—	135
GD4XTT	27	15	—	—	68	15	5	2	—	—	132
G0IMG	24	18	20	2	34	7	20	2	—	—	127
G8PYP	18	20	1	1	39	10	13	3	—	—	105
G0FYD	17	20	—	—	53	14	—	—	—	—	104
GW1MVL	2	2	—	—	43	10	11	2	—	—	70
GW4HBK	18	3	24	7	—	—	18	3	—	—	60
G6MXL	3	12	1	1	25	5	7	2	2	2	60
G7CLY	—	—	—	—	53	6	—	—	—	—	59
G4ZTR	—	—	—	—	36	12	—	—	—	—	48
G4SEU	—	—	42	3	—	—	—	—	—	—	45
G7CFK	18	12	—	—	—	—	—	—	—	—	30
GW7EVG	—	—	—	—	23	6	—	—	—	—	29
GM1ZVJ	1	8	—	—	2	1	—	—	—	—	12

QTH Locator Squares Table

Station	50	70	144	430	1296	Total
GJ4ICD	407	—	263	119	59	848
G3IMV	228	—	430	125	51	834
G3JXN	204	22	187	134	88	635
G6HKM	235	—	219	109	46	609
G1KDF	258	—	183	104	37	582
EI5FK	314	—	187	58	—	559
G0DAZ	146	—	221	137	39	543
G6HCV	309	—	233	—	—	542
G3UVR	—	50	257	140	83	530
G4KUX	—	—	372	120	—	492
G4RGK	—	—	284	124	50	458
G3XDY	—	—	206	148	91	445
G1SWH	185	26	156	59	—	426
G4DEZ	55	—	249	49	49	402
G0LBK	—	—	260	89	46	395
G6DER	—	22	183	110	78	393
ON1CAK	48	—	280	53	11	392
G8LHT	79	19	185	93	14	390
G1EZF	—	—	263	93	—	388
G4XEN	—	—	274	111	—	385
G1DWQ	239	—	144	—	—	383
G4MUT	82	22	153	93	31	381
ON1CDQ	43	—	255	56	7	361
G1LSB	44	—	172	143	—	359
G0EVT	88	—	209	57	—	354
G4ASR	268	38	—	41	3	350
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
G4TIF	—	—	200	110	—	310
G8PYP	166	2	108	32	—	308
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
GM0HBK	111	1	142	15	—	269
GW6VZW	118	—	143	6	—	267
G4PCS	—	—	258	3	—	261
G1GEY	—	—	168	77	11	256
G3NAQ	—	—	175	80	—	255
G0FYD	100	—	151	1	—	251
G6STI	—	—	152	69	24	245
G6DZH	—	—	156	87	—	243
G3FPK	—	—	241	—	—	241
G6MXL	52	22	97	48	20	239
G4IGO	—	—	238	—	—	238
G0EHV	—	—	160	75	—	235
GW4FRX	—	—	231	—	—	231
GM4CXP	—	—	198	31	—	229
G1SMD	115	—	106	—	—	221
G4DOL	—	—	216	—	—	216
G4MEJ	—	—	213	—	—	213
G8LFB	—	—	209	—	—	209
G8MKD	—	—	150	49	—	199
GJ6TMM	—	—	151	48	—	199
G4YCO	—	—	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
G7ANV	—	—	153	—	—	153
G4FVK	—	—	79	49	22	150
G4AGQ	—	—	104	42	1	147
G8XTJ	29	—	116	—	—	145
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
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
GW7EVG	—	—	16	—	—	16

No satellite or repeater QSOs
Starting date January 1 1975

Back-Scatter

for some considerable time. Multi-hop Sp-E was probably the reason for hearing the YV5ZZ beacon on June 19. It was heard between 1620-1700UTC, peaking 419. Later that evening, at 2200UTC, N4EJW reported copying G4AHN on 50.110MHz but no QSO resulted.

There's just enough room to give you all an inkling of what **Geoff Brown GJ4ICD** (JER) has been working on 50MHz. You would all get upset, if I really went into more detail! April 26, heard ZP6, at 1700UTC, but QRM on 50.110MHz causes contact to fail. May 1, heard FC1JKK/FY at 1650UTC, worked LU2DEK at 1825UTC, peaking S7. May 19, c.w. contact with FR5EL (LG78), he was heard for 45 minutes. May 29, heard the LU1DMA beacon on 50.072MHz at 1731UTC, after one hour of calling finally answered by LU8EEM and LU9EHF, both in locator FF95. June 2, at 1532UTC, worked A22BW at S7. June 3, CU1EZ at 1610UTC, heard 9L1US beacon from 1620-1735UTC. This may give you an idea of the wonderful QTH that Geoff enjoys on 50MHz. At the beginning of June, he was up to 407 squares worked, 330 confirmed and 92 legal countries.

The 70MHz Band

There were a number of interesting openings on this band during June. Aurora and Sporadic-E enabled some stations to work a number of new countries and counties. Other than that, most operators had to be content with the prevailing tropospheric propagation.

It's nice to be able to report some s.w.l. activity. **Alan Dimmick**, located in Glasgow, uses an FR101 fitted with an internal 70MHz converter board and an HB9CV antenna at 6m above ground. In the aurora on June 12 he heard G3IKR 56A, G4ASR 57A, G4SEU 57A, G4WND 56A, GM4DGT 54A and GM0GTU 37A. The latter station was very difficult to copy because of the auroral distortion. Alan mentions that he is sitting the RAE in December and hopes to work all the stations recently heard.

Dave Lewis GW4HBK (GWT) caught the second phase of an aurora on June 12. He worked 3 stations, the best being G6WEM in JO01. A Sporadic-E opening, on June 13 at 1744UTC, enabled Dave to work ZB0W (IM76) for a new country this year.

Another operator to find ZB0W was **Gerry Schoof G1SWH** (MCH). He worked the Gib station on June 4.

Collin Robertson GM0HBK (WIL) reports that he is now QRV on the band with 70W to an HB9CV antenna. Look for Collin during the next aurora.

Whilst beaming north, in the next aurora, you might hear **Malcolm Hamilton GM3TAL** (FFE). He listens most evenings at about 2130UTC on 70.200MHz but rarely hears anything on tropo.

Gordon Emmerson G8PNN (NLD) passes on the news that the Northumbria Amateur Radio Club has been operational, since 1987, on 70.475MHz with over 20 sets of converted p.m.r. equipment. Gordon is active also on s.s.b. with a 4CX250B amplifier and a 3-element Yagi at 10m above ground.

Ian Wright GW1MVL (CWD) can now be heard on 70.450MHz f.m. He is using a dipole fed with 4W from a modified Pye Europa.

The 144MHz Band

Despite a few very brief openings, the band saw little in the way of Sporadic-E propagation during June. Although ionisation on occasions was very intense, it appeared mainly to be directly overhead and of little benefit to us in the UK. There were however a number of days in the middle of the month when auroral propagation was prevalent allowing contacts to be made into central and eastern Europe.

But first, that elusive Sporadic-E! **Dave Brown GD4XTT** (IOM) made his first Sp-E contact of the year, at 1630UTC on May 29, when he worked EA7GFT (IM87). On June 4, another opening to the south gave contacts with EA7TL (IM76) and a new one in the form of ZB0T (IM76) at 1750UTC. The Gibraltar station was audible until 1820UTC, peaking 59. EB7BQI was heard during the opening but not worked. On June 18, Dave claimed an Sp-E contact with FD1LRL (JN27) but I suspect this was via a long meteor burst rather than via Sporadic-E.

Other correspondents of this column also caught some of the action. **Ela Martyr G6HKM** (ESX) worked EA7ZM (IM76) in the opening on May 29. On June 4, Gerry G1SWH worked EA7GAA (IM67), I also worked EA7GAA and EB7BQI and Mick Toms RS31976 (ESX) heard CT1DIZ.

There was an opening in West Germany, to Gibraltar, commencing at 1002UTC on June 5, in which **Wolfgang DJ3TF** worked ZB0T.

News of the Spanish opening which occurred on July 5 will appear in next month's column.

If the Sporadic-E passed you by, there was still a chance to work some DX in the auroras. In the event on June 12, between 1704-1745UTC, **Charles Coughlan EI5FK** worked OZ3GW (JO56), OZ8TU (JO65), SM5FRH (JO88), Y22ME (JO72) and a number of stations in G, GD and GM. The East German station was worked at 1945UTC, around the start of the second phase. Another opening, on June 14 between 1532-1610UTC, gave contacts with DK0TU (JO62), DK1KO (JO62), OZ1AZZ (JO57), Y22IC (JO63) and Y25NA (JO64) plus GD and GW. EI5FK requests that when he is calling specifically for DX that other UK stations do not call him. If you need to work EI, just turn your beam west and give a call anytime. It may not be as simplistic as this but please take note when a station is calling for a particular type of contact or you may end up in his black book!

Further to the north, **Frank Holland GI0AIQ** (ARM) made 27 c.w. contacts in the event on June 14, between 1420-1620UTC. Frank uses an FT767GX with integral 144MHz transverter, 100W amplifier and two stacked 9-element Yagis at only 6m above ground. Despite this relatively low height, contacts were made with DK0TU (JO62), F6CGJ (IN78), OK8DDF, PA0RLS (JO22), PA2GER (JO21), PE1LCH (JO32) and Y22IC (JO63). All stations were on a beam-heading of 50 degrees.

A number of excellent contacts were made during the aurora on June 12, by **David Law G0LBK** (YSS). Between 1440-1600UTC, QSOs were made with ES2XM (KO29), OH2TI (KP20), EI, GI, GM, LA, OZ and SMs in call areas 5, 6 and 7. He had similar results on June 14, working DL, F, G, LA, OZ, SM and Y, all between 1400 to 1730UTC.

The aurora on June 12 was so strong that G6HKM could hear GM1SMI/P (IO89) at 57A on a Trio 9130 and indoor halo. Bob's signal was many dB over S9 with the beam connected, giving Ela her first QSO with Orkney. Contacts were also made in the aurora on June 14 with stations in GM and OZ.

I found the first phase of the aurora on June 12 to be a fairly normal affair, c.w. QSOs being made with LA and SMs in call areas 5,6,7 & 0. I was called by ES2XM but he was so strong I thought he was a pirate and let him go! The later phase between 2200-2240UTC was very interesting. Contacts were made with DL, EI, G, GM, Y, HB9HFD (JN36), HG0HO (KN07) and SP4MPB (KO03). A smaller event, on June 14, gave me contacts with GI, GM, SM5MIX and SM7GWU, both in locator JO78.

Steve Damon G8PYP (DOR) reports a solitary contact with GM8VBX (IO85) at 1530UTC on June 14.

Stations to report the unusual tropo opening to Scandinavia on June 12 included EI5FK who, at 1704UTC, worked SK6HD (JO68) 51 bothways and G6HKM who worked LA3BO (JO59), LA8AK (JO38) and SK6HD. I managed to work SM6KJX (JO67) 55 at 2320UTC and SK6HD, a few minutes later at 59 bothways whilst G0LBK made a solitary contact with LA6HL (JO28). The band was also open to Norway on June 16, G1SWH working LA1T (JO37).

Other tropo openings occurred during June but they were pretty patchy and didn't extend much into Europe. Ian GW1MVL found the contest weekend, June 2-3, quite productive, contacts on s.s.b. being made into France and Belgium. On June 9, he contacted DL1EJA (JO31) for a brief QSO.

Another station to make use of the June contest was Steve G8PYP, who worked stations in 13 French locator

PROPOSAL TO BE IMPLEMENTED ON MARCH 1 1991

70MHz BAND PLAN	USEAGE	
70.000	70.000	GB3BUX
BCNS		GB3CTC GB3REB GB3ANG
70.030	70.030	PERSONAL BEACONS
SSB & CW	70.100	MS CALLING
	70.112	5B4CY (KM64PR)
	70.120	ZB2VHF (IM76HE)
	70.130	EI4RF (IO63SN)
	70.200	SSB & CW CALLING
70.210		
ALL MODES	70.260	AM & FM CALLING
70.300	70.300+/-	RTTY & FAX WORKING
FM SIMPLEX	70.3125	
	70.325	PACKET RADIO
	70.3375	
	70.350	
	70.3625	
	70.375	
	70.3875	
	70.400	
	70.4125	
	70.425	
	70.4375	
	70.450	FM CALLING
	70.4625	
	70.475	
	70.4875	PACKET LINKING
70.500		

NOTES:

[1] 70.350, 70.375 & 70.400MHz are sometimes used by RAYNET

[2] 70.125-70.450MHz is allocated in the Republic of Ireland

Back-Scatter

squares. A contact was also made with the special event station HY6JUN (IN99).

G0LBK reports that his new antenna system, consisting of four 9-element F9FT Yagis, is now working very well. Recent contacts in May and June, via meteor scatter, have included EA2LU/1 (IN71), EA3BEW, EA6VQ (JM19), HG3DXC (JN96), HG7B/P (JN97), IK0FEC (JN63), I5MZY (JN54), OH3BZY (KP10), SK3LH (JP93) and Y2/DJ2QV/P (JO74). He also found time to make his first e.m.e. contacts, working SM2CEW (KP16) on May 25 and SM5FRH (JO88) on June 24.

The 430MHz Band

Dave GW4HBK managed an s.s.b. contact with G0BPU (JO02) during the contest on June 10, but reports very little else occurring during the month.

G6HKM made a couple of contest exchanges during the European field-day on June 3, with ON4ARC/P (JO20) and FC1CDX/P (JN19) but like GW4HBK doesn't report any other DX contacts.

Welcome news from Colin GM0HBK insofar that he has his beam back up and is now running 100W into a 24-element Parabeam.

The Microwave Bands

Dave Ackrill G0DJA has been fairly active on 10GHz with a low power wideband f.m. system. He runs 5mW output from a Gunn Diode mounted in a surplus Solfan doppler head into either a 400mm dish, giving 5W e.r.p. or into a 600mm dish, producing 10W e.r.p. The receiver consists of a mixer diode feeding a 10.7MHz i.f. board and f.m. demodulator. Despite the simplicity of this system, results have been very encouraging. Contacts in 1990 have included G1RLR/P, G3PHO/P, G3UYM/P, G3ZME/P, G4MAP/P, G6NVS/P, G6UED/P, G8AYY/P, GW3ATM/P, GW4MAP/P and GW8IFT/P. The best DX was on May 6 when Dave, operating from Walton Hill, Clent, worked GW3ATM/P on Pen-y-Gadair Fawr, Powys, over a distance of 88km.

Proposed 70MHz Band Plan

Following an initial proposal by the RSGB v.h.f. committee to alter the 70MHz band plan, I have received numerous letters on the subject giving constructive criticism and some new ideas. The committee have taken these all into account and have produced a new proposal which they intend to implement on 1 March 1991. There is still time to change minor details, provided you communicate these to me before the next scheduled meeting of the v.h.f. committee on September 15. Don't miss this opportunity for you to influence the way the band is used.

Expeditions

A reminder that the following four expeditions, which I reported last month, are all scheduled to run during August.

Walter Steinwender, operating as **SV/OE6WIG**, is active until August 18, on 50.110MHz from locator KM19UW with 10W and a 3-element Cushcraft Yagi. He may also be found via meteor scatter, on 144.027MHz.

The Five Bells Group are operating from Iceland between August 4-14 on 144MHz and 430MHz.

Clive O'Hennessy GW4VVX is active between August 12-27 from locator IO78WA, on 50MHz and 144MHz, using the call sign **GB2XS**.

Bo **OX3LX** will be operating from HP15, on 50MHz, between August 3-23.

He will then move to locator GQ12 between September 1-28 and finally to GP80/GP90 from October 1-14. It is expected that Bo will also operate from GO89 during October.

Beam north if you want to work **GM/PE1KHP** (IO75) on 144MHz. He will be at this location, near Glasgow, between August 1-14.

Peter van Dokcum PE1JMZ will be operating Maritime Mobile, on 50MHz with an FT690R and dipole, from numerous wet squares whilst sailing between Portugal and Norway. The exact itinerary is uncertain as he will be in a yacht and therefore dependent on winds and weather. It is known that one leg of his trip will be between August 2-19.

John Hotchin G4ATA is mounting an ambitious expedition to IN79JX between August 10-17. He will be active from The Lizard, Cornwall on 50.190MHz, 144.190MHz, 432.190MHz and the h.f. liaison frequencies. John will use an IC202S, 25W transverter and 3-element Yagi on 50MHz, a TS780 driving a 4CX250B amplifier and two 14-element Yagis on 144MHz and the same driving transciever to a 100W amplifier and two 21-element Yagis on 430MHz. All antennas will be mounted on a 20m tower. Meteor scatter operation will also take place on s.s.b. but no details were given of frequencies or which period he would be transmitting in. Presumably, John will be found around 50.350MHz or 144.400MHz, transmitting during the second period, but a check should be made first.

It is expected that **Bill Somerville-Large EI9FK** will be operating on 70MHz during the peak of the Perseids from some rare squares on the west coast of Ireland.

LZ1KDF and LZ1V will activate KN42 on 144.151MHz via meteor scatter between August 6-12. During the same period, LZ1KDZ will be operating from KN43. Between August 11-13, UB5EDM/UB5V will be QRV on c.w. meteor scatter from KN43. Schedules for either of these stations can be obtained via the v.h.f. net on 14.345MHz.

You'll have to stay up late at night to work **HB0/HB9QQ** when he operates from Liechtenstein between August 11-14. Pierre will be QRV on 50MHz via meteor scatter from approximately 0030 to 0400UTC. When he was there in June, he operated on 50.185MHz.

The Haninge group will use the call sign **SK0NN** from a car ferry sailing through locator squares KO09 and KO19 on August 14-15. Running 100W and a 10-element Yagi, the group will be calling on 144.050 and 144.300MHz.

Hands up all of you that want to work the Isles of Scilly on 50MHz and 70MHz! The Midlands WAB Expedition Group are planning to activate the Islands from September 1. Further information and schedules can be obtained from G4ZUR at his packet mailbox GB7NUN.

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 practise of a number of operators heard on various ms calling frequencies. Just send me an A4 size stamped addressed envelope to receive a 10-page guide to practical meteor scatter working.

The Perseids meteor shower is encountered between July 20 to August 23, peaking on Sunday 12th. 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-south path, it generally being good at all times except between 0400-0800UTC and 1600-2000UTC.

QRZ Contest!

The entire month of August has been scheduled as an 430MHz activity contest by the RSGB.

The next few weeks will provide increased activity for the microwave operator. The 1.3GHz and 2.3GHz Trophy contests will be run on August 12, the 3.4GHz and up cumulative contests on August 19 and September 9, and a 1.3GHz activity contest period has been designated for the whole of September.

An IARU co-ordinated 144MHz contest will take place over the weekend of September 1-2.

The Scandinavian activity contests will be run on the following dates. Microwave activity on September 3, 144MHz on September 4 and 430MHz activity on September 6.

Interested in Amateur Television? The IARU International ATV contest is scheduled to run from 1800UTC on September 8 to 1200UTC on September 9. Please keep 144.750MHz clear of traffic as this frequency is used for ATV calling and talkback.

The Barking Radio & Electronics Society will not be holding their 144MHz contest this year because of the very poor response in previous years. They are however proposing to run a contest in 1991 to celebrate the 25th Anniversary of the Society.

Deadlines

Please send your letters to reach me no later than the end of August. The dates for the following two issues are September 24 and October 29. I can also receive messages via packet radio at my mailbox GB7TCM.

Back-Scatter

RTTY

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

DX Spotting

Any of you who have tried to capture some of the rare DX stations that appear from time to time will no doubt have been frustrated by the large number of stations all trying to call the same DX station. If you have the patience to wait your turn you will often find that the stations or conditions close before it's your turn! You may also have noticed that the keen DXers always seem to be at the front of the queue.

So, how do they do it? The answer is by utilising simple team-work and the true spirit of amateur radio. The technique is known as DX spotting and manifests itself in many different forms. The simplest example of this technique is the amateur who spots the start of a lift on 144MHz and announces the fact on S20 or perhaps the local repeater. This arrangement could be formalised so that a group of keen DXers pick a little used simplex channel and use it as a DX net frequency. If anyone spots some DX they then call in on the net frequency and announce details. This could even be extended to control the QSO so that the DX station works each member of the DX group in turn.

From this it's easy to see that with a little effort and organisation your DX achievement can be greatly enhanced.

Back-Scatter

There are of course many problems when using speech to communicate DX news. The most obvious being the need for repeats due to mishearing some of the information or a total loss while making the coffee!!

However this is by no means the end of the story, as technology has an important part to play in improving this type of group communications.

So far we have dealt with voice communications but wouldn't it be so much better if the DX information was to appear on a computer screen or printer so that you could continue to operate and pop in and out of the shack without fear of missing the vital information.

This is where packet radio comes to the rescue in the form of Packet DX Spotting Networks. These are a relatively new development and, as far as I'm aware, there are only two currently operational in the UK. So what are they and how do they work?

These networks centre around a node which consists of a radio, TNC and a computer running special software. The object of the exercise being to create a packet 'net' where many stations can log on and messages sent by any one station can be received by all.

The two key elements to creating this system are Packet Conference Bulletin Board (PCBB) and DX Spotting software from Pavillion Software in the USA. The PCBB differs from the conventional W0RLI/WA7MBL systems in several ways, the most significant being that it does not support message forwarding. It is the conference facility that allows many stations to be logged-on and receiving each others direct messages.

The DX Spotting software seems to have been very well thought out and includes a wide range of facilities designed to make life as easy as possible for the DX enthusiast.

One of the most used commands is SHOW DX which is abbreviated to sh/d. Issuing this command results in the last five DX stations being displayed. In addition to the callsign and band of the DX, there are a number of other useful features that may be displayed such as the station reporting the DX, signal strength, etc. You can also qualify the basic command to produce just the type of DX you are interested in. This can be reduced to just one band or perhaps just one prefix, for example sh/d 20 would produce a list of the last five DX loggings on the 144MHz band.

As if that wasn't enough there are a number of utilities provided to simplify DX operating even further. One that I particularly liked was the sh/heading command, this would give you the heading in degrees along with the distance in miles and kilometres to the specified prefix!

There are a whole host of other options available and in true digital style these will no doubt be under constant review to provide ever more powerful spotting systems.

Packet Clusters

The only problem with the PCBB system is that the maximum number of stations that can be connected at any one time is 26, which can be limiting especially in densely populated areas.

An alternative is the Packet Cluster software. This system features all the main DX commands, including the utilities but has some powerful network facilities.

The facilities lost are the conventional mailbox store and retrieve commands. However, 'live' messages can still be sent between stations that are logged on to the cluster by using the TALK command.

The cluster system works by employing two frequencies. One is used for local access to the node whilst the other is used to link the nodes together. This allows the same DX information to be received at all nodes within the cluster.

The inspiration for this foray into the world of DX spotting was a letter from **John Barber G4SKA** who is himself a keen DXer. Included with his letter was some interesting information from the Western DX Group who are currently trying to set up their own DX Cluster. Their network will link in with the existing UK systems so increasing the overall power for DX spotting.

The first site in the new cluster will be GB7WDX at Crediton, Devon. The only problem at the moment is funds which seems to be a common problem with this type of venture.

So I will end this section with a plea on behalf of the Western DX Group for donations to help complete this potentially very useful project. Donations can be sent to: Peter Green G0ABI, Hollowtree, Challices, Eggesford, Chumleigh, Devon EX18 7QX. For more information on the Western DX Group please contact John Forward G3HTA, Sunrays, Barnstable Cross, Crediton, Devon EX17 2EP.

RTTY DX

Just to prove the value of DX Spotting, John Barber has sent me details of some tasty Japanese DX for later in the year.

JH1QDB, Juni will be activating Ogasawara (JD1) between September 23 and 30. He will be using the callsign JH1QDB/JD1. Although he will be operating mainly RTTY he will run some c.w. and s.s.b. The planned frequencies are 14.088MHz/21.088MHz/28.088MHz for RTTY, .035 for c.w. and the main DX frequencies for s.s.b.

For those operating in the CQ World Wide RTTY contest he will be active for that.

QSL can be either via the bureau or direct to: Kuni Fujii JH1QBD, Hanasaki, Narashino 275, Japan.

BARTG Rally

Sunday September 16 sees the 1990 BARTG rally at the Sandown Park Exhibition Centre near Esher in Surrey. This is a very popular rally which has very easy access by road and free car parking. There was some criticism last year regarding the lack of space, but this year they have moved to the large hall which should solve that problem.

I will be attending with the magazine but we will only be running a small stand due to other commitments.

If you do manage to visit the show please come and have a chat as it's always good to have some feedback direct from readers.

Found an interesting piece of software? Heard about a new decoding package? Drop Mike a line and share the news. Don't forget the RTTY column is YOUR page!

PC-RTTY

Regular readers will remember that I recently reviewed the PC-RTTY program by Mike Martin G4VRQ. I had version 1.53 for the review and made mention that version 2.0 would be available soon. Well I have just heard that this new version is on the market. The prices are £9.95 for the 5.25in disk version and £12.00 for 3.5in disk, both prices are inclusive of p&p. One important point to remember is that you must include your callsign with the order. If you are a short wave listener then your name or listener number should be included.

For those who would like to upgrade from the original 1.53 this can be done at a reduced rate by returning your original disk along with a cheque for £5.00. If you need a new disk the cost is £6.00.

Version 2.0 of this program supports 45, 50, 57, 75, 100 and 110 baud operation using standard ITA No2. Other facilities include full colour display, printer echo, message file and QSO review windows. This is in addition to the features of version 1.0.

Orders for the new program can be placed via BARTG by sending to Peter Adams G6LZB, 464 Whippendale Rd, Watford, Herts WD1 7PT. Alternatively contact Mike Martin G4VRQ, 16 Dingley Rd, Bulkington, Warks CV12 9LP.

SARTG World Wide RTTY Contest

I know I gave you all the details of this contest a couple of months ago, but this is just to serve as a reminder. If all has gone well you should receive this magazine just prior to the contest which is on the weekend of August 18/19. The timings are:

0000UTC - 0800UTC Saturday August 18

1600UTC - 2400UTC Saturday August 18

0800UTC - 1600UTC Sunday August 19

The bands in use are 3.5MHz, 7.0MHz, 14.0MHz, 21.0MHz and 28.0MHz.

Don't forget I will be very interested to hear your reports on the contest.

Back-Scatter

Amateur Satellites

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

According to Richard Ensign, speaking at the Dallas HAMCOM convention in June, four more NASA Shuttle astronauts have now become US Technician Class Amateur Radio licencees and Ken Cameron is now upgraded to the General Class licence. We shall soon get more details on the names and their callsigns allocated soon, and on future missions they may crew. These may now have both the commander, crew, and possibly even the new YL astronaut on board, they now having joined the ranks of amateur radio operators.

STS-35/SAREX Mission Delay

In late June the NASA engineers and technicians found the hydrogen leak which prevented the planned lift-off of the shuttle *Columbia* (STS-35) on May 29. Because of the critical danger of an explosion from a hydrogen leak in the engine compartment and a further disaster, NASA officials were forced to abandon the launch and devote full attention to find the source of the problem. It was finally located between two plates that connect the shuttle and the external tank.

Since this constituted a major repair that could not be performed on the launch pad, *Columbia* had to be rolled back to the huge Vehicle Assembly Building. It was considered that repair of the leak and the return to flight readiness status of the *Columbia* shuttle could take about a month, but, complicating the repair work was the planned launch of the shuttle *Atlantis* (STS-38) for mid-July. NASA officials are now saying that it could be late August before *Columbia* carrying ASTRO-1 and the

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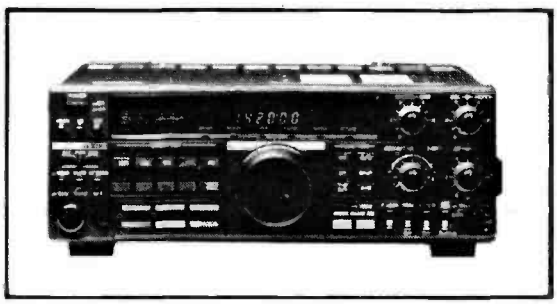

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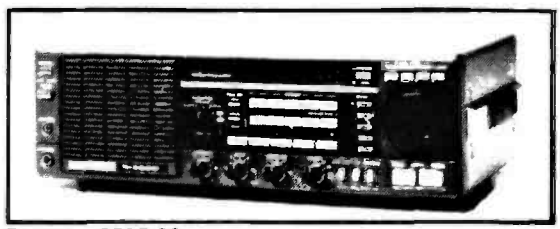

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VISA

Access

Instant finance available subject to status. Written details on request.

Back-Scatter

'SAREX' Shuttle Amateur Radio Experiment is able to go ahead.

Full details of the amateur radio operation are available, but we have not taken the space for publishing them as regrettably, the planned inclination will not bring it above the United Kingdom horizon.

A 'MIR' Coincidence?

On the morning of Sunday June 17, Paul G4VLS of Norwich, took a peek at the 'MH' calls monitored of his 144.650MHz GB7VLS packet radio mailbox and among those many locals listed was that of one 'M3-IR'.

Knowing (a) That GB7VLS was in the MIR footprint at that time, (b) that Sunday is the main amateur radio day for the cosmonauts, (c) that plans are in hand for the first amateur manned space to space QSO, that (d) the main forthcoming SAREX STS-35 mode for WA4SIR's mission is packet radio and (e) that M3-IR does not resemble any known possibly corrupted local callsign, one was bound to wonder if tests were ongoing from a Packet station on MIR.

Boris Stepanov UW3AX, who is the 'Ham in Space' co-ordinator for MIR operations responded to the query, replying that there is no packet radio station on board MIR yet, but plans are in hand for this with on the air operation expected by the end of this year. He added that neither U6MIR or U7MIR are very active at this time, and when they are they tend to call on 145.500MHz f.m.

Chris Van der Berg, via Nico Janssen PA0DLO reports that the large 'T' module launched at the end of May was finally docked to MIR on June 10, and then moved to a side port to re-establish symmetry the following day. It has since been in high productive use as a G-free laboratory manufacturing large quantities of crystalline and semi-conductor materials. A space walk to repair the damaged panels of SOYUZ-TM-9 is planned for July, and the next crew are due to go aloft in TM-10 on August 1 to dock with MIR on August 3. The retiring crew plan to return to earth via the repaired TM-9 on August 9.

FO-12 Lives Again!

Although 'shut down' officially, Fuji-OSCAR-12 continues active again, having been heard first by GM4IHJ and many times since by G3IOR, G3CAG and G4CUO. As it will only support ultra low power 'JA' mode operation, users are asked to treat it very gently, otherwise it goes QRT.

A good functioning element set for FUJI-OSCAR-12 follows:

Epoch: 90 51.92031722
Inclination: 50.0153
RAAN: 253.7437
Eccentricity: 0.0010861
A of P: 255.9721
Mean Anomaly: 103.9906
MM: 12.44404056
Drag: 2.5E-7
Orbit No: 16037

FO-20 - Tracking

The discrepancy between the published Keplerian elements that gave tracking some two to four minutes late and those from the Japanese source has been fathomed. It has turned out that NORAD were giving the data for what they thought was Fuji-Oscar-20, but actually 'DEBUT', a very similar satellite to FO20, in line, and with similar reflectivity. It is not surprising that NASA often call AMSAT's Bob McGwier N4HY, to ask him if he is able to provide them with a functioning element set for specific satellites! Here is a good functionally accurate set, modified by a tweak to the mean motion and drag by Dave Rowan, G4CUO, to give precise tracking:

Epoch: 90 144.15135168
Inclination: 99.0426
RAAN: 195.1993
Eccentricity: 0.054174300
A of P: 102.9597
Mean Anomaly: 263.2557
MM: 12.83255784
Drag: 3.0E-8
Orbit No: 1336
Semi-Major Axis: 7704.2879
Period: 112.228358 mins.
Apogee: 1743.4924km
Perigee: 908.7436km.

Remember that FO-20 has it's apogees at the furthest 99° N position during mid-August, and that northern hemisphere DX such as W6 and JA will be in real time range. The transponder(s) are apt to be turned off on Wednesdays, although an official schedule has yet to be produced.

Fuji Problems

Many users and would-be users have been having problems in getting into (and out of) the FO-20 mailbox, and are suspicious of their own developed communication systems. Sadly, although many problems can occur in the users station, FO-20, just like it's predecessor, does have a few internal problems that need airing.

Rod Clewes G3CDK manages to get the 8J1JAS messages to all on his system, but from many attempts only once has managed to get the G3CDK prompt, and nothing else, only just before LOS.

FO-20 'JD' mode appears to have a few 'bugs' in the operating software, although hopefully the new program loaded up by JARL in June may take care of some of these. Possibly the worst of these is the fact that no DISCONNECT is operative from the satellite itself. The deep cyclic fade-outs and loss of signals caused by screening of the spacecraft antennas by the structure means that many operators, having connected, are not able to disconnect before the spacecraft disappears below their horizon. Thus, no space is left in the sixteen only user file for a newcomer as it appears over their piece of sky. A number of users report that they have in fact sent disconnect commands well before LOS time, but no actual disconnect occurs. What is possibly of greater concern is that having disconnected, they are often immediately given an unsolicited and unwanted re-connect!

Thus, when the satellite comes over the north pole to Europe, the user file is often full of calls from ZL, JA and 9M, who are by now well below the user horizon. A few astute operators have been known to employ the calls of some of those absent stations found in the file, disconnect, and thus create a space for their own call. This is usually followed by a mass of European stations taking up the spaces created, perhaps to create a similar situation when it has JA, 9M and ZL in the footprint once again. Sadly, half the pass has gone by the time the box is cleared, and this again leads to failures of a sufficient time to disconnect.

A similar problem is reported in that the kill message command is also often ignored, which all adds to space wasted. No normal terrestrial BBS facilities are employed, such as message numbers of bulletins put up, so lots more time can be taken in hunting through the whole file dump.

Some users bemoan that the log-on lets one enter half a message, and then proceeds to ignore you, so preventing termination.

Some of the users themselves do not help, as they have been noted as 'joy riding', e.g. hitting the keys to see just how many times they can get FO-20 to respond to their call. Others are wasting everybody's time by reading personal mail not addressed to them, a facility permitted by the software protocol.

On the plus side, FO-20 has a good signal, often printing clear copy with a signal to noise ratio of only 3 to 6dB, far superior to all the microsats. It can be accessed with very simple antennas, and the wide f.m. downlink does not require demanding and precise a.f.c. control.

As FUJI-1, alias OSCAR-12 on 'JD' mode was the very first experimental amateur radio digital store and forward satellite, it was not surprising that a few teething problems would occur. FUJI-2, OSCAR-20 is a clone, but it was to have been hoped that the problems reported on its predecessor would have been overcome by the software engineers during the wait for a launch. It is unfortunate that the main original JAMSAT engineers seem no longer to be a part of the JARL team, and that this source of expertise may no longer be

CALL	NAME	MODEM	TNC	MAILBOX	D/L ANT	UPLINK ANT
ON6UG	Freddy	RUH	TNC2C	ON7RC	2m dish	9 el x-y
I0LYL	Lucio	RUH	TNC2	I0AZI	2x21 el	hand-made
DB2OS	Peter	JA2	TNC1	DK0MAV	20el XY	2el X-yagi
OH2SN	Pate	RUH	TNC2	OH2TI	19el XY	2x9 el hor
LU8DYF	Norberto	TAPR	TNC2	LU8DYF	11el	7 el
DD4YR	Robert	AFREG	TNC2C	DB0PV	23el XYRH	12el XY RH
WA8EBM	Mike	RUH	PK80	WA8URE	KLM40CX	KLM-22C
KI6QE	Dave	TAPR	PK232	WA6VQP	2X7	2x16
DF5DP	Norbert	TAPR	TNC2	DB0BQ	20el XY	12el X-yagi
IK0HIT	Pesa	RUH	PK232	I0AZI-8	17-T Helix	9-el XY
ON5PV	Philippe	RUH	TNC 2	ON7RC	2X17 EL	2X9 EL
N8AM	Tom	TAPR	Pac	WA8BXN	22el hor	KLM-22c
N5BF	Courtney	TAPR	TNC2	WB6YMH	2X15	2X8
VK7ZBX	Richard	RUH	PK-87	VK7ZTA	10 el X	16 t Helix
ON4KVI	Renaud	RUH	TNC2	LX0PAC	RUH HELIX	2x9 XY RHCP
VK5ZK	Garry	RUH	HAPN	VK5WI	20 el x-y	12 el XY
JH7CKF	Hajime	TAPR	TNC2C	JR7YVN	22el XY	12el XY
WC8J	Rich	TAPR	MFJ1278	WB8BII	KLM40CX	KLM22C
HB9AQZ	H.Peter	RUH	TNC2	HB9GL	16t Helix	2x10XY
9M2OT	David	PSK1	TNC2	9M2BBS	20el XY	12elXY
G3RUH	James	RUH	TNC2	GB7SPV	16t helix	10 XY RHCP
JH2XIL	Fujio	TAPR	TNC2	JH2XIL	2x19 el.h.	2x9 el.hor
YT3MV	Matjaz	YT3MV	YT3MV	YT3A	10T helix	2+12 NBS
K0RZ	Bill	TAPR	PK-88	WA8ZIA	4X15 Horiz	4X10 XY
9M2BBS	David	TAPR	TNC2	9M2BBS	20el XY	12el XY
KD8SI	Leo	TAPR	PK-232	N8ACV	KLM40CX	6xKLM17LBX
ZL1WN	Ross	TAPR	MFJ1270	ZL1AB	KLM40CX	KLM22CX
DL1CF	Heinz	RUH	TNC-1	DK0MAV	2X16 el.	2X7 el
I0JX	Tony	RUH	TNC-2	I0AZI-8	21 el XY	11 el XY
KB7HTA/EA	Tom	TAPR	PK-232	K87HTA	KLM40CX	KLM22C
SM5BVF	Henry	RUH	TNC200	SM0ETV	13 ele XY	6 ele XY
ON4DY	Bob	RUH	TNC2	ON6MS	19 el hor	9 el xy
HK3JHV	Juan	TAPR	TNC2	HK3JHV	20 el	16 el
OE5ACL	Karl	RUH	PK232	OE5XZL	4mtr Dish	9elxy
W0SL	Roy	TAPR	TNC200	K0PFX	—	—

Freddy's 'JD" Users List as refered to on the next page.

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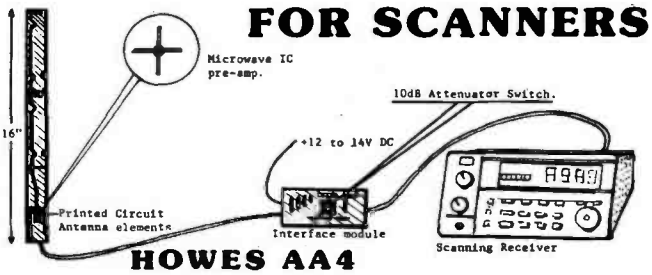

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DcRx54	5.4MHz HF Airband receiver	**£15.60**	**£21.50**
MBRX	HF Marine band reciever, inc. 80 & 160m	**£29.90**	**£44.90**
TRF3	Shortwave Broadcast TRF receiver	**£14.80**	**£20.20**
DCS2	"S meter" kit for all our receivers	**£7.90**	**£11.90**
CSL4	Sharp SSB and CW filters for our receivers	**£9.90**	**£15.90**
ASL5	Sharp SSB and CW filter for FRG7, R1000 etc	**£14.90**	**£22.50**
CTU30	HF bands & 6M ATU for any RX or 30W TX	**£27.90**	**£33.90**

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73 from Dave G4KQH, Technical Manager

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available to the organisation.

On the other hand, mainly praise has come in for the analogue 'JA' mode, which, other than the odd 'birdie' in the passband, seems to be satisfying every users needs. David Rowan, G4CUO is an avid user, and just wishes that the excellent 'JA' mode was on more often, and then activated in more social hours for Europe. Dave has found that the telemetry is showing high levels of recorded transponder transmitter output, up to 1.8 watts, when the 'JD' mode is switched off, and when there are zero 'JA' users being transponded. In the light of no explanations, he assumes that this is probably due to the spurii self stimulation of the transponder.

Who's Who on FO-20

From **Freddy ON6UG**, comes a complete mode 'JD' users list (on page 58), which has grown considerably in the past month. This will help identify contacts and further indicate the various combinations in use for effective operation.

WEBERSAT-OSCAR-18

Pictures have been coming down from WO-18 at a rate of four per day, and two of these are shown this month. They have been taken and processed by Frank Sperber DL6DBN, using his ATARI-ST system, and come to us courtesy AMSAT-DL.

The first picture, Fig.1, has it's original in applied colour, and shows the Sun in spectacular temperature bands of white, red, orange, yellow, green, blue and black. Whereas Fig.2 is the same picture, but captured in black and white.

Software for IBM computers and clones under the name of WEBERWARE 1.0 is available from AMSAT and AMSAT-UK. It processes the raw data from WEBERSAT to a picture, in colour with EGA/VGA. Be warned that each picture demands up to some 165 KBytes of disc space!

The WO-18 engineers are now experimenting with the optimum light levels for the 256 different camera iris settings possible in order to determine the ideal value according to that which is to be 'snapped'. When determined relative to information given by on board earth sensors, ideal pictures should be possible at all variants.

DOVE flies again - soon!

Bob McGwier N4HY wrote that as promised, he would begin reloading DOVE on the third week-end in June. He says "This will be a tedious process due to the extremely low Signal to Noise Ratio (SNR) of the data modulation. I have it working in the DSP box, but, because the SNR is so low, there will be many many retries to get it all loaded. Thanks to Hugh Pett, the ground station, the boot loader has been modified so that manual control over this process can be exercised. This will greatly enhance my ability to get this first code into the box. N2HPE and I will do the job since it will take four hands to run this DOVE load set up. We must load the new kernel, then a housekeeping task that does little more than it did before, but allows us to load those things we need loaded. It will swap between the 'S' band and the 2 meter transmitter in a configurable cycle and will have the latest and greatest battery management routines".

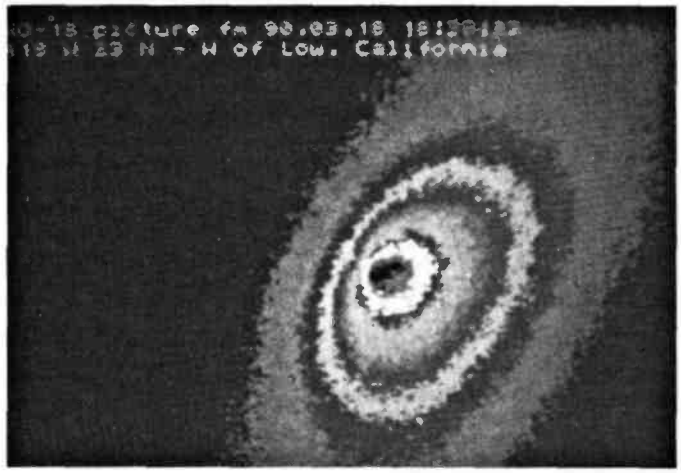

Fig. 1.

Fig. 2.

He adds that Harold Price NK6K, put in a Herculean effort to try to put in enough different watchdogs in the software "... in order that the lack of a simple retriggerable one shot in the lines that actuate the transmitters will have a much lower likelihood of reaching out and grabbing us again. I have the new kernel. I am modifying the DOVE routines to take advantage of the new kernel".

When Harold returns from a business trip, he will finish the 'optimal' loader, which will permit files to be sent up to DOVE and the other microsat spacecraft. He and Bob will then run memory tests on all the spacecraft in anticipation of mapping out 'bad clusters' in the RAM disks, if there are any, and follow this with a loading of the file systems. At the time of writing, they have begun painstakingly loading the DOVE talking software, files of phonemes, digitised voice, etc. into the file system.

Bob concludes "We are moving on DOVE again at long last. Thanks for your patience!" It will be well worth while watching 145.825MHz by the time you read this news in the hope of a fully functioning DOVE, but do remember it will not be on this v.h.f. continuously, so stay tuned for a time or you may miss it.

RM-1 Postponed

The launch of RM-1, nee RS-14, originally planned for June, postponed to July, is now unlikely before the early autumn of this year. The reason, according to Dr. Karl Meinzer DJ4ZC, head of AMSAT-DL, who visited the assembly plant, is due to the non-readiness of the vehicle until that time.

Phase III Satellites

Oscar-10 is still going strong, with its monopole antenna and mode 'B' only continuous operation. Whilst it suffers slightly from these limitations and the rather low elevation angles currently being experienced in the northern hemisphere, it is still providing excellent facilities, yet seems surprisingly little used.

Oscar-13 has been transponding well in the past month, and comes up to very high angles of elevation now in the northern hemisphere. I worked several JA stations on both s.s.b. and c.w., and had a perfect uninterrupted QSO with VK8KTC on Grut Island. It still seems strange for dyed-in-the-wool h.f. DX operators to point ones beam high in the sky to the north east and hear JA, W1 - 0 and all Europe coming in at one time!

A new transponder schedule for Oscar-13 commenced as from July 2, which should be maintained until 15 October when the next attitude manoeuvre is planned. The current schedule is now:

Mode 'B' from Mean Anomaly 003 until Mean Anomaly 165

Mode 'JL from Mean Anomaly 165 until Mean Anomaly 195

Mode 'S' from Mean Anomaly 190 until Mean Anomaly 205

Mode 'B' from Mean Anomaly 200 until Mean Anomaly 240

All transponders will be commanded off from Mean Anomaly 240, through perigee, until Mean Anomaly 003. The Mode 'S' section from MA 190 to MA 205 is further divided into three sectionalised activities, viz:

Mean Anomaly 190 to 195, 'S' beacon on, no transponder.

Mean Anomaly 195 to 200, 'S' mode transponder on.

Mean Anomaly 200 to 205, both 'S' and 'B' transponders on.

The omni-directional antennas will be switched in for use around the perigee period from Mean Anomaly 240 to 060.

What Goes Up....

N5BF tells us that many attentive satellite operators have noticed that the OSCAR-13 orbit perigee has been decreasing steadily since the final orbit change manoeuvre was completed in mid 1988. The spacecraft's perigee is now some 1000km lower than it was soon after positioning. This effect is not one of the normal orbital decay, as the satellite is still well above the worst of expanded atmosphere friction. It is a symptom of deep space perturbations, most notably from the sun and moon, which cause the eccentricity of an elliptical orbit to increase and decrease over a long term cycle. If the perigee at some point in the cycle is low enough, AO-13 will then begin to enter the earth's atmosphere, decay will begin to dominate, and eventually AO-13 may re-enter catastrophically and be lost.

Several amateurs, OE1VKW, N4HY, N6NKF, G3RUH, KA9Q, and WA5NOM among them, have undertaken to learn as much as possible about these effects and to attempt to numerically model the AO-13 orbit as far into the future as possible in order to determine, if possible, exactly what will happen. Although some pessimistic observers predict burn-up within the next two years, most of the modelling studies project a re-entry for AO-13 sometime within this decade. It must be emphasised at this point that all results obtained up to now are thought to be incomplete and therefore inconclusive. Formal errors resulting from projections months or years into the future still leave open the question of whether or when Oscar-13 will in fact re-enter prematurely. It could just as well be that the relative Sun and Moon positions to the eccentric orbit that have produced this result could well give the opposite over the next few years, resulting in an elevating perigee.

AMSAT has contacted various institutions, including Millstone Hill (the radar complex that provided early orbital

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data during both the Oscar-10 and Oscar-13 burns), NASA's Goddard Spaceflight Centre at Greenbelt, Maryland, and other NASA Centres in order to have the most complete possible analysis of the problem performed by experienced professionals. Any decisions or plans on the part of AMSAT must wait until after these results are obtained and fully understood.

Z21 Satellite Activity

Guenther Z21HJ/R, via Hardy DC8TS, tells of a special Zimbabwe satellite activity session planned for four weekends in August and September this year.

Period of Activity Callsign Location in Zimbabwe

31AUG90 - 02SEP90 : Z21SAT - from Pamuzinda Safari Lodge

14SEP90 - 16SEP90 : Z22SAT - from Victoria Falls

21SEP90 - 23SEP90 : Z23SAT - from Bulawayo

28SEP90 - 30SEP90 : Z24SAT - from Harare

The stations will be operated by Des, Z21GH, and Guenther, Z21HJ/R on a 145.905MHz downlink on mode B, mainly on Oscar-13, but employing Oscar-10 when Oscar-13 is not available. QSL cards may go either via the bureau or direct to G. Riepenhausen, Z21HJ/R, P.O.Box HG 395, Highlands, Harare, Zimbabwe.

If you work a minimum of two of the four calls you can apply for the ZIMBABWE SATELLITE ACHIEVEMENT AWARD 1990, to obtain send $US10.00 in cash by registered letter to the Z21HJ/R QTH above address together with a proof that you have worked the required two stations. All local costs are sponsored by companies in Zimbabwe, so all funds received for the Award as $US or IRCs will be equally distributed to AMSAT-UK and AMSAT-DL. Guenther says "Having fun and being able to make a small contribution to the huge costs for putting up Amateur Radio Satellites is the main goal of this activity".

Hardy adds "I hope that the activity will be a success and encourages the operators to plan a similar activity for next year - maybe from 7Q,9J or A2 - who knows?".

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Propagation

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

Ron Livesey (Edinburgh), using his projection apparatus located 5 active areas on the sun's disc on May 18, 19 and 27, 6 on days 25 and 28, 7 on the 20th and 9 on the 24th and 26th. **Neil Clarke G0CAS** (Ferrybridge) kindly sent his computer print out, Fig. 1, showing the big rise in solar flux units during May from 121 at the beginning of the month through 268 on the 19th and falling back to 140 by the 31st. Neil added that the mean sunspot number for May was 132 compared with 196 for June 1989 and 157 for October and November 1989.

I think that the latter part of the large 'hump' on Neil's chart can be attributed to the sunspots observed and drawn by **Patrick Moore** at his observatory in Selsey at 0900 on the 23rd, Fig. 2, 0810 on the 24th, Fig. 3 and 1115 on the 25th, Fig. 4. In Bristol, **Ted Waring** counted 19 sunspots on May 26, 12 on June 4 and 26 on the 16th. Although conditions were misty in Sussex at 0940 on the 16th, Patrick managed to locate the positions and size of several spots, Fig. 5. **Ern Warwick** (Plymouth) heard bursts of noise on 28MHz at midday on June 3, 0940 on the 9th, 1500 on the 10th, 1630 on the 13th and 0930 on the 16th.

Auroral

"The summer twilight has now taken its toll of auroral observing in NW Europe," wrote Ron Livesey, the auroral co-ordinator for the British Astronomical Association. However, he received reports of auroral displays being 'active and flaming' from observers in Ireland for the overnight period of May 9, 'unspecified forms' from Northern England on the 19th, 'ray bundles' from Denmark on the 22nd and 'active and flaming' from Nova Scotia on the 27th. The auroral effect on radio signals, which can only be described as 'tone-A' was heard by **Doug Smillie** (Wishaw) on stations transmitting from Norway and Shetland on the 22nd and 25th, Scotland on days 18, 22, 25 and 27 and Wales on the 22nd. Ron also received late reports of aurora seen overnight on June 12 from Denmark and Nova Scotia.

On the same theme, **Cmdr Henry Hatfield** (Sevenoaks), Ted Waring and Ern Warwick commented about the "growling" or "very rough tone" on the signal from the Spanish beacon (EA3JA-28MHz) between the 17th and 20th. **Fred Pallant G3RNM** (Storrington) noted a 'pronounced echo' from the signals of another Spanish beacon (EA6AU) on 28MHz at 0746 on May 31 and 'pronounced chirps' at 1016 on June 13. Ern Warwick told me that information signals sent by the German beacon DK0WCY on 10.144 indicated weak aurora at 1810 on May 27, 1346, 1706 and 1952 on June 9, 2100 on the 12th, 0910 on the 13th and 1806, 2100 and 2230 on the 14th. "The message sent by DK0WCY will say it is either Weak or Strong aurora," said Ern.

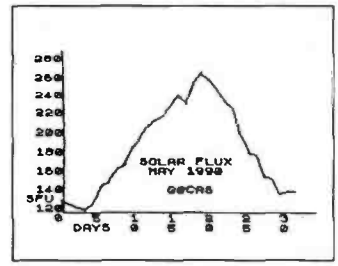

Fig .1

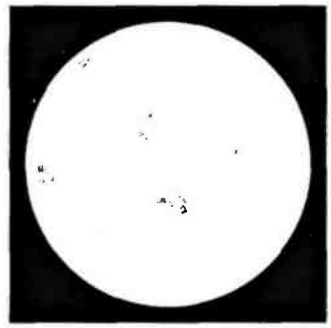
Fig. 2

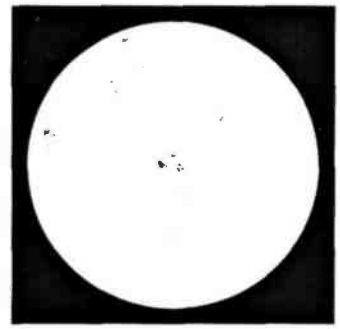
Fig. 3

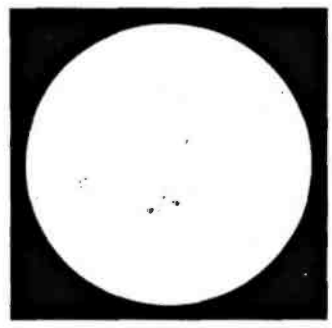
Fig. 4

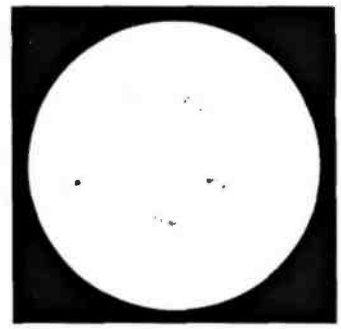
Fig. 5

Magnetic

Neil also sent a graph of the Ap index, Fig. 6, which he prepared for May and reports that the month was mostly, "active to minor storm with very few quiet days." The most active was the 22nd and 27th when the magnetic disturbance exceeded 40 points on the scale. The various magnetometers used by **Garry Hawkins** (Bristol) [Fluxgate], **Tony Hopwood** (Worcester) [Visual Unit], **Karl Lewis** (Saltash) [Fluxgate], Ron Livesey [Jam jar] and Doug Smillie [Hall Effect] between them found conditions 'stormy' on May 10, 18, 20, 21 and 27.

Joan and I had the pleasure of talking to **Ted Owen** and his wife from Maldon when they visited the Amberley Chalk Pits museum on July 1. Ted is very pleased with the magnetometer which he built and told me that the magnetic deflections are projected via a beam of light on to his bedroom wall. Briefly and without making it sound easy to construct, Ted has a suspended mirror and magnet and a pair of aluminium plates in close proximity to 'dampen' the movement.

Sporadic-E

The first week in June proved that the 1990 Sporadic-E season had really begun, for instance on the 1st, **Simon Hamer** (New Radnor) received television pictures from Albania on Ch. E2 (48.25MHz), Poland on Ch. R1 (49.75MHz), Italy on Ch. Ia (53.75MHz), the USSR on Chs. R2 (59.25MHz) and R3 (77.25MHz), Greece on Ch. E3 (55.25MHz), Italy on Ch. Ib (62.25MHz) and the USSR on Chs. R4, 5, 6 and 7 which represents 85.25, 93.25, 175.25 and 183.25MHz respectively. Simon logged the USSR on Chs. R1, 2 and 3 and Czechoslovakia and Hungary on R4 on the 2nd, a North American 525-line station on Ch. A2 (55.25MHz), Denmark and Norway on Ch. E3, Iceland on Ch. E4 (62.25MHz) and Algeria on Ch. E7 (189.25MHz) on the 3rd, Portugal and Spain on the 6th and by midday on the 8th an extensive disturbance had opened the bands from 27MHz, where CBers in Northern Ireland were putting strong clear signals into Sussex. On that day I received strong test-cards from Poland on Chs. R1, 2 and 3 and gave up after counting 60 east European broadcast stations between 66 and 73MHz. Simon received pictures from the USSR on Ch. R5.

Another Welsh station, not too far

Back-Scatter

from Simon, **Bert Mills GW3LJP** (Rhayder), was trying his loft mounted, home-brew, 10in magnetic loop antenna that evening and was thrilled to receive good reports from stations in Germany, Holland and Italy on 50MHz. Bert told me that this antenna is, "ideal for use in a flat or confined space."

Terence Burke (Bradford) tuned his Panasonic TR-3000G through Band I and found 'extra strong' pictures from Italy at 1125 on May 28, a 'colossal opening! 7.5 hours!' on June 1 when his TVDX included Czechoslovakia, Italy, Poland, Spain and the USSR and he then added Austria, Romania and Yugoslavia to the score on the 8th.

Around 1400 On June 26, Joan and I were in the car-park at Bodiam castle, East Sussex and, on arrival, (priorities right, hi,) tuned through Bands I, II and III, with my Plustron TVR5D and, apart from a bit of tropo, all was quiet. However, between 1600 and 1800 we were parked at Sissingshurst Castle and a further check revealed a massive Sporadic-E opening and, using only the set's rod antenna, the top end of Band I was blotted out by a picture and sound from Spain and a number of Spanish football commentaries were audible in Band II above 100MHz.

"Sporadic-E has been very poor," wrote **Lt. Col. Rana Roy** (Meerut, India) having seen only seven events between May 1 and June 13 and some of those were of short duration with fading DXTV pictures. Such events seem to have been more noticeable this year, for example, I caught another one while parked in East Grinstead, Sussex, at 1650 on the 28th, when, for a short while I watched a cartoon film, presumably from the USSR on Chs. R1 and R2 and for a few minutes early on July 3, I received a 'rock-crushing' test card from Sweden.

Many TV DXers saw the Cameroon v England football match dominating Band I during the evening of July 1st while another Sporadic-E increased the range of TV transmitters from Scandinavia to the USSR. This disturbance fluctuated throughout the following day and when I checked at 1752 there were strong pictures and sound on Chs. R1, R2 and at times R3 and, over 50 East-European FM broadcast stations were pounding in between 66 and 73MHz. Readers using scanners as early warning indicators for Sporadic-E may also care to listen for the sound signals for Chs. E2, R1, Ia, E3, R2, (E4 & Ib) and R3 on 53.75, 56.25, 59.25, 60.75, 65.75, (67.75) and 83.75MHz respectively.

Propagation Beacons

First my thanks are due to **Mark Appleby G4XII** (Scarborough), **Chris van den Berg** (The Hague), Henry Hatfield, **John Levesley G0HJL** (Bransgore), **Greg Lovelock G3III** (Shipston-on-Stour), Ted Owen, Fred Pallant, Ted Waring and Ern Warwick for their 28MHz beacon logs from which I compiled the chart, Fig. 8, of the beacons heard at their respective locations from May 26 to June 25.

Between them they found our old friends EA2HB (28.247MHz) and PT8AA (28.219MHz) again and added EA6PZ (28.210MHz), HG5GEW (28.225MHz), PB7AAQ (28.260MHz), PI7BQC (28.249MHz), PI7ETE (28.302MHz) and VE4EPE (28.225MHz) to the list of new ones. Ern Warwick also kept watch on the other bands during the period and copied, almost daily, signals from IK6BAK on 24.915MHz, PY2AMI(24.931MHz), LU4AA, ZS6DN/B and 4X6TU/B (14.100MHz) and DK0WCY (10.144MHz) and less frequently PY2AMI on 18.100MHz and CT3B, JA2IGY, KH60/B, OH2B and W6WX on 14.100MHz.

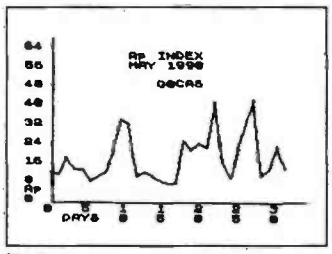

Fig. 6

Tropospheric

The atmospheric pressure readings shown in Fig. 7, covering the period May 26 to June 25, were taken at noon and midnight from the barograph installed at my home in Sussex. **George Garden** (Edinburgh) noticed the high pressure was on the point of declining so, with this in mind on June 16, he took the gear to his favourite DX site high on Cairn O' Mounth and received strong signals from BBC Radio Cleveland, not often heard there and BBC Radio York.

He drove to the site again while nearly similar conditions prevailed on the 25th and logged BBC Radio York, fading signals from the Pontop Pike transmitter of BBC Radio Newcastle, watched BBC North News from Chatton, Border TV from Eyemouth and Selkirk and a Grampian TV signal from Tay Bridge. I checked Band III, with my Plustron and its own rod antenna, at various spots on my journey through East Sussex and Kent on the 26th and received strong (negative) pictures from France on Chs. L5 and 9. **David Glenday** (Arbroath) received u.h.f. television pictures from Denmark and Holland during a weak tropospheric opening on May 28 and West Germany on at least 4 channels between 1700 and 2010 on the 31st.

934MHz

John Levesley (UK-627) worked stations in Guernsey and Jersey, around 160km, on May 28 and GY-186 in Guernsey again on June 9. On the 14th he heard people operating in Brixham, Guernsey and Torbay and although conditions were poor on June 11, **Les Jenkins GB-37**, in Deal, with his antenna just a few metres above sea level, managed to contact six stations in the Essex area. Les recently added a Crestbyte APT605 to his mast-head which is a receiver pre-amplifier and transmitter amplifier.

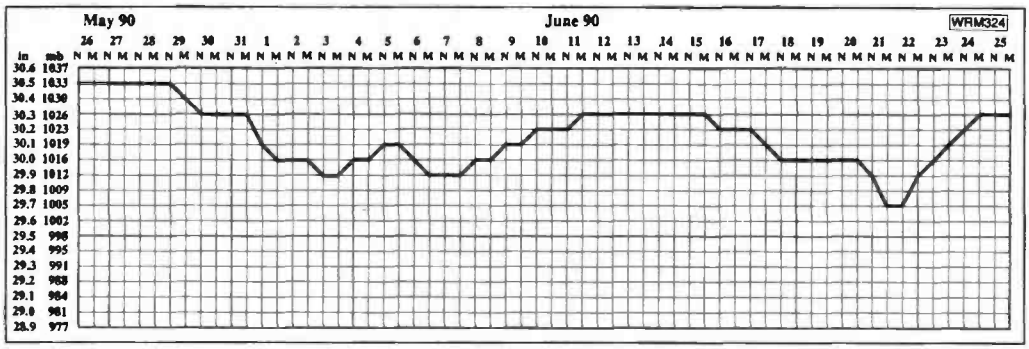

Fig. 7

Beacon	May 26	27	28	29	30	31	June 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	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X			
DF0THD							X	X		X				X			X	X						X	X	X					
DL0IGI	X		X		X	X	X	X	X	X	X		X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	
EA2HB										X	X											X									
EA3JA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X
EA6AU	X		X	X	X	X				X	X	X	X	X	X	X		X	X	X	X	X	X								
EA6PZ																										X					
EA6PW																									X						
HG5GEW			X		X	X		X	X		X		X	X	X	X						X	X	X	X	X	X				
IY4M	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	
KD4EC										X																	X				
KF4MS										X																					
KJ4X												X																			
LA5TEN					X	X	X	X	X	X	X		X	X			X					X	X	X	X	X		X	X		
LU1UG	X			X		X	X	X	X	X	X	X										X									
OK0EG			X		X	X	X	X	X	X	X	X	X	X			X	X		X		X	X	X	X	X	X			X	
OH2TEN			X	X	X	X	X	X	X	X	X		X	X	X	X	X	X		X	X	X	X	X	X	X	X	X			
PB0AAQ																							X	X	X						
PI7BQC							X			X														X							
PI7ETE							X			X													X	X	X	X		X			
PT8AA											X										X										
PY2AMI	X		X	X		X	X		X	X	X	X					X				X	X		X	X	X	X	X		X	X
SK5TEN				X	X	X	X	X	X	X		X	X	X	X		X	X				X	X	X	X			X	X		
VE4EPE										X																					
VK2RSY				X	X		X		X														X	X		X					
VK5WI			X	X				X		X	X												X	X		X	X				X
VK6RWA				X	X		X	X		X	X											X	X	X							
WA4DJS									X	X		X								X			X	X	X	X	X				
WC8E												X																			
W3VD												X														X	X				
YO2KHP					X										X																
ZD8HF	X			X	X		X		X	X												X	X	X	X	X	X	X		X	X
ZS1LA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X
ZS5VHF	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X		X	X	X	X	X	X	X		X	X	X	X	X	X
ZS6PW	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Z21ANB	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
4N3ZHK												X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
5B4CY																								X	X	X			X	X	X
5Z4ERR	X		X				X	X	X	X	X			X	X	X							X				X	X	X		

Fig. 8

Back-Scatter

Broadcast Round-up

Reports to
Peter Shore

In last month's column changes to BBC World Service were mentioned, and now comes news of the world-wide audience for World Service in English, and other languages which the BBC broadcasts in Fresh anaylsis of the audience indicates that the total estimated audience across the board is 120 million, up 60% since 1980, excluding the audiences in China, Iraq, Afghanistan and Vietnam. This means that the BBC is probably the most listened to station in the world, with more people tuning to World Service than the combined audiences of the Voice of America, Deutsche Welle and Radio Moscow.

Keen listeners to the bands will have noticed that some of the 'spy numbers' stations have stopped in recent weeks. A report from the DPA news agency in Hamburg, carried in some British newspaper, reports that the synthetic voice on the frequency of 3.22MHz which apparently provided East German spies with coded information and instructions, ceased on May 31. You should draw your own conclusions...

Further mudslinging in the Caribbean with Cuba complaining to the International Telecommunications Union about Radio and TV Marti which it is attempting to jam whilst fighting the United States over the 'illegal' occupation of frequencies allocated to the Island state. It would seem that the US may be forced to withdraw its propoganda stations in the near future if it wishes to be seen to uphold international agreements on frequency usage.

Construction of the Voice of America relay station in the Arava Desert in Israel has been stopped until completion of an impact study on the effects on birds of the station.

In Switzerland, plans to build new short wave transmitters in the Vaud have been abandoned following local opposition to the scheme. The new transmitters are required to replace outdated senders at the Schwarzenburg site in Canton Bern.

The West Berlin Senate wants to keep the stations SFB (Sender Freies Berlin) and RIAS (Radio in the American Sector) after unification of the two Germanies. The Senate plans to incorporate SFB in ARD whilst RIAS radio and television should become part of ZDF.

Meanwhile Deutsche Welle has begun sending its programmes on the Astra satellite with a 24 hour a day relay of the German service, and a selection of foreign language services on a different audio sub carrier. The Voice of Free China has started to use the C-SPAN audio network for North America in English.

Radio Moscow's English service output could change somewhat in the next few months. An agreement has been made with a US company whereby programmes will be jointly produced with a distinctly Western format. The American company, Trans World Communications, hopes that cable companies in the US, Japan and Europe will be interested in rebroadcasting the programmes which will first be heard on the World Service of Radio Moscow. It is planned to start this new series in September.

Meanwhile, following news last month of the ending of Japanese language programmes from the BBC, Radio Moscow is reducing the number of transmissions in this language, with the early morning (2200-2230UTC) transmission which is heard at 0700 Japanese time dropped. Radio Moscow cites dropping audience figures as the reason.

European Stations

All times UTC=GMT

Radio Berlin International has started broadcasts in Russian, described presently as 'tests'. Each broadcast is 15 minutes in duration and are broadcast:

1130 on 21.54, 21.465, 15.44, 11.97
1330 on 21.54, 21.465, 11.97
1430 on 17.88, 15.24

The transmissions are repeated the following day at:

0530 on 21.54, 15.24, 11.97
0700 on 21.54, 15.24
0945 on 21.54, 21.465 (weekends only)

Medium and long wave frequency usage by East German broadcasters is currently:

Deutschlandsender DS-Kultur on 177kHz
Radio DDR on 1.431, 1.044, 1.017MHz, 883, 603, 576, 531kHz
Jugendradio DT 64 on 657kHz
Berliner Rundfunk on 693kHz

The English service of Radio Romania International has announced its current English service schedule:

1300 on 21.665, 17.85, 15.365, 11.94
1930 on 11.81, 9.75, 9.69, 5.955
2100 on 11.94, 11.81, 9.75, 9.69

English programmes from Radio Kiev in the Ukraine are heard:

2000-2100 on 9-865
2300-0000 on 15.525, 15.485, 11.79

Relays of Soviet Republican stations for the Moscow area are now scheduled:

Armenian SSR
0453-1415 on 7.175
1420-1900 on 15.11
Azerbaijan SSR
0300-1430 on 7.30
1435-2200 on 15.175
Belorussian SSR
0300-1600 on 6.15
1605-2000 on 15.15
Estonian SSR
0255-1400 on 5.98 (from 0500 weekends)
1405-2230 on 9.56 (to 2330 Friday and Saturday)
Georgian SSR
0100-1500 on 7.125
1505-2000 on 15.24
Kazakh SSR
2300-1700 on 9.69
1750-2100 on 21.49
Kirghiz SSR
2300-1545 on 9.735
1550-1750 on 17.785
Latvian SSR
0300-1755 on 5.92
1800-2100 on 9.695
Lithuanian SSR
0300-1600 on 6.01
1610-2200 on 9.675
Moldavian SSR
0215-1500 on 6.075
1505-2100 on 15.36
Tajik SSR
2315-1700 on 9.785
1705-1900 on 17.605
Tatar ASSR
0230-1355 on 11.945
1400-1800 on 17.81
Turkmen SSR
0415-1455 on 7.145
1500-1800 on 17.635
Ukrainian SSR
0000-1415 on 6.03
Uzbek SSR
0100-1625 on 5.945
1630-1900 on 17.84

A new radio station called 'Soviet Lithuania' has started broadcasting on 864kHz at 1100 and 1600 with one hour long broadcasts.

Suggestions are that the new station is in favour of staying within the Union, and that the equipment for broadcasting is established within a former School.

Africa and Middle East Stations

The English service of Radio Jordan is on the air between 1100 and 1630 with a relay of the domestic service on 13.655 until a frequency change at 1315 when 9.56 replaces the higher channel.

The domestic service from Radio Mogadishu in Somalia has been heard again on nominal 7.20 (recorded at 7.198 or thereabouts).

Transmission span is believed to be from around 0300 until 2100.

Radio Lesotho uses 4.80MHz from 0255 until 2200, with English news broadcasts at 0500, 1130 and 1600.

From **Roy Merrall** comes details of his attempts to listen to Radio RSA following the reduction in output and total cessation of broadcasts beamed to Europe. He advises that he has not heard any of the listed frequencies before 1500 when 17.835 is on the air until 1555 with the usual RSA programmes such as *Our Wild Heritage, Sounds of Soweto* and so on, but no DX programme. There is a listeners' letters programme on Sunday with Kathy Fitch and Thelma M'Balate. Best reception to date has been SIO544 (from 333 at start-up) on Sunday June 10 until close at 1553.

The evening transmission on 15.27 and 17.765 is marred by colossal co- and adjacent channel QRM, but 15.27 is bearable for short periods. The best frequencies seem to be for the UK 15.365 and 17.745, both used by the French service from 1753 to 1953. 15.365 rates up to SIO444 quite often with 17.745 slightly less readable.

The Portuguese service starts at 1900 on 15.22 and 11.95 and appears very variable, sometimes S9+, other times inaudible. Incidentally, Roy reports, Chichewa on 5.96 at 1600 is sometimes audible if conditions are right.

15.365 seems to be in constant use through the afternoon starting at 1355. Swahili at 1445 improves and by 1530 is quite strong. Usual programming is lots of heavy soul music with percussion etc. This continues until 1653. Roy tells me that his main equipment is a 'hot-rodded' R5000 with 40m inverted 'L' at 12m, running 050/230.

Asian and Pacific Stations

Thank you to correspondents who wrote with details of Radio Australia's new schedule following my plea for help in the July column. As reported in August, the schedule turned up and solved all the problems. However, a small error was transmitted in the August column which described the station's use of the '1 MHz' band - this should, of course, have been the 13MHz band!

The current schedule for English to Europe from Radio Beijing shows continued use of out-of-band frequencies:

2000-2100 on 11.50, 9.92, 8.26, 4.13
2100-2130 on 3.985 (via Switzerland)
2100-2200 on 11.50, 9.90, 8.26, 4.13

Korea has been in the news recently, with the opening of a small part of the border around one of the truce villages between North and South. Short wave listeners may keep in touch with the viewpoint of each side by tuning in to either Radio Pyongyang in the North, or Radio Korea in the South.

Pyongyang's schedule for European English service is:

1500-1550 on 11.76, 9.977, 9.64, 9.325
1700-1750 on 11.76, 9.977, 9.64, 9.325
2000-2050 on 9.977, 9.64, 9.345, 6.576

From Seoul, English programmes to Europe:

1800-1900 on 15.575
2030-2130 on 15.575, 7.55, 6.48

Radio New Zealand has made a small alteration to its frequency from 17.68 to 17.765MHz heard from 0300 or thereabouts. The Pacific Service for which this is the frequency runs until 0830 with news on the hour, and news about New Zealand at 0505 and 0705.

North, Central & South American Stations

Broadcasts from Radio Canada International to Central and Eastern Europe have been affected by time changes in the Ukraine in the USSR. The English newscast at 1445 is now heard at 1415, although frequencies remain the same.

The weekday broadcast from Radio Surinam International relayed by Radiobras in Brasilia at 1700 is now carried on 17.75MHz.

Have you heard anything that Peter has not written about. If so, why not write and tell him all about it.

Back-Scatter

ATV

Reports to
Andy Emmerson G8PTH
71 Falcutt Way
Northampton NN28PH

First of all, a brief word about the BATC rally at Harlaxton (which seems all so long ago now!). If you were there you won't need telling how well this event turned out; if you weren't you should be green with envy that you didn't (or couldn't) attend. I must add my words of congratulation to the hard-working souls who planned the event and made it work on the day. The venue was superb (lots of room), access by road was easy (the clear A1 road), the weather was superb (thanks perhaps to the RfG weather satellite folk!), and the demonstrations and talks were interesting. I was particularly impressed with the very effective but low-cost 10GHz transmitter/receiver equipment operated by Bob G8OZP and Jim G0FNH. Oh yes, and finally, what we all came for - the junk was of excellent quality!

Indeed, Hugh Alison G6ANE/T (I can never remember his other call!) said we would really cringe when he wrote up the event in his second-hand and rally column in *Amateur Radio*. He said it was the best rally he had attended (though that was said before Stockwood, formerly Shuttleworth!). Anyway, the thought was kind. And talking of kind thoughts, many thanks to the mystery person who left a pack of photocopies of old articles on TV for me at Harlaxton.

To business now, and time once more for our round-up of activity on the air, and the first letter comes from someone who has been involved in our hobby for a considerable time. The writer is **Arthur Bevington G5KS** (West Midlands) and he says, "I feel I must let you know that I am still very active on the air and have been since I first joined BATC in 1951. Therefore I am one of the oldest members. I am active on 70cm and 24cm 625 lines and intercarrier sound on 24cm, all home-constructed on the above. G8MTF is also active and is in my age bracket; he joined the BATC around 1952/3 so please can we be remembered? I am also very active on SSTV with a Robot 1200C and Robot 800C computer from 7MHz up to 2 metres."

SSTV in East Anglia

Andy Dunham G6OHM rang up from his Chatteris (Cambs.) home to mention that because of 'operating conditions' his TV activity is now mainly on SSTV. He has acquired a Wraase SC-1 and is busy sending out SSTV and FAX signals on v.h.f. The best time to get him is between 7 and 9pm, particularly on Sunday and Monday evenings, though a phone call to (03543) 3791 (after 2pm) will fix a schedule. His father G6SXB in nearby Wimblington is also involved in SSTV and in fact uses G3WW's old gear: it was Richard G3WW who got Andy going with slow-scan. Another local is Phil G0BDD in Ramsey St Mary, while on 70cm fast-scan you may catch G8JAN in Downham Market or G0CFD in Bourne.

From the other side of the water **John Spaeth KD0LO** (St Louis, USA) writes: "I have been spending the lion's share of my free time on the AMIGA. Quite addictive you know. The AVT slow scan program has kept me extremely entertained. There is much to master with this program, and just getting it up and running is formidable - never mind actually working all the available modes.

"My latest interest is monitoring the hidden carriers on the C and KU band satellites. There are many such hidden carriers and of course my interest is with digital images such as facsimile. There is a ton of it up there and I refer to it as "The Band That Never Closes", quite a snappy name for a regular column don't you think? ... No, you may not use it because I might do just that for one of the rags.

"The FAX images are extremely high resolution. Unfortunately I have not yet figured out how to print out those 1024 by 600 pictures out on my laser printer ... but I understand there is a way.

"Because I need to tune these hidden carriers, I also needed to have a general coverage receiver so I am also the proud owner of a new h.f. rig ... does it ever end? I am actually quite embarrassed about buying a new (used) h.f. rig since I am a die-hard u.h.f. and MICROWAVE enthusiast, but after all it was only to facilitate me being able to receive images off the C and KU band satellites. Hi Hi.

"Have also been working feverishly on some class A1 amplifiers for 439.250MHz. Trying to water cool a 2C39 to push it to the max and yet preserve linearity. Tried to build the popular German designs from Wiener (*UHF Compendium*, 1988) but these are strip line and do not like to be water cooled. So now I am in the process of designing a cavity for the tube on 400MHz. If only f.m. would catch on here ... class A amps would be where they belong...in the trash, hi."

Network Expands

News from the East Kent ATV Network comes in from **Roy G6OKB**, who advises that their ambition in 1990 is to get everybody on the air with 24cm receive capability. To stimulate this, he has erected an attended personal TV beacon on 24cm, which is on the air from 1300 to 2200 daily from his Minster location. This Minster is on the Isle of Thanet, not the other Minster on the Isle of Sheppey, also in Kent! The beacon puts out a test pattern with the caption 'G6OKB BEACON. QSL 144.750' and Roy monitors the TV calling frequency in the shack. Power is 20 watts to an Alford slot antenna, 20 feet aloft and fed through second-hand Heliax cable.

One of the group, **Brian G8ZYZ**, has built a Wood & Douglas receiver which is used together with a 24cm dipole, a G8LES plate antenna and a Severnside ATV Group yagi aerial for mobile reception tests of Roy's beacon. Test results include P5 pictures at the Dover Bleriot memorial, P1 on the Western Heights and P5 at Great Mongeham. Roy says he is now building Trevor Brown's Teletron device and logic board for his beacon, which has acquired a new p.s.u. The old one blew up, passing 16V unregulated to the electronics.

Now Roy uses - and recommends - the p.s.u. over-voltage protection module made by G3ROO (Kanga Products); he has nothing but praise for this small business. You can have a catalogue by sending a s.a.e. to Kanga Products, 3 Limes Road, Folkestone, Kent CT19 4AU (Tel: 0303 276171). A 10% per cent discount is offered to BATC members. Four of the group recently took off from Manston aerodrome for a flight over east Kent in a Cessna aeroplane. It was a glorious Sunday morning and some excellent video recordings were made for showing on ATV.

Also in Kent, **Andy Parnell** or 'The SUY' as he known to his friends, is wondering if anyone would like to help him build a TV repeater in mid-to-north Kent. He would be pleased to hear any words of support on Faversham 0795-531541. Sounds like a good idea to me, especially as a carefully sited repeater could serve Sheppey and parts of Essex as well as the Swale region.

GB3RT relocated

Not exactly hot news, I know, but this is the first occasion I have had to note the fact for the record. GB3RT, the 23/24cm TV repeater has moved from Barby to a site near Coventry at the Tile Hill College of Further Education. Hopefully this will now provide better coverage. A formal repeater group has been set up and new members will be welcomed with open arms by Mike Wooding G6IQM (Rugby 0788-890365). Plans are afoot for a 10GHz TV repeater at Barby, for which the callsign GB3RV has been selected. More news as it happens (or six months later, whenever I can report it!).

North to Lancashire

"Having just read your article in *Practical Wireless* I decided to write in to you on news of ATV activity in this area. Before Christmas there was a revival of 70cm activity in the area after being dormant for a year or so. The following stations send television on 70cm: G6APK (Walney), G3YTI (Darwen) and me G3EKP (Belthorn)", writes **Jim Whittle**.

"But the most interesting news is of G4GVQ (Mellor, near Blackburn) who is now active on 24cm, I believe using a satellite RX for receive. I hope to join him shortly but storm damage to the house and antennas has curtailed my plans. Simon G4GVQ is looking for other contacts on 24cm in the area. I shall keep you informed of developments in Lancashire." Thanks Jim!

X-Band Antics

The fine Spring weather encouraged some microwavers to bring out their portable 10GHz gear and try some outdoor TV contacts. **Bob G8OZP**, something of a veteran in this field, emerged on Monday May 7 to try out the path to George G4EUF some 50km away. This was George's first real test of his gear and fortunately all went well. Both /P stations used 10mW gunn diode (burglar alarm) transmitters and 30in dishes; Bob's had a cassegrain feed, giving 34dB gain, while George employed the more conventional penny feed and achieved about 32dB. Bob was up in the Weaver Hills, 305m above the Dove valley and saw G4EUF as P3; George's /P location was Warren Hill in north-west Leicestershire and received Bob P1.

It is worth noting that these are genuine QRP contacts and show the amazing potential of the 10GHz band. The transmitters are based on burglar alarm heads bought for £5 or so at rallies: a complete transmit and receive station can be built for well under £100. This band is really going places, and cheap satellite receivers and solid state power amplifiers will make it even easier to achieve dramatic distances. Some people will even tell you that we should be using 10GHz for TV repeaters and reserving 23cm for the inter-repeater links. The arguments in favour of this are very strong, though too detailed to set out here.

Certainly, if we are to extend - and more important - interlink the repeater network, we really must start liaising and standardising our control protocols. We must also avoid potential conflict with the packet movement, which also has eyes on substantial chunks of the 23cm band for interlinking. We have the potential to wipe out their (f.s.k.) data links, while they could cause undesirable patterning on our (w.b.f.m.) pictures. Far better then to co-ordinate our joint requirements and look for a mutually agreed solution.

The Welsh Connection

With another tale of the Boys from the Blackwood, **Eric Edwards GW8LLJ** sends us another welcome letter (are we G8s now an endangered species?!?). He reports as follows.

"It was Easter Friday afternoon when I loaded the SSTV converter, a portable VHS camera and 12 volt 625 line monitor into the car. I had previously contacted the Blackwood ATVers earlier in the week, stating that I would be SSTV mobile Friday evening. That's right, mobile SSTV! You could hear the echoes of laughter throughout the Welsh valleys. Not put off, I carried out my plan.

"My SSTV gear consists of a G3WCY/G4ENA SSTV to FSTV receive converter and a separate FSTV to SSTV converter. They are switchable mains/battery using NiCads to supply the negative and positive rails. A couple of constant current chargers were built using the well-known 723 devices.

"All set, I proceeded to my destination when the camera fell off the parcel shelf (I don't know why they call it that, nothing ever stays on it!). So back to the shack to find something to jam somewhere to support the camera. Armed with a length

Back-Scatter

of chipboard (well, where can you get real tree-wood from these days?) and insulating tape, I once again set off on my journey, calling and listening on their club frequency. Soon Peter GW4EAI answered, joined by Ces (Cecil) GW8MTJ whom some of you may remember as GW30AJ/T alias GW60AJ/T. Those were the days. However, they called me and suggested I try the SSTV: I had to pull into a lay- by to set up the pictures.

"The monitor sees sampled 625 line pictures from the camera and continuously digitises pictures to enable setting up levels, etc. Confirmation of pictures received by both stations on 144.500MHz allowed me to carry on my 25 mile drive from Barry in South Glamorgan to Blackwood in Gwent. Leaving the motorway, then entering a dual carriageway and through winding valley roads provided interesting video. Peter and Ces could see their TV scanning a frame with a shot of a car immediately in front of me. The next frame would show a similar road shot with no car in front (each frame had a time lapse of eight seconds).

"The event was recorded and I saw an action replay later. Considering the mountainous terrain over a 25 mile path, they only lost me on two occasions. That exercise could not have been repeated with FST on 70cm given the same conditions and anyway, the viewers would have become giddy! This test has prompted me to operate portable SSTV. So, with decent weather I will probably be active on two metres. I am geared up only for 8 second field scan, and if I were to modify my equipment in any way it would be to improve detail at 8 seconds. Mobile SSTV may not be the ultimate but it is different!

Radio Diary

***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 Club's Red Rose Summer Rally will be held at the Bolton Sports and Exhibition Centre, Silverwell Street, Bolton.

August 19: The Royal Forest of Dean Radio Rally will be held at Speech House on the B4226. It will be a day out for all the family with a jazz band, magician, model racing cars, bouncing castle as well as the amateur radio attractions. **G4HZT. QTHR.**

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 2**: The Telford Rally will be held at the Raquet and Exhibition Centre in Telford. Doors open at 11am (10.30 for the disabled). There will be a hundred stands selling radio, TV, computer equipment and antennas, a flea market and refreshments.

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 Madley Satellite Earth Station Amateur Radio Group will be holding heir annual Car Boot Rally between 1000 and 1600 at Madley Air Field, near Hereford. In addition to the car boot sales, a number of local traders will also be in attendance. Car parking is available and the entrance is free. Pitches on the day £5, pre-booked £4, traders £8. Talk-in on S22 by G7BTI. **David Butler G4ASR. Tel: (0981) 250001** (daytime).

***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**.

***September 15**: The 1990 Scottish Amateur Radio Convention will be held at Cardonald College, Glasgow. There will be free parking for hundreds of cars, the college dining hall will be open as well as snack bars, there's a licenced bar, three exhibition halls as well as all the usual amateur radio attractions. Doors open at 11am (10.30am for the disabled) with the admission at £1.50. **Tom Hughes. Tel: 041-427 0122**.

***September 16**: The British Amateur Radio Teledata Group annual rally will be held at Sandown Park Exhibition Centre, this time in the larger Surrey Hall. **Peter Nicol G8VXY. Tel: 021-453 2676**.

September 16: The Bristol Radio Rally will be held in Brunel's Great Train Shed, Temple Meads Station, Bristol. All the usual traders will be there, a large Bring & Buy, food and refreshments as well as displays and demonstrations. **D.S. Farr. Tel: (0272) 839855**.

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

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