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Practical Wireless

THE RADIO MAGAZINE

Practical Wireless
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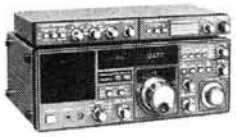

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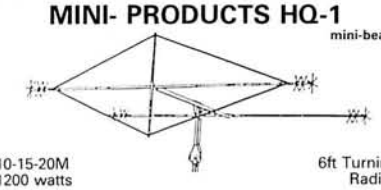

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Practical Wireless

FOR THE Radio ENTHUSIAST ...

NOVEMBER 1983 VOL. 59 NO. 11 ISSUE 920

Contents

19 **Directional Response Indicator**
Murray Edington G8XCN

31 **The Merriman Report**
G. C. Arnold G3GSR

33 **IF Signal Generator**
S. Niewiadomski

40 **Basic QSOs in Spanish—3**
Gareth W. Roberts GW4JXN and Ildefonso Sevilla EA7BWX

45 **PW "Dart" Top Band QRP Transmitter—1**
Rev. G. C. Dobbs G3RJV and Colin Turner G3VTT

49 **PW QRP Contest Results**
Neill Taylor G4HLX

54 **Air Test**
AEA Moscow Muffler Woodpecker Blanker
Gemscan 70—v.h.f./u.h.f. Scanning Receiver

56 **Antennas—10**
F. C. Judd G2BCX

60 **Kindly Note** PW "Marchwood"—June, July 1983
Structured Morse Learning Course—August 1983

63 **Faroe Islands DX-pedition**
Bruce Nicholson G4SAY

Regulars

94	Advert Index	25	News	18	PW RUIS
39	Benny	43	Next Month	17	Services
17	Comment	65	On the Air	42, 84	Swap Spot
37	Did You Know?	27	Products	38	Uncle Ed
59	Mods	64	PW Programs		

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- ★ Memory channels which store frequency **and** mode.
- ★ Full range of scan facilities.

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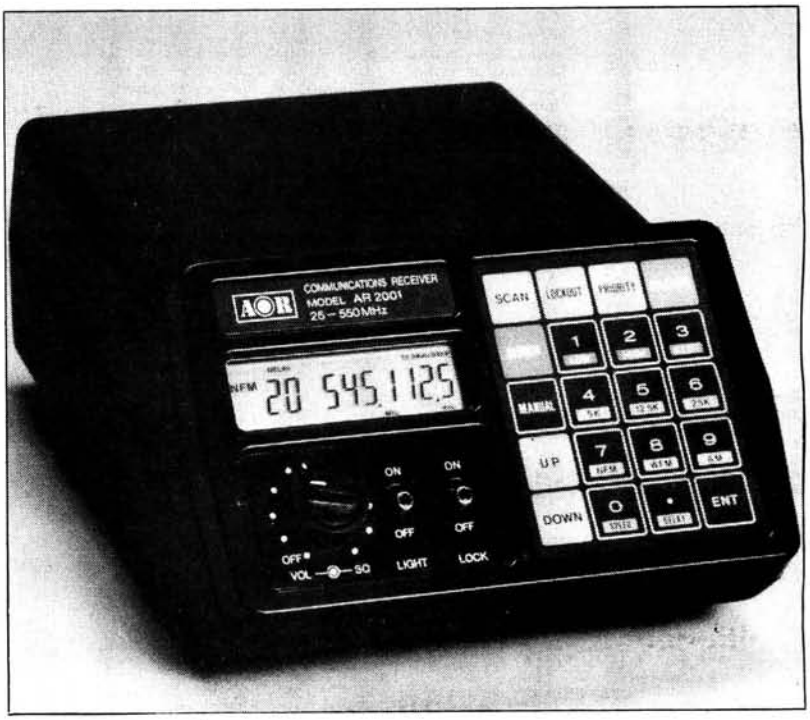

receiver coverage continuous from 25 to 550 MHz.

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the TRIO **TM201A** & the TRIO **TM401A** rigs that will actually fit in your car!

It has always been a major problem to find sufficient space to fit an amateur radio transceiver in a car. Today the problem is more acute with the modern car becoming more compact as a result of energy saving measures and no provision is made other than for mobile music.

With this problem in mind TRIO have concentrated on the size of the transceiver and its relationship to performance. Certain brand new concepts in mobile transceiver design have emerged. The result is not one new transceiver but two. TRIO, with their by now well known attention to the demands of the enthusiastic amateur, have simultaneously produced the TM201A two metre transceiver and its seventy centimetre version, the TM401A.

Using the transceiver is simplicity itself; VFO A steps in 25KHz steps, VFO B in 5KHz steps, controlled either from the front panel knob or the up/down mike switch. Dual function front panel switches are provided giving 5 memory channels as well as specific rig functions.

Memory 1 holds the priority frequency, memories 2 and 3 are standard memories and memories 4 and 5 hold receive and transmit frequencies independently.

The rig functions set by the six switches are; memory channel recall, memory scan, MHz changing, rig switching between VFO's A and B, initiating priority channel and finally frequency insertion in memory. A system of beep tones aids memory entry. Programmable scan is available using the frequency limits as set in memory 5 thus one can scan for example simplex frequencies between 145.200 and 145.575 and so avoid the rig locking on a repeater channel.

Of course all the standard repeater functions are available; 600KHz shift, 1750Hz tone burst and a locking reverse repeater shift. Both rigs have a bright yellow frequency display thus assuring maximum readability under mobile conditions.

An optional remote frequency controller (FC10) is available which connects to the TM201A/ TM401A and gives in addition to frequency readout, control of the more important rig functions.

The 2 metre TRIO TM201A gives 25 watts and the 70 centimetre TM401A 12 watts, both rigs giving 1 watt when switched to low power.

What more can I say? Just this, when I opened the first box in order to use the two rigs in my shack prior to putting together what you have just read, I was amazed! I thought that TRIO had forgotten to put the transceiver in the box. The rig is small, it is unbelievably small. The transceiver's dimensions are 5.6(141)W × 1.6(39.5)H × 7.3(183)D, inches(mm) and each rig weighs only 2.8lbs(1.25Kg).

How has this been achieved? TRIO have not only removed the internal speaker and included with the rig, as standard, a separate 77mm diameter speaker, but have totally designed the transceiver with size as a major consideration, the result, modern mobile perfection. The two new rigs are outstanding, a natural result of TRIO's high technology combined with the dreams of the enthusiastic amateur.

TM201A £269.00 inc VAT.
TM401A £299.00 inc VAT.

Securicor Carriage £6

the JRC **JST100** transceiver

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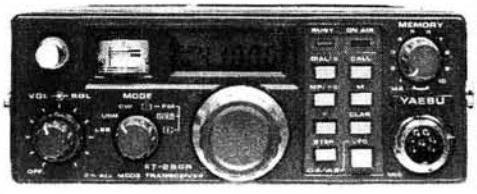
FT775	~~£435~~	*Now Only* £399 inc.
FT707	~~£515~~	*Now Only* £499 inc.

FT726R	~~£699~~	*Now Only* £675 inc.
FT290R	~~£285~~	*Now Only* £249 inc.
FT790R	~~£349~~	*Now Only* £299 inc.
FT230R	~~£255~~	*Now Only* £239 inc.
FT730R	~~£299~~	*Now Only* £259 inc.
FT708R	~~£229~~	*Now Only* £209 inc.



FT290R
2M MULTIMODE

FV102DM	~~£250~~	*Now Only* £230 inc.
FC102	~~£225~~	*Now Only* £200 inc.
FRG7700M	~~£399~~	*Now Only* £389 inc.

FC700	~~£94.65~~	*Now Only* £85 inc.
FV707DM	~~£200~~	*Now Only* £170 inc.
FC707	~~£88.55~~	*Now Only* £85 inc.

NEW FROM YAESU

FT757GX

Frequency range 160-10m Tx, general coverage RX. 10 Hz VFO steps and 500 KHz band steps.
Modes, USB, LSB, CW, AM, FM all as standard.
Power output 100W SSB, CW, FM 25W carrier AM, 3rd order products −40dB at 100W on 14 MHz.
Dynamic range better than 100dB CW(N) at 14 MHz.
Frequency stability better than ± 10ppm after warm up.
Dual VFO's and 8 memories with VFO/memory transfer feature allowing more flexible split frequency operation.
Programmable memory scanning with scanstop threshold adjustable with the RF Gain control.
All accessories installed including AM, FM, Marker, Speach processor, shift filters, 600Hz CW filter and keyer.
New heatsink design and ducted cooling system allow 100W o/p at 100% transmitter duty cycle.
Selectable semi break-in or full break-in and built in iambic keyer with dot-dash memory.
Three microprocessors control most of the switching and adjusting functions normaly done by hand and an optional CAT interface unit allow further operating flexibility with an external computer.

REMEMBER

Only authorised Yaesu dealers have direct contact with the factory in Japan, and only if you buy your radio from an authorised dealer can you be assured of spares and service back up. So **BEWARE** of grey importers who offer sets a few pounds cheaper, they may not be around if your set goes wrong!!

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ANTENNAS VHF

JAYBEAM

4Y/4M	Yagi 4 element	7dB	£29.90	£2.20
PM/12/4M	Phasing harness 2-way		£16.10	£1.50
HO/2M	Halo head only	OdBd	£5.98	£1.20
HM/2M	Halo with 24" mast	OdBd	£6.55	£1.20
C5/2M	Colinear omnivert	4.8dBd	£54.62	£2.50
LW5/2M	Yagi 5 element	7.8dBd	£14.37	£2.50
LW8/2M	Yagi 8 element	9.5dBd	£17.82	£2.50
LW10/2M	Yagi 10 element	10.5dBd	£24.15	£2.50
LW16/2M	Yagi 16 element	13.4dBd	£35.07	£3.20
14Y/2M	Yagi 14 element	12.8dBd	£36.23	£3.20
PBM10/2M	10 ele Parabeam	11.7dBd	£44.85	£3.20
PBM14/2M	14 ele Parabeam	13.7dBd	£55.77	£3.20
Q4/2M	Quad 4 element	9.4dBd	£29.32	£2.50
Q6/2M	Quad 6 element	10.9dBd	£39.10	£2.50
Q8/2M	Quel 8 element	11.9dBd	£44.85	£2.50
D5/2M	Yagi 5 over 5 slot	10dBd	£25.30	£2.50
D8/2M	Yagi 8 over 8 slot	11.1dBd	£34.50	£2.50
5XY/2M	Yagi 5 ele crossed	7.8dBd	£28.17	£2.50
8XY/2M	Yagi 8 ele crossed	9.5dBd	£35.65	£2.50
10XY/2M	Yagi 10 ele crossed		£46.00	£2.50
PMH2/C	Harness cir polarisation		£9.77	£1.50
PMH2/2M	Harness 2-way 144MHz		£12.65	£1.50
PMH4/2M	Harness 4-way 144MHz		£28.75	£1.50
C8/70	Colinear Omni Vertical	6.1dBd	£62.10	£2.50
D8/70	Yagi 8 over 8 slot	12.3dBd	£25.87	£2.50
PBM18/70	18 ele Parabeam	13.5dBd	£32.20	£2.50
PBM24/70	24 ele Parabeam	15.1dBd	£42.55	£2.50
LW24/70	Yagi 24 element	14.8dBd	£27.02	£2.50
MBM28/70	28 ele Multibeam	11.5dBd	£21.27	£2.50
MBM48/70	48 ele Multibeam	14.0dBd	£35.65	£2.50
MBM88/70	88 ele Multibeam	16.3dBd	£48.87	£2.50
8XY/70	Yagi 8 ele crossed	10dBd	£42.55	£2.50
12XY/70	Yagi 12 ele crossed	12dBd	£52.90	£2.50
PMH2/70	Harness 2-way		£10.35	£1.50
PMH4/70	Harness 4-way		£22.42	£1.80
CR2/23CM	Corner reflector	13.5dBd	£40.25	£2.50
PMH2/23CM	Harness 2-way		£31.05	£1.50

SMC-HS

SMCGDX1	Discone 80-480MHz 3dB¼ 3.3'	£40.25	£2.50
SMCGDX2	Discone 50-480MHz 3dB¼ 6.2'	£49.45	£2.50
GDXA	Discone 100-440MHz 3dB¼	£33.75	£2.50
SMCVHFL	Discone 65-520MHz Rx only 5.0'	£15.70	£2.50
SMCGP23	Colinear 2M 3 × ⅝ wave 7.8dB¼ 14.6'	£39.85	£2.50
SMCGP144W	Colinear 2M Multi ⅝ wave 6.5dB¼ 10.2'	£27.60	£2.50
SMCGP2M	⅝ wave c/w ground plane 3.4dB¼ 4.6'	£18.00	£2.50
SMCSQ144	2M Swiss Quad for vertical mounting	£57.60	£2.50
SMCGP432X	Colinear 70cm 3 × ⅝ wave 6.8dB¼ 5.6'	£29.90	£2.50
SMC7Q2V	Colinear 2.8dB¼ 2M, 5.7dB¼ 70cm 3.6'	£29.90	£2.50
SMC2HB6	6M HB9CV 2 Driven elements	£19.95	£2.50
SMCHS770	144/432 Duplexer 50W 30dB isolation	£15.35	£1.50
SMC2QW	Element 144MHz 1/4 wave ødB¼	£2.30	£1.50
SMC2NE	Element 144MHz 5/8 wave 3.ødB¼	£6.90	£1.80
SMC2VF	Element 144MHz 1/2 wave 3.0dB¼	£11.50	£1.80
SMC78F	Element 144MHz 7/8 wave 4.5dB¼	£13.80	£2.00
SMC78B	Element 144MHz 7/8 wave 4.5dB¼	£13.80	£2.00
SMC88F	Element 144MHz 8/8 wave 5.2dB¼	£18.80	£2.00
SMC258	Element 432MHz 2 × 5/8 5.5dB¼	£12.65	£1.80
SMC358	Element 432MHz 3 × ⅝ 6.3dB¼	£16.85	£1.80
SMC70N2M	2M 2.7dB¼ 70cm 5.1dB¼	£16.85	£1.80
SMCHS770	144/432 Duplexer 50W 30dB isolation	£15.35	£1.50
SMCGCCA	Gutter clip 4 mtrs Cable	£9.95	£1.80
SMCS0MM	Magnetic base c/w 4M cable	£9.95	£1.80

2M ASCOT ANTENNAS MOBILE
(The keenest prices)
Complete with bases and cable

340COM	¼ × Standard	£6.10	£1.50
310COM	¼ × Swival	£8.10	£1.50
344COM	¼ × Sprung	£10.38	£1.50
440COM	⅜ × Standard	£7.71	£1.50
330COM	⅜ × Swival	£10.00	£1.50
341COM	⅜ × Sprung	£12.31	£1.50
092	Magnetic Mount	£10.75	£1.50
350	½ × Standard	£14.26	£1.50
351	½ × Sprung	£15.01	£1.50
091	Magnetic Mt ½ ×	£10.75	£1.50

NB:PRICES INCLUDE VAT AT 15%
Carriage extra, mainland rate shown

ANTENNAS HF

HY GAIN

12AVQ	Vertical 10, 15, 20, 14.0'H	£50.60	£2.75
14AVQ/WB	Vertical 10, 15, 20, 40 18.0'H	£64.40	£2.75
18AVT/WB	Vertical 10, 15, 20, 40, 80M 25.0'H	£113.85	£2.75
14RMQ	Roof mounting Kit 12AVQ 14AVQ & 18AVT	£38.52	£2.75
18V	Vertical 10, 15, 20, 40, 80M 19.0'H	£36.22	£2.75
103BA	3Ele Yagi 10 metres 17.0'LE 8.0'B	£67.85	£3.50
105BA	5Ele Yagi 10 metres 18.5'LE 24.0'B	£155.25	£3.95
153BA	3Ele Yagi 15 metres 23.0'LE 12.0'B	£90.85	£3.50
155BA	5Ele Yagi 15 metres 24.5'LE 26.0'B	£236.90	£5.90
203BA	3Ele Yagi 20 metres 35.0'LE 16.0'B	£178.25	£4.90
204BA	4Ele Yagi 20 metres 36.5'LE 26.0'B	£286.35	£7.30
205BA	5Ele Yagi 20 metres 36.5'LE 34.0'B	£396.75	£9.40
402BA	2Ele Yagi 40 metres 43.0'LE 16.0'B	£247.25	£6.50
DB10/15A	3 Ele Yagi 10-15M 23.0'LE 13.0'B	£196.95	£4.80
TH3JNR	3 Ele Yagi 10-15-20M 24.2'LE 12.0'B	£202.40	£3.50
TH2MK3	2 Ele Yagi 10-15-20M 27.3'LE 6.0'B	£169.05	£3.50
TH3MK3	3 Ele Yagi 10-15-20M 27.0'LE 14.0'B	£274.85	£5.30
TH5DXX	"Thunderbird" 5 Ele 31.0'LE 18.0'B	£419.75	£6.70
TH6DXX	"Thunderbird" 6 Ele 31.1'LE 24.0'B	£396.75	£8.50
TH7DXX	"Thunderbird" 7 Ele 31.0'LE 20'TR	£511.75	£8.75
HYQUAD	2 Ele Quad 10, 15, 20M 13.5'TR 8.0'B	£354.20	£6.00
18TD	Dipole Tape 10, 15, 20, 40, 40, 80M 132	£121.90	£2.80

JAYBEAM

VR3	Vertical 10-15-20M. DC Short 6 lb 13.5'H	£46.00	£2.50
TB3	3 Ele Yagi 10-15-20M 14.6'TR 14.1'B	£189.75	£5.40

MINI BEAM

C4	Vertical Miniature 10-15-20M 8lb 11.5'H	£59.00	£2.50
HQ1	"Mini" Quad beam 10-15-20M 11.0'LE 4.5B	£139.00	£4.00

G4MH MINI BEAM

	Mini Beam 10-15-20M	£82.50	£4.00

SMC TRAPPED DIPOLE 10-80M 119' Potted Traps.

SMCTD/HP	14SWG H/D cμ traps 1000W PEP	£43.41	£2.50
SMCTD/P	Portable cμ/terylene 75' coax	£59.80	£2.50
SMCHPT	High Power 7MHz 1000W Per pair	£15.52	£1.80

SMC-HS ANTENNA

SMCHF5V	Verical 10, 15, 20, 40, 80M 15.7'	£54.80	£2.50
SMCHF5R	Radial kit loaded 6.5'-7.3'	£34.90	£2.50
SMCHF3VNB	Vertical 10-18-24M 1000W PEP 16.0'H	£51.35	£2.50

NB: PRICES INCLUDE VAT AT 15%
Carriage extra, mainland rate shown

ANTENNA ROTATORS

	Type			
RLD3	Bell	5 Core Light Duty	£40.25	
505	Bell	5 Core Light Duty	£40.25	
AR30	Offset	5 Core Light Duty	£56.35	
KP250	Bell	6 Core Lighter Duty	£54.91	
9502B	Offset	3 Core Lighter Duty	£56.92	
AR22	Bell	4 Core Medium Duty	£67.85	
9508	Offset	3 Core Medium Duty	£80.21	
AR40	Bell	5 Core Medium Duty	£90.85	
BT1	Bell	5 Core 4 Preset Medium	£91.43	
KR400	Bell	6 Core Medium matches KR500	£97.75	
KR500	Thro	6 Core Elevation	£112.12	
AR50	Bell	5 Position Medium	£113.85	
KR400RC	Bell	6 Core Medium Duty	£114.94	
CD45	Bell	8 Core Heavy Duty	£136.85	
KR600RC	Bell	8 Core Heavy Duty	£163.30	
HAM IV	Bell	8 Core Heavier Duty	£258.75	
KR200RC	Bell	8 Core Heavier Duty	£314.52	
T2X	Bell	8 Core Very Heavy Duty	£327.75	
H300	Bell	8 Core Digital Readout	£493.35	

Control Cable

RC4W	4 Way 28p/mtr	Carriage £1.80
RC5W	5 Way 33p/mtr	Carriage £1.80
RC6W	6 Way 51p/mtr	Carriage £1.80
RC8W	8 Way 55p/mtr	Carriage £1.80
9523	Support Bearing 9502	£15.81 Carriage £2.50
KC038	Lower Mast Clamp KR400/600	£12.07 Carriage £2.50

Prices including VAT and carriage, but accessories are extra unless sent with rotators.

STATION ACCESSORIES

HANSEN

			P&P
FS710H	1.8-60MHz 15/150/1500W Pep	£89.70	FOC
FS710V	50-150MHz 15/150W Pep	£88.70	FOC
FS50HP	1.8-80MHz 20/200/2000W Pep	£88.70	FOC
FS50VP	50-150MHz 20/300W Pep	£88.70	FOC
FS500H	1.8-80MHz 20/200/2000W Pep	£69.75	FOC
FS500V	50-150MHz 20/200W Pep	£69.75	FOC
FS300H	1.8-80MHz 20/200/1000	£46.40	FOC
FS300V	50-150MHz 20/200	£46.40	FOC
FS200	1.8-150MHz 20/200 Pep	£50.60	FOC
FS001M	1.8-30MHz 20/200W Pep	£51.35	FOC
FS601MH	1.8-30MHz 200/2000W Pep	£51.35	FOC
FS800M	50-150MHz 20/200W Pep	£51.35	FOC
FS600M	430-440MHz 5/20W Pep	£51.35	FOC
FS210	1.8-150MHz 20/200W Auto SWR	£55.20	FOC
FS301M	2-30MHz 20/200W	£36.65	FOC
FS301MH	2-30MHz 200/2000W	£36.65	FOC
FS302M	50-150MHz 20/200W	£35.65	FOC
FS711H	2-30MHz 20/200W Head	£36.80	FOC
FS711V	50-150MHz 20/200W Head	£36.80	FOC
FS711U	430-440MHz 5/20W Head	£36.80	FOC
HB1	FS711H Coupler	£23.75	FOC
VB1	FS711V Coupler	£23.75	FOC
UB1	FS711U Coupler	£23.75	FOC
FS5E	3.5-150MHz 20/200/1000W HF	£37.20	FOC
FS5S	1.8-150MHz 20/200/1000W HF	£37.95	FOC
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SWR3E	3.5-150MHz 20/200/1000W HF	£25.00	FOC
SWR3S	3.5-150MHz F/S Meter ant.	£28.46	FOC
SWR508	3.5-150MHz Twin Meter	£26.45	FOC
FS20D	3-150MHz 5/20W	£37.95	FOC
FS800	1.8-150MHz 6/30/150W	£115.00	FOC

JD

JD110	1.5-150MHz 10/100W	£13.80	FOC

MIRAGE

MP2	50-150MHz 50/500/1500W Pep	£100.00	FOC

SMC

S3-30L	Mini CB	£8.80	FOC
T3-170L	3.5-170MHz Relative	£14.95	FOC

MORSE KEYS

BKU1	Squeeze Key	£30.30	£1.20
HK703	Straight Key	£25.70	£1.20
HK704	Straight Key	£17.65	£1.20
HK706	Straight Key	£14.60	£1.00
HK707	Straight Key	£13.75	£1.00
HK710	Straight Key	£36.40	£1.75
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HK711	Key Mounting	£29.50	£1.50
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MK702	Single Lever Paddle	£26.45	£1.60
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MORSE EQUIPMENT

KP100	Squeeze CMOS 230 /13.8V	£69.00	£2.00
KP200	Memory 4096 Multi Ch Mem Back Up 230 /13.8V	£155.25	£2.50

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D70	Morse Tutor	£56.35	FOC

MICROWAVE MODULES - RTTY EQUIPMENT

MM2001	RTTY to Demod. /Convertor	£189.00	FOC
MM4001	RTTY Transceiver	£219.00	FOC
MM4001	IKB RTTY Transceiver c /w Keyboard	£299.00	FOC
MMS1	'Morse Talker'	£115.00	FOC
MMS2	Advanced 'Morse Talker'	£155.00	FOC
MM1000	ASCII to Morse Convertor	£69.95	FOC
MM1000K	KB ASCII to Morse conv c /w keybd	£89.00	FOC

PRICES INCLUDE VAT AT 15%
Mainland carriage where applicable

YAESU SPECIAL OFFERS

FTV107R TRANSVERTER c/w 2m	£89.00	FV101DM VFO	£119.00
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FTV707R TRANSVERTER c/w 2m	£99.00	FT227RA	£155.00
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ICOM's Latest
THE IC-745, HF Transceiver

What's the celebration about?
The IC-745...a new all band HF transceiver with SSB, AM. CW, RTTY and an FM option.. plus, a 100KHz – 30MHz general coverage receiver.

And...the IC-745 has a combination of features found on no other transceiver at such an incredibly low price. See the IC-745 at our shop and showroom at Herne Bay or contact your local authorised ICOM dealer for more information.

IC-2E, VHF/FM
IC-4E UHF Portables

Nearly everybody has an IC2E – the most popular amateur transceiver in the world – there is also the 70 cm version which is as good and takes the same accessories.

NEW! IC-271, VHF Multimode Base station

Icom have made improvements to the popular IC-251 and brought it up to date.

Power can be adjusted up to 25W on all modes SSB, CW and FM. Squelch works on all modes and a listen-input facility has been added for Repeater work. RIT shift is shown on the display.
Options include: SM5 desk mic. Internal chopper PSU
Speech synthesizer announcing displayed frequency.
22 Channel memory extension - with scan facilities.
10 Hz tuning facility. There is a switchable front end pre-amp.
There is now a 70 cm version available – the IC-471.

IC-R70, HF Receiver

The R-70 covers all modes (when the FM option is included), and uses 2 CPU-driven VFO's for split frequency working, and has 3 IF frequencies: 70MHz, 9MHz and 455KHz, and a dynamic range of 100dB. It has a built-in mains supply.

Other R-70 features include: input switchability through a pre-amplifier, direct or via an attenuator, selectable tuning steps of 1KHz, 100Hz or 10Hz, adjustable IF bandwidth in 3 steps (455KHz). Noise limiter, switchable AGC, tunable notch filter, squelch on all modes, RIT, tone control. Tuning LED for FM (discriminator centre indicator). Recorder output, dimmer control.

The R-70 also has separate antenna sockets for LW-MW with automatic switching, and a large, front mounted loudspeaker with 5.8W output. The frequency stability for the 1st hour is ± 50Hz, sensitivity- SSB/CW/RTTY better than 0.32 μv for 12dB (S+N)÷N, Am-0.5μv, FM better than 0.32 for 12dB Sinad. DC is optional

Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Thanet ICOM Th

The IC-751 HF Transceiver

Think about the IC-740,
One of the most popular amateur bands transceivers, make a few improvements such as adding 36 memory channels, doing away with mechanical bandswitching and then add full HF receive capabillity (0.1-30 MHz) which is even an improvement on the famous R70 and you get a pretty good idea of what the IC-751 is like. It is fully compatible with Icom Auto units such as the AT-500 and IC-2KL and a further option for computer control can be added. There is also a digital speech synthesizer option which will be ideal for blind operators For power supplies you have the option of the IC-PS740 (which fits inside) or the PS-15/PS20 range for external use.

As you would expect there is a built in speech processor, a switchable choice of a J-FET pre-amp, straight through or a 20dB pin diode attenuator and two VFOs allowing split frequency operation.

Other standard features include:- 36 memory channels with scan facility and start/stop timers, a marker, 4 variable tuning rates, Pass Band Tuning, notch, variable noise blanker, monitor switch, DFM (direct feed mixer) in the front end, full break-in on CW and AMTOR compatibility. The first IF is 70.045 MHz. Any XIT and RIT adjustment is shown on the display. The transmitter features high reliability 2SC2904 transistors in a low IMD (-32dB@ 100W) full 100% duty cycle. Power is restricted to 40W on AM and adjustable from 10W on all modes. FM and the IC-FL44A crystal SSB filter are both fitted as standard. As you can see from this brief description the IC-751 is certainly a transceiver worth considering – Why not call us for details?

IC-290H, VHF Multimode Mobile

The recently introduced IC-290H has proved so popular that we have decided to concentrate on this (25W) model 2m multimode. With its bright green display, 5 memories, scan facilities on either memories or the whole band, tone-call button on the microphone and instant listen input for repeaters, this little box really is a beauty.

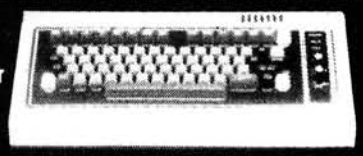
As well as stocking the complete ICOM range of equipment suitable for European use, we also sell Yaesu, Jaybeam, Datong, Welz, G-Whip, Western, TAL, Bearcat, Versatower and RSGB publications from our shop and showroom at the address below. Come in for a demonstration or just a chat, our qualified sales staff and technicians will be glad to assist you.

RTTY, Morse & ASCII

Shortwave listeners and amateurs are able to take more interest in other modes of transmission than speech with the latest range of decoders and senders available. As well as amateur transmissions, there is an abundance of news and other interesting broadcasts which can be read using these space-age devices.

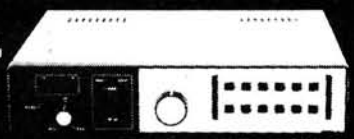
Some models in our range are the Tono 550, 9000E and the Telereader CWR-670, CWR-685E and CWR-610E. There is now available a professional version of the Tono 9000E, the PRO-1, which has a built-in scrambler. The Telereader CWR-670 is also available with a built-in VDU which can include a 40 column printer.

TONO 9000E Sender/Decoder



CWR-610E, Decoder

TONO 550, Decoder



As U.K. importers of the renowned TONO and TELEREADER products, we can offer you a wide range, from a simple morse and RTTY reader which can be plugged into your TV., to a complete send and receive system with memories and built-in displays, or outputs for high-definition VDU.

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Thinking of 1296? Then Icom IC-120 could be the answer.

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Features include:	Output Power = 1 W or more
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Adjustable Repeater Shift	2 VFO's
6 Memories - with scanning facility	Deviation + 5 KHz
Spurious Emissions - 40dB or better	RIT

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TET ANTENNA SYSTEMS

AX210N	10 ele. yagi for 2m crossed	74.95	(n/c)
HB10F2T	2 ele. 10m mono band beam	51.50	(n/c)
HB10F3T	3 ele. 10m mono band beam	74.95	(n/c)
HB15F2T	2 ele. 15m mono band beam	60.66	(n/c)
HB15F3T	3 ele. 15m mono band beam	93.46	(n/c)
HB15M25P	VP mini size 15m 2 ele.	69.50	(n/c)
HB15M35P	VP mini size 15m 3 ele.	102.30	(n/c)
HB34D	4 ele. tri band beam 10/15/20m	222.90	(n/c)
HB33SP	3 ele. tri band beam 10/15/20m	192.50	(n/c)
HB35C	Tri band array 10/15/20m	283.95	(n/c)
HB35T	5 ele. 10/15/20m	278.50	(n/c)
MV3BH	Vertical for 10/15/20m	37.99	(n/c)
MV4BH	Vertical for 10/15/20/40m	48.90	(n/c)
MV5BH	Vertical for 10/15/20/40/80m	63.95	(n/c)
MLA4	Loop antenna 10/15/40/80	105.60	(n/c)
SQ22	Phased 2 ele. swiss quad 2m	58.95	(n/c)
SQY06	6 ele. quagi 2m	45.75	(n/c)
SQY08	8 ele. quagi 2m	52.75	(n/c)
HB210S	10 ele. dual driven yagi 2m	47.99	(n/c)
TE214	14 ele. long yagi 2m	74.40	(n/c)
SSL720	9 x 2 ele. (18) slot fed 70cm	77.20	(n/c)
HB23SP	2 ele. tri band beam 10/15/20m	135.60	(n/c)
SSL218	9 x 2 ele. (18) slot fed 2m	144.79	(n/c)
TPH2	Phasing harness 2m	17.25	(n/c)
QYU10	10 ele. quagi 70cm	67.90	(n/c)
SQ007	70cm 2 ele. phased swiss quad	66.99	(n/c)
SQ10	Swiss quad 10m	97.50	(n/c)
SQ15	Swiss quad 15m	106.90	(n/c)

YAESU ANTENNAS

Base

RSL145GP	½ wave base ant. 2m	21.20	(1.50)
RSL435GP	½ wave co-linear 70cm	31.60	(1.50)

HF Mobile

RSL3.5	3.5MHz resonator & whip	12.21	(0.50)
RSL7.0	7.0MHz resonator & whip	11.80	(0.50)
RSL14.0	14.0MHz resonator & whip	11.45	(0.50)
RSL21.0	21.0MHz resonator & whip	11.20	(0.50)
RSL28.0	28.0MHz resonator & whip	11.00	(0.50)
RSL2A	Mast to suit above	5.00	(0.50)
RSM2	Gutter mount/Feeder/PL259 suit above	10.94	(0.75)

VHF Mobile

RSL145	2m ¼ wave fibreglass whip	12.10	(0.50)
RSL145S	2m ¼ wave steel whip foldover	9.25	(0.50)
RSL150SS	2m ¼ wave PL259 shock spring	3.90	(0.50)
RSM2	Gutter mount/Feeder/PL259 (RSL145)	10.94	(0.75)
RSM4M	Heavy duty mag/Feeder/PL259	13.25	(1.00)

UHF Mobile

RSL453S	¼ wave antenna	15.50	(0.50)

ANTIFERENCE ANTENNAS

VHF Mobile

TAP3009	¼ wave 3db snap-in hinged whip	13.00	(3.00)
TAP3677	¼ wave 3db snap-in shock coil	14.56	(3.00)
TAP3002	¼ wave unity gain snap-in hinged whip	9.96	(3.00)

UHF Mobile

TAP3462	¼ over ¼ wave 3db	16.86	(3.00)
TAP3697	¼ over ¼ wave 5db	20.00	(3.00)
K220	Mag mount/Feeder to suit above	11.96	(2.00)

Simply phone or write and leave the rest to us

Antennas Various/Accessories

HQ1	Mini beam 10/15/20m 2 ele. 1kW	139.00	(4.00)
C4	Vertical 10/15/20m	48.50	(3.00)
G4MH	Mini beam 10/15/20	88.00	(4.00)
KTLM-4	Gutter mount/Cable assy. SO239	6.90	(0.50)

DATONG PRODUCTS

PC1	50KHz to 30MHz receive converter	137.42	(0.50)
VLF	Very low freq. converter	29.90	(0.50)
FL1	Frequency agile audio filter	79.35	(0.50)
FL2	Multimode audio filter	89.70	(0.50)
ASP/A	Auto RF speech clipper (YAESU)	82.80	(0.50)
ASP/B	Auto RF speech clipper (TRIO)	89.70	(0.50)
D75	Manual RF speech clipper	56.35	(0.50)
RFC/M	RF speech clipper module	29.90	(0.50)
D70	Morse tutor	56.35	(0.50)
AD270	Active dipole RX ant. (indoor)	47.15	(0.50)
AD370	Active dipole RX ant. (outdoor)	64.40	(0.50)
MK	Morse keyboard	137.42	(0.50)
DC144/28	2m converter	39.67	(0.50)
RFA	Broadband preamplifier	33.92	(0.50)
MPU	Mains power unit	6.90	(0.50)

MICROWAVE MODULES

Transverters

MMT28/144	10m transverter	109.95	(2.50)
MMT70/144	4m transverter	119.95	(2.50)
MMT432/144R	70cm transverter	184.00	(2.50)
MMT1296/144	23cm transverter	184.00	(3.00)
MMT70/28	4m transverter	119.95	(2.50)
MMT144/28	2m transverter	109.95	(2.50)
MMT432/28S	70cm transverter	159.95	(2.50)

Linear Amplifiers

MML28/100S	10m 100W linear amp.	129.95	(3.00)
MML70/50S	4m 50W linear amp.	85.00	(2.50)
MML70/100S	4m 100W linear amp.	139.95	(3.00)
MML144/30LS	2m 30W linear amp. 1-3W in	69.95	(2.50)
MML144/50S	2m 50W linear amp.	85.00	(2.50)
MML144/100LS	2m 100W linear 1-3W in	159.95	(3.00)
MML144/100S	2m 100W linear 10W in	139.95	(3.00)
MML432/50	70cm 50W linear amp.	109.95	(3.00)
MML432/100	70cm 100W linear amp.	228.65	(4.00)
MML1296/10	23cm 10W linear amp.	199.00	(2.50)
MML432/30	70cm 30W linear amp. 1-3W in	99.00	(3.00)

Converters

MM1000KB	ASC11 morse converter with keyboard	99.95	(3.00)
MM4001	RTTY to TV converter	189.00	(2.50)
MM4001KB	RTTY transceiver	269.00	(2.50)
MM4000KB	RTTY transceiver with keyboard	299.00	(4.00)
MMC28/144	10m to 2m converter	29.90	(1.00)
MMC50/28	6m to 10m converter	29.90	(1.00)
MMC70/28	4m to 10m converter	29.90	(1.00)
MMC70/28LO	4m to 10m with LO	32.90	(1.00)
MMC432/28S	70cm to 10m converter	37.90	(1.00)
MMC432/144S	70cm to 2m converter	37.90	(1.00)
MMC435/600	UHF ATV converter	27.90	(1.00)
MMC1296/28	23cm to 10m converter	34.90	(1.00)
MMC1296/144	1296MHz low noise converter	69.95	(1.00)
MMK1691/137.5	1691MHz meteosat converter	129.95	(2.50)

Morse Talkers

MMS1	Morse tutor 2-20WPM Side tone	115.00	(2.50)
MMS2	Morse tutor (advanced) 6-32WPM + speak back	169.00	(2.50)

Amateur TV

MTV435	70cm 20W (PSP) transmitter	149.00	(2.50)
MMC435/600	Converter ATV UHF output	27.90	(1.00)

Preamplifiers

MMA144V	2m preamp RF switched	34.90	(1.00)
MMA28	10m preamp	16.95	(1.00)
MMA1296	23cm preamp	34.90	(1.00)

Frequency Counters

MMD650/500	500MHz digital meter	75.00	(1.00)
MMD600P	600MHz pre scaler	29.90	(1.00)
MMDP-1	Probe	14.90	(0.50)

Filters

MMF144	2m band pass 40W max.	11.90	(1.00)
MMF452	70cm band pass 40W max.	11.90	(1.00)

Various

MMS384	384MHz signal source	29.90	(1.00)
MMR15/10	15db 10W attenuator	11.90	(1.00)

HI-MOUND MORSE KEYS

HK702	Up down keyer marble base	24.50	(0.50)
HK704	Up down keyer	16.68	(0.50)
HK705	Up down keyer	12.50	(0.50)
HK706	Up down keyer	13.75	(0.50)
HK708	Up down keyer	11.96	(0.50)
HK808	Up down keyer marble base	39.57	(0.50)
MK704	Twin paddle keyer	10.95	(0.50)
MK705	Twin paddle keyer marble base	22.00	(0.50)

MOULDINGS

IK	Iambic keyer	19.95	(0.50)

TOKYO HY POWER

HC150	HF ATU SWR/Power meter 200W PEP	62.50	(n/c)
HC2000	HF 2kW ATU SWR/Power meter 6 POS ant. switch. 6 to 1 vernier high Q coils 2kW peak 1kW continuous	276.55	(n/c)

Antenna Rotators & Accessories

9502	Channel master med duty up to 8 ele.	57.00	(3.50)
9523	Alignment bearing for 9502	15.81	(1.25)
KR400	Med/Heavy duty 180° meter	90.85	(3.50)
KR400RC	Med/Heavy duty 360° meter Load 200Kg 1½"-2" masts	114.94	(3.50)
CASTING	Lower casting set	15.00	(1.25)
KR600RC	Heavy duty 360° meter Load 200Kg Rot600Kg/cm Brake 4000Kg/cm 1½"-2"masts	163.30	(3.50)

Antenna Switches

SA450	SO239 connectors 1 in 2 out	9.75	(0.50)
SA450N	"N" type connectors 1 in 2 out	12.75	(0.50)

Baluns

BL50A	RAK 50 ohm ferrite BALUN 1:1 1.8-38MHz 1kW	12.88	(1.50)
BL-40X	Balun 2K PEP 1.1	11.52	(1.50)

Dummy Loads

T30	30W DC 500MHz PL259	6.61	(0.50)
T100	100W DC 500MHz SO239	20.12	(1.00)
T200	200W DC 500MHz SO239	31.36	(1.50)
T210	Wide band 10W 1.2G-2.4G	24.50	(0.75)
AW05	Pocket RF wattmeter 5W up to 500MHz BNC	19.75	(1.00)

DRAE PRODUCTS

DRAE4	4 amp PSU	30.75	(2.00)
DRAE6	6 amp PSU	48.00	(2.50)
DRAE12	12 amp PSU	74.00	(3.00)
DRAE24	24 amp PSU	105.00	(4.00)
DRAE WM	135-450MHz wavemeter	27.50	(1.00)

"N" Connectors (Silver Plated)

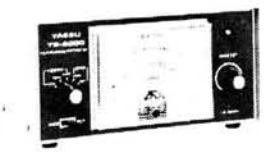
N58	"N" Male connector RG58	2.25	(0.25)
N8	"N" Male connector RG8	2.40	(0.25)
N308	"N" T adaptor (three female)	2.40	(0.25)
N307	"N" L adaptor (1 male 1 female)	2.40	(0.25)
N306	"N" Double female adaptor	1.90	(0.25)
N310	"N" Double male adaptor	2.50	(0.25)
NB304	"N" Female to BNC male adaptor	2.10	(0.25)
N402	"N" Plug to SO239	2.05	(0.25)
N403	"N" Socket to PL259	2.00	(0.25)
N404	"N" Socket to SO239	1.80	(0.25)

TOKYO HY POWER

HL32V	VHF 30W linear 1-5W drive HI-LOW output	53.50	(n/c)
HL82V	VHF linear preamp output meter 2-12W in 35-85+ out	144.50	(n/c)
HL160V	VHF linear preamp output meter 1-10W in 160W+ out	242.40	(n/c)
HL45U	UHF linear preamp 2-15W in 10-45W out	119.75	(n/c)

YAESU

YH55	Headphones Low Z	10.00	(0.50)
YH77	Lightweight headphones Low Z	10.00	(0.50)



SWR/Power Meters

YAESU

YS200		52.90	(n/c)
YS2000		69.79	(n/c)

Other Makes

RF2000	Twin meter 3.5-150MHz F/Scale 200/2000W	18.25	(1.00)
YM1X	Twin meter 3.5-150MHz F/Scale 12 or 120W	14.99	(1.00)

COMPUTERS

Commodore 64. 64K, sprites, sound chip etc.	343.85	(n/c)
Vic 20 + C2N datasett + intro to base part 1 + 4 games. Special price	139.99	(3.00)
Commodore 1541 174K disk drive	299.00	(n/c)
Vic 3K ram pack	29.95	(0.25)
Vic 8K ram pack	44.95	(0.25)
Vic 16K ram pack	74.95	(0.25)
Vic 20 reference guide	9.95	(0.25)
Commodore 64 reference guide	14.95	(0.50)
C2N datasett	44.95	(1.75)
Spectrum 48K	129.95	(1.75)
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Plus selection of software for all models.

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AMATEUR RADIO EXCHANGE

A PERSONAL APPROACH

Advertising in magazines is a very important part of our business, and judging by the response that we have, a great many amateurs and radio enthusiasts do read these ads. But we've often wondered if in fact the repetition of page after page of similar ads offering identical products at similar prices does not indeed become boring and monotonous to our readers.

So in the way of a change let us take time to discuss what after all you really want to know about, and that is what is new and even more important what items constitute real bargains.

First of all let it be said that nearly every item advertised by our competitors can be purchased through **AMATEUR RADIO EXCHANGE – AND NEARLY ALWAYS AT BETTER PRICES AND WITH BETTER SERVICE THAN ELSEWHERE. Ask** around if you want proof of that statement. We mail order all items, just phone before midday and give us a credit card No. and we will despatch the same day, if it is in stock.

NOW FOR THE BARGAINS

Firstly ICOM's now well known and tried IC 740 solid state HF transceiver listed at **£769,** available from us while stocks last at **£599,** including VAT & delivery.

Our second offer is the **YAESU FT 102,** and HF transceiver proved beyond doubt as a fine piece of equipment. Employing 3 × 6146B PA valves, a super receiver with notch and IF shift also FM facilities. List price **£839** but from us **£675** including VAT & delivery.

FT-102

How about VHF? There is no need to reveal once again all the excellent qualities that go to make up the performance and reliability of the **YAESU FT 290.** Just look around any Radio Rally and see just how many people are carrying one over their shoulder. Then consider this; we can supply the **FT 290R at £239,** or with Mutek Board fitted **£279,** whilst most of our competitors are still asking **£289** for the rig alone.

IC-740

FT290R

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FC 902 ATU – List Price **£135** – Our Price **£99 + £5.50** Securicor
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FV 101 DM Digital VFO – List Price **£260** – Our Price **£129 + £5.50** Securicor

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You may well ask, how do we do it? Why is it that we can usually make the opposition look silly when it comes to price. Well its no secret. We buy big and very often straight from the manufacturer. Where our competitors think twice about buying 5 pieces of a model we will not hesitate in buying 50, and by doing so we will obtain a very much better price.

So enough of the ego, lets consider our old friend **TRIO** – or is it **KENWOOD?** Call it what you will it is still excellent equipment, all made by **KENWOOD** in Japan and marketed throughout the world as **KENWOOD,** except in the U.K. where, probably by accident in translation or purely for convenience, it became known as **TRIO.** Different perhaps, but so is the price. Why pay **£469** for a **TRIO TW 4000** when we will supply the **KENWOOD TW 4000,** with full European specification, 25 watts out on each band at **£425.** Why pay £736 for the TRIO TS 430 when the **KENWOOD TS430** can be bought for **£695,** or if your pocket will stretch to it the fabulous TRIO TS 930 can be bought elsewhere for **£1216** and from us at **£1095.**

Then also remember at these prices there is available to you interest free H.P., Securicor delivery and a first class service department with 3 full-time engineers and an excellent supply of spares.

Now for the bits and pieces that are essential in completing any radio shack. We stock over 5000 different items from power supplies, capable of 50 amps, to 500 MA fuses. Items advertised in this magazine can be supplied by us from Towers to Transistors, from **LOG periodics** to **HALO'S** – nothing is too much trouble and no order is ignored, even if it is just for a few pence. We now also stock a full range of PMR equipment and have available our own VHF Community Repeater situated in the centre of London.

Yaesu	**Bencher**
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Icom	**Alinco**
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Tono	**Bnos**
Tasco	**Datong**
Weltz	**Strumeck**
Mutek	**Tonno**
Adonis	**J Beam**
Diamond	**Microwave Modules**

REMEMBER THIS

We started business 7 years ago with 3 pieces of new equipment and lots of empty boxes, a tin of coffee and an electric kettle, and in 7 years we have become one of the largest suppliers of Amateur Equipment in the country. Of course the coffee helped, but the goodwill, the service and the smile did a lot more. So phone us now – let's talk about that new rig or the second-hand one, or the part-exchange, or if you like, perhaps the weather. We are available to you 5 days a week from **9.30** till **5.30,** or if those times are not suitable leave a message on the ansafone and we will return your call.

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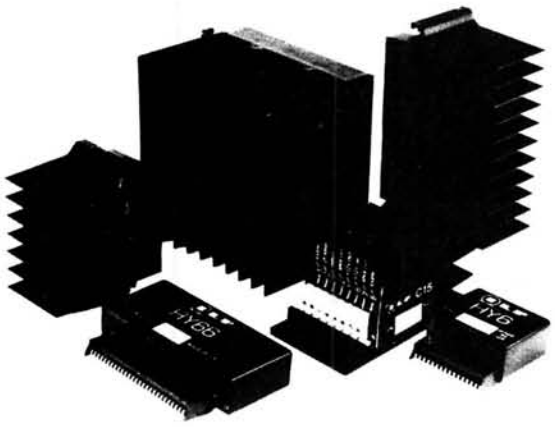
136 GLADSTONE STREET, ST HELENS, MERSEYSIDE
Tel: 0744 53157 *Our North West branch run by Peter (G4 KKN), just around the corner from the Rugby Ground.*

Closed Wednesday at Acton and Monday at St Helens, but use our 24-hour Ansafone service at either shop.

AMPLIFIERS

ILP



Over the last few years we have received feedback via the general public and industry that our products are from Taiwan, Singapore, Japan, etc... ILP are one of the few 'All British' electronics Companies manufacturing their own products in the United Kingdom. We have proved that we can compete in the world market during the past 12 years and currently export in excess of 60% of our production to over twenty different countries – including USA, Australia and Hong Kong. At the same time we are able to invest in research and development for the future, assuring security for the personnel, directly and indirectly, employed within the UK. We feel very proud of all this and hope you can reap some of our success.

I.L.Potts – Chairman

WE'RE INSTRUMENTAL IN MAKING A LOT OF POWER

In keeping with ILP's tradition of entirely self-contained modules featuring, integral heatsinks, no external components and only 5 connections required, the range has been optimized for efficiency, flexibility, reliability, easy usage, outstanding performance, value for money.

With over 10 years experience in audio amplifier technology ILP are recognised as world leaders.

BIPOLAR MODULES

Module Number	Output Power Watts rms	Load Impedance Ω	DISTORTION T.H.D. Typ at 1KHz	DISTORTION I.M.D. 60Hz/ 7KHz 4:1	Supply Voltage Typ	Size mm	WT gms	Price inc. VAT
HY30	15	4-8	0.015%	<0.006%	± 18	76 x 68 x 40	240	£8.40
HY60	30	4-8	0.015%	<0.006%	± 25	76 x 68 x 40	240	£9.55
HY6060	30 + 30	4-8	0.015%	<0.006%	± 25	120 x 78 x 40	420	£18.69
HY124	60	4	0.01%	<0.006%	± 26	120 x 78 x 40	410	£20.75
HY128	60	8	0.01%	<0.006%	± 35	120 x 78 x 40	410	£20.75
HY244	120	4	0.01%	<0.006%	± 35	120 x 78 x 50	520	£25.47
HY248	120	8	0.01%	<0.006%	± 50	120 x 78 x 50	520	£25.47
HY364	180	4	0.01%	<0.006%	± 45	120 x 78 x 100	1030	£38.41
HY368	180	8	0.01%	<0.006%	± 60	120 x 78 x 100	1030	£38.41

Protection: Full load line. Slew Rate: 15v/µs. Risetime: 5µs. S/N ratio: 100db.
Frequency response (–3dB) 15Hz – 50KHz. Input sensitivity: 500mV rms.
Input Impedance: 100K Ω . Damping factor: 100Hz >400.

PRE-AMP SYSTEMS

Module Number	Module	Functions	Current Required	Price inc. VAT
HY6	Mono pre amp	Mic/Mag. Cartridge/Tuner/Tape/ Aux + Vol/Bass/Treble	10mA	£7.60
HY66	Stereo pre amp	Mic/Mag. Cartridge/Tuner/Tape/ Aux + Vol/Bass/Treble/Balance	20mA	£14.32
HY73	Guitar pre amp	Two Guitar (Bass Lead) and Mic + separate Volume Bass Treble + Mix	20mA	£15.36
HY78	Stereo pre amp	As HY66 less tone controls	20mA	£14.20

Most pre-amp modules can be driven by the PSU driving the main power amp.
A separate PSU 30 is available purely for pre amp modules if required for £5.47 (inc. VAT). Pre-amp and mixing modules in 18 different variations.
Please send for details.

Mounting Boards
For ease of construction we recommend the **B6** for modules HY6–HY13 £1.05 (inc. VAT) and the **B66** for modules HY66–HY78 £1.29 (inc. VAT).

MOSFET MODULES

Module Number	Output Power Watts rms	Load Impedance Ω	DISTORTION T.H.D. Typ at 1KHz	DISTORTION I.M.D. 60Hz/ 7KHz 4:1	Supply Voltage Typ	Size mm	WT gms	Price inc. VAT
MOS 128	60	4-8	<0.005%	<0.006%	± 45	120 x 78 x 40	420	£30.41
MOS 248	120	4-8	<0.005%	<0.006%	± 55	120 x 78 x 80	850	£39.86
MOS 364	180	4	<0.005%	<0.006%	± 55	120 x 78 x 100	1025	£45.54

Protection: Able to cope with complex loads without the need for very special protection circuitry (fuses will suffice).
Slew rate: 20v/µs. Rise time: 3µs. S/N ratio: 100db
Frequency response (–3dB): 15Hz – 100KHz. Input sensitivity: 500mV rms
Input impedance: 100K Ω. Damping factor: 100Hz >400.

'NEW to ILP' In Car Entertainments

C15
Mono Power Booster Amplifier to increase the output of your existing car radio or cassette player to a nominal 15 watts rms.
Very easy to use.
Robust construction.
Mounts anywhere in car.
Automatic switch on.
£9.14 (inc. VAT)
Output power maximum 22w peak into 4Ω
Frequency response (–3dB) 15Hz to 30KHz, T.H.D. 0.1% at 10w 1KHz
S/N ratio (DIN AUDIO) 80dB, Load Impedance 3Ω
Input Sensitivity and impedance (selectable) 700mV rms into 15K Ω 3V rms into 8Ω
Size 95 x 48 x 50mm. Weight 256 gms.

C1515
Stereo version of C15.
£17.19 (inc. VAT)
Size 95 x 40 x 80. Weight 410 gms.

POWER SUPPLY UNITS (Incorporating our own toroidal transformers)

Model Number	For Use With	Price inc. VAT
PSU 21X	1 or 2 HY30	£11.93
PSU 41X	1 or 2 HY60, 1 x HY6060, 1 x HY124	£13.83
PSU 42X	1 x HY128	£15.90
PSU 43X	1 x MOS128	£16.70
PSU 51X	2 x HY128, 1 x HY244	£17.07

Model Number	For Use With	Price inc. VAT
PSU 52X	2 x HY124	£17.07
PSU 53X	2 x MOS128	£17.86
PSU 54X	1 x HY248	£17.86
PSU 55X	1 x MOS248	£19.52
PSU 71X	2 x HY244	£21.75

Model Number	For Use With	Price inc. VAT
PSU 72X	2 x HY248	£22.54
PSU 73X	1 x HY364	£22.54
PSU 74X	1 x HY368	£24.20
PSU 75X	2 x MOS248, 1 x MOS368	£24.20

Please note: X in part no. indicates primary voltage. Please insert "0" in place of X for **110V**, "1" in place of X for **220V**, and "2" in place of X for **240V**.

Western

It's Western *for YAESU and KENWOOD*

Since we first introduced the "Yaesu Musen" brand name to the UK market in 1970 and more recently the "Kenwood" name for Amateur Radio equipment, you can buy with confidence where experience counts. We maintain links with the factories for spares though we maintain stocks also. We also have extensively equipped service facilities with extensive (and expensive!) test equipment. It's gratifying to hear that more and more discerning prospective customers object to the "knocking and false rumours" put around by our competitors. Thank you Mr A. in Kent for your order for Kenwood TS-530S a few minutes ago. Remember, Kenwood is *THE* brand name throughout the world. It's only for UK that Trio is used. At 'WESTERN' we are not part of any illegal price ring and we are pleased to supply KENWOOD brand equipment known and recognised throughout the world.

Western – FOR VALUE FOR MONEY WITH

YAESU

THIS MONTH'S SPECIAL CHOICE . . . YAESU PRICES (carr. paid)

YAESU FT-101Z £499 **FT-101ZD £569**

- ★ Digital frequency readout on 'D' model
- ★ QRM-beating Variable IF Bandwidth
- ★ High performance RF processor
- ★ Rugged 6146B PAs with RF negative feedback
- ★ Full band coverage 160-10 metres
- ★ Compatible with all '901 accessories

VHF/UHF EQUIPMENT

1234	FT-290R	2m all mode transceiver, portable	245.00
1242	FT-720RV	2m FM mobile transceiver, 10W	189.00
1241	FT-720RU	70cm FM mobile transceiver, 10W	219.00
1263	FT-230R	2m FM mobile transceiver, 25W	230.00
1210	MMB-11	Mobile Mount for FT-290R	21.50
1202	CSC-1A	Carrying Case for FT-290R	3.25
1220	FP-80A	AC PSU, 4.5Amps	53.00
1595	C NICADS	Set of 8 Nicads for FT-290R	21.00
1205	FP-4	AC PSU, 4Amps	42.00
1211	NC-11C	Charger for FT-290R	8.00
1200	NC-1	Desk Charger for FT-202R	19.00
1201	PA-1	12V adapter for FT-202R	19.00
1258	NC-7	Base charger for FT-208/708R	26.00
1253	NC-8	Deluxe fast charger for FT-208/708R	42.00
1260	FBA-2	Battery sleeve for NC-7, NC-8	3.00
1262	NC-9	Compact trickle charger	8.00
	FT-208R	VHF Handie FM Transceiver	189.00
	FT-708R	UHF Handie FM Transceiver	199.00
	FT-726R	VHF/UHF multiband transceiver (2m installed)	649.00
	FT-730R	70cm 10W FM SSB Transceiver	250.00
	FT-790R	70cm SSB/FM Transceiver	290.00

KENWOOD PRICE LIST

1301	STS-1	Base stand/charger for TR-2400	43.00
1302	KB-1	Deluxe knob for TS-530/830 series	10.50
1307	PS-20	DC PSU for TR-9000	49.00
1308	PBK-24K	Spare battery pack for TR-2400	16.00
1309	MC-30S	Hand microphone, 500 ohm	13.00
1312	MC-50	Desk microphone, 500 ohm/50k	30.00
1313	MC-60	Desk scanning microphone, dual impedance	50.00
1317	MB-100	Mobile mount for TS-130S	18.00
1318	SP-100	Speaker for R-1000	26.00
1322	TS-130S	HF transceiver	525.00
1323	DFC-230	Digital remote frequency controller	130.00
1324	TS-430S	HF transceiver with gen. cov. receiver	705.00
1328	R-600	Receiver	240.00
1329	SP-930	External speaker	55.00
1330	TS-930S/ATU	HF transceiver with gen. cov. receiver & ATU	1263.00
1331	TS-930S	HF transceiver with gen. cov. receiver	1199.00
1332	R-1000	General coverage receiver, digital	279.00
1333	DCK-1	DC operating kit for R-1000	8.26
1335	R-2000	New general coverage receiver	389.00
1337	TR-2400	2m FM hand portable transceiver	195.00
1339	TR-9130	2m Multimode transceiver, 25W	419.00
1341	TR-9500	70cm FM/SSB/CW mobile transceiver	399.00
1343	TR-8400	70cm FM mobile transceiver, synthesised	250.00
1344	DS-2	DC converter for TS-830S	42.00
1319	SP-430	Speaker for TS-430S	30.50
1320	AT-130	Aerial tuning unit 100W	91.00
1321	MB-430	Mobile mounting bracket for TS-430S	12.50
1325	AT-230	Aerial tuning unit, all band, matches TS-830S	135.00
1326	TS-530S	HF Transceiver 160-10m with new bands	515.00
1327	SP-230	External speaker unit	41.50
1334	FM-430	FM option unit for TS-430S	33.75

from the KENWOOD STABLE FOR . . . the discerning DX-OPERATOR . . . or . . . DX-SWL . . . the TS-930s, £1199 . . . and . . . R-1000 £279

Since, at 'WESTERN', we sell both Yaesu and Kenwood, we do not try to push a prospective purchaser into a particular brand of equipment . . . we have no "axe to grind" one way or the other.

Our M.D. (He's spoilt! He just takes home what he fancies for a trial evaluation!) thought he'd try the top of ranges FT-1 and TS-930S. He promptly brought the FT-1 back to the stock-room (Mr Hasegawa, please note!). Then he took the FT-102. He hitched the FT-102 and TS-930S up together but brought the FT-102 back. Said he'd got too old and lazy to bother with controls like PA Tune, PA Load, Pre-selection tuning, when the TS-930S does the same job with less knobs. He's grown to like the 930S so much he hasn't tried it against the Yaesu FT-980 – although no doubt it's only a matter of time (The FT-102 is back in the demonstration room!). The 'Noise Blanker' really cuts old "Woody Woodpecker" down to size! UA's will have to find something new to annoy a TS-930S owner.

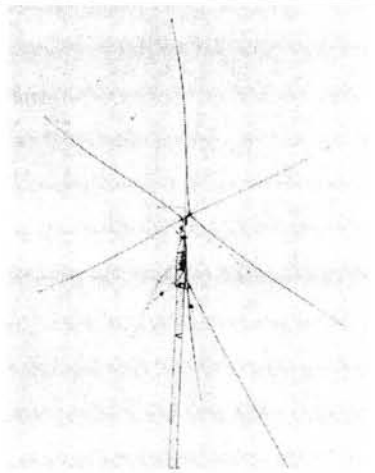
How often have you found a rare DX-station only to discover he has a good pile-up too! With the '930' you just press "M In" and store his frequency in the memory and carry on tuning round or QSO elsewhere. Then to come back smack onto the rare DX you just select 'Memory' instead of the VFO, and up pops your DX station. Since there are 8 memory channels there are more than enough for anyone!

The R-1000 is an un-cluttered simple to use and excellent general coverage receiver. It brings the world to your fingertips in seconds. With its PLL synthesised receiver you get excellent stability and accuracy.

Features are:–

- ★ Covers 200kHz to 30MHz continuously
- ★ 30 1MHz bands
- ★ Noise Blanker
- ★ Terminal for external tape recorder
- ★ Built-in 12hr. quartz digital clock with auto-timer facility to switch 'On' at pre-determined time
- ★ 'S' meter with 'dimmer' control to panel lighting
- ★ Built-in 4" speaker
- ★ Built-in attenuator to prevent overloading
- ★ Digital readout to 1kHz and analogue dial

Electronics (UK) ltd



. . . AN EXCITING NEW ANTENNA IN THE 'PENETRATOR' SERIES

. . . the DX-26Q . . . 6-BAND QUAD

its a formidable force on the band!

5&9 ZP5CDB
5&9+20DB VP8NX
5&9. 8P6DH
5&7. TG9NX
5.9+20DB WD9AEU
5.9 ZD7BW
5.9 WA70PZ OREGON
5.9 VP8AEN. ANTARTICA
5,9+20dB. CX8CB
5&7. 5WIDZ

5H3JR "Strong Signal"
G4HRN/W5 "Very outstanding signal"
W4US/HR1. "Wow Man! are you really in England?"
VK81F "Thought you were local"

The above are a few of the reports and comments received over the course of a few hours operating. They (or the antenna!) speak for themselves. When you upgrade your antenna system to a quad, you'll only have one regret . . . and that's not having done it sooner! Send SAE for specification.

DX-24Q
2 Elements
2,10,15,20m **£199.99**

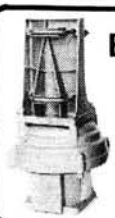
DX-26Q
2 Elements
2,10,12,15,16 & 20m **£224.25**

Prices (Inc. Carr. and VAT)

DX-31 Dipole, 2KW, 10-15-20m, Rotary	£75.89
DX-32 2 element, 2KW, 10-15-20m	£112.70
DX-33 3-element, 2KW, 10-15-20m	£164.45
DX-34 4-element, 2KW, 10-15-20m	£234.59
DX-6V Vertical 10-80m	£82.79
DX-103 3-element, 10m	£82.22
DX-51, Dipole Rotary for 14, 18, 21, 24 and 28 MHz	£90.85
DX-105 5-element, 10m	£106.95
TD1/10/80 Trapped dipole, 10, 40, 80m	£52.90
TD1/15/80 Trapped dipole, 15, 20, 40, 80m	£52.90

☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆

ROTATORS . . . we only stock the best . . . buy RELIABILITY . . . buy EMOTO



EMOTO

. . . WE ARE THE SOLE U.K. DISTRIBUTORS!
Models 103SAX and 502SAX (illustrated) now have 360° circular dial presentation.

EMOTO 103SAX For light HF and large VHF arrays	£123.05
EMOTO 502SAX For heavier HF beams plus VHF/UHF	£171.35
EMOTO 1102MXX The really big one for large HF monobanders	£240.35
EMOTO 1103MXX As 1102MXX but greater turning power	£246.10
EMOTO 1102MSAX Circular dial	£303.60
EMOTO 1103MSAX Circular dial	£309.35
MB-300 Rotary bearing	£17.25
450 Flexible mount for '103'	£6.32
451 Felxible mount for 1102/3	£12.65

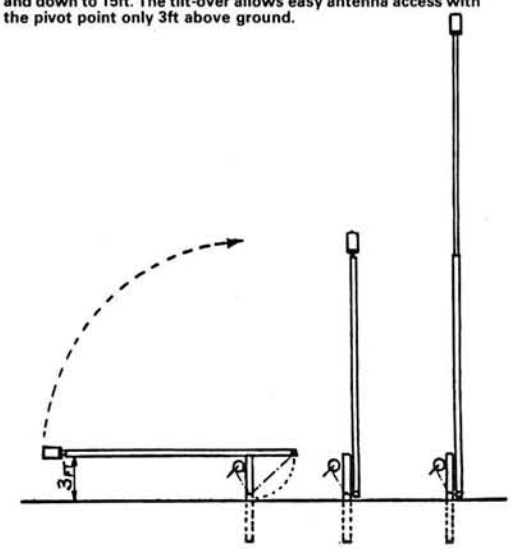
VHF ROTATOR
only £39.95
ask for Cat. No. 1145

HF ROTATOR
only £86.25
ask for Cat. No. 1144

☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆ ☆

The 30ft ULTIMAST

A new mast for the budget-conscious amateur. Constructed in two sections, the lower being a square section tube and the upper a 3" dia. round tube, the ULTIMAST telescopes up to 30ft and down to 15ft. The tilt-over allows easy antenna access with the pivot point only 3ft above ground.



ANOTHER Western WINNER!

We designed our ULTI-MAST for PEOPLE WITH 2 HANDS!

Seems our competitors got it wrong! They need 3 hands according to the review in "Practical Wireless" of March, 1983.

REMEMBER . . . the ULTI-MAST was so called because it is the

ULTI-MATE IN DESIGN

Our structural engineering department came up with the maximum of strength for the minimum of cost. It's impossible to get MORE strength for LESS cost . . . so beware of cheap copies . . . they may not have the correct material.

Slim, unobtrusive
For VHF and HF antennas
Simple ground fixing
One-winch operation
Telescopic and Tilt-over
Self-supporting

THIS IS THE TELESCOPIC YOU CAN AFFORD!

Ultimast, UM-1 ..... £251.85
Reducer head, UHD-1 (reduces to 2" dia stub) £16.10
Rotor head, UHD-2 (takes up to Emoto 103SAX) £35.65
PRICES INCLUDE DELIVERY AND VAT AT 15%

● ACCESS ● BARCLAYCARD ● DINERS CLUB ● H.P. ARRANGED ● PART EXCHANGE

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THE LEICESTER AMATEUR RADIO SHOW

WILL BE HELD THIS YEAR AT THE GRANBY HALLS LEICESTER

ON FRIDAY & SATURDAY OCTOBER 28th & 29th, 1983

10.00am-6.00pm

ENQUIRIES TO FRANK G4PDZ LEIC 553293

The Squeeze Is On

EVENTS IN THE UK, and more recently in Belgium where the Administration is seeking to limit quite severely the access to Amateur Bands at u.h.f. and above, give considerable cause for unease. The Merriman Report, discussed elsewhere in this issue, was produced solely as a means of generating recommendations on how the very rapid growth in demand for radio communications (especially in the Mobile Service) and broadcasting channels is to be met. It concludes that the Mobile Service will reach saturation within about six years **"unless significant use can be made of other bands and/or new technology".** Already, Bands I and III have been earmarked for use mainly by Mobile Services when the existing TV transmitters are closed down in 1984, and the 431–432MHz segment of the 70cm Amateur Band has been given to the Mobile Service in the London area.

This pressure on the spectrum **is** going to affect Radio Amateurs in the future, as well as other radio users; of that there is no question. One cannot help wondering whether the revised Schedule of allocations to UK Amateurs which was published in February 1982 and the more recent revisions to the Belgian Amateur allocations were a "try-on", just to see what reaction it would provoke from Radio Amateurs and their national society. Perhaps I have a nasty suspicious mind, but there have been occasions when I've had similar thoughts in other fields—the big petrol-coupon book scandal a few years back for example. Was the intention to introduce rationing at the time, or was it a prudent step in preparation for the worse that might be to come? Or was it just a scare-story dreamed up by some person or persons unknown?

In another area of interest to the radio enthusiast lies the question of the legality of listening in the UK to transmissions from stations other than the permitted "authorised broadcasting stations and licensed Amateur Stations", as laid down in the Wireless Telegraphy Acts. As I've said in the past, this prohibition strikes me as a bad law, simply because it is unenforceable, except in a police state. Far better to acknowledge that there are millions of radio receivers in use capable of receiving other sorts of transmission (on Band II v.h.f. to name but one example), and make it an offence instead for a listener to make use of any information he might gain by listening to a station in another category.

Now, I understand that a number of countries, in Europe and elsewhere, are proposing to ban scanning receivers totally, or even to make "general coverage" receivers illegal. Under new legislation, short-wave broadcast receivers would have to tune across the broadcast bands only. I don't see how they will enforce it.

I get the feeling that this could all be the thin end of a rather nasty wedge.

Geoff Arnold

QUERIES

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

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

PROJECT COST

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

INSURANCE

Turn to the following page for details of the PW Radio Users Insurance Scheme, exclusive to our readers.

CONSTRUCTION RATING

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

Beginner

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

Intermediate

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

Advanced

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

SUBSCRIPTIONS

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

BACK NUMBERS AND BINDERS

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

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

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

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

PW RADIO USERS INSURANCE SCHEME

Practical Wireless Radio Users Insurance Scheme was devised by Registered Insurance Brokers B. A. LAYMOND & PARTNERS LIMITED following consultation with PRACTICAL WIRELESS to formulate an exclusive scheme designed to meet the needs and requirements of: Amateur Radio Enthusiasts ● CB Radio Users ● Taxi Companies and Fleet Users with Radio Telephones. A copy of the Policy can be inspected at the offices of B. A. Laymond & Partners Ltd., or of Practical Wireless in Poole.

SPECIAL FEATURES

● All Risks Cover ● "New Lamps for Old" Cover (as defined in policy) ● Index Linked Cover to combat inflation ● Includes Personal Liability cover against damages payments of up to £500000 to members of the public ● Licence protection—covers legal costs arising from any breach of your licence conditions ● Equipment covered anywhere in the UK, Channel Islands and Isle of Man, but not Northern Ireland and Eire ● Fixed Antennas (Aerials) covered ● Frequency, Power and SWR Meters and similar radio-related test equipment covered ● 30 days cover on Western Europe included Free of Charge ● Absolute Security as this scheme is underwritten by a leading member of the British Insurance Association on the London Insurance Market ● Practical Wireless radio receiver and transmitter projects covered (when stated in feature) ● Available to Clubs and Organisations† ● Available to Companies†

†Write directly to B. A. LAYMOND & PARTNERS LTD, for a special application form and full details enclosing the coupon below.

B. A. Laymond & Partners Ltd., Practical Wireless and the Underwriters wish to make it clear that it is an offence to instal or use a radio transmitter in the UK except under the authority of a licence granted by the Secretary of State and it is not their intention to provide cover for or to encourage or condone the illegal use of CB and/or other communications equipment.

Cover for property contained in vehicles is subject to a Limit of Liability of £250, increased to £750 where the vehicle is protected by a reputable audible alarm, correctly set and operational.

When the vehicle is unattended, mobile equipment secured so that tools or a key are required to remove it must be disguised or concealed from view. Portable and mobile equipment not so secured must be removed and placed in a locked boot or otherwise concealed from view, or removed from the vehicle entirely. Equipment not in a secure building or vehicle must not be left unattended.

How Much Will It Cost?

Sum to Insure	£1000	£3000	£5000
Annual Premium	£20	£35	£45

The premium is charged on sums insured in pre-selected bands. Thus equipment totalling £3750 would be in the band up to £5000, and the premium would be £45. Quotations for larger sums available on application.

Claims will be settled after deduction of an excess in the following manner:

Type of Loss		Excess
From saloon cars and hatchbacks with fully concealed luggage compartments		15% of claim (minimum £25)
From estate cars, vans and hatchbacks without concealed luggage compartments		25% of claim (minimum £25)
All others:	Sums insured up to £3000	£25
	Sums insured up to £5000	£50

How To Insure

Complete the application form below to obtain immediate insurance cover. Photocopies will not be accepted

APPLICATION FOR PRACTICAL WIRELESS RADIO USERS INSURANCE SCHEME PW1♯/83

Name in full (State Mr, Mrs, Miss or Title)

Address

Post Code

Occupation Age Phone No. (Home) (Work)

I/We hereby apply to insure the equipment detailed below

BLOCK LETTERS	Manufacturer's Name	Model	Serial No.	Description of equipment to be insured e.g. Base station; Mobile; CB; etc.	VALUE £
1					
2					
3	Antennas (Aerials), s.w.r. meters, etc.				

Please continue list of equipment on a separate sheet if necessary

TOTAL SUM TO INSURE £

DECLARATION: I/We hereby declare that: 1. The sums insured represent the full replacement value of the equipment. 2. I/We have not* had insurance cancelled, declined, restricted, or other terms imposed in any way other than the normal Policy terms. 3. This proposal shall be the basis of the contract and that the contract will be on the Underwriters normal terms and conditions for All Risks and Legal Costs/Expenses cover unless otherwise agreed. 4. I/We have not* sustained any loss or damage to any radio communications equipment or been involved in litigation relating to use of radio equipment during the past three years, whether insured or not. 5. All the above statements made in connection with this proposal are true and no material information has been withheld. 6. I/We understand no liability shall attach until this proposal shall have been accepted by Laymond's and the premium paid in full and a Certificate issued.

* If you have, please give details on a separate sheet.

Date Signed

Rush us details of PW Club Insurance ☐
PW Company Insurance ☐

DELAY IN ARRANGING COVER COULD COST YOU A GREAT DEAL OF MONEY. COMPLETE THIS APPLICATION AND POST WITH YOUR PREMIUM MADE PAYABLE TO "LAYMOND'S" NOW. ADDRESS TO: PRACTICAL WIRELESS (INSURANCE), B. A. LAYMOND & PARTNERS LTD., 562 NORTH CIRCULAR ROAD, LONDON NW2 7QZ. TELEPHONE: 01-452 6611.

A DIRECTIONAL RESPONSE INDICATOR

Murray Edington G8XCN

The directional response indicator (d.r.i.) design presented in this article, in conjunction with any d.c. coupled 'scope, will produce a polar pattern from any periodically varying d.c. voltage applied to its input.

To test r.f. antennas, the d.r.i. must be used in conjunction with the antenna mounted on a stand and rotating at the same rate as the time-base of the d.r.i., i.e. once a second. A transmitter positioned about 2·5m away provides a signal directed at the antenna. The r.f. output from the antenna is rectified and the resulting d.c. voltage is picked off the rotating mount by piano-wire brushes, tipped with copper pads. These make contact with two copper slip-rings etched on a circular p.c.b. mounted on the rotator spindle. Any noise generated at the brushes is considerably reduced by putting a 0·1μF capacitor across the brushes, while screening the motor reduces r.f.i. picked up by the antenna.

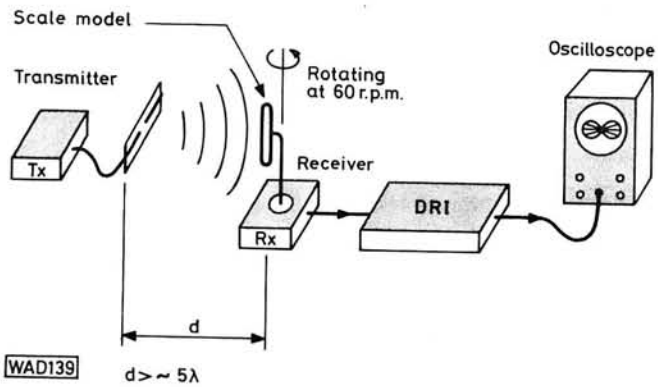


Fig. 1: The basic test set-up required to evaluate receiving transducers e.g. scale model antennas, directional microphones or photocells. The motor driving the model antenna rotates at the same rate as the d.r.i. scan. A full display will be provided on a high persistence or storage type oscilloscope

Thus a d.c. voltage proportional to the signal strength is fed to the d.r.i., where it may be amplified or attenuated as necessary. The d.r.i. may be adjusted to accept inputs between 50V and 100mV or less.

The rotator motor does not need to be connected to the d.r.i. at all. If a 60 r.p.m. mains synchronous motor is used, little adjustment is necessary once set up, since the d.r.i. timebase is very stable. If thought necessary, an additional toothed slip-ring could be fixed to the rotator and the signal derived from this could be used to synchronise it to the d.r.i. using the phase-locked-loop principle.

The overall arrangement of the antenna test rig is very similar to that used by F. C. Judd G2BCX. For further details of this set-up readers are recommended to read *Aerial Design Using Scale Models* and *Aerial Performance Test Set* contained within the *PW* publication *Out of Thin Air.*

The Op. Amps

The prototype used TL084 quad f.e.t.-input op. amps, although the circuit would work reasonably well with 741s. The main difference is that the slew rate of the 741 is not as high, resulting in reduced accuracy and spurious spikes originating from the comparators. This leads to a messy-looking display. When correctly set up, the device will give an accuracy of better than a few per cent. If a logarithmic response is required, IC4(d) will have to be changed.

Circuit Description

Integrated circuits IC2(a) and IC2(c) form two integrators and together with the series inverter stage IC2(d) provide a resonant circuit set to 1Hz by R9 and triggered by S1. The output sine wave is stabilised by providing positive feedback via IC2(b) which has a gain of approximately 1/200. The 90 degrees mutually out-of-phase X and Y components are fed to integrators IC1(a) and (b) which are reset at 360Hz by reset pulses, generated by IC1(c) and shaped by IC1(d), applied to c.m.o.s. analogue switches—IC3(a) and (b).

The square wave output obtained from IC1(c) is adjusted to 360Hz by R2 and differentiated by R5 and C2 to provide a triangular wave input to IC1(d). This input is compared by IC1(d) with a voltage selected from potentiometer R6, allowing the duty cycle of the 360Hz square wave to be altered independently of frequency. Initially the duty cycle (high:low) should be set to approximately 1:4.

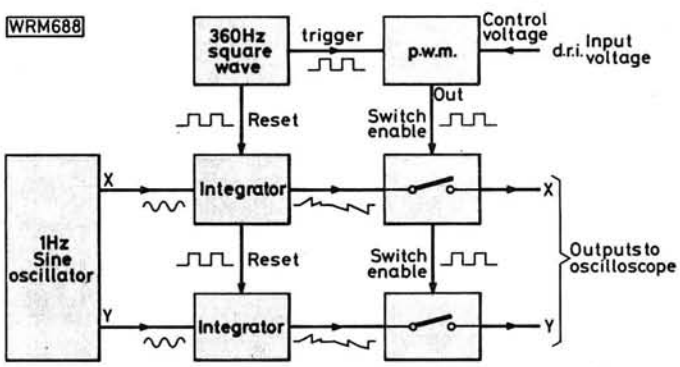


Fig. 2: Block diagram showing the operation of the d.r.i. circuit

Variable resistors R16 and R17 are adjusted to give maximum amplitude of the sinusoidally varying amplitude ramps without positive or negative saturation. The switched outputs of IC1(a) and (b), whose peak values vary sinusoidally, are fed via sockets SK2 and SK3 to the X and Y plates of an oscilloscope to produce the familiar

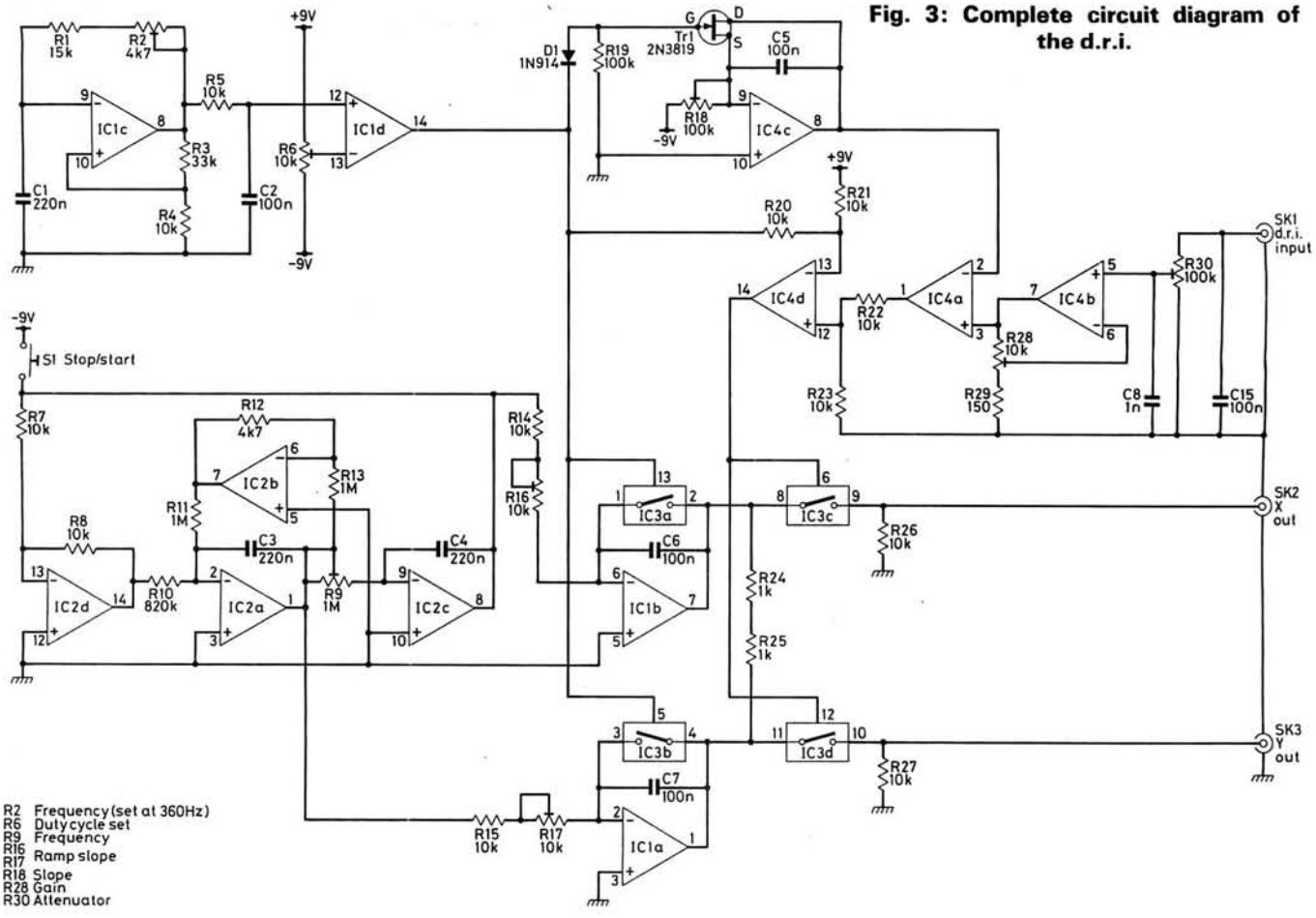


Fig. 3: Complete circuit diagram of the d.r.i.

★ components

Resistors

¼W 5% Carbon film

150Ω	1	R29
1kΩ	2	R24, 25
4·7kΩ	1	R12
10kΩ	12	R4, 5, 7, 8, 14, 15, 20–23, 26, 27
15kΩ	1	R1
33kΩ	1	R3
100kΩ	1	R19
820kΩ	1	R10
1MΩ	2	R11, 13

Miniature horizontal preset

4·7kΩ	1	R2
10kΩ	4	R6, 16, 17, 28
100kΩ	2	R18, 30
1MΩ	1	R9

Capacitors

Polyester film

22nF	3	C11, 12, 16
0·1µF	5	C2, 5–7, 15
0·22µF	3	C1, 3, 4

Monolithic ceramic

1nF	1	C8

Tantalum–10V

10µF	2	C9, 10

Tantalum–20V

10µF	2	C13, 14

Semiconductors

Integrated circuits

CD4016	1	IC3
TL084CN	3	IC1, 2, 4

Transistors

2N3819	1	Tr1

Diodes

1N914	1	D1

Miscellaneous

50Ω BNC chassis sockets (3); s.p. switch, min. momentary push button; 14 pin d.i.l. i.c. sockets (4); p.c.b. Vero pins

BUYING GUIDE

No problems of supply should be encountered as all specified components are readily available from regular stockists advertising in *PW*

Approximate Cost

£24

Construction Rating

Intermediate

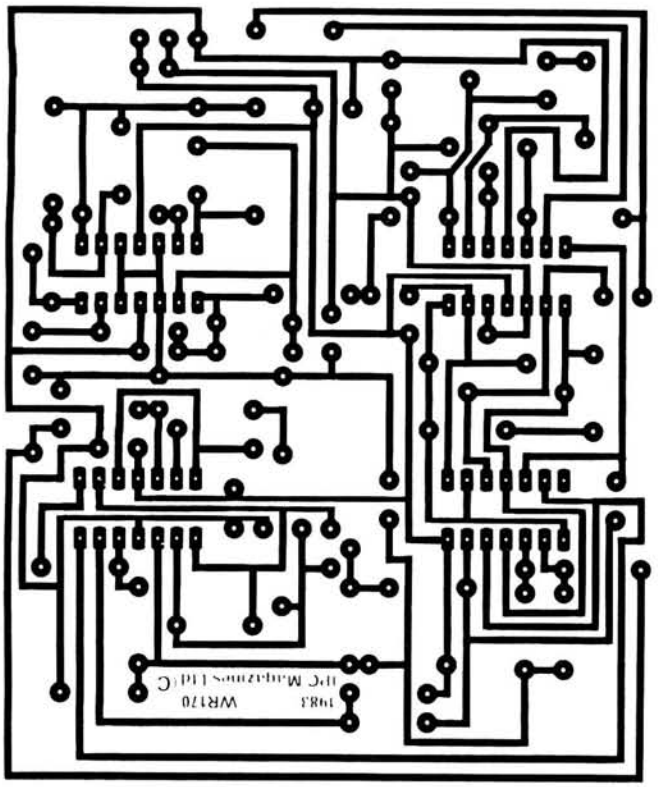
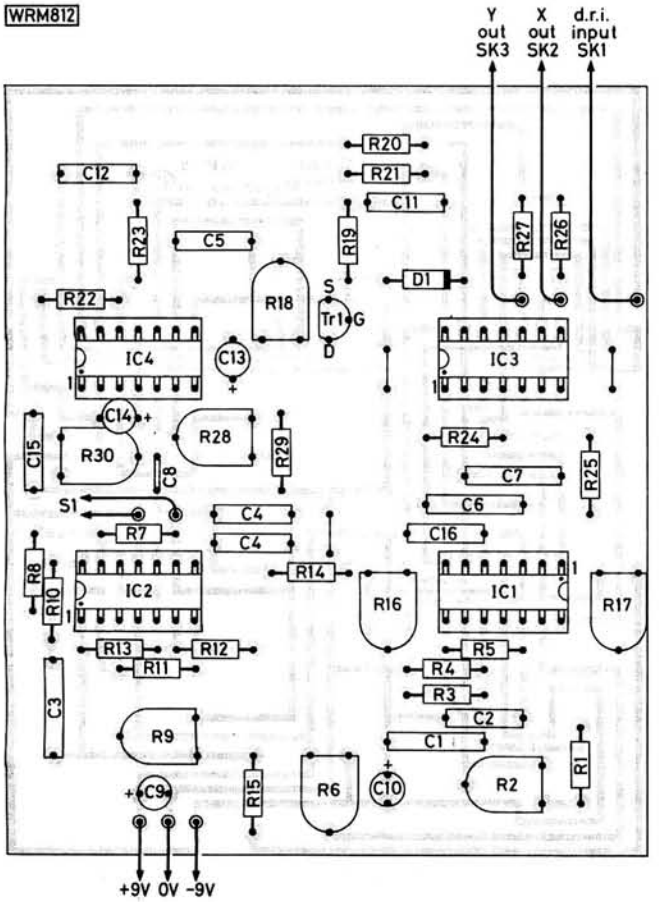


Fig. 4: Component placement and p.c.b. track pattern of the d.r.i. shown full size. The waveform drawings shown opposite relate to the indicated points on the circuit diagram, Fig. 3



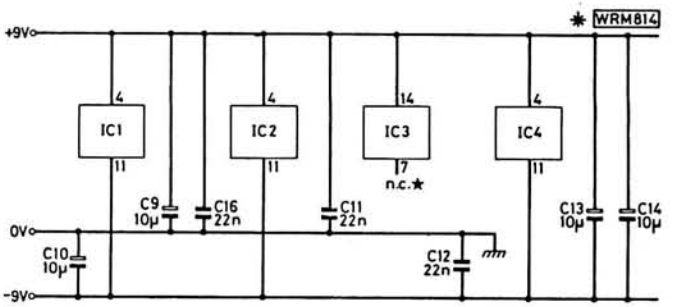


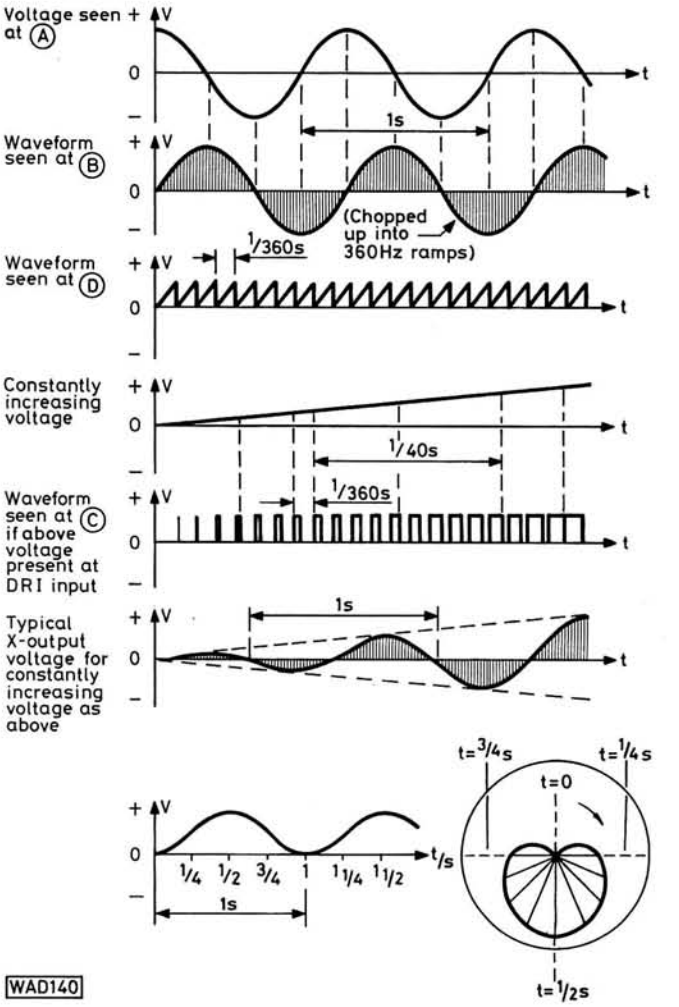
Fig. 5: Supply rail and de-coupling arrangements. Note that pin 7 of IC3 is not connected

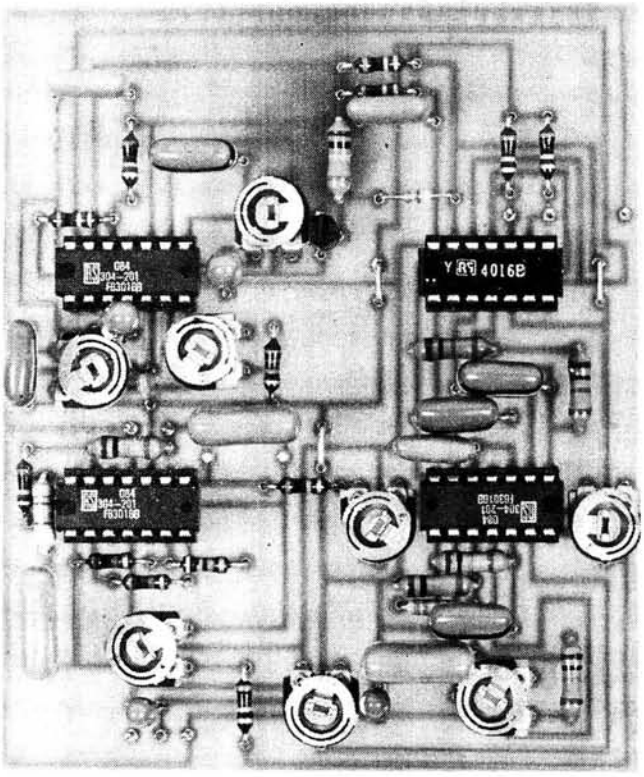
circular polar pattern which is continuously traced out in one degree increments. If the resulting pattern has a "hole" in the centre then the length of the reset pulses must be increased by adjustment of R6 until IC1(a) and (b) are completely reset during the reset period and the above procedure repeated.

Output Modulator

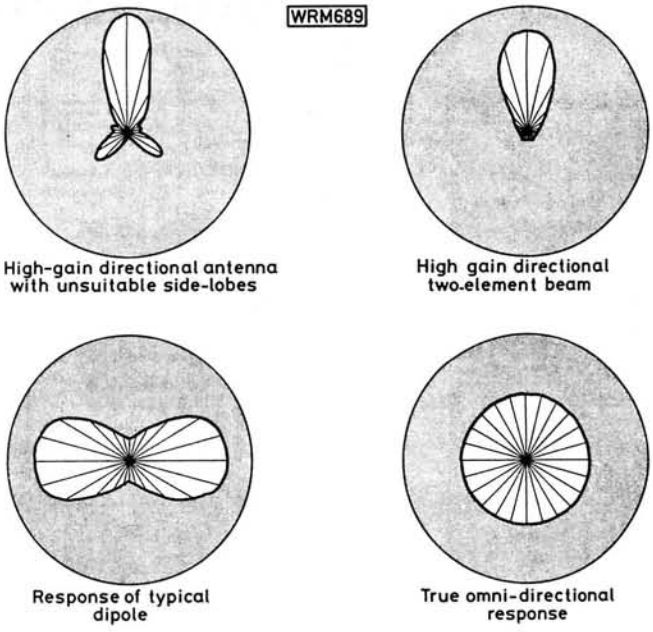
The remaining parts of the circuit are designed to modulate the radial length of the circular pattern so that it is directly proportional to the d.r.i. input voltage obtained from the test signal source.

Variable resistor R18 is adjusted so that IC4(c) produces a ramp output which is of maximum possible amplitude without reaching saturation. The integrated constant voltage obtained from IC4(c) is reset by Tr1, D1 and R19 which are in turn controlled by reset pulses from IC1(d).





A photograph of the prototype d.r.i. circuit board which may be compared with Fig. 4



Drawings that show some typical response characteristics for the d.r.i.

Integrated circuit IC4(a) compares the ramp input to that of the input voltage which has been amplified/attenuated by IC4(b) and R30. The duty cycle of the output of IC4(a) varies with the input voltage. A further stage formed by IC4(d) prevents these pulses from going positive while the reset pulses are also positive.

The resulting signal is a series of square wave pulses synchronised with the ramps which become positive when the ramps from the trace generators have just been reset and which become negative after a period which is directly proportional to the d.r.i. input voltage. This ensures that the fraction of each ramp entering the c.m.o.s. output switches IC3(c) and (d), which is allowed through to the output, is directly proportional to the d.r.i. input voltage.

PCB and Construction

Details of the track pattern for the single-sided p.c.b. used for the prototype d.r.i. circuit is given in Fig. 4. The resistors used were CR25 type, since these are small and allow close packing of the components. All the capacitors other than the tantalum supply decoupling ones were polyester C280 types while the 0·1μF input capacitor was a plate ceramic, although none of these component types are very critical.

Please note that the d.r.i. design is the subject of patent application No. 8020180.

Other Applications

The d.r.i. may be used to replace the conventional rotary chart recorder as used to characterise directional antennas, microphones etc. by manufacturers. The oscilloscope may be used to replace linear chart recorders and could also be adapted to provide a cheap radar-type monitor by providing a means of modulating the intensity of the trace. An acoustical "radar" system could easily be designed around the unit. ●

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FT 726R NEW	£675.00	£67.00	£26.00
FT 208R	£199.00	£20.00	£8.00
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FT 290R	£249.00	£25.00	£10.00
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2mtr 3 × ¼ co/lin base 8db	£39.50	£3.00 p&p
2mtr co/lin base 6.5db	£27.60	£2.20 p&p
2mtr ¼ f/over mobile	£13.80	£1.80 p&p
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19.0mm Tube 12.7mm	£1.99	£0.23 p&p
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35mtr & over	20%	£7.50

When these larger quantities are ordered please allow 14 days for delivery. Other sections available are angle, bar, channel, half-round.

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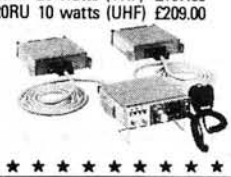
FT720RU 10 watts (UHF)	£209.00	**£195.00**



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The Datong Woodpecker Blanker Story

Anyone who saw the mystery prototype of the Datong Automatic Woodpecker Blanker being demonstrated at the RSGB exhibition earlier this year may be wondering why it took so long for Datong to actually get the product onto the market.

Dr. David Tong G4GMQ, managing director of Datong, has written to us explaining why this happened, so, here's the story in his own words:

"When we realised that we had a novel product we decided that the best thing to do was to apply for a patent. Twice before our products have been copied by a country that shall remain nameless, and patent protection seemed like a good idea.

"We applied for a patent and the application was sent in as normal by our agent and we then went to the Dayton show in the USA to demonstrate that and our other products, secure in the knowledge that the application was on file and that our priority date was therefore protected even if we disclosed how it worked.

"Then back in Britain two weeks after the show came the bombshell: a letter arrived from the Patent Office forbidding us to communicate the details of the invention to anyone until after it had been vetted by the Ministry of Defence in case it contravened the Official Secrets Act!

"By this time our orders for component parts were in the pipeline as were our forthcoming advertisements about the product (bearing in mind that advertising lead times are anything up to two months). In other words a lot of money, plus a lot of expensive R & D, were suddenly placed at risk.

"Now after six nail-biting weeks, with the product sitting on the shelf because if we shipped it I risked prison and my company risked disaster, the secrecy order has been lifted and we can begin to honour our obligations to customers.

"In time no doubt the whole thing will begin to look almost amusing, even to me. But the fact is that in a highly competitive world market our sales efforts have lost valuable momentum. In today's market place one cannot afford to mess about and this kind of delay does not help a small company to be competitive one little bit.

"It is also interesting to speculate what would have happened if permission had not been granted to continue with the product. I am advised that there is no mechanism through which we could be compensated for the losses which we would have incurred. Presumably therefore the several thousand pounds worth of special parts for our first batch would have been scrap, and our advertising expenditure would have been totally wasted.

"Also what if we had broadcast the details to all and sundry at Dayton safe in the knowledge that our Patent priority was secure? Would I now be heading for prison having committed an offence in total innocence? Shades of Kafka!

"Anyway, to anyone who wondered what had happened to our new baby that's the story. We have the product on the shelf and it looks as if it's going to be another winner!"

David Tong G4GMQ

The Automatic Woodpecker Blanker, Model SRB2, referred to in this story is featured on the *Products* page this month.

Midlands VHF Convention

The Midlands VHF Convention will now be held at the British Telecom Training School, Stone, Staffordshire, on Saturday 15 October, starting at 11.00am. The date for the Convention has been changed from 8 October to avoid conflicting with the ARRA exhibition at Doncaster Raecourse.

The Convention will feature lectures by G3RKL on the GB3SF experimental pilot s.s.b. repeater, G3RZP on solid-state power amplifiers and G3USF on the first six months of UK 50MHz operation. There will also be extensive measurement facilities and demonstrations, a bookstall, bring and buy stall and all the other attractions expected of a VHF Convention, it should be noted that this event is not a rally.

The new location offers superior facilities than the cramped Wolverhampton site used in previous years, also there is extensive free parking adjacent to the Convention area. Talk-in will be provided on S22.

Admission to the Convention only is £1.00 at the door and evening buffet tickets are available, price £4.00, by advance booking.

Further details from: *G3UBX, 28 Coalway Road, Wolverhampton WV3 7LX.*

World Communications Year

Mr. Kenneth Baker MP, Minister of State for Industry and Information Technology, visited Burma Thailand and India between 24 August and 8 September.

The purpose of the visit, during World Communications Year, was to promote UK trade with those countries and included talks on collaboration in telecommunications and electronics.

Small Satcom Station

Researchers at the NASA Ames Research Center and General Electric have developed a remote communications system which can fit into two suitcases. It consists of a terminal and a folding antenna and can be operated from an ordinary mains power supply or even from a car battery.

Although the terminal employs the latest modern electronics, it is used with a 15 year old satellite. An operator can use the terminal to communicate with any of several ground stations using the ATS-3 satellite, an experimental spacecraft which NASA has been operating since 1967.

The equipment allows an operator anywhere in either North or South America (as well as anyone over much of the Atlantic or Pacific oceans) to communicate with a fixed earth station. It takes only about two minutes to set up the station: the antenna must be unfolded and directed towards the satellite by reference to a chart, a compass and an elevation indicator.

BD

The Leicester Radio Show

In the wake of the ARRA moving their radio show to a new venue at Doncaster, many traders and amateurs were concerned that a "Leicester" show at the Granby Halls would not be held this year.

This prompted the formation of an organising committee drawn from the ranks of the Leicester Radio Society and the Leicestershire Repeater Group. The efforts of this committee have resulted in The Leicester Amateur Radio Show to be held at the Granby Halls, Leicester on Friday 28 and Saturday 29 October 1983.

Further details from: *Frank Elliott G4PDZ, Secretary—Leicester Amateur Radio Show, 40 Treasure Close, Glenfield, Leicester LE3 8LT. Tel: (0533) 553293.*

STS-9 Space Shuttle Mission

At the time of going to press, I received information that the STS-9 Space Shuttle Mission launch date has been put back from 30 September to 28 October 1983.

Readers of this column will recall that Dr Owen Garriott W5LFL, one of the astronauts who is also a radio amateur, intends to operate a 144MHz handheld transceiver from space.

The original frequencies allocated were either not in the region 1 allocation or fell in the beacon and repeater sub-bands, consequently, the only region 1 simplex frequency that is accessible with Owen's 20kHz step transceiver is 145·550MHz, S22, and this will be the main frequency used when overflying region 1.

New Catalogue

A completely redesigned format heralds the publication of the latest catalogue from electronic case specialists West Hyde Developments Ltd.

The catalogue contains full information on thousands of top quality cases and accessories, all at competitive prices. Also, for the first time, two £1 vouchers are included. Each of these can be exchanged with orders for goods worth £10 or more.

Many new products are included in this 100-page edition and each product is illustrated with a photograph and dimensioned drawing, whilst the text describes it fully and gives some indication of use.

The catalogue can be obtained by sending a cheque or PO for £2 to: *West Hyde Developments Ltd., Unit 9, Park Street Industrial Estate, Aylesbury, Bucks. HP20 1ET. Tel: (0296) 20441.*

QTI Talking Newspaper

QTI Tape Magazine will shortly be changing its name to *QTI Talking Newspaper* in order to ease registration with the Charity Commissioners.

This free service of recorded readings from magazines has now helped numerous blind radio amateurs and short wave listeners world-wide. As a result, the Manpower Services Commission has granted a part-time worker to administer the service. New members are always welcome.

Further details are available from either: *G4MRB, QTHR or QTI Talking Newspaper, 79 Narrow Lane, North Anston, Sheffield S31 7BJ;* alternatively, telephone *Dawn on (0909) 566301* on weekdays between 10.00am and 4.00pm.

BBC Satellite Service to the Far East

Since the 1 August 1983 the BBC's External Services programmes for the Far East have been transmitted by satellite to Singapore. From there they are relayed to millions of listeners as far apart as Hong Kong and New Zealand.

As a result of an agreement reached in October last year, the Telecommunications Authority of Singapore has provided the BBC with four high-quality sound channels from London to Singapore via the Indian Ocean Region satellite. The programmes from the Bush House studios in London are transmitted to the satellite via the British Telecom Earth Station at Madley. The same signals are used to feed two Foreign and Commonwealth Office stations on Cyprus and Masirah which also relay BBC programmes.

A significant improvement in the sound programme quality is expected as a result of using high-quality digital pulse code modulation on the satellite. Previously telephone circuits or direct reception of h.f. and s.s.b. transmitters were the only means of relaying live broadcasts from the UK.

BBC, Engineering Information Department, Broadcasting House, London W1A 1AA.

Amateur Radio and Computing

Readers, with a particular interest in computers, will be interested to know of the existence in the UK of two computer user-groups specifically catering for radio enthusiasts.

For details of their activities, users of all micros excepting Sinclair products should contact: *RAMTOP, The School, Wellingborough, Northants NN8 2BX;* and for Sinclair users: *SARUG, 3 Red House Lane, Leiston, Suffolk IP16 4JZ.* In both cases an sae is essential.

Readers may also like to know that the British Amateur Computer Club in Oxford has an amateur radio section.

See You There

The ARRA are holding what they intend to be the biggest and best amateur radio and electronics exhibition they have ever organised at the exhibition centre, Doncaster Racecourse (Leger Way), on the 6, 7 and 8 October.

Practical Wireless will have a stand at this event and in addition to current and recent projects being on display we will have for sale: Parabolic dishes (£10 each), *PW Radio Programs—1* and 2* cassette tapes, plus copies of *Out of Thin Air, Passport to Amateur Radio* and recent issues of *Practical Wireless.* *Now available for either the 16 or 48k ZX Spectrum.

News from the RSGB

1984 President: The Society recently announced that the 1984 President will be Mr. R. G. Barrett GW8HEZ. Not only will "Bob" Barrett, who is just over 40 years old, be one of the youngest people to achieve the Society's highest office, but it will be the first time that a Class B licensee will be President.

Bob Barrett has been interested in amateur radio from an early age, and since being licensed in 1972 has held numerous offices within the Society.

When not involved in amateur radio, Bob is Head of Production in a video facilities company: he was with the BBC for some 18 years in the television and film areas, travelling abroad a good deal. GW8HEZ is also an acitive participant in local Raynet activities and is a founder member of his local repeater group, looking after GB3BC. His other chief hobby is sailing small dinghies.

Provisionally, the Presidential installation will take place on 14 January 1984 at Cardiff Castle.

Very Nasty: There would appear to be a potentially serious health hazard in many amateur shacks. Some high voltage transformers, large dummy loads and "oil"-filled capacitors contain derivatives of a group of substances known as polychlorinated biphenyls, or PCBs—fluids of this type were used in manufacture as recently as the late 1970s. However, it has been shown that PCBs have been linked to various types of cancer—notably cancer of the liver—and their use is now prohibited in the USA.

PCBs are usually colourless liquids and are harmless so long as the container remains securely sealed. However, any spillage is likely to be hazardous and fumes from a warm dummy load could also be injurious to health according to a recent American report. PCBs should not, under any circumstances, be disposed of by tipping them down the drain. Should anyone have reason to believe that any components are leaking or liable to leakage, they are advised to contact their local area health authority. Alternatively, the local fire station may be able to help, as the fire service holds details of potentially hazardous materials and their disposal.

Products

Single-handed Soldering

One of the most useful and innovative soldering products I have seen for a long time, turned up on my desk recently. Patented and called the GPE Self-Feed Soldering Iron, it is manufactured in England, to comply with BS recommendations, by Gardner Precision Engineering.

The iron enables two of the soldering functions, heating the joint and applying the solder, to be carried out using only one hand. Constructors will immediately recognise the benefits of this facility, if like me, they have regularly experienced the inadequacy of not having a third hand when soldering.

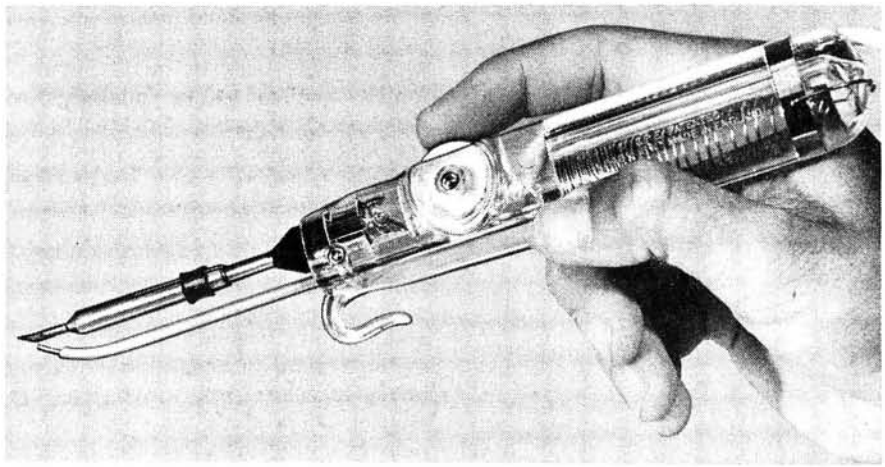
This new development in soldering iron design with a combination of light weight and the unique one-handed operation, should prove a boon to constructors, engineers and the handicapped. It is also extremely useful when making connections in inaccessible locations.

As the photograph shows, the flux-cored solder is visually stored in the transparent polycarbonate handle and fed through a stainless steel tube to the bit. The solder is transported through the stainless steel tube by turning the serrated wheel with the index finger, and applied directly to the joint.

The standard iron costs £14.95, is powered by a.c. mains (other voltages are available to order) and draws 18 watts which provides a maximum bit temperature of 390°C. The total weight of the iron, including four metres of solder, is only 80g, leakage current is less than 2μA with breakdown voltage better than 2500V a.c.

The bits available are iron-coated slide-on types, a 2·3mm bit is supplied as standard but 3mm and 4·7mm bits are available at £1.21 each. A pack of four solder refills costs £2.44 and replacement elements cost £2.26. All prices quoted include VAT and carriage.

For further details contact the manufacturers: *Gardner Precision Engineering, North Road, Woking, Surrey GU21 5DS. Tel: (048 62) 20722.*



Top Pocket Rig

Recently received from Lowe Electronics is the Belcom LS-20XE Pocke Tra 2, a 144MHz f.m. portable transceiver that really is pocket sized.

The rig covers 144 to 146MHz in 5kHz steps, selected by three thumbwheel switches and a tiny push-button for 0 or 5kHz. In addition to volume, on/off and squelch, three switchable controls located behind a slide panel, include repeater shift (+ or −), automatic tone burst on/off and r.f. power out high-medium-low (1W, 500mW and 100mW respectively). The p.t.t. switch is located on the side of the unit, as are three sockets for remote microphone, and charge only—if NiCad cells (4 x AAA type) are employed.

Optional accessories include a.c. mains charger, mobile charger, speaker microphone, battery carrying pack, soft case and a matching headset with built-in VOX, which provides simple operation whilst cycling or walking etc.

The LS-20XE costs £128, including VAT, plus £2.50 p&p, and is available from: *Lowe Electronics, Chesterfield Road, Matlock, Derbyshire DE4 5LE. Tel: (0629) 2817/2430/4057/4995.*

The knob (known to its friends as KB–1) is intended to give super-grade main tuning control featuring, as the blurb puts it "easy operation, attractive style, high inertia and an excellent feeling"—we could all do with some of that.

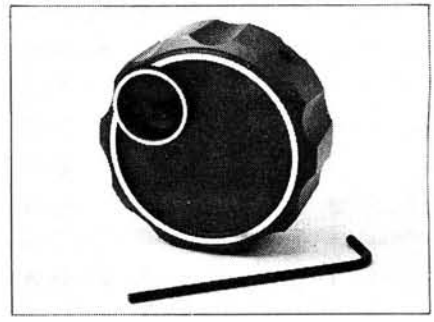
Before you all rush out to buy one, it is only intended to fit Trio range rigs TS–830S, TS–530S, TS–820S and receiver R–820, though at 51mm overall diameter (6mm shaft size), it could no doubt be used on some others.

Seriously though, it adds a nice finishing touch, with the "fast-winding" handle being actually ball-race mounted. No more worn-down index-fingers!

Further details from *Lowe Electronics* and Trio dealers.

Mystery Solved

Advertisements of a well-known emporium in Derbyshire have from time to time carried a photograph with the caption "Deluxe Knob", but no other explanation. Intriguing, eh? Well, at a recent exhibition we managed to lay hands on one of these mystery objects, and can now reveal all, as they say.



Products

1GHz Frequency Counter

Not so long ago most budget price test equipment was designed, manufactured and imported from the land of the rising sun.

Now, however, Black Star, the Huntingdon based instrument specialists, offer a range of quality frequency counters at highly competitive prices, that have been wholly designed and manufactured in the UK.

The top of the range instrument, the Meteor 1000, covers a frequency range of 5Hz to 1000MHz (typically 2Hz to 1·2GHz) in three switch selectable ranges with readings displayed on a large 8-digit, 0·5in high, 7-segment l.e.d. readout.

Three switch selectable gate times are provided, 0·1, 1 and 10 seconds with resolution to 1kHz, 100Hz and 10Hz respectively. Input sensitivity is quoted as greater than 25mV for 40 to 600MHz and less than 50mV up to 1GHz. Also a low frequency filter is provided with a cut-off frequency of 50kHz (50Ω source impedance).

Power for the unit is derived from a separate 9V d.c. at 600mA (max.) supply or via a purpose-built a.c. mains adaptor which is supplied free with the instrument, or by six NiCad 'C' type cells for which a built-in charger is installed as standard.

Two input sockets are provided (BNC type) for 5Hz to 100MHz and 40MHz to 1GHz, plus a front panel trigger level control is incorporated.

Overall measurements of the Meteor 1000 are 219 × 240 × 98mm and optional accessories include NiCad cells, telescopic pick-up antenna, passive probes and an external reference input frequency at 10MHz.

The Meteor 1000 is priced at £159, the Meteor 600 at £115 and the Meteor 100 at £89. VAT must be added to the prices quoted and the a.c. mains adaptor/charger is supplied with each model.

Further details are available from: *Black Star Ltd., 9A Crown Street, St. Ives, Huntingdon, Cambridgeshire PE17 4EB. Tel: (0480) 62440.*

Automatic Woodpecker Blanker

The Model SRB2 Automatic Woodpecker Blanker from Datong provides a major advance in dealing with interference caused by the Russian over-the-horizon radar system which operates at phenomenal strength and has become the scourge of the h.f. bands. The unit blanks out the interference pulses at both r.f. and a.f. and is unique in featuring fully automatic operation.

No synchronisation, pulse width, or in/out adjustments are required as the Model SRB2 uses its novel circuitry (patent applied for) to analyse the Woodpecker's signals and then tailor the width, number and position of the blanking pulses to match. It can even remove more than one Woodpecker at the same time.

An automatic antenna changeover relay is built-in which will handle the output of most popular h.f. transceivers and the unit connects in series with the antenna and the loudspeaker terminals of the receiver or transceiver. The r.f. blanker circuit stops the Woodpecker pulses from reaching the receiver's antenna input—and therefore avoids desensing, while the a.f. blanker removes any remaining clicks from the loudspeaker. This combination allows good copy of s.s.b., a.m. and c.w.

signals even with the severest of Woodpecker interference. When no Woodpecker interference is present, no blanking occurs, and the receiver or transceiver operates exactly as normal.

The unit requires a power supply of 10 to 16V d.c. at 200mA and is controlled by three front panel switches which select power on/off, pulse repetition rate (10/16Hz), and before-and-after monitoring. A red l.e.d. indicates when the unit is actually blanking.

The price of the Model SRB2 is £86.25, including VAT, and it can be obtained from Datong dealers or direct from the manufacturers: *Datong Electronics Ltd., Spence Mills, Mill Lane, Bramley, Leeds LS13 3HE. Tel: (0532) 552461.*

A rather interesting story relating to the introduction of this product is published in this month's *News* column.

Beckman Multimeters

Semiconductor Supplies International Ltd. can supply two quality digital multimeters from Beckman at very reasonable prices.

Both instruments, the T100 and T110, are robustly constructed in a shock-resistant case, and as the photograph shows, offer a wide and versatile selection of functions and ranges, which includes a dedicated diode test function and the choice of high or low power on the ohms range. All functions and ranges are selected via a central rotary switch and displayed on a large $3\frac{1}{2}$ digit l.c.d. readout.

The T110 also possesses an audible tone instant continuity test function and accurancy is 0·25% on Vd.c. Accuracy for the T100 is 0·5% on Vd.c.

Supplied complete with test leads, operator's manual, battery and spare fuses, the T100 costs £49.50 plus VAT and the T110 £59.50 plus VAT. A full range of accessories are available, including current clamps, high voltage probe, r.f. probe and temperature probe.

The instruments are obtainable from: *Semiconductor Supplies Ltd., Dawson House, 128/130 Carshalton Road, Sutton, Surrey SM1 4RS. Tel: 01-643 1126.*

The MERRIMAN REPORT

by Geoff Arnold G3GSR

As I mentioned in "Comment" last month, the final *Report of the Independent Review of the Radio Spectrum (30–960MHz)** chaired by Dr J H H Merriman, CB, OBE, F Eng, makes no direct recommendations as to any reallocation of frequency bands.

Other than in the Annexes, it makes no reference whatever to Amateur Radio, but many of the comments give a useful feel as to the "writing on the wall" regarding the future use of radio in general.

We reproduce here (printed in heavy type) the Summary of Conclusions and Recommendations from the report. Some of our comments and observations are added (in light type).

The full report, which runs to 137 pages, contains much other useful information including summaries of evidence and completed questionnaires from a number of organisations and individuals, information on Radio Regulatory practice in other countries, papers on frequency demand and growth, and on spectrum pricing.

LAND MOBILE BANDS

While the situation in the land mobile bands is likely to be manageable until the late 1980s, problems thereafter are likely to become acute unless significant use can be made of other bands and/or new technology.

The transfer of broadcasting Bands I and III to other services, mainly Land Mobile, recommended in the Interim Report has been accepted by the Government.

BROADCASTING

We recommend in relation to ancillary services that:

(i) as a matter of some urgency, the demand emerging from the enlarged community of programme makers be taken into account in policy formulation;

(ii) the broadcasting authorities be given every encouragement to make the maximum use of the existing broadcasting bands to accommodate their ancillary requirements; and

(iii) any further requests for spectrum for these various services be given very close scrutiny in view of the many other competing claims for frequencies.

There is no justification for the provision of additional spectrum for terrestrial TV or sound services without very serious consideration of the frequency implications, in the light of the undoubted emergence of alternatives. Within the timescales we are considering, there is no scope for any reduction in the use of spectrum for terrestrial broadcasting.

Ancillary services are: point-to-point links for outside broadcasts, both to carry programmes, talk-back and engineering services; radio microphones, etc.

DEFENCE BANDS

There is little scope for the reductions in defence spectrum usage which some respondents have suggested.

Account is taken of the general disbelief of this statement by the inclusion of Governmental usage in the recommended five-year review (see under "Frequency Spectrum Management").

My own impression is that the problem stems from the fact that military radio systems are becoming so complex and therefore take so long to develop. As a result there are always a number of different systems in use for the same purpose at any given time, each of a different technological vintage and working in a different band. A development time-scale of some fifteen years from conception to full introduction is not unknown.

FIXED SERVICES

We recommend that early special arrangements be made with all parties concerned to review the policy and practice of frequency spectrum management in relation to fixed services so that overall strategies can be developed in the face of the saturation likely to begin in the late 1980s.

The Committee extended its sphere of consideration into the microwave bands up to 30GHz here, and stressed that the use of fibre optics and other line communications where practicable would be essential if the traffic demands were to be met.

GENERAL GROWTH

In respect of the processes of frequency, management and the operational requirements of the major users:

(i) there is no prospect of any significant reserves of unused or underused spectrum being identified in the 30–960MHz range and reallocated;

(ii) the long timescale involved in bringing about major changes in the pattern of use means that fundamental decisions will have to be taken at an early date on the relative priorities to be accorded to different services.

FREQUENCY SPECTRUM MANAGEMENT

We recommend that:

(i) an Annual Report be published by RRD reviewing spectrum policy and management;

(ii) explanatory material be produced, to a high standard of presentation, for the user, potential user or general reader;

(iii) regular reviews be instituted by the RRD at not less than five year intervals related to specific user groups or systems and covering growth in spectrum usage, technical and operational changes taking place or foreseen, and spectrum efficiency;

(iv) the Frequency Allocation Table be published.

RRD is the Radio Regulatory Department of the Department of Trade and Industry (previously of the Home Office).

**Cmnd 9000, HMSO, £8.40, ISBN 0 10 190000 7*

All these recommendations are intended to improve the information flow and the public image of the RRD. The availability of frequency bands for some specialist applications is not made widely known, for example, giving the impression that an attitude of: "If potential users know it's allocated, they might want to use it!" exists in the RRD.

A Frequency Allocation Table, showing national usage rather than international as laid down by the ITU, is published in several other countries but not in the UK.

(v) a high-level Advisory Committee be established;

(vi) the overall allocation of spectrum for defence purposes be reviewed periodically, perhaps every five to ten years, by a small committee of Privy Councillors or people of similar standing, to whom the appropriate classified details of defence arrangements could be disclosed;

(vii) cost/benefit analysis or similar techniques be, wherever relevant, an element in spectrum management decisions; and that applicants be encouraged to submit supporting evidence of such analyses where available;

(viii) more general techniques of costing spectrum use be progressively developed;

(ix) in appropriate frequency bands, the basis for calculating licence fees be amended so as to further regulatory objectives and in particular to encourage by financial incentives both the use of less frequency-demanding equipment and the use of less congested frequency bands.

In other words—if someone wants to use a particularly heavily populated part of the spectrum, he may have to pay more for the privilege. It is hoped that this will encourage development and use of narrow-band modes.

(x) adequate resources be devoted to spectrum monitoring, particularly of the mobile and fixed bands, as an aid to efficient spectrum usage and effective management.

FREQUENCY ASSIGNMENT MANAGEMENT

We recommend that:

(i) responsibility for assignment be delegated, wherever practicable and defensible, to definable and responsible common interest groups, subject to two safeguards: the imposition of technical criteria where appropriate, and of a requirement to report annually to the RRD.

This is already done in some areas, such as Civil Aviation, and in some ways in Amateur Radio, where the RSGB acts as a clearing house for applications to establish repeaters and beacons in the UK, and participates with other IARU member societies in drawing up band-plans.

(ii) wherever practicable, preference be given to the establishment of further service-providing systems when spectrum is being reallocated; and that long-term regulatory policy be directed to encouraging users to use such systems rather than to seek individual assignments.

The use of "trunking", where a number of users participate in a radio service provided by a radio specialist, rather than each having their own service, can give great savings in spectrum space.

(iii) fixed-term assignments be adopted.

A user can at the moment expect to have his licence and frequency allocation renewed without question each year. There could be a place for fixed-term assignments, where users might be expected to give up their allocation and change to (presumably) a less-congested part of the spectrum at a future date when the technology allows.

(iv) short-term provisional assignments be introduced to increase planning and development efficiency.

Where new radio systems are being planned there is at present a "chicken-and-egg" situation. The RRD will not assign a frequency to an applicant until a fully-completed application form is submitted. A system cannot be planned and an application form completed without knowing what frequency might be allocated.

We make no formal recommendation on spectrum pricing. We incline to the view that it may well be *impracticable*. However, if Government believe that this matter should be further pursued we recommend that before any action is taken a detailed and critical feasibility study be commissioned.

The idea of having to rent a segment of the spectrum, rather than expecting access as a right, has received much attention, particularly in the USA, and is seen by some as a means of limiting demand. The use of radio for point-to-point links, simply because it is cheaper than the alternative wired link, is a case in point.

Some countries already place limits on such use, even in the Citizen's Band service.

STAFFING AND RESOURCES

We recommend that:

(i) a special grade structure be created, with appropriately increased salary levels, for the engineering staff in RRD.

(ii) regular interchange of staff between the RRD and industry be introduced.

(iii) RRD interests in the SERC "Specially Promoted Programme into Radio Communication Systems" be increased and adequately resourced (both in the programme and the RRD).

(iv) RRD experience, knowledge and guidance, not only at technical, but also at policy levels, be made available to SERC.

(v) an annual review of the relevance and effectiveness of the SERC programmes be made by the RRD and SERC and incorporated in the Annual Report of the RRD.

(vi) system-oriented research, with the maximum practicable industrial participation, be increased.

SERC is the Science and Engineering Research Council.

THE PLACE OF RADIO REGULATION IN THE GOVERNMENTAL STRUCTURE

We recommend that:

(i) radio regulation remains within Government rather than being made the responsibility of a non-Governmental body.

(ii) a separate ministerial department responsible for telecommunications be created.

(iii) failing (ii), responsibility for *telecommunications* be concentrated in a distinct unit with its own Minister, within an existing Government department;

(iv) failing (iii), the Radio Regulatory Department be transferred from the Home Office to the Department of Industry.

The RRD was transferred from the Home Office to the Department of Trade and Industry in June 1983, shortly after the General Election. ●

IF Signal Generator

S.Niewiadomski

The signal generator presented in this article was developed to aid testing and alignment of i.f. strips and detectors. The centre frequency of the generator can be set to any of the normal intermediate frequencies around 455kHz and then varied about that frequency. This facility is useful for determining the response of i.f. transformers and filters either contained in an i.f. strip or on their own.

Modulation can be applied to the output waveform from internal oscillators. Amplitude or frequency modulation can be applied with a variable degree of depth (or index in the case of f.m.). Two audio oscillators are included, nominally set to 1kHz and 400Hz, thus, a.m. and f.m. can be applied simultaneously so that, for example, the a.m. rejection of an f.m. detector can be investigated.

By using the generator without modulation an s.s.b. or c.w. signal can be simulated as they appear to an i.f. strip as a single frequency component at the intermediate frequency. In this way detectors which rely on the injection of a carrier signal can be tested and the carrier insertion oscillator set to the correct frequency.

A buffered output from the 455kHz oscillator is provided which can be connected directly to a frequency counter without any significant loading effects. Accurate measurement of the frequency is necessary if a filter response is being determined, hence the need for a buffered output.

As this instrument provides the functions of signal generators which have a much greater frequency range, why bother to build such a specialised instrument? Well, in the first instance by restricting the frequency range, the output frequency can be set very finely and accurately. Secondly, the cost of most general purpose signal generators (for example the waveform generator described in *PW* February 1982) is fairly high compared with this design.

As well as being useful for testing and alignment, this generator can be used for educational purposes for showing the effects of modulation on carriers. Amplitude modulation can easily be seen on an oscilloscope but for a true appreciation of the production of sidebands, especially with f.m., a spectrum analyser is invaluable.

Circuit Operation

The complete circuit of the generator is shown in Fig. 1. IC1 is an LM1458 dual op.amp which with its associated components form 1kHz and 400Hz phase shift oscillators. Several circuits were tested before this design was adopted and they all suffered similar drawbacks. Loading effects of the active element (for example, a transistor) meant that the actual frequency of oscillation was very different from that calculated from the phase shift network component values. Also, unless a complicated feedback control circuit was employed considerable distortion was produced because output limiting was the only mechanism governing the overall gain. By using an op.amp for the gain element both of these problems are largely overcome. The high input and low output impedance of the op.amp minimises loading effects and by using a pre-set potentiometer between output and input, the gain can be adjusted so that the circuit is just oscillating. In this way an output sine wave with less than −45dB second harmonic content (relative to the fundamental) has been produced.

Integrated circuit IC1a and its phase-shift components form an oscillator at approximately 1kHz. The gain of the stage is determined by the ratio of R2 divided by R3. For oscillation to take place the gain must be at least 29. When using an op.amp with a 2-rail rather than a 3-rail supply the +v input (pin 3) must be biased to mid-rail. This is achieved by R8 and R9.

The second audio oscillator is formed by IC1b, at about 400Hz. Here the gain of the op.amp is the ratio of R17 to R15. The mid-rail biasing components are R10 and R11.

If a different frequency is required for these oscillators, then change the value of C1, C2 and C4 (all equal) and/or R5, R6 and R7 (again all equal). The components to change for IC1b are of course C5, C6 and C7 and/or R12, R13 and R14. The frequency of oscillation is given by: $f = 1/2\pi\sqrt{6}RC$.

The output of IC1a is applied via R1 to a balanced modulator i.c. IC2 (MC1496). In this application IC2 is operated in an unbalanced mode (R22 and R25 not equal). This means that as well as two sidebands being present at the output the carrier is also present. This is classical a.m. If required, double sideband suppressed carrier can be produced by making R22 and R25 equal at say 27kΩ.

IC2 obtains its carrier source either from the internal oscillator or from an external source depending on the setting of S2. According to the data available for the MC1496, the external source could be up to 300MHz, but no guarantees are given here for those frequencies. Two outputs are available from the MC1496, pins 6 and 12. Here the output has been taken from pin 6 with R21 and R24 providing the collector loads for the output transistors. By varying R20, the gain of the modulator can be changed, providing an output level control.

The internal carrier oscillator uses a conventional f.e.t. circuit and a cheap Toko i.f. transformer. A stabilised supply is derived from the main positive rail by R38 and D1. The frequency of oscillation is varied by altering the bias voltage on D4, a BB109 varicap diode. This can be accomplished either by changing the setting of R44 or by applying a sine wave via C8 and R19.

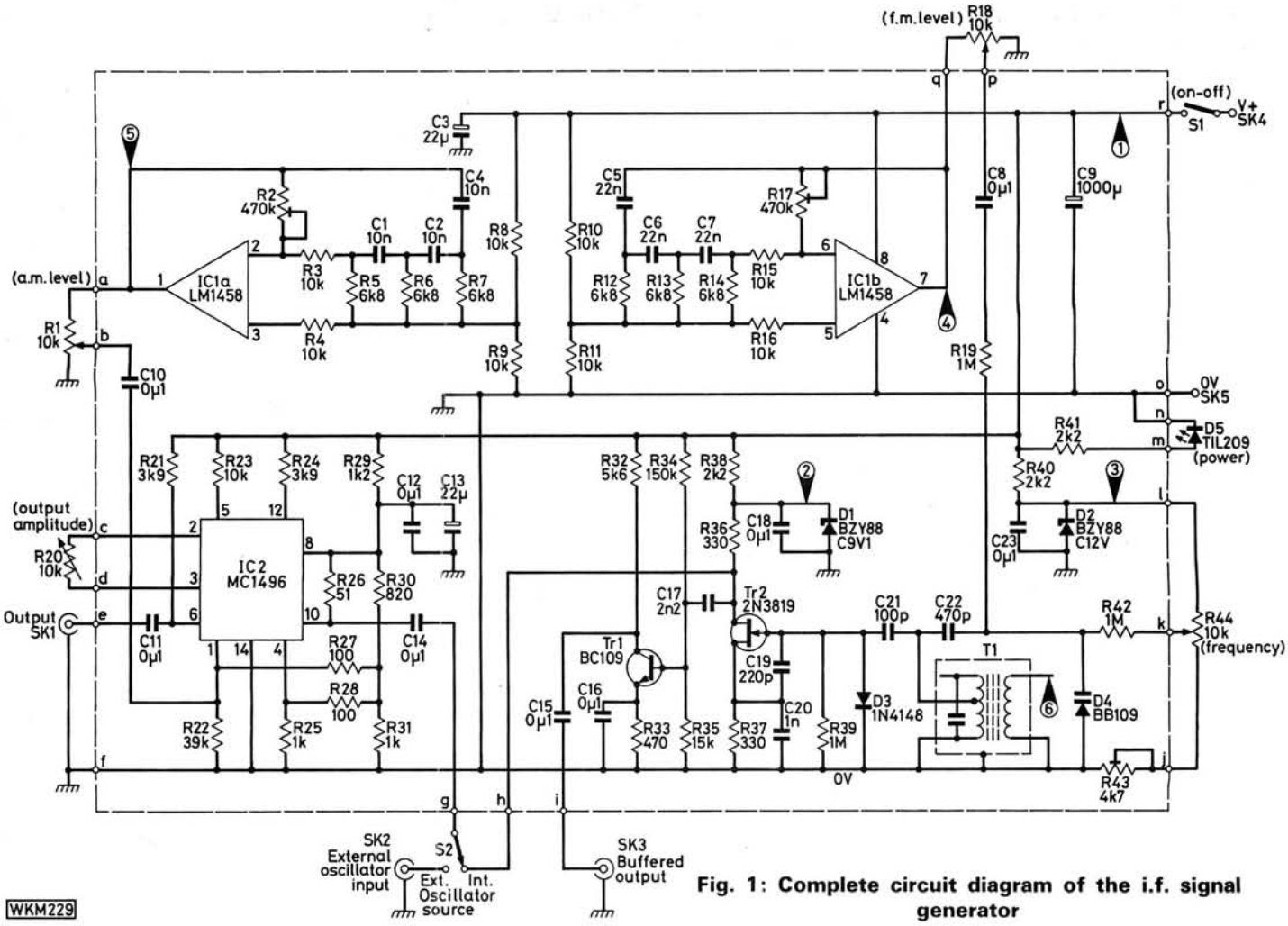


Fig. 1: Complete circuit diagram of the i.f. signal generator

A 12 volt stabilised supply is obtained for R44 by R40 and D2 and the range of frequency shift that R44 provides can be varied by R43. The method of setting up R43 is given later.

The path C8/R19 is the method of applying frequency modulation directly to the oscillator. Potentiometer R18 determines the level of modulation obtained.

Although the output voltage swing of Tr1 is adequate for driving IC2 it is not really sufficient to drive a simple frequency counter. For this reason and to eliminate loading effects on the oscillator, Tr2 is used to amplify the oscillator output.

An attempt was made to incorporate a mains power supply inside the unit but trouble was experienced with detectable f.m. at the output due to mains interference. The solution adopted was to take the power rails to terminals SK4/5 to which an external d.c. supply of 15–20 volts should be connected. If a well-smoothed mains p.s.u. is available, it can be used or alternatively two 9 volt batteries in series are suitable. There is room inside the unit to incorporate two 6–F22 (PP3) size batteries if desired.

Construction

All components within the dotted lines on Fig. 1 are mounted on the p.c.b. whose foil pattern is shown full size in Fig. 2. The positions of the p.c.b. mounted components are also shown in Fig. 2.

The use of sockets for the integrated circuits is recommended—be careful to insert the i.c.'s the right way round. It is probably best to leave Tr1 until last and use the normal m.o.s. handling and soldering precautions for this device. Work systematically from one end of the board to the other, checking for solder bridges and splashes as you go.

The circuit layout does not seem to be critical as one prototype was built on Veroboard without trouble. This construction method is a good compromise if a p.c.b. cannot be obtained. The only problem when using Veroboard is in mounting the inductor T1 because of its pin spacing.

BUYING GUIDE

No problems should be encountered in obtaining components for this versatile test instrument. The prototype was housed in a Verobox No. 202-21038

Approximate Cost £35

Construction Rating INTERMEDIATE

★ components

Resistors

¼W Carbon Film 5%

51Ω	1	R26
100Ω	2	R27, 28
330Ω	2	R36, 37
470Ω	1	R33
820Ω	1	R30
1KΩ	2	R25, 31
1·2kΩ	1	R29
2·2kΩ	3	R38, 40, 41
3·9kΩ	2	R21, 24
5·6kΩ	1	R32
6·8kΩ	6	R5–7, 12–14
10kΩ	9	R3, 4, 8–11, 15, 16, 23
15kΩ	1	R35
39kΩ	1	R22
150kΩ	1	R34
1MΩ	3	R19, 39, 42

Miniature horizontal pre-set

4·7kΩ	1	R43
470kΩ	2	R2, 17

Linear Carbon track potentiometer

10kΩ	4	R1, 18, 20, 44

Capacitors

Polyester—100V

10nF	3	C1, 2, 4
22nF	3	C5–7

Ceramic

100pF	1	C21
220pF	1	C19
470pF	1	C22
1nF	1	C20
2·2nF	1	C17
0·1µF	9	C8, 10–12, 14–16, 18, 23

Tantalum Electrolytic—16V

22µF	2	C3, 13

Single-ended Electrolytic—25V

100µF	1	C9

Semiconductors

Integrated circuits

LM1458	1	IC1
MC1496	1	IC2

Transistors

BC109C	1	Tr1
2N3819	1	Tr2

Diodes

BB109	1	D4
TIL209	1	D5
BZY88C9V1	1	D1
BZY88C12V	1	D2
1N4148	1	D3

Miscellaneous

TokoYHCS11100ACZ 455kHz i.f. transformer (T1); s.p.s.t. miniature toggle switch (1); s.p.d.t. miniature toggle switch (1); BNC sockets (3); Case 180 × 120 × 65mm; knobs (4); Veropins and p.c.b.

WKM231

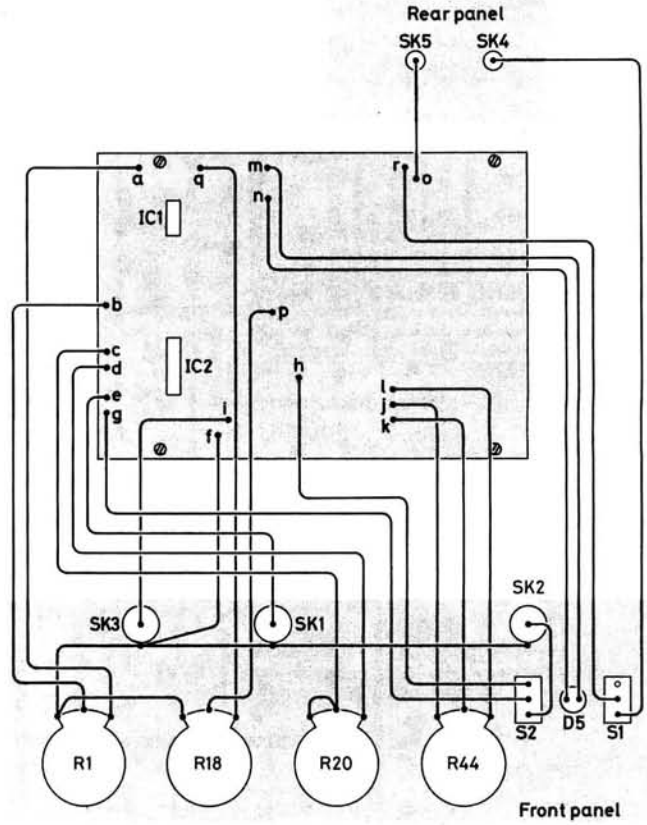


Fig. 3: Interconnecting wiring diagram between the p.c.b. and the panel mounted components

Lengths of stiff wire (resistor leads are useful here) can be carefully soldered onto the used pins and then pushed through the Veroboard, standing the transformer about 10mm above the board.

Six test point locations are provided on the p.c.b. and these should have Veropins (or lengths of stiff wire) soldered into them.

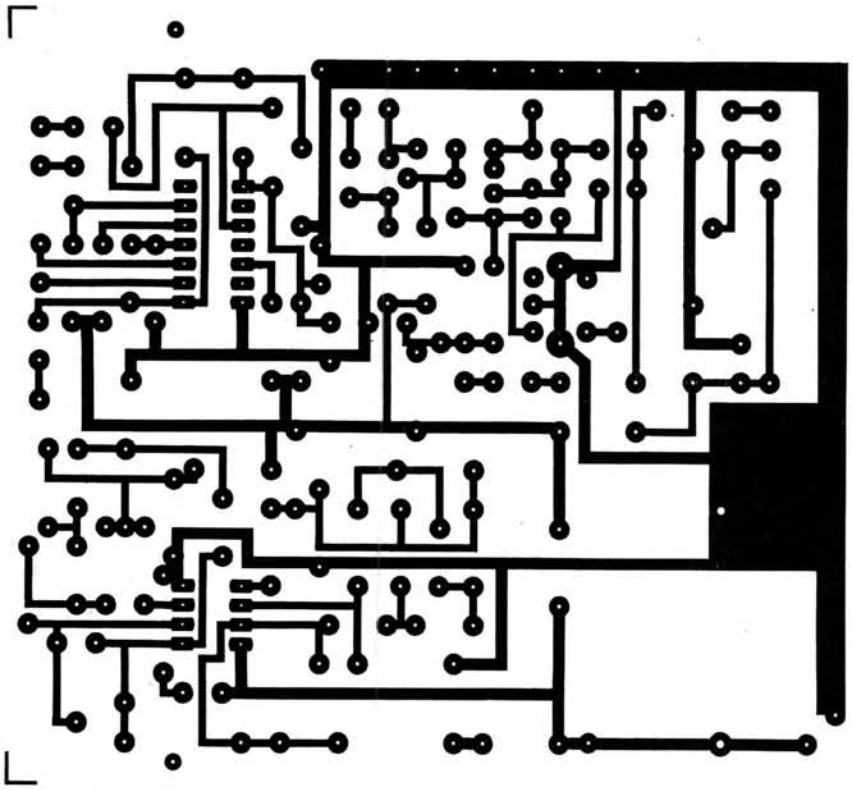
Fig. 3 shows the connections between the p.c.b. and the panel mounted components. A Verocase size 180 × 120 × 65mm was used to house the prototype generator—the four mounting screw hole positions shown on the p.c.b. correspond to the mounting pillars moulded into the Verocase.

Testing and Adjustments

After checking the p.c.b. for short circuits and dry joints and also verifying that the wiring is OK, switch on. Place the negative lead of a voltmeter or scope probe on the negative lead of C9 and measure the voltage on TP1—it should be at least 15 volts. Then check that TP2 is at approximately 9 volts with TP3 at 12 volts.

Next place a scope probe on TP4 and adjust R17, watching how the oscillation starts at a certain setting and then becomes more clipped as the control is advanced further. Back R17 off until the clipping is just noticeable, at which setting the harmonic content will be acceptably low. Repeat the procedure with R2 while monitoring TP5.

Place the scope probe on point B on the p.c.b. and check that the amplitude of the sine wave varies as R1 is rotated. Repeat with point P and R18. When the audio oscillators are working correctly move on to the 455kHz oscillator.



WKM230

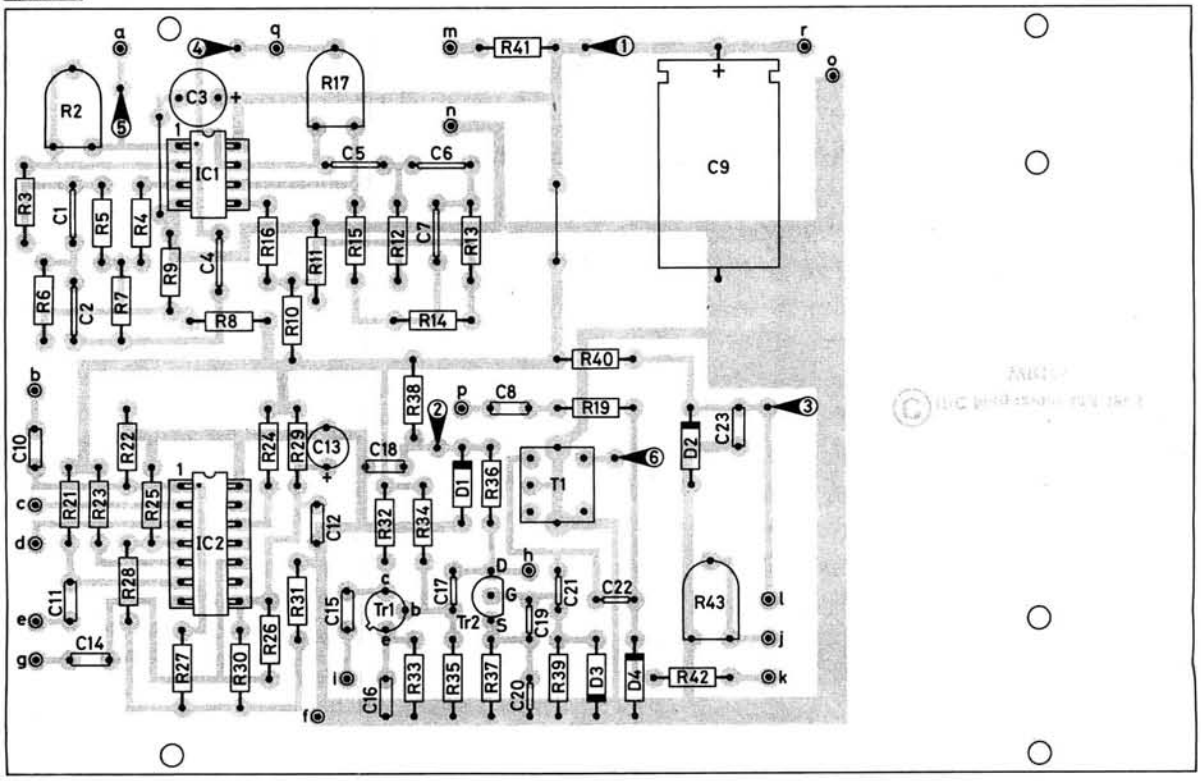


Fig. 2: The track pattern and component placement details of the i.f. signal generator

Set R43 and R44 to approximately mid position and monitor TP6. A fairly low level (approximately 600mV peak-to-peak) sine wave at about 455kHz should be seen. Now move to point I and check that a much higher level (and probably more distorted) sine wave is present. Connect a frequency counter to the buffered output socket and adjust the core of T1 until a frequency of 455kHz (or the centre frequency required) is indicated. Rotate R44 between its limits and note the high and low frequencies obtained. Adjust R43 gradually, swinging R44 each time until the desired frequency range is obtained. It may be necessary to adjust the core of T1 again as variations in R43/R44 and T1 are not independent.

The operation of the amplitude modulator can now be checked. Switch S2 to select the internal oscillator and monitor the output socket. Make sure that R1 is at its minimum setting so that no modulation is applied to IC2. By varying R20 the output amplitude should range from about 100mV to 3V peak-to-peak. Still monitoring the output, the effect of rotating R1 can be seen. The modulation depth can be seen to vary from zero to one hundred per cent. Rotate R1 back to the zero level and the f.m. effect can be checked.

Display about 10 cycles of the output sine wave on the scope and rotate R18 gradually. The effect of f.m. can be seen as a fuzziness in the sine wave towards the right hand side of the scope screen. If a spectrum analyser is available it is interesting to monitor the output with it and see the amplitudes of the side-bands vary as R18 is rotated. Any textbook which deals with the theory of f.m. will contain tables or graphs of the sideband amplitudes.

One final check is to select the external source with S2 and inject a sine wave, monitoring the output again. Only a.m. can be applied to the external source, any f.m. having to be applied directly to the external oscillator.

Using the Generator

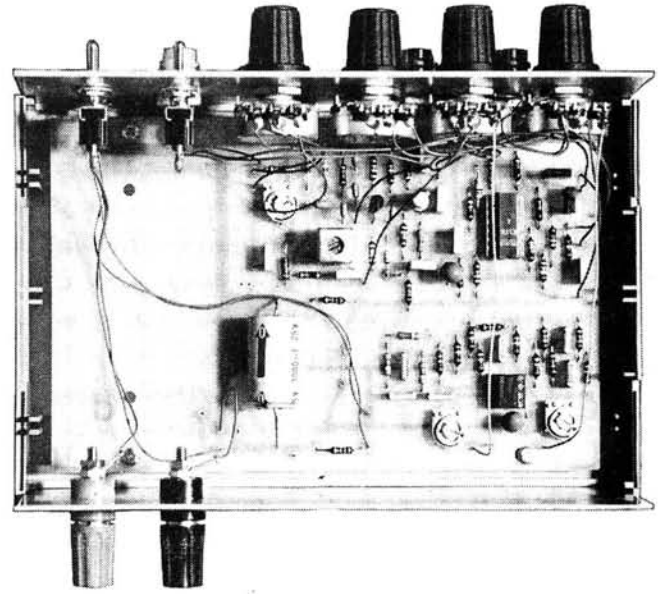
To use the i.f. signal generator to align an i.f. strip, attach a length of coaxial cable to the output socket. Remove the braid from the free end of the cable for about 50mm, leaving the centre conductor insulated by the dielectric. For most purposes sufficient input will be injected into the i.f. strip by simply placing the end of the cable near the input. If insufficient injection is obtained a small capacitor can be connected between the cable end and the circuit under test. Potentiometer R20 can be used to reduce the level of injection to prevent overloading the i.f. stages.

If the i.f. strip is part of a complete receiver, remember to disable the receiver's local oscillator before starting the test. The a.g.c. action of the i.f. stages can be checked by varying R20 over a certain range and monitoring the a.g.c. line and the output of the i.f. strip.

A useful feature of this generator is that a.m. and f.m. can be applied simultaneously and at different frequencies. This allows the a.m. rejection of an f.m. detector to be verified.

To set the frequency of a carrier insertion oscillator or b.f.o. for an s.s.b. or c.w. detector, set the generator accurately to the i.f. centre frequency. Then monitor the audio output of the detector and adjust the b.f.o. frequency until the audio output is at about 1800Hz. Two settings of the b.f.o. will be found to produce this output frequency, one above the intermediate frequency and one below. The setting above the i.f. will demodulate lower sideband modulation and the setting below the i.f. will demodulate upper sideband.

When using the generator to determine the response of a filter couple the output to the filter with a small capacitor. Remember to terminate the input and output terminals of the filter with the impedances recommended by the manufacturer. ●



Photograph of the author's prototype showing the general layout of components

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Did You Know...

That the earliest BBC microphones were held together with Vaseline?

Before broadcasting began in Britain, the only microphones available were those used in telephones, usually with the addition of a cardboard horn attached to the mouthpiece. That was the type of microphone the world-famous soprano Dame Nellie Melba sang into during her famous pre-BBC broadcast from Chelmsford on 15 June 1920. The small range of frequencies that it could handle, and the fact that it had to be held to the broadcaster's mouth, made it unsuitable for BBC use, so the new broadcasting company standardised on the Marconi-Sykes "Magnetophone". This was a moving-coil instrument in which the sound waves directly activated a flat coil of aluminium wire within the field of a strong electromagnet that was switched on immediately before the performance of any item, and switched off again immediately afterwards. For technical reasons, the flat aluminium coil's mounting consisted of four cottonwool pads upon which it was stuck with dabs of Vaseline. Unfortunately, the coil had a tendency to fall off during transmissions, whereupon the formally attired announcer would jab his finger into a jar of Vaseline that was kept handy, re-anoint the coil and stick it back into position.

Eric Westman

SWITCHES–1

Switches look a pretty simple, straightforward item, usually relegated to the "Miscellaneous" section of component lists in *Practical Wireless*. But in fact there are so many terms and abbreviations used to describe switches, even the sorts that the hobbyist might use, that it's a topic that baffles many readers. The Editor tells me his postbag often includes queries on switches, and so he's asked me to explain them for your benefit. First, I'll talk about the terms and abbreviations used in commonplace switches (toggle switches, slide switches, push-button switches), then go on to explore the more complicated or unusual types.

The earliest switches were the "knife" type (Fig. 1) such as you see on laboratory switchboards in the "Frankenstein" films. The insulating handle on the end of the moving blade lets you operate the switch without touching any live parts. The switch shown in Fig. 1 is single-pole, because it can control one line or pole of a circuit, and double-throw, because it can be thrown to the left to connect the moving blade to one spring clip contact, or to the right to connect it to the other spring clip contact. So it's a single-pole, double-throw switch, abbreviated s.p.d.t., and its circuit symbol would be as in Fig. 2. The moving blade is called the "common" or "wiper" connection of the switch, and might be labelled "com" or "w" on a circuit diagram.

You could of course have just one spring clip contact (say the one on the left in Fig. 1) in which case the circuit will be **open,** with the moving blade "up in the air" as shown in the drawing, or **closed** when it's pushed down into the clip. This is known as a single-throw switch, so the abbreviation becomes s.p.s.t., and the circuit symbol is as Fig. 3.

The terms "pole" and "throw" are still used for the more modern types of switches, though often "throw" *is replaced* by "way" so our switch of Fig. 1 could also be described as a 1-p. 2-w. (one-pole, two-way). The term "way" is always used for rotary switches and multi-pushbutton switches where there are more than two ways. Watch out for a possible source of confusion here, as in some components (such as terminal strips) the word "way" is used to describe the number of circuit connection points available—in other words what would be called "poles" in a switch.

You could put two or more of the switches of Fig. 1 side by side and join all the handles together so that the switches can be operated together with one hand. It then becomes a multi-pole switch—two switches linked like this would be called double-pole (d.p.) or two-pole (2-p.) while three switches linked would be three pole (3-p.), etc.

Toggle Switches

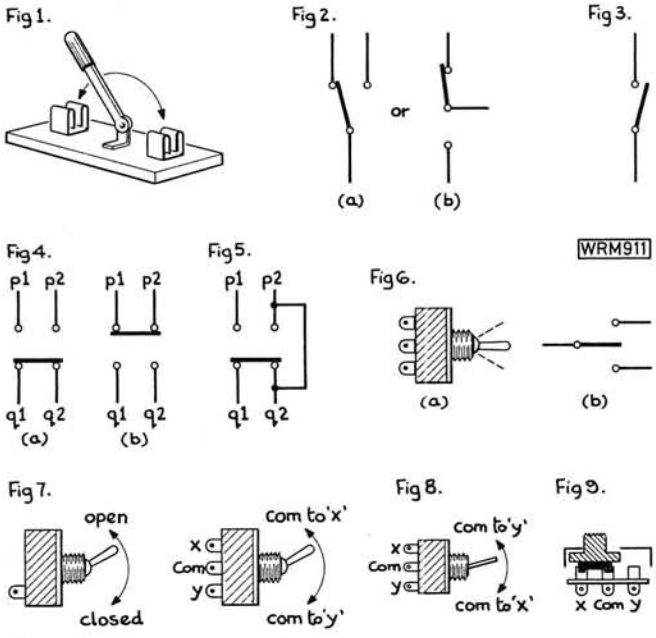
In toggle switches, a s.p.d.t. switch like Fig. 2 will have three terminals or tags on the back (or sometimes one on each end and one on the back for the bigger switches). You may sometimes come across one with four tags (Fig. 4). The switch operating lever or handle, properly called a "dolly", is linked to a contact-bar which can either join terminals q1 and q2, as in Fig. 4(a), or terminals p1 and p2, as in Fig. 4(b). This can be very useful if you have two circuits which are not linked together, and you want to complete one or the other but never both at the same time. Some manufacturers who make both sorts of switches distinguish between them by calling the 4-terminal version single-pole change-over (s.p.c.o.), but don't rely on that difference. Better to consider s.p.d.t. and s.p.c.o. as meaning the same thing until proved otherwise in a particular circuit. Incidentally, if you've got a 4-terminal version you can turn it into a 3-terminal one by linking p1 and q1 or p2 and q2, as in Fig. 5. You can't make a 3-terminal version into a 4-terminal one!

Whilst on the subject of using one switch to do another job, you can of course use a double-pole switch as a single-pole, either by simply ignoring one set of terminals or by linking them in parallel, which would be better practice as it will increase the current-handling capability and reduce contact resistance, of which more later.

In a similar way, you can use a double-throw switch as a single-throw, by connecting to the "common" terminal and one other, and ignoring the third.

Going back once more to Fig. 1, the old knife-switch gives you an option which isn't available on ordinary toggle switches. As well as being able to connect the "common" terminal to either one of the two end contacts, you can also leave it standing up as shown in the drawing, not connected to anything else. There is a special toggle switch that can do the same thing, and it's called a "centre-off" toggle as shown in Fig. 6, with the circuit symbol at Fig. 6(b).

In most toggle switches, the dolly lever stays in the position you put it in. But you can also get "biased" switches in which the dolly lever is spring-loaded so that it returns to its



original position when you let go of it. In single-throw switches it's very often used to bias the action to the "OFF" position. In "centre-off" switches, biasing can be applied to return the dolly lever to the centre position. Sometimes both sides are biased to return to centre, in other switches one side is biased and the other is not.

Contacts

When a pair of switch contacts (and here a pair means two contacts of one pole, **not** as is sometimes thought by the beginner, two different poles) is opened, the current that was flowing wants to carry on, and forms an arc across the widening gap. In a.c. circuits, because the voltage falls to zero twice in every cycle, the arc will quickly be extinguished, but in d.c. circuits the arc will carry on until the contact gap gets too wide for it to be maintained. Because the arc damages the contact surfaces, it is not a good thing, and should be stopped as quickly as possible.

For a switch operating on d.c., it is best to use one with a quick-make-and-break action (q.m.b.). Some sort of spring-assisted mechanism (absolutely no connection with the biasing I talked about just now) pushes the moving contact over rapidly no matter how quickly or slowly the operator moves the dolly lever. On low-voltage d.c. (up to about 24 volts or so) the gap that the arc will jump is not very large, so it's not so important to have the q.m.b. action. In that case a simpler (and often cheaper) slow-make-and-break (s.m.b.) action will do.

There is a school of thought which says that s.m.b. switches are actually better than q.m.b. in a.c. circuits, on the principle that the s.m.b. will extinguish the arc near the zero voltage crossover, whereas the q.m.b. one may break at or near the peak of the a.c. cycle, which for 240V mains, for example, will be almost 340V ($V_{peak} = V_{r.m.s.} \times 1{\cdot}414$). I've never quite followed the logic of this argument, but perhaps some reader may care to enlighten me.

For switching in circuits which carry very low powers, such as signals at a.f. or r.f., contact resistance can become a problem, and the use of switches having contacts plated with gold and other exotic metals becomes essential.

Moving up a little in power levels, silver-plating becomes an adequate contact finish, but the natural tarnishing of silver surfaces can produce poor contact. At reasonable powers (greater than about 6VA) the arc formed at making and breaking the contact will break through the tarnish. Below this, "wiping" contact arrangements are used, where the moving contact scrapes against the fixed contact and wipes the tarnish off each time the switch is operated. This may not be satisfactory if the switch is not moved for long periods. Incidentally, be warned that gold-plated contacts will not handle the same current and voltage levels as a silver-plated contact of the same size. So don't be tempted to standardise on gold-plated contact switches. They'll cost you around 50 per cent more anyway, which is another good reason.

Deciding on the relationship between the position of the dolly lever and the moving contact inside the switch is not easy. The only really reliable way is to check for continuity between the terminals with an ohmmeter whilst operating the switch. Generally, in the larger toggle switches, the contact is made on the same side as the dolly is moved to (Fig. 7), and in the miniature and sub-miniature ones the contact is made on the opposite side to the dolly (Fig. 8). If in doubt, check!

Slide Switches

Slide switches are becoming a very popular alternative to toggle switches for low-voltage circuits, and are available in a range of sizes including some designed for direct p.c.b. mounting.

The way the contact mechanism works is shown in Fig. 9. The sliding actuator carries a contact spring strip which can be moved so that it either connects "com" to "x" or "com" to "y". It's a slow make-and-break type of course, and there is a point in the movement where neither "x" nor "y" is connected to "com". In fact, some slide switches have a "centre-off" position which can be felt as a notch when moving the actuator.

A more recent arrival on the slide switch scene is a 3-position version, equivalent to a 3-way in the terms I described earlier.

The contact mechanism arrangement of the slide switch is also used in push-button switches of the multi-gang type, of which I shall say more next month.

BASIC QSOs in Spanish

PART 3

G.W. Roberts GW4JXN and Ildefonso Sevilla EA7BWX

Social		
From the shack I can see mountains/sea/moors.	Desde mi cuarto de radio puedo ver montanas/el mar/paramos.	Desdee me kwarto day radio pooayhdo ver montanas/el mar/paramos.
I have a friend/wife/children in the shack with me.	Tengo un amigo/esposa/hijos en el cuarto de radio conmigo.	Tengo oon ameego/mee esposa/eechos en el kwarto day radio conmego.
He is a visitor/a shortwave listener.	Es una visita/un radio escucha.	Es oona biseeta/oon radio eskootsha.
She is a visitor.	Ella es una visita.	Elia es oona biseeta.
He intends to sit his radio exam.	El va a examinarse de radioaficionado.	El va a eximinarsay day rahdioafithionahdo.
I am at home/at work/at a friend's house.	Estoy en casa/trabajo/casa de amigo.	Estoy en casa/travacho/casa day ameego.
This is a demonstration/special station.	Es una demostracion/estacion especial.	Es oona demonstrathion/estathion espethial.
I have visited your country.	He visitado su pais.	Ay visitahdo soo pays.
I hope to visit your country.	Espero visitar su pais.	Espayro visitar soo pays.
We had a nice time.	Lo pasamos muy bien.	Lo pasamos mooee be-en.
Excuse my Spanish.	Perdone, no hablo bien Español.	Payrdonay no ablo be-en espaniol.
I wish I could speak your language as well as you speak mine.	Desearia hablar su idioma tan bien como usted habla el mio.	Desayareea ablar soo eedioma tan be-en como oostedh abla el meeo.
Can we continue in English?	Podemos continuar en Ingles?	Podhaymos continooar en inglays?
May I say it in English?	Puedo decirlo en Ingles?	Pooayhdo daythirlo an inglays?
May I explain it in English?	Puedo explicarselo en Ingles?	Pooayhdo explicarsaylo en inglays?
QSL		
Could you please send me your QSL card.	Por favor podria mandarme su QSL.	Por favor podhreea mandarme soo kooehse ehle.
I would be very pleased to get a QSL card from you.	Me gustaria mucho recibir su tarjeta de QSL.	May gwstareeia mootsho raytheebeer soo tarchayta day kooehse ehle.
I shall send you my QSL card via the bureau/direct.	Le enviare mi QSL via buro/directa.	Lay enviaray me koo ehse ehle via bwro/directo.
My name is in the American/British callbook.	Mi nombre esta en el Call Book americano/Ingles.	Me nombre esta en al Call Book amayrican/inglays.
Is your name and address in the callbook?	Esta su nombre y direccion en el call book?	Esta soo nombre ee deerecthion en el call book.
Can you give me your address and telephone number over the air?	Deme su direccion y telefono ahora?	Daymay soo directhion ee telayfono aora?
What is your postal code/telephone code?	Cual es su codigo postal/prefijo telefonico?	Kwal es soo codheego postal/prayficho telefoniko?
This is my address and my telephone number.	Esta es mi direccion y mi numero de telefono.	Esta es me directhiom ee me noomayro day telefono.
Concluding Remarks		
May I thank you once more for this call, and wish you a very good morning/afternoon/evening/good weekend.	Una vez mas gracias por la llamada, y le deseo buendia/ buenas tardes/buenas noches/buen fin de semana.	Oona veth mas grathias por la liamadha, ee le daysayo booendeea/booenas tardhes/booenas notshes/booen fin day semana.

Merry Christmas and a Happy New Year.	Felices Pascual y prospero ano nuevo.	Faylithes Paskwal ee prospayro ano nooayvo.
I send you my best regards.	Le envio mis mejores recuerdos.	Lay envio mees mechores rekooerdhos.
All the best to you and yours.	Todo lo mejor para usted y su familia.	Todho lo maychor para oostaydh ee soo fameelia.
I look forward to working you again.	Espero que podamos copiarnos otra vez.	Ayspayro kay podhamos kopeearnos otra veth.
May I wish you 73, 55, 88 and make this my final.	Muchos 73, 55, 88 y me despido.	Muchos sehtentaeetrehs, seenkooentaheetheencoh, ohshentaheeohshoh ee may despidho.
Back to . . . from . . . who is waiting for any concluding remarks from you.	El cambio para . . . de . . . que espera cualquier otra cosa.	El kambio para . . . day . . . kay espayra kwalkweear otra cosa.
So best wishes and good DX.	Mis mejores deseos y muchos DXs.	Mees maychores deayos ee mootshos Day Exs.
Goodbye until next time/until the pleasure of seeing you again.	Adios hasta la proxima/vez que nos encontremos.	Adios hasta la proxiema/veth kay nos enkentraymos.
This is . . . signing off and clear with . . . and now standing by for a call on this frequency.	Aqui . . . terminando con y quedando atento a la frecuencia para cualquier llamada.	Akee . . . terminando con ee kooendando atento a la frookooenthia para kwalkwee-er liamadha.
. . . now monitoring this frequency and waiting for any call.	. . . ahora espero cualquier llamada en esta frecuencia.	. . . aora espero kwalkweer liamadha en esta frekooenthia.
. . . now changing frequency to . . .	. . . ahora voy a cambiar a . . .	. . . aora voy a kambiar a . . .
. . . now returning to the calling channel.	. . . ahora vuelvo al canal de llamada.	. . . aora vwaylvo al canal day liamadha.
. . . now going QRT.	. . . ahora quedo en QRT.	. . . aora kwaydo en cuertay.

Numbers together with their pronunciation

1	uno	oonoh
2	dos	dohs
3	tres	trehs
4	cuatro	kooahtroh
5	cinco	theencoh
6	seis	says
7	siete	see eh teh
8	ocho	ohshoh
9	nueve	nooehveh
10	diez	dee ehz
11	once	onsay
12	doce	dohsay
13	trece	trehsay
14	catorce	katorsay
15	quince	keensay
16	diezyseis	dee eh zi says
17	diezysiete	dee eh ze sea eh teh
18	diezyocho	dee eh zi oshoh
19	diezynueve	dee eh zi nooehveh
20	veinte	veh in teh
21	veinte y uno	veh in teh oonoh
22	veinte y dos	veh in teh dohs
30	treinta	treh in tah
31	treinta y uno	treh in tah oonoh
40	cuarenta	koo ah rentah
41	cuarenta y uno	koo ah rentah oonoh
50	cincuenta	seenkoo entah
60	sesenta	sehsenta
70	setenta	sehtentah
80	ochenta	ohshentah
90	noventa	nohvehntah
100	cien	see-ehn
200	dosciento	dohsseehntoh
1000	mil	mill
2000	dos mil	dohs mill

Common Spanish Christian names — it is easier to recognise them in the QRM if you have seen them before.

Angel	Diego	Guillermo	Manolo
Alfonso	Damian	Gerardo	Miguel
Antonio	Dionisio	Gonzalo	Pedro
Alfredo	Eduardo	Igancio	Pablo
Andres	Eulogio	Isidoro	Pepe
Alberto	Enrique	Jose (Pepe)	Ramon
Bernardo	Emilio	Juan	Ramiro
Benito	Ernesto	Joaquin	Rafael
Carlos	Francisco	Luis	Salvador
Carmelo	Federico	Leon	Santiago
Cristobal	Felix	Manuel	Tomas

Time

1 o'clock	son la una	sohn lah oonah
2 o'clock	son las dos	sohn las dohs
2.05	son las dos y cinco	
2.10	son las dos y diez	
2.15	son las dos y cuarto	
2.20	son las dos y veinte	
2.25	son las dos y veinticinco	
2.30	son las dos y media	
2.35	son las tres menos veinticinco	
2.40	son las tres menos veinte	
2.45	son las tres menos cuarto	
2.50	son las tres menos diez	
2.55	son las tres menos cinco	

Days of the week

Sunday	Domingo	Domeangoh
Monday	Lunes	Looness
Tuesday	Martes	Martess
Wednesday	Miercoles	Mee ehr coless
Thursday	Jueves	Who eh vess
Friday	Viernes	Ve ehr ness
Saturday	Sabado	Sahbahdoh

The Spanish alphabet — this is used to give the Q code and also for callsigns (distintivo de llamada).

A	a	ah
B	be	bay
C	ce	say
D	de	deh (like the e in let)
E	e	eh
F	efe	ehfeh
G	ge	gheh (strong H like in hell)
H	ache	asheh
I	i	ee
J	jota	hohtah (like the o in home)
K	ka	kah
L	ele	ehleh (like the e in set)
M	eme	ehmeh (like the e in set)
N	ene	ehneh (like the e in set)
O	o	oh (like the o in not)
P	pe	peh
Q	co	koo
R	ere	ehrreh (like the e in set)
S	ese	ehseh (like the e in set)
T	te	teh (like the e in set)
U	u	oo (like the u in put)
V	uve	ooveh
WW	uve doble	ooveh dohbleh
X	ehkiss (equis)	ehkiss
Y	ee gree ehgah	ee gree ehgah
Z	zeta	thehtah

For those who have some knowledge of Spanish there follows a list of the most common technical words and phrases. The pronunciation is not given.

absorption wavemeter — ondametro de adsorbcion
ammeter — amperimetro
amplifier — amplificador
amplitude modulation — modulacion de amplitud
antenna — antena
antenna matching — adaptador de antena
antenna tuning unit — adaptador de antenas
aurora — aurora
auroral — auroral
balun — balun
band pass filter — filtro pasa banda
calibrator — calibrador
carrier frequency — frecuencia portadora
coaxial cable — cable coaxial
coil — la bobina
condenser — condensador
continuous wave — onda continua
cross modulation — modulacion cruzada
deviation — desviacion
dial — el dial
a digital frequency meter — frecuencimetro
directional antenna — antena direccional
disturbance — perturbaciones
dummy load — carga fantasma
earth — tierra
to earth — a tierra
fading — desvanecer
feeder — linea de alimentacion
final stage — etapa final
fixed — fijo
frequency modulation — modulacion de frecuencia
ground wave — onda de tierra
high pass filter — filtro paso alto
indoor antenna — antena interior
insulator — aislador
ionosphere — ionosesfera
jack — enchufe
lightning protection — proteccion pararayo
line of sight — al alcance de la vista
log book — libro de guardia
lower sideband — banda lateral inferior
low pass filter — filtro paso bajo
metal case — caja metalica
a meter — un contador
modulated wave — onda modulada
omnidirectional antenna — antena omnidireccional
operator — operador
oscillations — oscilaciones
parasitic oscillations — oscilaciones parasitas
plug — clavija
power supply — fuente alimentacion
preset — pre-ajustado
preset potentiometer — potenciometro pre-adjustado
pulse modulation — modulacion pulsatoria
to radiate — radiar
the range — el alcance
readability — inteligible
receiver — receptor
repeater — repetidor
r.f. amplifier — amplificador alta frecuencia
rig — el equioamento
rotating antenna — antena directiva
rotator — rotor
satellite — satelite
selectivity — selectividad
sensitivity — sensibilidad
shielded braiding — maya protectora
sideband — banda leteral
single sideband — banda lateral unica
skip zone — zona muerta
sky wave — onda espacial
sound frequency — frecuencia (audiofrecuencia)
speech processor — compresor de audio
standing wave — ondas estacionarias
switch — conmutador
transceiver — transceptor
transistor — transistor
transmitter — emisor
troposphere — tropoesfera
tuned circuit — circuito sintonizado
to tune up — sintonizar
upper sideband — banda lateral superior
valve — una valvula
variable — variable
vertical antenna — antena vertical
vertical rod — varilla vertical
voltmeter — viltimetro
wavelength — longitud de onda

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Have party built Juliet 3½in gauge coal-fired locomotive. Chassis nearly ready plus parts for boiler. Would exchange the lot for 144MHz transceiver or amateur radio receiver or w.h.y. Tel: Norwich 662460 (evenings). *T259*

Have Super-Colour Swinger Land Camera made by Polaroid. Would exchange for useful gear for s.w.l., 144MHz converter for communications receiver or w.h.y. M. James, "Westholme", Church Lane, Lincoln LN2 1QJ. *T260*

Have Cybernet Beta 3000 CB rig, mobile and base station antennas, gutter mount, cable, s.w.r. meter and p.s.u. Would exchange for FT-290R 144MHz transceiver or FRG-7700 receiver. J. Whittle. Tel: Great Glen 3270. *T295*

Have Datong Morse Tutor and Hi-Mound key, as new in boxes. Would exchange for h.f. RX, v.h.f. gear or Sinclair computer. Tel: 061-303 1792 (Manchester area). *T300*

Have Dymar 144MHz f.m. portable transceiver with multi charger and eight NiCad packs. Would exchange for Sinclair Spectrum, ZX81 16K plus, heavy duty beam rotator and 144MHz linear or w.h.y. Tel: Sedgley 78792 (will return call). *T305*

Have CB rig converted to 28MHz (10m) band. Would exchange for decent scanner. Tel: Stevenage 722845 (evenings). *T313*

Have Marconi TF144G signal generator 85kHz–25MHz, internal and external modulation with output level meter, working but poor condition. Also valve a.c. voltmeter. Would exchange for frequency counter or cassette deck. Mr. P. M. Blackett. Tel: 01-647 8838. *T314*

Have Realistic 50-channel PRO2002 programmable a.m./f.m. v.h.f./u.h.f. receiver cost £300, excellent condition. Would exchange for good compressor 5 to 6 c.f.m. Tel: Sunderland 675955 (after 5pm). *T322*

Have Uniden 100 CB, 7amp p.s.u., Wot-pole, cable, s.w.r./power meter as new in boxes. Also Prinzsound stereo tuner. Would exchange for short wave receiver suitable for RAE student. Tel: Stevenage 350310. *T326*

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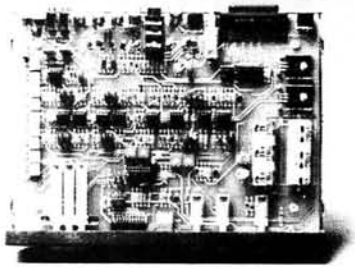

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U25	1.15	2D21	1.10	6BR7	4.80	6SN7GT	0.80	20P3	0.75
U26	1.15	2K25	1.85*	6BW6	6.20	6SR7	1.10	20P4	1.25
U27	1.15	2X2	24.50*	6BW7	1.80	6SQ7	0.95	20P5	1.35
U191	0.85	3A4	1.15	6C4	0.50	6V6G	1.50	25L6GT	0.95
U281	0.70	3AT2	0.70	6C6	0.55	6V6GT	0.95	25Z4G	0.75
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U600	11.50	3D22	0.50	6CL6	2.75	6X4WA	2.10	30C17	0.50
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UAF42	1.20	5B/254M	18.25	6F6	1.60	7B7	1.75	30FL12	1.25
UBF80	0.70	5B/255M	16.90	6F6GB	1.10	8BN8	2.95	30FL14	2.15
UBF89	0.70	5B/258M	14.50	6F7	2.80	9D2	0.70	30L15	1.10
UCC84	0.85	5C22	12.50	6CY5	1.15	9D6	2.90	30L17	1.10
UCC85	0.70	5R4GY	29.90	6F8G	0.85	10C2	0.85	30P12	1.15
UCF80	1.30	5U4G	1.20	6F12	1.50	10F18	0.70	30PL13	1.25
UCH42	1.65	5V4G	0.75	6F14	1.15	10P13	1.50	30PL14	2.45
UCH81	0.75	5Y3GT	0.95	6F15	1.30	11E2	19.50	35L6GT	1.40
UCL82	0.95	5Z3	1.50	6F17	3.20	12A6	0.70	35W4	0.80
UF41	1.35	5Z4G	0.75	6F23	0.75	12AT6	0.70	35Z4GT	0.80
UF80	0.95	5Z4GT	1.05	6F24	1.75	12AT7	0.65	50C5	1.15
UF85	0.95	6/30L2	0.90	6F33	10.50	12AU7	0.60	50CD6G	1.35
UL84	0.95	6AB7	0.70	6FH8	4.20	12AV6	0.95	75B1	1.25
UM80	0.90	6AC7	1.15	6GA8	1.95	12AX7	0.65	75C1	1.70
UM84	0.70	6AG5	0.60	6GH8A	0.95	12BA6	0.90	76	0.95
UY82	0.70	6AH6	1.15	6H6	1.60	12BE6	1.25	78	0.95
UY85	0.85	6AK5	0.65	6J4	1.35	12BH7	1.95	80	1.70
VR105/30	1.25	6AK8	0.60	6J4WA	2.00	12BY7A	2.30	85A2	1.40
VR150/30	1.35	6AL5	0.60	6J5	2.30	12C8	0.65	807	2.55*
X66	0.95	6AL5W	0.85	6J5GT	0.90	12E1	18.95	813	1.25
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Z803U	16.00	6AS6	1.15	6KD6	4.50	12SJ7	0.70	866E	6.25
Z900T	2.45	6AT6	0.90	6L6M	2.80	12SQ7	1.45	931A	13.80
		6AU6	0.60	6L6G	2.50	12SQ7GT	0.85	954	0.60
				6L6GC	2.65	12Y4	0.70	955	1.20
				6L6GT	1.25	13D3	0.70	956	0.60
				6L7G	0.65	13D5	0.90	957	1.05
				6L18	0.70	13D6	0.80	1625	1.80
				6LQ6	2.95	14S7	1.15	1629	1.85

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PW DART QRP TOP BAND TRANSMITTER

by Rev G.C. Dobbs G3RJV & Colin Turner G3VTT PART 1

I remember well my first venture into phone on Top Band. It was in the days that a.m. ruled. I had built the obligatory valve transmitter for Top Band: EF50 v.f.o., EF50 buffer and 807 p.a. with cathode of the 807 keyed for c.w. operation. Then following the advice of an old timer I put a carbon microphone in the key socket and shouted into it. Lo and behold—amplitude modulation . . . and a sore throat. It all seems so complex in these days when single side band holds sway. What we offer here is a simple means of being able to put a voice transmission onto an amateur band.

Each year my family and I leave the safety of Birmingham and make a sojourn in Kent to the G3VTT household. During these visits we usually make time from wife pacifying and child amusing to work on some project in the shack. On one such visit I found Colin towards the end of making a little double sideband suppressed carrier (d.s.b.s.c.) transmitter for Top Band and we completed the project together. I liked it. Practically nothing in the box and it put a useful signal onto the 1·8MHz (160m) band. The circuit appeared shortly afterwards in *SPRAT*, the journal of the G-QRP Club[1] and was named BREN after Colin's long suffering wife. Several G-QRP Club members built the transmitter with success. Bristol even produced a small 1·8MHz band net of people using the design. I have added a little to the circuit, standardised the components for ease of purchase, presented a p.c.b. layout and we now offer it to wider audience as the *PW* Dart.

The circuit offered has several advantages. It uses cheap bipolar devices plus a couple of common f.e.t.s. together with standard inexpensive components. The circuitry is simple enough for most amateurs to tackle. It has been built without problems by a number of people. But best of all, it puts a useful couple of watts onto the 1·8MHz band on c.w. and the d.s.b.s.c. signal is of good quality and taken by most people for an s.s.b. transmitter. Many modern multiband transceivers do not offer a 1·8MHz band option and this is a simple way to get on that band.

What are we talking about when referring to d.s.b.s.c.? Well, it is an amplitude modulated signal in which the two sidebands are transmitted but the carrier is removed.

BUYING GUIDE

The Jackson air-spaced capacitors used in this unit are available from Bi-Pak Semiconductors. The SBL-1 double balanced mixer is obtainable from Ambit International. Neosid Small Orders have a kit, PW80, for inductors L1 and L7 priced £1.50 including post and packing. The author's prototype was housed in a box obtainable from Minffords of Sun Street, Ffestiniog, Gwynedd LL41 4NE. All other components are readily available from advertisers in this magazine.

Approximate Cost £55

Construction Rating INTERMEDIATE

The Circuit

The complete circuit of the transmitter is shown in Fig. 1. The key item in the circuit is the mixer, it is the splendid SBL-1 Double Balanced Mixer module. The v.f.o. signal on 1·8 to 2MHz is fed into one port and, in theory, no signal will emerge at the output port (pin 1) unless the mixer is unbalanced with a signal on the third port. If this port is supplied with an audio signal, a double sideband r.f. signal will emerge—suppressed carrier because it only appears in response to the audio input. If a d.c. voltage is keyed onto the third port a keyed c.w. signal will emerge. In practice a little of the v.f.o. signal will leak through the double balanced mixer (d.b.m.) but with careful construction and layout this leakage is minimal.

The v.f.o. is a simple common drain Colpitts Oscillator, Tr1, with a single buffer stage, Tr2. The output from the source of Tr2 gives a reasonable match into the d.b.m. The Power Amplifier Board may lack sophistication but uses inexpensive devices in a linear arrangement to produce some 2 watts of output. It consists of a pre-driver BC108, a driver 2N3053 and a pair of 2N3053 transistors

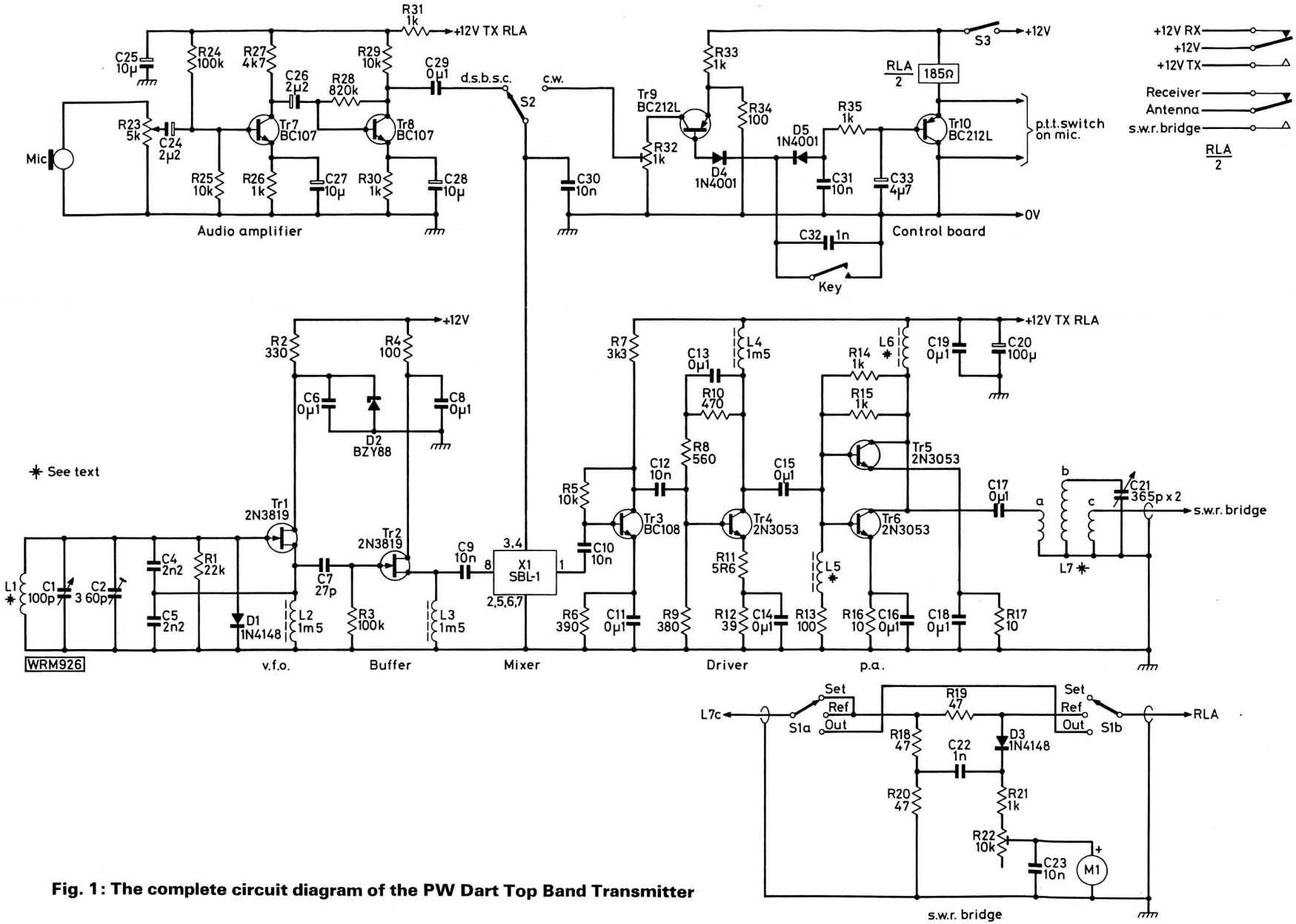
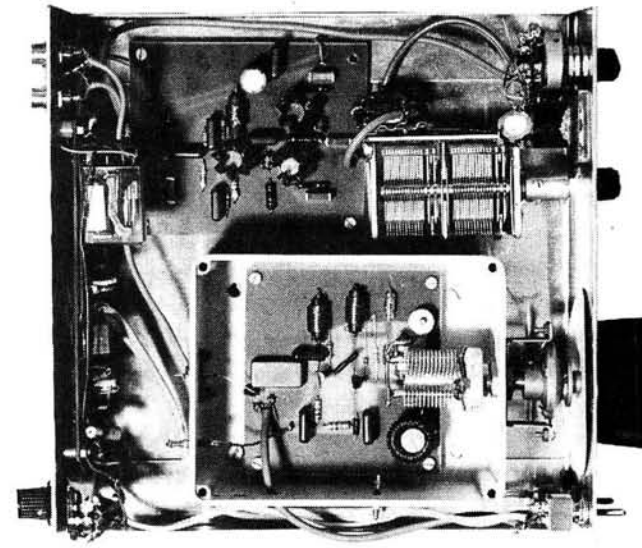


Fig. 1: The complete circuit diagram of the PW Dart Top Band Transmitter

in the final. Other similar bipolars will probably give much the same results. The audio signal comes via a very scant two-stage amplifier, Tr7 and Tr8, which has more than adequate gain for full output from a cheap medium impedance CB type microphone. I hate microphone hugging and found even without full gain I could hold the microphone almost a metre from the mouth. The transmitter may even be capable of the "marble hall" effect that Italian s.s.b. operators seem to love.The key operates two d.c. switches Tr9 and Tr10. Keying produces a voltage through Tr9 onto a preset R32 which provides the d.c. voltage for the c.w. signal. Keying Tr10 operates a relay, RLA1, with a degree of hold on provided by C33 to give a semi-break in effect. On d.s.b.s.c. operation the "press-to-talk" switch shorts out Tr10 to put the circuits onto transmit. The two-pole changeover relay contacts switches the antenna between the transmitter and receiver and also provides 12VTX on transmit and 12VRX on receive from the 12 volt power line.

The output from the transmitter is tuned by a single tuned circuit, L7/C21, which has two small input and output link windings. This gives a low impedance output but most operators on Top Band cannot provide a 50Ω antenna . . . oh for the space of the dipole! So an integral s.w.r. bridge circuit is provided on the output. The circuit chosen has several advantages in that not only is it simple but also it offers impedance protection to the p.a. transistors and allows tuning-up to be a simple three switch action. The bridge is a resistive s.w.r. bridge based upon the Wheatstone Bridge beloved of physics masters. Resistors R18-20 provide three arms of the bridge, the fourth being the impedance of the antenna. When the output "sees" 50Ω the sensing circuitry, D3/C22, are at a null and the



★ components

Resistors

Carbon Film ¼W 5%

5·6Ω	1	R11
10Ω	2	R16, 17
39Ω	1	R12
47Ω	3	R18-20
100Ω	3	R4, 13, 34
330Ω	2	R2, 9
390Ω	1	R6
470Ω	1	R10
560Ω	1	R8
1kΩ	8	R14, 15, 21, 26, 30, 31, 33, 35
3·3kΩ	1	R7
4·7kΩ	1	R27
10kΩ	3	R5, 25, 29
22kΩ	1	R1
100kΩ	2	R3, 24
820kΩ	1	R28

Midget Potentiometer

5kΩ	1	R23

Vertical pre-set

1kΩ	1	R32

Horizontal pre-set

10kΩ	1	R22

Capacitors

Monolithic Ceramics

1nF	2	C22, 32
10nF	6	C9, 10, 12, 23, 30, 31
0·1µF	7	C6, 8, 13-15, 19, 29

Polystyrene

27pF	1	C7
1nF	1	C3
2·2nF	2	C4, 5

Electrolytic (axial)

4·7µF 16V	1	C33
10µF 25V	3	C25, 27, 28

Electrolytic (p.c.b. mounting)

2·2µF 16V	2	C24, 26
100µF 25V	1	C20

Miniature Layer Polyester

0·1µF	4	C11, 16-18

Miniature Trimmer

3-30pF	1	C2

Air-spaced Variable

100pF 2 gang	1	C1
365pF	1	C21

Semiconductors

Diodes

BZY88	1	D2
IN4001	2	D4, 5
IN4148	2	D1, 3

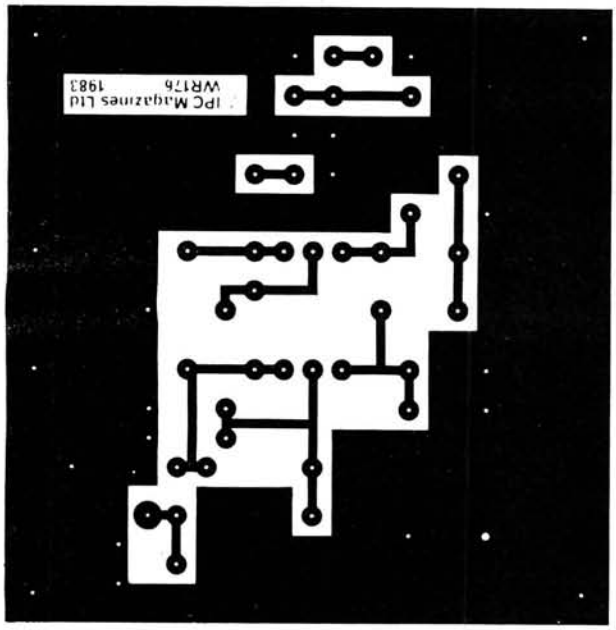
Transistors

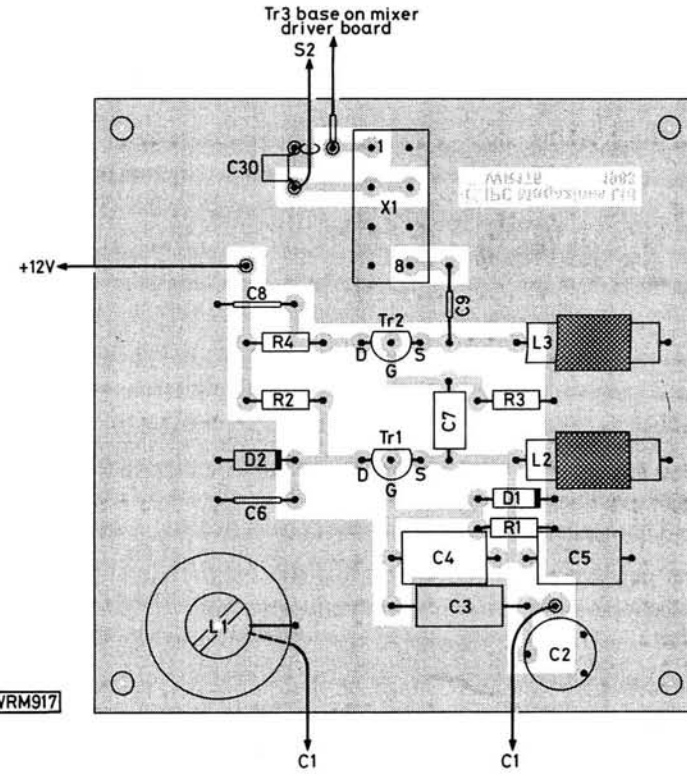
BC107	2	Tr7, 8
BC108	1	Tr3
BC212L	2	Tr9, 10
ZN3053	3	Tr4-6
ZN3819	2	Tr1, 2

Miscellaneous

p.c.bs; s.p.d.t. miniature toggle switch (2); 4p·3w wafer switch; 12V 2 pole changeover relay 185Ω coil; 1·5mH r.f. choke (3); ferrite beads (2); T68-2 torroids (2); SBL-1 double balanced mixer; 200µA moving coil meter (see text); 6:1 slow motion tuning control; 32 s.w.g. & 28 s.w.g. enamelled copper wire; case (see text).

Fig. 2: Full size p.c.b. track pattern and component placement of the v.f.o./mixer board





meter should read zero. So an external a.t.u. can be adjusted to obtain this match. This form of bridge is especially useful since even with a severe mismatch the transmitter output is always loaded by R18 and R20 which should be enough to stop the output transistors curling up their toes.

The tuning-up procedure is simplicity itself. The switch, S1, is placed in the SET position where it acts as an r.f. indicator. Capacitor C21 can then be adjusted for peak reading. The switch is then turned to the REF position where it acts as the resistive bridge. The external a.t.u. can then be adjusted for the minimum reading on the meter. The transmitter should now be matched and S1 can be moved to the OUT position which cuts out the resistive bridge and allows all the r.f. into the antenna. It is possible to tune up very quickly using this three step procedure without risk to the p.a. stages and only radiating a very low signal.

Construction

Most of the transmitter is built on three small boards; a v.f.o. Mixer Board, a Power Amplifier Board and an Audio/Changeover Board.

The v.f.o./Mixer Board is mounted in a small screened box within the body of the transmitter. The prototype used a diecast aluminium box 114 × 89 × 51mm in size, although any sturdy box would serve the purpose. Some constructors seem to have problems with stability in the v.f.o.s. In practice I have found that if a v.f.o. is built to be dropped from 9000m, it will probably be stable! The tuned circuit uses a toroid former which although not favoured by some for v.f.o. tuned circuits, seems to be very stable at this sort of frequency. Capacitor C1 should be a good airspaced capacitor of some 100pF, these can be very expensive though can be found on the surplus market, (but can't everything). In fact a value slightly over 100pF would be useful as with this value the v.f.o. barely covers the whole of the band. Capacitor C2, a semi-airspaced variable trimmer, sets the band edges. The critical fixed components are the capacitors C3, 4 and 5, these should be high quality temperature stable components. The prototype used polystyrene types but good quality silvered mica capacitors would also be suitable.

One of the problems of a simple d.s.b.s.c. transmitter is v.f.o. leakage through the mixer giving an unacceptable carrier level before the audio signal is applied. Short leads around the SBL-1 mixer, with good screening, are required. The SBL-1 is mounted on the v.f.o. printed circuit board within the v.f.o. case and the circuit board has a large copper ground mat around the mixer module as shown in Fig. 2. The filter capacitor, C30, although shown as part of the Audio Amplifier board in Fig. 1, is mounted as close as possible to the audio input port, pins 4 and 5, of the SBL-1. The mixer output capacitor, C10, is not board mounted but forms the connection between the output port of the SBL-1 on the printed board and a lead-through to take the signal out of the v.f.o. enclosure. The input and output leads to the mixer are all screened cables.

The tuning coil in the v.f.o., L1, is wound on a T68-2 toroidal core, and this core should be physically secure. The coil is 45 turns of 28 s.w.g. enamelled copper wire. The prototype was mounted onto the p.c.b. with a plastics 0BA bolt and held above the board with a large plastics pillar. The tuning requires some form of slow motion drive; the inexpensive little 6:1 epicyclic drives seem suitable for this application. They are easy to use, reasonably smooth, and a circular scale made of metal or stiff card can be mounted onto the portion of the reduction shaft in front of the main gearing. It is wise to build the v.f.o. first and test it in its own right, if only by listening for it on a receiver.

Part 2 of this article will deal with the audio amplifier/changeover board and p.a. board.

Readers who intend to operate the *PW* Dart should be in possession of the appropriate licence issued by the Department of Trade and Industry to those who have passed the City and Guilds Radio Amateurs' Examination. Details may be obtained from: The Department of Trade & Industry, Radio Regulatory Department, Amateur Licensing Section, Waterloo Bridge House, Waterloo Road, London SE1 8UA.

RESULTS RESULTS RESULTS

RESULTS RESULTS RESULTS

by Neill Taylor G4HLX

The *Practical Wireless* 144MHz QRP Contest on 19 June 1983 was very well supported, with 160 entries received, making it one of the most popular single-band v.h.f. contests in the UK. Seventy of the entries were from single-operator stations.

For many entrants it was their first go at a v.h.f. contest, but there were also plenty of established clubs and groups active. The overall winners, the Blackwood Amateur Radio Society GW6GW/P fell into both of these catagories since they are a well-known group in v.h.f. contests, but in this event their operators were all newcomers having their first taste of contest working. From their site near Abergavenny they achieved an impressive lead which gains for them the winners' cup.

Runners-up G4LDR/P on Win Green Hill in Wiltshire, and third-placed G3UFB/P on the South Downs in East Sussex receive certificates.

The leading single-operator, John Otley G4CYA, at his home QTH in Sheffield receives a certificate, as do the second and third placed single-operators, G3JXN in Ealing, West London, and G8KQW in Harefield, Middlesex.

Certificates are also awarded to the leading fixed station, G6OOZ (multi-operator) at Meopham in Kent, who just kept G4CYA from taking this title too, and to the leading Scottish station, GM6WIX/P, whose signals from the Keir Hills in Dumfriesshire were heard by many in the south.

Congratulations to the winners and to all who gained certificates, as well as to the many others whose efforts brought them close to the top of the results table.

Logs

The standard of the logs submitted was high, by-and-large, although a few entrants had not read the rules carefully enough. Almost all stations lost some points during adjudication due to logging errors, and a large number of stations lost a considerable proportion of their scores. On the other hand a couple of entrants, unable to count up the number of squares they had worked, will find they now have more points than they claimed!

Cross-checking the logs revealed all manner of errors, though the most common mistake was the dropping of the /P suffix from a callsign, or occasionally the adding of one which wasn't there. In some cases this could be found in many logs in contacts with the same station, suggesting that the fault was in the sending, rather than the receiving, operator.

With a few exceptions, however, if a callsign or QTH Locator was incorrectly logged, both stations involved lose a point. If a station had serious errors in *all* its claimed contacts in a given square, that square is not counted as a multiplier. A few stations have come to grief on this—when working a station in a rare square it pays to take particular care that the information is correctly sent and received.

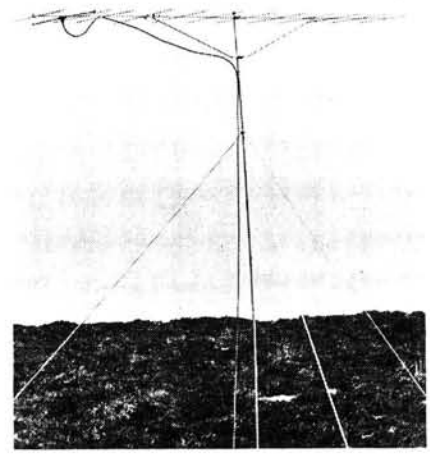
The numbers of QSOs and QTH Locator squares worked as shown in the results table are *after* the above process has been applied.

Unmarked duplicate contacts found in the logs were penalised by loss of both QSOs, or by more severe loss of points if they occurred frequently. Most entrants seem to have been careful about this.

Stations

Many entrants seem to have put a great deal of effort into their stations, particularly with regard to the antenna system and site from which they operated.

As regards equipment, 57 per cent of stations in the results table used a Yaesu FT-290R as their main transceiver. A further 9 per cent used an Icom IC202, and 8 per cent used a Yaesu FT-221R or FT-225R, the remainder using one of the many other popular multimodes, in fairly equal numbers. Sadly, only one station, G8INR, used a home-brew transceiver, although many users of commercially-made equipment reported the use of home-made accessories such as speech processors, receive pre-amplifiers, or power supplies.



E17DG/P on Three Rock Mountain, ten kilometres south of Dublin—placed thirtyfirst overall, fourth single-operator and only E1 entry

G6VFR/P on Clee Hill, Salop—placed thirtythird. The car is "home-brewed"

A wide range of antennas were used, as can be seen in the results table, and many of these were home-built, chiefly from the designs published in *Practical Wireless* (and re-printed in the *Out of Thin Air* Booklet). However, the single most popular antenna was the Tonna 9-element Yagi, used by 18 per cent of entrants.

Sites used ranged from sea level to 1000 metres above (GM3NHQ/P, who "took the opportunity of joining the contest while out climbing" on Ben Vorlich for an hour or so). A number of extravagant locations were used, and in all 22 stations operated from a height of 400 metres or more above sea level.

Conditions

Many groups arrived on site to find a good tropospheric lift to the continent underway, which ceased in most parts of the UK just before the start, or for the lucky ones just after the start, of the contest. Comments received show the variety of times at which the lift ended:

"Excellent conditions the previous evening . . . . died rapidly 'till at 0830 it was 'average'."—G6DRT/P (in AK square)

"Band closed about ¼ hour before contest started."—G8VVY/P (YL square)

"A tropospheric duct into Denmark and N. Germany . . . continued to improve into the (Saturday) night . . . provided several very useful DX contacts in the early stage of the contest before it finally collapsed around midmorning."—G6VFR/P (YM square)

"Conditions . . . after a superb early start, faded by lunchtime."—G4SDK/P (YM square).

General views of conditions were very varied, due, it would seem, to differing expectations of distances to be worked on QRP from a good site. A selection of views:

"No exceptional conditions—band was fairly flat."—G6PUS/P (ZK square)

"Excellent conditions."—G6EKR/P (AL square)

"Conditions seemed to go through a little dip on Sunday."—GM4RGC/P (YQ square)

"Excellent tropospheric conditions."—GM3NHQ/P (XQ square)

"Above average throughout, especially first thing."—G4SFY/P (AM square)

"Slightly above average but no 'real' DX heard."—G3JXN (ZL square)

G4LDR/P on Win Green Hill in Wiltshire—runners-up. Operators are G4RLF (right) and G4LDR (left)

G6MTH/P on Harts Hill near Nuneaton, Warwickshire—placed thirtysecond. From left to right G6REO, G6MTH, G6OQV, G6MTG, G6HQT

The winners made good use of the early lift:

"Propagation on the Saturday evening when the station was set up was near perfect . . . very good conditions (at start of contest) enabled Steve (GW6TGX) to score at a rate of more than one a minute even with no previous contest experience . . . propagation slowly decayed . . . only one EI and a noticeable lack of French stations."—GW6GW/P (YL square).

Weather

After a long spell of mediocre and downright bad weather, the superb conditions on the day brought many comments such as these:

"WX unbelievable—must have been in high 70's, possibly low 80's."—G8VVY/P

"How did *PW* negotiate such good WX?"—G4SDK/P

"Too hot at times—overcome by flies."—G6PHF/P

"All operators and loggers were sunburnt by the end of the day."—G6NOL/P

Signals

Many operators were appreciative of the generally cleaner sounding signals produced by the 3 watt power limit. Comments included:

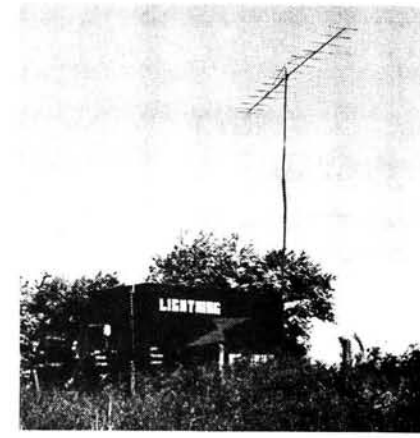
"QRP produced a lot less QRM than had been known in previous contests from the site."—GW6GW/P

"In one of the best reception sites in England, there was relatively little interference in spite of the many stations involved."—G6VFR/P

"Suffered very little QRM."—G6NOL/P

"So nice to work the band when it is not dominated by stations running full legal power (or more!) and 20 Yagis at 90m above ground."—G6EKR/P

There were at least four cases of two stations sharing the same hilltop, in each case with apparently no problems. For example:

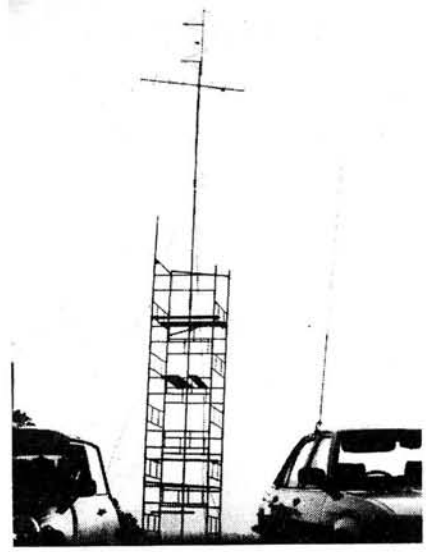


G6LJO/P Yellow Welly Contest Group near Bulkely, Cheshire—placed eighteenth

"Another station turned up and found me in his 'favourite spot' . . . after a friendly chat he successfully worked from a position only 7m away."—GW6PKK/P

"We did not experience any QRM from other station not far away on same hill."—GM4RGC/P

Only a few entrants reported being troubled by bad signals, and in most of these receiver problems seem the most likely explanation as high gain pre-amps were in use. Nevertheless, a QRP signal *can* be broad if the TX is overdriven, and from a good site with a high gain antenna can cause considerable splatter at other stations. However there is no doubt that the standard of signals was generally much higher than in "open" contests. There were, of course, some higher power stations active, just "giving a few points away".



G8BGU/P Hedley on the Hill, near Newcastle-upon-Tyne. North East Radio and Communications Club—placed joint seventysixth

General Comments

The contest was enthusiastically welcomed by most entrants:

"Very enjoyable contest."—G4LDR/P

"Has filled a gap in the contest calendar."—G6EKR/P

"Very worthwhile . . . just showing what can be done with 3 watts."—G6EPN/P

"Most enjoyable contest that gave everyone a fair chance."—G4SFY/P

"Very enjoyable and friendly."—GW6PKK/P

"Truly a contest among contests—I loved every minute of it."—G4EZZ/P

"A chance to show what can be done with QRP."—G6NOL/P

"It makes a change to be on equal terms as far as power goes."—G4SIQ/A

The many newcomers to the contest scene seemed to find the experience worthwhile, e.g.:

"Our first attempt and we all found it immensely enjoyable."—G6MTH/P

"Much was learnt."—G6PUS/P

and their presence on the band was appreciated by others:

"Nice to come across so many new callsigns."—G6EKR/P

Some were surprised at what QRP could do:

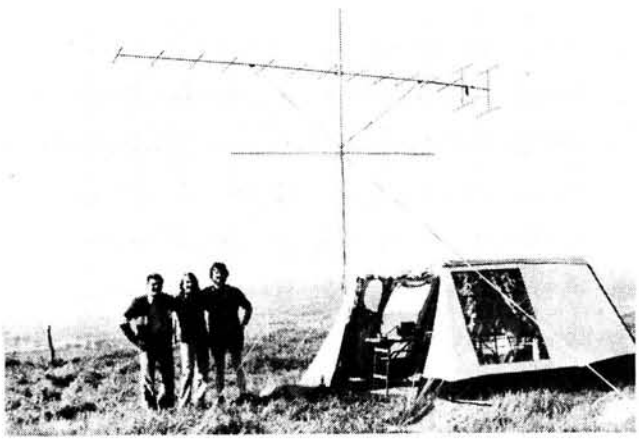
"The thrill of working that far west of Wales on 1½ watts and a quarter-wave almost equals IW0 on 100 watts!"—G6BHS/P

One regret was the general low level of activity on c.w.:

"Disappointed at the lack of CW activity—just two c.w. contacts made."—G4SDK/P

"No takers on c.w."—G3JXN

This was unfortunate as c.w. is so well suited to very low power operation.



G4PUP/P on Ditchling Beacon in Sussex—from where they gained seventh place in the results

The scoring system was something of an experiment and seems to have been generally well-received.

"Simple, easy to work out and gave the added enjoyment of QRA chasing."—G4SFY/P

"Contacts x squares scoring system kept the beams turning and not all facing east."—GW6GW/P

"Straightforward and just about right."—G4SDK/P

Others were less sure:

"Not too sure if I like the scoring system."—G6NOL/P

and some had pre-conceptions about who would benefit from it:

"Scoring system penalised stations who operate near the coast."—G6DRT/P

"QTH squares multiplier does really act strongly in favour of stations able to run portable from a good high point in central England."—G6VFR/P

although these views are clearly not borne out by the results, the first 20 places containing only two stations in ZL square and only one each in ZM, YL and YM, despite 41 per cent of stations being located in these squares.

Of course any scoring system is liable to create some geographical bias, although propagation conditions are likely to create even more. G3JXN is probably most realistic:

"Scoring system simple and, I would have thought, fair to all except those in Scotland and West Wales! Not many of them about I suppose."—G3JXN

This was one reason for awarding a certificate to the leading Scottish station, the leading English and Welsh stations receiving certificates anyway in other categories, and there being insufficient entries from GI or EI to warrant a separate award there.

Almost all entries carried a comment such as

"Here's looking forward to the next one."—G4SFY/P

"Hope it will become an annual event."—G6EKR/P

and some took it as a foregone conclusion that it would be:

"Will certainly take part next year."—G6NOL/P.

Accordingly, it is intended to repeat the event, the provisional date being 17 June 1984, 0900–1700GMT (an hour later than this year), along very similar lines, although some minor changes in the rules are likely.

In conclusion, many thanks to all who took part and submitted entries, and let's hope for an equally popular event next year.

	Name	Callsign	Score	QSOs	Squ's	Sing	QTH	Antenna[1]	a.s.l.	TX/RX
1	**Blackwood ARS**	**GW6GW/P**	**9960**	**332**	**30**	**—**	**YL**	**9Y**	**430**	**FT-290R**
2	**Neil Underwood & Martyn Wright**	**G4LDR/P**	**8845**	**305**	**29**	**—**	**YK**	**6Q**	**280**	**TS-770**
3	**Neil Brinkworth & Colin Richardson**	**G3UFB/P**	**8580**	**286**	**30**	**—**	**ZK**	**16Y**	**210**	**FT-221R**
4	Three Counties ARC	G4RRA/P	8086	311	26	—	ZL	12Z	260	FT-221R
5	Warrington RC	G6WRC/P	7704	321	24	—	ZN	2 × 16Y	460	TS-700S
6	Durham ARC	G6ROL/P	7440	240	31	—	YO	17Y	680	FT-290R
7	B. H. Philipp & others	G4PUP/P	5550	222	25	—	ZK	14Y	250	IC-251E
8	East Kent RS	G6EKR/P	5538	213	26	—	AL	19Y	40	IC-202S
9	Fylde Coast Contest Group	G4ITR/P	5292	252	21	—	YN	10P	430	TR-9000
10	Worthing & District ARC	G3WOR/P	5175	225	23	—	ZK	2 × 16Y	200	FT-290R
11	Telford & District ARS	G6NOL/P	4899	213	23	—	YM	13Y	490	FT-290R
12	David Lloyd & Roger Bullock	G6CLX/P	4693	247	19	—	YN	12Z	310	IC-211E
13	Ray Walton & others	G4RWT/P	4600	200	23	—	AL	14P	130	FT-290R
14	**Ian Burns & Simon Thornton**	**G6OOZ**	**3969**	**189**	**21**	**—**	**AL**	**17Y**	**160**	**IC-202**
15	**John Otley**	**G4CYA**	**3880**	**194**	**20**	**S**	**ZN**	**2 × 12Z**	**220**	**IC-202E**
16	A. R. Thompson & R. Daniels	G6HUN/P	3859	227	17	—	ZL	9Y	310	IC-202S
17	Tim Wander & Mike Beach	G6GUX	3820	191	20	—	ZM	16Y	—	FT-290R
18	Yellow Welly Contest Group	G6LJO/P	3640	182	20	—	YN	15Y	280	IC-251E
19	Harlow & District ARS	G6BUT/A	3586	163	22	—	AL	14Y	90	FT-225R
20	Ray Baker & others	G4SFY/P	3542	154	23	—	AM	17Y	70	FT-221R
21	South Dorset RS	G4SDS/P	3540	177	20	—	YK	9Y	180	FT-221R
22	**Dr. John Tindle**	**G3JXN**	**3420**	**190**	**18**	**S**	**ZL**	**11Y**	**80**	**FT-221R**
23	**Michael Robertson & Thomas Gemmell**	**GM6WIX/P**	**3340**	**167**	**20**	**—**	**YP**	**8Y**	**370**	**FT-290R**
24	Bug Bashers Contest Group	GW4TTU/P	3315	195	17	—	YL	13Y	550	FT-290R
25	Mark Wheeler & Clive Wankling	G6DOD	3281	193	17	—	ZL	2 × 9Y	180	FT-290R
26	Dave & Bill Contest Group	G8COI/P	3276	156	21	—	ZL	19Y	310	FT-290R
27	N. Barrington & M. A. Ray	G4PUZ/P	3268	172	19	—	ZL	16Y	270	FT-290R
28	**Ian Lamb**	**G8KQW**	**3249**	**171**	**19**	**S**	**ZL**	**20Y**	**90**	**TS-700**
29	Michael Dent & David Andrew	G6PHF/P	3197	139	23	—	YO	8Y	630	FT-290R
30	David Flanagan	GW6PKK/P	3006	167	18	S	YN	5Y	260	FT-290R
31	Robert Loftus	EI7DG/P	2904	121	24	S	WN	13Y	450	IC-202S
32	John Hackett & others	G6MTH/P	2788	164	17	—	ZM	19Y	190	FT-290R
33	Dr. Kevin Tyler	G6VFR/P	2640	165	16	S	YM	5S	480	IC-260E
34	Julian Tether	G6LOH	2628	146	18	S	ZM	17Y	170	FT-290R
35	Stephen Aram & Michael Hainge	G6SRY/P	2580	172	15	—	ZL	13Y	240	FT-290R
36	Lincolnshire Yellow Bellies	G4PYD/P	2574	143	18	—	AN	16Z	120	FT-290R
37	Douglas Valley ARS	G3BPK/A	2540	127	20	—	YN	12Y	100	TS-700G
38	Robert Tribe	GW6HEW/P	2533	149	17	S	YM	11Y	480	FT-290R
39	The 456 Group	G4SQJ/P	2502	139	18	—	ZK	13Y	210	FT-290R
40	Peter Hutchinson	G6DRT/P	2489	131	19	S	AK	8Y	210	TR-9000
41	E. W. Harvey & K. Hickey	G4TNQ/P	2430	162	15	—	ZK	19Y	220	TS-700G
42	Brighton & District RC	G4GQR/P	2420	121	20	—	ZK	9Y	250	FT-221R
43	A. P. Pevy & others	G8NID	2353	181	13	—	ZL	16Y	110	FT-707[2]
44	B. C. Kates & P. M. Crayden	G4LGK/P	2329	137	17	—	ZK	9Y	230	FT-290R
45	T. Slack & P. Thompson	G4ANW/P	2145	143	15	—	ZK	16Y	240	FT-290R
46	Ibstock ARS	G6AAA	2132	164	13	—	ZM	9Y	170	TS-770
47	Peter Martin	G4SDK/P	2032	127	16	S	YM	13Y	460	FT-290R
48	Peter Dixon	G4JBR/P	1980	110	18	S	XL	9Y	320	FT-290R
49	S. Barlow & K. Brown	G4NVF/P	1940	97	20	—	YN	2 × 9Y	20	IC-260E
50	Dukeries ARS	G3SBW/P	1938	102	19	—	ZN	8Y	100	TS-700
51	Redditch RC	G6RRC/P	1918	137	14	—	ZM	6Q	120	FT-290R
52	Ketts Contest & Amateur Club	G4TSJ	1870	110	17	—	AM	17Y	50	IC-211E
53	J. Stockton & G. Rogers	G6IKU/P	1848	132	14	—	YN	8Y	120	IC-290H
54	Barry Gardiner & Alan Bathurst	G4SXL	1846	142	13	—	ZL	16Y	90	FT-480R
55	Quentin Campbell	G4OEU/P	1840	115	16	S	YP	9Y	370	IC-202S
56	Devizes & District ARC	G6PUY/P	1824	152	12	—	ZL	?Z	300	FT-290R
57	Dave Smith & others	GM4PKJ/P	1755	117	15	—	YQ	14P	460	FT-290R
	Colin Walker	G6LXY/P	1755	117	15	S	ZK	6Q	270	FT-290R
59	Gerd Willetts	G6MAN/P	1750	125	14	S	YM	9Y	250	FT-290R
60	Barry Page & Malcolm Taylor	G6HZB/P	1738	158	11	—	YM	7Z	440	FT-290R
61	Robert Gordons College ARC	GM4RGC/P	1728	96	18	—	YQ	9Y	450	FT-290R
62	Paul Empringham & others	G6GZS/P	1691	89	19	—	ZN	4Q	160	FT-290R
63	Alan Butcher	G8ZFL/P	1664	104	16	S	YL	7Z	210	FT-290R
64	Falcon Contest Group	G4SGK/P	1620	108	15	—	ZM	7Y	230	FT-290R
65	Ripon & District ARS	G4SJM/P	1596	114	14	—	YO	17Y	590	FT-290R
	Skegness & District ARS	G4SKG/P	1596	84	19	—	AN	14Y	100	FT-290R
67	Dave Warburton & others	G6LKB/P	1575	105	15	—	YO	12Y	310	FT-290R
68	North Avon Contest Group	G6HRQ/P	1560	104	15	—	YL	9Y	200	C-58
69	Terry Dansey & Michael Gill	G6MZA/P	1529	139	11	—	ZL	9Y	270	FT-290R
70	G. T. Wood	G6GDZ/P	1521	117	13	S	ZN	16Y	370	FDK-750E
71	British Telecom Technical College ARC	G4NJR	1512	126	12	—	YM	16Y	110	FT-221R
72	John Nicholas	GW3OIN/P	1496	88	17	S	YN	5Y	420	IC-202E
73	I. E. Davies	G3IZD/P	1494	83	18	S	YO	6Q	90	FDK-750E
	Hayfever Contest Group	G6NTJ/P	1494	83	18	—	YK	13Y	260	FT-290R
75	Adrian McBride	GI6UCF/P	1440	90	16	S	XO	12Z	270	FT-290R
76	Shefford & District ARS	G3FJE/A	1428	102	14	—	ZM	17Y	90	TS-700G
	North East Radio & Communications Club	G8BGU/P	1428	102	14	—	ZO	8Y	10	FT-221R

	Name	Callsign	Score	QSOs	Squ's	Sing	QTH	Antenna[1]	a.s.l.	TX/RX
78	Tiverton (South West) RC	G4TSW/P	1408	88	16	—	YK	16Y	280	FT-290R
	B. Collins	G6VRT/P	1408	88	16	S	ZL	9Q	250	FT-290R
80	C. Knowles & C. Reevs	G6FWT/P	1376	86	16	—	AL	5Y	90	IC-202S
81	Silverthorn RC	G2HR	1375	125	11	—	AL	9Y	120	IC-202S
82	Trevor Holden & others	G4TLI/P	1360	80	17	—	YN	8Y	340	FT-290R
83	Robin Shelley & Leonard Shelley	G8VVY/P	1358	97	14	—	YL	14P	270	IC-251E
84	Colin Bracher	G4SXR/P	1344	96	14	S	YL	9Y	250	FT-290R
	David Fifield	G8INR	1344	84	16	S	AL	6Q	40	h'brew
86	Ann Stevens	G8NVI	1261	97	13	S	ZL	9Y	60	IC-201
87	Derek Andrews	G4EZZ/P	1254	114	11	S	ZL	8Y	130	FT-290R
88	Andrew Wilson & others	G6NQQ/P	1248	96	13	—	YL	10Y	310	FT-290R
89	Tony Jones & Mike Bryant	G6NSH	1230	82	15	—	AL	7Z	60	FT-290R
90	Jonathan Dew	G6USS	1209	93	13	S	ZL	5X	70	FT-290R
91	Russell Coward	G6HRI	1206	67	18	S	YN	2 × 10Y	20	FT-290R
92	Martin Peters	G4EFE	1196	92	13	S	ZL	9Y	130	FT-290R
93	John Hancock	G6ISM	1190	85	14	S	ZM	8Y	90	FT-221R
94	Tony & friends Contest Group	G8XWE/P	1188	99	12	—	YN	14P	460	FT-290R
95	David Binns	G6RSR/P	1116	93	12	S	ZL	5Y	120	FT-290R
96	Christopher Boulter & others	G8ITK/P	1092	84	13	—	ZL	9Y	150	FT-290R
	Stanford-le-Hope & District ARC	G4SLH	1092	78	14	—	AL	9Y	20	FT-290R
98	Willie Wilkie	G4SIQ/A	1080	90	12	S	ZK	5S	120	FT-290R
99	John Dawson & Tony Lee	G6SXE/P	1050	75	14	—	ZN	16Y	370	FT-290R
100	Steven Johnson & others	G6THD	1022	73	14	—	ZN	8X	20	FT-290R
101	Peter Atkins	G4DOL	1005	67	15	S	YK	2 × 9Y	40	IC-202
102	David Price	G4BIX/P	996	83	12	S	ZL	8Y	170	IC-202S
103	Gilbert Tibbetts	G4OGK/P	990	99	10	S	YM	4Q	460	SB-2X
104	John Sutton	G6TEP	976	61	16	S	AL	8Y	10	FT-290R
105	A. G. Wallis	G6PPK/P	972	54	18	S	ZO	5Y	280	FT-290R
106	Andover ARC	G8ALR/P	962	74	13	—	ZL	9Y	250	FT-290R
107	Stafford & District ARS	G4TTT/P	936	78	12	—	YM	14P	130	FT-290R
108	Adrian Sargent	G6CUP	902	82	11	S	ZL	8Y	70	FT-290R
	Mike Long & Colin Stangroom	G6TPE	902	82	11	—	ZL	9Y	40	FT-290R
110	Jeremy Sandford	G6FEX	900	60	15	S	AL	5Y	20	FT-290R
111	Tony Smith & Tom Howard	G4SHS	884	68	13	—	AL	10X	150	FDK-750E
112	A. J. Ruddell	G4BGH/P	864	72	12	S	ZL	HB9CV	190	IC-202
113	Dave & Jane Green	G4OTV	814	74	11	—	AL	8Q	110	FT-290R
114	Christopher Rudge	G6LAW/P	810	81	10	S	ZL	12Z	210	FT-290R
115	Peter Appleyard	G6VGI	793	61	13	S	ZN	14Y	160	FT-290R
116	Maidstone YMCA ARS	G8TRF	790	79	10	—	AL	8Y	80	TR-9130
117	Robin Hooper	G6MFK	774	86	9	S	ZL	5S	30	FT-290R
118	Ainsdale ARC	G4SMT/P	765	85	9	—	YN	16Y	140	FT-290R
119	Kevin Cowdell & others	G8BDZ/P	754	58	13	—	YL	16Z	120	TR-9000
120	Kevin Brent & Martin Ellis	G6ICI	732	61	12	—	ZN	17Y	120	FT-290R
121	D. B. Cater	G6SZT	720	60	12	S	AL	6Q	30	FT-290R
122	Spen Valley ARC	G3SVC/P	710	71	10	—	ZN	?Z	130	FT-290R
123	B. E. Bush & G. Lawrence	G6EBW/P	702	78	9	—	YK	12Z	190	FT-290R
124	T. R. Threlfall & others	GW4TGT/P	689	53	13	—	XL	10Y	370	FT-290R
125	University of Birmingham ARS	G3IUB	670	67	10	—	ZM	10Y	130	FT-221R
126	E. J. T. Pearce	G6GNG	650	65	10	S	YL	9Y	110	FT-290R
127	Peeblesshire Contest Group	GM6JFP/P	630	42	15	—	YP	2 × 9Y	710	FT-290R
128	Mike Sharp	G6TWT/P	612	68	9	—	ZN	5Y	400	TR-9000
129	Mark Holloway	G6PUS/P	611	47	13	S	ZK	9Y	10	FT-290R
130	Fareham & District ARC	G4ITG/P	600	60	10	—	ZK	13Y	110	FT-726
131	Godfrey Manning	G4GLM	568	71	8	S	ZL	8S	70	FT-290R
	Tim Kirby & Jon Watson	G6BHS/P	568	71	8	—	YL	5Y	240	FT-290R
133	Tom & Paul Lawless	GM6JOD/P	550	50	11	—	XP	6Q	310	FT-290R
134	Robin Williams	G6POG/P	496	62	8	S	ZM	9Y	190	FT-290R
135	B. Evans & F. Bell	G8XXQ/P	494	38	13	—	YO	8Y	150	FT-290R
	Frank Laanen (check log)	PE1EWR/P	468	39	12	S	BL	10P		
136	Roland Jeffery	G6DSA	441	49	9	S	YN	8Y	50	FT-225RD
137	John Beech	G8SEQ	423	47	9	S	ZM	13Y	110	IC-202E
138	John Graham	G6HFW	420	42	10	S	YN	10X	230	FT-290R
139	P. Baxter	G6IAZ	418	38	11	S	ZN	8Y	90	FT-290R
140	Graham Sangster & Brian Meldrum	GM4OBD/P	400	40	10	—	YR	10Y	180	FT-290R
141	P. A. Knight	G6EPN/P	360	40	9	S	XK	12Z	220	FT-290R
142	Allan Parry	G4SZI	343	49	7	S	ZL	12Z	100	FT-290R
143	H. B. Warehand	G6DVO	336	48	7	S	ZL	5X	70	FT-290R
144	Colin Baker	G4KFJ	328	41	8	S	YN	7Y	200	FT-290R
145	Raymond Knighton	G6HYZ	310	31	10	S	YN	9X	0	FT-290R
146	Malcolm Reynolds	G6NLZ	308	28	11	S	AK	2 × 16Y	10	FT-290R
147	Bryan Faulkner	G6PSH	301	43	7	S	ZM	7Y	60	FT-290R
148	Edward Cawkwell	G8VEL	288	32	9	S	ZL	5Z	130	FT-221R
149	Tim Healey	G6HTI	272	34	8	S	YK	9Y	110	C-58
150	Jonathon Askey	G6SWJ	258	43	6	S	ZL	9Y	40	FT-290R
151	Trevor Froggatt	G6MKS/P	232	29	8	S	AL	5Y	60	Liner 2
152	David Ackrill	G6VMQ	216	36	6	S	ZM	2Y	160	FT-290R

	Name	Callsign	Score	QSOs	Squ's	Sing	QTH	Antenna[1]	a.s.l.	TX/RX
153	Bruce Thomas	G4RRY	184	23	8	S	ZN	12Z	30	IC-202S
154	J. A. Barlow	GW6PQT	175	25	7	S	YN	8Y	?	FT-290R
155	G. Hands	G6WKK/ P	160	32	5	S	ZM	8Y	190	FDK-700E
156	Frank Heritage	G6OLK/A	115	23	5	S	ZK	12Z	80	IC-290E
157	John Wainwright	GW6PBW/A	104	13	8	S	XN	5Y	10	FT-290R
158	Tom Harrison	GM3NHQ/P	96	12	8	S	XQ	5Y	1000	IC-202S
159	Graeme Caselton	G6CSY	80	16	5	S	AL	halo	80	TS-130[2]
160	Mike Jones	G6RZZ	12	6	2	S	YL	S. Jim	30	FT-480R

The stations marked in **bold** type are certificate winners.

[1]Antennas

16Y—16-element Yagi
14P—14-element Parabeam
6Q—6-element quad
5S—5 over 5 slot-fed Yagi
12Z—12-element ZL Special
10X—10-element XY

[2]These stations used an h.f. rig in conjunction with a transverter

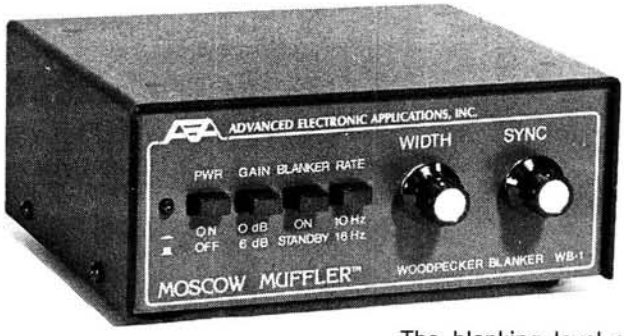
FOR YOUR DIARY

PW QRP CONTEST 17 JUNE 1984 0900—1700GMT

AIR TEST

USER REPORTS ON SETS AND SUNDRIES

AEA WB-1C "Moscow Muffler" Woodpecker Blanker



The AEA WB-1C is designed to be inserted into the 50Ω coaxial feeder between antenna and rig. It generates a steady stream of blanking pulses which control a gate in the antenna feed-line, isolating receiver from antenna when the pulse is present.

Two variable controls allow the width of the pulses to be adjusted (from around 280µs to 25ms on the review model), and the pulsetrain to be synchronised with the received interference. There is also a push-button switch which selects 10Hz or 16Hz pulse rates, though the 10Hz is far more common at present.

A nominal 6dB pre-amplifier is incorporated into the WB-1C. This can be switched in or out as desired. On the review model, it provided around 4·5dB gain at 5MHz, 6dB at 16MHz and 9dB at 30MHz so that the response was flat within ±2dB from about 2·5–30MHz with the pre-amp in. Below about 2·3MHz the response of the WB-1C (with or without the pre-amp in operation) drops like a stone, so don't forget to switch the power OFF when listening to medium-wave broadcasts or Top Band.

The blanking level specified in the instruction manual is 45–50dB. On the test-bench, measured isolation ranged from 50dB at 10MHz to 40dB at 30MHz.

Very little information about the circuitry is revealed in the manual. A peek inside the unit reveals a very neat and tidy layout with a p.c.b. carrying 10 i.c.s, including a lot of low-power Schottky, 7 transistors and a 4MHz crystal which is obviously used to "clock" the pulse generator.

Power requirements for the unit are a normal 12V d.c. at 575mA, according to the data sheet, though I couldn't persuade ours to draw more than 200mA.

An r.f.-operated antenna transfer relay is built in, which allows automatic operation with transceivers of up to 150W output power. A rear panel control allows the "hang" time at the end of a transmission to be adjusted.

In Use

Operating the Moscow Muffler takes some practice to get the best results. The method recommended is to switch on with the pulse-width set over-long, adjust the SYNC until the Woodpecker signal is reduced, as indicated by a lower "S" meter reading on the receiver, finally reducing the pulse-width for minimum interference level.

I found that there was no point at which the interference could be made to "disappear". Looking at the receiver audio output on an oscilloscope, the best that could be achieved was that the Woodpecker pulse could be reduced to two brief spikes, one at the beginning and one at the end, which could then be further reduced by using the receiver's conventional noise blanker and/or adjustment of *a.g.c.* time constant, as the instructions recommend. The unit can certainly cut down the total pulse energy reaching the receiver, turning an unusable channel into a usable one, but the clicks are still there.

Because the Moscow Muffler depends on a constant-rate, internally clocked pulse train, it cannot really cope with Woodpecker echoes or with multiple Woodpeckers, unless the two sets of pulses are very close together, so that they can be covered with a single blanking pulse. If the blanking pulses are set too wide, they will tend to chop-up received signals, and can render Morse unreadable.

The WB-1C Moscow Muffler is available from **ICS Electronics Limited, P.O. Box 2, Arundel, West Sussex BN18 ONX, telephone 024 365 590**, price £119.00 including carriage, insurance and VAT, or from appointed dealers. Our thanks to ICS Electronics for the loan of the review model.

Geoff Arnold

AIR TEST

USER REPORTS ON SETS AND SUNDRIES

GEMSCAN 70 Programmable VHF/UHF Scanning Receiver

A scanner can prove to be a very useful piece of equipment for both the s.w.l. and licensed amateur alike. The main requirements for a good scanner are a wide enough frequency range, sensitive receiver and sufficient functions to make listening around the bands easy.

The Gemscan 70 was on review for several months and in that time fulfilled each of the above three requirements satisfactorily.

The frequency range although classified as 7-bands can more easily be described as 4 separate frequency segments: 60–89MHz, 108–138MHz, 140–179MHz and 380–519MHz. For the radio amateur and s.w.l. this is very useful as it covers the 70MHz (4m) band, the 144MHz (2m) band and the 432MHz (70cm) band. Within the scanner's range there is coverage of various land mobile allocations including aeronautical and marine mobile frequencies.

The sensitivity of the receiver was more than adequate on both its own telescopic whip or the external antennas that were connected. The scanner comes with a spare antenna connector which enables the user to connect an antenna tuned for the band of their particular interest. This was very useful especially on 432MHz reception as most of the signals received from local repeaters were too weak for good reception on the telescopic whip. When a 432MHz band colinear was connected the signals greatly improved. The internal speaker audio was very good and there was never any need to connect an external speaker, even under mobile conditions. The audio output was approximately 2 watts r.m.s.

The scanner was quite easy to install in a mobile and the normal car radio antenna was used for reception with fair results. The battery back-up does retain all the memories when the supply is removed, so that moving the set from the base station to mobile doesn't require all the memories to be re-set. However, this does not apply to the clock setting, the time is not held by the back-up batteries and needs to be re-set each time the supply is removed. One useful function with the time display is that the scanner need not be switched on to display the time.

The functions of the Gemscan 70 are really too numerous to mention each one individually, so the ones described are those I found most useful during the review period.

The "scan speed" is just about right—5 or 10 channels per second—selectable by the SPEED button. Once the scanner finds a signal it stops on that channel until the carrier drops and then it resumes the scan. You can delay the restart of the scan on as many of the 70 programmed channels as you wish. This becomes a useful function whilst listening to the various calling channels.

There is a "lock-out" function also available on as many of the channels as required. I think this is one of the most useful functions as often one channel becomes busy and the scanner would stop on that channel until the QSO finished. Another "lock-out" facility is that complete blocks of channels can be locked-out i.e., channels 21–30 inclusive, 31–40 inclusive, 41–50 etc. This was most useful when one band of frequencies (144MHz) was programmed between channels 21 and 40 for example, then this group of channels can be missed during the scan cycle.

The clock is 24 hour and very easy to program, you enter the time using the numerical keyboard e.g., 143030 and as the E centre button is pressed the clock starts counting.

One function mentioned in the handbook, which I didn't try, was the facility to connect a tape recorder to the scanner. The scanner then supplies the tape recorder with approximately 500mA to switch the recorder on when a signal is received on channel 1.

There are many more functions that the scanner is capable of performing, and each operator will no doubt find these most useful to themselves.

The Gemscan 70 measured 270 × 90 × 230mm and weighed about 3kg. The numerical display is easy to read even in fairly bright sunlight, and has large red l.e.d. numerals. The power for the scanner can be either mains 240V a.c. or a 13·8V d.c. supply for both home and mobile operation.

The Gemscan 70 is available from **Gemini Communications, 102 Derby Street, Bolton. Telephone 0204-392226** priced £258. I would like to thank them for their help and the review model.

Elaine Howard G4LFM

PLEASE MENTION PRACTICAL WIRELESS WHEN REPLYING TO ADVERTISERS

ANTENNAS

PART 10

F.C. JUDD G2BCX

For practical purposes the most common performance measurements concerned with antennas are "gain" (or rather gain achieved by directivity), radiation patterns, polarisation, resonance and impedance. Although voltage standing wave ratio (v.s.w.r.) is associated with antennas it is normally the product of incorrect impedance matching between the antenna and its power source. In any case measurement of v.s.w.r. is a simple one, as are also impedance and resonance, for which suitable instruments are readily available. Polarisation may normally be assumed from the geometry of the radiating element(s)—unless special methods are employed to change it for specific purposes. However, the measurement of both gain and radiation pattern requires the availability of a suitable test site or what is often called an *antenna test range,* as well as accurate measuring instruments.

Although the measurement of gain and radiation patterns, etc., of antennas intended for the h.f. bands is not totally impossible, the problems involved put such measurements beyond the capabilities and/or resources available to the average radio amateur. What follows therefore, applies to v.h.f. and u.h.f. antennas intended for operation at frequencies from 70MHz and upward. *It must be emphasised that the gain of an antenna and determination of its radiation pattern are the most difficult measurements to make and can be seriously in error unless proper procedures are adopted and the test site is as ideal as possible for the purpose.*

Environment of an Antenna Test Range

Because antennas have a reciprocal performance, gain and radiation patterns can be determined by using the antenna under test in either the transmit or receive mode.

It is more usual however, to use the receive mode for measurement with the r.f. signal source and its transmitting antenna located at a remote position, "illuminating" the test site position with r.f. in a constant but controlled manner.

Ideally of course, antenna measurements should be carried out in "free-space" i.e., without the influence of the earth and conducting objects in the vicinity of the test site—not very practicable of course. However, the main requirement is that the plane wave from the signal source antenna must fully and uniformly illuminate the effective aperture, or capture area of the antenna under test.

Since a radiation field expands as the distance from the source increases it would seem feasible to locate the source antenna as far as possible from the test site. On the other hand certain practical aspects must be considered and the most important, for the sake of convenience and easy access, is to have the signal source antenna and the antenna under test as near to each other as possible and not too high above the ground. Under these circumstances reasonable uniformity of phase and amplitude in the plane wave can still be obtained despite the reflection from ground of signals from the signal source.

The Test Range Site

The terrain should be flat, clear of obstructions that are conductive and have a uniform surface e.g., all grass, or all hard surface. For both gain measurements and plotting radiation patterns the minimum length of the range is determined by uniform illumination of the aperture area of the antenna under test.

The source antenna is generally a beam type with a gain not greater than that of the antenna being tested. It is the ground itself that presents the biggest problem because some of the radiation from the signal source antenna is reflected from ground to the antenna under test, whilst some will arrive by the direct path—antenna to antenna. This is illustrated in Fig. 10.1 and means that radiation from the signal source antenna could arrive at the antenna under test either completely, or partially, in or out of phase.

It is therefore necessary to set the height of the source antenna so as to obtain the *maximums* of the radiation amplitude at the test site as illustrated in Fig. 10.2. The antenna under test may then be situated in one of the regions of maximum field intensity e.g. within the first or second maximum at H1 or H2. Although this method is convenient it has the limitation that the height of both the source antenna and the antenna under test (and the distance between them), must be adjusted for different frequencies. Incidentally, other possible causes of a non-uniform field at the test location are an improperly directed source transmitting antenna or one from which the beamwidth is too narrow.

The next stage is to find that portion of the maximum chosen, preferably the first, where the signal amplitude does not vary by more than 1dB over the dimension (D) of the aperture of the antenna to be tested. This can be done by using a dipole or better, a simple low gain beam to probe the region *vertically.* This can be facilitated by using a vertical support mast of wood equipped with a means of raising or lowering the probe antenna which is connected to a detector/meter capable of registering deviations in amplitude of less than 1dB. The same mast could of course be used for supporting the antenna to be tested.

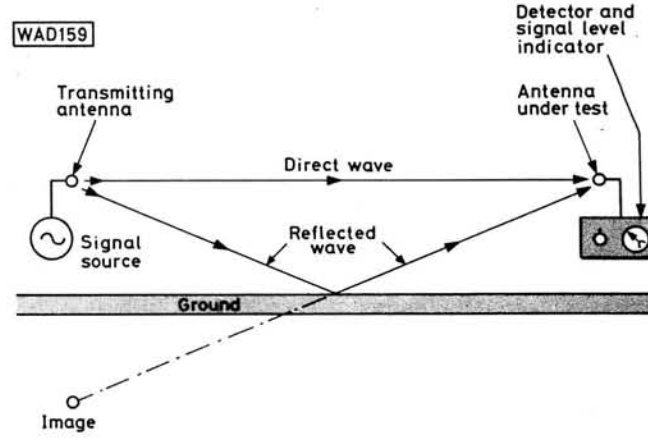


Fig. 10.1: Direct wave versus ground reflected wave from the signal source antenna to the antenna under test

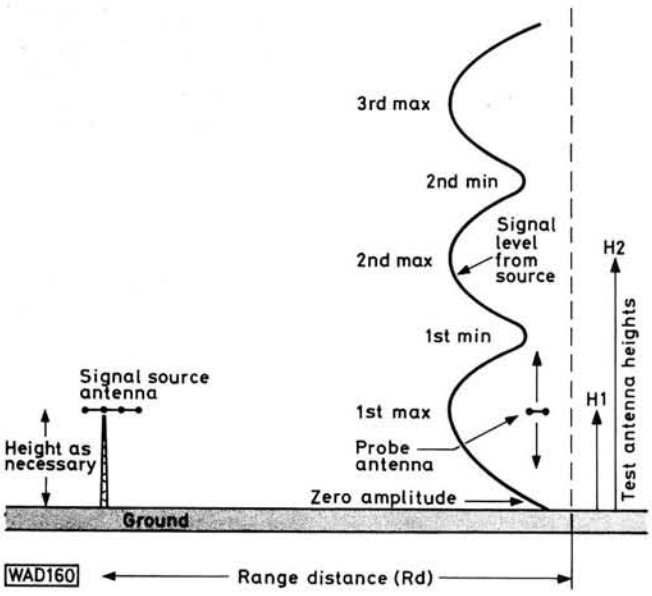


Fig. 10.2: Profile of the signal level at the test site from the signal source

A sample plot of a measured vertical amplitude profile for a first maximum is shown in Fig. 10.3. The aperture dimension (D) is within the 1dB limit and in compliance with the usually accepted phase difference of approximately 22 degrees at the extremes of this dimension. The antenna under test would normally be located at the point marked (P) and at a height on axis with this point.

Effective Aperture

The minimum range distance (Rd) is based on $2\frac{D^2}{\lambda}$, in which "D" is the *greatest aperture dimension of the antenna under test* and λ is the free space wavelength in the same units as "D", for example in metres. The effective aperture, or capture area (Ae) of an antenna is derived from:

Gpi $\frac{\lambda^2}{4\pi}$ with Gpi being *the power gain over an isotropic radiator* and λ the operational wavelength in metres.

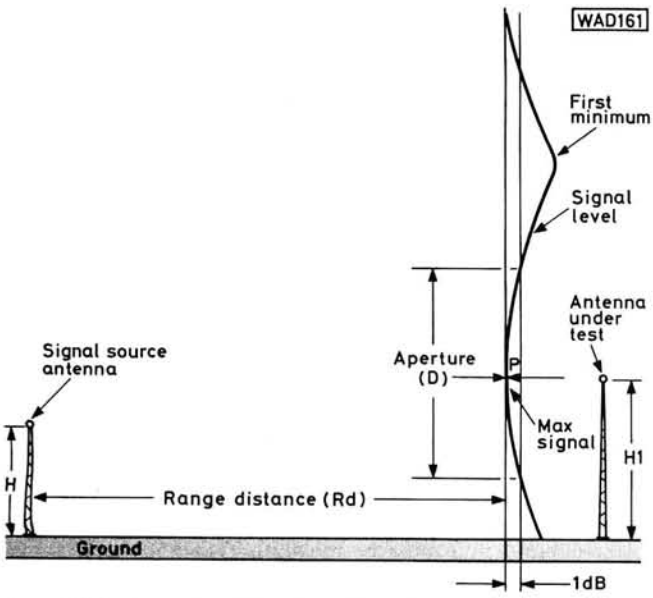


Fig. 10.3: A plot of the signal level over the first maximum and showing the ultimate position (P) of the antenna under test

With a 144MHz (2m) antenna having a gain of 12dBd, its gain over an isotropic radiator would be 12 + 2·15 = 14·15dBi which is a *power gain over an isotropic* of approximately 26. Its effective aperture *area* is $26 \times \frac{2^2}{4\pi} = 26 \times \frac{4}{12{\cdot}56} = 8{\cdot}2$ square metres, or an area 2·863 × 2·863 metres. The required aperture dimension "D" as in Fig. 10.3 is 2·863 metres.

For a 432MHz band (0·7m) antenna having a gain of say 15dBd, gain over an isotropic would be 17·15dBi which is a power gain of 52 (iso). This gives an effective aperture area of:

$52 \times \frac{0{\cdot}7^2}{12{\cdot}56} = \frac{25{\cdot}48}{12{\cdot}56} = 2{\cdot}02$ square metres and a dimension (D) of 1·42 metres.

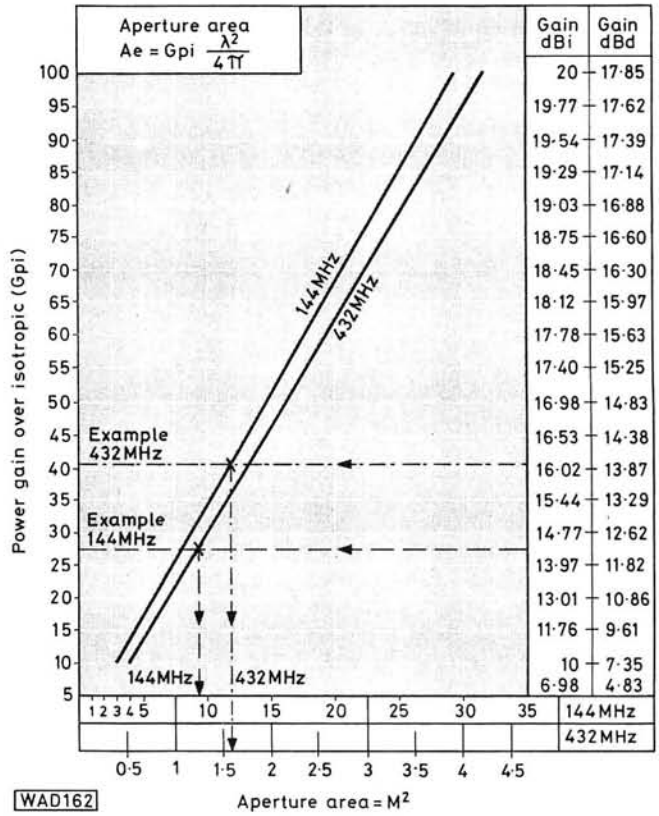


Fig. 10.4: The aperture areas for 144MHz and 432MHz antennas with the gain factors in dBd or dBi (right hand columns) and relative power gain over isotropic in the left hand (Y) column. Examples are shown with dotted lines

The graph Fig. 10.4 gives effective square aperture areas for single 432MHz and 144MHz antennas with gain factors ranging from nearly 5 to 18dBd and covering a power gain over isotropic range from 5 to 100. Note that the "X" scales at the bottom of the graph are, upper for 144MHz and lower for 432MHz. The examples indicate the wide difference in effective apertures for the two bands.

Antenna systems made up of stacked or bayed arrays have much larger effective aperture areas. For a pair of stacked Yagi antennas having a total gain of approximately 22dB the effective aperture area is just over $20\lambda^2$. Operational on 144MHz the smallest dimension would be 8·3 metres and the largest, 15·1 metres, would be used as D^2 in calculating the range distance. The graph Fig. 10.4 does not cover antennas with a gain of 3dBd but for the sake of completeness the effective aperture for a 144MHz beam with this gain is approximately:

$3{\cdot}25 \times \frac{4}{12{\cdot}56} = 1{\cdot}03$ square metres. For a 70MHz band (4m) antenna with a gain of 3dBd the effective aperture area would be:

$3{\cdot}25 \times \frac{16}{12{\cdot}56} = 4{\cdot}1$ sq. metres. (3·25 = Gpi)

With an antenna for 1296MHz (0·23 m) and a power gain over an isotropic of 100 (normal gain over isotropic 20dBi) the effective aperture area would be $100 \times \frac{0{\cdot}23^2}{12{\cdot}56} = 0{\cdot}42$ square metres — a further example of the reduction in aperture area with increasing frequency despite the relatively high gain.

For any given power gain the effective aperture is proportional to the square of the wavelength. For example, an antenna with a gain of approximately 14dBd operating at 432MHz has an effective aperture some eight times smaller than an antenna for 144MHz with the same gain. An antenna for 70MHz has an effective aperture area approximately four times the size of its 144MHz counterpart i.e., one having the same quoted gain.

At 1296MHz the effective aperture area is about 75 times smaller than that of an antenna for 144MHz having the same gain. This means that as the wavelength is reduced (frequency increased) it becomes important to design the antenna so as to have a higher gain factor to compensate for this smaller effective aperture. This is particularly important in the receiving mode.

Range Distance (Rd)

As already explained, the height of the signal source antenna is determined by an amplitude deviation of not more than 1dB over a signal maximum at the test site as illustrated in Fig. 10.3. The minimum range distance that can be used for antennas having a square aperture is:

$$Rd_{min} = 2 \times \frac{\text{Aperture area in square metres}}{\lambda \text{ metres}}, \text{ or } 2\,\frac{D^2}{\lambda}$$

where D is the largest aperture dimension (see Fig. 10.5).

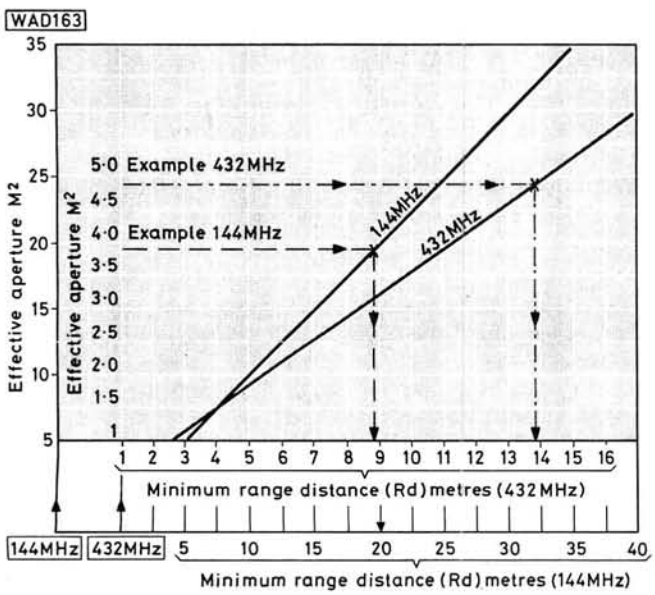


Fig. 10.5: The graph shows the minimum range requirement (Rd_{min}) for various effective apertures for both 144MHz and 432MHz antennas

For a 144MHz band antenna with an aperture area of 20 square metres the minimum range distance (Rd) would be $2 \times \frac{20}{2} = 20$ metres and for a 432MHz antenna with an aperture area of three square metres, the minimum range distance would be $2 \times \frac{3}{0{\cdot}7} = 8{\cdot}57$ metres. It will be realised that considerable flexibility over the distance between the signal source antenna and the antenna under test and also their respective heights will be needed which is why masts on platforms that can be run along rail tracks to increase or decrease range distance are commonly employed. In addition the masts used are made of wood and are telescopic so that they can be raised or lowered.

There is also a wavelength to range distance relationship. For example, the range distance for 70MHz antennas will be approximately twice that required for 144MHz, but about one third of the distance needed for 144MHz will suffice for 432MHz tests.

General Procedure

The measured vertical signal profile amplitude (1st or 2nd maximum) against height should be plotted and from this it can be determined whether the effective aperture dimension D can be accommodated as in Fig. 10.3. If the variation exceeds 1dB the source antenna should be lowered and the antenna under test raised in height. The same procedure applies for horizontally or vertically polarised antennas.

Although very little variation in amplitude of the transmitted signal profile will be obtained with horizontally polarised antennas, those antennas which are long and thin, such as vertically stacked colinears normally intended for vertically polarised omni-directional operation, should be tested in the horizontal mode i.e., with the long dimension parallel to ground.

Gain Measurement

Having established the antenna range distance the measurement of gain is usually accomplished by direct comparison with a *standard gain antenna* i.e., one with a very accurately known gain factor usually to within ±0·25dB of its real gain.

A "Standard Gain Antenna" is one for which the absolute gain relative to an isotropic radiator is known. Such antennas are difficult to construct and calibrate to the accuracy required. A design is given in the *ARRL Antenna Handbook 13th Edition* but may be found in other later editions.

First the signal level obtained with the antenna to be tested is noted and then replaced with the standard or reference antenna at the exact location of the antenna under test. The difference in signal level between the two is added or subtracted to obtain the absolute gain factor which will be the *gain relative to an isotropic radiator.* This method is superior to and more accurate than using a dipole as the reference antenna. Naturally all antennas i.e., that for the signal source, the reference antenna, and the antenna under test must be carefully matched to their respective feed cables. The feed cable used for the reference antenna must be the same type and of the same length as that used for the antenna under test.

continued on page 60▶▶▶

Mods

No.26 Roger Hall G4TNT (Sam)

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

Now that I have eventually cleared my file of mods for the Yaesu FT-290R, I hope to be able to publish a few of the ones that have been sitting in my desk for more months than I care to remember. This first one is a good example of a mod that I have been trying to publish for almost a year. It was sent in by Panos G6JEU, but until now there has not been room to print it. His letter contained very comprehensive instructions for fitting a relative signal strength meter to the **Icom IC-2E**. Very few handhelds have an "S" meter fitted as standard and this is a pity. Knowing the strength of an incoming signal can be very useful. It makes life a lot easier when checking the input of a repeater to see if a contact can be worked simplex. I have also been confused at times because I have not known if a repeater is transmitting or not. This may sound silly but I have often had to back off the squelch on my handheld because the repeater has been transmitting a blank carrier and I have not known whether the squelch has been open or not. A handheld with an "S" meter can also be used for direction finding, especially when used with a small beam such as an HB9CV.

The circuit that Panos has designed is shown in Fig. 1. IC10 contains eleven operational amplifiers. Ten are wired as a parallel comparator analogue to digital converter and the other is a buffer amplifier with a high input impedance.

Pin 5 of IC1 (MP 5701) inside the IC-2E provides a convenient tap from the second i.f. and this 455kHz signal is detected by C1, C2, D1 and D2. The resultant d.c. voltage is then fed to pin 5 of IC10. This drives the high-impedance amplifier which in turn drives the a-d converter. Full scale deflection is set by the voltage appearing on pin 6 of IC10. This is derived by dividing an available reference voltage on pin 7 using R2 and R3 and then feeding it to pin 6. This voltage should be about 120mV; it

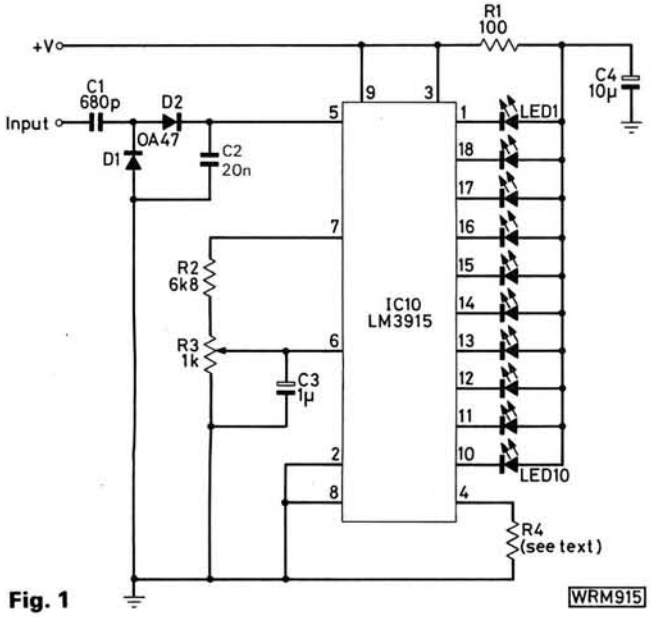
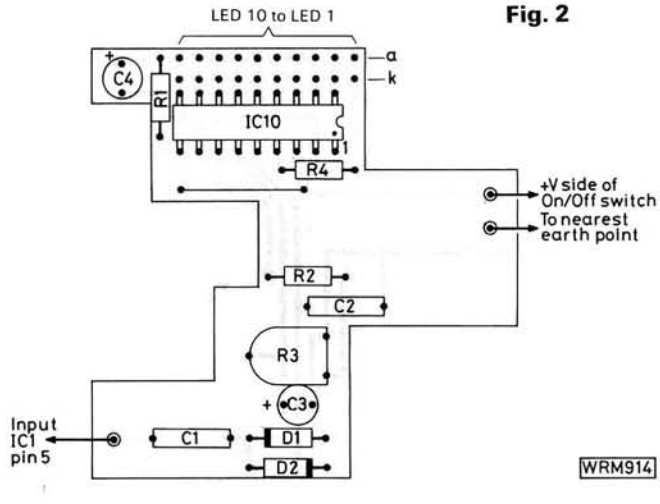


Fig. 1



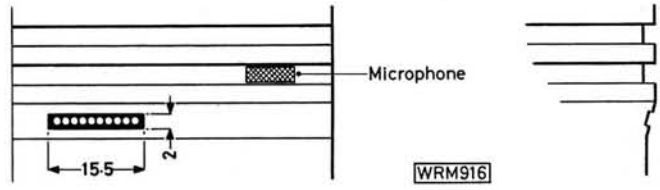


Fig. 3

★components

IC10	LM3915
D1,2	OA47 (x2)
R1	100Ω
R2	6·8kΩ
R3	1kΩ
R4	1kΩ (see text)
C1	680pF (polystyrene)
C2	20nF (ceramic)
C3	1µF (Tantalum Bead)
C4	10µF (Tantalum Bead)

The l.e.d.s numbers 1–6 should be green and the others red. All resistors are $\frac{1}{4}$W.

can be adjusted with R3 which acts as a calibration preset. In some cases it may be necessary to insert R4 to desensitise the meter at the bottom end of its range, but a wire link should be all that is needed. Components R2 and C4 serve to filter out the switching noise from the IC-2E's power supply.

The total current drawn by this circuit should be less than 20mA when all of the l.e.d.s are lit. The quiescent current is about 3mA, a negligible drain on the batteries.

Mods

The printed circuit board layout is shown in Fig. 2 and if the board is no more than 0·6mm thick, it should fit inside the case without difficulty, although it may still be necessary to file the edges of the board. The l.e.d.s are soldered to the print side of the board and all of the other components go on the other side. All components should have their legs cut very short and be mounted as close as possible to the board. All links should be sleeved.

If the board layout is adhered to, the l.e.d.s will show through the cut-out shown in Fig. 3. A small piece of clear plastics can be glued over the hole to prevent dust entering.

Calibration can be carried out by adjusting R3 while comparing the reading with the "S" meter on another receiver.

One big drawback with this circuit is that the meter reads from right to left. The only way to overcome this is to re-route the tracks that lead to the l.e.d.s but this is quite tricky and should only be undertaken by those who have had plenty of experience at making p.c.b.s.

Thank you Panos for sending in a very useful circuit.

Pass it on...

If you have a mod that you would like to pass on or if you have a request for a mod that you would like to carry out, please write to me at this address: R. S. Hall, Practical Wireless, Room 204B, Hatfield House, Stamford Street, London SE1 9LS.

ANTENNAS—10

▶▶▶*continued from page 58*

Measuring Instruments

It goes without saying that the receiver/detector unit and its read-out system (analogue or digital) must be capable of registering at least the equivalent of ±0·5dB.

For example the author uses a linear detector coupled via a calibrated attenuator to a d.c. amplifier which, in turn, drives a large scale linear reading dB meter with calibration to 0·5dB per division. Total dynamic range available is 50dB. The alternative is the use of a linear detector driving a meter with a linearly calibrated scale of say 1 to 100, used with a (dB) calibrated step attenuator having an input/output impedance equal to the antenna feed cable and the detector unit input.

References

AntennasTheory and Design Vol. 2 H. Paul Williams — published by Sir Isaac Pitman and Sons Ltd.
Antennas Professor J. D. Kraus. McGraw Hill Book Co. Inc. (USA)
Beam Antenna Handbook W. I. Orr. Radio Publications Inc. (USA)
Power Gain from Transmitting Aerials F. C. Judd. *Practical Wireless*, Aug. 1980.

Part 11 of this series will deal further with antenna gain measurement and plotting of radiation patterns. It will illustrate the method of obtaining a reasonably accurate gain figure from a radiation pattern read-out.

Kindly Note

PW "Marchwood" June–July 1983
Several readers have complained to us about our use of RS Components Ltd. parts in this project.

We specify parts from a particular source for our projects only where some feature of the electrical specification or the mechanical details is critical. In the case of the PW "Marchwood" these are:

1. Reservoir capacitors C2, C3. These must be computer grade with a ripple rating of at least 23A if the supply is to operate reliably and safely at full load. No doubt suitable components are available from other sources; we quote the RS catalogue number for the convenience of readers.

2. Overvoltage Trip IC2. This is a Motorola device type MC3423. In our experience, Motorola semiconductors are not widely available on the hobbyist market—again we quote the RS number for convenience.

3. Fan. The physical size and shape must fit the case, which forms a vital part of the specially designed ventilation system.

4. Relay RLA/1. The release-time specification is critical for this component if it is to provide the designed protection to the supply. The RS part quoted has a guaranteed release time of 10 milliseconds maximum, in other words, within half of one a.c. mains cycle.

5. Thermal Switches S4 and TS1. Both these components must have the correct specification to provide the designed protection. S4 is an s.p.s.t. bi-metallic switch opening at 70°C ± 3°C and closing at 55°C ± 4°C. TS1 is a solid-state thermal sensor which changes its resistance from 100kΩ to 100Ω (approx) over a 10°C range at around 75°C.

We do not know of an alternative source of similar devices trading in the hobbyist market.

Hobbyists can obtain retail access to RS Components Ltd (who deal only with the trade) via radio/TV shops having accounts with RS Components, or via companies such as C. Bowes Electronics Ltd who regularly advertise in *PW* their readiness to supply parts from RS.

Structured Morse Learning Course—August 1983
In the simple output port and morse practice oscillator shown in Fig. 1, IC4 pin 8 should be connected to +5V and IC1b pin 9 should be connected to pins 10 and 12. (IC1 pin 11 is not connected.)

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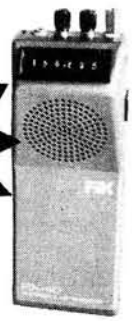

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TS930S	160–10m trans./gen. cov. receiver	1,216.00	5.00
AT930	Aut. ATU 80–10m ham bands	141.75	2.50
TS430S	HF trans. 160–10m/gen. cov. receiver	736.00	5.00
PS430	Mains PSU. built-in cooling fan	112.75	5.00
SP430	Matching speaker for TS430S	29.50	1.50
MB430	Mobile Mount bracket for TS430S	11.25	1.50
FM430	FM option unit for TS430S	34.50	1.00
TS830S	160–10m trans. with new bands	697.75	5.00
VF0230	VFO with mem and digital readout	243.75	5.00
AT230	All band ATU & power meter.	135.75	5.00
SP230	Ex. speaker with switched filters	41.25	2.00
YK88C	500Hz CW filter for TS430S	31.75	0.75
YK88CN	270Hz CW filter for TS430S	37.25	0.75
YG445CN	250Hz CW filter SPECIAL PRICE!	39.00	0.75
TS530S	160–10m trans. with new bands	575.00	5.00
AT130	100w aerial tuner – new bands	93.00	1.75
TL922	160–10m 2kw linear. 3–500Z tubes inc	724.50	5.00
MC50	Deluxe dual impedance desk mic.	30.75	1.75
MC60A	Deluxe desk mic. with built in pre-amp	55.25	2.00
MC35S	Fist mic. 50K impedance	14.75	1.25
MC30S	Fist mic. 500ohm impedance	14.75	1.25
MC40S	Up/down mic. for TR900/7800 etc.	14.75	1.25
MC42S	Up/down hand mic. for TS930S	15.25	1.25
LF30A	HF low pass filter, 1kw rating	21.25	1.25
TS780	2m/70cm all mode transceiver	843.00	5.00
TR9130	2m multi mode mobile/fixed station	433.50	2.50
TR7800	2m FM syn. mobile/fixed station 25w	257.50	2.50
TR7930	2m FM trans. with large LCD display	305.25	2.50
TR2300	2m FM syn. portable trans.	152.00	2.50
VB2300	10w amplifier for TR2300	65.75	1.50
TR2500	2m FM syn. handheld	232.50	2.50
VB2530	30w amplifier for TR2300	69.75	2.00
SMC25	Speaker/microphone	16.00	1.00
TR3500	70cm handheld trans. to match 2500	250.75	2.50
TR9500	70cm syn. mulitmode mobile fixed.	389.00	5.00
R600	Syn. Gen. Cov. receiver 150kHz–30mHz	257.50	5.00
R1000	Syn. 200kHz–30mHz receiver	269.00	5.00
R2000	Gen. Cov. Receiver	398.75	5.00
VC10	VHF unit for R2000. 118mHz–174mH	113.00	1.50
HC10	Digital station world time clock	67.50	1.50
YAESU			
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FT980	New Gen. Cov. HF transc.	1,150.00	5.00
SP980	Matching speaker	54.80	2.00
FC902	9 band atu SWR/PWR meter.	135.00	5.00
SP901	External speaker for 901 and 101	31.00	2.00
FT101ZDFM	9 band HF transc. SSB-CW-FM	665.00	5.00
FAN	Cooling fan for above	14.20	1.50
FT102	9 band HF transceiver	685.00	5.00
FC102	9 band matching atu	200.00	5.00
SP102	External speaker plus AF filtering	49.05	2.00
FM/AM	Unit for above	46.00	1.00
FT77	SSB/CW 8 band 100w transceiver	459.00	5.00
FM Unit		25.30	1.00
FP700	PSU for FT77	110.00	5.00
FC700	ATU for FT77	99.00	2.00
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FT290R	2m multimode portable 2½ watts	249.00	2.50
FT790R	70cm multimode portable	299.00	2.50
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NC11C	230v AC charger for 290/790	9.20	1.00
CSC1A	Soft carrying case for 290/790	3.85	0.75
MMB11	Mobile mount for 290/790	24.90	1.75
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FT208	2m FM synthesised handheld 1 watt	229.00	2.00
FT708	70cm FM synthesised handheld 2½ watts	209.00	2.00
NC9C	slow charger	8.05	1.00
PA3	Battery eliminator/charger 12v DC	14.20	0.75
FT230R	2m 25 watt FM mobile transceiver	239.00	2.50
FT730R	70cms 10 watt FM mobile transciever	299.00	2.50
FT726R	3 band all mode base station	675.00	5.00
430T726	70cms module	230.00	2.50
50T726	6 metre module	170.00	2.50
SAT726	Full duplex cross band unit	90.00	2.00
FRG7700	0.2–30mHz gen. cov. rec. digital display	335.00	5.00
FRG7700M	As above but fitted memory unit	399.00	5.00
MEMGR7700	Memory module option for above	98.90	1.50
FRT7700	Antenna tuner unit for above	42.55	1.50
FRA7700	Active Antenna	38.70	2.00
VHF converters for FRG7700. Prices start from		74.00	1.50
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	144/8T	8 Ele long	2.45 m	11 dBd	£31.26
	144/14T	14 Ele	4.5 m	13 dBd	£44.49
	144/19T	19 Ele	6.57 m	14.2 dBd	£53.22
	144/6X	6 Ele crossed	2.5 m	10.2 dBd	£37.86
	144/12X	12 Ele crossed	4.57 m	12.2 dBd	£54.95
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FAROE ISLANDS DX-PEDITION

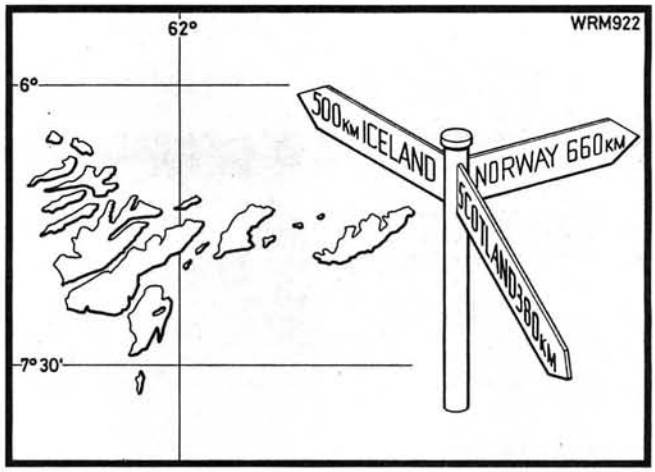
by Bruce Nicholson G4SAY

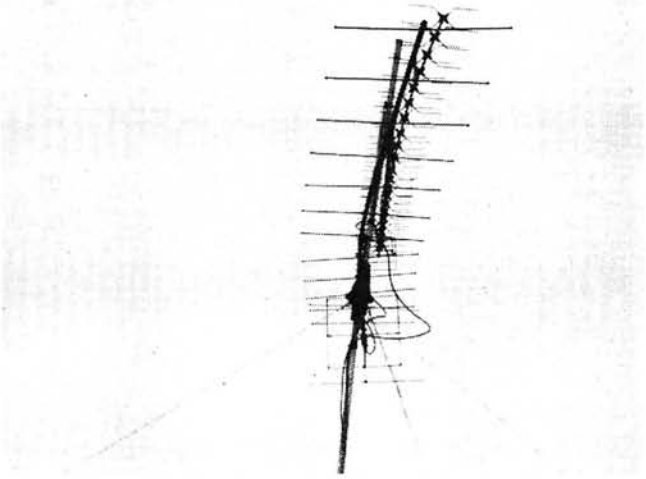
Ever thought of mounting a DX-pedition to that far away exotic sun-drenched island, in the Pacific, complete with cannibals? Well, the Faroe Is. aren't exactly in the Pacific, and they're certainly not sun-drenched, but on the other hand, they're not too far away, very civilised and rare on all bands. Here's a report on how seven members (G4SAY, G4MIK, G4MLM, G4RWA, G6LDN, G6LGO and an s.w.l.), of Imperial College Radio Society (G5YC), got on up there this summer during June and July.

We started off on the southernmost of the islands, Sunduroy, in WV square, arriving at four in the morning after three days of travel. The h.f. station was immediately set up on site 400m a.s.l., darkness not being a problem at night in these northerly latitudes. The station comprised an FT-902DM transceiver, a trapped vertical lent by G3REZ for the 7–28MHz bands and dipoles for 1·8MHz and 3·5MHz. The v.h.f./u.h.f. station proved a little more difficult to establish. We attemped to erect two 14-element 144MHz beams and an 88-element beam for 432MHz on an aluminium pole which we soon discovered wasn't up to the job, folding completely at the base, next to the rotator when the mast was being raised. The mast and rotator eventually supported a single 144MHz beam and 432MHz beam after another go with a stronger pole.

The 144MHz equipment used was an FT-221R and Tono 150W amplifier; and for the 432MHz band we had a TR-9000, MM432/144, and Microwave Modules 100W amplifier.

Operation commenced on h.f. with 21MHz and 14MHz being the "bread and butter bands". 'Phone, and c.w. together with RTTY, using a MM4001, were used on most bands. The 28MHz band opened up a number of times into Europe; and many a pile-up was worked which was





What the gales did to our 144MHz Jaybeam

The second site on a very rare nice day

The well-equipped shack of 144/432MHz enthusiast John OY9JD

great fun. Operation on 7MHz was also fruitful, but the broadcast QRM made life very difficult. A handful of stations were worked on 3·5MHz, but again the levels of interference were high. A number of CQ calls were put out on Top Band but nothing resulted. QRN from our generator on 1·8MHz was a problem, and the shortness of the night up there didn't help propagation-wise. On 144MHz, we worked as far south as Aberdeen, working stations including GM4HIG. A number of 144MHz m.s. skeds including one RTTY sked were attempted but not completed, although a number of pings were heard.

On the Saturday morning of VHF NFD a big gale hit us and forced us off our site (literally!) and the air while equipment and operators dried out and moved back up to the shelter of the main island. Two days later, we were back on the air from just outside the capital town, Torshavn, on h.f. only as we were at sea level and shielded in most directions v.h.f.-wise by hills. Unfortunately VHF NFD was missed and so was an opportunity possibly, to make use of 432MHz.

We met quite a few of the eighty-odd local amateurs on the islands, most of whom use 144MHz mainly as a sort of local telephone system. A number though, are regularly on h.f. On the first and third Wednesdays of each month the Torshavn Club OY6FRA, meets and is to be found on h.f. in the evening with an IC-701, a four-element 14MHz beam, and dipoles for the other bands.

There's a lot of local 144MHz activity as most OY amateurs are licensed for 144MHz and other higher frequencies. Most of it is on the local repeater, OY6REA on R1, sited some 700m a.s.l. There is a 144MHz beacon, OY6VHF on 144·885MHz, but unfortunately for British amateurs it beams to Denmark as the amateur who constructed it is an OZ. It is possible though that the beacon may beam our way as well some time in the future. On s.s.b., John OY9JD is very active, going portable to a nearby hill at the first sign of a 144/432MHz opening.

Niels OY5NS is also active, mostly on 144MHz m.s. c.w., and is currently assembling a 432MHz e.m.e. station. Nearly all OY amateurs operate from WW square, but OY9JD often goes portable to WV square.

Anyone planning a trip to the Faroe Is. shouldn't have any trouble, licences are easy to obtain from the Danish authorities. Amateurs going to the Islands are assured of a warm welcome from the local amateurs. To all the locals and particularly OY5J, OY5T and OY9JD, members of G5YC/OY would like to give their thanks. Thanks also to SMC, Microwave Modules, and Jaybeam for the loan of equipment.

One of the DX-pedition team operating the /P station

on the air

AMATEUR BANDS by Eric Dowdeswell G4AR

Reports to: Eric Dowdeswell G4AR, c/o 60 Blakes Lane, New Malden, Surrey KT3 6NX.
Logs by bands in alphabetical order.

Having acquired a communications receiver and got it going with an antenna of some sort, the proud owner usually starts looking around for additions that can be made to the system in order to improve reception. The first item, which I consider to be of prime importance, is a pair of decent headphones. There are many signals which may be too weak to resolve using a speaker but which will appear perfectly readable on headphones.

Normally, plugging in the headphones will silence the set's speaker. Considering that the audio frequency response on commercially made transceivers in general use is tailored to a band between about 300Hz and 2700 or 3000Hz there is little point in using the stereo hi-fi headphones found around the home these days. Their wide response, perhaps between 50Hz and 20kHz, will only emphasise the unwanted signals that are present at the audio output, thus reducing the readability of the wanted signal.

One way round this problem is to fit an audio filter, between the headphone socket and the headphones, which will restrict the audio response. Some of the more comprehensive filters include an audio amplifier and the gain and bandwidth may be adjustable. In addition, a notch or peak control may be fitted which is probably the most desirable feature of any audio filter enabling a particular frequency to be either emphasised or suppressed depending on whether it is a wanted or unwanted signal.

The receiver's output impedance will be around eight ohms, the same as the internal speaker, and most stereo headphones can be plugged straight in without worrying about impedance matching. Apart from any other considerations the headphones isolate the listener from all those outside noises that pervade the average household, thus again improving the wanted signal level. Once one has become accustomed to using headphones the speaker will only be used for listening to the nets on 3·5MHz (80m) s.s.b., or the local radio station!

If it is decided to buy a pair of headphones they should be a lightweight design, especially if long DXing sessions are planned. Contest operators will know the importance of this factor in reducing fatigue. The headphones used with personal stereos are ideal, being physically small and light in weight, and their earpads, although rather small, will still keep out a lot of ambient noise.

For c.w. reception there is nothing better than the old-fashioned magnetic headphones with a metal diaphragm, which may be adjustable. They invariably had a sharp peak somewhere in the audio range that could be utilised by making the c.w. beat note correspond with the peak.

It should be remembered that audio filters will not make up for deficiencies in the front end of the receiver where a strong signal may cross-modulate a weak, wanted signal, creating internally generated interference that will be blamed on external sources when it is, in fact, the result of poor receiver design. Audio filters are best used for providing the very sharp selectivity required for good c.w. reception, perhaps with a bandwidth of 100Hz or less, preferably adjustable, and incorporating a notch/peak facility.

An interesting letter from **Paul Hardy** in Reading takes me to task on the bit I wrote on superhets in the September issue for not explaining why a local oscillator should be higher in frequency than the signal frequency circuits. Nothing taboo in it, OM, just coming under the heading of "accepted practice". As Paul points out, if the l.o. is lower, then the tuning range required on the l.o. is much wider than if it is tuning on the high side. He cites a typical example of a m.w. set covering, say, 550kHz to 1600kHz when the l.o. on the low side will need to tune between 80kHz and 1130kHz (a ratio of 12:1), assuming an i.f. of 470kHz, but only 1020kHz to 2070kHz (a ratio of 2:1) on the high side.

The tuning ratios of 12:1 and 2:1 are vastly different and the lower ratio of 2:1 makes the tracking or alignment of the various circuits very much easier. The signal frequency circuits, tuning between 550kHz and 1600kHz, represent an acceptable ratio of about 2·9:1. In practice, the ratios are adjusted by means of padding and trimming capacitors and adjustable coils.

Another very important consideration is harmonics of the local oscillator if it is lower in frequency than the signal circuits. The second harmonic in particular can appear as a very strong unmodulated signal when tuning the receiver and can cause a lot of trouble at high frequencies.

In General

In the August issue of *Radcom*, **Bob Treacher** BRS32525 very rightly commented in his column on the poor quality of some s.w.l. QSL cards. In view of their high cost these days it is certainly time that they were laid out correctly giving the right type of information of use to the DX station. I saw one recently that did not carry the s.w.l.'s name, and the address was an obscure town, a postal code, and "UK" not even mentioning the country concerned within the UK!

Such rubbish should be shunned. First of all, get samples, which a good printer will always provide for an s.a.e., before spending your hard-earned cash on useless cards. There is no doubt that many of these poor cards are off-shoots of the type used by CBers and are quite unsuitable for use on the amateur bands. To be quite brutal, there is not one in a thousand s.w.l. reports to an amateur station that is of the slightest use to the recipient, especially as far as the h.f. bands are concerned, the v.h.f. and u.h.f. bands being quite a different kettle of fish.

About the only operators who would appreciate reports from s.w.l.s are the low power (QRP) enthusiasts using c.w., but unfortunately the number of s.w.l.s who monitor the bottom ends of our h.f. bands is pitifully small.

One of our regular readers is a senior citizen living in Orpington, Kent, and he has a treasured Eddystone 940 receiver that he feels is in need of a check-up and possible realignment. Any volunteers? Drop me a line if you can help.

Summer date for the Sefton ARC was the Wigan Motor Show and special event station GB4WMS

Brian Patchett of Sheffield is usually mentioned in the DX notes every month, but he has written to say he has passed his code test and RAE, so congrats OM, and well done! After some nice, personal blurb he goes on to say that *PW* readers who are genuinely interested in getting a licence must discipline themselves to study, and having done that it really is not so difficult. Following a comment of mine in the Club notes on the lack of club activity in Sheffield, things have changed there, says Brian.

From Olney in Bucks another regular DX reporter, **"Roger"**, says he too has passed the RAE and awaits a call. Sorry I

can't quote your surname, OM, but can't unearth your last letter of a few months ago. The Morse code is expected to follow before long, as he's determined to stick to the h.f. bands. On the *PW* Marchwood project, Roger says the price of the listed RS Components killed it stone dead for him. Perhaps alternative sources ought to be given or the component details to enable other makes to be bought. *(See comment under "Kindly Note"—Ed.)*

Anne Edmondson GM4TCW in Edinburgh now has her DX40 and v.f.o. and hopes to be on the air and working the DX by the time that this appears in print. She has a G2DYM Unipole antenna and is about to sink some earth rods so we shouldn't have much trouble hearing her on the bands.

DXing

Holidays have interfered with some readers of late, cutting down listening time. **Jim Willett** in Grimsby has been trying various antennas with his FRG-7700 and matching a.t.u., and has a 30m-long wire at the moment. Catches on 14MHz included 9M6YY, VP2MKD, ZL3LE, TG9WE (QSL Box 2358 Guatemala City), with HL1ANV, DU1NUY and AP2MQ on 21MHz.

Viv Doidge in Callington, Cornwall, found conditions not quite up to scratch with lots of short skip and plenty of QRN. Still his FRG-7700 and a.t.u. and a 40m-long wire brought in TU2NA, VP5WJR, 5H3FN and 9J2BL on 21MHz plus FY7YK, HZ1TC (QSL OE3YLK), and W5JMM/SU probably with a UN contingent. The 7MHz band threw up CP8ISE, G4JVG DXing in OH0/OJ0, and HK4FLT, while the best on 3·5MHz was FM7WS, VK7AD (a very good one indeed), ZP5PX, 3X4EX and 6W8AR, all around the top end of the band.

From South Harrow, Middx, **Goff Curtis** bemoans the lack of c.w. reports in the column. Certainly I used to get frequent reports for that mode but they have died out now, yet as Goff says, there must be some c.w. listeners. So what about it, you people who are getting ready for the code test, you must have something to report? During the war, Goff was aircrew signals and afterwards got going with an Eddystone 740 receiver. Now it's an R-600 and c.w. catches include ZD8YH on 28MHz, then CS1CBU, T28DC and 9J2BO on 21MHz and on to TR8DR, VS5DG (s.s.b.), 9V1VP and VR6TC copied on 14MHz.

In attendance at GB4WMS from the Sefton ARC were, back row, G8ZWZ, G8YPL, G6ICR, G6PZW, G4KIN, G6NRK and G6WFE. On their knees are G6NIN and G6EXC

Andy Durrant has decided to swop his second receiver, an HQ100A, for a good a.t.u. or trapped dipole. He was rather chuffed at copying G3XTC/P, the station of the Wimbledon & District ARC operating at Chessington, Surrey, using a 76m wire held up by courtesy of a large kite, on 1·8MHz. Sticking to 14MHz, Andy logged 6Y5OM, C6ANY, EA9MO (QSL Box 162, Ceuta), VP5WJR (QSL KA5BPE) and WD4FSY/HP1 with cards to W4OSH. Andy uses an AR88 and 20m-long wire.

The old favourite FRG-7 is **David Price's** rig for DXing, aided and abetted by a 30m-long antenna feeding a home-brew antenna tuning unit. The log for 21MHz shows S79MC, 5H3DM (QSL G3NXR), 9X5SL (QSL DL8DF), VS5PP, 9J2BO (QSL W6ORD), YC3FQ, 6Y5MJ and 5W1DZ in Western Samoa, while on 14MHz he logged 3X-4EX in Guinea and QSL to N4CID, HL1DU, VS6DX, FG7AK, FM0FAE, HH5CB (QSL K9WJU) and KH6BB. Dave also commented on the number of French amateurs in Corsica, on holiday, all madly signing /FC!

May I once again appeal to readers who are interested in c.w. to have a look on the low ends of the bands and let me know of any interesting DX heard there. There must be many of you who are aspiring to pass their code test soon who are busy copying c.w., so let's hear from you!

A card from VS5HG was the first for **Dave Shapiro** BRS53844 of Prestwich, Manchester, where his DX200 and a 20m-long wire brought in J28BG, VP8ANT and YS1UL on 14MHz, plus FM7CD and DF3NZ/ST2 on 7MHz. On 3·5MHz it was OJ0MA and a good one in VK6LK, not bad for summer DX, then the OJ again on 1·8MHz, and EA9KB. Up to 21MHz and CE0ZAD (QSL WB6WOD), C21BD, FR7CR, TA1AM, TL8ER, VP5WJR, VP8ANT, VS5HG (QSL POB 980, BSB, Brunei, N. Borneo), XT2AU, ZD7BW, ZD8LM, ZD9BV, 3X4EX (QSL N4CID).

Club News

Acton, Brentford & Chiswick ARC G3IIU Next meeting is on October 18, a Tuesday, when G3XPC will talk on further experiences in DX countries. It's the Chiswick Town Hall, High Road, Chiswick, London W4, at 7.30, says sec W. G. Dyer G3GEH, 188 Gunnersbury Avenue, Acton, London W3.

Bath & District ARC G4TMH Now running successfully for around 18 months, the club caters for all AR interests and allied subjects according to G6HRX at 14 Arundel Road, Bennetts Lane, Bath. Both h.f. and v.h.f. antennas have now been erected, by kind permission of mine host at the Englishcombe Inn, E'combe Lane, Bath, on *alternate* Wednesdays (how I hate that expression), which I have worked out on my calendar to be October 5 and 19. 7.45 will do.

Braintree ARS G4JXG G6BRH At the Braintree Community Centre, Victoria Street, at 7.45 on the first and third Mondays. October 17 marks a visit by RSGB regional rep Tony Howe G3PLF, while on November 7 it is construction contest judging time. Club mag *BARSCOM* is full of interesting items and news, but Jeff Roberts G6OIX, 27 Medley Road, Rayne, Braintree, Essex, is waiting to tell you of the club's activities in detail, or buzz him on B'tree 44857.

British Railways ARS G4LMR Big event is the AGM on Saturday October 8 at Stanier House, Stephenson Street, Birmingham, adjacent to New Street Station, at 1pm. Members and prospective members most welcome. More from Geoff Sims G4GNQ, 85 Surrey Street, Glossop, Derbys.

Bury RS G3BRS Club mag *Feedback* has interesting contents, including TV DXing, making a suppressed-zero voltmeter and a mobile microphone pre-amp plus much on club activities. Meetings every Tuesday at 8, the Mosses Community Centre, Cecil Street, Bury, with the principal gathering on the second Tuesday. October 11 date is a constructional contest to be judged by an anonymous bunch of home-brewers with cash prizes for the winners, says PRO Malcolm Pritchard G3VNQ who can be caught on Rochdale 355922, for the time being, in the absence of hon sec G4TBT who is in dock. Get well soon, OM.

Cambridge University Wireless Society G6UW During term time it's informal meetings in St Johns College Buttery and Bar at 9pm, starting on October 9. The club has a well-equipped shack with h.f. and v.h.f. gear including RTTY, plus a couple of 20m-tall towers. Note on Tues/Wed Oct 4/5, the club will have a stall at the Societies' Fair at the Kelsey Kerridge Sports Hall, Cambridge. More from sec Laurence Barker G8NJJ, Selwyn College, Cambridge.

Cheltenham AR Association G5BK Seems to be first and third Fridays at the Stanton Room, Charlton King's Library, C'ham, and be there by 7.30, with main talks and lectures and the like on the first Friday. October 7 is joint meeting time with the GC ARC and Smiths Instruments RS, so don't miss the fun. According to *CARA News*, an interesting monthly mag, you should contact sec Gill Harmsworth G6COH on C'ham 25162.

Chesham & District ARS Foregathers every Wednesday at 8pm at The Stable Loft, Bury Farm, Pednor Road, Chesham, Bucks, with new or potential members most welcome, according to sec J. Alldridge G6LKS, 15 Whichcote Gardens, Chesham.

Chichester & District RC Apart from fun in the JOTA event, the club will have a junk sale on October 20, and make a note in the

diary of Ron Ham talking on sporadic-E propagation and DXTV, on November 17. Meetings in the Green Room, Fernleigh Centre, 40 North Street, Chichester, on the first and third Thursdays at 7.30. The club net is on 145·275MHz, otherwise S11 on Weds at 7pm. Local facilities include an RAE course at the Bognor Adult Education Centre now under way, and a Morse code class to start at the same spot in January next. Do contact sec T. M. Allen G4ETU, 2 Hillside, West Stoke, Chichester, Sx, otherwise West Ashling 463.

Cornish ARC Something for everybody in the mag *Cornish Link*, with both radio and computer interests catered for. AR section meets at the Church Hall, Treleigh, which is on the old Redruth by-pass it seems. Next meeting on Thursday October 6, with G4EIK and G4DTB leading on "1296 and all that". Computer buffs have G3CZZ on peripheral control on Monday October 17, at the Social Club Room of the SWEB in Penrhyn Street, Redruth. PRO is S. Rodda (now G4PEM), Cliff Hotel, Penrose Terrace, Penzance, Cornwall, or Penzance 3948.

Darlington & District ARS Two RAE classes are run by G3UTI and G3GUV, with frequent talks on AR, and by the time you read this a club station should be on the air. Despite broadcasts on local radio and GB2RS, plus the local press nothing seemed to happen, so it is hoped this little epistle will help the club to get going after its few months of existence. Don't let me down, chaps! Get along to the Hurworth Community Centre, just south of Darlington, on a Friday at around 7.30. After all, as the hon sec says, *PW* is read also by the CB and s.w.l. fraternities. He is C. Webb G4NYJ, 34 Cleveland Terrace, Darlington, also D'ton 467271.

East Kent RS G3LTY G6EKR First mention, I think, of this thriving club with over 80 members on the books. Meetings first and third Thursdays at 8, The Cabin in King's Road, Herne Bay, ranging from informal natter nites to formal lectures plus film shows mainly in the winter months. AGM is scheduled for October 6. The club calls are used frequently in contests both fixed and portable. Try Stuart Alexander G6LZG, 66 Down Road, Canterbury, Kent, for further info, or 'fone C'bury 68913.

Flight Refuelling ARS G4RFR G6SFR First of all, your contact is Mike Owen G8VFY on Wimborne 882271. Meetings every Sunday evening at 7.30 at the FR Social Club, Merley, Wimborne. If you get this issue early you might make the h.f. transceiver chat by G3VBL on Oct 2, otherwise it's G6XM chatting on pre- and post-war work on 50MHz on the 9th. More of Nick's technical rambles (G8MCQ) on the 16th and G8YCA discussing video recording techniques on the 23rd, linked to a discussion on video matters on the 30th. Apart from that the club will operate GB2WDS and GB8WDS for the Wimborne District Scouts on Jamboree weekend Oct 15/16.

Fylde ARS At the Kite Club, Blackpool Airport, first and third Tuesdays at 7.45. You may be in time to get along to the October 4 do when G3AEP talks on and demonstrates some constructional projects. The 18th is devoted to discussion of the forthcoming year's programme. Good idea, chaps! Let me know the outcome. Ah, yes, it will be too late if I leave it, so make a note of Nov 1 and G4DPI dealing with nucleonics. Prog sec is H. Fenton G8GG, 5 Cromer Road, St Annes, Lytham St Annes, Lancs.

Gosport (Rowner & District) ARS First and third Mondays at 7.30, at the Hardway & District Community Association, Fieldmore Road, Gosport, with an RAE course under way run by G4NEJ. More from C. Jackson G4NAB, The Police House, 30 Titchfield Road, Stubbington, or try (0329) 662144.

Greater Peterborough ARC Fourth Thursday of the month makes it October 27, when a local G4 will describe and demonstrate his home-brew transceiver. Note especially and get ready for the surplus gear sale at the November meeting. Details of the many club activities can be monitored on the club net on 21·2MHz at 8 on Mondays, or contact Frank Brisley G4NRJ, 27 Lady Lodge Drive, Orton Longueville, Peterborough (0733) 231848.

Halifax & District ARS Now has a new venue after general dissatisfaction with the old one, so note the Running Man, Pellon Lane, Halifax, but more from Phil G4JHS, 79 Windermere Road, Bradford, W. Yorks, also B'ford 576504.

Hastings Electronics & Radio Club G6HH Club mag *Vital Spark* is a very breezy affair covering a lot of interests. Meeting schedules are a bit complicated, like micro nights on first, second, fourth and fifth Wednesdays at Ashdown Farm Community Centre, with main meetings on the third Wed at West Hill Community Centre, all at 8pm. October 19 is junk auction evening and keep a place for an amateur TV demo on November 16 by G3TLB. Just to fill any gap there is Morse practice on Tuesdays at 7.30 and RAE course on Thursdays at 7.45 which has just got under way. If you could possibly want to know more, drop a line to George North G2LL, 7 Fontwell Avenue, Little Common, Bexhill-on-Sea, or Cooden 4645.

Inverness ARC New sec Bob Irwin, 40 Lawers Way, Kinmylies, Inverness, says club meets every Thursday at the Cameron Youth Club, Planefield Road, Inverness, at 7.30. Projects under way include a p.s.u. and a 144MHz transceiver, plus a weekly Morse code class.

Leighton Linslade RC Meets in Room A64, Vandyke Community College, Vandyke Road, Leighton Buzzard, Beds, on the first and third Mondays, from 7 to 10pm. Feature in October is on the 17th when G3RWL, Richard Limebear, will talk on AMSAT and the OSCAR satellities, with a live demo. Not to be missed! Contact sec Pete Brazier G6JFN, Kingsway Farm, Miletree Road, Heath & Reach, Leighton Buzzard, for more info on club events. Also try 052 523 270.

Lincoln SW Club G5FZ G6COL The City Engineers' Club, Central Depot, Waterside South, Lincoln, Wednesdays. October 12 sees a talk and demonstration of slow scan TV by G3CCH with the 19th devoted to RAE and Morse code instruction. European steam trains is the subject for the 26th by Alan Hoggett. Must tell you now of more RAE/c.w. work on November 2. Write to Pam Rose G4STO at the club address for more info.

Nene Valley RC G4NWZ G6CWZ October is a busy month in this club with a natter-nite plus on-the-air activity on the 5th, a lecture on the activities of the Aylesbury Vale repeater group by G8MEH on the 12th, manning the JOTA station GB4WDS on the weekend 15/16th, and another natter-nite on the 26th, when a well-known electronics company will be showing and selling its products. It is hoped to get an RSGB lecture by G3RPE organised for the 19th. Visitors should note that the transmitting activities are held at the club room of the Scout Hall, First St Mary's, Finedon, while lectures and the like take place at the Dolben Arms, Finedon. It's junk sale time in November on a date yet to be fixed, so contact Lionel Parker G4PLJ, 128 Northampton Road, Wellingborough, Northants, for latest news.

Newark & District ARS Assembles at the Palace Theatre, Newark, on first Thursdays at 7.30 with code classes and the club station on the air at meetings, and there is a club net every Monday at 8 on 144·525MHz where details of latest club events can be obtained. Otherwise, ring Roger Hiscock G4MDV on East Stake 539.

Norfolk ARC G4ARN Sec is Peter Forster G3VWQ, 12 Thor Road, Thorpe-St-Andrew, Norwich, likewise N'wich 37709. Club meetings at the Crome Centre, Telegraph Lane East, N'wich, at 7.45 every Wednesday, but on Sunday October 9 there is a visit to the BBC in London.

Plymouth RC Another club with a new venue, the Penlee Secondary School, Somerset Place, Stoke, Plymouth, at 7.30, alternate Mondays which is OK if you remember that on October 17 there is a talk on air-sea-rescue work by G3XLU with the 31st given over to an activity night, mainly on the air with the club rig. There will also be a home-brew gear competition that evening. Publicity bod is Mike Newcombe G4FJZ, 56 Dolphin Square, Plymstock, Devon.

Radio Club of Thanet G2IC Note that the AGM is now on Saturday October 8 and the junk sale of equipment on Saturday October 22. The club meets at the Birchington Village Centre with a net on 28·4MHz at 9.30am Sunday mornings, plus 145·575 (S23) on Thursday evenings at 8. Your liaison is Ian Gane G4NEF, 17 Penshurst Road, Ramsgate, Kent, but you can call (0843) 54154 if you like for further info.

Radio Society of Harrow At the Harrow Arts Centre, High Road, Harrow Weald, Middx, at 8 on Fridays, in either the Belmont or Roxeth Room. Interesting letter from G8NRB in club mag *QZZ* shows how cheap CB rig can be easily modified for the 28MHz band. Unfortunately, there is a complete lack of any info on club sec, or anyone else, come to that! Digging deep into past records I find it is Chris Friel G4AUF, 17 Clitheroe Avenue, Harrow, Middx, also 01-868 5002, I hope!

Sefton ARC Next meeting of the club is on Wednesday October 5, then on the 9th and fortnightly thereafter, at the Walton Prison Officers' Club, Hornby Road, Walton. As will be seen from the appended photographs, the club had a fine old time running GB4WMS at the Wigan Motor Show back in June. Enquiries to Mike Webb G6ICR, 33 Belle Vue Road, Gateacre, Liverpool L25, which also answers on 051-487 0756.

Skelmersdale & District ARC Thursdays at 7.45, Dunlop Sports and Social Club, White Moss Road, S'dale, Lancs, so says George

Rogers who is G6OMN at 113 Foxfold, Fosters Green, S'dale. Club mag *Feedback* is wide ranging in its contents, coming out bi-monthly.

Southdown ARS The Chaseley Home, South Cliff, Eastbourne, at 7.30. Too late to tell you of Oct event, but on Wednesday November 2 there will be a talk and slide show concerning the moving of the Isaac Newton telescope, by G. Harding, while the AGM lifts its ugly head on Monday December 5. It's Peter Henley G8IQO, 45 Springfield Close, Westham, East Sussex, or (0323) 763123 for latest information on club activities.

Spen Valley ARS G3SVC A good year on the whole is the verdict on the club's activities, especially since a move to a new venue which has proved very popular, the membership now being in the 50's. Meetings on Thursdays at 8 at the Old Bank Working Men's Club, Mirfield, where on October 13 there is a committee project evening with the 27th devoted to G4MLW dealing with computers in AR. November 10 is equipment alignment night. Other Thursdays of the month are natter and noggin evenings. Club sec remains Ian Jones G4MLW, 54 Milton Road, Liversedge, Heckmondwike, W. Yorks.

Stevenage & District ARS G3SAD G8SAD First and third Tuesdays at 8, although you can join in the code class at 7.30, on TS Andromeda, Fairlands Valley Park, Shephall View, Stevenage, Herts, plus DF hunts on the second Tuesday at 7.30pm from the Fairlands Valley Lakes car park at Six Hills Way. Secretary is Cliff Barber G4BGP, 13 The Sycamores, Baldock, Herts, or (0438) 893736. A talk on batteries by a rep from Ever Ready happens on October 18, and on Nov 1 it will be a chat on SSTV by G4BWU.

Stockton & District AR Group Only too happy to promote this club that meets every Monday at 8 at the Oxbridge Hotel in Stockton-on-Tees with a very modest 50p membership fee and 20p at a meeting. An RAE class started on September 5, but I'm sure it's not too late to join now. Interested? Then contact John Walker G6NRY, the club's PRO, at 7 Widdrington Court, S-on-T, Cleveland.

Stourbridge & District ARS G6OI G6SRS First and third Mondays which are informal and formal respectively, starting at 8pm at the Garibaldi, Cross Street, Stourbridge. At a special meeting it was agreed that informal gatherings could remain at the pub but that main meetings should be held in a new and more formal spot. Main meeting on October 17 has G4HUP dealing with meteor scatter propagation at v.h.f. Nov's meeting is the annual surplus gear sale, on the 21st. Malcolm Davies G8JTL is the sec, at 25 Walker Avenue, Quarry Bank, Brierley Hill or ring Lye 4019.

Sutton & Cheam RS Following the resignation of sec George Brind G4CMU the post has been filled by Jack Korndorffer G2DMR of 19 Park Road, Banstead, Surrey. First meeting in October is on the 7th at the Sutton College of Liberal Arts, when the RSGB film *The Hams Wide World* will be presented. On the 21st there is a surplus gear sale at the Downs Tennis Club, Holland Avenue, Belmont. Meetings generally on Fridays at 7.30pm.

Swale ARC Sec Brian Hancock G4NPM, Leahurst, Augustine Road, Minster, Sheppey, Kent, who reports that an RAE course and c.w. practice is well under way, with details from Brian or at the club. Meetings every Monday at 7.30, at Nina's Restaurant, 43 High Street, Sittingbourne, Kent.

Torbay ARS G3NJA G8NJA Good news is that the club mag *TARS Talk* is about to be resurrected, which is bound to help keep the club together. It meets every Friday at 7.30 and on the last Saturday of the month at Bath Lane, which is at the rear of 94 Belgrave Road, Torquay. October event, on the last Saturday, is a showing of the RSGB's video cassette on satellites, and to which visitors are also most welcome. PRO is Tony Rider G6GLP, 7 Kingston Close, Kingskerswell, S. Devon, or (08047) 5130.

Wimbledon & District RS It's AGM time again when the club committee comes up for review, and that is on Friday October 14 at 8pm at St John's Ambulance HQ, 124 Kingston Road, London SW19. More info on the club's activities from Geoff Mellett G4MVS, 26 Paget Avenue, Sutton, Surrey, 01-644 8249, if he's still in office that is!

Wirral ARS G3NWR New meeting place! The Guide Hut, Westbourne Road, West Kirby, on the first and third Wednesdays, but arrive by 7.45 for a prompt start at 8.15. One group of members, headed by G4MIA, is on the air most evenings on 144·725MHz or thereabouts, at 7.30pm, sending slow Morse for the benefit of members. Faster speeds are sent later in the evening. Cedric Cawthorne G4KPY, 40 Westbourne Road, West Kirby, is the sec and is also available on 625 7311.

Vale of the White Horse ARS New meeting spot, so make a note of the Canteen & Social Club, Milton Trading Estate, Milton, near Abingdon, with October 4 slated for a surplus gear evening. So, it looks like the first Tuesday of the month and so I'd better tell you of the chat by G4DGU of MuTek Ltd on November 1, and advance notice of the Christmas social on December 6. Club sec is Ian White G3SEK, 52 Abingdon Road, Drayton, Abingdon, Oxon, otherwise (0235) 31559.

Yeovil ARC G3CMH G8YEO It's a new venue for club meetings, the Recreation Centre, Chilton Grove, Yeovil, Som, at 7.30 on Thursdays. Coming on Oct 6 is G3MYM on ionograms and the concept of virtual height (of the layers, I presume) with the same lad describing the potential (ugh!) of the amateur radio movement in the community, on the 13th. G3GC talks on choosing a v.h.f. site, and v.h.f. propagation, on the 20th. Relax on natter nite on the 27th. G3GC is also the new sec, at short notice, now that Adrian G4JBH's work has taken him outside the area. Eric Godfrey G3GC can be contacted at Dorset Reach, 60 Chilton Grove, Yeovil, Som, otherwise (0935) 75533.

May I ask club secretaries once again to put the full club meeting information on all correspondence or to see that it appears in full in club magazines, as well as the QTH, etc., of club official responsible for dealing with new member enquiries. The complete lack of info in some mags is appalling and quite unforgivable. If everyone would co-operate the club coverage would be more complete and I would not have to delve deep into old records to get the information myself, wasting precious time! Ta!

MEDIUM WAVE BROADCAST BAND DX

by Charles Molloy G8BUS

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

Last time we had a look at the possibility of picking up medium wave stations in North America, when it was suggested that newcomers to the band should make a start by searching for CJYQ St John's in Newfoundland on 930kHz. If propagation on the path from North America is favourable, CJYQ should be audible once the European QRM on 927kHz subsides. This happens around 2245UTC. Many DXers though prefer to wait until winter time arises, this year on October 23. Then one can decide before bedtime whether it is worth searching for DX. Even the most dedicated can be discouraged by staying up late only to find that reception is poor. As a diversion until next month we will have a look at a listening technique used by a few DXers, which is simply to concentrate on several carefully chosen frequencies and see what turns up.

Interesting European Channels

The amount of high power all-night broadcasting in Europe appears to have decreased recently. Certainly it is possible to find channels before midnight that are relatively quiet. Two that interest me are 927kHz and 747kHz.

At my QTH the dominant occupant of 927kHz is the 300kW Flemish-speaking Wolvertem in Belgium. By 2245 the transmitter will have been switched off and we can now look for DX. If you hear Arab music it will probably be the Voice of Free Sahara in SW Algeria. It transmits with a power of 4kW to disputed territories formerly known as Spanish Sahara. The station is located at Beni Abbes. The 50kW Zakynthos in Greece is also on 927kHz but you have to be quick to catch it as it usually signs off shortly after 2300. If you hear "SW" in Morse it is an intruder operating on 930kHz and causing interference with broadcasting. This is an aeronautical beacon located in Estonia, I believe, which seems to agree with bearings taken with a loop. The really interesting find on 927kHz is a station in Asiatic USSR. I logged it recently at 0115 when it was

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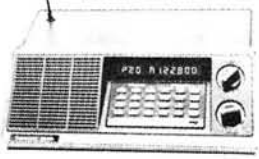
BC-20/20FB (with air band)



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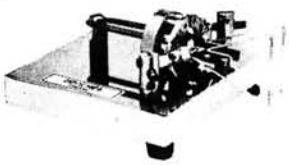

Bearcat 200FB

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SPECIFICATIONS

Frequency range:
66-88 MHz Low Band
138-144 MHz Extended VHF Range
144-148 MHz 2-Meter Amateur
148-174 MHz High Band
406-420 MHz Extended UHF Range
420-450 MHz 70-cm Amateur
450-470 MHz UHF Band
470-512 MHz UHF "T" Band

Size: 9"W×3"H×9½"D

Weight: 3 lbs.

Power Requirements: 240 Vac, 50 Hz (using external wall outlet power supply, included)

Audio Output: 800 milliwatts RMS

Antenna: Telescoping (suppled)

Sensitivity: 1.0μV for 12 dB SINAD

Scan Rate: Selectable, 5 or 15 channels per second

Connectors: External speaker card edge connector (optional accessory Model No. WH-1)

Wall outlet power supply. Plug-in power supply converts standard household current to safe voltages used by radio.

16 channels. Program 16 frequencies for automatic scanning in any combination of bands and frequencies.

Patented Track Tuning. Electra-patented feature allows scanner to peak on each transmission automatically for optimum reception.

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Priority. Lets you sample a designated frequency, on Channel 1, every two seconds to prevent missing important calls.

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▼/Limit key. Sets lower and upper frequency limits for Automatic Search. Also used to "step down" through frequencies in Manual Search.

Automatic lockout. By-pass any channel not of current interest for faster scanning cycle.

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weak, even when using a long wire but the music was Asiatic and the language was nothing like Russian. This was Nebit Dag on the Eastern side of the Caspian Sea in Turkmenia.

I first became interested in 747kHz when a DXer in Western Canada sent me a tape of DX he had heard on this frequency. It turned out to be the interval signal from Holland plus a programme from Bulgaria. The Dutch station signs off at 2300 leaving the channel to two others easily separable with a loop. These are the 500kW Petrich in Bulgaria and an African broadcasting in French but with programmes of African music and drums. We are now south of the Sahara in Upper Volta and the station is the 100kW outlet at Ougadougou. Although never strong, it is consistent. I once managed to pick it up with my Vega 204 using the internal ferrite rod antenna. Of course I was looking for the station and I knew where to look but it does show what can be done with simple equipment.

There are other broadcasters on 747 and 927 and there are other relatively quiet European channels if you look for them. Tune slowly round the band and if there is a gap, investigate.

Bearings and Distance

Intrigued by a "small ad" on page 93 of the July 1983 issue of *PW*, which began "Beam Headings and Distances by Computer Printout from your own QTH." I sent off a cheque together with my latitude and longitude. By return post came a six-page list in alphabetical order (also available in prefix order) of 372 locations and countries giving the bearing in degrees of the Great Circle paths along with the distances in kilometres and miles from Southport. The list was headed with my name and the location with its latitude and longitude to the nearest tenth of a degree i.e. LAT 53.6DEG, LONG 03 DEG. You can find your Lat and Long from an Ordnance Survey map or your local library may be able to help.

Although intended for the radio amateur this list will also be of interest to DXers who use a medium wave loop antenna. The information is available from other sources of course. Owners of a ZX81 home computer can use the *PW* Bearings and Distances program whose listing appeared in the supplement in the December 1982 issue or in a ready-to-load cassette *PW Radio Programs–1* £3.50 from PW, Westover House, West Quay Road, Poole, Dorset. Also now available for Spectrum at £3.75. The Great Circle Map produced by the RSGB, Alma House, Cranbourne Road, Potters Bar, Herts EN6 3JN, for £2.12 post-paid, enables one to obtain range and bearings simply by using a ruler.

One advantage of a list is that comparisons are easily made. For example, the bearings of Newfoundland 282°, New York 287° and Cuba 278° are all roughly the same so far as a loop antenna is concerned. The reciprocal (subtract 180°) passes through Central Europe (Czechoslovakia is 106°) which means that if you try to null out QRM from that direction you will also null out the DX from North America. A loop has two nulls in opposite directions to one another.

An interesting one is Bermuda at 272°. This country broadcasts on the North American channels 960kHz and 1230kHz and it might just be possible at my QTH to isolate it with a loop. Other paths of interest are Bogota in Colombia 260°, Puerto Rico 262° and Caracas in Venezuela 257°. These should easily be separable from North American DX. Natal in Brazil is on 219° which means that all of South America lies between 219° and 260° from my QTH. Some values may be significantly different from other locations in the UK.

Direction Finding

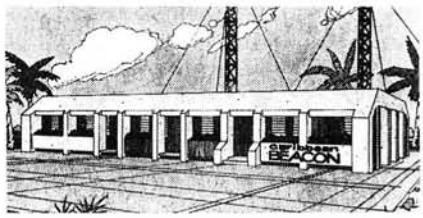
When DXing, it is not necessary to know the precise direction to point the loop. All one does is to rotate it for the best reception but some DXers might like to try their hand at DF (direction finding). It can be an interesting exercise and a positive aid to station identification at times. In case some readers are not familiar with the conventions used, north is zero degrees written 000°. Going round clockwise, east is 090°, south 180°, west 270°, and on to 360°/000° which is north again. These are true bearings related to the geographical north pole and should be written with the suffix T. The compass points to the magnetic pole which is located in the north of Canada. The difference between true and magnetic is called variation, which is westerly in the UK lying between 006° and 011° depending on location. The exact figure can be found from an Ordnance Survey map. An average value of 008° will probably be accurate enough for most purposes. Taking St John's in Newfoundland from the Beam Headings list which gives true bearings, we have 282°T or 290°M (282 + 008), the latter being the compass bearing, the range (from my QTH) is 3680km or 2290 miles. Conversely, you can take a compass bearing of a station then subtract the variation to get the true bearing and then compare this with the list or GC map.

Radio Bermuda is seldom heard since it moved from 1235kHz to 1230kHz

Ideally one should use a compass outdoors but I have found that accurate bearings can be taken when standing in the middle of a room. This might not be the case though in a steel-framed building. The list is available from Randall Hill and Fare, Dial House, Dial St, Warrington, Cheshire, for £4 post-paid and do not forget to mention your latitude and longitude together with a note saying you want the alphabetical list.

Readers' Letters

"I was wondering if you had come across a beautiful little portable by National Panasonic about 1977" writes **E. S. Walden Vincent** from Great Yarmouth. He is referring to the RF1105 LB/LBE. "The outstanding feature of the receiver is the ferrite antenna fitted outside the case. The antenna could be turned 90 degrees either way so that the receiver does not have to be turned to null out unwanted stations".



Caribbean Beacon located in Anguilla is on 1610kHz. Sent in by Philip Hodgson

Reader **Shoyab Patel** (Dewsbury) reports on DX heard during Ramadan last summer. He used an ICF M206 with several turns of wire wound round the set. One end of this wire was connected to a 5m long antenna while the other bare end, was held in the hand (earth?). Broadcasts heard with this set-up included Voice of the Arabs in Egypt on 819kHz, another Egyptian on 621 (Batra), the Voice of Free Sahara on 927kHz (Algeria), Radio Algiers on 531, 549 and 891, Jeddah 1512 and Dubai 1521 both in Saudi Arabia. Thanks for an interesting log old man, hope to hear from you again.

SHORT WAVE BROADCAST BANDS

by Charles Molloy G8BUS

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

"I have found that more important than a good antenna is a highly efficient earth system—my earth is composed of several long earth spikes and numerous radials covering most of the modest sized back garden" writes **Matthew Probert** from Haslemere. Our reader goes on to say that there is reduction in electrical interference when using his earth system. Two rather important points arise from this letter.

A Good Earth

When using a random (long wire) antenna you need an earth to complete the electrical circuit formed by the antenna and the receiver. The mains earth will not do. It could be as long as the antenna! The mains earth is connected to other electrical equipment so there is a common path to earth for all, including your radio signals, which facilitates the transfer of noise into your receiver. What is required is a separate path to earth for your radio signals—a signal earth.

My own set-up is less ambitious than Matthew's. I use a single 1·2m long coppper-plated steel earth rod (Tandy item 15-530). It enters the ground in the space between two flagstones, a few inches away from the walls in order to avoid the foundations. A channel was opened up between the flags for the cable used as the earth lead, the rod was hammered down until the top was slightly below the level of the flags and rod and lead were then covered in cement to make, I hope, a weatherproof connection. An alternative to an earth rod would be a wire and earth clip to a water pipe close to where it enters the ground and quite separate from the mains earth.

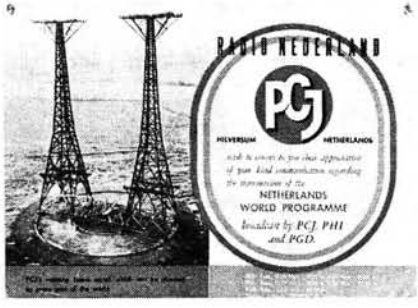
Connecting Earth to Receiver

How do we use our earth? Mine enters the shack via heavy-duty electrical cable which ends on a terminal block. This is the signal earth point. This earth is also used for the lightning arrestor located at the antenna switch though I intend providing a separate earth for this in the future.

There shouldn't be a problem using this signal earth with a battery-operated set. Connect it to the terminal marked E (earth) or GND (ground). If your receiver does not have A and E terminals and you are attempting to increase pickup, perhaps by wrapping a few turns of wire around the plastics cabinet, connect one end of this wire to the antenna and the other end to the signal earth.

There may be problems with a mains-operated set. The antenna terminals of my DX160, which are typical, are shown in Fig. 1(a). A1 and A2 are connected internally to the input (primary winding) of the antenna tuning inductors via the wavechange switch. GND is connected inside the receiver to the metal cabinet and to the mains earth. This is done in the interests of safety and should not be altered. When using a half-wave dipole or other balanced antenna such as a m.w. loop, which do not require an earth, join the incoming leads to A1 and A2. The normal arrangement when using a random wire is to connect it to A1 and join A2 to the GND terminal. A separate earth, if used, is now connected to GND, Fig. 1(b).

Personally I do not like this arrangement as we are connecting our signal earth to the mains earth. I do not use an external strap between the A2 and GND terminals and have joined the signal earth to A2. This is shown in Fig 1(c). Antenna to A1, signal earth to A2, GND connected internally to the receiver cabinet and to the mains earth via the mains plug.



Radio Nederland's Rotating beam antenna sent in by Mike Gater

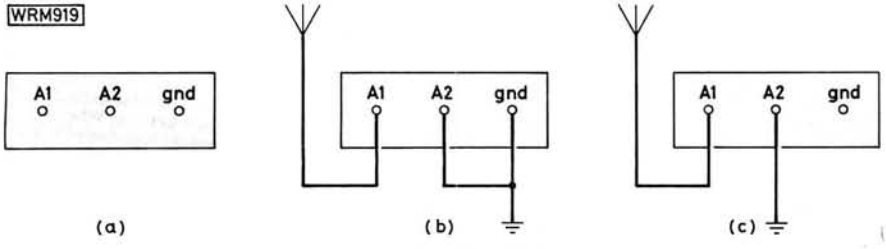


Fig. 1

The Tropical Bands Survey (Front Page)

Perhaps I am being fussy but there has been a noticeable reduction in electrical noise, TV buzz, etc., since I installed my signal earth and started using it this way.

Short Wave Clubs

"I have read in many issues of *Practical Wireless* about radio clubs and British DX clubs scattered around the country but I have not read anything about DX clubs abroad" writes **Andrew Hill** from Cheslyn Hay. He goes on to say that he belongs to a DX club in Hungary—the Radio Budapest DX Club. "My only commitment to the club is to send just four reception reports each month. Unlike DX clubs in Britain, there is no membership fee."

Well, the cost of posting all these reception reports might be comparable with a club subscription! The success of any DX club depends on the input from the membership while one advantage to the individual member is that the club puts him in touch with what other DXers are doing and hearing. It is a two-way process. A club in the UK will have membership with similar interests and problems and it may be possible for the members to meet one another. However, there are two independent DX clubs located in Western Europe that have significant membership in the UK. These are:

The World Wide DX Club in West Germany. Its members are scattered all over the world and it produces a monthly publication in English for them called *DX*

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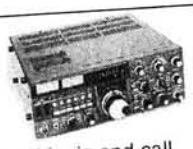

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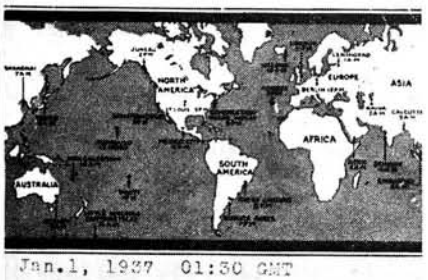

Jan. 1, 1937 01:30 GMT

M r. J. Molloy

We acknowledge with thanks your communication reporting reception of our short-wave program on the above date from station W2XAF—W2XAD.

W2XAF, operating on a frequency of 9530 kilocycles or 31.48 meters, is on the air daily from 4:00 p.m. until 12:00 p.m. Eastern Standard Time.

W2XAD, operating on a frequency of 15,330 kilocycles or 19.56 meters, is on the air daily from 10:00 a.m. until 3:45 p.m. Eastern Standard Time.

Special transmissions, other than the above, will be announced at sign-off periods on both stations.

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Magazine. Further information can be had by sending an IRC to the WWDXC, Postfach 1214, D6380 Bad Homberg 1, Federal Republic of Germany.

The **Danish Short Wave Clubs International** is located at DK-2670 Greve Strand, Denmark. Its monthly bulletin *DX News* is in English while the club has its own 15 minute radio programme called *World DX News*. This can be heard from Sines in Portugal at 0900 on Sundays on 9·670MHz at the start of the *Adventist World Radio* half hour. There is a weekly Tips section by Finn Krone while the last Sunday of the month brings Barry Davies (UK) who gives the latest information about DX heard on the medium waves.

Some DXers find it an advantage to belong to two clubs; a local club in the UK which puts them in touch with DXing in this country and an international club which on account of the large membership, has the resources to provide a comprehensive service to its members.

Tropical Bands Survey

The 11th (1983) edition of the *TBS* produced by the Danish Short Wave Clubs International has just come to hand. Compilation ended on 5 July 1983 and the 28-page A4 size list covers broadcasting in the range 2MHz to 5·0MHz. What I like about this list is that it shows what is actually being heard. It is compiled from reports from DXers living in more than 39 countries. Each entry in the list is classified as follows:- A = often reported, B = regularly reported, C = seldom reported, D = not reported but known active, E = possibly inactive, S = seasonal frequency (not used all 12 months).

The *TBS*, which is edited by the well known DXer Anker Peterson can be had by anyone sending nine International Reply Coupons to the DSWCI, DK-2670 Greve Strand, Denmark. Anyone seriously interested in DXing the Tropical Bands should get hold of a copy.

Vintage QSL Cards

In reply to my request in the September issue Mike G4ICC has loaned me his PCJ QSL card which shows Radio Nederland's famous rotating beam antenna. The card which is dated 2 April 1948 is signed by Edward Startz. Eddie was in the chair at Radio Nederland *Happy Station Programme* for many years until his retirement. Mike writes: "I seem to recall that the station engineers distorted the rotating mechanism when Holland was invaded and that the beam was stuck facing north until the war ended. That was the story I was told anyhow!" Many thanks for the loan of the card Mike, it will bring back happy memories to many.

My own contribution is my first QSL card which came from W2XAF in Schenectady New York. This station relayed the domestic programme of WGY, with the Jack Benny show on every Sunday at midnight our time. QSL cards of this period are part of the history of wireless. Hopefully they will find a home somewhere after the present owners have switched off for the last time.

Readers' Letters

Our reader **Adrian Butcher** is interested in producing a logbook suitable for broadcast band DXing. Anyone interested in this project should write to Adrian at 3 New Cottages, Rock Road, Washington, West Sussex, RH20 3BH.

VHF BANDS by Ron Ham BRS15744

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

"I've thoroughly enjoyed my first six months on the air and look forward to many more contacts in the future" writes newly licensed **Susan Beech** GM4SGB from Clackmannanshire. How true, Susan, your words perfectly echo the general attitude of most participants in this unique world of amateur radio.

Solar

A few small bursts of solar radio noise were recorded at 136 and 143MHz by either **Cmdr Henry Hatfield,** Sevenoaks, or me on July 20 and 30 and August 10, 12, 13 and 19 and strong noise storm conditions on July 24 and August 1 and 3. Milder storms were recorded on July 29 and 31 and August 3 and 8, and Henry also received solar noise at 196MHz on the 31st, 8th and 9th.

"Three quite good spot groups, each with penumbral spots, crossed the central meridian on July 21 and August 3 and 13" writes **Ted Waring,** Bristol. He also counted 38 sunspots during his observations on July 21, 10 on the 28th, 36 on August 4, 17 on the 7th, 22 on the 11th and 30 on the 14th. No doubt it was the activity within this high number of sunspots that caused the ionospheric disturbance reported by the BBC World Service around 0500 on the 14th.

The 50MHz Band

"As from July 22, VK6 stations have unrestricted use of 50 to 50·150MHz and other call areas can use the portion outside of TV hours" writes **Graham Rogers** VK6RO, Bunbury, West Australia. He adds, "The TV station concerned is on Ch. 0 with sound on 51·740 and 51·750MHz. However, we still have 52 to 54MHz for all VK". Thanks for the gen Graham, let's hope there is a G/VK hook up on 50MHz one day.

"C6ADV in the Bahamas is reported to have heard the UK 50MHz beacon GB3SIX by multi-hop sporadic-E on 3 successive days early in July" writes **David Newman** G4GLT, Leicester.

Following my report in our January issue that David heard ZS6RAC calling CQ on 50·100MHz c.w., I received a welcome letter from **Simon Poysden** ZR6AGN, who tells me that this is the call of the Rand Amateur Radio Club and in April they competed in the first of two v.h.f./u.h.f. annual contests. While operating from the QTH of Piet ZS6AQC and his XYL Riekje ZS6AQF, the club made 30 ZS contacts on the 50MHz band. Club members normally listen out on 50·099, 50·100 and 50·110MHz as well as 28·885 and 3·700MHz which is the Natal 50MHz back-up frequency. "RARC is a club which concentrates on generating and promoting interest in amateur radio" writes Simon and says their chairman ZS6AEU has demonstrated u.h.f., v.h.f.,

h.f., RTTY and SSTV gear for the club at various shopping centres and hobby fairs. Good luck to you all Simon, most of the clubs in the UK do their bit towards PR for amateur radio too. Readers hearing or working RARC club members should send their reports or QSL cards to RARC, P.O. Box 17501, Hillbrow 2038, Republic of South Africa.

At 2259 on July 13, David Newman worked crossband, 50/144MHz, with GD3ZEX who was at 100m at the top of a hotel overlooking the sea and David would like to thank the GD lads for taking part in the experiment. Our congratulations are due to David for a very comprehensive report, covering his study of the 50MHZ band between February 2 and July 31, which he has sent to the RSGB. This document, which I hope the society will publish in full, runs to eight A4 pages and covers such modes of propagation as auroral, meteor scatter, sporadic-E and tropospheric and gives credit to many other amateurs who took part.

Ted Waring received signals from the Gibraltar beacon ZB2VHF at 1730 on July 22 while experimenting with some 50MHz equipment which he is building.

The 28MHz Band

During the month preceding August 10, **Norman Hyde** G2AIH, Epsom Downs, heard or worked stations in Brazil, Denmark, East and West Germany, Hungary, Finland, Israel, Italy, Norway, Portugal, Romania, Spain, Sweden, Switzerland, USSR and Yugoslavia on 28MHz. He also reported short skip conditions on July 20 and 21 and for a couple of hours on the 24th. "The short opening on the 24th was notable for me because I had just erected a half-size G5RV antenna exclusively for 28MHz and the first QSO I had with it, was a station in Romania YO2CEQ, who gave me 59!" writes Norman.

Following my reference in our September issue to the strong GM signals during the short skip opening on June 17, **Jim Burke** GM4TNP, Glenrothes, tells me that between 1800 and 2100 on that day he worked 5 south coast G stations ranging from Devonshire to Kent, 4 GMs one of whom, GM4HBG, was QRP with 2·5 watts and ON5SD in Deinze. Jim had been out portable during the day using a Trio TS-130S and Hustler vertical mobile antenna on his Land Rover. When he arrived home he became involved in this opening and operated /P from outside his home for the evening. "Very little to offer on h.f. 28/29MHz, on the whole poor except odd days when European and UK activity was very strong due to short skip", writes **Bill Kelly,** Belfast. **Peter Lincoln,** Aldershot, wrote "There have been some sporadic-E signals in the month but some days I found the band completely dead". Very true Peter, I found the band dead on many days during the period of this report. "There was a remarkable short-skip event on 28MHz on August 4 and between 1800 and 1920, I heard EI, GD, GI and GM stations at 599 and I don't remember hearing them at such volume" writes Ted Waring who is a very consistent listener on the 28MHz band.

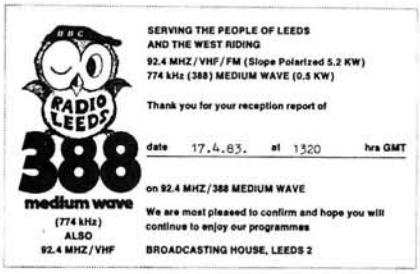

Fig. 2: Radio Leeds QSL received by Simon Hamer

28MHz Beacons

"There have been several short skip sporadic-E openings as shown by the reception of European beacons in the log" writes Norman Hyde, whose log, along with those of **John Coulter,** Henry Hatfield, **Edward Owen,** Ted Waring and I provided the information for this month's beacon chart, Fig. 1. Norman ran skeds with **Chris Rees** G3TUS/I6 near Ancona on 28·380MHz and made contact on July 13, 19, 20, 21, 23 and 29. "All six QSOs took place only on a day when the German beacon DK0TE was heard at this QTH" writes Norman who also pointed out that DK0TE is roughly on the same bearing and about two thirds the distance to Ancona. While in Italy, Chris has received signals from the 28MHz beacons in Australia VK2RSY, VK5WI and VK6IV, England GB3SX very strong at times even after dark, Germany DF0AAB, DK0TE and DL0IGI very strong, Hong Kong VS6TEN, New Zealand ZL2MHF and South Africa ZS5VHF and ZS6PW. Thanks to both Chris and Norman for their interesting work. Edward Owen, Malden, whose wireless operating dates back to the early 1920s, is very interested in 28MHz and in addition to his contribution to the beacon chart he heard ZS5VHF briefly at 1515 on July 25, LU1G on August 7 and on the 10th, ZS6PW was so strong that it was audible in his next room.

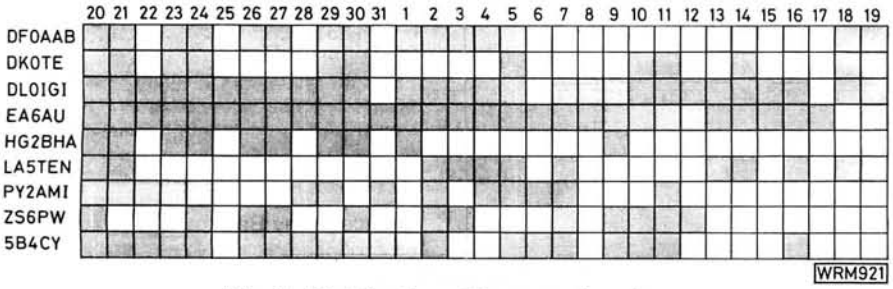

Fig. 1: Distribution of beacon signals

Amateur Satellites

Both John Coulter, Winchester and I logged the message "V Congrats to AMSAT OSCAR 10 successful operation from orbit de USSR Sputnik Group", from RS3A on 29·331MHz on August 10. However, while John used his ears and his skill as a c.w. operator, I read it the lazy way via my CW/RTTY reader and I believe that such instruments will help people like myself, with limited ability in using c.w., to better appreciate this mode of transmitting signals.

Sporadic-E

Many years of observation have shown that there are rapidly varying degrees of sporadic-E and during the more extensive disturbances, both **Harold Brodribb** and I received very strong signals from East-European broadcast stations which operate within their own countries, between 66 and 73MHz and normally have a limited range. An average of 21 such stations were counted during 12 normal sized events which took place on July 20, 23, 26 and 30 and August 1, 2, 5, 9, 11, 15, 16 and 17. During major events on July 21 and 29 and August 19, the numbers heard were 34, 35 and 47 respectively.

Tropospheric

Apart from about 50 hours around July 23 and 24 and approximately 30 hours on the 31st and August 1, the atmospheric pressure, measured at my QTH, hovered just above 30·0in (1015mb) from July 18 to August 19, peaking at 30·3 (1026) on the 20 and 29 and from August 3 to 9 the pressure was absolutely steady at 30·3, giving favourable v.h.f. conditions and frequent lifts throughout the period.

Early in July, **Simon Hamer** visited the Droitwich Rally and picked up a Daiwa Search 8 144MHz receiver. Then at 2200 on August 4 set the machine DXing and heard signals through the 144MHz repeaters GB3BX R2, MH and PW R3, VT R1, WH R2 and WR R0 and heard operators talking about the lift conditions. "144 MHz was very satisfying with access for long periods into the UK repeaters AR, AY, HI, MP and of course

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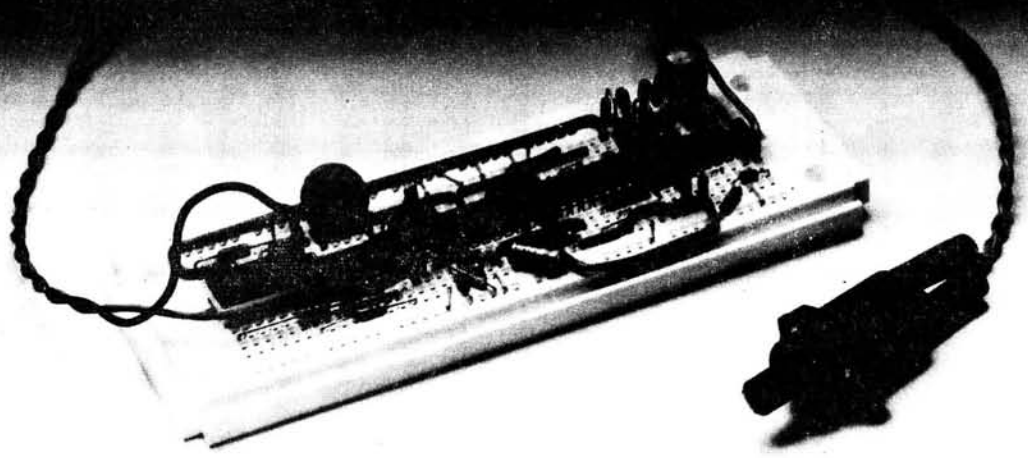

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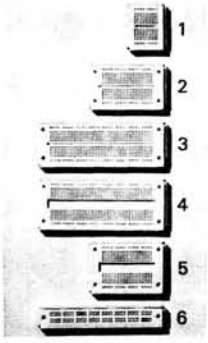

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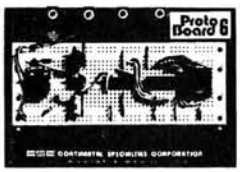

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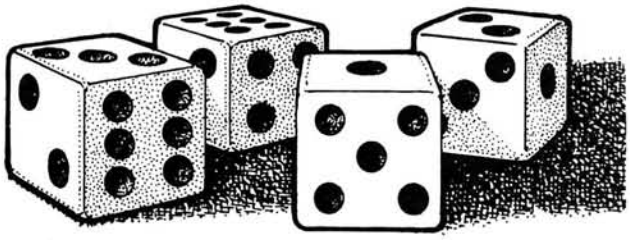

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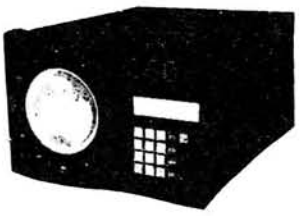

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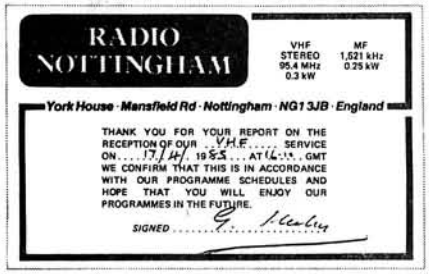
VISA

the Irish repeaters NI, LY and WT and EI7DAR and EI1DK", writes Bill Kelly, Belfast. He added, "We had many Cornish amateurs coming in to GB3NI and many others from the Midlands and North Devon". Bill also heard EI4AOB in Galway city working into EI7DAR and reported hearing GB3PW nearly 300 miles away.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SIGNED

Fig. 3: Radio Nottingham QSL received by Simon Hamer

Band II

One of my regular contributors, Simon Hamer, New Radnor, has received QSL cards acknowledging his reports from BBC Radios Leeds Fig. 2, Nottingham Fig. 3 and Germany's Norddeutscher Rundfunk from Steinkimmen, Fig. 4.

Late on the 29th, Simon heard BBC Radio York from Acklam Wold on 90·2MHz and ILR Capital Radio on 95·8MHz. Harold Brodribb logged 15 French stations in Band II on July 20 and 21, 8 on August 3, 12 on the 4th, 8 on the 10th, and Dutch stations on July 21 and August 10. "The 20th and 21st of July have been very good for v.h.f. Band II stations" writes **Denis Parkes,** Brighton. He heard stations from Belgium, France and Italy on the 20th and many French, one Belgian at 102·8MHz and ILR Radio Gwent from Newport, on the 21st. Denis has tapes of v.h.f. DX from continentals going back some 15 years and says that if anyone in the Brighton area is interested they are to contact him. To do this, drop me a line and I will send it on to Denis. I counted about 10 very strong continental broadcast signals between 87 and 100MHz during the evening of August 15 and during the preceding month I heard several complaints from domestic users about interference to their favourite BBC station.

At 0510 on July 14, **John Berridge,** Cardiff, heard a French station transmitting classical music with harpsichord and piano, at 0515 he heard Belgian, Dutch and German stations with pop music above 100MHz, a German transmitter just below LBC and French, Dutch and Spanish stations at the lower end of the band. John takes a Sanyo four-band, full-coverage receiver with a long-wire antenna and sets it up wherever his travels take him.

A report in the *Gloucestershire Echo* on June 27, under the heading Look You it's a TV freak, revealed that although some viewers in the Charlton Kings area had difficulty in getting Channel 4 they were at times receiving strong signals from Channel 4 intended for Wales which, an IBA spokesman said, was due to "freak signals" and coming from the Wenvoe transmitter. This prompted one of my readers, **John Williams,** to write to the editor and say that he regularly received Radio Cymru transmitted from Wenvoe on 96·8MHz in Charlton Kings. He also explained that under freak conditions he has heard v.h.f. f.m. signals from Spain's Radios Almeria, Castilia and Seville. Although there was no further interest in John's letter, a friend of his, local radio dealer **E.J. Fear,** remembered this letter and tuned to Radio Cymru on July 23 and was amazed to hear a Spanish station adjacent to it. Well done John, it always helps to use the press to tell the general public about these freak conditions and your own experiences.

RTTY

Although **Phil Hodson** G8RBY, Leicester, has made RTTY QSOs on 144MHz with stations in 10 countries covering 38 QTH locator squares, he still needs to make contacts in XM and YO squares if anyone can help. Phil was amused when his print-out showed that a German amateur he worked on 144MHz had given his occupation, a policeman and his QTH "the little village of Borstel".

Between July 20 and August 19, I copied signals from RTTY stations in 21 countries, CT2, DF, DL, EA, F, GI, HK, HZ, I, JH, KJ, LA, OE, OH, OK, SM, TG9, VE, VK, W and YV on 14MHz

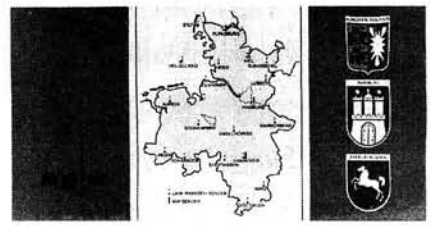

Fig. 4: German broadcast QSL received by Simon Hamer

(around 14·090MHz), 7 countries, DL, FM7, IT9, SL, W, YV and Y2 on 21MHz (around 21·090MHZ) and F6GSS/P on 28MHz (around 28·090MHz). My best DX on 14MHz was VK1RY and VK5RY on July 23 and the two-way QSO between JA3QBM and LA3WH on August 15.

"I have received a QSL card from 9V1UC, so the confirmed total in the RTTY mode is slowly going up" says Peter Lincoln, who, in addition to the European countries he usually logs, copied RTTY signals from EA9JZ, KJ2O, KV4BQ, TF3IB and 5B0CV, a special World Communications Year call, during the month before August 14.

In November and December the BARTG will be running cumulative contests on Monday evenings on 432MHz to increase RTTY activity in this band. Readers who are not members of BARTG and have not seen the group's summer newsletter can get more information by sending an s.a.e. to Ted Double, 89 Linden Gardens, Enfield, Middlesex EN1 4DX.

Tailpiece

Congratulations to Susan Beech, Dollar, who passed both the RAE and Morse test and with her callsign GM4SGB has already worked stations on 144MHz in 41 QTH locator squares and 13 countries, all with 10 watts from an IC-290 at her QTH 170m a.s.l. During the sporadic-E openings on June 17, Susan worked DL1MBV and DJ8QP, on the 21st HG8CE, on July 7 EA3BRC and EA9AAW, and on August 9 EA4QR plus a few PAs.

TELEVISION *by Ron Ham BRS15744*

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

"From Norway to Portugal and Russia to Yugoslavia, what more could a Welsh TVDXer want?" asks **Simon Hamer,** who like us all has been wallowing in the sporadic-E, with a little tropo to make life even more interesting.

Sporadic-E

I sensed the excitement in each of your letters about the mid-summer sporadic-E disturbances which have given us all a great deal of pleasure from our television gear. "This year has been absolutely fabulous for sporadic-E resulting in really excellent video from many countries", writes **Major Rana Roy,** Amritsar, India. He received Band I pictures from China on May 1, Fig. 2, the USSR on May 30, Fig. 3 and an Arabic station on June 1,

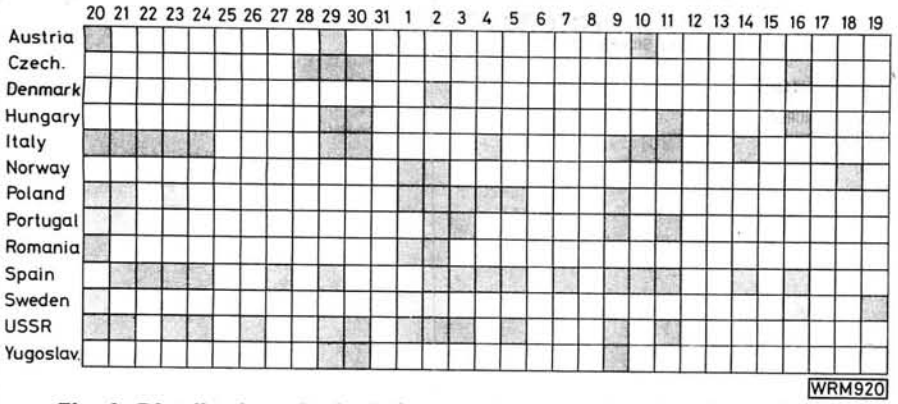

Fig. 1: Distribution of television signals received during Sporadic-E disturbances

Fig. 4. He adds, "I also saw a feature film in English with Arabic captions and American cartoon films like *Donald Duck, Popeye* and *Tom and Jerry,* from an Arabic station on Ch. 2. "On July 17, Band I was really open and many signals were pounding through", writes **Alan Taylor,** Coventry who reports "within the span of 5 minutes I found five different 'Norge' test cards, which just about sums up the band". I see from your log, Alan, that the five named were Hadsel, Hemnes, Melhus, Steigen and Televerket, which, I understand is used when the transmitter is being serviced. Alan's wife Julie and his father, another Alan, are also TVDXers and between them they sent me a very impressive sporadic-E log. On July 20, **David Newman,** Leicester, saw a puppet show on Ch. R1 49·75MHz, which he is sure was coming from Romania. Also Simon Hamer and I logged the German ARD Grunten test card on Ch. E2 48·25MHz, as well as various other stations listed in Fig. 1, which was compiled from the information in the logs I received from **M.C. Bennett, Harold Brodribb, Iain Dunworth,** Simon Hamer, **Fraser Lees,** David Newman and the Taylor family.

"At 0920 on July 21, I received a weak but steady test card from JTV Amman, not only the best DX of the month but the best reception via sporadic-E I have received yet", writes **David Hackwell,** Warrington. He was also pleased to receive pictures from East Germany, especially a children's TV caption from DDR, Fig. 5. Harold Brodribb, St. Leonards-on-Sea, received RTVE Aitana on the same day, and on the 22nd RTVE Gamoniteiro, while on the 23rd, Alan Taylor saw both signals. Following his report, Simon Hamer received a QSL letter from Mr Sverrir Olafsson, technical manager of RUV Iceland who explained that the word "Frettir" means "News Cast" and "Dagskra Kvoldsins" is "The Evenings Programmes."

At 1324 on July 30, I saw test cards from Yugoslavia JRT labelled BGRD and then ZGRB1 on Ch. E3 55·25MHz, with a digital clock showing 1424. At 1830 on August 16, while a YL presenter was giving Russian weather information, pictures of cities appeared on the screeen with the names CNOPT, MNHCK and MOCKBA, accompanied by temperatures, superimposed on them. On July 8, M.C. Bennett, Slough, saw the Telediario 2 caption with a digital clock, followed at 2155 by adverts such as in Fig. 6.

From your letters I see that you have seen programmes on a very wide range of subjects from many countries. I know that your comprehensive reports are of great help to other readers—especially the captions. Do bear in mind that the spelling of these words is as near as possible because often they only appear on the screen briefly or the signal fades at the vital moment. This month you have received such captions as: AK, BPEMR, CNOPT, HIRADO, HOBOCTON, MbBOB, NPORPAMMA, NRK, PANON KARONKA, PNrA, PREZWRA, TACC, TB CCCP, TELEWIZJA POLSKA, TP TV Reklam and ZDF Teletext.

Amateur Television

My opposite number in our sister magazine *Television,* **Roger Bunney,** using a Labgear CM7060 u.h.f. preamplifier into a Fortop 435/600 converter for ATV, received pictures from F6AGY in Boix, Fig. 7, at 530km around 0200 on July 16. He has also seen signals from F1EDN in Le Havre and G6MPE in Brighton.

Tropospheric

"Around July 13 and 14, conditions on bands IV and V were nothing short of spectacular" writes **Martin Messias** G4JCN, London. He is equipped with a JVC CX610 GB receiver, Antiference XG8 antenna, on his balcony, rotated by hand and a Ferguson 3V30 Video recorder on which he recorded pictures from Belgium on Ch. 25, Fig. 8 and France Ch. 45, Fig. 9, on July 13 and Germany Ch. 54, Fig. 10, on the 14th. Martin's camera settings range from 0·25 seconds at f5.6 to 1 second at f11 using FP4 film. Thanks for that gen Martin, readers often ask about camera settings.

From 2230 on the 29th, **Steve Green,** Malvern, watched a gardening programme on BBC1 North from Belmont on Ch. 22, and *Shelley,* on Yorkshire from Belmont on Ch. 25. Like Simon Hamer saw Tyne Tees TV from Bilsdale on Ch. 29. While Band III was open on August 10, Steve received pictures from Denmark on Ch. E8 and when he checked Band V he saw a documentary about an African tribe from Germany WDR 3 on 5 different frequencies. At 2210 he watched the news on ARD and at 2145 *Nos Journal* read by Fred Emmer on Nederland 2. Fraser Lees, Ringmer, received pictures from Belgium on Chs. 8 and 10, Holland Ijsselstein and Smilde on Chs. E4 and E6 respectively and Germany DDR on Ch. E6 and ARD/ZDF Ch. 8, on July 28. I logged Nederlands PTT-NED 2 around 0820 on both the 30th and 31st on Ch. E5.

While on the Sussex Downs around 1700 on August 19, using a TVR5D with its own rod antenna, I saw the negative image of the French TV caption FR3 and strong pictures from French stations on several spots between Chs. 21 and 30.

SSTV

In addition to the usual European SSTV signals logged by **Peter Lincoln,** Aldershot, during the month prior to August 14, he also copied a few pictures from North America and a CQ call from LA4R, Fig. 11, thus adding Norway to his list of countries seen on slow scan television.

Other Stations

The TVDX station of M.C. Bennett comprises a Plustron TVR5D, Labgear Tele-Verta and a Waltham receiver and a wide-band dipole on the roof for Band I, and he is delighted with the results from such a simple antenna.

Down in Cornwall, Iain Dunworth uses a Plustron TVRC5D (model with cassette recorder) with a dipole for Band I and has plans to install a Wolsey Colour King antenna for Bands IV and V.

Ray Howgego G4DTC, Caterham, became interested in DXTV after reading an article in *Radio Constructor* by Charles Rafarel back in1962, and using a Bush TV56, Ray and his XYL, by careful fiddling of the line and height controls, found they could get consistent signals from Caen. Ray used an ex-RAF RF24 unit and an R1155 communications receiver for the sound. This equipment was followed with a modifed Bush TV125 and now they have a Philips 326. "My interest has been largely confined to Band I for which I use a Mullard Varicap Band I/III tuner feeding into the i.f. strip of the Philips", says Ray. He also has a simple dipole for Band I and during the past 15

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BU03	PL259 for 0·2in cable (UR43)	0.62
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BU15	SO259 inline socket for UR43	0.65
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BU22	SO259 back to back male	1.32
BU23	SO259 elbow male to female	0.98
BU24	Double female single male 'T' coupler	1.35
BU25	Triple female 'T' coupler	1.55
BU26	Female to female lightning arrestor	1.12
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BU29	Chassis mount back to back female	0.98
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BU36	UHF male to N female	2.93
BU37	UHF female to N male	2.93
BU38	UHF female to N female	2.65
BU39	UHF female to phono/car aerial male	0.65
BU40	UHF male to phono female	0.65
BU41	UHF female to 3·5mm jack plug	0.68
BU42	SO259 to push on PL259 adaptor	0.85

★★ Also see BNC adaptors ★★

BNC CONNECTORS

		Price
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BB01S	For 0·2" cable (UR43)	0.98
BB02S	For 0·25" cable (UR90)	1.05
BB03S	Elbow for 0·2" cable (UR43)	N/A
Sockets		
BB11S	Chassis mount 4 fixing hole type	0.98
BB12S	Single hole long thread type	0.96
BB13S	Single hole short thread type	0.90
BB14S	Inline socket for 0·2" cable (UR43)	0.99
Couplers		
BB21S	Back to back female	1.24
BB22S	Back to back male	1.90
BB23S	Elbow male to female	2.17
BB24S	Double female single male 'T' coupler	2.61
BB25S	Triple female 'T' coupler	2.34
BB26	Back to back female chassis mount	1.36
Adaptors		
BB31	BNC male to UHF male	1.63
BB32	BNC male to UHF female	1.29
BB33	BNC female to UHF male	1.45
BB34	BNC female to UHF female	1.15
BB35	BNC male to phono female	0.95
BB36	BNC female to phono male	0.95
BB37	BNC female to 3·5mm jack plug	1.15

★★ Also see 'N' type adaptors ★★

BL01	30 Watt dummy load PL259 connector	6.80
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BN04S	For 0·55" cable (UR83 & RG14/U)	2.93
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BN12S	Chassis mount 2 fixing hole type	1.58
BN13S	Single hole fixing type	1.25
BN14S	Inline socket for UR67 cable	2.05
BN15S	Inline socket for UR43 cable	1.86
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BN22S	Back to back male	2.73
BN23S	Elbow male to female	2.54
BN24S	Double female single male 'T' coupler	3.75
BN25S	Three female 'T' coupler	3.05
Adaptors		
BN31S	N male to BNC male	N/A
BN32S	N male to BNC female	2.05
BN33S	N female to BNC male	1.95
BN34S	N female to BNC female	1.63

★★ Also see UHF adaptors ★★

BC01	Solderless inline splicer for UR43	0.45
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C	2·20Ah	2.40	2.30	2.20
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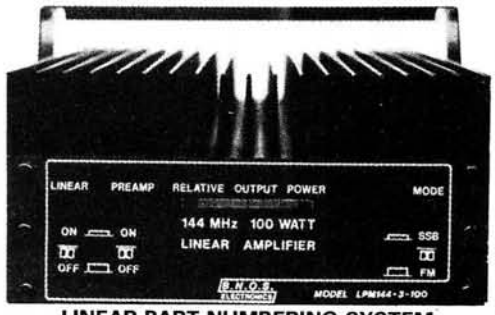

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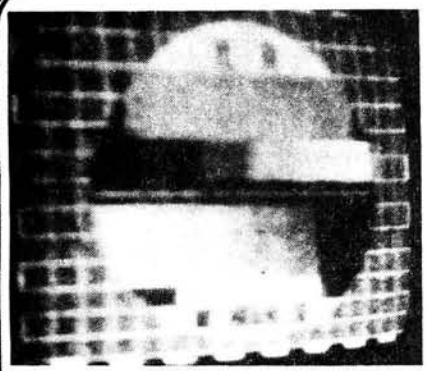

Fig. 2: Test card from China
Major Rana Roy

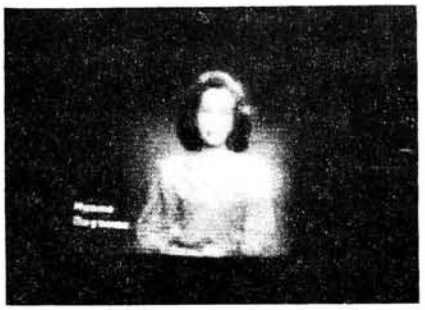

Fig. 3: Russian newscaster
Major Rana Roy

Fig. 4: Arabic announcer *Major Rana Roy*

Fig. 5: East German caption
David Hackwell

Fig. 6: Television advertisement
Iain Dunworth

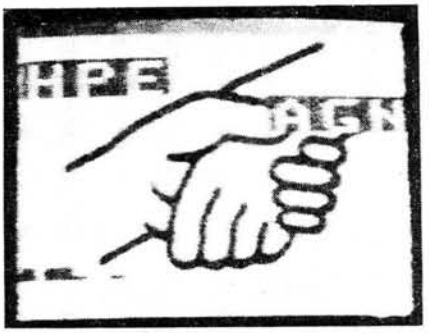

Fig. 7: ATV picture from F6AGY
Roger Bunney

Fig. 8: Belgian TV ..... *Martin Messias*

Fig. 9: TVDX picture .... *Martin Messias*

Fig. 10: TVDX picture .. *Martin Messias*

Fig. 11: SSTV picture .... *Peter Lincoln*

Fig. 12: QSL received by Simon Hamer

Fig. 13: Russian football results
Steve Green

years has received pictures from virtually every European and near Russian station on the air.

Can anyone help Ray in finding a source of supply of BF272 transistors which he has used in the past to build low-noise pre-amplifiers for DXTV and found them exceptionally good for the job.

on the air

After moving to a new QTH some 170m a.s.l. in Malvern, Steve Green was delighted with his television reception especially as he can only use his 67-element u.h.f. array, 13-element Band III Yagi and coaxial dipole for Band I, indoors. At 1800 on July 1 a Russian clock appeared on the screen of his Sharp colour set showing 2100 which was followed by their news, sport (Fig. 13) and weather on Chs. R1 and R2 59·25MHz and since he has seen most of the stations listed in Fig. 4.

In reply to his report, Simon Hamer has received a QSL card from the German station ZDF (Fig. 12), confirming his reception of their pictures on Ch. 37 during the tropo opening on 26 September, 1982.

David Burke, London, uses a Sony TV122UK and Hitachi K2400 receivers for DXTV and with the aid of an antenna amplifier/splitter, he can view the DX on the Sony and tune in the sound on the Hitachi. While in Ramsgate for a few days around August 15, he watched some interesting programmes, including a documentary on computers, from Belgium BRT TV1 on Ch. 43 and Holland, Nederlands 1 and 2 on Chs. 29 and 32 respectively. David also has an Antiference XG8 antenna and Labgear 7065 amplifier ready for use.

Swap Spot

Have Sentinel Auto 432MHz pre-amplifier. Would exchange for similar for 144MHz. G3ARU, QTHR or Tel: 01-989 3196. *T327*

Have Ford Corsair 1600cc, V4 and m.o.t. until July 1984, good condition. Also Star SR200 receiver 1·8MHz–28MHz in good working order. Would exchange for h.f./v.h.f. transceiver, anything considered. Tel: Fleetwood 70743. *T348*

Have Hammarlund HQ100A-RX, 540kHz–30MHz, a.m., s.s.b., signal meter, a.f. and r.f. gain, a.v.c., b.f.o. and frequency multiplier in excellent condition (1960s). Would exchange for very good a.t.u. 500kHz–30MHz for RCA88 and long wire or trap dipole for 14MHz–3·5MHz. 117 Avon Way, Colchester, Essex. *T361*

Have Minolta SR7 f1·4 plus 80–210 zoom, extension tubes, 3X converter, capacitor electronic flash, remote cable release. Would exchange for h.f. band transceiver FT-101E or equivalent. W. D. Hughes, 8 Coape Road, Stockwood, Bristol BS14 8TN. Tel: 833296. *T363*

Have Daiwa Search 9 144MHz receiver with Microwave Modules pre-amp and home-brew power pack. Would exchange for Vega 206 or similar receiver in working order. Ellis, 41 Brooke Road, Princes Risborough, Bucks. Tel: 7243. *T376*

Have Nems Clarke RX and separate extension unit 60–450MHz, Candian 58 set and p.s.u., Ultrasono 'scope monitor 'scope, Collins monitor head. Would exchange for mobile h.f. gear or solid-state RTTY equipment w.h.y. Tel: 231639 (Peterborough). *T375*

Have Datong Doppler r.f. direction finding equipment with four 27MHz magmounts. Would exchange for transistorised h.f. general coverage receiver, MMT 432/144R transverter, Reftec 934MHz transceiver or w.h.y. Fincher, 11 Chapel Street, Tring, Herts. Tel: 5087. *T381*

Have DX200 h.f. communications receiver, FC5M digital frequency counter, Tamiya Superchamp, Acoms 2-channel radio, NiCad rapid charger. Would exchange for 144MHz transceiver or v.h.f./u.h.f. scanner. A. Southby, 25 Parkhill, Church Crookham, Hants. Tel: Fleet 3965. *T395*

Have Yaesu digital receiver FR-101DD plus 50MHz and 144MHz plus f.m. Also Teac U9 cassette deck, DBX222 plus 30 tapes and National Panasonic TRS65G 5in TV. Would exchange all or part for w.h.y. D. Fenney, 98 Hanover Gardens, Hainault, Essex. Tel: 01-500 5395. *T398*

Have HRO, coils, p.s.u., BC348, medals and metal military models. Would exchange for c.w./RTTY to TV convertor, Digital readout frequency converter, 144/28MHz converter, Datong FL2, a good a.t.u. etc. Tel: Milton Keynes 314095 (after 3pm). *T403*

Have Realistic DX200 RX (150kHz–30MHz) also Zenith 35mm Photo Sniper outfit complete in case (mint) plus tripod. Would exchange for Realistic DX302. D. P. Harris. Tel: Pontypridd 400616. *T411*

Have Telequipment oscilloscope, model S22, portable with home-made probes. Also working, but battered, 19 Set and power supplies. Would exchange for working, clean KW2000A or B or similar h.f. transceiver. E. Naylor, 33 Attlee Road, Cheadle, Staffs. Tel: 756396. *T412*

Have Sinclair ZX81 computer plus accessories. Would exchange for short-wave receiver. Kendall, 4 Howlets Terrace, Chelmondiston, Ipswich, Suffolk. *T414*

Have Sony KV1400 UB colour portable and Casio 7000 stereo keyboard, both as new. Would exchange one or both for the following: 2 or 3-element Triband beam or 5-band vertical and Yaesu FL-2100Z linear amplifier. Steve. Tel: Cumbernauld 20038. *T417*

Have CB rig—York JCB f.m., brand new and boxed with mobile antenna, cost £75. Would exchange for clarinet with cash if necessary. Also 80 radio amateur magazines for anything radio. Tel: 0274 728219 (Bradford). *T419*

Have Alta-1 indoor u.h.f. TV antenna amplifier, KU700 a.c. mains operated, also Tandy 9V pocket l.c.d. calculator EC202, both as new, no longer required. Would exchange for general coverage preselector (assembled) as described in PW Jan '83. Ekisler. 01-959 7715. *T420*

Have S27 Hallicrafters RX 27–145MHz, overhauled and in good condition. Collectors item and value £70. Would exchange for good a.t.u. or Datong FL2 filter. Also require digital add-on frequency readout. Tel: Milton Keynes 314095. *T427*

PW "SWAP SPOT"

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A FEW SIMPLE RULES: Your ad. should follow the format of those appearing above; it must be typed or written in block letters; it must be not more than 40 words long including name and address/telephone number. Swaps only—no items for sale—and one of the items MUST be radio related. Adverts for ILLEGAL CB equipment will not be accepted.

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20 pin	1605	.18
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24 pin	1607	.24
28 pin	1608	.27
40 pin	1609	.30

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5V	78L05	.28
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15V	78L15	.28
18V	78L18	.28
24V	78L24	.28
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15V	79L15	.55
18V	79L18	.55
24V	79L24	.55

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15V	MVR7815	.40
18V	MVR7818	.40
24V	MVR7824	.40
NEG −	**Order No.**	**Price Ea**
5V	MVR7905	.50
12V	MVR7912	.50
15V	MVR7915	.50
18V	MVR7918	.50
24V	MVR7924	.50

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Element	1969	£2.10

FOR MODEL C250

3/32" (2.3mm)	1949	£0.65
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Element	1952	£1.80

FOR MODEL MLX Order as Model SX
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Com Cathode RED	1588	£1.00
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Com Cathode YELLOW	1590	£1.10

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R/H decimal point

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Com Anode GREEN	1592	£1.10
Com Anode YELLOW	1593	£1.10
Com Cathode RED	1594	£1.00
Com Cathode GREEN	1595	£1.10
Com Cathode YELLOW	1596	£1.10

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Ten LED elements housed in 20 pin package to form a compact linear bar display. Can be end stacked to create bargraphs of various lengths.

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IF = 20mA RED 1.6V
GREEN 2.7V
YELLOW 2.4V

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	GREEN	1568	.23
	YELLOW	1575	.23
	SQUARE		
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	GREEN	1569	.23
	YELLOW	1576	.23
	TRIANGULAR		
	RED	1563	.20
	GREEN	1570	.23
	YELLOW	1577	.23
5mm RANGE	**RECTANGULAR**		
	RED	1564	.20
	GREEN	1571	.23
	YELLOW	1578	.23
	CYLINDRICAL		
	RED	1565	.20
	GREEN	1572	.23
	YELLOW	1579	.23
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	RED	1566	.20
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P772 2 pole connector mates with P782. 6A 250V.AC	1633	£1.42
P597 connector mates with P590. 10A 250V.AC	1635	£1.10
P587 connector mates with P580 & P579. 6A 250V.AC	1636	£1.06
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200V	BR2/200	.40
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400V	BR10/400	1.90

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VRRM	Order No.	Price Ea
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ELECTROVALUE

Oct. 1983

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INDEX TO ADVERTISERS

A.D. Electronics 92
A.H. Supplies 86
Allweld Engineering 10
Amateur Electronics U.K. 8,9
Amateur Radio Exchange 11
Ambit International 96
Amcomm Services 73
Ant Products 74
Antex ..... Cover 3
Armon Products 89

Bi-Pak 85
Birkett, J. 87
Blackstar Ltd. 89
B.N.O.S. Electronics 81
Bredhurst ..... Cover 2
British National Radio & Electronics School 30,86
Butterworths 93

C-Tec Security 94
C.Q. Centre 95
C.R. Supply Co. Ltd. 90
Cambridge Kits 93
Caranna, C. 92
Colomor Electronics 44
Cricklewood Electronics 86

Datong Electronics 95
Davtrend 82
Dewsbury Electronics 30

Electronics Mail Order 91
Electrovalue 86
Enfield Emporium 24

Garex Electronics 62
G2DYM Aerials 91
G40GP Electronics 30
Gemini Communications 70
Global Specialties Corporation 77
G.T. Technical Services 92
Greens Telecom 89

H.A.C. Shortwave Products 94
Howes, C.M. Communications 89

I.C.S. Electronics 44
I.C.S. Intertext 87
I.L.P. Electronics 12,13
Institute of Electronic Learning Systems 91

Lee Electronics 29
Leeds Amateur Radio 82
Leicester Amateur Radio Show 16
Lewis & Betts 10
Lexton, H. 79
Lowe Electronics 2,3

Maplin Electronics ..... Cover 4
Marlborough Electronics 90
Metal Fayre 62
M.H. Electronics 92
Microwave Modules 70
Mitsubishi Power 94
MuTek 87
Myers Electronics 90

Northampton Communications 96

P.M. Components 24
P.N.P. Communications 90
Photo Acoustics 43
Powell, T. 94
P.R. Golledge 90
Proto Design 92

Quartzlab 86

Randam Electronics 89
R.S.T. Valve 95
Radio Components Specialists 92
Radio Shack Ltd. 69
Radsoft 91

Scarab Systems 74
Scientific Wire Co. 92
Selectronic Services 10
S.E.M. 74
South Midlands Communications 4,5
South Wales Communications 22,23
South West Aerials 91
Spectrum Communications 87
Stephens-James Ltd. 44

Thacker, A.H. 62
Thanet electronics 6,7,82

Wallen, Les. Mfg. 24
Ward, Reg. 93
Waters & Stanton 61
Western Electronics 14,15
Wood & Douglas 93

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Oscilloscope Probes
PCB Aids
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Rotary Switches
Screwdrivers
SCRs
Semiconductors
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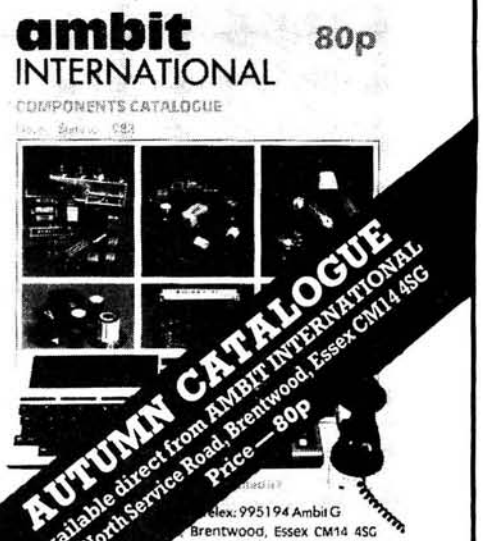

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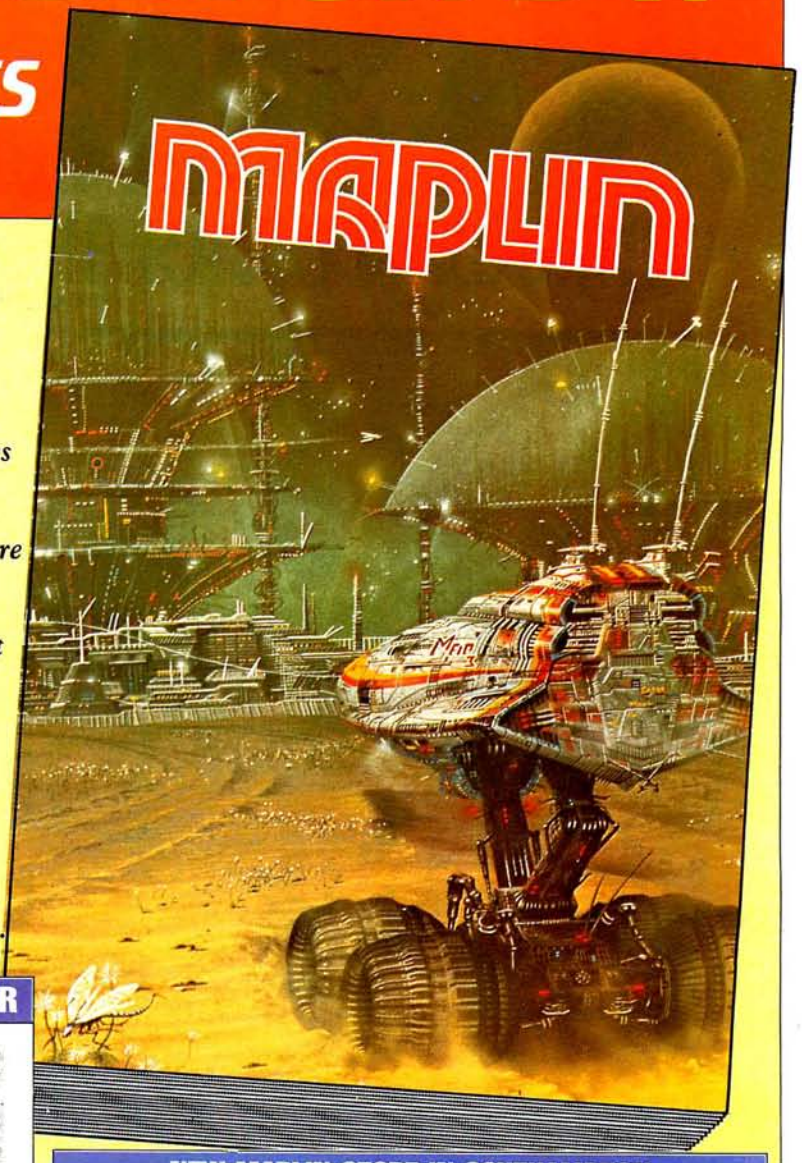

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